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The New York Sun and other papers are doing good work in stirring up the Brooklyn Bridge Trustees to the necessity for better and greater transportation facilities. A bill has been reported at Albany to provide for better terminal facilities, the plans to be submitted to a board of three experts. The plans first described in the ENGINEERING AND MINING JOURNAL are evidently receiving general approbation. No one has yet brought forward any serious criticism of them, and no better or less expensive plan has been suggested. There should be no delay in providing the increased capacity so urgently needed.

We have elsewhere referred to the severe criticism by Professor UNWIN of the reported tests of the economy of the Thornycroft water-tube boiler, which was claimed by Professor KENNEDY to have "beaten the record" by evaporating 13.4 pounds of water per pound of coal. We find that a new American boiler, of a somewhat similar type to the Thornycroft, known as the Morrin boiler, has a published record just a little better, or rather a little more unworthy of belief—13.44 pounds of water, from, and at 212 degrees, per pound of combustible. The test was said to have been made with a mixture of soft coal and culm, costing less than \$2.50 per long ton. The head of one of the largest boiler concerns in this country recently said that any boiler test which shows an evaporation of much over 12 pounds of water per pound of combustible is unworthy of belief. An evaporation of 12 pounds from and at 212 degrees is 80 per cent. of theoretically perfect performance, and it allows only 20 per cent. to cover

all the losses due to heat carried away in the chimney gases, to imperfect combustion and to radiation. This is about all that can be expected, and much better results are not possible.

TEST OF A COMPOUND LOCOMOTIVE.

A compound locomotive was recently built by the Michigan Central Railroad, and tested in competition with a simple engine of same general type. The results are apparently strongly in favor of the compound engine. Both engines were of the ten-wheel type, having six coupled driving wheels, 68 inches diameter, and a four-wheel leading truck. The compound engine had cylinders 24 x 24 inches and 29 x 24 inches. The simple engine had cylinders 19 x 24 inches. With passenger trains, the simple engine consumed 13.6 per cent. more coal and 13.9 per cent. more water than the compound engine. With heavy freight trains, the simple engine used 18 per cent. more coal and 27.5 per cent. more water than the compound. With fast express trains, the compound showed a saving of 23.5 per cent. of coal and 13 per cent. of water over the simple engine.

This compound engine is the third which has been tested in this country, the first having been the Webb engine, imported from England by the Pennsylvania Railroad, and the second was built by the Baltimore & Ohio Railroad. No official reports have yet been made of the performance of these engines.

THE BEARS' NEST, ALASKA, SWINDLE, AND WHO PROFITED BY IT.

In the ENGINEERING AND MINING JOURNAL of November 2d, 1889, we gave under this title a brief history of this now notorious swindle, and in citing the names of the chief beneficiaries of the fraud we said, "we trust we shall yet be able to announce that some, at least, of those who have profited by this swindle, but who, we believe, were innocent of any complicity in it, have, like honorable men, refunded the share they have received of the ill-gotten 'boodle.'" Since this was published, it was brought to the attention of the several parties named, and we greatly regret to say that not one of them has shown himself to be "an honorable man," but on the contrary they have all held on to their ill-gotten gains and have become accomplices in the swindle after the fact, and have thus become morally as dishonorable and dishonest as though they had planned and carried out the nefarious transaction from the beginning.

These several beneficiaries of the swindle who have declined to make restitution of the money are JAMES, and it is said JOHN, TREADWELL, of San Francisco; N. A. FULLER, at that time superintendent of the Treadwell mine and mill, where the ore was "salted," and is credited with being the moving spirit in the swindle. F. O. DOWNING, of Portland, Ore., was also one of the original owners of the property, and therefore profited by the transaction. For some unknown reason he has since been made secretary of the English company that owns the mine. P. MURRAY, of San Francisco, and Dr. FULLER were the agents who went to London to carry out the sale. Capt. JAMES CARROLL, of the Pacific Coast Steamship Company, is said to have been interested in the sale.

It is with great regret that we have to admit that not one of these several so-called reputable gentlemen has declined to profit by a barefaced swindle, and we can see no difference in culpability between those who are accessories after the fact and those who planned and carried out the fraud.

R. M. BRERETON, the chief English expert who received \$10,000 for examining the property, and who allowed himself to be deceived and his clients to be swindled, was, until the collapse, acting as manager of the company at a high salary, and though a man who possessed in England a high reputation, he has shown no disposition to refund the unearned and undeserved profits his connection with the unfortunate enterprise brought him.

T. E. GREGORY and E. J. DOWLING, the other, minor, English experts, are not supposed to have profited beyond the receipt of a fee for examining the property. The injury their careless and incompetent work has done them professionally has been their severe punishment.

We have already mentioned the methods by which the drill core was "salted," and the amount (about \$1,000,000) of which the vendors and their agents defrauded the English company.

The following is the financial history of the enterprise:

The vendors created the Alaska Gold Company of Oregon to represent this property on Douglas Island, having a nominal paid-up capital of \$2,500,000; and thereupon they proceeded to float bonds amounting to \$1,500,000, employing for this purpose a well-known firm in London, and paying to the same firm as a commission \$500,000 of the above stock of the Company for floating such bonds, at a discount of 25 per cent.; and as a further inducement to investors in such bonds, they gave a bonus of the balance of the stock of said company equal to 80 per cent. of the face value of the bonds.

The said firm then obtained the assistance of other parties in London, Liverpool and Hamburg in selling these bonds to their clients, which agents received their proportion of the said \$500,000 commission.

In August, 1889, a market had been created for this "Bonus" stock,

and the shares were sold in Hamburg as high as 59s. 6d. a share, at or about the time when it was known that the mine was valueless, and under grave suspicion that it had been "salted" in the most wholesale and skillful manner by the vendors.

The German parties have since employed three experts to thoroughly examine the mine, and have since caused it to be rumored that the property is not worthless, as was represented in August last, and that good ore had been obtained. We have reliable information from competent persons who have examined these recent workings, and have had assays thereof made, and we are assured that the ore disclosed will not average one dollar a ton.

The vendors do not care, because they feel themselves protected by the fact that the bonds were sold, not by them, but by the parties to whom they had given the \$500,000 commission, and also by the fact that the bondholders, who hold also a larger amount of the company's stock than is lawful for them to hold under the alien act, cannot legally obtain any redress in the United States courts. This unfortunate position of the bondholders could scarcely have existed had they been previously informed that the London and Hamburg agents for the sale of the bonds were subsidized agents for the vendors.

THE PROPOSED SILVER BILL.

The Republican Senate Caucus Committee, which represents the majority of the Senate, has agreed upon the following silver bill, which accordingly stands a chance of passing.

SECTION 1. That the Secretary of the Treasury is hereby directed to purchase from time to time silver bullion to the aggregate amount of 4,500,000 ounces of fine silver in each month at the market price thereof, not exceeding \$1 for 371.25 grains of pure silver, and to issue in payment for such purchases of silver bullion treasury notes of the United States to be prepared by the Secretary of the Treasury in such form and of such denominations, not less than \$1 nor more than \$1,000, as he may prescribe, and a sum sufficient to carry into effect the provisions of this act is hereby appropriated out of any money in the treasury not otherwise appropriated.

SEC. 2. That the Treasury notes issued in accordance with the provisions of this act shall be redeemable on demand in lawful money of the United States, at the Treasury of the United States, or at the office of any Assistant Treasurer of the United States, and when so redeemed may be reissued, but no greater or less amount of such notes shall be outstanding at any time than the cost of the silver bullion then held in the Treasury purchased by such notes; and such Treasury notes shall be receivable for customs, taxes, and all public dues, and when so received may be reissued; and such notes, when held by any national banking association, may be counted as a part of its lawful reserve, provided that upon the demand of the holder of any of the Treasury notes herein provided for, the Secretary of the Treasury may, in his discretion and under such regulations as he may prescribe, exchange for such notes an amount of silver bullion which shall be equal in value at the market price thereof on the day of exchange to the amount of such notes.

SEC. 3. That the Secretary of the Treasury shall coin such portion of the silver bullion purchased under the provisions of this act as may be necessary to provide for the redemption of the Treasury notes herein provided for, and any gain or seigniorage arising from such coinage shall be accounted for and paid in to the Treasury.

SEC. 4. That the silver bullion purchased under the provisions of this act shall be subject to the requirements of existing law and the regulations of the Mint service governing the methods of determining the amount of pure silver contained, and the amount of charges or deductions, if any, to be made.

SEC. 5. That so much of the act of Feb. 28, 1878, entitled "An act to authorize the coinage of the silver dollar and to restore its legal-tender character" as requires the monthly purchase and coinage of the same into silver dollars of not less than \$2,000,000 nor more than \$4,000,000 worth of silver bullion is hereby repealed.

SEC. 6. That this act shall take effect thirty days from and after its passage.

This bill appears to us to be a dangerous one in many respects. In the first place it increases the purchases of the government far beyond the total production of silver in this country. During the calendar year 1889, the entire amount of silver offered to the government was about 47,000,000 ounces, yet this bill requires the Secretary to buy 54,000,000 ounces at a cost of about \$70,000,000—for there can be no doubt that the price of bullion would quickly go to \$1.29²⁵/₁₀₀ an ounce. The ten refining companies which handle 99-100 of our silver product, would fix absolutely the price the government would have to pay; and as there is no provision whatever for restricting purchases to silver produced by our own mines foreign speculators would also be the beneficiaries of this insane policy.

What would be done with the vast volume of currency thus created? The experience and statistics of the Treasury department show clearly that not more than about \$20,000,000 of silver a year has been absorbed under the present plan, where \$24,000,000 or \$25,000,000 were purchased annually. The natural result of the proposed excessive issue will be to inflate values, to the injury of the poor, who have everything to buy and nothing to sell. Also the large notes will come back into the Treasury in payment of government dues, thus cutting off the gold revenue. These notes will be re-issued in government payments; but how are they then to be redeemed? Certainly not in gold, for we have not enough free gold in the Treasury to redeem one year's issue of these notes.

The very fear of such legislation as that proposed is already driving gold out of the country; \$63,000,000 in gold bars were taken away last year. Another such year will take all our free gold. Between August 1st, 1889, and March 1st, 1890, our exports of merchandise exceeded our imports by \$125,000,000, and yet less than \$4,000,000 in gold has come in to pay for it. Our "securities" of one kind or another are coming back, and when the balance of trade does not pay for them, gold will go out.

The new issue of notes must necessarily be redeemed in silver dollars, and they will then be at a discount, as compared with gold. Our financial system will then be on the single silver basis. *Facilis decensus Avernii.* We shall then hear a howl from one end of the country to the other that we

are being plundered by England and other gold basis countries, as our "orators" are now so fond of saying India is being plundered.

No wonder the London *Times* chuckles in its financial article to-day in this fashion:

"America is practically committed to an open adoption of the silver standard at a not very remote date. That is an odd position for one of the richest nations of the world to occupy, but only a currency fanatic will allege that it is necessarily bad for America, though possibly when the full consequences of the situation are perceived Americans may not altogether like them. In the immediate future the measure, if passed, will doubtless be popular."

No doubt England has everything to gain by our silver policy. It plays into her hands beautifully, but surely our legislators are not all blind to the incalculable injury it would bring to this country.

The WINDOM bill, though not without its drawbacks, as we have pointed out, was free from the dangers of the proposed caucus bill, and would be an infinitely safer and better measure. Senators and Congressmen must now assume full responsibility for their acts in this matter, and, appreciating this, they should not be led astray by the wild "demands" of irresponsible politicians. The safety and welfare of the country are at stake, and it would be well to avoid dangerous experiments in finance. The existing law goes far enough. The silver bought by the government is even more than the country needs, as is abundantly proven; but if the whole country is to be taxed to favor one section for political ends, then at least let the measure be one which will not bring disaster on the nation, and that will not be especially injurious to the wage earners, as is this.

THE PROPOSED TARIFF ON LEAD ORES.

The question of the tariff on lead ores as proposed in the bill now pending is attracting wide attention. Elsewhere we give the views of our special contributor, Dr. RAYMOND. We have also received communications from several of our principal lead smelters on this subject. The almost universal opinion is that our smelting industry absolutely requires for its continued well being the free entry of foreign lead ores, and our "dry" silver ore mines are absolutely dependent on this for their very existence. The change in opinion of the smelters and silver miners since the ENGINEERING AND MINING JOURNAL first pointed out the true situation has been very apparent. When we demonstrated the advantages the free entry of fluxing lead ores would be to the silver miners, and to the smelters the ENGINEERING AND MINING JOURNAL not only received little thanks, but was even the recipient of much newspaper abuse. Now, all the Western and Eastern smelters have been converted with a few exceptions, one of which is interested in carbonate mines in Colorado, and the head of the other has political aspirations in Colorado, which he thinks—erroneously, as we believe—would be injuriously affected by his open advocacy of free Mexican ores. The silver miners at last are beginning to see that they are paying the piper, while the few carbonate mine-owners dance. No one desires the injury of our lead mining industry, but it cannot complain when lead ores bring the full value of the lead in them, and should not ask that they should be paid \$4 to \$6 a ton more than the ore is worth by taking this premium off the price of dry ores. The silver mines employ more men and capital than the lead mines, and should not be taxed to pay for the working of these. This is what is being done by excluding the fluxing ores, that are absolutely necessary for the economical treatment of the silver ores.

One very prominent representative of the metal industry says, in answer to our inquiry as to his "views" on the question of the tariff on lead ores:

"To me it appears so obviously to the benefit of the smelting, mining and general commercial interests of the country that Mexican lead ores should come into the United States free of duty that any other view can only be supported by parties whose object is to secure some personal advantage, without regard to the welfare of the community at large. The output of fluxing ores in this country is so limited that nearly all the large smelters are more or less dependent on supplies of that class of ore from Mexico. Were such not the case, however, a restrictive policy, in order to conserve some private interests, is certainly not a very prudent and far-seeing course to be adopted by this country.

"Mexico is a country greatly dependent for its prosperity on the mining of ores, and if the United States are closed to its produce the natural consequence will be to compel the Mexicans to look out for other markets; and as hardly any of the lead ore can bear the cost of carriage to Europe, it follows that it will have to be smelted in Mexico. This becomes more practicable from the fact that recently large coal fields producing good coal had been opened in the State of Coahuila, and smelting works are already in course of erection at Montorey, Guadalupe, Ceralvo, and other places, the produce being shipped to Europe.

"Under these circumstances, it is to be hoped that the Legislature will discuss this important matter with due regard to the commercial welfare of the country at large, and not under the narrow considerations of what may be the effect on a few individuals. The ENGINEERING AND MINING JOURNAL has all along consistently advocated 'free entry' of the ore, and on this account is entitled to the commendation of the general commercial community."

The representative of one of our largest lead smelting and refining works says: "We have always been on the side of the ENGINEERING AND MINING JOURNAL in regard to the duty on Mexican lead ores, and have done all we could to prevent any change in the present ruling." We shall give the views of other prominent members of the industry in our next issue, and shall be pleased to hear from all who are interested in the subject. The following petition shows how the mining interests of Colorado are now beginning to feel on this subject.

"To Hon. H. M. Teller, U. S. S. Washington, D. C.:

"The undersigned, representing the largest producing mines of Aspen, strongly protest against placing a duty on the lead in Mexican ores. The bulk of our ores, which are practically dry ores, has to rely on lead fluxing ores for successful treatment. Any increased shortage of these fluxing ores, which will surely occur in case Mexican lead ores are kept out, will result in increasing the smelting charges on our product."

(Signed)

"THE ASPEN MINING AND SMELTING COMPANY—By Fred G. Bulkley, General Manager.

"THE MOLLIE GIBSON CONSOLIDATED MINING AND MILLING COMPANY—By Frank Bulkley, Manager; H. B. Gillespie, Vice-President.

"THE ASPEN MINE—By Henry Paul.

"THE ENTERPRISE MINING CO.; THE DURANT MINING CO.; THE LATE ACQUISITION CONSOLIDATED MINING CO.; THE SMUGGLER MINING CO.; THE CONNAMARA MINE—By D. M. Hyman.

"JOHN M PALMER.

"DAVID R. C. BROWN.

"THE ARGENTUM-JUNIATA JOINT WORK—By C. E. Palmer, Manager.

"THE LULU S. MINE—By C. E. Palmer, Manager.

"THE JUNIATA MINING CO.—By C. E. Palmer, Manager.

"THE SILVER BELL MINING CO.—By Chas. H. Field, Manager.

"THE ARGENTUM MINING CO.—By W. E. Newberry, Superintendent.

"THE DEANE, ARGENTA AND EAGLE GROUPS; THE ASPEN UNITED MINING & MILLING CO.—By George W. Lloyd, General Manager.

"THE TAM O'SHANTER MINING CO.—By J. W. Smith.

The following telegram, sent to-day to Senator Teller, explains itself:

"ASPEN, Colo., April 16, 1890.

"There is a constant decreasing production of lead in Colorado. Our ores are practically dry ores, and must have lead fluxing ores for successful treatment. As a small number of our smelting companies has secured contracts for the future production of our lead-producing mines, the exclusion of Mexican lead will practically close many smelting works, or greatly increase charges for reducing our ores. If foreign lead ores are excluded, the cost of smelting will be greatly increased, and the reward of our labor must diminish, and many mines close. We are employing 300 men.

(Signed)

"HENRY PAUL, Superintendent Aspen Mine."

THE NEED OF FOREIGN LEAD ORES.

By Our Special Contributor.

Some months ago I published in the ENGINEERING AND MINING JOURNAL my views on the question of the importation of argentiferous lead ores, as related to the construction of the existing tariff laws, and to the expected action of the Secretary of the Treasury. It was my misfortune not to agree with either party to the controversy then in progress. I thought then, as I still think, that the discussion of the wisdom of the law was entirely irrelevant to an inquiry into its meaning. And while it seemed to me unquestionable that argentiferous lead ores are mineralogically and metallurgically lead ores, whether they contain much or little silver, I frankly declared that I favored, on general principles, the importation of all ores free of duty.

Not a few of my friends and colleagues in the smelting business, who at that time earnestly endeavored to get the Treasury Department to exact duty upon all lead ores, irrespective of their contents in silver, have since changed their minds, by reason of a change in the business situation. They are now anxious to have Secretary Windom's decision stand, whether it be logical or not; for they find that the supply of lead-ores in the United States is inadequate. A single large producing district—the Cœur d'Alène—is receiving excessive prices for its ores, and smelters are engaged in a ruinous competition to get them, and are smelting them at a clear loss, after the railroads have hauled them at a loss. The losses of the railroads are made up out of other freights, incidental to the smelting business, or required by the communities it supports. The losses of the smelters must be made up, if at all, out of the profits on other classes of ores, which are smelted with the lead ores as a necessary basis. The existing situation is barely tolerable, they say. If no foreign lead ores at all come in, it will become intolerably worse. Hence they wish to preserve the present condition of affairs.

Without reproaching any such persons with their change of views, or even inquiring whether the change of conditions which has caused it was not close at hand, and clearly to be foreseen at the time of the former discussion, I would point out that the smelters as such would be still better off if the lead ores of all grades, from Mexico and British Columbia, could come more freely into this country. Who would suffer by such a change?

I am not quite certain of the effect of taking off the whole duty at once. But I think a distinct gain to all legitimate industries would come from such a change as would increase the quantity of such ores now imported. This might be done, for instance, by making the duty very much lower, or by enlarging the range of the class now admitted free—as, for instance, by restoring the practice of the Custom House to what it was before Secretary Windom's ruling. As before observed, I do not approve the principle of that ruling, or of any classification of lead ores for tariff purposes according to their silver contents. Hence, I would rather see all lead ores treated alike. And as a sincere protectionist upon principle, I believe the wisest course would be to place a specific duty upon the lead in the ores slow enough to permit large importations, when the market price of lead is high, yet high enough to check such importations upon a glutted market. I have no hesitation in saying that the present duty is, in my judgment, too high; and that its effect, as enforced by the McKinley bill, would be to kill some smelting establishments, cripple all, and injure the producers of "dry" silver ores, while it would benefit only the owners of a comparatively few lead mines, who cannot adequately supply, and would thus be enabled to "corner" the demand for lead ores.

R. W. R.

THE IRRIGATION SURVEYS.

By Our Special Contributor.

A disagreement, reported to exist between Director POWELL of the United States Geological Survey, and Captain DUTTON, the distinguished geologist and engineer, in charge of one of its most important lines of work, involves really two or three different questions. According to the most intelligent accounts hitherto published, there is dissatisfaction among the people of the West over the manner in which the appropriation for irrigation-surveys has been applied by the Director. It is complained that he has expended too large a part of it upon costly and detailed topographical surveys, and too little upon reconnaissances and local studies and *projets* of immediate usefulness. And it is understood that Captain DUTTON, in a spirit entirely friendly and respectful to the Director, protests against the continuance of this policy.

The argument in defense of it appears to be that a carefully-made topographical survey is the only basis for reliable work, geological or topographical; that once done so thoroughly that it need not be done again, it will be forever available and invaluable for all such purposes; and that such a comprehensive work should precede the development of mere local investigations. It may be worth while to examine, some day, the real scope and bearing of this proposition, which undoubtedly has some foundation in truth; but, conceding to it all the force that can be claimed for it, it seems to me to be superseded in this case by another principle, namely, that money appropriated by Congress for a definite object ought not to be expended for an object, however important, which is only constructively, and not avowedly or intentionally, connected with the purpose of the appropriation.

The result of such attempts, in the interest of Science or of the welfare of the country, to lead legislatures along in the path of expenditure for noble ends, not foreseen at the beginning, is always unfortunate. The result in this case appears to be that members of Congress suspect, so to speak, the loyalty of a great executive department; that is, they conceive that the servants of the government hold a still higher allegiance to Science, and are constantly doing more or other than they are ordered to do, in order to advance Science and the welfare of the country thereby. Every appropriation made to meet some pressing need becomes, in the view of such complainants, the entering wedge for some vast scheme of governmental expenditure. "When it has been used up," they say, "we are told that though nothing has been accomplished, everything has been beautifully begun. Our scientific servants are busily employed in 'educating Congress,' without its knowledge."

Now, this suspicion may be ignorant and unjust. That is not the question I wish to consider. What seems to be the uniform lesson of experience is, that it ought not to be aroused, and that it should be prevented by absolute frankness on the part of the scientific officers of the government, and the strictest construction of their duties as disbursing officers.

Without impugning in the slightest degree the patriotism, sincerity and conscientiousness of Director POWELL, I must say in this case, as I have said in many similar cases, that the scheme of extensive "fundamental" scientific work should be separately authorized by Congress, or else abandoned for the present. I think he has made an error in judgment; and it is only to be hoped that the reaction will not (as has often been the result of such mistakes) stop the whole work.

R. W. R.

NEW PUBLICATIONS.

SLIDE VALVE GEARS.—An explanation of the action and construction of plain and cut-off slide valves. By Frederic A. Halsey, Engineer of the Rand Drill Company. Analysis by the Bilgram Diagram. Pp., 135. D. Van Nostrand & Co., New York.

The preface states that this book has been written with the aim of making it intelligible to any one who might be willing to make a serious effort to understand it. High authority exists for a mathematical treatment of the subject, but with this the author has no sympathy. Designing a valve gear is essentially a drawing board process, and a mathematical treatment of it is simply an uncalled for use of heavy artillery. The graphical treatment is therefore adopted throughout, Mr. Hugo Bilgram's diagram being used, which the author considers a marked improvement upon Zeuner's. This little book is a model of concise and careful writing. The author, in avoiding the faults of prolixity and carelessness which characterize many recent productions of writers on mechanical subjects, has almost gone to the other extreme, and made a book whose chief fault, if it be a fault, is that there is not enough of it. He begins with the plain slide valve, in its most primitive form, using the slotted yoke to avoid the complications introduced by the angularity of the connecting rod, showing it in several positions, and clearly illustrating its action. He then adds lap to the valve, and gives angular advance to the eccentric, showing the effect of each. An explanation of the Bilgram diagram follows, and its application in laying out a valve is shown. The limitations of the plain slide valve, the effect of angular vibration of the connecting rod and the eccentric rod, the method of equalizing the exhaust and the cut off, and of setting the valve are then treated of.

Part II. introduces the slide valve with shifting and swinging eccentric. The author credits Professor John E. Sweet with being the first to adopt balanced valves of the pressure plate type, with multiple ports in connection with a shifting eccentric and a shaft-governor. Professor Sweet's Straight-Line Engine he says is therefore to be regarded as the progenitor of a large and numerous family. A number of the modern valves with shifting eccentrics are illustrated and described, including the Straight-Line, the Woodbury, the Armstrong, the Rice, Armington and Sims, and others. By means of the Bilgram diagram the action of the swinging and shifting eccentric is studied. Methods of equalizing the lead and cut-off are also shown.

Part III. treats of the slide valve with independent cut-off. The Gonzenbach, Meyer, Buckeye and Straight-Line independent cut-off gears are illustrated and studied by means of the diagram.

Mr. Halsey deserves credit for his original work on this book, and we trust he will continue his labors in the same direction.

THE GEOLOGY OF ONTARIO, WITH SPÉCIAL REFERENCE TO ECONOMIC MINERALS. By ROBERT BELL, M. D., LL. D., assistant director of the Geological Survey of Canada, etc. Reprinted from the report of the Royal Commission on the mineral resources of Ontario. Toronto, 1889. Paper, 57 pp.

Dr. Bell, who has for many years been conspicuous on account of his earnest and always practical efforts toward the development of the mineral wealth of Canada, has in the publication under notice kept fully up to his mark. In a pamphlet of only 57 pages, he has succeeded in presenting a very thorough account of the general geology of the province, and has still found space to briefly comment upon the principal mineral deposits and working mines.

Condensation in geological literature is so rare, and usually so unsatisfactory when attempted, that it is a treat when one meets with an essay like this, which, while not confusing the mind of the reader by details not pertinent to a fair general understanding of the subject, still covers the ground thoroughly enough.

Another point which should be noticed is the admirably clear style of presentation. Dr. Bell has the faculty of grasping the salient points of his theme at once, and, what is more difficult, of making his reader comprehend them, too. It would be a good thing if all geologists, and especially those working in the field of economic geology, were equally successful. In the present case the author is writing, not only for the handful of fellow geologists, but for the "general reader," and manages to avoid unnecessary technicalities without descending to puerility. Any intelligent person can follow his descriptions, while these and the deductions from them are maintained on a high scientific plane.

The account begins with a general outline of the field, geographically and geologically. A table exhibiting the divisions of the rocks of Ontario is given, the section showing the well known enormous gap between the Devonian and the post-Tertiary; the older systems, especially the Archæan, being very fully represented, and those above the interval consisting of the drift, boulder clays, gravels, sands, soils, etc., of the Pleistocene and Recent. Dr. Bell does not seem to think that all of the missing formations were originally absent, but that their non-occurrence at present may be accounted for by denudation—a view which finds support in the evidences of decay of the Laurentian and Huronian rocks to great depths and the immense planing down they have received from glacial action and other causes.

On first glance the geology of Canada seems simple enough, but many important problems are involved, especially in the physical geology of the Archæan, which can be (and have been) studied to better advantage in Canada than elsewhere, because of the vast exposures of the azoic rocks. The principal features of these rocks are pointed out; their intricate plications (amounting to frequent overturnings and almost everywhere to high angles of dip), the lithological characters, and the structural relations. The distinction between the Huronian and Laurentian is well brought out; and both systems are divided provisionally into an upper and a lower group, though by no well defined line of separation.

As to the supposed evidences of life in the Archæan, it is evident that Dr. Bell is a non-believer. The famous *ozoön* is dismissed with the remark that "forms like the branching structures which are portions of the so-called *ozoön*, said to have resemblance to certain organisms, are assumed by a great variety of minerals, but in the case of *ozoön* these forms are unlike any organic structure in the fact that they are different one from another." In regard to the significance of limestones, iron ores, graphite and apatite, Dr. Bell is equally positive. He says that the limestones have been carefully examined by numerous geologists over immense regions during the last 40 or 50 years, and that they support the opposite view, namely, that they are of chemical origin.

The iron ores "occur in greater masses than any of those deposits which appear to have been aided by organisms in their formation, and, besides, the modes of occurrence are opposed to any theory of this kind. The graphite and apatite occur principally as vein matter," their origin being mainly from igneous rocks. "Apatite is a common constituent of traps and granites, and is widely diffused in small grains even in gneiss." A strong point is made against the argument based on the fact that phosphate of lime is the principal constituent of the bones of vertebrate animals. "In the natural order of things the phosphate must have existed first and the vertebrate animals later on. The converse of this is absurd." "There is no evidence to show that phosphorus, carbon, iron and calcium did not enter into the original constitution of the earth, as well as the other elements." Of course not; nobody supposes so. There are some, perhaps not very many, geologists of standing who imagine, however, a transition of these elements from their original state through organic life back again to rock. "*Eozoön*" may go, but such geologists have not been left altogether without ammunition.

The tens of thousands of lakes of various sizes, many 30 to 50 miles long, are ascribed to glacial action. The lakes with double outlet afford the curious possibility of canoe navigation across watersheds.

The successive formations in the Ontario series are described in order and in some detail, and their respective importance as sources of metalliferous and other valuable minerals is pointed out. The Huronian is "the great metalliferous system of Ontario, and indeed of all Canada, and hence its great importance in the economic geology of the country. The whole series is more or less metalliferous, but the various ores are not uniformly distributed, some occurring in one region or in some special stratum, while others may prevail in another section of country or in a different horizon in the series. Besides metallic ores, the Huronian also contains various rocks and non-metallic minerals of value." The author then briefly describes the iron, copper, copper-nickel, gold, silver, lead, zinc, arsenic and antimony deposits of the Huronian, and notes the occurrence of platinum, tin, molybdenum, bismuth, and cobalt. In the Animikie group (Cambrian) are some of the best known silver deposits of Ontario. These are described in some detail, as are also the copper and nickel of the Nipigon formation (Cambrian). The Potsdam furnishes only sandstone for building and glass making. The Chazy (Silurian) limestones are suitable for building, and the sandstones are used to a small extent locally. The Black River (Silurian) formation affords good limestone for building. Natural gas and petroleum occur in the Trenton (Silurian). Oil shales from the Utica (Silurian) were formerly distilled, but the finding of free petroleum caused a cessation of this industry. Iron occurs again in the Clinton (Silurian) formation.

The Niagara limestone is an excellent building stone and burns to a good lime. This may also be said of the Guelph (Silurian) dolomites. In the Onondaga (Silurian) formation are salt wells, gypsum and some lithographic stone (not utilized). The Devonian rocks are important in various counties from holding deposits of petroleum, salt, gypsum, building stone, bluestone and iron ore. "The Drift superficial deposits are important in relation to water supply, the nature of the soils which they afford, and many of the clays have direct value for the manufacture of bricks and drain tiles." Shell marls, peat and lignite also occur in the post-Tertiary deposits.

As an appendix, a note is added giving a fuller account of the Sudbury copper and nickel mines than was available at the time of the original report. These mines, as well as most of the copper, silver, iron, apatite and other important deposits, have been described in the ENGINEERING AND MINING JOURNAL from time to time, as developments have progressed.

In general, Dr. Bell takes a very hopeful view of the future prospects of the various mineral industries of Ontario, many of which are already prosperous and of high importance. The country has not been fairly prospected yet, much less thoroughly tested even where discoveries have been made. The author considers the outlook for gold in the province to be very promising, notwithstanding the only partial success heretofore made to mine and extract it. A considerable portion of the space is devoted to the consideration of this metal.

ELECTRICAL ENGINEERING FOR ELECTRIC LIGHT ARTISANS AND STUDENTS. By W. SLINGO and A. BROOKER. Published by Longmans, Green and Co., London and New York, 1890. Cloth, 8vo., 631 pp.; 307 illustrations. Price, \$3.50.

This work comprises the branches of study in electrical engineering prescribed in the syllabus issued by the City and Guilds Technical Institute, London. Both authors are connected with the Telegraphists' School of Science. Mr. Slingo as director and Mr. Brooker as instructor in the electrical engineering section. Their familiarity with the needs of students and the necessity of following out the course systematically will account for the excellent progressive arrangement of this treatise. The method is clear and direct, though there is some repetition of principles which might have been avoided with advantage to book readers, but was probably inevitable in the lecture room—from which it is to be presumed the greater part of the contents of "Electrical Engineering" was derived. This is no great fault; it merely results in adding a little to the length of the book and to the time necessary in mastering it.

The scope of the book is considerably wider than is usually given electric light students and artisans; for while no pretence is made of offering a complete manual of electricity, it is also designed, as the authors state, "for the use of those who, having little or no electrical knowledge, have under their supervision various kinds of electrical machinery." The work should therefore prove of service to such men as marine, railway and tramway engineers, naval officers, municipal officials, and especially to managers of mines having electric plant, or where it is proposed to introduce it.

The authors recognize the fact that "as a rule the most successful electrical engineers are evolved from good mechanical engineers." This has certainly been true in the past. Now, it is merely a question of words; for in this country, at least, training in the two branches (if they are really two) goes on simultaneously. If they are considered separately, the chances are that the electrical engineer would get rather more mechanics than the mechanical engineer would of electricity. Electrical engineering stands to general mechanical engineering in precisely the same relation as does steam engineering. In short, the specialist has to go outside his specialty, exemplifying the truth of the old saying that one should know a great deal of one thing and a little of everything.

This book is essentially modern in tone, and carries the subject up to the latest phase of development possible in book publishing. Unfortunately, however, this modernness is somewhat insular. A very fair view of recent British practice is given, but American, French and German methods appear to receive attention only so far as they have been adopted in Great Britain. But, since the tendency nowadays is toward a rapid diffusion of information and consequently to a growing uniformity of practice, we find considerable space given to the inventions of Brush, Sprague, Edison, and other Americans, so far at least as they have been transplanted.

The opening chapter deals with first principles. One is always astonished, on reading current electrical works, to find how vastly different are the theoretical views now held from those taught a quarter of a century ago, or just before the great development began. Then a good many things were laid down as laws which either had to be modified or are now put forward very diffidently, often not even on the footing of hypotheses but rather as convenient forms of speech to describe phenomena not really understood though perfectly apparent. Thus, in one sense, the theoretical progress has been *backward*. That is to say, while the knowledge of outward manifestations has been enormously augmented, and the refinements of scientific measurement have been carried to a high pitch, we are no nearer than before to an answer to the question, "What is electricity?" Certainly there is far less assertion, more reservation. This is in harmony with the prevailing scientific method, which, when baffled, is ever willing to say, "We do not know," whereas formerly a dogma might have been ventured. The new method is not only sounder, but paves the way for future progress. As to electricity, it is safe to say what it is not in many cases; it is not a fluid, nor a double fluid, for example. But we think the authors might have let it stand as an energy, according to the old nomenclature. Instead, while not precisely saying so, they seem to regard it as merely a "condition." The nearest to a definition is contained in the appended quotation, which follows a short review of exploded theories: "Let us rather consider electricity to be a condition into which material substances are thrown, and that all substances partake more or less of this condition, just as we say that all bodies are heated, although to varying degrees, and that in virtue of this heat their particles are set into more or less rapid vibration." Electricity is certainly comparable to heat, and the comparison is a convenient one; but is heat itself only a "condition," or is it a "mode of motion," or what? According to the doctrine of the unity of force, or that of correlation of the forces, electricity would be rated as one form, or at least manifestation, of energy.

Perhaps, after all, it is best to say of electricity, as of gravitation, "We do not know."

The terms "positive," "negative," "current," "potential," "lines of force," etc., are handled in a similarly cautious way, "ether" still more gingerly; but the definitions of the standard electrical units (volt, ampere, ohm, coulomb, watt, joule, etc.) are very clearly set forth, and their interdependence and arithmetical values are made very distinct. It might possibly have been an improvement if, somewhere in the book, a short summary of all the definitions, laws, equations and conversions had been inserted, for the sake of convenient reference. They are all there, but somewhat scattered as the development of the subject progresses. The mathematical treatment throughout is admirable, and is quite within the grasp of any one who can solve a simple equation.

Chapter III. treats of primary batteries, a few typical ones out of the many being taken for illustration. Chapters IV., V. and VI. describe the mode of measurement of current strength, resistance and electromotive force respectively. The seventh chapter is devoted to electro-magnets and electro-magnetic induction.

The most satisfactory portion of the book is contained in the next four chapters on dynamo-electric machines (generators). This subject is worked out analytically, and the *rationale* of the different systems is explained by using the leading machines in actual use as types of classes. We have nowhere met with a clearer exposition of the salient features of the best known dynamos, nor so simple a classification. The reasons for divergence in form, material and adjustment, and the special purposes for which each is most suitable, are also well brought out. Here, as elsewhere in the volume, the numerous diagrams exhibit the essential points in a way which the pictures of the actual machines do not. The latter, however, are sufficiently profuse to give a good idea of the outward forms. A very good résumé of the modern practice in dynamo construction is appended.

Chapter XII., on electromotors and their appliances, is not so full as is desirable, the authors treating motors in general as merely reverse generators, changing electricity back into a part of the mechanical energy which originated it. To mining men a moderately full account of electric engines for the many kinds of work to which they are adapted and are being so largely introduced, would have been most welcome. Attention has been mainly given to that class of motors used on trams.

Transformers, which are now playing so important a part in the English system of carrying high voltages in electric lighting, are described in Chapter XIII. The next chapter, on secondary batteries, gives some of the leading forms. Then follow two chapters on arc and incandescent lights and fixtures, photometry, etc.

One of the subjects of most imminent importance at present—insulation—is given less prominence than it deserves, being treated rather scantily in the closing chapter, in which are grouped matters of installation, equipment, fittings and miscellaneous details. It is true that the question has not aroused the same interest in Great Britain as here. In the former country electric lighting and power plant, as a rule, has been installed on a more permanent and expensive basis than with us, and where high potentials are employed in Great Britain it has generally been possible to adopt means which are not always commercially practicable here. Underground insulation appears to be fairly successful there, though security to life is obtained at the cost of many disadvantages besides the item of money expense. But very high tension currents are there employed, and we do not hear of the startling accidents which lately made such a sensation in this country. There is room for a good monograph on insulation, leaving out all other considerations than those directly affecting this great question, which is far from solution yet in spite of the persistent efforts of electrical inventors, and is destined to become more and more pressing as the development of the new industry, now only in its infancy, goes on. Such a monograph should record the experiments and working results so far reached by the various systems which have been tried. It should give especial attention to the above-ground insulation of high tension currents, for no matter how carefully underground conductors are protected there are always the surface fittings to attend to.

What is said on insulation in the present volume, both as to overhead and underground conductors is, however, sensible and practical. It is only regretted that there is not more detail. Indeed, this part of the book is probably that to which the majority of readers would naturally turn first.

On the whole, "Electrical Engineering" is a work to be commended, its special value being in the newness of much of the matter and in the able method of treatment. The typography and illustrations are excellent.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

All letters should be addressed to the MANAGING EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Use of Bichloride of Mercury in the Saving of Fine Gold.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of January 11th, 1890, B. F. Wilson, Jr., writes an article on "The Use of Bichloride of Mercury in the Saving of Fine Gold." He is not alone in thinking that "it is obvious that the saving of this fine gold is a matter of great importance in this region," as that was the object intended to be attained by the parties who put in the "New Wiswell" plant. He further says: "And now we come to a method that has been tried hundreds of times and proven to be successful. This is the method comprising the use of bichloride of mercury."

From his article one would infer that the whole aim and object of the process was the production, by electrolysis, of the bichloride of mercury. The real intent was to produce a solution of mercury in water that would save the gold. That this was done, his own signed certificates show.

Success in recovering gold from its ores means dollars in the pockets of the investors, like any other business success, while the "hundreds of times" the various bichloride processes have been tried and not one but the Wiswell in successful operation to-day, would seem to disprove Mr. Wilson's statements somewhat. It is true that it was at first thought that it was the bichloride of mercury that possessed the potent energy in the saving of gold, but it is now known by a long series of tests and

experiments that there are chlorides of mercury, as well as of other metals, which, properly combined, are more economical in the manufacture of the solution, in time and in the saving of gold, the analysis of which I am not at present at liberty to divulge, but for which patents in this, as well as in a number of foreign countries, are now pending.

He recommends a more concentrated solution—"the greatest strength is of course the greatest efficiency," ignoring the fact that with "strength" beyond the limit determined by the quantity of fine gold per ton in the ore, the base, but less soluble, metals which are nearly always present in refractory gold ores, are acted upon, and that, therefore, after retorting the mercury, there is necessity of cupellation or further treatment, while the danger of amalgamating on the crushing rolls and bed of mill is proportionately increased.

"A Muscular Amalgamator," in your issue of March 1st, 1890, takes up the cudgels of criticism, and, in commenting on Mr. Wilson's paper, makes the whole subject as limpid as the "blue mud" in question, making out a clear case of *lucua a non lucendo*, giving, in paragraph numbered "2nd," as the cause of loss of fine gold, "the becoming perfectly dissolved in the mercury;" admitting which, it is only necessary to provide an apparatus that will not "flour" the mercury and dissolved gold, or that will conserve it in case it should escape from the coarse or rough grinder, this being the very thing the "new Wiswell" mills and process were designed to do, have done and are doing.

On looking over paragraphs numbered "3rd" and "4th," I am inspired to remark that the belligerent tendency of "A Muscular Amalgamator" to contest statements made by Mr. Wilson has led this self-professed athlete to put chips on both shoulders, which I will now proceed to knock off. He suggests the reversal of the poles of the electric energy and the production and use of sodium amalgam, and tells how to produce from the uni-chloride the bi-chloride. Inasmuch as the "blue mud" is only formed when the saline bath, in which it is being made, is surcharged with the solution of the simple chloride of mercury, this last would again (by synthesis, if I may be allowed to use the term in analyzing a product by electrolysis to its elementary state) become metallic mercury and free chlorine, and, while not disputing the subsequent formation of sodium amalgam, the infinitesimal quantity of this alloy, as ordinarily used, would hardly induce its manufacture by first electrolyzing mercury, reversing the poles,—undoing the work done,—and the subsequent formation of sodium amalgam, the use of which has long been known to the veriest tyro of an amalgamator, "muscular" or otherwise.

Quoting from paragraph numbered "4th," he says: "But if dichloride act as described, gold chloride must be formed, and at some stage of the operation the gold would be left very pure and bright at the surface, and be easily amalgamated by the surplus quicksilver charged, but the dissolved gold would be irredeemably lost, either in battery, Chili mill, or Wiswell. That would be a dreadful way of 'saving gold.'" Had the "muscular amalgamator" known more of the subject of his criticism he would not have had the temerity to doubt the possibility of precipitating gold, silver, and mercury from their chlorides by a little of his surplus iron.

SYNOPSIS—Mercuric and mercurous chlorides in solution in water; ore ground in this; superior affinity of chlorine for iron, supplied to a certain extent by wearing surfaces of mill and its abraded particles, and consequent liberation of metallic mercury and its resultant deposition on gold particles; free chlorine, purposely put in the solution before use, whereby extremely fine gold is dissolved, becoming chloride of gold in solution—"a dreadful way," is it not?—passage of gold bearing water and pulp to another mill for finer trituration; continued breaking up of chloride compounds; passage to a third, fourth or more regrinders, the last one of the series having at bottom a quantity of metallic mercury. Between this pan and the one preceding the addition of a suitable precipitant, in excess, to the gold (or silver) and mercury bearing water, insuring complete amalgamation, precipitation and absorption by underlying mercury; retorting of the latter and recovery of an average of 90 per cent. This, in a general way, and omitting several important details, is what we have done, do, and can do again.

PROOF, in a small way.—A glass of water in which put small piece of gold previously smeared with, say, talcose slate, add a little mercuric or mercurous chloride—or both—solution; no action. Now touch the gold with a small, clean coil of iron wire, when, in consequence of the greater chemical affinity of the chlorine for the iron than for mercury, it breaks up some of the salts of mercury compound, liberating a chemical equivalent of free mercury, which at once deposits on the gold.

In conclusion, I may say that, when the Wiswell process has been a little further developed, with a view to getting still better results, with minimum cost of plant, renewal of wearing parts, portability, ease and simplicity of operation for ordinary workmen, cheap yet effective solution, and is offered to the public, "A Muscular Amalgamator," as well as other experts in that line, are invited to inspect "the whole business," when we hope to satisfy him and others interested of its vastly increased ability to "save" gold and silver, and the great economy of this process over any of its predecessors.

BEN TROVATO.

GEMS AND PRECIOUS STONES.

Mr. Geo. F. Kunz's book is attracting great attention. The *Jewelers' Review*, of New York, in its issue of the 19th inst., in speaking of this book, calls it a "literary and artistic triumph," and continues to say:

"Notwithstanding the many glowing accounts that have reached us from time to time of the rare treat in store for us in 'Gems and Precious Stones of North America,' we must frankly confess to having ill-prepared ourselves for such a feast as George F. Kunz and the Scientific Publishing Company have jointly produced. The radiant colors in which the work has been repeatedly painted for our imagination through various sources are more than borne out by the publication itself, which we have not the slightest hesitation in pronouncing the most beautiful specimen of gem literature ever brought to our notice. That such results could be attained as are set forth in the tinted illustrations of this magnificent volume almost surpasses our comprehension. They are the very acme of perfection, throwing out each drawing with marvelous accuracy, supplemented with the most delicate lines and shading. Nature herself could not have imparted more realistic hues to the gems in the concrete than

are so startlingly portrayed in these brilliant plates. To all true lovers of precious stones they will most certainly prove a revelation."

"Of the typographical contents we can only say that the elaborate claims advanced by the publishers have been faithfully fulfilled, and more besides."

"Suffice it to say that no library, be it public or private can afford to be without a copy, while every prospector, mineralogist, geologist, mining engineer, jeweler—in fact, every person interested in precious stones should avail himself of this jewel among gem literature."

"The splendid art-work and printing throughout call for the highest encomiums on both author and publishers."

THE "THWAITE" CONTINUOUS RECUPERATIVE GAS FURNACE.

This furnace, the illustration and description of which we take from our contemporary, *The Engineer*, was designed so as to obtain a part of the advantages of the recuperative principle without involving an expensive, complicated, and non-durable structural form. The arrangement is such that unless the work is exceedingly badly executed, there can be no leakage in the walls intervening between the air heating chambers and the chambers for the floor of the heated products of combustion; a difficulty that asserts itself in most other forms of continuous recuperative furnaces. The furnace is very simple in constructional character, and temperatures almost equal to that of steel melting can be obtained. The system has been applied for some years with success for heating purposes, and is suitable for all heating purposes where the temperature required is below steel melting heat, or 1,800 degrees Fahr., although with oil firing a temperature of from 1,700 degrees to 2,200 degrees C., can be obtained. Referring to the illustrations, Fig. 1 is a longitudinal section on line A A; Fig. 2 is a cross section on line B B; Fig. 3 is a plan of the hearth taken on line C C, and Fig. 4 is a vertical cross section of gas and air ports D D. The arrangement of combustion is as follows: The gas flows from gas producer to the furnace by flue marked A, and ascends to furnace by gas flue and port B, flowing into furnace at C, and over bridge D, where it meets with a supply of air that falls in ample volume and heated condition on to the gas as it escapes from the gas port. The flame flows through heating chamber E, and escapes discursively by side ports F into a chamber G formed beneath the hearth of furnace. The products of combustion descend by flue H into a lower and bottom chamber I, and pass through, and thence to chimney flue J the chimney aspiratory effect being regulated by vertical damper. The air to support combustion of gaseous or liquid fuel flows into and through the chamber intervening between the chambers G and I, through which the heated products of combustion flow, and in which part of their sensible heat is left. The air becomes highly heated in passing through the air chamber K, and in this condition meets the gaseous fuel or liquid fuel spray at the point L, and a combustion of high thermic value is the result. The walls M dividing the air and gas chambers are formed of rebated refractory tiles—a durable and exceedingly effective form of construction. L shows the position of the oil injector. The inventor of the furnace is Mr. B. H. Thwaite, C. E., of Liverpool.

ARIZONA AND MONTANA MINING AND METALLURGICAL NOTES.

Special Correspondence of the Engineering and Mining Journal, by Dr. E. D. Peters, Jr.

Since my last letter from Harshaw, A. T., I have swung around a circle that would do credit to a presidential candidate, and have seen a number of things that seem to me worth mentioning.

After several delightful weeks in the mountains of southern Arizona, I spent a few days at Tucson. While fairly prosperous as regards general business, this town seems to remain still in the expectant attitude that I have noticed on previous visits. Always waiting for outside capitalists to come and purchase their mines, and in the meantime doing little themselves toward developing their mineral wealth. If they have any genuine faith in the value of these mines, it seems to me that the only reasonable thing to do, is to go ahead themselves and develop and work their own property.

There seems to be a general impression here that a local custom smelter would be a cure for all evils. But I am sure this is an entirely mistaken idea. There is no fear but what a smelter will be established as soon as—and I fear much sooner than—it can find ore to supply it.

It should also be understood by all owners of copper mines in that district, that a silicious ore, even if quite rich in copper, is comparatively worthless at present, owing to the great expense of smelting it, and that a 10 per cent. ore, with a gangue of lime and iron, is usually worth more than a 15 per cent. ore with a quartz gangue.

The mountains about Tucson are full of mineral, and I feel quite certain that a properly conducted local enterprise would be of far greater and more permanent value to the town than isolated sales of doubtful property at high prices, followed almost invariably by failure and a still more profound stagnation of the mining interests.

In addition to a sufficient load of satchels, valises, etc., I left Tucson for San Francisco encumbered by a box containing a "Gila Monster," 19 inches long, which I hoped to take home and determine whether it was venomous, as has lately been stated on high authority. The trouble that this wretched lizard caused me can be more easily imagined than described. I would no sooner get safely settled in a Pullman car with the cage under the seat than some miserable infant would discover its presence, and then would come a torrent of excited questions from the entire female contingent of the car. After much experience, I settled on the following formulae for my replies:

"Is it alive?"

"Yes."

"What does it eat?"

"In its wild state, it lives on young Mexican children." (Exclamations of horror, and a general removal of all children from my vicinity.)

"What are you going to do with it when you get it home?"

"I am going to experiment to see if its bite is deadly."

"How can you tell that?"

"I hope to get a baby to experiment on." (Unanimous burst of indignation, and a general corraling of all children at the far end of the car.)

Passing rapidly through San Francisco, Ogden, Pocatello and Silver Bow we reach Anaconda, noted as being the site of the largest copper smelting works in the world, and having by long odds the best hotel that I have seen between Chicago and San Francisco. That the "Montana" Hotel is liberally run, "regardless of expense," is shown by the fact that in spite of being well patronized, it runs behind some \$10,000 a month. It is owned by some of the wealthy Anaconda mining men, who have determined to have as pleasant quarters as possible for themselves and their friends, and is indeed an oasis in the desert. I am almost afraid that my readers will think I am practicing on their credulity if I go on to say that the office of this hotel is presided over by a clerk who is always amiable and ready to answer questions to any extent, and who actually treats his guests on an equality and neither snubs nor insults them.

Deacon, the lizard, is turned loose in my closet, where he at once becomes the terror and delight of all the chambermaids, while he regales himself on a raw egg and unlimited water, lapping it up with his long, black tongue, like a dog.

Mr. Stallman, the superintendent of these immense works, kindly gives me permission to visit them, so that, of course, I do not feel at liberty to mention many interesting details of treatment that attracted me. Referring only to the general features of the process, I noticed with much interest, that in the concentration works, all sizing trommels were thrown out, and the ore classified simply by a hydraulic separator, as at Lake Superior. This is feasible at Anaconda, as all the ore is crushed through a $\frac{3}{8}$ x $\frac{3}{8}$ slot, steam stamps of 200 tons capacity being used for the purpose. The slimes from the separator go direct to ordinary revolving convex tables, without the "Evans" head attachment, while the coarse products of the separator, sorted into four portions of equal falling grains, go to the jigs.

Both Collom and Hartz jigs are in use, the former giving decidedly poorer tailings under identical conditions.

All the tailings from the jigs are ground finer in a grinder made by Fraser & Chalmers, consisting of vertical revolving plates that give very little slimes. The coarsest of this product goes to the fine jigs—the finer to convex buddles.

Thus no concentrating machines are used in these immense works, except jigs and buddles, and the results are exceedingly satisfactory, as they always will be with suitable material, if properly classified and the machines not crowded with too much pulp.

I can only suggest one improvement of any importance in this admirable establishment. And that is, that the overflow of the first hydraulic separator, as well as the reground tailings, should also pass through proper hydraulic separators before being fed upon the revolving tables. It is just as important that this very small-sized material should consist of equal-falling grains, as it is for the coarser stuff; and it is only when so sorted that the tables can do their proper work. The less the difference in bulk between the particles of mineral and the particles of gangue, the better the separation on the table. The amount of slimes resulting from using steam-stamps for crushing instead of rolls, has not been materially increased, while a great saving in cost has resulted. The abolition of all sizing trommels has also wonderfully cheapened the process of concentration, and in the new works, two miles below the old concentration plant, the cost has been still further reduced by running all the concentrates into elevated tanks with a sloping bottom, where, after draining a few hours, they are loaded automatically into calciner cars.

As far the greater portion of the ore now being produced by the Anaconda Company, while its mine is closed by the fire, comes from the Chambers' Syndicate group of mines, there is much less first-class ore produced than usual, and almost everything smelted consists of concentrates. These consist of a mixture of copper glance with iron and copper pyrites, and contain less than 8 per cent. silica. They run therefore very high in sulphur—over 33 per cent.—and consequently require a thorough calcination.

There are a large number of long hand-calcining furnaces of the ordinary type; but my principal interest was centered in the enormous Brückner's cylinders, holding 14 tons of concentrates at a charge. I do not feel at liberty to give the product and amount of fuel used per 24 hours, but it is evident that they do very much cheaper and probably better work than the long hand-calciners. I have long opposed these cylinders for copper ore calcining, but in the light of the results obtained here, I must admit my mistake.

I wish somebody who has tried roasting pulverized mattes of various grades in these cylinders would communicate their results to you. It is a very important point.

During the rapid evolution of the blast furnace, the reverberatory has remained comparatively stationary, an average of 16 tons in 24 hours' work being considered very good. I have averaged 18 tons per day of Parrot ore, but never knew it to be exceeded at the date referred to. But of late there has been a decided advance in reverberatory work, both in the size of the furnaces, the improvement of combustion and other points, and the new reverberatories at Anaconda now smelt four charges per day of about $7\frac{1}{2}$ tons each, thus averaging some 30 tons per 24 hours.

This is indeed a triumph, and has been obtained without a proportionate increase in the consumption of fuel.

The matte is now tapped into iron molds, and the slag, after passing over two or more settling pots, is granulated and removed by a stream of water.

After five intensely enjoyable and instructive days, I packed my valises, and with the aid of two hotel porters and the editor of the local paper, armed with tongs, umbrellas and other dangerous implements, chased Deacon from the wilds of the chamber closet into his traveling box, and started for Great Falls via Butte City.

Butte is so well known that I will not attempt to say anything about it in this article, nor did I stop long enough to note any particular changes in the methods of ore treatment.

The town seemed full of business, and every stack was smoking to its full capacity, so I have no doubt that it is as prosperous as ever.

Passing rapidly through Wickes, with its smelter shut down on account of the temporary failure in ore supply of the local mines, we reach Helena, and in a few hours more, cross the Missouri, and are in Great Falls.

This is a thriving town of great future promise, and owning water power of a million horse power or more. But it seems to me, judging from the prices of city lots, that its inhabitants are discounting the future a little.

Having a thousand or two dollars idle, it occurred to me that it might be a good idea to buy a dozen or more lots near the centre of the town, and I was prepared to go as high as even \$250 apiece for extra good ones, on the main street. Consulting a real-estate agent, to whom I had a letter of introduction, he assured me that I could not have struck a better time, as there was a temporary tightness in the money market, which was forcing a number of heavy land-owners to unload.

Dreams of several hundred per cent. increase per year began to pervade my system, and noticing on the map a block of half-a-dozen adjoining lots on the main street, a few blocks from the business centre, I asked him the lowest cash price for the six. He looked at me with increased respect, and remarked that a week earlier those lots would have brought \$25,000 apiece at public auction, but as he had peremptory orders to sell them at any sacrifice, he would venture to put in the six at \$120,000 cash, and could have the deeds ready in twenty-four hours!

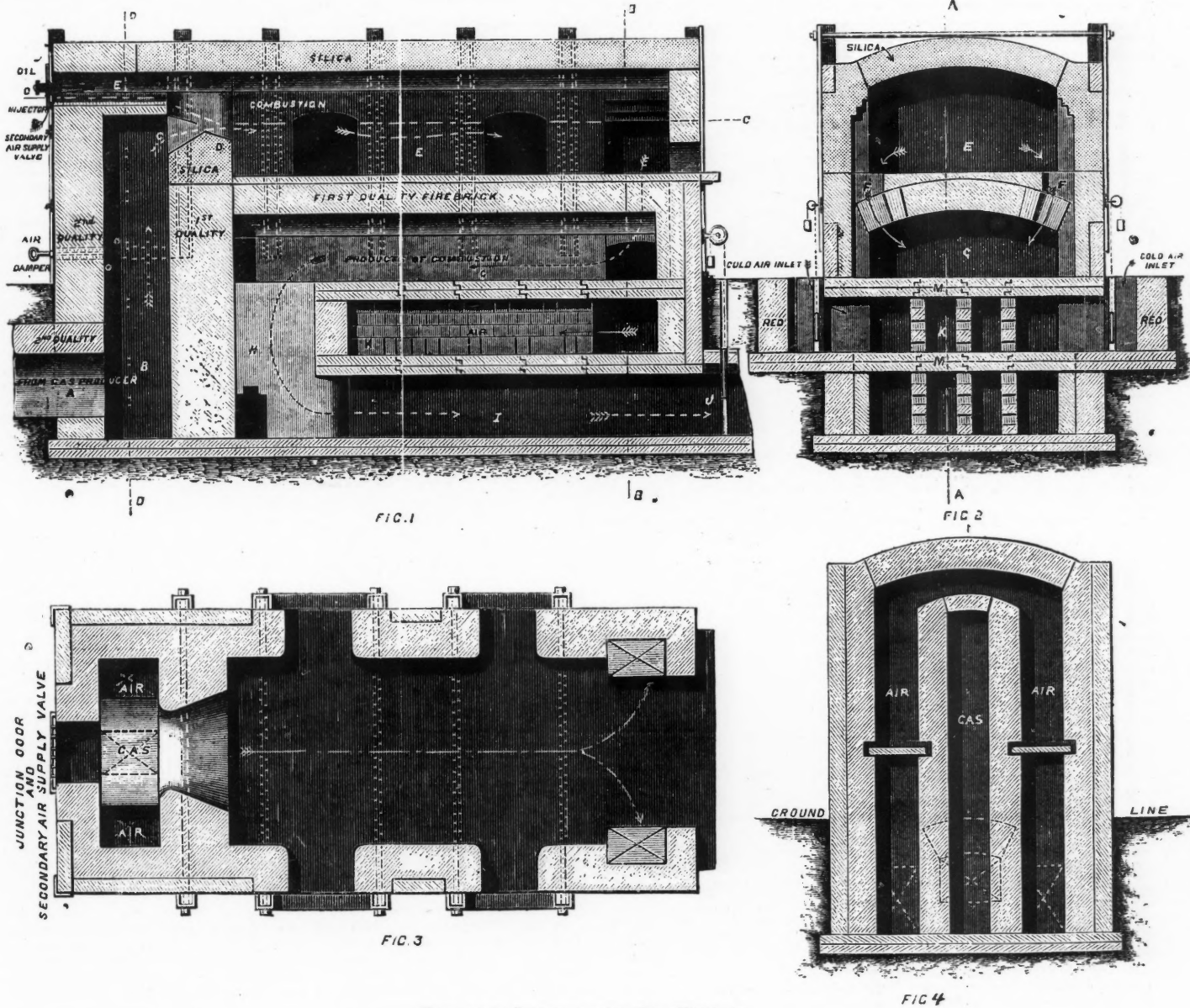
I did not quite faint on the spot, but muttering some incoherent remark about "having the title examined first," I crawled feebly out of his pres-

A drive of four miles on the south bank of the Missouri brings one to the superb plant of the Montana Smelting Company. This is a silver-lead smelter, and in point of general arrangement, size and convenience of buildings, and general arrangement of plant, is far ahead of anything I have ever seen in the country.

Indeed, I expected nothing less from a concern that has Anton Eilers as managing director, with Dr. R. W. Raymond as brother director, and Mr. R. Sticht as metallurgist. Mr. H. W. Childs is general manager, but was unfortunately absent at the time of my visit.

Here again, where I was most cordially received and treated as an honored guest, I cannot publish what I learned, but must confine myself to a few unimportant points.

I noticed, amongst many other improvements, a tuyere-valve, invented by Mr. Eilers, which remains open while the furnace is running, but as soon as the blast pressure is taken off, closes automatically, and prevents the backing-up of gas into the blast pipes. The gas is allowed to escape through the rear-end of each tuyere into the open air, where it burns



THWAITE'S RECUPERATIVE GAS FURNACE.

ence, firmly resolving to stick closely to copper smelting in future, and leave real estate to those who had the money to pay for it.

The Boston & Montana Company, of Butte, is preparing to erect extensive concentrating and smelting works on the north bank of the river, a couple of miles below the town of Great Falls. No doubt they have carefully considered the matter, but it seems to me a most unfortunate business to have to transport their crude ore this great distance by rail, and over the main divide of the continent, where a locomotive finds it difficult to crawl at a rate of 6 miles an hour, with two or three passenger coaches.

If it were only concentrates they were transporting it would be quite another matter; but assuming that one ton of concentrates requires three tons of crude ore, it will make a freight charge against the concentrates of three times the freight rate of the crude ore, which is a terrible pull-back, and will constantly become heavier as the rich zone is worked out and the low-grade pyrites come in. In fact, this freight charge alone would make a handsome profit on certain grades of ore, and I cannot believe but that I have been misinformed, and that the concentration will take place nearer the source of supply.

quietly for a moment until the pressure inside the furnace is relieved, and the natural draft upwards is re-established.

The blast furnaces are 4 in number, with room for a fifth, and the calciner plant is unusually extensive in proportion to the smelting capacity.

The engines, shafting and machinery in general, are the best I ever saw in smelting works, and are of ample capacity, so that stoppages for repairs are almost unknown.

But like all the silver lead works in the country, these works are temporarily suffering from a dearth of lead ores, and frequently run with a charge so low in lead that it would have seemed impossible a few years ago. These works are most fortunate in having an apparently unlimited supply of carbonate of lead ores in the Belt Mountains, a district that will soon be tapped by railroad, and that will no doubt place them in the best position of any of the smelters as regards lead ores. I did not fully realize the bitter struggle for lead ores until I was informed that one-quarter of 1 per cent. of lead in an ore is reckoned and paid for.

The Sand Coulee coal fields furnish an unlimited supply of fairly good fuel for boiler and calcining furnaces, while the smelting is done with

Connellsville coke. The very lowest grade of coal is used for calcining, as it answers very well, and is obtained literally almost for hauling it away. But the amount of ash it produces is beyond anything I ever saw, and I believe amounts to one-third the bulk of the original coal.

Below the river bank, opposite the works, gushes forth "The Giant Spring," said to be the largest spring in the United States. At any rate, it nearly doubles the volume of the Missouri at this point, and is a wonderful phenomenon. The country rock consists of nearly horizontal layers of red sandstone, and it is between these layers that the water has worn subterranean channels from the distant mountains.

And here, the night before leaving, I experienced a sad disappointment: Deacon died an awful death. Knowing that he constantly suffered from the chilly Northern air, I placed his box in the evening on a steam radiator, which gave out only a trifle of warmth, and which I was assured would not be heated up again.

But the fireman, in an excess of zeal, made a fresh fire under the boiler, and the poor lizard was baked to death in his box.

I had really become quite attached to him, as he had learned to recognize me, and would manifest pleasure when I stroked him, while if a stranger attempted similar liberties he would open his mouth to its fullest extent and hiss loudly at him. I left his mortal remains with my friend Sticht, who is to have him stuffed, and keep him as a souvenir.

"REQUIESCAT IN PACE."

THE THORNYCROFT MARINE WATER-TUBE BOILER.

Mr. John Isaac Thornycroft recently read a paper before the British Institution of Civil Engineers on the subject of "Water-Tube Steam Boilers for Marine Engines," in which he describes the boiler of his design, which has been adopted in some of the latest high-speed torpedo boats, and gives a record of tests which are quite remarkable.

The Thornycroft boiler consists of a horizontal water and steam drum about 30 inches in diameter, the water-level being carried about the middle, and two smaller water drums, one on each side of the furnace, and a nest of curiously curved tubes, 1½ inches in diameter, connecting the water drums and the steam drum. The tubes are expanded into the upper portion of the steam drum, opening into the steam space. Their curved form avoids the evils of unequal expansion and contraction. The tubes are shaped so as to make an arch over the fire, only allowing escape for the products of combustion by a series of openings a little above the surface of the fire. In the upper portion of the arch each tube by touching its neighbor forms practically a continuous roof, and incloses a large fire space above the fire bars, extending the whole length of the boiler.

The upper horizontal drum acts as a steam and water separator. It contains a number of baffle plates and an internal dry-pipe.

Mr. Thornycroft's firm, by changing the form of boilers used for high speed vessels from locomotive to water-tube, has been enabled to reduce their weight by one-third. This reduction in weight has been accompanied by superior steaming power, economy of fuel, and less forcing of the fires, and besides the safety of the boats and of the crew have been greatly increased. The first water-tube boiler put into a torpedo boat afforded a very satisfactory means of comparison between the new boiler and its locomotive rival, which had been placed in a sister vessel. The boat fitted with the water-tube boiler showed a speed of about one knot faster than its rival, under natural draught, and the full power trials showed a difference of 0.67 knot speed in its favor. Evaporative tests made by the Portsmouth authorities indicated that equal duty could be obtained from the two boilers when the proportionate quantity of water evaporated was 2.36 from the water-tube to 1.00 from the locomotive boiler. The highest pressure hitherto used in these boilers has been 250 pounds to the square inch.

The tests were made by Prof. Alex. B. W. Kennedy, and a condensation of the results found by him is given below.

TESTS OF THORNYCROFT BOILER.

Heating surface, 1,837 square feet; water surface, 30 square feet. In trials "D" and "E" the grate was reduced to 26.2 square feet. Ratio of heating to grate surface, 61.2 and 70.1 to 1.

Analysis of Coal.

	Per cent.
Moisture.....	0.96
Asb.....	2.19
Carbon.....	87.76
Hydrogen.....	4.11
Sulphur, nitrogen and oxygen, by difference.....	4.98
	100.00

By calculation the coal has a calorific value of 14,900 thermal units per pound, which is equal to that of 1.025 pounds pure carbon. Each pound of coal is therefore capable, if completely burnt, of evaporating 15.41 pounds of water from and at 212 degrees Fahr.

The Thornycroft boiler is, no doubt, very economical in fuel when run at a moderate rate, but Professor Kennedy has certainly not added to his reputation as a careful experimenter by allowing such figures as those above given to be made public. He says in his report: "It is only right that I should say that this is the highest boiler efficiency I have ever found upon any trial with which I have had to do, if indeed it be not, as I almost think it is, the highest on record in any trustworthy manner." The figures of efficiency, heat lost in chimney gases, and heat lost by radiation, in test D, are utterly beyond the limits of credibility. In test E there was nearly seven times as much water evaporated, and more than eight times as much coal burned as in test D, and as the surfaces of the boiler which radiate heat externally were practically of the same temperature in the two tests, it would naturally be expected that in the test D the percentage lost by radiation would be many times larger than in the test E, yet the figures show the exact reverse—that when the boiler was driven at a high rate the percentage of heat lost by radiation was twice as much as when it was driven slowly.

In the discussion on the paper, Prof. W. C. Unwin criticised these tests most severely, as they deserved. He said he wished to utter a protest against bringing forward short trials of that kind, and speaking of them in the way in which Professor Kennedy had spoken. He did not

TEST.	A.	B.	C.	D.	E.
Draft.....	Natural.	Natural	Pressure	Pressure	Pressure
Duration of test.....	5 hours.	4 h. 57 m.	0.27 in.	0.49 in.	2 in.
Steam pressure.....	186 lbs.	181.3 lbs.	5 h. 9m.	4 hours.	2 hours
Coal burned per hour..	334 "	203.3 "	171.2 lbs.	149.4 lbs.	189.5 lbs
Coal burned per sq. ft.			559.0 "	894 "	1751. "
of grate.....	11.1 "	7.74 "	18.60 "	29.80 "	66.80 "
Feed water per hour...	Not taken.	2281 "	5852 "	8583 "	15,554 "
Water per pound of coal from and at 212°.	" "	13.40 "	12.48 "	12.00 "	10.29 "
Analysis of flue gases by weight.					
Co.....	12.63 lbs.	17.10 "	Not taken.	17.00 "	18.40 "
Co.....	0.37 "	8.10 "		0.55 "	2.15 "
O.....	11.47 "	8.20 "		7.82 "	4.15 "
N.....	75.33 "	74.60 "		74.60 "	75.30 "
Air used per pound of coal.....	24 "	18.14 "	Est. 17.8 lbs	17.4 "	17.2 "
Temperature of flue gases.....	474° F	421° F	540° F	610° F	777° F
Efficiency of boiler, per cent.....		86.8	81.4	78.2	66.6
Heat expended in raising temperature of furnace gases.....		10.8	15.0	16.5	20.3
Heat lost in formation of carbonic oxide.....		0.5		5.0	9.2
Heat lost by radiation, or otherwise unaccounted for.....		1.9	3.6	2.3	3.9

know any trial in which the radiation was as small as 1.9 per cent. Such a figure was more remarkable than the 13.4 pounds of water evaporated per pound of coal. The trials themselves seemed to show that it was an impossible value, which ought to have raised a little suspicion.

But leaving aside the claims for economy of the Thornycroft boiler, which are rather too high for belief, it is no doubt as economical of fuel as any other boiler can be made. The question of the permanent adoption of any boiler of this kind in marine service is not one of economy of fuel, but economy of weight and space, of durability under the severe conditions of ocean service, of facility of making repairs and of a capacity to furnish dry steam. Thus far the Thornycroft boiler has shown a creditable record in these particulars. One of them has been in use now over three years, and its performance has been quite satisfactory. There is no doubt that this type of boiler is far ahead of all other types in economy of weight and space, in safety and in ability to stand far higher steam pressures than are now used in ocean steamers. In economy of fuel they are at least equal; and the only questions concerning them which remain to be definitely settled in their favor, or in which there is a chance for still further invention and improvement, are those concerning durability, repairs and the giving of dry steam.

TWO HUNDRED-TON HYDRAULIC RIVETING PLANT.

The plant we illustrate, the description and cuts of which we borrow from our contemporary, *Industries*, has been designed and erected by Mr. W. Payne-Gallwey, of Messrs. Anderson & Gallwey, of 274-277 Strand, London. The gap of this machine has been made 12 feet deep, so as to deal with the largest work ever required, and has been given a closing power of 200 tons. It is capable of closing rivets up to 3 inches diameter, though most of the work at present will not require rivets of more than 1½ inches diameter.

A view of the machine when arranged for work is shown in Fig. 1, and in Figs. 2 and 3 the accumulator and a section of it.

The nature of the ground upon which the plant is erected was so treacherous that the customary mode of making the machine framing of a massive casting had to be abandoned and a new method of designing the main framing had to be arranged.

After much thought had been given to the matter, it was decided to build the frame of steel plates 1½ inches thick, and to stiffen them with angles and internal bulkheads. The reduction in weight accomplished by this novel arrangement is very considerable, while the rigidity and stability are very great. In the construction of this framing, the rivet holes were drilled in position and the rivets were closed by one of Messrs. Anderson & Gallwey's "Eagle" riveters. The holder-up or hob is of solid cast steel, and weighs about 13 tons. It is secured to the frame by two forged steel bolts eight inches in diameter, whose threads are swelled up and cut of saw-toothed section, the thrust face of the threads being vertical. Between the hob and main frame there is a distance piece, which is made of plates of box section. The cylinders and rams are all of cast steel. The main or rivet-closing ram is hollow, and within it is the plate-closing ram; by this arrangement a pressure of 100 tons is first brought to bear on the plates to close them; then another 100 tons is put on the rivet; and afterwards the entire pressure of 200 tons is put upon the rivet head and plate.

The steam traveling crane is composed of an oak gantry which has a 41-foot span and is 50 feet high; it is designed to raise and manipulate a complete marine boiler weighing anything up to 50 tons. The power is obtained from two engines, whose cylinders are 8-inch diameter by 10-inch stroke; double 1-inch chains are used, and they work through cast-steel pitch wheels. The cross beams are of oak 18 inches square, trussed with eye bars.

The hydraulic power is supplied by duplex horizontal direct-acting pumping engines. These pumps have two high-pressure steam cylinders, each 23-inch diameter by 18-inch stroke. The pump ends are 3½-inch diameter, and have double rams connected by side rods. The output is 70 gallons per minute at a pressure of 1,500 pounds per square inch. Two steel locomotive type boilers supply steam to the pumps and to the crane; each is capable of working the entire plant independently, and can do duty equal to about 130 I. H. P. The exhaust steam is partly used in a feed heater of the horizontal multitubular type, and the rest is discharged up a special upcast pipe, or into the chimney. The accumulator for the riveter is of large proportions, and the tower in which it works and is guided, is a structure composed of 12 inch by 6 inch rolled joists, stiffened with T braces and angular struts. The whole stands on a base made of 12 inch by 6 inch joists,

which are stiffened at the top and bottom by $\frac{1}{4}$ inch plates. Its stability is such as to allow of the canting of the whole, with its loaded counterweight box containing 100 tons, at an angle of 15 degrees, this precaution being taken on account of the treacherous nature of the foundations. Some idea of the necessity of this provision may be gained when it is stated that it has to stand within a few yards from a river bank, and that upwards of eighty 70-foot piles have been driven to obtain a firm base. The accumulator ram is 14 inches in diameter, and works in a cast-steel cylinder allowing a 10-foot stroke. The boiler force pump is supplied with a lever for hand working.

The complete plant presents a very massive appearance, and is even larger than it looks, as about one-third of the frame is below the level of the platform, as shown in the illustration.

THE WATERS OF THE PASSAIC RIVER AND ITS TRIBUTARIES—THE SELF PURIFICATION OF STREAMS.

By Henry Wurtz, Ph. D., with the Assistance of Durand Woodman, B. Sc.*

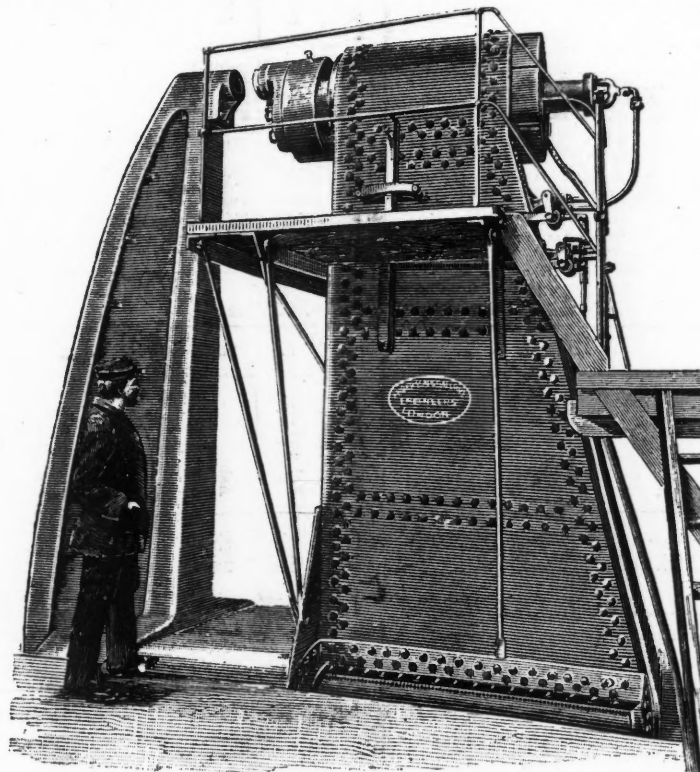
(Concluded from page 450.)

First it may be stated that the amount of organic matter found in solution in oceanic waters is so small that statements of analyses rarely refer to it as present at all; so that to a chemist the inferential proof that the figure in column 5 of Table VII. represent organic matter derived practically altogether from drainage, amounts to demonstration, because no other source of any importance can be indicated or suggested possess-

TABLE X.

Comparative Influences of Drainage into the Passaic above and below the Dundee Dam.

MEANS.	5.	5a.	8.	8a.	14.
	Total organic matter.	Organic matter relatively to sewage of tidal population.	Total salt.	Salt traced positively to sewage of tidal population.	Total nitrogen.
1. Of water above Passaic Falls....	1'166	.....	194	.....	0'322
2. Of water of Dundee Canal.....	1.104	.....	435	.....	0'250
3. { Of the Tidal Channel: "Normal" waters of Table VI.....	1.394	.....	938	.....	0'418
4. { Of the Tidal Channel: Highly polluted waters of Table VII.....	5'396	3'175	17'000	9.882	.0549
5. { Of all from the Tidal Channel (except freshet waters of Dec. 30).....	3'499	2'836	12'141	6'175	.0493



200-TON HYDRAULIC RIVETER—FIG. 1.

ing any probability whatever. The only objection—and this but a trifling one—that is possible, is that part of the loss on ignition may have arisen from oxidation of magnesium dichloride derived from sea-water. Therefore I have thought it best to introduce another computation, in which the maximum possible allowance is made for this by multiplying the salt figures in column 6 of Table VIII. by '081, a coefficient found to express the average ratio in analysis of ocean water of the salt to the loss in complete oxidation of all MgCl² present. At the same time due deduction is made in column 3 of the amount of organic matter introduced into the tideway from up the river through the Dundee Canal (Table V., column 5). The results are shown in percentages in column 9 (Table IX).

Another table (Table X.) may now be brought in, which shows at a glance the relative amounts of impurity attributable respectively to the population between the Falls and the Dundee dam, to the riparian population of the tidal reach above Newark, and to the population of Newark itself.

Here we see first, in columns 5 and 14, the work of this river during its downflow in destroying and abolishing its impurities, which only get the mastery of it in the tidal upflows through Newark, these overloading the water with organic matter. In the salt only, column 8, do we perceive a regular progression, which should approximate to that of the population. Concentration by evaporation, however, it must be remembered, comes in here, as always, as a factor of some fractional weight, and in the exceptional circumstances of a season of unexampled drought, not to be neglected. Every rational allowance being made, however, column 8 presents a striking exhibit.

F. REMEDIAL CONSIDERATIONS.

Pertinacious denials were formerly made, and frequently reiterated, of several of the facts now conclusively demonstrated by these analyses, namely: the fact of pollution in the Passaic

water as distributed for domestic use in Newark, Jersey City and Hoboken; the fact of the derivation of most, or even of any, of such pollution from Newark; the fact that any of the polluting matter from Newark is conveyed by the tides as far up as the Jersey City and Newark pumps; the fact that the proportionate amount of pollution from Paterson was small; the fact that any or all of the latter failed to reach the tideway, and so on.† A recent application to the Legislature for permission to dam the Passaic at or below Belleville, appears, however, to foreshadow some change in public opinion. Other remedies may be indicated. The simplest and cheapest, which certainly would furnish a far purer supply for many years to come, would be merely to carry pipes from the present Newark and Jersey City pumping stations to the Dundee Canal. We have proved that from August last to January last, this canal conveyed water averaging less than half the nitrogenous impurities contained in the water at the Newark pumps (See Table X., column 14), and indeed water appreciably purer than that above the falls at Paterson.

Another remedy, which I have years ago urged with all my power, is one which would remedy the difficulty almost for all time to come. This is to convert the Morris Canal into a channel of water-supply to all the northern New Jersey population. There would thus be attained a water-supply of immense volume and of the highest grade of purity that occurs on any large scale among natural waters; coming from the hill-streams and lakes of your New Jersey highland region of crystalline rocks. This high degree of purity was proved by me in my Report to Newark and Jersey City in 1873.‡ I have taken the opportunity to confirm it in the

† It must be remembered that this was written seven years ago. Nevertheless the most prevalent popular views, certainly in Jersey City, are even now in accordance with the above. Within a year, distinguished members of the medical profession in that city have publicly expressed views substantially in consonance with the above.

‡ For further references to this part of the subject, see my letter to the ENGINEERING AND MINING JOURNAL, prefatory to this report.

*Report to the Board of Alderman of the City of Paterson.

TABLE IX.
Demonstration of the Derivation of large proportions of the Organic Matter of the Polluted Tidal Waters of the Passaic from Influx of Sewage.

1.	2.	3.	4.	5.	6.	7.	8.	9.
Original number.	Organic matter Total.	Organic matter in the Dundee Canal.	Increase of volatile matter during tidal flow.	Salt assumed as possibly from ocean brine (Table VIII., column 6).	Ratio of NaCl in ocean brine to assumed loss of HCl from MgCl ₂ on ignition.	Assumed loss of HCl from MgCl ₂ subtrahend from column 4.	Difference between Cols. 4 and 7: Organic matter traced positively to sewage of tidal population.	Percentage of organic matter of tidal origin thus traced positively to sewage of tidal population.
28.	1.633	— 1.104	= .529	.0339	× .081	= .0028	.5262	99.5
30.	2.916	— 1.104	= 1.812	2.0227	× .081	= .1639	1.648	91
29.	3.149	— 1.104	= 2.045	3.1301	× .081	= .2535	1.792	88
10.	3.237	— 1.104	= 2.133	1.6724	× .081	= .1354	1.998	94
8.	6.415	— 1.104	= 5.311	18.5094	× .081	= 1.499	3.812	72
21.	10.264	— 1.104	= 9.160	31.3123	× .081	= 2.536	6.624	72.5

TABLE XI.
Waters of the Morris Canal.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Ordinary number.	LOCALITIES.	DATES.	Total solids.	Organic.	Ash.	Common salt.	Sulphuric oxide.	Ammonia (as such).	Ammonia albumenoid.	Ammonia from N acids.	Ammonia total.	Total Nitrogen.	
17	Long level, above Paterson	Sept. 29, 1881	2.496	1.283	1.213	.....	.419	None.	.0047	.0093	.0140	.0115
24	Long level, above Paterson	Oct. 31, 1881	2.939	.983	2.006	.....	.200	.0006	.0047	.0093	.0146	.0120
32	Long level, above Paterson	Nov. 14, 1881	4.182	1.167	3.015	.....	.181	.0038	.0070	.0053	.0161	.0133
43	Long level, above Paterson	Dec. 31, 1881	3.044	.874	2.170	.....	.190	.0047	.0082	.0093	.0221	.0181
	Means.....		3.165	1.064	2.101	.....	.190	.0023	.0062	.0083	.0167	.0135
	{ Mean of Table III., above falls.....		4.918	1.166	3.752	.....	.194	.0056	.0125	.0210	.0391	.0322
	{ Differences, in favor of Morris Canal.....		1.753	.102	1.651	.....	.291	.0033	.0063	.0127	.0224	.0187
	{ Mean of Table V., Dundee Canal.....		5.805	1.104	4.667	.....	.435	.0040	.0089	.0172	.0304	.0250
	{ Differences, in favor of Morris Canal.....		2.640	.040	2.566	.....	.245	.0017	.0027	.0089	.0137	.0115
	{ Mean of Table XII., Croton.....		4.214	1.108	3.103	.....	.200	.0021	.0051	.0184	.0178	.0413
	{ Differences, in favor of Morris Canal.....		1.049	.044	1.002	.....	.110	.0028	.0122	.0095	.0246	.0205

TABLE XII
Waters of the Croton Aqueduct, New York City.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
	LOCALITIES.	DATES.	Total solids.	Vol. and combustible.	Ash.	Salt.	Sulphuric oxide.	Free NH ₃ .	Albumenoid NH ₃ .	Nitrates.	Total NH ₃ .	Total N.	
11	New York hydrant.....	Sept. 12, 1881	3.872	.876	3.056	.....	.535	.0053	.0172	.0204	.0429	.0353
27	New York hydrant.....	Oct. 31, 1881	3.292	1.021	2.274	.....	.276	.0041	.0204	.0109	.0354	.0292
39	New York hydrant.....	Dec. 19, 1881	5.471	1.487	3.989	.....	.124	1.046	.0058	.0175	.0222	.0455
	Means of Nos. 11 and 27.....		3.58	.919	2.665	.....	.276	.408	.0047	.0188	.0157	.0392
	Means of all three.....		4.21	1.108	3.103	.....	.200	.621	.0051	.0184	.0178	.0413

TABLE XIII.
Chemical Changes in the Passaic River, at Six Stages of its Flow.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
No. of stage.	STAGE OF THE RIVER.	Total solids.	Total organic matter.	Mineral.	Common salt.	Sulphuric oxide SO ₃ .	Ammonia (as such).	Ammonia albumenoid.	Ammonia from N-acids.	Ammonia Total.	Total Nitrogen.		
1.	Untampered head waters, Morris Canal; mean of 4, at different dates.....	3.165	1.064	2.101	.190	.511	.0023	.0062	.0083	.0167	.0135		
2.	River entering Paterson, above falls; mean of 5, different dates.....	4.918	1.166	3.752	.194	.802	.0056	.0125	.0210	.0391	.0322		
3.	River leaving Paterson, Broadway bridge; mean of 3, different dates.....	5.008	1.409	3.600	.285	.765	.0035	.0146	.0194	.0375	.0309		
4.	River leaving Dundee Canal; mean of 4, different dates.....	5.805	1.104	4.667	.435	.848	.0040	.0089	.0172	.0304	.0250		
5.	Down flow in Tidal Channel; mean of 5, different dates.....	6.752	1.394	5.358	.938	1.081	.0101	.0090	.0364	.0508	.0418		
6.	Up flow, carrying Newark sewage; mean of 5, different dates.....	31.710	5.396	26.514	21.193	2.084	.0111	.0159	.0375	.0667	.0549		

course of the present investigation. Table XI embodies the results, as well as interesting comparisons with our other figures.*

* Since writing the above I have encountered an analysis of the Long Level of the Morris Canal, made in 1876, in the N. J. Geol. Report of that year, p. 15; which is very interesting in comparison with ours, and which I have, therefore, here recomputed to the same standard as ours:

	Cook & Bogardus, midsummer, 1876.	Wurtz & Woodman, mean of 4; Sept., Oct., Nov. and Dec., 1881.
Total solids.....	3.169	3.165
Vol. and combustible.....	1.064	1.064
Mineral matters.....	2.085	2.101
Common salt.....	.138	.190
Sulphuric oxide.....	.229	.511
Ammonia (as such).....	.0008	.0023
(albumenoid).....	.0102	.0062
(from N-acids).....	undetermined.	.0083
Total nitrogen.....	.....	.0135

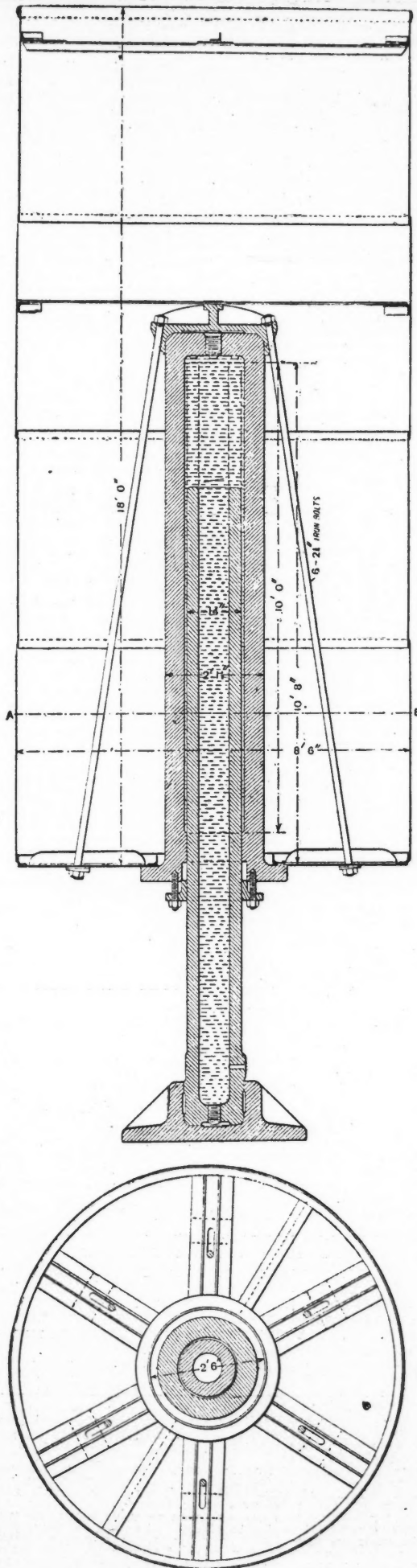
Had Professors C. and B. but given the NH₃ from N-acids, a strikingly close corre-

G. SADDLE RIVER AND ITS IMPURITIES.

Examination of all the affluents of the Passaic was a task far beyond the scope of this report, but my attention was called to this, its largest tributary below Passaic Falls, by complaints of residents of its banks, below the chemical and dye works at Lodi, to the effect that what was formerly a beautiful, pellucid and wholesome stream was now turbid, dark-colored, filthy and repulsive, unwholesome for both men and animals. Time allowed the obtaining only of the two sets of analytical figures, 14 and 15, in Table I. These point to a confirmation of the above

spondence in every particular, except one, would no doubt have appeared between these two analyses made some five years apart, upon this Long Level water. The cause of difference in the sulphates, the only appreciable difference as shown above, must have been connected in some way with the difference of season.

Professor Cook, director of the N. J. State Geological Survey, evidently had not become aware of the alleged poisoning of cattle, the insufficiency of volume, and so on, so widely alleged at that day, of the canal. Allegations were brought forward also by a distinguished professor, in New Jersey public journals, as well as by hosts of other writers, against the facts and conclusions in my report of 1873. For example, the Morris Canal was asserted to be nothing but a "huge open drain." Professor Cook says in 1876 of this canal, that "the water is unexceptionable in quality, sufficient in quantity with its present reservoirs to supply 35,000,000 gallons daily, and capable of having its supply enlarged indefinitely," with other remarks largely confirmatory of my own views published three years before. (See New Jersey Geological Report for 1876, p. 46.)



ACCUMULATOR OF 200 TON HYDRAULIC RIVETTER. - FIGS 2 AND 3.

statements. The total solid contents were more than trebled by the pollution from Lodi, the organic matters doubled, the nitrogenous matters also doubled, and the sulphates were increased more than eightfold.

H. COMPARISONS OF PASSAIC WATER WITH CROTON WATER.

It was thought that some interest would attach to a few analyses of the Croton water, during the great drought, especially in comparison with the Passaic. Three samples were therefore taken, and the results are brought together in Table XII. The large increase of dissolved matters in December I am at a loss to explain fully. The amounts of organic matters and of salt were not far from those in the Passaic above the Falls, but the mineral matter was distinctly less, and the total nitrogen about the same. In the Croton the albumenoid matters were some 47 per cent. larger than in the Passaic, and about 200 per cent. larger than in the Morris Canal.

J. CONCLUSION.

A general review shows that we have obtained quite complete and satisfactory data regarding the chemical composition of the Passaic at six important stages of its flow, during the four months of September to December, inclusive, 1881. In the course of this report there have been presented, moreover, rational and consistent theories of the causes of the principal changes of composition throughout these six stages. In table XIII. they are presented in succession.

First Stage.—This is represented by the Morris Canal, chiefly and directly fed from the Highland hillstreams of your State, unexcelled in purity. Lake Hopatcong, the Summit Canal reservoir, it should, however, be remarked, does not naturally belong to the Passaic watershed, but to that of the Delaware; its tributaries, nevertheless, interlock with those of the Passaic, and rise in the same crystalline rocks.

Second Stage.—Represented by the river just above the Passaic Falls. The increments shown here of dissolved matters above those in the canal cannot be attributed in any important measure to *evaporation*, which takes place from both channels. The salt is the same in both, the sulphates considerably larger in the river, the total organic matter but little larger, while the albumenoids are doubled, and the total nitrogen more than doubled in the river. This last increase, with that of the sulphates, is easily traceable to the much larger drainage from animals and fertilized lands received by the river before arriving at this stage.

Third Stage.—Represented by the river at the Broadway Bridge, before entering the Dundee Lake, after receiving the total sewage of Paterson, but subsequently furnishing nourishment to extensive masses of aquatic plants and animals, and rippling through some miles of shallow rapids, which, with the aeration and oxidation consequent upon these conditions, and upon the basic composition of this river, has effected the absolute absorption and destruction of almost the whole of the Paterson sewage matters. Of the latter, the only chemical evidences left are the salt, which has been increased about 50 per cent., the total organic matter, which has increased only 21 per cent., and the albumenoids, which now average more than double the proportion in the first stage, the canal, though still not large enough to condemn the water for potable purposes, even at this point. Moreover, the total nitrogen has been kept down, so that it barely exceeds that above the Falls. The sulphates, by fertilizing the water weeds, have actually been reduced in amount.

Fourth Stage.—Represented by the current in the Dundee Lake outlet, or Dundee Canal. The water has here undergone evaporation, but at the same time much further aeration and depuration by its slow passage through the expanse of the lake. Thus, we find that, while the total solids have increased by concentration, the total organic matter has been partly consumed, so that it has fallen to less than 4 per cent. more than in the first stage. The salt and sulphates have both increased, while the albumenoids have now decreased to a figure not greatly above the first stage, and the total nitrogen has also decreased nearly 20 per cent. during the lake passage, so that now both this and the albumenoids are appreciably less (the former 22, the latter 29 per cent. less) than above the Falls before entering Paterson.

Fifth Stage.—Represented by what we have concluded to be the "normal" composition of the downflowing tideway waters when free from the great influx of sewage from Newark. The increase of nearly a grain per gallon of total solids, half of which is salt, is due to several causes, one being evaporation, another local sewage influx. The increase of sulphates, over one-fifth of a grain, may be partially from the Lodi Chemical Works, as already shown. The total organic matter increases 26 and the total nitrogen as much as 67 per cent., although, rather unexpectedly, the albumenoids do not increase at all, but must be destroyed by the downflowing current and converted into the innocuous forms of ammonia salts and nitrogen acids about as fast as they enter.

These latter two components, accordingly, have increased at the rate of 152 and 112 per cent. respectively.

Sixth Stage.—Represented by samples—mostly Newark hydrant waters—showing large sewage pollution. Here the salt has increased over 22 times, the sulphates are doubled, and the total organic matters increased four-fold, over the downflowing tidal current of the fifth stage. Nevertheless, very curiously again, the albumenoids have not increased proportionally, but only about 77 per cent., now being but little more than at the Broadway Bridge, at the head of Dundee Lake. The destructive action of Passaic water on animal and animalized matters appears, therefore, to prevail at all stages of the river's flow. The total nitrogen in this sixth stage is but 31 per cent. larger than in the fifth stage, though 70 per cent. larger than in the water above the Paterson Falls, 120 per cent. larger than in the Dundee Canal, and 307 per cent. larger than in the Morris Canal.

Alterations in Conductivity by Heat.—The alterations in the conductivity of pure copper, aluminum and magnesium, and of commercial zinc and German silver, after a lengthened exposure to a high temperature, have recently been investigated by J. Bergmann. Disks, 70 millimeters in diameter, were heated to 300 degrees C., and maintained at that temperature for one hour, and then allowed slowly to cool. The conductivity of copper was increased by something like 2.4 per cent. by this process; that of aluminum, magnesium and zinc being increased respectively 5, 6.8 and 2.4 per cent. The conductivity of the alloy was, on the other hand, diminished by about 2 per cent.

PERSONALS.

Mr. F. M. Endlich, mining engineer and metallurgist, of Socorro, New Mexico, has taken the management of the Yankee Boy Mines, of Ouray, Colo.

Mr. G. C. Hewett has been appointed superintendent of mines of the Union Pacific Railroad system, vice Mr. Thomas Middleton, resigned. The appointment took effect April 10th.

Mr. Geo. W. Maynard, mining engineer, of New York, will shortly leave for Osceola, Nev., to manage the operations of the Osceola Gravel Mining Company. He will remain West until next fall.

Mr. E. G. Stoiber has retired from the firm of Stoiber Bros., the owners of the Stoiber Sampling Works, at Silverton, Colo. The business of the firm and of the works will be carried on by Mr. G. H. Stoiber, as sole proprietor.

Mr. J. W. Parker, late with Messrs. H. M. Sciple & Co., of Philadelphia, Pa., has taken out the agency of the Ball Engine Company, and has opened an office at 38 South Fourth street, Philadelphia. Mr. Parker has been selling the Ball engine for some years, and is well-known to the trade.

The programme for the next convention of the Amalgamated Association of Iron and Steel Workers, to be held in Pittsburg, Pa., commencing on June 1, has been issued. The most important recommendation in regard to proposed changes comes from the puddlers. It is reported that a great many of them will ask the convention to change the scale for puddling from \$5.50 to \$6 per ton. It is also expected that the weighers and catchers will ask an advance from the rollers, and that it will be vigorously opposed.

In our issue of April 5th we exposed the recent humbug, called Schmiedbarenguss, and its promoter, Charles L. Hartsfeld, of Newport, Ky. The Cincinnati *Enquirer* of 17th inst. states that he has been arrested and bound over in \$500 on the charge of using the United States mails for fraudulent purposes. It says—we quote literally—"Hartsfeld is the originator of the Hartsfeld Portable Smelting Company, the Newport Aluminum and Still Company, and the Schmiedbaren Gas Heating Company." He advertised his humbugs throughout this country and in Germany, the bills ranging from \$10 to \$40. Scores of drafts came to the Newport bank and were returned dishonored. Finally the post-office authorities investigated, and the result was Hartsfeld's arrest. It is now time for Messrs. Otten & Westenhoff, chemists, of Cincinnati, to rise and explain how they obtained a tensile strength of 200,000 pounds per square inch with "Schmiedbarenguss," if they really did so, as was stated in Hartsfeld's circulars.

OBITUARY.

Thomas Gill Nock, president of the New York Locomotive Works in Rome, N. Y., died on the 20th inst. in that city. Mr. Nock was sixty-one years of age. When he was about twenty years old he entered the iron business with his father, George Nock. At Windsor Locks, Conn., Mr. Nock was superintendent of the E. G. Ripley & Co. Iron and Steel Works, which position he held until he went to Rome in 1864. There he became superintendent of the Rome Iron Works. In 1882 the New York Locomotive Works were erected in Rome and Mr. Nock was made their president.

SOCIETIES.

ENGINEERING ASSOCIATION OF THE SOUTHWEST.—A very interesting meeting of the Engineering Association of the Southwest was held at the Galt House, Louisville, Ky., on the evening of April 11th, at which President MacLeod, of Louisville, presided, and at which twenty-five members from Louisville, Ky.; Cincinnati, O.; Buffalo, N. Y.; Nashville, Tenn.; Chattanooga, Tenn.; Covington, Ky.; Fayetteville, Tenn.; New Albany, Ind., and Jeffersonville, Ind., and twenty visitors were in attendance. A very cordial address of welcome to the Association was made by Col. Bennett H. Young, of Louisville, and letters of regret were read from Chas. D. Jacob, Mayor of Louisville, and Edward McGuire, Captain of Engineers, U. S. A., recently transferred to Louisville. Hunter McDonald, of Fayetteville, Tenn., and Granville W. Shaw, of Louisville, were appointed tellers to canvass the ballot for election to membership, which resulted in the election of the following gentlemen: As members: Robert L. Engle, Engineer in charge Louisville & Jeffersonville bridge, Louisville, Ky.; Graham Macfarlane, Consulting Engineer on coal and iron matters, Louisville, Ky.; Harry P. McDonald, architect, Louisville, Ky.; Thomas Sharp, president and general manager of the Shoal Creek Iron Company, and secretary and general manager of the Smith & Sharp Mining Company, Nashville, Tenn. As associates: Lewis Collins, president Collins Varnish Company, Louisville, Ky.; Udolpho Sneed, vice-president and business manager of the Sneed & Co. Iron Works, Louisville, Ky.; James B. Speed, cement manufacturer, Louisville, Ky. A communication was read from Mr. Wm. P. Shinn, chairman of the Committee of the American

Society of Civil Engineers, on the revision of its constitution relative to the matter of proposed forms of affiliation of local engineering organizations with the American Society of Civil Engineers, requesting this Association to formulate its views and submit them by either report or by personal representation at a meeting of the committee of the American Society at New York in June, 1890. The matter is referred to the executive committee of the association with instructions to report at the May meeting. The programme of the evening was introduced by a paper entitled, "Excavating Under Pneumatic Pressure," by Mr. Charles Hermany, chief engineer of the Louisville Water Company, Louisville, Ky. The paper comprised a brief historical outline of the development of the present forms of excavating under pressure with descriptions of the various devices employed. The paper gave particular attention, however, to a description of the construction and workings of the O'Connor excavating bucket which Mr. Hermany had found very successful in the sinking of his immense pneumatic caisson for the foundations of the new pumping station in the bed of the Ohio River at Louisville. The device consists of a cylindrical bucket working in a cylindrical shaft that extends from the open air above to the working chamber of the caisson, with the bottom of the shaft closed and access to it given through air-tight doors in its side near the bottom. The upper end of the bucket, which is closed at top and bottom, and has openings at the side to correspond with the openings in the shaft, is fitted with an extension or flange, which forms a conical air-tight valve, the seat of which is attached to the shaft and is of sufficient diameter to permit the whole bucket, except the top, forming the valve to pass freely through. To operate the system the bucket is lowered until the valve seats itself. The lower portion of the shaft is thus shut off from communication with the open air by the conical valve forming the top of the bucket. The air pressure in the caisson is then turned on to the portion of the shaft below the valve, the doors in the side of the shaft opened, and the operation of filling the buckets through these doors and the corresponding openings in the side of the bucket is effected. When ready to be hoisted the doors entering the side of the shaft are closed, the air pressure in the lower portion of the shaft is released and the bucket is hoisted out of the shaft. While the lower portion is under pressure, the bucket valve is held to its seat against the upward air pressure below the valve by three conical-pointed screws that pass through the shaft and hold down the valve against its seat. When the bucket is to be hoisted these are backed out of the way. The second paper of the evening, entitled, "Foundations of the Louisville & Jeffersonville Bridge," which is now under construction, was read by the engineer in charge, Mr. Robert L. Engle, of Louisville, Ky. The structure will be a single track railway bridge with 5-foot side walks on each side, and street traffic will be carried over by trains on flat cars with suitable railing and gates, a platform being built at each end of the bridge to allow teams to drive on and off. This arrangement is similar to that now in effect at Omaha, Neb. and a similar plan will be employed on the new Merchants' Bridge at St. Louis soon to be opened for traffic. Beginning at the Jeffersonville side, the bridge entire comprises an iron viaduct approach 4,073 feet in length with a maximum grade of 0.9 feet per 100, then one span of 210 feet in length, one of 550, one of 553, one of 550 and two of 341, closing with the Louisville approach, and will be an iron viaduct 2,740 feet in length, with a grade of 1.2 feet per 100, making the total length of iron work a little over 1½ miles. The bridge will have no draw span, as the lowest point of the substructure will be 53 feet above high water and 92.3 feet above low water. Counting from the shore end of the 210-foot Jeffersonville span, piers Nos. 1, 6 and 7 will be composed of three-eighths inch iron shells filled with concrete, No. 1 resting on rock, and Nos. 6 and 7 resting on pile foundations. Nos. 2, 3, 4 and 5 will be masonry piers composed of dimension face-stones, with concrete backing. No. 2 was built on bed rock in an open coffer dam. No. 5, which is now completed to high water, was sunk to 44 feet below low water by pneumatic caisson and a crib, and is the pier at which the accident occurred on January 9th, by which 14 workmen lost their lives by the escape of the compressed air from the caisson. Nos. 3 and 4 will be sunk similarly to No. 5, though as yet no work has been done on them except to build the caissons which are now floated and waiting for the river to fall. Sooy Smith & Co. are the contractors for the substructure. Both the papers of Mr. Hermany and Mr. Engle, with their drawings, will be published by the association at an early date. The discussion of Mr. Engle's paper drifted into a discussion on concrete and hydraulic cement in which the cause of the setting of cement was discussed. On motion of Mr. E. C. Lewis, Messrs. Olin H. Landreth, William L. Dudley and Granville W. Shaw were appointed a committee to report on the present state of knowledge relating to the cause of the setting of cements and mortars.

The programme for the following day's entertainment of the Association was, then read, and an invitation extended to the Association by the Louisville Southern Railroad to pass over its line

and inspect its new Young High Bridge at Tyrone. The Association then adjourned to meet at Nashville on May 8th.

On Saturday, the 12th inst., the association was very pleasantly entertained by the resident members, aided by the proprietors and managers of the leading industrial establishments and railroads centering in Louisville. They were taken by the elevated road to visit the Kentucky and Indiana bridge and the Louisville bridge. They were then driven in carriages through the tornado district, and were then taken to inspect the Louisville Water Company's pumping station, the water tower of which was entirely demolished by the recent tornado. The excursion stopped on the way to inspect the substructure work of the new Louisville and Jeffersonville bridge, and while returning were given a lunch on the train. The remainder of the afternoon was spent in a trip to the Crescent Hill reservoir, the storage plant of the Louisville water system. While at the latter point, the association was called to order in the gate house, and the following resolution was adopted: *Resolved* by the Engineering Association of the Southwest that the thanks of this body be tendered to the Kentucky & Indiana Bridge Company; the Jeffersouville, Madison & Indianapolis Railroad Company; the Louisville & Nashville Railroad Company; the Galt House Company; Mr. R. L. Engle; the Louisville & Jeffersonville Bridge Company; Mr. Charles Hermany and the Louisville Water Company for courtesies extended to the association during its meeting in Louisville, Ky.

After adjournment the visiting members assembled and adopted the following resolution: *Resolved*, that the visiting members of the Engineering Association of the Southwest extend to the local members of the Association their sincere thanks and express their hearty appreciation of their kind entertainment and the courtesies extended while in Louisville.

The next meeting of the American Society of Mechanical Engineers will be held in Cincinnati, beginning Tuesday evening, May 13th, and continuing till Friday afternoon. The sessions for the discussion of papers will be held in the Scottish Rite Cathedral. Reports will be presented by the committees on standard method of conducting duty trials of pumping engines and on uniform methods of tests and materials. The list of papers to be presented numbers no less than twenty-five, all of which will be printed in advance of the meeting. Only five minutes is allowed to each author for the presentation of his paper, in order that the time of the meeting shall be chiefly given to discussion and all papers be afforded an opportunity for discussion. No papers are read by title as is the custom in other societies. The Mechanical Engineers have now had several years' experience with this practice, and it has given universal satisfaction. Copies of the papers are sent in advance of the meeting to those members who signify their intention to be present, and in this way some of the best discussions are frequently presented in writing.

The papers for the Cincinnati meeting cover a very wide range. Among them are papers on tests of lubricants, automatic sprinklers, engines, hot-water and steam-heating plants, and a refrigerating plant on testing apparatus, such as indicators, a mercury column, a calorimeter, and an absorption dynamometer. Theoretical papers will be presented, Hirn's theory of the steam engine in chimney draft, on locomotive efficiency and on thermodynamics, and on inertia in shaft governors. Other titles are crane chains, electric railways, kerosene in steam boilers, heating furnaces, the Kinzua viaduct, propeller screws and unbalanced eccentrics. A list of "Topical Questions" is given for discussion, in case there is time for them. These are all of a practical nature. The following is a fair sample: Have you any experience with self-stoking furnaces? How does yours operate and what difficulties and advantages does it offer?

An excursion will be made on Thursday, May 15th, to Proctor & Gamble's soap works at Ivorydale, and to the Niles Tool Works at Hamilton, and a reception will be given at the Art Museum in the evening. The headquarters during the meeting will be at the Gibson House.

INDUSTRIAL NOTES.

The Wilmington, N. C., Cotton Mills are getting ready to put in 2,500 new spindles.

Over \$300,000 worth of stock has been subscribed for in the North Carolina Iron and Steel Works, at Greensboro, N. C.

A stock company, with a capital stock of \$10,000, has been organized to erect an ice factory at Greensboro, N. C.

The Industrial Manufacturing Company, of Wilmington, N. C., has decided to increase its capital stock to \$30,000.

The Spiral Weld Tube Company has removed the sales office from 5 and 7 Beekman street to 43 John street, New York.

Another company with the same capital stock has been organized to erect an ice factory at Montezuma, Ga.; the machinery has been ordered and is expected to arrive in a few days.

The Abbeville (Ga.) Improvement and Construction Company has closed a contract for 1,000 tons of steel rails for the Abbeville & Waycross Railroad, which is now in the process of construction.

An explosion occurred at the Colebrook Iron Furnace No. 1, at Lebanon, Pa., on the 22d inst. The cast house was wrecked and the engine house blown to pieces. Two men were seriously injured.

The Trenton Iron Company, Cooper, Hewitt & Co., Trenton, N. J., have just installed a large battery consisting of six Manning boilers of 200 horse power each for their rolling mill. They have also introduced the Archer fuel gas process.

A canning factory with a daily capacity of 8,000 three-pound cans is to be established at Carthage, N. C., by A. V. Dockery, Esq. A. Stewart, of Rockingham, N. C., will erect a similar factory at that place. The machinery for this factory has been ordered.

The Corliss Steam Engine Company, of Providence, R. I., are preparing to ship to South America a triple-expansion engine of 1,000 horse power, also two tandem compounds of 150 horse power each, and have under construction a 400 horse power triple-expansion engine.

A large casting weighing 70 tons has been successfully made at the Ordnance Works of the Bethlehem Iron Company, Bethlehem, Pa. The casting is intended as a bed plate for the massive columns which are to support the new steam hammer now in course of erection.

The Ronecverte Mining and Manufacturing Company has been incorporated under the West Virginia law, with authorized capital of \$300,000, of which \$50,000 have been issued and taken up. The company has bought over 800 town lots and a number of manufacturing sites situated between the Chesapeake & Ohio Railway and the Greenbrier River, and will make arrangements with any manufactories desiring to locate.

Messrs. S. L. Moore & Sons Company, of Elizabeth, N. J., are going to add iron ship-building business to their foundry and machine works on Front street. About \$50,000 worth of tools and machinery have been contracted for, and \$25,000 more will be expended in the enlargement and improvements necessary. Three large buildings of frame and iron will be put up.

Specifications for the building of a large dam in the Colorado River, to utilize the water power for electric light works, etc., at Austin, Tex., have just been submitted. The estimates call for a 60-foot dam with crest, 1,150 feet long, 16 feet wide at the top, and 50 feet at the base, to have a mean capacity for 5,227 horse power, day and night, and propose that three water wheels of 600 horse power each be put in. The construction of a reservoir with capacity for 37,000,000 gallons of water is urged. The estimated cost, including construction of dam and reservoir, gate house, pumping and electric plants, mains, etc., is \$1,370,000. The issuance of \$1,500,000 of bonds for the work is contemplated.

We have received three remarkably well ranged, well written and well illustrated catalogues of mining machinery from Messrs. Hinckley, Spiers & Hayes, of the Fulton Iron Works, San Francisco. No. 1 deals with hoisting works and appliances, No. 2 with gold mills and hydraulic appliances, and No. 3 with silver mills, amalgamating and leaching machinery. As instances of the care with which these catalogues have been prepared, we may note that the description of the Lixiviation process is by Mr. Ottokar Hofmann, one of the best authorities on the subject, and is brought up to date, while the description of the "Boss continuous system" of silver amalgamation is from the pen of Mr. Boss himself. Each of the sections contains in addition well selected tables and a vast amount of really useful information.

The American Axe and Tool Company, which has its central office at Pittsburg, Pa., and to which we referred in our issue of March 8th, has secured the control of the edge tool business in this country, and absorbed two of the leading manufactories of Oakland, Me. The company has bought in New England the Douglass Axe Company of East Douglass, Mass.; the Underhill Edge Tool Company, of Nashua, N. H.; the Dunn Edge Tool Company and the Hubbard & Blake Manufacturing Company, of Oakland, Me.; and the Edge Tool Company, of North Wayne, Me., paying satisfactory prices, largely in cash, partly in stock. The only firm in Maine that refused to sell was Emerson & Stevens, of Oakland, who prefer to carry on their own business. They have agreed not to cut the list prices of the consolidation, however, and have come under \$10,000 bonds to keep their agreement. The whole amount expended by the American Axe and Tool Company in its Maine purchases, it is estimated, cannot be far from \$150,000.

CONTRACTING NOTES.

The Baker Chain and Wagon Iron Manufacturing Company, of Allegheny City, Pa., have just completed a contract for chains for the Government, which is probably the largest order for chains ever sent to Pittsburg. The order amounted in all to about 140 tons.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office.

No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

765. A tail-ropo plant for a colliery; plant includes coupled high pressure horizontal engines 18" x 30"; two drums 5' diameter; two return tubular boilers, 80 H. P. each, 60" diameter by 16' long, and all other parts of the plant necessary to make an efficient working concern. Bids are to be made f. o. b. cars at colliery in Tennessee, and a competent man is to be sent to superintend erection.

766. Machinery for a chair and furniture factory. Alabama.

767. Cold storage machinery of the most approved pattern. Tennessee.

768. Heating apparatus for two buildings. South Carolina.

769. Water motor, 8 to 10 H. P. Maryland.

770. Hand elevator chain pump and power to bring water out of a well 70 feet deep, with a capacity of 500 gallons per day of ten hours. North Carolina.

771. Complete plant for calcining plaster. Virginia.

772. Windmills to pump water into tanks. Mississippi.

773. Bricks for the construction of several houses. Mississippi.

775. Steam laundry outfit; estimates and full particulars. South Carolina.

776. Address of cotton rope machinery. Louisiana.

777. Flour mill machinery with a capacity of 100 barrels per day; also cornmeal bur. Maryland.

778. Engine, Corliss preferred. Maryland.

779. Addresses of stepladder makers. Louisiana.

780. Marine machinery. North Carolina.

781. Second-hand blowing engine; capacity, 6,000 cubic feet per minute. Full particulars, giving maker and description. New Jersey.

782. Roofing material for large court house and other public buildings. Texas.

783. Addresses of manufacturers of ice machinery. Louisiana.

784. Minerals: antimony and manganese ores corundum, emery, very white talc, very black white, red or yellow clays, or any choice ores, minerals or clay. Pennsylvania.

785. Flour mill machinery: rolls, bolts, cleaning machinery and water-wheel. Tennessee.

786. Wood-working machinery: bucking machines, spoke, hub and handle machinery. Alabama.

787. Prices of flour mill machinery, roller process, capacity 25 or 50 bbls. per day; also grist mill for corn. Tennessee.

788. Engine to supplement water power to the extent of 60 horse power. North Carolina.

789. Electric light plant of 150 incandescent lights. North Carolina.

790. Quotations on engineering and surveying instruments. Tennessee.

791. Wood-working machinery for wagon factory. Alabama.

792. Estimates on material for water works, gas works and electric light and power plant. Tennessee.

793. Machinery for manufacturing flour, corn meal, etc. Also cooper supplies. Kentucky.

794. Two engines: One 16 by 24 inches, and one 12 by 24 inches. Also shafting, belting, etc., Georgia.

795. Flour bolt. Arkansas.

796. 1,000 feet of 3/4-inch wire rope for ferry. Alabama.

799. Dynamo and fixtures for electric plant for mill 32x50 feet. Maryland.

AMERICAN GOODS WANTED ABROAD.

702. Brick and tile machinery. Mexico.

738. A plant for a tin mine; all machinery necessary: engines, furnace, crusher, buddles and jigs. Mexico.

759. Gas machines for making gas for private residences. Australia.

774. Japanned or nickel music stands for military band; prices per dozen. Malta.

797. Catalogues, price lists, etc., of portable hand rock drills. Mexico.

798. Catalogues, price lists, etc., of the most improved American tools for mechanical and mining purposes. France.

GENERAL MINING NEWS.

ARIZONA.

A dispatch from Denver states that a company of prospectors is now in the canon in force. It is said that 400 miles of the canon show a wealth of precious minerals, and assays from specimens obtained on the trip down the river demonstrate that these veins are of remarkable richness. The action of the water has worn smooth the sides of the canon, and the vein matter is clearly discernible to the naked eye.

Placer gold is found nearly the entire length of the river. Every point panned produced color, then in places the bars were found to contain coarse gold in surprising quantities. Mr. Stanton, the commander of the expedition, says the placers could be easily worked, because there is no lack of water facilities. A short distance below Lee's Ferry the expedition ran across old Jack Sumner, a member of Major Powell's original expedition in 1869, washing out gold in a primitive way and taking out from \$5 to \$10 per day.

CALIFORNIA.

LOS ANGELES COUNTY.

(From our Special Correspondent.)

Los Angeles, April 15.

A great deal has been said and written about the mines in Santa Catalina Island, off the coast of California. Quite recently it was talked about that an English company would go to work and systematically dig away the island; but it seems to stand up as boldly as ever. There has been no perceptible diminution in its size. The fact is, there are mines, or veins, on Santa Catalina, but I have yet to see one developed that shows pay.

There are no startling developments in mining in this county of recent date, but at a small town about 45 miles east of Pasadena a stone quarry has been opened and a large quantity of the stone, a brownish-red rock, has been used in the construction of buildings. Recently it has been discovered that this stone possesses peculiar properties, which render it very desirable for fire-proof bricks. I have in my possession a small fragment, which was put into the very heart of the assay furnace and kept there for hours at a white heat, and it is not affected in the least. Its composition is said to be, silica, 52 per cent.; alumina, 36; iron, 5; water, 7.

A valuable characteristic of the rock is that it is quite soft, so that it may be sawed quite readily into any desired shape or size. I am told that the Selby Smelting Company has been looking into the property with a view to purchasing it, should the rock be found to give satisfactory results on test.

SAN BERNARDINO COUNTY.

A very rich strike of silver ore is reported from the vicinity of Oro Grande. I cannot confirm it, or give any details.

The gold mill at Victor, on the line of the A., T. & S. F. railroad, is completed. This mill was built to work the ores of the Adams mine, located about 12 miles from Victor.

A party of miners left yesterday for Silver Reef to do the season's assessment work, though if a rich strike is made continuous work will be commenced at once. The ores of the Reef are chloride and embolite, and range from \$40 to over \$3,000 per ton, averaging probably about 80 to 100 ounces. As yet, the ore bodies are small.

This is an unusually good season for prospecting and mining on the desert, as the spring is late and water is more abundant than usual, and some good results may be anticipated. "ROVER."

COLORADO.

OURAY COUNTY.

CALLIOPE MINING COMPANY.—In this company's mine, it is reported, an excellent ore body has been opened in the north vein.

Westamivell Iron Mills, at Elkton, Md., the property of the McCollough Iron Company, which were shut down on account of lack of orders two or three weeks ago, have been closed indefinitely, and it is said that the property will be sold. The works have been operated for more than thirty years.

PITKIN COUNTY.

BUSHWHACKER MINING COMPANY.—This company has been organized with a capital of \$2,000,000. The company owns the Park Regent, Alpine and Bushwhacker mines. It is placing its stock in Aspen and Denver. Manager Wheeler expects to be ready to list the stock on the mining exchanges of Denver, Kansas City and St. Louis within thirty days. Manager Wright of the Park Regent and treasurer of the Bushwhacker company, has gone to Cleveland, O., and New York. From March 24th to April 15th the ore shipped and sold from the Bushwhacker mine brought \$16,126.94 after paying sampling, smelting and freight charges to Denver. This is a fair showing considering the condition of roads and the delays caused by putting a large plant of machinery on the property during the time.

LITTLE RULE MINING COMPANY.—This company

has just made a contract to transport the ores from the mine to the samplers. The tramway company will run a jack train from the mine to the tram, and the ore will be brought down rapidly. It is reported that the ore that was shipped by jack train to Aspen ran up to between 30 and 40 ounces, and left the company a net profit of from \$11 to \$20 per ton. The contract with the tramway will add about \$2 per ton to the company's profits. The mine is looking well.

PARK CONSOLIDATED MINING COMPANY.—This company has been incorporated, the property involved being the Buckhorn group. The company has a capital stock of \$50,000, of the par value of \$1 each. The directors are D. M. Van Hovenbergh, H. T. Tissington, W. J. Chamberlain, Geo. W. Crowe and W. W. Cooley. Mr. Van Hovenbergh is president of the company; Mr. Cooley, vice-president, and Mr. Crowe manager. The Buckhorn group comprises three claims, the Buckhorn, the Castle No. 2 and the Tanner, embracing 28 acres of ground in Tourtelotte Park just south of the Justice company. These claims are among the oldest in the district, and are patented.

SAN JUAN COUNTY.

E. G. Stoiber & Co. will erect a gold mill at the Silver Lake this season. The power will be transmitted from dynamos located on the Animas river. The mine is said to be in fine ore, and that an immense quantity has been mined during the winter, says the *Silverton Miner*.

ASTOR GOLD & SILVER MINING COMPANY.—This company has filed articles of incorporation. The directors are C. K. Holliday, John Guthrie, J. N. Strickler, of Topeka; Thomas Nickerson and E. C. Fritz, of Boston. The capital stock of the company is \$250,000, shares \$10 each.

SAN MIGUEL COUNTY.

It is reported that rich mineral has been found recently on the Miguel River, below Telluride. The gold is said to be found in caves, and assays are claimed to show returns of about 50 cents per pound.

SUMMIT COUNTY.

TIFFIN GOLD AND SILVER MINING COMPANY.—The trustees of this company (dissolved) have let a contract for the extension of the Idelia tunnel 60 feet to cut the vein at greater depth.

THE QUEEN OF THE WEST.—The stockholders of property on the 17th inst., received a circular from the directors of that company informing them that immediate arrangements must be made for the payment of an indebtedness amounting to \$66,345.74, which was personally advanced by the larger stockholders for the purpose of developing the mine, and which is secured by a first and second trust on the property. Messrs. Samuel Cupples and R. S. Brookings, who advanced this money, now make a demand for immediate payment and have notified the stockholders that action must be taken in the matter prior to the annual meeting at Kokomo on the 14th prox. Messrs. Cupples and Brookings will allow ample time for an examination of the property, but failing of any proposal on or before June 1st the mine will be sold under the deed of trust.

IDAHO.

SHOSHONE COUNTY.

CARBON CENTRE LEAD AND SILVER MINING COMPANY.—Nathan Elliott and several other Portland parties have organized this company, and as soon as the snow disappears will push the development of the Toughnut claim on Sunset peak.

ILLINOIS.

Notwithstanding their bitter experience of last year, a dispatch says that it is probable that all the miners practically in Southern Illinois will be on strike during the coming summer. The Convention of Coal Miners of Belleville District was opened on the 23d inst. in East St. Louis. The business of the opening session was the consideration of the eight-hour question. The men seemed to be a unit in favor of the unconditional demand for shorter hours and better pay.

CHRISTIAN COUNTY.

Miners held a secret meeting on the 20th inst. at Pana and decided upon a strike at the Penwell Company's mine. The strike was precipitated by the refusal of the Penwell Company to reinstate forty union men discharged last week. The fight will be strong, as the operators say positively that they will not recognize the Miners' Union.

KENDALL COUNTY.

According to reports gold has been discovered on the farm of C. B. Fisher, ten miles south of Aurora. Mr. Fisher will make further investigations. It is said that the Indians used to claim that there was gold in this county.

INDIANA.

CLAY COUNTY.

BRAZIL BLOCK COAL COMPANY.—This company is said to be the largest firm of operators in Indiana, has posted notices at all its block mines of a 5 cent reduction from May 1st to November 1st. The present rate is 75 cents. The miners, acting with the National Miners' Union, have demanded 95 cents. A strike is expected. The National Union has ordered that it shall take place the second week in May.

KANSAS.

CHEROKEE COUNTY.

[From Our Special Correspondent.]

GALENA, April 19.

The JOURNAL correspondent had the pleasure of meeting the mine operators and business men in the parlors of the Business Men's Club room yesterday evening. During this meeting the question of properly setting forth the lead and zinc mining industry of Galena came up. Your correspondent was called on and fully set forth the advantages the JOURNAL offered as the best mining paper in the world. These sentiments were fully endorsed by the club; then Col. W. B. Stone stated that he had been a constant subscriber for the JOURNAL for the past fourteen years, but would be pleased to see the JOURNAL take a little more interest in a protective tariff on Mexican lead ores, as he thought a bill to admit Mexican lead ores free of duty would prove detrimental to the great lead mines of Southwestern Missouri and Southeastern Kansas.

The following are the resolutions which were adopted by the club on this question:

WHEREAS We are informed that extraordinary efforts are being made to have Congress place Mexican lead ore on the free list of imports; and

WHEREAS, We understand that the placing of this commodity on the free list is done at the instance of the railway companies who desire to carry the freight from Mexico to Kansas City and other points, and largely at the instance of the Kansas City Smelting and Refining Works, which employ about 500 men; and

WHEREAS, There are now in Southeastern Kansas about 3,000 men employed in the industry of mining and reducing lead ores and handling pig lead; and

WHEREAS, The placing of lead ore on the free list would be disastrous to our mining interests, would close our mines, and the destruction of our mining industries would close our smelters; and

WHEREAS, It is claimed that the Mexican lead ore is necessary in this country to flux gold and silver-bearing ores; and

WHEREAS, Kansas and Missouri lead mines produce enough ore to flux all the gold and silver ore which this country produces, to say nothing of lead ore which Colorado and other States can produce; now, therefore, be it

Resolved, That we protest against the placing of lead ore on the free list, for the reason that it will destroy the lead mining of this section and the United States, and for the reason that we object to being singled out as a sacrifice to railway corporations and a large smelting monopoly.

Resolved, That a copy of these resolutions be sent to each Representative and Senator of this State in Congress.

W. B. STONE, Chn. of Com.

GALENA, KAN., April 4th, 1890.

GALENA AS A LEAD AND ZINC MINING DISTRICT.—But few people who have not personally visited Galena and Empira City can form any idea of the magnitude of the lead and zinc mines. It is certainly a poor man's camp, owing to the fact that such large deposits of lead are found near the surface, and as depth is gained the zinc ore is found, and again lead. The Galena lead and zinc mines are now producing from \$8,000 to \$15,000 worth of lead and zinc ore per week.

MICHIGAN.

ROPES.—The Gates rock crusher at this mine has been broken recently, and will require some time to repair. The breaking was caused by a sledge which was dropped in the crusher by an employe.

COPPER MINES.

The outputs of the reporting mines of the district for the month of March, together with the outputs since January 1st, have been as follows:

Mine.	March.		Since Jan. 1st.	
	Tons.	Lbs.	Tons.	Lbs.
Calumet & Hecla.....	3,345	1,810	9,310	475
Quincy.....	350	1,450	976	435
Franklin.....	200	1,955	604	110
Atlantic.....	210	30	593	80
Huron.....	105	.....	321	500
Peninsula.....	75	.....	237	785

GERMANIA.—Before the late fire in this mine, on the seventh level, clean ore was struck and mined into. This new body of ore is in the schist under the quartzite. The new find will be worked as soon as the debris of the fire is removed. The depth of the vein discovered is reported to be 32 feet, and composed of solid ore.

[From our Special Correspondent.]

April 21.

CENTENNIAL MINING COMPANY.—Your correspondent recently visited the Centennial property, concerning which so much that is favorable has been written. The old workings consist of Nos. 3 and 4 shafts, located in the Calumet Conglomerate (which extends through the center of the property), near the south boundary. During the past year No. 4 shaft has been sunk to the ninth level—300 feet below the old workings—at which point sinking operations have been suspended. Starting from this level a drift has been extended south to No. 3. No. 3 shaft is down 1,500 feet, and is being continued towards that rich chute of copper, the source of which has been so clearly defined by the workings of the Calumet & Hecla. It is supposed to drift across the Centennial property, and it is believed by the management that it is only a question of a couple of years before it will be in that rich

ground which has made the Calumet & Hecla and the Tamarack veritable gold mines to their owners.

The new developments which are being carried on, are making a showing which is extremely gratifying. A shaft—No. 6—has been started on the lode, 1,500 feet north of No. 4. It is down 120 feet in rock. Almost at its start a rich chute of copper was struck. This was taken as indicative that there was something big beyond, and work was pushed forward. It increased in value as depth was attained. At the point named sinking operations have been temporarily suspended, and a drift started north. The rock which is being taken from this drift will average as rich as any deposit discovered on the range. That there is rich rock at this point is certain. The limited extent of exploration renders it impossible to write concerning the extent of the deposit. Those who are conversant with the rich copper bearing rock in the Calumet & Hecla, and the course which it takes, believe that the Centennial has its equal in this new discovery. There is no logical reason why the boundaries inclosing the Calumet & Hecla and Tamarack should include the only rich copper bearing rock of that conglomerate. Lake stock owners take this view of the situation, and are adding to their holdings.

It will be only a question of time before a second shaft will be started on new ground, 700 feet north of No. 6. The company has half a mile of unexplored ground in line with this rich deposit. The old stamp mill on the property will be fitted with a Ball head of stamps before it is used. Stamping operations will not be started for a considerable period.

FRANKLIN MINING COMPANY.—At the annual meeting of this company the following directors were elected: Messrs. Henry J. Stevens, D. L. Demmon and R. E. Demmon, of Boston; S. L. Smith, of Lansing, Mich., and Johnson Vivian, of Hancock, Mich. Mr. R. E. Demmon takes the place of H. L. Simons, deceased. Mr. Stevens was subsequently re-elected president, and Mr. Demmon secretary and treasurer.

TAMARACK MINING COMPANY.—This morning at 3 a. m., fire consumed the hoisting plant of Tamarack No. 1 shaft. It is supposed to have originated from a dynamo, located in a small addition to the rear. In the engine house was located a double Corliss engine with equipment, including a balance drum and 3,000 feet of wire rope, and a sixteen drill compressor. All were more or less injured. Damage to the plant, when compared to that which will result from delay, is slight. The entire plant could be replaced by a much better one for \$15,000.

It is the expressed intention of the management to do nothing of a temporary nature. Every move made to repair the damage will be a permanent one. Orders for machinery have been placed, and it is expected to have the plant in running order in less than four weeks. There is communication with the mine through No. 2 shaft and the third compartment of No. 1, which latter is operated by an engine located in a separate building.

Pending the re-equipping of No. 1 hoisting plant, no temporary arrangements will be made for hoisting from No. 1 shaft, as no such arrangement could be made to pay on a perpendicular hoist of more than 2,800 feet. A small amount of rock may be hoisted from No. 2, but not in mentionable quantities. Considering the fact that there would necessarily have been some stoppages, and also that improved machinery will be introduced, the Tamarack Company will be about as well off at the end of the year as if the fire had not occurred.

MINNESOTA.

The Duluth & Iron Range Railroad opened this season on the ore docks at Two Harbors, April 1st. The docks, possessing 40,000 tons capacity, will be filled prior to the opening of navigation. The company expects to ship 1,000,000 tons from its docks this year, or 200,000 tons more than last year.

MISSOURI.

JASPER COUNTY.

[From our Special Correspondent.]

JOPLIN, April 21.

Notwithstanding the heavy rainfall during the forepart of the week, the output of the entire district shows a steady increase. The ore buyers are beginning to take in some of the large piles of ore that have accumulated at many of the mines. The ruling price paid for the week ending April 19th was \$24@24.50.

The following is the amount sold:

Joplin mines, 885,081 pounds zinc ore and 121,534 lead; value, \$13,221.

Webb City mines, 1,715,500 pounds zinc ore and 77,900 lead; value, \$22,247.

Casterville mines, 372,800 pounds zinc ore and 82,000 lead; value, \$6,227.

Zincite mines, 206,572 pounds zinc ore and 2,430 lead; value, \$2,515.

Lehigh mines, 130,550 pounds zinc ore; value, \$1,580.

Galena, Kan., mines, 976,570 pounds zinc ore, and 154,320 lead; value \$14,047. All districts total value \$59,537.

All the mines on the Standard Mining Company land at Belleville, have been idle for the past two weeks, except the lots operated by the Standard Company, which run steady regardless of bad weather.

Bremer & Co., at old No. 5 pump shaft on the Oswego land, have opened up a fine body of land

at a depth of 125 ft., and in five days mined out and cleaned up 22,750 pounds of lead.

The Bay State Mines on the Oswego land turned in 39,540 pounds zinc ore and 6,800 lead for the week ending April 19th.

The Snyder Bros. are making some surface improvements on their land by putting up an office, store room and scales. They also made a good strike of zinc ore at a depth of 45 feet.

THE KING JACK MINING COMPANY.—This is a newly organized company of Kansas City and Joplin parties, with a capital stock of \$50,000, 10,000 shares of which are set aside as treasury stock to be sold on the exchange at Kansas City. A portion of the property is located within the city limits of Joplin, and the other is at Lehigh, both of which have been large producers and quite well developed.

The mines are under the personal supervision of Mr. F. J. Pearson, who has had a large experience in the mines of this district.

The Empire Zinc Company produced 164,484 pounds of zinc ore, and 32,450 of lead during the week.

The old reliable Center Creek Mining Company, of Webb City, heads the list with an output of 1,433,800 pounds of zinc ore, and 58,720 of lead.

The most important transaction of the week was the sale of the Grand Falls water power to a syndicate of Kansas City and eastern capitalists, through Chas. Mott & Co. The Grand Falls are located four and one half miles south of the city of Joplin, on what is known as Shoal creek, and there is a natural waterfall of 18 feet, which will now furnish from 1,500 to 1,800 H. P. It is the intention of the purchasers to utilize this power for the purpose of generating electricity, which will be transmitted by cable to the city of Joplin for running an electric railroad and furnishing power for operating the mines.

There is now in operation two dynamos that furnish light to the city. The purchase of this property will mark a new era in this lead and zinc mining district.

The building of the electric railroad is now assured, as the engineers will commence the preliminary survey to-morrow.

MONTANA.

BLACK ROCK MINING COMPANY.—This company has been incorporated with a capital stock of \$300,000, to work the Black Rock and other mines in Silver Bow and Jefferson counties. The principal office will be in Butte. The incorporators are: Christian Weideman, Isadore Strasburger, W. Kemper, Thomas Jeffries, Charles Croen, John McGuire, A. Riley, and Isaac Taurensbro.

BEAVERHEAD COUNTY.

SAN FRANCISCO CONSOLIDATED MINING COMPANY.—All the property belonging to this company was to be sold at sheriff's sale on the 26th inst., under an execution issued to John R. Shepley. The sale will include the North Frisco, E. D. Holland, Little Tom, Silver Star and the Marie lodes, together with all the machinery, etc., belonging to this company.

DEER LODGE COUNTY.

CHAMPION CONSOLIDATED MINING COMPANY.—At the annual meeting of this company the following officers were elected: President N. J. Bielenberg; vice-president, Willard Bennett; secretary and superintendent, E. P. Mills; treasurer, Howard Zenor; trustees, N. J. Bielenberg, Willard Bennett, E. P. Mills, Howard Zenor, Joseph Lodge, Harry Peterson and Wm. Facer.

LEWIS AND CLARKE COUNTY.

MONTANA COMPANY, LIMITED.—The monthly report for March shows that the total weight of ore crushed during the month was 6,690 tons; yield from the three mills, \$105,000; working expenses for the month, \$53,500; the estimated number of ounces contained in returns by assay being, 2,719 gold, 37,830 silver.

NEVADA.

STOREY COUNTY—COMSTOCK LODE.

KENTUCK MINING COMPANY.—Since last fall, when work was resumed in the mine, there has been some energetic exploration under the superintendency of Edward Conrad, and some small deposits of good ore have been found on the 100 and 950 levels. The managers are so encouraged at the prospects that they are sinking a winze from the 950 to the 1,000 level, and will crosscut the ledge at that additional depth.

WHITE PINE COUNTY.

THE OSCEOLA GRAVEL MINE.—The East (19 mile) ditch which has been in process of construction since September, 1889, is nearly completed, and the water from Lehman's Creek will be running through it in the early summer. While the phenomenal snowfall of the past winter has greatly retarded the work, it will, in the long run, prove a great advantage, because affording a water supply far in excess of any former season.

The distributing reservoir has been enlarged so that its capacity has been raised to over 3,000,000 gallons.

On the 12th of April 300 miners' inches were being discharged from the west (16 mile) ditch when hydraulicicking was begun. The result of a few

hours hydraulicicking and the clean-up of 96 feet of boxes in December was about \$1,200.

A collection of nuggets taken from the property is now on exhibition at Messrs. Tiffany & Co.'s Union square, New York.

NEW MEXICO.

President Whitney, of the Bonanza Development Company, is said to be on his way East. Inference is that the improved state of the copper market may result in the sale of the Santa Rita property, which came near being accomplished before the collapse of the French syndicate.

GRANT COUNTY.

M. W. Neff has sold to John Brockman the property known as the Neff zinc mine, located in the Hanover district. The consideration is believed to be quite large. On the same day Peter Mangall bonded the Mangall & Black zinc mine, also located in the Hanover district, to the same gentleman. This places Mr. Brockman in the possession of all the developed zinc mines in this county. It is understood that in bonding and purchasing these properties he is acting as the agent of a company of Illinois capitalists, who intend to commence active mining and shipping operations at once.

SANTA FE COUNTY.

SANTA FE COPPER MINING COMPANY.—Superintendent Hyams has returned from the Santa Fe mine, and makes a most doleful report of the condition of the property. The mine has been shut down. Officials of the company, while acknowledging the ability of Mr. Hyams, want corroboration of some of the statements made, as they do not tally with former reports made by mining experts.

NORTH CAROLINA.

(From our Special Correspondent.)

CHARLOTTE, April 17.

Subscription books of the Thomasville, Silver Valley & Pee Dee Railroad have been opened at several places in the State, and will remain open until the 1st of May, when the company will be organized at Thomasville. This road will open up one of the best mineral and timber sections in the South, also the water power at the "Narrows" on the Yadkin River, which is not exceeded by any in the country. The fall is said to be 167 feet to the mile in one place.

BUNCOMBE COUNTY.

WESTERN NORTH CAROLINA MINING AND IMPROVEMENT COMPANY.—This company has been incorporated by A. E. Jenks, C. N. Jenks, and L. B. Rich, of Asheville, to purchase and otherwise acquire lands, and do a general mining, milling and manufacturing business. The capital stock is \$50,000.

GASTON COUNTY.

THE CATAWBA (KING'S MOUNTAIN) MINE.—This mine suspended operations last year on account of legal complications. It is presumed that an understanding has been reached now, however, as work has been resumed. This property has been one of the best in the State, and it is credited with a yield of over three-quarters of a million of dollars. It is in the limestone belt of the State, situated on the Air Line Railroad, 1½ miles from the village of King's Mountain. The ore body is limestone, carrying a small percentage of sulphurets, including galena and telluride of lead (altaite), 60 feet thick in places; it is divided into a 'front' and 'back' vein by a seam of talcose and chloritic slate varying from nothing to 2 feet in thickness. The strike is northeast and southwest and the dip is about 45 degrees west. The richest ore is in the foot wall of the 'front' vein, ranging from \$3.85 to \$16.54 per ton of 2,000 pounds; the thickness of this vein is 11 to 15 feet. The 'back' vein carries the larger amount of sulphurets. Three shafts have been sunk on the property—the Richardson, the W. Richards and the pump shaft, the latter being over 320 feet deep. At the time of closing down the plant consisted of a well equipped 40-stamp mill.

MECKLENBURG COUNTY.

An interview with Mr. S. G. Burn, Thomas A. Edison's expert and manager here, settles the speculation concerning Mr. Edison's plans in the southern mining districts. It is now a well-known fact that Mr. Edison has for a long time been working on a process for the profitable reduction of auriferous sulphides, especially those of low grade. During the past fall, having satisfied himself that he had solved the problem on a laboratory scale, he next collected a great many five-ton lots of different kinds of auriferous ores. These he claims to have treated very successfully; in consequence of which he engaged Mr. Burn to travel all through the southern mining region and investigate any properties that should come to his notice.

A couple of months ago Edison came to Charlotte and established an office. He then visited such neighboring properties as had been favorably reported upon. The result of these visits is that he went north, to return again during the first week in May, with prospecting diamond drills. He proposes to sink 1,000 or 1,200 feet on the most favorable localities and settle the now pending question as to the existence of sulphurets in

quantity. In case satisfactory results are obtained, the properties will be purchased and works put up.

As to the details of his process, they are to be withheld until the success of the undertaking is assured by actual working. However, this much can be said: That the idea is to purchase several groups of one, two, three or more adjoining properties, and that at each group there will be erected a concentration plant, consisting of probably stamps and frue vanners. The vanners will be placed in tandem as long as they will work profitably. In the case of a property having a small percentage of sulphurets with free-milling ore, plates for amalgamation will be interposed between the stamps and the vanners. The motive power of each plant is to be the electrical transmission of water wherever it can be done, and in all cases electrical labor saving devices will be taken advantage of to render the working as completely automatic as possible. Attached to each of these concentration plants is to be a plant for carrying on the first stages of the reduction: the products of these plants (something like mattes, I suppose), will be transported in cans or drums, holding about 500 lbs. each, to the central works at Charlotte, where the process is completed. The "canned stuff" mentioned will be the unfinished product of many tons of ore, so its transportation to the central works will not be a serious item.

OHIO.

COLUMBUS AND HOCKING COAL AND IRON COMPANY.—This company proposes to issue half a million of 5 per cent. accumulative preferred stock, to be used for the purpose of giving additional working capital and doing away with the floating debt. The company, it is said, has never had any difficulty in meeting the interest on its bonds, but it has been hampered for the want of sufficient working capital.

PENNSYLVANIA.

COAL.

Eight hundred miners in the Smithton district went on strike on the 24th instant to secure the Columbus scale, and nearly one thousand coke ovens at Scottdale have closed down. The companies wanted the miners to remain at work under the old agreement. The miners allege that it is the company's intention to discharge all of their leaders, whatever the result of the strike.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to April 18th, were as follows:

	1890.	1889.
	Gals.	Gals.
From Boston.....	705,739	1,004,063
Philadelphia.....	30,871,365	37,675,570
Baltimore.....	1,205,962	7,033
Perth Amboy.....	3,159,507	5,790,751
New York.....	104,184,931	119,142,439
Total exports.....	110,127,764	163,623,546

SOUTH DAKOTA.

PENNINGTON COUNTY.

HARNEY PEAK TIN MINING, MILLING AND MANUFACTURING COMPANY.—This company has purchased a group of 26 tin claims from Messrs. Fish & Rose. The property is known as the February group and is situated near Hill City. The purchase price could not be definitely learned.

UTAH.

BEAVER COUNTY.

HORN SILVER MINING COMPANY.—The following statement, for three months ending March 31st, has just been issued:

Jan. 1.—Cash Balance, per last Quarterly Report.....	\$256,646.46
RECEIPTS.	
Sales of Ore for January, February, March.....	112,321.13
Smelter at Francklyn: Proceeds sale of Slag.	
Iron Ore, Sundry Rents, etc.....	1,851.43
Store at Frisco: Surplus Funds.....	4,000.51
Outstandings due Company: On account.....	3,522.06
	\$378,341.69

DISBURSEMENTS.

MINING:	
Labor, supplies, timbering and dead work....	\$35,433.50
GENERAL EXPENSES:	
Salary of manager and clerk, Frisco and Salt Lake City.....	1,782.64
DIVIDENDS:	
Dividend No. 17, paid from net earnings of current quarter.....	50,000.00
New York Office: Salaries and expenses.....	2,364.43
BALANCE CASH ON HAND:	
United States Trust Company.....	\$210,000.00
First National Bank.....	46,387.94
Deseret National Bank.....	32,139.64
F. Honkamp, Chicago.....	154.85
Petty cash.....	18.40
	283,700.83

\$378,341.69

WEST VIRGINIA.

The meeting of miners of the Kanawha Valley adjourned on the 22d inst. Every region of the State, including fifty mining communities, was represented. A branch organization of the United Miners of America was formed. The scale adopted as sent out on the 21st inst. will, operators say, certainly result in a strike. The operators declare their intention not to yield. They claim that they are now paying 65 cents for screened coal and 45 cents for lump, which is all the market can afford, and

to pay an additional 7½ cents as asked by the action of miners yesterday is more than they can do. The operators hold that all the markets along the Ohio River are full on account of the open winter, and that coal is not demanded.

One of the largest mineral and timber deals ever made in this section, according to reports, has just been concluded, in which Major Jed Hotchkiss, of Staunton, Va., transfers to Low, Aspinwall & Co., for \$450,000, about one hundred thousand acres of land in Lincoln and Wyoming counties.

WYOMING.

SWEETWATER COUNTY.

It has been decided to smother the extensive fire in the Union Pacific's No. 4 coal mine, at Rock Springs, where an explosion occurred on the 22d inst. Men are engaged in the work of closing all its openings with a view to keeping air from the flames. The mine will remain sealed for some time, and if the fire is not entirely extinguished after a time it will be flooded. Of the fifteen persons injured by the first explosion all but two, Foreman Thomas and Evans, will soon recover. The number of Chinamen still in the mine is estimated from ten to twenty.

FOREIGN MINING NEWS.

AUSTRIA.

Serious trouble has broken out at the iron works at Wittkärz. Twelve thousand men have struck work, and on the 17th inst. troops fired upon riotous miners at Karvin, killing at least one of the strikers and wounding several others. The Governor of Prague has sent troops to protect the mine owners at Rokowitz.

In the fight at Wittkärz three workmen were killed and at least a dozen severely wounded. In the Karvin and Ostrav districts 100,000 workmen are out of employment as a consequence, directly or indirectly, of the strikes.

The mines and works where the strikes prevail belong to the richest men in Austria. One of the factories belongs to the Archduke Albrecht, another to Baron Rothschild, and other noted capitalists are also interested.

The workmen of the mines and iron works of the Prague Industrial Company and of the Austro-Alpine Mining Company demand a working day of eight hours, threatening to strike if the demand is not granted. Their movement is ominous of a general strike throughout the empire, and causes the gravest fears among the authorities.

The present state of general excitement insures demonstrations on May 1st. The authorities are nervous and the Cabinet Council has prepared a proclamation which will be published shortly with a view to influencing workmen.

BRITISH COLUMBIA.

DEVELOPMENTS IN THE KOOTENAI DISTRICT SHOWING FINE ORE.

BLUE BELL.—A large body of galena ore was struck in this mine recently. The strike was made in the tunnel nearly 600 feet from its mouth. The vein is penetrated to a distance of 12 feet, showing solid ore, and all indications point to its being as wide at this depth as it was found last summer at an upper level, namely, 86 feet. This vein of galena is now known to exceed in width any other existing in this part of the country, not even excepting the famous Bunker Hill and Sullivan, at Wardner, Idaho.

CANADA.

PROVINCE OF ONTARIO.

(From our Special Correspondent.)

PORT ARTHUR, April 15.

Arrangements are now perfected to continue the construction of the Port Arthur, Duluth & Western Railway from Sand Lake to the international boundary at Gun Flint Lake. The road will be completed and equipped as far as White Fish Lake by the end of October. The bridge crossing the Kammistiquia River is completed. The ties, trestle timber, and all necessary material are distributed along the right of way for the next ten miles, and it is reasonable to assume that trains will be running between Port Arthur, Beaver mine and as far as the Porcupine within six weeks from this date. This will be a great boon to all interested in the development of the mining district to the southwest of this place, as at this season—for a period of about three weeks—the government wagon road becomes almost impassable in places for heavy loads, and those who have not experienced it can never thoroughly appreciate the time wasted, difficulty experienced and expense of transporting heavy supplies over this piece of road. The advent of the railway will forever do away with this greatest of hindrances to the development of the resources of this district. The Dominion government has subsidized the railway to the extent of \$3,200 per mile from Sand Lake to Moss township. The Ontario government has subsidized it at the rate of \$3,000 per mile over the same route, and have set apart ten miles wide of the mineral lands on either side of the line to form a subsidy fund for the purposes of railway construction. These lands will not pass into the possession of the railway company, but all moneys received by the government from the sale of the lands will be given yearly to the railway com-

pany. This will be good news to capitalists and others interested, as it not only insures the construction of the main line, but also the extension of branches into the iron deposits on Hunter's Island to the south and the gold deposits of Part-ridge and Shebandowan lakes to the north. This, with the proposed branch of the Canadian Pacific Railway into the Atic-Okan iron district, will give the Port Arthur mineral region most ample railway and transportation facilities, and will recompense the people of Port Arthur for the long years of agitation they have spent in inducing the governments to grant the necessary aid to insure the construction of these roads. The Board of Trade of Port Arthur, in conjunction with the boards of trade and parliamentary representation from British Columbia, have been successful in inducing the government to remove the duty of 30 per cent. heretofore imposed on all mining machinery imported into Canada. They have also been successful in having the iron lands of Hunter's Island thrown open for sale, the government only retaining those portions of the island valuable as pine timber lands.

MEXICO.

CHIHUAHUA.

NORTH MEXICO MINING AND MILLING COMPANY, LIMITED.—Mr. Ottakar Hofmann has cabled to the company in London as follows: "We have struck rich sulphuretted ore in San Nicolas shaft."

GUERRERO.

Several deposits of cinnabar are said to have been discovered in the Aldama district, where the native metal appears on the surface. Fourteen mines have been denounced in this region. The richest of these deposits is probably that of the Concepcion mine in Acapetlahuaya, where the vein is said to be four meters thick and can be traced for a long distance. In all of the mines the country rock is decomposed slate or shale, or sometimes limestone.

SONORA.

"La Quintera" is constructing lixiviation reduction works.

The mines near Chinipas, of Ramos Clumos & Co. will be visited by a New York engineer, in connection with a deal that is pending. The owners are asking \$500,000 in American gold. If the business suits the buyer, six months' time will be given for the payment, but on the condition of paying \$5,000 a month during that period, which payments will be forfeited if the purchase is not completed.

Uruapa is also for sale. It is rumored that the price asked is \$600,000 in American gold. It has been visited by the Engineer, Mr. Lohse, from Palmarejo.

PALMAREJO.—The works in the Reduction Works "Instina," of the important enterprize "Palmarejo," go on progressing. The most important is the railroad which is being constructed from the mine to the reduction works. Mechanics, laborers, etc., are scarce, and retard progress. There are 80 of the men sick with influenza.

NEWFOUNDLAND.

The Cape Copper Company (Limited) has made an arrangement with the Tilt Cove Copper Company for working their mines in Newfoundland upon the basis practically of a division of profits. The terms are that the Cape Copper Company should pay nothing by way of purchase-money or for good-will, but that it should work the mines on joint account. The only payment to be made will be a loan of £15,000, more than covered by the outlay upon the machinery and plant. This £15,000 is payable out of the first profits, and will form a first charge upon those profits, so that when liquidated they will be in possession of the plant and machinery and their money as well. The ground rent of £4,400, represented by the interest upon the debentures which the old Newfoundland company floated for the purpose of buying the ground rent, will also have to be defrayed out of the profits before either company participates, and in the unlikely event of the mines not yielding a sufficient income to defray this ground rent, they are at liberty to surrender the leases at twelve months' notice.

SPAIN.

The first lot of antimony ore, of great yield, from the Zalamea de la Serena Mines, in Estramadura, has been dispatched from the mines for England. A large sample of this ore, sent to Germany, was analyzed, and found to contain 15 grammes of gold per ton. As a rule, all the ores of that place, both antimony and silver lead, have shown more or less gold.

MEETINGS.

Cambria Iron Company, at Philadelphia, Pa., noon, May 15th, at 12 o'clock, noon.

Douglas Mining Company, at New York, May 5th, at 10 a. m.

Lac La Belle Mining Company, at No. 308 Walnut street, Philadelphia, Pa., May 20th, at 11 a. m.

Neath Gold Mining Company, at Idaho Springs, Colo., May 19th, at 10 a. m.

Pleasant Valley Coal Company, at No. 168 South Main street, Salt Lake City, Utah, April 30th, at 2 P. M.

DIVIDENDS.

Black Diamond Coal Mining Company, dividend of 20 cents per share, payable immediately, at No. 428 California street, San Francisco, Cal.

Little Rule Mining Company, dividend of 2 cents per share, payable April 27, at the office of Col. C. N. Perkins, No. 904 17th street, Denver, Colo. Transfer book close April 25th.

Mammoth Mining Company, dividend No. 17 of 10 cents per share, \$40,000, payable April 19th, at No. 251 South Main street, Salt Lake City, Utah.

ASSESSMENTS.

COMPANY.	No.	When I'veed.	D't'nt' In office.	Day of Sale.	Am't per share.
Alabama, Nev.	1	Mar. 18	Apr. 22	May 13	.08
Alpha, Nev.	4	Apr. 5	May 12	June 3	.25
Andes, Nev.	36	Apr. 10	May 14	June 3	.25
Bailey, Nev.	1	Mar. 18	Apr. 22	May 13	.08
Confidence, Nev.	15	Mar. 12	Apr. 6	May 7	.75
East Best & B., Nev.	1	Feb. 11	Mar. 14	Mar. 31	.25
Haje & Norcross, Nev.	95	Apr. 9	May 14	June 5	.50
Hartford, Nev.	7	Apr. 8	May 15	June 6	.02
Holmes, Nev.	11	Mar. 12	Apr. 17	May 8	.25
Humboldt,	1	Mar. 18	Apr. 22	May 13	.08
Martin White, Nev.	23	Feb. 12	Mar. 31	Apr. 30	.25
Mayflower, Cal.	46	Mar. 8	Apr. 10	May 1	.50
Navajo,	20	Apr. 8	Apr. 15	June 6	.15
North B. Isle,	17	Apr. 8	Apr. 14	June 6	.20
North Occidental ..	2	Mar. 31	May 5	May 26	.06
Ophir,	56	Apr. 2	May 6	May 26	.50
Quaker, Cal.	18	Mar. 8	Apr. 15	May 5	.20
Peerless,	14	Mar. 28	May 6	May 27	.20
Potosi, Cal.	34	Mar. 27	Apr. 30	May 21	.10
Quaker, Cal.	18	Mar. 8	Apr. 15	May 5	.50
Silver Hill, Nev.	26	Apr. 14	Apr. 20	June 11	.20
Standard Con., Cal.	2	Mar. 4	Apr. 16	May 19	.25
Union Con., Nev.	40	Mar. 5	Apr. 10	Apr. 30	.25
Utah Con., Nev.	9	Mar. 11	Apr. 17	May 5	.25

MINING STOCKS.

For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 487 and 488.

NEW YORK, Friday Evening, April 25.

Another week has passed and without any appreciable change in the general features which have characterized this market for months past. To most men variety is a necessity, but mining brokers must be an exception, inasmuch as they wax happy with the existing condition of affairs. They live on hope, and are hope against hope. The prophets—and they are very numerous—who have been prognosticating livelier times, are, strange to say, losing hope of their own predictions ever coming true.

Through an oversight Mr. J. A. MacPherson, chairman of the committee on Mining Securities, was incorrectly reported in our last issue. What he did say was that upon the event of the passage of the pending Windom Bill, some silver mines, which have hitherto barely paid expenses, will be enabled to declare dividends, if silver advances, say 20 per cent.

Manipulation in Brunswick continues and the stock advanced from \$5 to \$1.10. The sales amounted to 12,400 shares.

There have been rumors of a strike in Plymouth Consolidated, but this seems to have had no effect on the stock, which was quiet at \$4 to \$4.25.

Nothing was done in Quicksilver Preferred all the week, a few sales were made to-day at \$38.50 to \$37.50. Common was also neglected until to-day, when it sold at \$7.45 to \$7.55.

There was one sale of Bodie Consolidated at 70 cents.

No attention was given to Sutter Creek, the promoters of this stock have their hands full with Brunswick. Sutter Creek ruled all week at \$1.60; Astoria at 5c. Nothing was done in Middle Bar or in Amador.

The stock of the well-known Minnesota Iron Company appeared on the list on Saturday at \$2.50. Only 50 shares changed hands. This company owns large iron mines in the Vermilion district, Minn., and has produced largely within the past few years.

Kingston & Pembroke attracts no attention. A sale was made to-day at 70 cents.

There was no business in the copper stocks this week.

Phoenix, of Arizona, continues firm at from 85 to 80 cents. Silver King declined from 57 to 45 cents.

The company has declared a dividend of 7½ cents, and it is reported that a financial statement showing a prosperous condition will be shortly issued. Moulton is quoted at 45 cents.

The promoters of Wall Street Mining and Milling Company are neglecting the stock; only one transaction is reported, and that was a sale of 50 shares on Wednesday at 50 cents. Alice was steady at from \$1.45 to \$1.50.

The movement in Horn Silver continues, and as we predicted a few weeks ago, this stock has advanced. The price went up to \$3.10, and the closing prices to-day ruled at \$2.90 and \$3.00. The transactions were large, amounting to 12,784 shares. In our mining news column we publish the last quarterly statement of the company. Ontario continues to hold its own at from \$43 to \$45.

Deadwood Terra, Homestake, Father de Smet, Iron Hill, are neglected, no sales were reported. The only transactions in the Black Hills stocks were in Caledonia, the price of which ruled at \$2.25.

El Cristo continues to drag along at from \$1.35 to \$1.40, and there seems to be no prospects of having it appear again in the "bear garden."
Mutual Smelting and Mining was quiet at \$1.05@1.70. Only one sale of Hapahannock is reported at 5 cents.

There seems to be some inquiry for the low-priced Leadville stocks, Leadville Consolidated, for instance, was dealt in at from 12c. to 15c. Little Chief was also strong, and went from 31c. to 34c. There was nothing doing in Breece, which sold at 45. The boom in Freeland seems to have had its day; the stock is neglected, and sold all week at from \$1 to \$1.10. Robinson Consolidated shows a few transactions at 40c. and 45c. Ward Consolidated one at 25c. La Crosse at 7c. Monitor at 3c.

Mt. Diablo, in which there is little or nothing doing in this market, is quoted this week at \$2.70. Belle Isle shows a sale at 55 cents.

The Comstocks were quiet. Consolidated California & Virginia showed a downward tendency, going from \$5 to \$4.75. Crown Point was quoted at \$2.65. Gould & Curry was also lower and went from \$2 to \$1.65. Hale & Norcross sold at \$2.50; Ophir at \$3.85; Savage at \$2.05; Yellow Jacket at \$2.50. Alta was steady at from \$1.25@1.35. Andes, in which there is very little doing at all times, sold at 85 cents; Bechtel at 21 cents; Chol-lar at \$2.95. Consolidated Imperial declined from 45 cents to 25 cents. Julia was firm at 40 cents and 45 cents. Exchequer shows a sale at 90 cents. Mexican at \$3.40. Occidental advanced from 85c. to \$1.25. Overman sold at \$1.80. Potosi declined from \$3.75 to \$3.50, and later in the week advanced again to \$4. Utah declined from \$1.35 to 95 cents.

Comstock Tunnel showed a few transactions in the beginning of the week at 22@24 cents. Script went from 35 to 25 cents.

Boston. April 24.

(From our Special Correspondent.)

The market the past week has been fairly active, and prices generally have been well maintained. There is good buying of stocks on all concessions, and the general opinion seems to be that copper is likely to advance to 16c. this year, that all the producing companies will make a great deal of money for their stockholders, and that present prices will look very low before the close of the year. Those who have studied the copper situation predict that dividends upon a ten per cent. basis are among the possibilities, and that Calumet & Hecla will sell at \$300; Tamarack at \$200, and Quincy at \$100, etc.

Calumet & Hecla declined during the week from \$270 to \$263, but fully recovered the decline. Tamarack declined on the report of a fire at the mine, from \$168 to \$159, but recovered to \$166½, when it was ascertained that the loss would not exceed \$10,000, and the delay in production would not exceed one month.

Quincy shot up from \$86 to \$95, but the height was a dizzy one and could not be maintained, although we expect to see it sell at \$100 before many months. One of the directors, who is a large owner, says there is nothing beyond the strong position of the mine and the outlook for copper to account for the advance in Quincy. He predicts \$100 for the stock before June 1. The stock sold yesterday at \$88.

Boston & Montana sold ex-dividend this week, opening at \$48½ and advancing to \$49. For the past few days it has been a little heavy, and sold off to \$47.

Osceola has been very active between \$29 and \$29½, as highest and lowest, and attracts strong buyers, who have confidence in its futures.

Franklin touched \$16 again this week, and has been fairly strong until to-day, when it declined to \$15 for a small lot.

Kearsarge has ruled heavy under a pressure to sell stock, presumably to realize profits. A good deal of this stock was bought at low prices, and the recent advance has brought it out. Stock opened at \$12½ and declined to \$11½, with sales of over 3,000 shares. Centennial continues to be manipulated, selling at \$25 and declining to \$23 same day. The stock is going into strong hands, and will some day take a big jump and stay there. The latest dispatch from the mine says: "Seven feet of the width of the north drift will go three per cent. copper." Butte & Boston sold at \$15 and \$14½, closing at \$14½.

Atlantic has been very quiet this week, selling at \$15.50 and \$15. Allouez sold at \$4; Mesnard at 50c.; Bonanza at 82½c.; National at \$2.50, and Ridge at \$1.

Santa Fé has had a hard week of it, steadily declining from 60c. to 30c., culminating at the latter price with reaction to 40c. The immediate cause of the decline was on account of the doleful report of Superintendent Hyams, who has just returned from the mine. The mine has been shut down, and it is doubtful if the money necessary to put the property into good producing condition can be secured, and even if it could be, it is a matter of great uncertainty if it would pay anything above expenses. Sales over 30,000 shares.

The silver stocks, with the exception of Breece, have been neglected. Breece advanced from 36c. to 50c., with sales of about 5,000 shares. Dunkin is in demand, but there is no stock offered; 60c. was bid for it to-day without bringing it out. Catalpa

and Crescent quiet, at 25c. for the former and 10c. for the latter.

3 P. M.—The market closed dull but firm. Quincy sold at \$88; Boston & Montana at \$47½; Osceola, \$29½; Santa Fé, 35@37½c.

By Telegraph.—Montana \$47½; Centennial \$24½; Osceola \$29½; Butte \$14½; Atlantic \$14½; Santa Fé \$37½.

Denver.

April 25.

(From our Special Correspondent.)

Market steadily improving and increasing in transactions. The general outlook for permanent business is very encouraging, and as soon as the coming election of officers is over there will be an advance in prices and increase of sales. The selection of the best men connected with the exchange from all factions and tickets is a sure indication of the awakening interest our people are taking in the perfect success of future mining operations in Colorado. It means a new era.

Prices and sales during the week ending April 21st.

Company	Open- ing.	H.	L.	Clos. ing.	Sales.
Allegheny, Colo.	29*	39	27	28	7,000
Amity, Colo.	14*	18	11½	17*	157,700
Bangkok, C. B., Colo.	14*	18	11	17*	94,600
Bates-Hunter, Colo.	21*	25	20	22½	46,100
Brownlow, Colo.	40*	44*	39	42*	7,900
Calliope, Colo.	47	47	45	45	2,300
Clay County, Colo.	40a	42*	34a	42*	2,000
Emmons, Colo.	20½	22*	20½	22*	10,900
Hard Money, Colo.	13	17a	12½	15a	21,600
John Jay, Colo.	21a	22	18	21	4,100
Little Rule, Colo.	51	55	51	55	13,200
Matchless, Colo.	140	200a	100	200a	100
May-Mazepa, Colo.	121	123	120	125*	23,400
McGee Gibson, Colo.	60a	60a	50b	50a	.....
Ore, Colo.	500b	700	500b	700	4,300
Pay Rock, Colo.	09*	09	07½b	08	34,500
Puzzler, Colo.	27†	27†	21	24*	12,400
Reed-National, Colo.	53*	53	50b	53	8,900
Rialto, Colo.	14	14	10b	14	600
Silver Cord, Colo.	49a	50a	41b	50a	.....
Whale, Colo.	34	35	32	35*	1,300

Total for the week..... 587,750
*Buyer 30. †Buyer 60. ‡Seller 60. §Seller 30.
a Asked. b Bid.

Lake Superior Iron and Gold Stocks.
(Special Report by David M. Ford, Houghton, Mich.)

Iron Stocks.—There has not been much change in the prices of these stocks during the past week. Everything has been quiet, and in some cases a small decline in price. Shipments by lake have already commenced from Escanaba. The harbor is full of boats awaiting cargoes, and the mines and railroads are rushing the ore forward as fast as possible. At Marquette the capacity of the ore docks has been increased about 12,000 tons, and at Two Harbors about 7,000 tons. The shipments from the mines are going forward actively to the lake ports. It is expected that a large fleet of ore carriers will reach the Lake Superior ports early this week, as there is a large number of them beating their way through the ice up toward Sault Ste. Marie. The mines have generally large stock piles to ship from. The Chapin, on the Negaunee range, has over 200,000 tons in the stock pile, and the big Norrie mine about 300,000 tons. There will be a race between these two mines this summer, as to which will have the larger output. These two mines are expected to lead, but the other large mines will, in some cases, follow close after them. There is more exploration now being done in the iron district than at any time in the past history of the country, and it is expected that many new and valuable finds will be made.

Gold Stocks.—The prices of these stocks, as in the iron stocks, have a downward tendency, as is shown by the table. At the gold mines the immense body of snow going off has filled all the shafts and stopped the work of sinking. At the Gold Lake Company's mine men have been placed on the surface, and are now stripping the vein toward the west, awaiting the subsidence of the water.

At the Grayling, Ropes and Michigan mines work is being prosecuted with as much vigor as it can be until the water subsides.

At the Peninsula they have made a find of quartz, quite rich, showing the gold in large grains, nearly as large as kernels of wheat. It is presumed that the flood of water will have been absorbed in the course of a week or two, and the roads become passable so that active mining work can be resumed. There are a great many inquiries in regard to options for exploration, and it is probable that this gold range will be extensively explored this summer.

GOLD MINING STOCKS.

Name of Company.	Par value.	Lowest.	High.
Gold Lake M. Co.	.....	.....	.75
Grayling Gold & Silver Co.	\$25.00	.....	.75
Michigan Gold Co.	25.00	\$1.75	\$2.25
Peninsula Gold & Silver Co.	25.00	.....	.75
Ropes Gold & Silver Co.	25.00	2.25	2.75

IRON MINING STOCKS.

Name of company.	Par value.	Bid.	Asked.
Ashland Iron Co.	\$25.00	\$55.00	\$65.00
Aurora Iron Co.	25 00	7.50	8.00
Champion Iron Co.	25 00	\$100.00	102.00
Chandler Iron Co.	25 00	37.50	40.00
Chapin Iron Mining Co.	25 00	30.00	33.00
Chicago & Minn. Ore Co.	100.00	110.00	115.00
Cleveland Iron Co.	25 00	18.50	19.00
Germania	25 00	11.50	12.50
Jackson Iron Co.	25 00	120.00	125.00
Lake Superior Iron Co.	25 00	67.00	68.50
Milwaukee Iron Co.	25 00	5.50	6.50
Minnesota Iron Co.	100.00	83.50	85.00
Montreal Iron Co.	25 00	9.00	10.50
Norrie (Metropolitan)	25 00	75.00	80.00
Odanah Iron Co.	25 00	20.00	22.00
Pittsburg Lake Angeline Co.	25 00	170.00	175.00
Republic Iron Co.	25 00	46.00	47.50

We have received advices from Ishpeming that Mr. Ford's quotations of Michigan are too high and the following prices have been quoted to us: Highest, \$2.25; lowest, \$1.90.

PIPE LINE CERTIFICATES.

(Specially Reported by Messrs. Watson & Gibson.)

Petroleum has been a little firmer, but it does not sympathize with the boom in railway stocks and grain. There was a slump early in the week on a "new gusher," but there is not enough news to change the situation from what it has been of late. We expect higher prices on the first move either way.

NEW YORK STOCK EXCHANGE.

Opening.	Highest.	Lowest.	Closing.	Sales.
April 19.....	85	85½	84½	32,000
21.....	85	85	83½	38,000
22.....	83	83½	82½	86,000
23.....	83½	83½	83	57,000
24.....	83½	84½	83½	143,000
25.....	84½	84½	84½	61,000

Total sales in barrels..... 417,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

Opening.	Highest.	Lowest.	Closing.	Sales.
April 19.....	85½	85½	84½	85
21.....	85	85	82	154,000
22.....	82	83½	81½	196,000
23.....	83	83½	82½	69,000
24.....	83½	85	83½	130,000
25.....	84½	85	83½	108,000

Total sales in barrels..... 721,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 25.

Statistics.

Mr. John H. Jones, chief of the Bureau of Anthracite Coal Statistics, furnishes us the following statement of shipments of anthracite coal (approximated) for the week ending April 18th, 1890, compared with the same period last year:

Regions.	April 19, 1890.	April 20, 1889.	Difference.
Wyoming Region.Tons	322,509	268,862	Inc. 62,647
Lehigh Region .. "	122,212	111,574	Inc. 10,638
Schuylkill Region .. "	182,989	144,201	Inc. 38,788
Total.....	627,710	515,637	Inc. 112,073
Total for year to date..	7,504,976	8,356,192	Dec. 451,216

Statement of anthracite coal production for month of March, 1890, compared with the same period last year, compiled from returns furnished by the mine operators:

	March, 1890.	March, 1889.	Difference.
Wyoming Region.Tons	1,056,477	1,221,250	Dec. 164,773
Lehigh Region .. "	434,966	279,279	Inc. 155,687
Schuylkill Region .. "	614,016	602,532	Inc. 11,484
Total.....	2,105,461	2,103,062	Inc. 2,399

	For year, 1890.	For Year 1889.	Difference.
Wyoming Region.Tons	3,092,543	3,634,667	Dec. 542,124
Lehigh Region..... "	1,296,432	1,266,139	Inc. 30,292
Schuylkill Region .. "	1,855,516	1,922,447	Dec. 66,930
Total.....	6,244,492	6,823,254	Dec. 578,761

The stock of coal on hand at tide-water shipping points, March 30, 1890, was 992,309 tons; on Feb. 28, 1890, 1,143,360 tons; decrease, 150,071 tons.

PRODUCTION OF BITUMINOUS COAL for week ending April 19th and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

Tons of 2,240 lbs.	1890.	1889.
Phila. & Erie R.R.	1,538	36,977
Cumberland, Md.	73,191	1,128,193
Barclay, Pa.	2,896	43,090
Broad Top, Pa.	9,144	126,697
Clearfield, Pa.	79,737	1,221,551
Allegheny, Pa.	22,161	437,113
Beach Creek, Pa.	40,167	582,159
Pocahontas Flat Top.	48,188	555,675
Kanawha, W. Va.	42,549	637,069
Total.....	319,571	4,806,273

*Week ending April 14.

WESTERN SHIPMENTS.

Pittsburg, Pa.	17,807	282,798	185,681
Westmoreland, Pa.	33,704	546,572	464,330
Monongahela, Pa.	9,128	72,533	54,540
Total	60,639	901,903	704,551
Grand total	380,210	5,708,176	4,305,028

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending April 19th, and year from January 1st, in tons of 2,000 lbs.: Week, 97,573 tons; year, 1,702,850 tons; to corresponding date in 1889, 1,366,490.

Anthracite.

The anthracite coal trade is still very quiet. Hardly any business is being done, although inquiries for coal for future delivery are becoming more frequent. On the 24th inst. the sales agents of the different companies held a meeting, and after considerable discussion agreed to restrict the output to 2,500,000 tons for the month of May. If the prices are strictly adhered to it may restore the confidence of buyers and impart strength to the trade. The recent action on the part of Cox & Co., in announcing a still further reduction in their prices on stove and nut coal at the mines, was severely criticised, and fears were expressed that this would have a disastrous effect on the trade. In a circular, under date of April 17th, they quote stove coal at the mines at \$1.90 and nut coal at \$1.75, or a reduction of 15 and 25 cents respectively from the prices quoted on March 20th.

No further steps have been taken in regard to a reduction in railroad tolls, and even the most sanguine of the individual operators have lost all hopes that any reduction will be granted by the transportation companies. The demand for chestnut coal has improved somewhat, and \$3.50@3.60 is now frequently quoted. Pea and buckwheat are still scarce at \$2.85 and \$2.30 respectively. For other sizes at New York, alongside, we may quote ruling prices to be: Broken, \$3.50; stove, \$3.40, and egg, \$3.30.

The Retail Coal Trade.

The regular semi-monthly meeting of the Retail Coal Exchange of New York was held at the Exchange rooms on Twenty-third street last Friday, April 18th. President Theford presided, and about thirty members were present. The minutes of the previous regular and special meetings were read and approved. Messrs. Brown & Co., of West Thirteenth street, were admitted to membership, and five more names were proposed. These go over to the next meeting, in accordance with the rules. The treasurer made a report showing cash on hand to be \$1,212.31. The excursion committee were not ready to report.

The by-laws were amended to hold but one meeting per month during June, July and August. The secretary reported that a special committee of three had met similar committees from other exchanges at Newark on the 17th inst., for the purpose of discussing a permanent organization or conference of exchanges. The members present agreed that such a conference was advisable, and the president was authorized to appoint a permanent committee of three—himself to be one—for the purpose.

The Building Fund plan was then read, and on motion the Exchange authorized the Board to open subscription books for the purpose. No objections were raised to this, all opinions expressed during the evening being highly in favor of making a strong effort to accomplish it. The meeting then adjourned.

Bituminous.

One or two good sized contracts are still being eagerly bid for, and will undoubtedly be closed at very low prices; in fact, a great many bituminous coals are selling at figures that leave little, if any, profit to the producers. The supply of vessels is fair, but as very little coal is being shipped to Sound ports, most of the shippers preferring to send their vessels around the Cape to Maine, so as to return with a cargo of fish, there is likely to be a scarcity of boats before long. Coastwise freights are strong at 70 cents New York to Boston, \$1@1.05 Philadelphia, and \$1.10 Baltimore.

Encouraged by the success the Ohio and Pennsylvania miners met with in their demands for an increase in wages, the miners of Illinois and Indiana are making a like demand. All through these States they are rapidly organizing and a strike seems inevitable, as the operators are not willing to grant an increase. In West Virginia also there is a probability of a strike, as the miners there are demanding an increase of 15 cents a ton to equal the Columbus, O., schedule.

Buffalo. April 24.

(From our Special Correspondent.)

The anthracite coal market is showing signs of improvement. It is noticeable that many private families have already received their annual quota of fuel.

The bituminous coal dealers say that the market is in good shape, with firm prices and upward tendency; demand excellent for manufactories, propellers, tugs, etc. Supply adequate.

Coke steady, with average trade. The following items may prove interesting: An order of the Canadian Council reduces tolls

on coal going Eastward through the Welland Canal from 20 to 10 cents per ton during the present season of navigation.

An agent of the Reading Company is reported as having said: "I am declining to book any orders or contracts for coal for future delivery at the present prices, as my company expects as the season advances that the demand will increase and quotations will be marked up accordingly."

In the suit against Messrs. J. Langdon & Co. by Andrew Selleck, for injuries sustained by falling through a defective trestle, the jury last week awarded him \$6,500 damages in lieu of the amount asked for, \$25,000.

The Sault Ste. Marie is nominally open, although much trouble is being experienced by vessels through ice, low water and other causes.

Port Arthur will not be reached by vessels before the beginning of May, as the ice is still solid in that locality.

The canals of the State will be opened for navigation next Monday, April 28th, excepting the Champlain, which cannot be fully prepared until May 1st.

Natural gas has been found at our city's almshouse in sufficient quantity to make a saving of consumption of coal of about four tons per day, if the supply is continuous and pressure adequate.

Messrs. J. Langdon & Co., the coal merchants, of this city, have sold the Erie Basin elevator and docks. The latter has a frontage of 270 feet. The parties who purchased intend erecting trestles, etc., thereon in connection with the Central Railroad.

A well-posted coal man says that "the sale of the Buffalo, Rochester & Pittsburgh Railroad to the Bell, Lewis & Yates Company, who are interested in preserving harmony among the bituminous roads engaged in the lake business, is a matter of prime importance to all the bituminous coal roads in the East, and particularly the Western New York & Pennsylvania, which has stood the brunt of the fight. In five years there has been a constant struggle for lake coal tonnage and freight rates, and prices were reduced to an absurdly low figure. The change means the restoration of rates, and consequently an increase in earnings."

Mr. E. B. Hill, formerly of East Brady, Pa., has been appointed general agent of the Home Coal Company with offices in Buffalo.

Many of the coal operators in the Wyoming and Lackawanna regions complain that the Lackawanna Railroad has refused them cars for shipment on the ground that the shippers have been selling below the schedule. President Holden, of the Lackawanna, denies the statement. The complainants will probably bring the matter before the Interstate Commerce Commission.

From the opening of navigation to April 23d, inclusive, the shipments of coal by lake from this port aggregate 89,190 net tons, namely, 33,490 to Chicago, 19,950 to Milwaukee, 8,560 to Toledo, 6,440 to Racine, 2,100 to Kenosha, 2,300 to Gladstone, 5,150 to Superior, 1,600 to Green Bay and 9,500 to Duluth and 100 to Bay City. The rates of freight the past week were 40c. to Chicago and Milwaukee, 35c. to Duluth, 40c. to Saginaw and Gladstone, 30c. to Toledo and Detroit, 50c. to Racine and Kenosha, 35c. to Superior. Receipts of coal light for shipment by lake, many vessels leaving without cargoes in consequence. Freight rates firm.

Chicago. April 23.

(From our Special Correspondent.)

The market for hard coal in Chicago is firmer in prices, with a limited consumption, and continues without any notable change. In view of the "strike," referred to last week, among the soft coal miners in this and other States, who, it is now conceded, will go out on May 1st for an eight-hour day, 17½ cents per ton pay, with two pay days per month, dealers are acting accordingly; still not much apprehension appears to be felt as to the continuance of the "strike," should it take place, owing to a lack of complete organization among the men, and their crippled condition resulting from their strike of last year, yet some have serious apprehensions of a coal famine. The present supply on hand is large, and a week yet remains to add to the stock.

The all-round prices for anthracite at retail we continue to quote at \$5.75 and \$6 per ton.

For large and small egg, \$4.50; range and chestnut, \$4.75 on dock, on wheels 25c. additional.

Bituminous, per ton of 2,000 pounds, Green and Sullivan County (Ind.), shaft, \$2.75@2.40; Jackson Hill, \$3.25; shaft, \$3.25; Hocking Valley and Ohio-Central, \$3; Erie, Briar Hill, \$4.10@4.20; Indiana block, \$2.35.

Pittsburg. April 24.

(From our Special Correspondent.)

Coal Trade.—The situation shows no particular change; the season is drawing to a close, and the Ohio river is now too low for coal shipping purposes. Tow-boats, on arrival, forward their empties to the pools and lay up to await a rise in the Ohio. Several mines have closed, and others will do so as soon as their empties are loaded. The lower markets have an ample supply.

The nominal prices are:

1st pool	Per 100 bushels	3d pool	Per 100 bushels
2d pool	\$4.75	4th pool	\$3.90
	\$4.50		3.25
	\$5.00		\$5.50

Railroad coal, \$5.00@5.50. Connellsville Coke.—Business in the coke region shows no particular changes. Prices are

steadily maintained, but many of the works are running four days; others, at certain points, have shut down for want of orders. Of course, the cokers are again talking strike. If they have no cause they soon make one. Operations and output for the week show 13,690 active and 970 idle, against 13,875 active and 777 idle previous week. Production unchanged. Shipments, 6,145 cars, against 6,340 previous week. Decrease, 195.

Current rate: Furnace f. o. b. cars at works, \$2.15; Foundries, \$2.45; Crushed, \$2.65. Freight show no change. Pittsburg, 70c.; Mahoney and Shenango Valley, \$1.35; St. Louis, \$3.05; Chicago, \$2.75; Cleveland, \$1.70; Cincinnati, \$2.65; Louisville, \$3.20.

FREIGHTS.

Freights on Pig Iron.—At a meeting of the trunk lines, held at Chicago, Ill., they all secretly agreed to make the same reduction in all iron rates as was made recently by the Central Traffic Association lines. This reduction is one of classes, less than car lots being now fourth class and car lots fifth class. The reduction will be to fifth and sixth classes respectively, and involves a reduction in rates of about 15 per cent. The reduction will be announced in time to go into effect before May 1. The trunk lines disagreed radically with the Central Traffic reduction, but now make the same rates in response to the united pressure brought to bear on them by the iron men.

From New York to: Boston, 70; Bridgeport, 60; Cambridge, 70; East Boston, 75; East Cambridge, 70; Fall River, 65; Gardner, 85; Lynn, 80; Meuford, 75; New Bedford, 65; New Haven, 65; New London, 60; Newport, 65; Norwich, 70; Norwalk, Conn., 50; Portland, 70; Portsmouth, 80; Providence, 65; Quincy, Pt., 75; Salem, 70.

From Baltimore to: Bath, Me., 1.15; Boston Mass., 1.15; Brooklyn, 1.05; Charleston, 70; Fall River, 1.10; Galveston, 3.00; New Bedford, 1.10; New Haven, 1.10; New London, 1.10; New York, N. Y., 1.05; Portland, 1.15; Portsmouth, N. H., 1.15; Providence, 1.10; Richmond, 70; Salem, Mass., 1.15; Savannah, 95; Somerset, 1.10; Williamsburg, N. Y., 1.05.

From Philadelphia to: Alexandria, 4.85; Annapolis, 6.00@6.5; Baltimore, 1.60; Bangor, 11.00@11.10; Bath, Me., 1.05; Beverly, 11.00@11.10; Boston, 11.00@11.10; Bristol, 11.00; Brooklyn, 1.90; Cambridge, Mass., 11.00@11.15; Cambridgeport, 11.10@11.15; Charleston, 70@75; Charlestown, 11.05@11.15; Chelsea, 1.00@1.10; Com. Pt., Mass., 11.05@11.15; E. Boston, 11.00@11.10; E. Cambridge, 11.05@11.15; Fall River, 11.00; Galveston, 2.50; Gardner, Me., 11.00@11.15; Georgetown, 1.85; Gloucester, 11.05@11.15; Lynn, 1.10@1.20; Marblehead, 11.05@11.15; Milton, 11.20; New Bedford, 11.00; Newburyport, 1.20@1.25; New York, 1.90; Norfolk, Va., 1.65; Portland, 11.00@11.10; Portsmouth, Va., 1.65; Portsmouth, N. H., 11.10@11.15; Providence, 11.00; Richmond, 60@70; Rockport, 11.25; Roxbury, 11.00; Salem, 11.00@11.10; Saugus, 11.15; Savannah, 1.80; Somerset, 11.00; Washington, 1.85; Weymouth, 11.10@11.20.

*And discharging. †Along-side. ‡And towage. §Flat.

METAL MARKET.

NEW YORK, Friday Evening, April 25.
Prices of silver per ounce troy.

Apr	Sterling Exch'ge	London Pence	N. Y. Cts.	Apr	Sterling Exch'ge	London Pence	N. Y. Cts.
19	1.86½	46½	23	4.86½	46	††	
21	4.86½	45¾	† 21	4.86½	‡	‡‡	
22	4.86½	45¾	‡ 25	4.86½	‡‡	‡‡	

*100½ to 1.02. †99¾ to 1.00¼. ‡98¾ to 1.00¼. §47 to 47½. ¶48 to 48¾. ††1.00½ to 1.01½. ‡‡1.02½ to 1.04. §§1.05 to 1.06.

Council Bills declined 5-32d. per rupee on Wednesday allotment.

The silver market this week has been very speculative and excited, depending on Congressional action. Since the agreement of the Republican caucus upon a silver bill practically amounting to free coinage, the price has rapidly advanced here, the London market following our lead. Speculative transactions upon the Stock Exchange in silver certificates have been very active, and at prices considerably over the market price of bullion.

There are now about 1,000,000 ounces on deposit in the Mercantile Deposit Company.

The market closes firm upon the probable passage of present bill. We notice this bill editorially elsewhere.

The United States Assay Office at New York reports total receipts of silver for the week to be 275,000 ounces.

SILVER BULLION CERTIFICATES.

NEW YORK STOCK EXCHANGE.

	Price.		Sales.
	H.	L.	
April 19	103½	103	10,000
April 21	103	102	23,000
April 22	103	101	22,000
April 23	103	102½	148,000
April 24	105¼	105	283,000
April 25	107	106	280,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

April 24	103½	105	85,000
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Total sales..... 1,032,000

Bar Silver.

April 21	101¼	100%	900,000 oz
April 22	100	100%	25,000 oz

Foreign Bank Statements.

The governors of the Bank of England at their weekly meeting on Thursday made no change in its rate for discount, and it remained at 3 per cent. During the week the bank lost £482,000 bullion, and the proportion of its reserve to its liabilities was reduced from 45.30 to 44.45 per cent., against a gain from 40.05 to 42.36 per cent. in the same week of last year, when its rate for discount was 2½ per cent. The bank on the 24th inst. lost £200,000 bullion on balance. The weekly statement of the Bank of France shows gains of 15,725,000 francs gold and 6,125,000 silver.

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked
Trade dollars.....	\$.80	\$.85
Mexican dollars.....	\$.80	\$.85
Peruvian soles and Chilean pesos... 7 and Nom. Nomal.	4.86	4.90
English silver.....	.94	.95
Five francs.....	4.97	4.90
Victoria sovereigns.....	3.86	3.90
Twenty francs.....	4.74	4.78
Twenty marks.....	15.55	15.70
Spanish doubloons.....	4.82	4.88
Spanish 25 pesetas.....	15.55	15.70
Mexican doubloons.....	19.50	19.60
Mexican 20 pesos.....	3.96	4.00
Ten guilders.....	106	107
Bar silver.....		

Copper.—Our market has been firm with a continued steady demand. It is understood that the bankers have lately had submitted to them bids for their entire holding of Lake copper in the neighborhood of 14 cents per pound, which bids were declined and subsequent bids of 14.74 cents met with the same response. This is strong evidence that the holders of this copper are not at all anxious to sell and are determined to stick to it until they get their price.

We are sorry to report that owing to the engine house at the Tamarack mine having been destroyed by fire production there will be curtailed somewhat during the next month or so. In consequence of this the demand for Lake copper has been rather more active during the week, and nothing can be bought under 14½ cents.

The consumptive demand for Arizona and casting brands also continues very good; the quotations for those descriptions are now Arizona 12½ to 13 cents, and casting qualities 12½ to 12½ cents.

The London market for Chili bars and Great Britain copper opened steady on Monday morning at last week's closing quotations, viz.: £48 2s. 6d. to £48 7s. 6d., 3 months, since which a gradually shading tendency has been observable, and the closing quotations received by cable to-day stand at the highest figures of the week, viz.: £48 17s. 6d. to £49, spot; £49 2s. 6d. to £49 5s., 3 months.

In the European markets furnace material still continues rather pressed for sales, and transactions are reported in Anaconda and Boston and Montana matte at 9s. 9d., which is rather a low figure.

The brass making and yellow metal trade has been decidedly dull over in Europe and manufacturers have consequently been anxious to secure orders, the natural result being that prices are somewhat depressed. On the other hand the finest grades of copper continue in very good demand. The latest quotations are as follows: English tough, £51 10s. to £52 10s.; best selected, £53 10s. to £54 10s.; strong sheets, £56 to £60; India sheets, £56 to £57; yellow metal, 5½ to 6d.

The exports of copper during the last week were as follows:

To	Copper.	Lbs.	\$250.
To Liverpool.....	10 Pigs.	2,100	\$250.
To Rotterdam.....			
To Spandam.....	45 Casks.	56,250	\$8,153.

Tin.—Owing to the low quotations from London, the market was rather depressed at the beginning of the week, but later, in sympathy with stronger advices from London, the feeling here experienced a sudden change and prices rapidly improved, and we close to-day very firm at the following quotations: Spot, 20'60; April, 20'60; May, 20'60; June, 20'60.

In London the market commenced the week with quite a dull tendency at £90 12s. 6d. to £90 15s. spot, and £91 12s. 6d. to £91 15s. three months, and gradually weakened until, on Wednesday, £90 to £90 2s. 6d. for spot and £90 12s. 6d. to £90 15s. for futures were the quotations marked. Thereafter, however, influenced no doubt to a great extent by the rise in silver resulting from the expected early legislation in this country on the silver currency, a strong advance set in, and, according to cable advices, the market closes to-day strong at the highest figures, viz.: £92 15s. to £92 17s. 6d. spot, and £93 10s. to £93 12s. 6d. three months.

Lead.—The long period of dullness, almost amounting to absolute stagnation in the lead market, has at last been enlivened by a strong and sudden demand, which, in the absence of offers on the part of smelters, has led to a rapid rise in prices. At the beginning of the week 3½c. was freely accepted, and only a few hundred tons could be placed at that figure, but prices have since run rapidly up until to-day as high as 4'05 and 4'07½ was done, but the feeling at the close is a little easier again, and we have now to quote 4.02½ to 4.05. It is a difficult thing to say whether this first rise is fully justified, and it seems very likely that present prices will tempt smelters to send forward supplies.

The London quotations stand at £12 17s. 6d. for Spanish, and £13 2s. 6d. for English.

The St. Loui's Lead Market.—Messrs. John Wahl & Co. telegraph as follows:

"Since our last report lead has undergone a radical change. The prolonged dormancy of this metal has been succeeded by a spirit of activity, and quite a material advance is recorded. Transactions will easily aggregate 1,000 tons at prices ranging from 3'65 to 3'80c. At the close, offerings are limited. Common lead has 3'75c. bid, and corroding is quietly saleable at 3'80c.

The Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: "Lead has been scarce during the week, resulting in gradually hardening values. Sales foot up some three hundred tons at 3'75 to 3'80c. At the close the market is irregular, and, nominally, 3'85 to 3'90c. is asked."

Spelter continues very unsettled, and with sales reported at 5c it appears that even a trifle under that figure has been quoted. It is certain, however, that very little can be bought below 5c., and we have to quote 5@5'05c., with higher prices asked for special brands.

In the London market, where prices had declined rather heavily, owing to the falling off in the galvanizing trade, which led to various lots held by speculative holders being thrown on the market, a strong demand set in about the middle of the week, resulting in an advance of about £1 per ton, the closing prices being £21 10s. for ordinaries and £21 15s. for specials.

Antimony.—Demand continues good. Some heavy arrivals of Cookson's took place during the week, and the price of that brand declined to 25c.; but for Hallet's (the supplies of which are very moderate), the quotation is steady at 19@19½c. English producers are reported sold out for four to six weeks, and only limited supplies can arrive for some time to come.

Quicksilver.—Quotations continue as for some weeks past, \$49.50 to \$50 for New York, and £9 10s. for London.

Nickel.—Monotonously quiet at 70@75c., according to quantity.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 25.

Pig Iron.—The week has been of the same featureless character which has prevailed in this market for some time past. Some dealers, especially in Northern brands, report that they are not accumulating stock, and are inclined to hold optimistic views regarding the outlook for pig iron. The pessimists, and they are not few, say they expect still lower prices, but not very soon. On the whole, it seems to us we are about at the bottom for the present and that a better market may be looked for, though production is still apparently ahead of consumption.

The sharpness of the competition from Southern furnaces is somewhat duller. The large sales in Cincinnati and other Western cities may keep them busy for some time to come, and in that way reduce the pressure here. Southern No. 1 foundry iron is scarce, and the reports and rumors of sales at very low figures do not apply to sales of this brand. Low grades of iron are plentiful and cheap. Quotations are hard to obtain, certain dealers offering prices which others do not hesitate to pronounce a "bluff." Nevertheless, the following range will cover all the offerings we have heard of: No. 1 Southern iron, \$17@18; No. 2, \$16.25@17.25. For Northern brands we quote, \$18@19 for No. 1 X, and \$17@18 for No. 2.

The Thomas Iron Company last week declared a stock dividend of 25 per cent., the accumulation of surplus profit for some years past.

Scotch Pig.—The market on the other side is weaker. Here there is no change, and the dullness continues. Quotations here are nominally Eglinton, \$19.50@20; Dalmellington, \$22@22.25; Coltness, \$25@25.50.

Steel Rails.—Buyers, in the expectation of lower prices, are holding off and are doing a hand-to-mouth business. The mill men, however, are not complaining, and say they are well sold up. No large sales have occurred. Quotations are \$33@34, the latter figure being asked by mills whose large contracts are being filled.

Spiegeleisen and Ferro-Manganese.—The condition of the market has not changed much, a sale of 5,000 tons of spiegeleisen being the only feature of interest. Twenty per cent. spiegeleisen may be quoted at \$32@33.

Nothing has occurred to dispel the dullness in ferro-manganese, and nominal quotations are \$82.50@83 for early delivery.

Merchant Steel.—There is a good normal demand for steel, and a fair amount of business is being transacted. We quote this week, best English tool steel, 15c. net; American tool steel, 7½@10c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3½c.; open-hearth machinery, 2½c.; open-hearth spring, 3½c.; tire steel, 2½c.; toe calks, 2½c.

Structural Iron and Steel.—No change either as to prices or volume of business; quotations are about as follows: Universal plates, 2'x5; bridge plates, 2'x20; angles, 2'x20; tees, 2'x5; beams, 3'x10.

Rail Fastenings.—A dearth of actual transactions is all that can be reported in rail fasten-

ings. We quote spikes 2'10c., angle plates 1'00c. 1½ its and square nuts 2'85c. and hex. nuts 3. Buyers demand, and in some cases obtain, lower prices.

Tubes and Pipes.—Prices remain undisturbed, and a prosperous condition of trade is reported. The monthly meeting of the association takes place next week, but a very great change in prices need not be looked for. The ruling discounts on car lots are 47½ per cent. on small black, 40 on galvanized, 60 on large orders of black and 47½ on large lots of galvanized; 45 on 1½ inch boilers, 50 for 2 to 4-inch and 52½ on larger than 4-inch; casing all sizes, 50 per cent.

Chicago. April 23.

(From our Special Correspondent.)

The prevailing opinion as to the Chicago iron market appears to be, among consumers, this week, that bottom has been reached. Prices remain about the same; still many believe that lower prices are at hand, and are acting accordingly. Upon the whole, an active week may be reported. It is said that iron and steel products were never more largely consumed in this city and in the Northwest. The labor troubles in the local building trades are not as yet seriously felt in connection with business in this direction.

Ohio furnaces claim lower prices to be out of the question, and coke and ores are not likely to decline soon. Consumers who have omitted to take advantage of the late prevailing low figures will most likely have to regret lost opportunities. A considerable movement in Southern pig has given these irons more firmness, although no advance in prices is noted here as yet. Lake Superior irons are held firm, and the same may be said of malleable.

Pig Iron.—We quote to-day for cash per ton f.o.b. Chicago. For No. 1 and 2 Lake Superior charcoal, No. 3 for carwheels, and No. 4 and 5 for malleable \$21@21.50; Lake Superior coke, Bessemer, \$22; No. 1 Lake Superior coke, Bay View, \$17.50@18; No. 2, \$17; No. 3, \$16.50; Southern coke, No. 1, \$16@16.50; No. 2, \$15.50@16; No. 3, \$15@15.50; Southern charcoal, \$19@19.50; Standard Southern car wheels, \$24.50@25; Ohio softeners, Hanging Rock, \$18.50@19.50; Jackson County, \$17.50@18; Hanging Rock cold blast, \$26@28; warm blast, \$27@28; No. 1, Scotch according to brands, \$25@26; American Scotch, \$20@21; Bay View Scotch, No. 1, \$17.50; No. 2, \$16.50; Chicago Scotch, No. 1, \$17.50; No. 2, \$16.50; Emma, \$19@19.50; Blackband Hubbard Scotch, \$20.50; Hazleton, \$20.50; Soft Silvery, \$18; Wellston, No. 1, \$18; No. 2, \$19.50; Hamilton, No. 1, \$18; Norton, No. 1, \$17.50; Zanesville, No. 1, \$18.

Bar Iron.—The favorable conditions noted last week continue. Valley mills quote \$1.65 half extras; local mills continue to ask \$1.50@1.90 for half extras, and \$1.80 for car lots. The prospective strike at the mills causes these rates to be held firmly, and the drop in freights will act advantageously on this market.

Structural Iron.—While the good demand reported last week continues, prices have a tendency to decline. Molders demand shorter hours and increased wages, and many contractors refuse to have the "strike" clause inserted; this may send them elsewhere for castings. For car lots f. o. b. Chicago, we quote: Angles, iron and steel, \$2.40@2.50; Universal plates, \$2.55; sheared plates, \$2.60; tees, \$2.70@2.80; beams and channels, \$3.20.

Block Sheet Iron.—Mill agents continue reluctant to quote prices beyond midsummer deliveries; increased demand is springing up; prices at mills are, for No. 27, \$2.95@3.05; Jobbing prices are No. 27, \$3.50; Nos. 25 and 26, \$3.40, and No. 24, \$3.30.

Galvanized Sheet Iron.—Business is reported very heavy, with strong demand and no concessions in prices. Dealers are finding it difficult to keep up with orders; inferior brands affect the market more or less; discounts for both cheap and standard brands are 60 and 60 and 5 per cent. on Juniata, and 62½ per cent. on charcoal from store. Jobbing lots 50 and 10 per cent., according to quantity.

Merchant Steel.—The demand continues good, with no change in prices; figures are, for tool steel, \$7.75@8; specials, \$12@25; open-hearth machinery, \$3; Bessemer machinery, \$2.50@2.60; open-hearth spring, \$2.60@2.65; tire, \$2.50@2.60; toe calk, \$2.79@2.80; crucible sheet, \$7@10; crucible spring, \$3.75.

Plates, Tubes, etc.—Business good, demand fair, prices unchanged. We quote as follows: Tank iron, \$2.70; tank steel, \$2.80; heavy sheets, No. 10 to 14, \$2.90@3; steel sheets, Nos. 10 to 14, \$3.25@3.50; shell iron, \$3@3.25; flange iron, \$4@4.25; flange steel, \$3.50; shell steel, \$3.25; boiler rivets, \$4@4.25; fire-box iron and steel, \$4.75@5.50; boiler tubes, 4½ in. and larger, 52½ per cent.; 2 to 4 in., 50 per cent.; 1½ in. and smaller, 45 per cent. In car lots, tank iron, \$2.50; tank steel, \$2.65; iron sheets, Nos. 10 and 14, \$2.60@2.70; steel sheets, \$2.80.

Old Wheels and Rails.—A market without any activity, prices nominal. Old wheels range from \$18.50@19; iron rails, \$23.75@24; steel rails, \$19.50@21.

Scrap Iron.—A total apathy in this market and \$13 paid for country mixed. No. 1 mill, \$14@15; light wrought, \$9.50; horse shoes, \$18.50; axles, \$23; cast machinery, \$12.50@13; stove plates,

\$9.50@10; borings, \$9@9.25; wrought trimmings, \$12@12.50; No. 1 railroad shop or forge, \$20; track scrap, \$18; mixed steel, \$15.50.

Nails.—Very good sales are reported during the week. An advance in prices is anticipated from May 1st, when the Nail Association is to hold its next meeting. Mill lots are quoted at \$1.90 rates. Car lots at Chicago are held at \$2.05 per keg. For wire nails the demand is heavy at \$2.40 for large lots.

Sheet and Bolt Copper, 22c. pound rates.

Sheet Brass, Copper and Brass Wire, 25 per cent. discount, factory delivery, with a prospect of advanced prices.

Louisville. April 22.
(Special report by HALL BROS. & Co.)

There is a better feeling now than existed a short while ago, and better figures have been obtained than were ruling on the heavy trading that has taken place in the past two or three weeks. A number of round orders has been placed during the week under review, varying in quantities from 100 to 1,500 and 2,000 tons. There are still some furnaces, however, that are disposed to take new business at very low prices, and some of the orders that have been placed during the past week have been with those parties, and for deliveries beginning in July and running through the year.

There was no apparent reason for some of the figures that were made, and the parties could easily have obtained better prices than they did in the cases referred to had they asked them. Buyers seem to be reconciled to the situation, and are willing to make contracts for long deliveries, though some furnaces refuse to entertain long future business except at materially advanced prices over the late ruling figures.

Hot Blast Foundry Irons.

Southern Coke No. 1.....	\$15.25@15.50
" " No. 2.....	14.75@ 15.00
" " No. 3.....	14.00@ 14.50
Mahoning Valley, Lake ore mixture.....	18.00@ 19.00
Southern Charcoal No. 1.....	17.50@ 18.00
" " No. 2.....	17.00@ 17.50
Missouri " No. 1.....	18.50@ 19.00
" " No. 2.....	18.00@ 18.50

Forge Irons.

Neutral Coke.....	13.50@ 14.00
Cold Short.....	13.25@ 13.50
Mottled.....	12.75@ 13.00

Car Wheel and Malleable Irons.

Southern (standard brands).....	22.50@ 23.00
(other brands).....	19.00@ 20.00
Lake Superior.....	22.50@ 23.00

Philadelphia. April 24.
(From our Special Correspondent.)

Pig Iron.—The two features deserving of attention in the pig iron market during the past week have been the withdrawal of the extremely low quotations recently made; and, second, the withdrawal of offers of large blocks of first-class brands of iron. Makers are seemingly preparing for the reaction which they think will soon come; but buyers are paying very little attention to the market one way or the other. A few large contracts for both forge and foundry iron have been placed, but the rank and file of buyers still hold back. Occasionally an offer is made of \$15.50 for a large block of forge, but \$16 is the ruling price. Several lots of Southern forge have been offered here; but even on this iron the extremely low prices of two weeks ago have disappeared. No. 2 foundry is quoted at \$17@17.50; No. 1, \$18@18.50, with a few special brands selling at \$19, and for these latter brands quite an active demand has set in. The feeling all through the market is somewhat better than it was a week ago, but there is still a good deal of unrest and dissatisfaction on both sides. Bessemer iron is very dull, but makers, having a good deal of business on hand, are not concerning themselves very much about orders for future delivery.

Foreign Material.—Spiegel has weakened in consequence of the withdrawal of offers made two or three weeks ago for large blocks at prices which were then considered bottom; the result has been that prices have dropped about 50c. Quotations, \$32.50; ferromanganese is quoted at \$80.

Muck Bars.—The low prices of the past few days have resulted in some business on a basis of \$2¹/₂ at mill, but first-class material is held 50c. @ \$1 higher. Quite a number of buyers are willing to pay \$28, but cannot obtain the desired quality at that price.

Billets.—The possibility of an advance in billets is recognized by large buyers, and within a day or two negotiations have been pushed forward looking to the covering of some extensive summer requirements; but buyers and sellers are still too far apart for any agreement to be expected this week. Quotations are \$30.50 to \$31.50.

Blooms.—Charcoal blooms are strong at \$52.50 to \$55; anthracite, \$44.50; scrap, \$35.

Merchant Iron.—There has been quite a rush of small buyers, at both city and country mills, but prices are low and there are no signs of improvement. Refined iron has sold as low as 1'80 at interior mills, and 1'85 is the ordinary price, while city mills are getting 1'90@1'95, only very small lots bringing the outside figure. Manufacturers are anxious for business, and are willing to yield wherever possible. The margin on bars is

now insignificant, and the trade is anxiously awaiting an improvement.

Nails.—The anxiety of nailmakers to get rid of stocks and load up with others has resulted in cutting prices down to \$1.85 in carload lots, and it is intimated that 5c. less has been taken in some cases. The market is in a condition very unsatisfactory to makers, but buyers are having things pretty much their own way.

Skelp Iron.—Small lots of skelp are selling at 1'85 to 1'90 for grooved, and 2 to 2'10 for sheared. Large lots can be had at a little less.

Wrought-Iron Pipes.—There is nothing new to report in the wrought-iron pipe branch of trade. All mills are busy, and prices remain where they have been since last meeting.

Sheet Iron.—The market is active; mill orders and store sales are good, and card rates are maintained without difficulty.

Plate Iron.—Several large contracts for plate iron have been secured within the past few days, on a basis of about 2c. Both iron and steel plates are in better demand than they have been for some time. Brokers state that contracts for a large amount of material will be placed early in May.

Structural Iron.—The receipt of specifications within the past week shows that bridge builders are now in earnest about placing business. A large amount of material has been contracted for since the writing of last report. The active condition at mills continues, and everything points to an active summer demand. Angles are 2'20 for iron; tees, 2'70; beams and channels, 3'10.

Steel Rails.—Steel rails are said to be \$34, but some large negotiations are pending at \$33, and two or three large blocks are about to be placed at Eastern Pennsylvania mills. There is some sharp competition going on, and it is impossible to say which mills will secure the prizes.

Old Rails.—Old rails are quoted nominally at \$24 for tees. Business is of very small proportions.

Scrap Iron.—A number of our scrap dealer report quite a liberal movement on a basis of \$22.50 for No. 1. Machinery scrap has been selling freely at \$16; wrought turnings, \$16.50.

Pittsburg. April 24.
(From our Special Correspondent.)

Raw Iron and Steel.—The past week has developed nothing of special importance, the trade at the present time being practically at a standstill, with dealers, as a general thing, waiting for something to turn up in the way of improvement; just how long they will have to wait is what no person can find out. The general impression is that the present stagnation is but a waiting period preceding active business and better prices. One thing admits of no dispute. Iron made from coke at present prices and ore purchased for delivery during 1890 can't be made and sold at prices, the cost of the raw material, to say nothing about the increased cost of labor, being fully \$3.50 per ton over iron made last year and the early part of this year. The question then to be decided is, who will pay the increased cost of making iron and steel. Eventually it must come off the consumer, as makers will certainly refuse to continue to make iron at a loss. You may make up your minds to one thing—prices must be enhanced or furnaces will close down and remain closed until better prices will be the rule, not the exception. There are certain city furnaces that may be said to be out of the market so far as relates to selling at present rates. Consumption is still going on on a large scale, stocks in the hands of consumers steadily growing less, and when the end comes there will be plenty of buyers. You may rest assured that time is not far off. Since the first of April lower quotations have been made for certain grades than at any time since last summer, but then pig iron is only following the lead of other descriptions of iron, so that it was not altogether unexpected, but in a general way it is considered that the storm is about over, and that when adjustments of prices are completed the market will soon rally.

A leading dealer has this to say, prices have not advanced, nor has there been any influx of new business, but in certain quarters there seems to be more confidence than existed at date of last report. It is known that stocks at most points are light, and the iron now in stock is principally in the hands of furnacemen. The mills are generally full of orders, and as everything promises large consumption there must be a ready market for pig iron in the near future. Although the nominal capacity of the furnaces now in blast is considerably in excess of the estimated current consumption, still the furnaces are not yielding their full capacity, and the production and consumption are pretty even balanced.

Coal and Coke Smelted Lake Ore.

2,000 Tons Bessemer.....	18.00 cash.
1,000 Tons Bessemer.....	17.75 cash.
1,000 Tons Bessemer.....	17.65 cash.
1,000 Tons Grey Forge.....	15.50 cash.
500 Tons Grey Forge.....	15.25 cash.
500 Tons Grey Forge.....	15.30 cash.
500 Tons Grey Forge.....	15.25 cash.
500 Tons Grey Forge.....	15.50 cash.
500 Tons Grey Forge City Furnace.....	15.75 cash.
100 Tons No. 1 Foundry.....	18.00 cash.
100 Tons No. 2 Foundry.....	17.25 cash.

Coke, Native Ore.

500 Tons Grey Forge.....	15.75 cash.
140 Tons No. 2 Foundry.....	17.00 cash.
50 Tons White all ore.....	16.00 cash.
50 Tons No. 1 Foundry.....	18.00 cash.
50 Tons Silvery.....	18.00 cash.
50 Tons Silvery Extra.....	20.00 cash.

Charcoal.

100 Tons No. 2 Foundry.....	23.25 cash.
75 Tons Cold Blast.....	29.75 cash.
75 Tons Cold Blast.....	26.00 cash.

Muck Bar.

1,500 Tons Neutral.....	27.25 cash.
750 Tons Neutral.....	27.62 cash.
500 Tons Neutral.....	27.50 cash.
500 Tons Neutral.....	27.00 cash.

Steel Slabs and Billets.

500 Tons Billets.....	28.00 cash.
500 Tons Nail Slabs, Wheeling.....	27.00 cash.
500 Tons Billets.....	27.25 cash.

Steel Wire Rods.

500 Tons American Fives.....	40.00 cash.
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Steel Bloom Ends.

250 Tons Bloom Ends.....	20.00 cash.
250 Tons Bloom Ends.....	20.00 cash.

Ferro-Manganese.

50 Tons 80 per cent., May, f.o.b. Baltimore.....	81.50 cash.
50 Tons 80 per cent., June, f.o.b. Baltimore.....	81.50 cash.

Spiegel.

75 Tons 20 per cent., Pittsburgh.....	36.00 cash.
50 Tons 10 and 12 per cent., Pittsburgh.....	33.50 cash.

Skelp Iron.

350 Tons Sheared Iron.....	212 ¹ / ₂ 4 m.
300 Tons Wide Grooved.....	175 4 m.
200 Tons Narrow Grooved.....	170 4 m.

Old Iron and Steel Rails.

400 Tons American Ts.....	24.00 cash.
250 Tons Old Steel Rails.....	22.00 cash.

Prices.

Coke or Bituminous Pig.....	20 ¹ / ₂ Spiegel at Pittsburgh.....	\$36.00@36.50	
Foundry No. 1.....	\$18.00@18.25	Muck-Bar.....	27.50@27.75
Foundry No. 2.....	17.25@17.50	Steel Blooms.....	28.00@
Gray F. No. 3.....	15.75@16.00	Steel Slabs.....	28.00@
" " No. 4.....	15.25@	Steel Crp Ends.....	21.50@22.50
White.....	15.00@	Steel Bl. Ends.....	20.00@21.00
Mottled.....	15.00@	Ferro-Man., 80%, seaboard.....	81.50@82.00
Silvery.....	18.25@20.00	Steel Billets.....	28.00@28.25
Bessemer.....	17.75@18.50	Old Iron Rails.....	24.00@24.50
Low Phos.....	26.00@	Old Steel Rails.....	21.50@22.00

Charcoal Pig.

Foundry No. 1.....	23.50@24.50	No. 1 W. Scrap.....	21.25@21.50
Foundry No. 2.....	22.00@22.75	No. 2 W. Scrap.....	17.50@17.75
Cold-Blast.....	25.00@26.00	Steel Rails.....	34.00@35.00
Warm-Blast.....	24.00@25.00	light sec.....	34.00@37.00
10 + 1 ¹ / ₂ Spiegel at Pittsburg.....	33.50@	Bar Iron, nom.....	1.85@ 1.90
		Iron Rails.....	2.00
		Wire Nails.....	2.00
			@ 2.50

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, April 25.

Heavy Chemicals.—The heavy chemical market is undergoing at present the natural reaction of the late excitement. Dealers report that they are not doing much business at present, inasmuch as buyers are holding off. Shipments have arrived, but they went into consumption, and there is not a superabundance to-day of chemicals. Prices do not differ much from those quoted last week. Quotations are as follows:

Caustic soda, 60 per cent., 2 ¹ / ₂ @2 ¹ / ₂ cents; 70-74 per cent., 2 ¹ / ₂ @3 cents; 74-76 per cent., 2 ¹ / ₂ @3 cents.
Carbonated soda ash, on the spot, for the 48 per cent., 1 ¹ / ₂ @2 cents; 88 per cent., 1 ¹ / ₂ @2 cents.
Caustic soda ash. Prices for forward shipments are 1 ¹ / ₂ @1 ¹ / ₂ cents.
Sal soda, 1'10@1'25 cents.
Bleaching powder is quiet, and may be quoted 1'50@1'75 cents.

Acids.—There has been a fair amount of business transacted during the week, and, while there is still room for improvement in the trade, yet, as this applies to all branches of business, the acid men say they are not complaining, and that, on the whole, business is better than it was.

The effect of the circular issued by a prominent manufacturer, and published in our last week's issue, has been to fix the price of sulphuric acid in Brooklyn and New Jersey.

Sixty-six per cent. sulphuric may now be obtained for \$0.85 per cwt.

Fertilizing Chemicals continue without change or features of interest. There has been a firmer market on ammoniates, and a few sales are reported. At this time of the year this is encouraging. On the whole prices remain unchanged. We quote high grade dried blood \$1.90@1.95. For the low grade the price is \$1.80@1.85. Azotine, \$1.95@2. Tankage, high grade, 9 to 10 per cent. ammonia and 15 to 20 per cent. phosphate, \$20@21 per ton, and low grade 7 to 8 per cent. ammonia and 25 to 30 per cent. phosphate, \$18.50. Fish scrap, \$20.50@21 per ton, f.o.b. factory. Sulphate of ammonia at \$3.10@3.12¹/₂ per cwt. Concentrated tankage, \$1.90@2. Refuse, bone black, guaranteed 70 per cent. phosphate, \$18@18.50 per ton, and sales at the first figure have been reported. Dissolved bone-black is nominally 95c. per unit for available phosphoric acid, although on large lots prices might be somewhat reduced, and acid phosphate 80c. per unit for available phosphoric acid. Steamed bones, underground, \$20@23; ground, \$25@26.

Charleston rock, undried, \$5.75 per ton; kiln-dried, \$6.50@7 per ton, both f. o. b. vessels at the mines. Freight by rail from Charleston to New York, \$2.25@2.50 per ton. Charleston rock, ground \$11.50@12, ex-vessel at New York.

Quotations are for 48 to 50 per cent. sulphate of potash, \$2.37¹/₂ per 100 pounds for shipments from date; high grade manure salts, basis 90 per

cent. sulphate of potash, \$2.36 1/2 per 100 pounds. There is very little on the spot.

A telegram from Charleston, S. C., received at the moment of our going to press, informs us that all the phosphate land miners have joined the exchange to-day and maintain their prices \$6.65 and \$5.65, respectively, on standard grades f. o. b. vessel at the mines.

Kainit.—There have been a good many inquiries for future shipments, but not much actual business is being transacted. We quote \$9.50@9.75.

Muriate of Potash.—Large quantities are expected to arrive very soon, and this will relieve the market. There has not been much doing, and our last quotations still hold good at \$1.77 1/2@1.85, according to quantity.

Nitrate of Soda.—The market appears a little better. We quote \$1.75@1.80 ex-store, according to quantity.

Brimstone.—Brimstone continues to show a lack of interesting features. Quotations are, to arrive, best unmined seconds, \$19.50, and best thirds, \$19. Two cargoes of Japanese sulphur have arrived at San Francisco. The quality is excellent, but the price offers no advantage over the Sicilian brimstone. Elsewhere we give some interesting particulars concerning the Chance process sulphur, and its cost. A combination, embracing all the English producers except two, have appointed Messrs. Linden & Meyer, of this city, as their agents for the present.

A Sulphur Combination.—The English alkali makers, who are preparing to recover sulphur by the Chance process, met at Liverpool lately for the purpose of devising a scheme for selling the whole of their produce, so far as it is intended to be placed on the open market, through a single medium and at a uniform price. In view of the already very depressed condition of the sulphur market in England, such a combination alone can prevent the manufacture under the Chance process from becoming absolutely unremunerative, as, apart from that process, there is already a much greater quantity of sulphur offering on the market than can be assimilated. Mr. Chance, the patentee of the new process, presided over the meeting, and after some discussion it was decided to form a limited company especially for the sale of the product. It is thought that the quantity of Chance sulphur available for the market during the first year will represent a value of between \$40,000 and \$50,000, the bulk of which will be manufactured at Widnes and St. Helens. Four-fifths of the producers were represented at the meeting and all but two firms have joined in the combination. We learn that the Tharsis Company thinks, with reference to this process, that the question of cost has not been thoroughly gone into yet, and that it will not be nearly so cheap as has been thought.

Liverpool. April 16.

[Special report by Messrs. J. P. Brunner & Co.]

The expectation that the demand for chemicals would improve after the Easter holidays and settlement of the dock-laborer's strike has not been realized, but, on the contrary, the demand all round is very slow, and prices generally have eased off in consequence.

Soda ash is still in small compass, but as there are few fresh orders coming on the market some makers show more anxiety to meet buyers, and 1 1/2d. to 1 3/4d. are now nearest spot quotations for both 48 per cent. caustic and 48 per cent. carb ash. As far as high-test ash is concerned there is still

nothing offering, makers being fully sold for some time ahead.

Soda crystals have declined, and £3 5s. up to £3 10s. are spot quotations.

Caustic soda, very flat, and the absence of the expected Spring demand for the Continent has caused the market to be depressed. There is so little moving that it is difficult to test the market, and quotations are quite nominal, as follows: 60 per cent., £9 to £9 5s.; 70 per cent., £10 to £10 5s.; 74 per cent., £11 to £11 5s.; 76 per cent., £12 10s. With orders firm in hand some second-hand parcels of 60 per cent. and 70 per cent. could probably be had at under the lower figures named, but buyers hold aloof looking for a still further decline.

Bleaching powder is quite neglected, and nearest quotations are £5 15s. @ £6, but no sales reported.

Chlorate of Potash flat and easier at 4 1/2d. @ 5d. per lb. for prompt delivery.

Bicarb Soda firm at £6 5s. per ton and upward for one cwt. kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of Ammonia is still very dull and rather easier, £11 7s. 6d. @ £11 10s. per ton being spot quotations for good gray 24 per cent. f. o. b. Liverpool.

(From Geo. G. Blackwell's Report.)

Minerals.—Our market has continued strong, and the late advance has been well maintained. Manganese: Arrivals are proportionately small; prices unaltered. Magnesite: Stocks of raw lump continue large, and prices are very easy. Raw ground, £6 10s., and calcined ground £10@£11. Bauxite (Irish Hill brand) in increased demand at very strong prices—lump, 20s.; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mine. French chalk: Arrivals this week have increased, but all have practically gone into consumption; prices, therefore, are firm at last figures, especially for G. G. B. "Angel-White" brand—90s. to 95s. medium, 100s. to 105s. superfine. Barytes (carbonate) continues easier. Selected crystal lump scarce at £8; No. 1 lumps, 90s.; best, 80s.; seconds and good nuts, 70s.; smalls, 50s.; best ground, £6; and selected crystal ground, £8. Sulphate has somewhat improved. Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground best white, G. G. B. brand, 65s.; common, 45s.; gray, 32s. 6d. to 40s. Pumicestone quiet. Ground at £10, and specially selected lump, finest quality, \$13. Iron ore unaltered. Bilbao and Santander 9s. to 10s. 6d., f.o.b.; Irish, 11s. to 12s. 6d.; Cumberland in strong demand at 18s. to 24s. Purple ore steady, at last quotations. Spanish manganiferous ore selling freely at good prices. Emery-stone: Best brands still scarce both for spot and forward delivery; prices firmer. No. 1 lump is quoted at £5 10s. to £6, and smalls £5 to £5 10s. Fullers' earth steady: 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Scheelite, wolfram, tungstate of soda, and tungsten metal inquired for. Chrome metal, 5s. 6d. per pound. Tungsten alloys 2s. per pound. Chrome ore: The present demand has been supplied by fairly large arrivals, prices, however, are unaltered. Antimony ore and metal have further advanced. Uranium oxide, 24@26s. Asbestos: Best rock, £17@£18; brown grades, £14@£15. Potter's lead ore: Prices are firm; smalls, £14@£15; selected lump, £16@£17. Calamine: Best qualities scarce—60@80s. Strontia steady; sulphate (celestine) steady, 16s. 6d. @ 17s. Carbonate (native), £15@£16; powdered (manufactured), £11@£12. Limespar:

English manufactured, old G. G. B. brand in demand, and brings full prices; 50s. for ground English. Felspar, 40@50s.; fluorspar, 20s. @ £6. Bog ore in demand, firm, at 22@25s. Plumbago steady; Spanish, £6; best Ceylon lump at last quotations; Italian and Bohemian, £4@£12 per ton; founders, £5@£6; Blackwell's "Mineraline," £10. French sand, in cargoes, continues scarce on spot—20s. @ 22s. 6d. Ferro-manganese and silicon spiegel in good demand at stronger figures. Chrome iron, 20 per cent., £24@£25. Ground mica, £50. China clay freely offering—common, 18s. 6d.; good medium, 22s. 6d. @ 25s.; best, 30s. @ 35s. (at Runcorn). Irish moss, although more is offering, prices are firm at £12@£14.

BUILDING MATERIAL MARKET.

New York, Friday Evening, April 25.

Lime.—A good condition of affairs prevails in the lime market. The demand is equal to the supply, and nobody is complaining.

Prices remain unchanged, and quotations are: For Rockland common, \$1 per barrel; Rockland finishing, \$1.20; St. John common and finishing, 90c. @ 95c.; Glen Falls, common and finishing, 85c. @ \$1.11.

Bricks.—There have been some sales of brick this week, although they do not aggregate one-half the amount of business transacted last week, the latter being very great. Buyers, in consequence, are filled up, and do not exhibit much desire to buy. There is not much brick coming in, and only a few arrivals are reported. There is an excellent demand for best grades of Haverstraw bricks, but these are coming only in small schooner lots. It is estimated that to 1,000,000 bricks of various brands there are only about 50,000 Haverstraws. On account of the open winter Haverstraw bricks have come in right along to the exclusion of Uprivers. Now, however, these have the upper hand, and arrivals are frequent, while of Haverstraws very little can be obtained.

Prices are somewhat unsettled. We quote Haverstraws, \$7.25@7.50; Uprivers, \$6.25@6.75; South-rivers, \$5@5.75; Keyports, \$5; Pales \$3@3.25.

As the result of action taken on the 23d inst., the 2,000 carpenters of Milwaukee will probably strike on May 1. The Contracting Carpenters' Association has decided not to grant the eight-hour day. The reason assigned is that a large number of contracting carpenters outside the Association would continue to work their men ten hours.

NOTES OF THE WEEK.

It is now estimated that over one hundred thousand idle men will be on strike in Chicago next week. Nearly every organized union in the building trades will strike unless their demands for the eight-hour day and official recognition of their unions is acceded to. It is stated that there are some seven thousand carpenters on strike. The men are well organized, with the exception of some twelve thousand at the stock yards.

The idleness among the building trades consequent on the carpenters' strike is increasing. The president of the Bricklayers' Union called at the strikers' headquarters on the 24th inst., and said that less than 300 of the 4,500 bricklayers in the city were at work. The same state of affairs prevails in most of the building trades. No building work of any importance is being done. The carpenters' strike seems as far from a termination as ever.

IMPORTS AND EXPORTS OF METALS AT NEW YORK APRIL 12 TO APRIL 19 AND FROM JANUARY 1.

Table with multiple columns for metal types (Iron, Steel, Copper, etc.), units (Tons, Pounds), and values. Includes sub-sections for Imports and Exports.

DIVIDEND-PAYING MINES

DIVIDEND-PAYING MINES

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last), DIVIDENDS (Total paid, Date and amount of last), NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last), DIVIDENDS (Total paid, Date and amount of last).

G. Gold, S. Silver, L. Lead, C. Copper, * Non-assessable, † Previous to the consolidation in Aug., 1884, the Terra Nevada paid \$1,000.00 in dividends, and the Con. Virginia, \$400.00. * Previous to the consolidation of the Copper Queen with the Atlanta, Aug. 1885, the Copper Queen had paid \$1,250.00 in dividends. † 1,000.00

NEW YORK MINING STOCKS QUOTATIONS.

Table with columns for 'DIVIDEND-PAYING MINES' and 'NON-DIVIDEND-PAYING MINES'. Each section lists company names and their stock prices for various dates from April 19 to April 25, 1890. Includes a 'SALES' column for each company.

*Ex dividend †Debit in at the New York Stock Ex. ‡Unlisted securities †Assessment unpaid. Dividend shares sold, 49,932 Non-dividend shares sold, 48,950 T. E. New York, 98,912.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for 'NAME OF COMPANY' and dates from April 18 to April 24, 1890. Lists mining stock prices in Boston, including sales figures.

Boston: Dividend shares sold, 20,031. Non-dividend shares sold, 48,889. Total Boston, 68,920.

COAL STOCKS.

Table listing coal stocks with columns for 'NAME OF COMPANY', 'Par. val. of sh'rs.', and dates from April 19 to April 25, 1890. Includes sales figures.

**Sales in New York, 42,744; in Philadelphia, 24,303. Total sales, 330,354.

San Francisco Mining Stock Quotations.

Table with columns for 'COMPANY' and dates from April 18 to April 24, 1890. Lists closing quotations for mining stocks in San Francisco.

STOCK MARKET QUOTATIONS

Baltimore, Md.

Table with columns: COMPANY, Bid, Asked, L. H., L. H. listing various coal and mining stocks.

Birmingham, Ala.

Table with columns: COMPANY, Bid, Asked, L. H., L. H. listing various mining and industrial stocks.

Pittsburg, Pa.

Table with columns: COMPANY, B, A, Closing listing various coal and mining stocks.

St. Louis, April 22.

Table with columns: COMPANY, Bid, Asked, L. H., L. H. listing various mining and industrial stocks.

Table listing various mining stocks with columns for company name and price.

Trust Stocks. April 25.

Table listing trust stocks and their prices.

Sales at the New York Stock Exchange week ending April 25: American Cotton Oil... National Lead... Sugar...

Foreign Quotations. London.

Table listing foreign quotations for various commodities and stocks from London.

Table listing Paris quotations for various commodities and stocks.

CURRENT PRICES.

These quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Table listing current prices for various chemicals and minerals.

Sulphur-Roll, # lb. 1 1/4

Table listing prices for Sulphur, Flour, Crude Brimstone, etc.

THE RARE METALS.

Table listing prices for various rare metals like Aluminum, Arsenic, Barium, etc.

BUILDING MATERIAL.

Table listing prices for various building materials like Bricks, Cement, etc.

THE ENGINEERING AND MINING JOURNAL will thank

any one who will indicate any other articles which might with advantage be quoted in these tables or who will correct any errors which may be found in these quotations.