

THE ENGINEERING AND MINING JOURNAL



Entered at the Post-Office of New York, N. Y., as Second-Class Mail Matter.

VOL. I. AUGUST 9. No. 6.

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ROSSITER W. RAYMOND Ph.D., M.E. Special Contributor.

Cable Address: "Rothwell, New York." Use A. B. C. Code, Fourth Edition

London: 76 Finsbury Pavement, London, E. C., Mr. Thomas B. Provis, Civ and Mining Engineer, Manager.

Mexico: Mr. R. E. Chism, M. E., Callejon Espirito Santo No. 4, City of Mexico.

Peru, S. A.: Mr. John Newton, No. 2 Calle Constitucion, Calla.

Australasia: Messrs. Moffat, Judd & Co., 11 Bridge street, Sydney, N. S. W.; Mr. W. Forster, 56 Elizabeth street, Melbourne, Victoria; Messrs. J. T. Partridge & Co., 134 Manchester street, Christchurch, New Zealand.

SUBSCRIPTION PRICE, including postage:

Weekly Edition (which includes the Export Edition), for the United States, Mexico and Canada, \$4 per annum; \$2.25 for six months; all other countries in the Postal Union, \$5.

Monthly Export Edition, all countries, \$2.50 gold value per annum.

REMITTANCES should always be made by Bank Drafts, Post-Office Orders or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING CO. All payments must be made in advance.

THE SCIENTIFIC PUBLISHING CO., Publishers,

SOPHIA BRAEUNLICH, Sec'y & Treas. R. P. ROTHWELL, Pres. and Gen'l Manager.

P.O. Box 1833. 27 Park Place, New York.

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The Manual shows that the general results of operations during 1889 were more encouraging than in the previous year, there having been a healthy growth in gross earnings, with a small reduction in the ratio of expenses to earnings.

It costs, on an average, 2.17 cents to carry a passenger one mile in the United States, and the average length of his trip is 24.17 miles. About half a billion passengers were carried, and if their united journeys were undertaken by one person he would have an expedition of about twelve billion miles to make.

Over 600,000,000 tons of freight were handled during the year. The cost of moving one ton one mile, on the average, has been brought down to .97 cent, while for some of the great trunk lines the rate is much lower.

The total investment, measured by share capital, funded and unfunded debts, in American railways, is \$9,680,942,249, on which last year's gross earnings were 10.4 per cent., and net earnings 8.3 per cent.

REMARKABLE WORK IN ARMOR-PIERCING.

A remarkable group of shells was prepared for the Royal Military Exhibition at Chelsea, London, consisting of eleven six-inch cast steel projectiles fired as proof-rounds at Shoeburyness, against nine-inch compound armor-plates. Each shell had gone intact completely through the armor-plate and through from five to eight feet of oak backing as well.

In the center of this group stands a 9.2-inch shell, which is simply a steel casting, neither rolled nor hammered, and which has gone unbroken through two feet of wrought iron and twenty feet of oak backing. In a superb half-size photograph which we have seen, neither crack nor deformation appears, either in the 9.2-inch or in the 6-inch projectiles.

All of these were made at Hadfield's works in Sheffield.

The results obtained with the forged six-inch projectiles are even at the first glance sufficiently excellent, for it has usually been thought a severe test of an armor-piercer if it pierces a compound plate of the thickness of its own calibre. But the extraordinarily small amount of deformation undergone by some of Hadfield's six-inch projectiles in piercing these nine-inch compound plates is still more impressive.

No. 2553 pierced the 9-inch compound plate and 8 feet of wood backing without cracking, shortening 0.21 inches, bulging 0.011 and 0.009 inches.

No. 2554 penetrated the 9-inch compound plate and 8 feet of oak backing without cracking, shortening 0.21 inches, bulging 0.000 inches and 0.013 inches.

One of these two retained even the driving band after doing this remarkable work.

Others of these 6-inch projectiles were wholly uncracked, after passing completely through the 9-inch compound plate, and one was so little deformed that the base plug could still be unscrewed.

From circumstantial evidence we infer that the total number of projectiles fired was thirteen, out of which these eleven went through intact. The whole of each of the two others also went completely through the nine-inch compound plate; but each of these was found broken behind it.

The plates pierced were new ones, made within the last twelve months, and of the Cammell-Wilson type, which is thought much harder to pierce than the Ellis-Brown or the French plates. They were faced with three inches of hard steel, in some cases containing as much as 1.25 per cent. of carbon.

Another remarkable case is that of projectile No. 2546, 13.5 inches in diameter, which penetrated an 18-inch compound plate and a 6-inch wrought-iron plate immediately back of it, 30 feet of oak backing, another wrought-iron plate, 10.5 inches in diameter, and, finally a fourth wrought-iron plate 2 inches thick, or a total thickness of 36.5 inches of armor-plating. The projectile was found broken in the last plate. The third plate had been fired at previously, but it had no hole larger than 8 inches; hence the projectile must have met much resistance in piercing it. The velocity was 1,960 feet per second.

We may reproduce some photographs of these projectiles in a future number.

HIGHER TECHNICAL EDUCATION.

Dr. FRANKLAND has recently delivered a lecture on the Aim and Scope of Higher Technical Education before the Society of Arts, London. He gives the result of an inspection tour of the technical schools of Germany and Switzerland. He returned home, as might be expected, with an exalted, probably too exalted, estimate of the aims and methods of German teaching, and a very deprecatory, probably too deprecatory, estimate of the scope and result of British technical education.

The figures he gives are very interesting, and his strictures as worthy of consideration by ourselves as by Englishmen. He finds that the technical schools of Germany are divided into two classes. The polytechnic schools, which are universities devoted exclusively to teaching science, pure and simple, in all its branches, and to training men of

In the second paragraph of the article on Bull's metal in our last issue a typographical error made us state that the jog or change of curvature occurred in certain classes of iron when they had been worked cold. This should have read, when they have not been worked cold.

In 1880 the percentage of steel rails to the total track of all the railroads of the United States was only 29.1. Now it is 74.8 per cent. If the average rate with which steel rails supplanted iron ones during the last decade were continued, all the iron rails would be wiped out by 1898. But it is noteworthy that the change, so far as mere statistics of totals is concerned, has been going on more slowly during the latter part than the earlier part of the decade 1880-'89. There is still a considerable amount of old iron track which figures more in statistics than in actual duty; and as this iron track is presumably subject to light wear or is on practically abandoned tracks it will be some time before it is all replaced by steel or rusted out of even statistical existence.

AMERICAN RAILROADS IN 1889.

The railroad statistics of the United States for 1889, as given in advance sheets of Poor's Manual, are very impressive. At the close of that year there were 161,397 miles of track, of which 5,751 were laid during the year. The gross earnings for the year were a trifle over one billion dollars, and the net earnings nearly one-third of a billion—\$318,125,339.

high culture, but of such culture as is calculated to be of greatest utility in the various branches of industrial life. In addition, there are the practical schools, in which the application of science to given arts is taught and practised.

Dr. FRANKLAND finds a lamentable deficiency in the English standard of teaching and scholarship, as compared with the Continental, a lack of system and thoroughness, and a niggardliness of means and appliances. He compares the sumptuous palaces of science in Munich and Berlin with the dingy City and Guilds of London's Central Institute and other science schools of the United Kingdom. But what he regrets most is that the science schools, besides being clad in shapeless brick and mortar, do not furnish their students the mental bricks and mortar out of which to construct stable and artistic industrial structures. If the efficiency of a school depends on its external and internal architecture and furnishing, and on its curriculum and professional staff, our schools and those of Great Britain rank low indeed; but if the standard of comparison is the general fitness of the men they turn out for the varied work they are called on to do, our American as well as the English schools deserve a different rating.

The statistics Dr. FRANKLAND produces certainly bear out the claim he makes to thoroughness.

Germany possesses nine polytechnics. The two principal schools are:

	Students.	Teachers and staff.
Berlin.....	1,295	104
Munich.....	786	75

The subordinate schools are:

	Students.	Teachers and staff.
Brunswick.....	265	51
Carlsruhe.....	504	68
Darmstadt.....	324	45
Aix la Chapelle.....	266	57
Hanover.....	418	56
Stuttgart.....	274	56

Taking as an example the provincial school of Carlsruhe, he finds it equipped for the following course of studies:

	Years.	Regular students.
1. Mathematics and natural science.....	2	8
2. Civil engineering.....	4	38
3. Medical and electrical engineering.....	4	188
4. Architecture.....	4	34
5. Chemistry.....	4	99
6. Forestry.....	3	45
Irregular.....	4	92
		504

Into such minutiae does the course of architecture for instance enter that 58 different subjects, directly and remotely bearing on the sciences and arts subsidiary to architecture, are treated during the four years' course by a staff of 22 professors and assistants.

Dr. FRANKLAND may be right in arguing that a thorough education can be acquired only by pursuing the German method, and confining the student to a rigidly specialized course of study; but the American and English student obstinately refuses to follow it. He has his own ideas as to what he wants, and how to satisfy his wants, and if one technical institute does not meet his requirements he goes to the school which does.

Were our schools State schools, and were there no independent technical institutions the student would have no alternative but to enter the State schools and submit himself to the State curriculum of training as submissively as a German student enlists by compulsion in the State army and learns the State drill. It would be better for one student, perhaps, were he allowed less initiative and obliged to conform himself to what men wiser than himself have learned to be the best for him, but the habit of thinking for himself and acting on his own thoughts, for better or for worse, determines the course of study he adopts and the subjects he selects and those he sees fit to omit. And the recent experience of Harvard would seem to prove that the institution which couples good teaching with the widest latitude of choice will win students from its more rigidly governed competitors.

Of course such a system, or rather want of system, cannot turn out good students of the German type and standard, but it turns out men who, having wilfully, often ignorantly, acted on their own impressions of what was best for themselves in selecting their teachers, go into active life with the same independent, often impudent, conceit of themselves and disregard of authority and traditions, and who therefore fulfill the demands of modern trade, which are to produce quantity rather than quality—to make machinery wherever possible to replace the human hand and to tax material and men almost to the breaking strain. Such men cannot compete with the German in the chemical laboratory, in the factory of aniline dyes, or in certain branches of the mechanical and electrical arts, where knowledge of the higher mathematics and slow, patient application are required, but they will outstrip him in applying the general principles of mechanics, physics, chemistry and metallurgy to the new purposes and under the new conditions, which the ever shifting requirements of our new country and special civilization present to him.

The German student, loaded down with knowledge, often overtrained and handicapped with a reverence for the sacredness of what he has learnt, must find it difficult to invent new methods, to extemporize new

appliances, to resort to expedients which he knows are not in conformity with the best practices, and believes in fact to commit a sin by compromising with his scientific principles.

A combination of the two systems, if practicable, would probably turn out the best men, but such combination is as difficult to effect as it is to find teachers who possess both theoretical knowledge and practical familiarity with the subject of their course. A man with practical faculties, well developed and trained, and directed to some special art or pursuit, even if he still remembers his theoretical acquirements, seldom possesses the patience to teach, supposing he had the necessary power of expression; besides which our schools cannot afford to pay men who have obtained favor as managers in the industrial world such large salaries as they can obtain in the more congenial pursuits of active life.

Moreover, as it has always been found difficult to combine the worship of God and Mammon, so we imagine our more prominent professors find it embarrassing to reconcile the claims of their office with the desire to respond to the tempting calls of extra professional work; and therefore it becomes impossible for a man to devote himself to teaching a pure science while keeping in touch by actual practice with the progress of any technical art.

ELECTRIC MOTORS VERSUS STEAM LOCOMOTIVES.

A paper read by Mr. LINCOLN MOSS, C. E., at the recent convention at Cresson of the American Society of Civil Engineers, describing comparative tests of an electric motor and a steam locomotive on the Manhattan elevated railway in New York, seems to consign to the remote future the possibility of employing the electric motor as a substitute for the steam locomotive. The tests were made on the Ninth avenue elevated road, between Fourteenth and Fiftieth streets, a distance of 1.76 miles. Four empty cars, each weighing 29,500 pounds, were used. The generating machinery was located 400 feet distant from the track, and comprised three return tubular boilers of 100 horse power each, a Wright automatic non-condensing engine 22 inches \times 42 inches, making from 90 to 100 revolutions per minute. The belt velocity was from 4,524 to 5,026 feet per minute. It was put in perfect adjustment and showed only 5 per cent. friction. There were four generating dynamos, nominally 50 horse power each. The four driving wheels of the motor were 48 inches diameter, 6 feet between centers, and coupled to obtain the maximum tractive force. On the rear axle were two carefully cut steel gears, driven by two steel pinions keyed on the shaft of the motor. The motor weighed over 10 tons, and the dynamo was said to be of 120 horse power.

Profile diagrams are given in the paper showing the indicated horse power exerted by the engine, the net horse power expended to pull the train, the pull of the motor as measured by dynamometer, and the speed of train in feet per second at each portion of the route. The average indicated horse power of the driving engine was 176.8 horse power; the net horse power expended to pull the train at an average speed of 9.4 miles per hour was 26.7 horse power, making the average efficiency of the motor and engine combined 15.1, and the average loss 84.9 per cent. Even when the train was stopped at the stations, the power expended by the engine never went back to zero, but showed an average expenditure of 43 horse power. Of this about two horse power is lost in the engine itself and the rest is consumed in friction, local currents, current waste, resistance and leakage. The greatest power of the engine was exerted when the train was being started; at one time it indicated as much as 395 horse power, while at the same time but 7.2 horse power was being exerted to pull the train, showing less than 2 per cent. of the power of the engine transmitted to the train at that instant.

To account for this great waste the author states that when a motor is being started there is no counter current, and it is necessary to increase the resistance by rheostats, shunts or resistance coils, or by varying the strength of the field, and these methods increase the current waste. In a system where a stationary motor is to be driven at a constant speed, under an unchanging load, it is possible to adjust the various relations of size, speed, counter electromotive force, etc., so as to retain a good proportion of the force generated in the prime mover. As much as 60 or 70 per cent. has been claimed in such instances, but in an electrical locomotive the conditions are the very worst for economical results, by reason of the ever-changing speeds and load, and the complication of conditions, and the heavier the load to be handled and the greater the speed demanded the more difficult and complicated the problem becomes. Devices that would answer for a 10 horse power electric street car at ordinary speeds would not answer the purpose on a 120 horse power motor handling far greater loads with much larger variation in speeds.

A number of tests were made with a steam locomotive pulling the same train over the same track, using hand brakes, and reducing the running time to that of the electric motor. The cylinders were 11-inch bore and 14-inch stroke, and the drivers $26\frac{1}{2}$ inch diameter. The total working weight was 37,900 pounds, of which 23,900 pounds were on the drivers. The boiler pressure was 140 pounds. The average indicated horse power was 25.92, and the average net horse power expended in pulling the train

was 21.95, making the efficiency of the prime mover .85. Taking the average performance of a locomotive boiler as a consumption of six pounds of good coal, costing \$4.20 per gross ton, per horse power per hour, and the performance of a good stationary engine for driving the dynamo as a consumption of 3 pounds of coal, costing \$3.30 per long ton, per horse power per hour; assuming an hourly consumption of steam of 20 pounds per horse power, with an efficiency of .15 from the prime mover, the cost of one net horse power by electricity would be 3.1 cents, while in the case of the locomotive, with an efficiency from the prime mover of .85, the cost per net horse power would be 1.3 cents. The ratio of cost by locomotive to that by electric motor is as 1 to 2.38.

If, instead of one train being run on the trial section, a number of trains had been run, the constant loss of 43 horse power would have been divided among at most four trains on this section, which would reduce the average horse power per train at the low rate of speed of 9.4 miles per hour to 162.5 H. P., while the net horse power would remain at 26.7, giving an efficiency of 16.4 per cent.; but on the other hand, the evidence goes to show that if the speed were brought up to the regular average of 15 miles per hour, the efficiency would have shrunk to eight or nine per cent., and this would again be reduced by lowering the potential of the current to a safe limit. Based on these facts, the author states that a conservative estimate would be that the cost of electric propulsion would be four times that of steam locomotion.

NEW PUBLICATIONS.

THE PALEOZOIC FISHES OF NORTH AMERICA, by J. S. NEWBERRY. Monograph XVI. of the United States Geological Survey. Government Printing Office, Washington, 1889. Cloth, 4to, 340 pp.; 53 pl. Price \$1.

In this monograph Professor Newberry gives references to all notices of our older fossil fishes heretofore published, so far as he has found them, to which he has added descriptions and figures of all new species which have come under his personal observation. The compilation is one of a class very much needed in establishing landmarks in American paleontology. It furnishes, in a single publication, what we presume to be a fairly complete statement of the present knowledge of its field, and will hence serve as a useful work of reference for future observers. The plates seem to be good representations of the specimens which they illustrate, but are generally too dark, and in some cases too flat for good artistic effect.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in *Journal*.]
Manual of the Railroads of the United States. By Henry V. Poor. Published by H. V. & H. W. Poor, New York, 1890. Pages 1,424. Price, \$6. With maps.

The Principles of Mechanics, as applied to the Solar System. Published by R. P. Traxler, San Francisco, Cal., 1889. Pages, 70. Price, 50 c. Illustrated.

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.

The Silver Question.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: As a subscriber to the JOURNAL, and an admirer of its fearlessness in exposing fraud and appreciating its value and services in acquiring and imparting the enormous amount of information to be found in its pages, its course regarding silver has been a constant source of surprise to me. Doubtless the larger percentage of its readers comes from the silver interest of the country, or those which are dependent on or closely related thereto. To charge its course to the influence of this or that element and to deny that its editorials are the honest expression of its views and sympathies would not be fair, and entirely out of the question.

Taking, for instance, its last editorial in the issue of July 19, the arguments and objections advanced are the same that have been dinned into one's ears ever since the Bland Act became a law, and the outcome is a steady growth of sentiment in favor of silver; and an entire failure of the bug-a-boo predictions to materialize—let us see what there is to some of them.

Without taking issue with it on the discretionary powers of the Secretary, although the act says he "is hereby directed to purchase" . . . and the market is stated to be up to one dollar for 371.25 grains of pure silver, and the notes are not to be redeemed with silver dollars coined from the silver purchase, as the JOURNAL states, but also, as in sec. 2, in gold or silver coin on demand, the JOURNAL says: "It may very easily occur that silver bullion will command a price of \$1.20 an ounce, payable in silver dollars or their equivalent notes, while gold might be at a high premium"; further, "We see no reason to change our opinion that, so long as gold can be obtained at 1 to 16 for silver dollars, there will be a large amount of foreign silver sent here and gold taken away." How could gold be at a premium? To say that it could assume that silver dollars or their equivalent notes would not be at par (taking the gold dollar as par), that those who would pay a premium would do so in silver, for instance, give 102 silver dollars for gold ones, at 2 per cent. premium, who are they that would be likely to go into this business? The party that received the 102 silver dollars could pay his custom dues, revenue taxes, buy his postage stamps, etc., just as well with his silver dollars, and the fool that had the temerity to attempt such a thing would soon find himself loaded down with all the gold he wanted, and if the Secretary should coolly step in and redeem the notes in gold coin for a month or so, how long would the premium last? It would be a strange thing that a note, with all the gold and sil-

ver in the Treasury behind it, could not be kept at par when at one time over \$300,000,000 in greenbacks, having but \$100,000,000 in gold behind them, were.

Who would go into the business of trading 1 to 16 gold for silver, when both are at par? Not the government nor any large banking house, nor any one else that I can think of. Where is the gain in the exchange?

If silver reaches \$1.20 per ounce here, how long will it be before it has a like value abroad? Not a week. Why? Because if the holder of silver bullion abroad can get \$1.20, or nearly that, exporting it here less the commissions, insurance, etc., would he take less for it there? If, then, it reached the same value abroad, comparatively, as here, certainly there would be nothing gained shipping it here, consequently it would stay at home and go into the usual channels at the advanced price. Suppose foreigners do become scared and send our securities home; we have to redeem them some time; why not now?

Again, the JOURNAL says: "The taxpayers will not continue to pay out sixty or seventy millions a year for silver that is not needed." . . . Where do the taxpayers pay out a solitary dollar? If the government buys 371.25 grains of silver and pays for it in a stamped note that in turn is traded back again for the 371.25 grains, where does it lose or pay out by the transaction? "Inflation is not prosperity." . . . "The poor man is the one who always suffers." . . . So the JOURNAL says. What is inflation? I take it that those who use this term mean that it is making money plentiful—putting it more into circulation, as it were.

The capitalists have been absorbing the circulating medium until 75 per cent. of the actual money of the country is held by the government, by banks and the large capitalists; meanwhile the population has been increasing twelve to fourteen millions in ten years. The coinage of \$2,000,000 silver dollars per month has done much to offset the contraction, but not sufficient for the increase of population and the absorption of the circulation by way of profits by the banking class and large capitalists.

Silver, according to the "Knox Bill," is good material for the National Banks to base their circulation on and thus assume the functions of the government, but the latter must not use it; oh no. It certainly will be interesting to watch these and the anti-silver men "take water" one of these days, when European governments hastily follow in the footsteps of the United States in remonetizing silver. The JOURNAL is taken by many silver men who probably are as much surprised as I am at its course. Why do they not object? Where are they?

I would like to see a little more silver sentiment in its columns, even though its subscribers have to furnish it. HARRINGTON BLAUVELT.
REYMET, A. T., July 28th, 1890.

Milling and Mining on the Comstock Lode.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: "The Mining Stock Association" of this city, through its president (the writer of this article), informally thanks your JOURNAL for the kind words of sympathy expressed in its editions of June 28th and July 12th, 1890.

We desire to call the attention of our general government to the unchecked outrages which have been and are being perpetrated upon a large number of citizens of the Pacific States by a very few men.

The large number of citizens to whom we refer are joint stockholders in mining corporations with the very few men who perpetrate the outrages. The very few men, holding positions of trust conferred upon them by the many, have illegally managed the Trust property, thereby acquiring wealth, sufficient in their estimation to place them beyond the reach of the laws of our country.

The property of these mining corporations is situated on the Comstock Lode, Nevada. The very few men who have confederated together to rob the many own the mills which crush and mill the ores of these mines. Through the skillful mechanisms of their long practices, coupled with the artful devices conjured from the best legal brain obtainable by money, they have succeeded in holding the State law in contempt, while they publicly and defiantly loot the mining property of their fellow citizens.

Bullion stealing on the Comstock is an open secret. It is conducted openly, defiantly, and in violation of law, morality or even common decency. The bullion is boldly taken from the mills to the United States mint at Carson, and the very few men owning these mills deem themselves powerful enough to sidetrack any legal action taken by the State or investigation instituted by the general government. Let it be conceded, if necessary, that the machinery which makes the State law operative rests in their hands, but not that of the general government.

Your article of June 28th comments upon their exorbitant charge (\$7 per ton) for milling ores. We do not object to the charge so much as we do to the manner in which our ores are milled.

The law of the State under which these mines are incorporated requires a weekly statement, made *under oath*, by the managers to the stockholders, giving the weight and assay value of all ores shipped to mill.

A careful system of car sampling, under this law, would prevent the mill from making false returns to the mine without being detected.

The trustees of the mines, being dummy representatives of the mill owners, violate this law and refuse to obey its provision by withholding the mine assay value from the other stockholders. As a result, ore that will assay from \$50 to \$60 per ton at the mine is reported by the mill men, when assayed at the mill, to be \$25 or \$30 ore.

To better illustrate this bullion steal, take the month of February, 1889. The Hale and Norcross mine had milled that month 8,973 tons and 800 pounds of ore. This ore assayed a fraction above \$56 per ton by carefully prepared ear samples taken by the superintendent at the mine. (These mine assays are withheld from all the other stockholders.) When this ore was crushed the pulp assay returned by the mill to the mine averaged a fraction less than \$23 per ton, and the bullion returned amounted to about \$19.65 per ton.

Take \$7 per ton, cost of milling, from \$19.65, and the mine actually received \$12.65 from its \$56 ore, out of which the mine paid the bullion discount on silver bullion and the cost of mining.

This imperfect manner—we should say criminal manner—in which the ore was milled, can only be understood when it is known that samples taken from the tailings assay about \$9 per ton, and samples of slimes taken from the sluice boxes assay more than \$100 per ton, and that all the bullion taken from these tailings and slimes is unlawfully converted to the profit of the mill owners. This conversion of bullion has been made in defiance of the protests of other stockholders, who have tried for

the past year or more to have the trustees of their mines bring an action in the courts of our State for the recovery of all the bullion unlawfully withheld by the mill owners and converted to their private profit.

The publicity given to this bullion stealing is made apparent by the following item copied from the *Evening Chronicle*, a newspaper published at Virginia City, Nevada. On April 15th, 1890, this paper says: "Six dollars per ton is the price which Thomas Hully contracts to pay for the ore tailing concentrates at the California Pan mill, which, if the estimate, 5,000 tons, is correct, aggregates \$30,000. The best of the tailings are said to show an average assay value of \$20 per ton."

An inquiry at the office of the Consolidated California & Virginia mine revealed the fact that they knew nothing about the transaction, although the mill had milled the ore of this mine, and the mine had paid the mill \$7 per ton for its services.

They presumed that Mr. Mackay was selling the tailings which belonged to his mill.

The same newspaper, in its issue of July 25th, 1890, contains the following item: "There are probably 30,000 tons of tailings at the Morgan mill that will be run through the pans after the stamps are hung up."

Since that date the stamps have been "hung up," and the Morgan mill is, without doubt, turning these 30,000 tons of tailings into bullion for Mr. Mackay. Following the estimate of the other tailings at \$6 per ton, these 30,000 tons will produce \$180,000 more, or a total steal of \$210,000 from the stockholders of this one mine. There are some seven or eight more mills to be heard from. If the ratio keeps the same, they would net their owners some two million dollars per year. As these mills have been grinding away, not slowly but fast, for the past three or four years, the amount of money converted to the mill owners can be easily computed. Two million dollars per year, illegally taken or stolen from any one industry, in place of disbursing that amount in dividends among people to whom it belongs, is enough to impoverish all those not a party to the steal. In such a condition is the mining industry mentioned herein. Is not the condition of this industry of sufficient importance for the general government to protect?

We think it is, and many of our members, who have given the best portion of their lives and money to this one industry for the past twenty-five years, are patiently awaiting the motion of one department of our government, considering it a courtesy due the official in charge, before making a formal demand through Congress assembled for a thorough investigation of this bullion steal.

W. N. GRISWOLD, M. D.,
President of the Mining Stock Association.

122 TURK STREET, San Francisco, Cal.,
August 2.

ARIZONA'S NEW BONANZA.

Special Correspondence to the Engineering and Mining Journal by W. H. Storms, M. E.

Although comparatively a new mine, the Hillside, of Yavapai County, Arizona, has already begun to attract widespread attention, and in my opinion is destined to become one of those grand bonanza mines which have made this territory famous.

For some months before coming to Prescott, where I am now located, I had heard of the Hillside, and a few days since I determined to avail myself of the opportunity to visit and examine the gigantic proposition, accepting the kind invitation of Mr. John Lawler, the discoverer and at present the half owner and superintendent of the mine.

Accompanied by two gentlemen from California, I drove from the city of Prescott toward the Hillside, which is located in Yavapai County, on Boulder creek, one of the tributaries of the Santo Maria river. Though the distance from Prescott to Hillside is but a little over 40 miles, the road, owing to the topography of the country, is 82 miles. During the first day we rode through a portion of the most beautiful part of this great territory. Broad stretches of open valley land whereon were grazing countless numbers of cattle met our delighted gaze at every raise in the road. The impression that Arizona is one vast desert, in which life is a burden and sixshooters at a premium, is a mistake. It is true that a few years ago the irrepressible, festive Apache used to "raise Cain" and occasionally some unfortunate's scalp lock, but such things are now of rare occurrence, and it is to be hoped that the noble redman will never again institute a reign of terror in this really beautiful country.

At the close of the first day's travel we were entertained by Joe Cooksie and his excellent wife at one of the finest and most valuable cattle ranches in Western Arizona. There is abundance of pure, cold water here; picturesque hills rise on every side, and a great belt of the most magnificent pine extends for miles about the ranch. Cooksie's ranch is 56 miles from Prescott, by roadometer, over one of the best highways in Arizona.

We left this beautiful, comfortable and hospitable home early the following morning, continuing our journey to the Hillside. Half a mile from the ranch house we passed the sawmill, which belongs to the Hillside company (not a corporation), which had been located in the midst of this grand old pine forest. There is piled at the mill about 200,000 feet of lumber. A million feet would scarcely make an impression on the timber. The trees average 2 feet in diameter, and many of them are 3 and 4 feet; remarkably straight and free from limbs for 30 to 60 feet from the ground. Such is the Hillside pinery.

About two hours after leaving Cooksie's ranch we reached a broad, beautiful valley, and saw a large number of cattle. To the left, about 10 miles distant, is a mountain range, the name of which I did not know, but where I was informed some rich prospects had been discovered. As a matter of fact there are few hills in Arizona where more or less ore cannot be discovered.

Crossing the valley, and ascending the slope on the further side, the scene changes. We have reached the great basalt plateau, which has spread over this country in a vast sheet hundreds of feet in thickness, covering hundreds, yes, thousands of square miles beneath its black floor. The hills are all gently rolling now, though entirely devoid of timber. Here and there peaks and ranges rise out of the great lava plain, called, from the Mexican, "Malpais," or bad country.

Driving on this great plateau one would think that a road could be made in any direction across its apparently smooth slopes. Oh, sad mistake. Soon great rents appear in the earth, and from some of the higher parts of the mesa glimpses can be obtained of the most rugged, precipitous, black, forbidding gorges imaginable.

The heavy torrents of rain have accumulated in the gently sloping valleys, and have by their slow but untiring process cut down deeper and deeper into the once molten rock, until in magnitude they approach portions of the Grand Canyon. Many of these terrible canyons are over 1,000 feet deep, and not over 2,000 feet in width at the top.

In order to cross this part of the country each of these canyons must be headed, for it is impossible to do otherwise. The Hillside is but 26 miles from Cooksie's, yet it took us from 7:30 till 2 P. M. to make the distance.

At last we came in sight of the new silver land. Two sharp, rugged peaks were seen rising a thousand feet or more above the general level of the mesa, and these, one of my companions said, were back of the Hillside.

About 1:30 P. M. we drove over a slight swell in the plateau, and here before us yawned a black gulf, which was highly suggestive of the infernal regions. The road led us to the very verge of this black abyss, but here it turned, and we descended into this great crack in the earth for 600 feet by a most excellent road. And it ought to be; the road from the mine to the top of the mesa is a mile and half in length and cost over \$7,000. Having descended 600 feet, we came to the weighing platform where the ore is loaded into the great wagons which, with splendid teams of horses and mules, are hauled across this wild country to Garland, a station on the Prescott & Arizona Central Railway, 52 miles distant.

From the mine to this point the ore is packed by the slow patient burro up a grade 500 feet in height, and not over 3,000 feet in length. A very strong, well trained team of horses can pull a load of 1,000 pounds up this grade, but ordinary teams have no business to attempt it.

Just beyond the weighing platform we got our first glimpse of the famous Hillside Camp. There, far below, nestled at the foot of a mountain 1,200 feet in height, and faced by the frowning cliffs of black lava, we discovered one of the most prosperous looking mining camps it has ever been my pleasure to behold.

The great dumps; the neat buildings, painted dark red; the well-constructed though terribly steep grade, in fact, everything about it was suggestive of a well-managed successful mine owned by a wealthy corporation, and yet it is only the work of a couple of prospectors and some friends whom they interested after the value of the mine had been proven.

We left our wagon at the weighing platform and drove the team down the steep grade to the camp below, where the superintendent, John Lawler, met us with a hearty welcome. After a very acceptable lunch and a quiet smoke on the veranda of the mine office and store, we were conducted by Mr. Lawler through the two main tunnels of the mine, each of which is almost 1,000 feet in length, and through some other large surface workings, though only small in comparison with the long tunnels.

Later in the evening, when there were fewer men in the stopes, we were conducted through the two principal stopes where ore is now being mined for shipment to Colorado. A great deal of this ore is broken down on canvas and sacked in the mine, requiring no sorting whatever. I saw that afternoon and evening enough metallic wealth to satisfy almost any person, for in my opinion the Hillside is a very valuable property. The total cuttings on the Hillside property, exclusive of stopes, are 6,000 feet; stopes, 4,000 feet.

The following day I and my friends made a cursory examination of the "country" in the immediate vicinity of the vein, and I arrived at the following conclusions:

The Hillside vein, or vein system—for there are several veins with numerous branching spurs—is located in a silvery gray phyllite graduating into mica schist. It is unquestionably a *true fissure*. I do not say this to give any coloring to the mine. It needs no coloring. The phyllite and schist in the main mountain mass dip at an angle of about 65 degrees to the eastward. In the immediate vicinity of the vein, however, it lies nearly flat, in some places showing a local displacement dipping on the west side of the vein about 15 degrees from the horizontal toward the eastward, and on the east side of the vein at about the same angle to the westward, looking as though the vein had sunk, dragging the inclosing rock down with it.

I am inclined to think that these disturbances of the country rock from the quite uniform pick of the main mountain mass are due to certain faults and slides which have occurred in the mine, and are principally confined to the region between the several veins, the number of which is at present unknown, though there are two now located, and from certain decided faults which have broken the vein, bringing the hanging wall side of the fault down, I am sure that at least one more vein lies back of the present workings in the body of the hill.

There is a double system of faults cutting and displacing the vein. One series has cut across the strike at an angle of about 70 degrees from the horizontal, causing a side pitch in one place of 27 feet, and less in other places. The second series of faults has cut the vein but slightly above the plane of the horizon, causing side throws of 3 to 6 feet. There are several of these. The tunnels have now extended southward beyond the last slip 400 feet without a break. Along this part of the vein the course lies higher up the hill, and there is less pressure from the mountain behind it than where the faults occur, and from this I have concluded that it is the pressure of the great rock mass behind the vein that has caused the several dislocations.

The ores at the surface are highly oxidized, of a light brown and yellowish color, and carry large amounts of gold and chloride of silver, running in some places over \$1,000 a ton in large quantity. One car load (10 tons) returned \$9,000. The ores from the lower levels are the sulphides of iron, copper, lead and zinc. Iron, the arsenical variety, predominates, there being but little zinc and not a great deal of copper, though the proportion varies in different parts of the mine. The Hillside furnishes some rare and beautiful specimens of native silver, chiefly wire. Great masses of quartz crystals are found interwoven with wires of pure white silver. Gold that can be distinguished with the naked eye is rarely found. It is a notable fact that the gold content of the vein averages in the lowest workings about as it does at or near the surface.

The vein is a beautiful one, frequently exhibiting a clearly banded structure. It varies in width from three inches to almost eight feet. Some of the larger faces of ore, three to four feet wide, show large amounts of shipping rock.

From what I could discover in and about the Hillside, the vein is in

archæan rock. I am led to this belief partly by the character of the rocks of the vicinity and partly by analogy.

The rocks of the district are granite, the variety pegmatite occurring occasionally, mica schist, phyllite, syenite, quartzite, felsite and quartz porphyry, and also the later dolerite and scoria of the "Malpais." The latter exhibits all of the peculiar characteristics of great lava flows: black tough dolerite, scoria, amygdaloid, tuffa, obsidian and breccia.

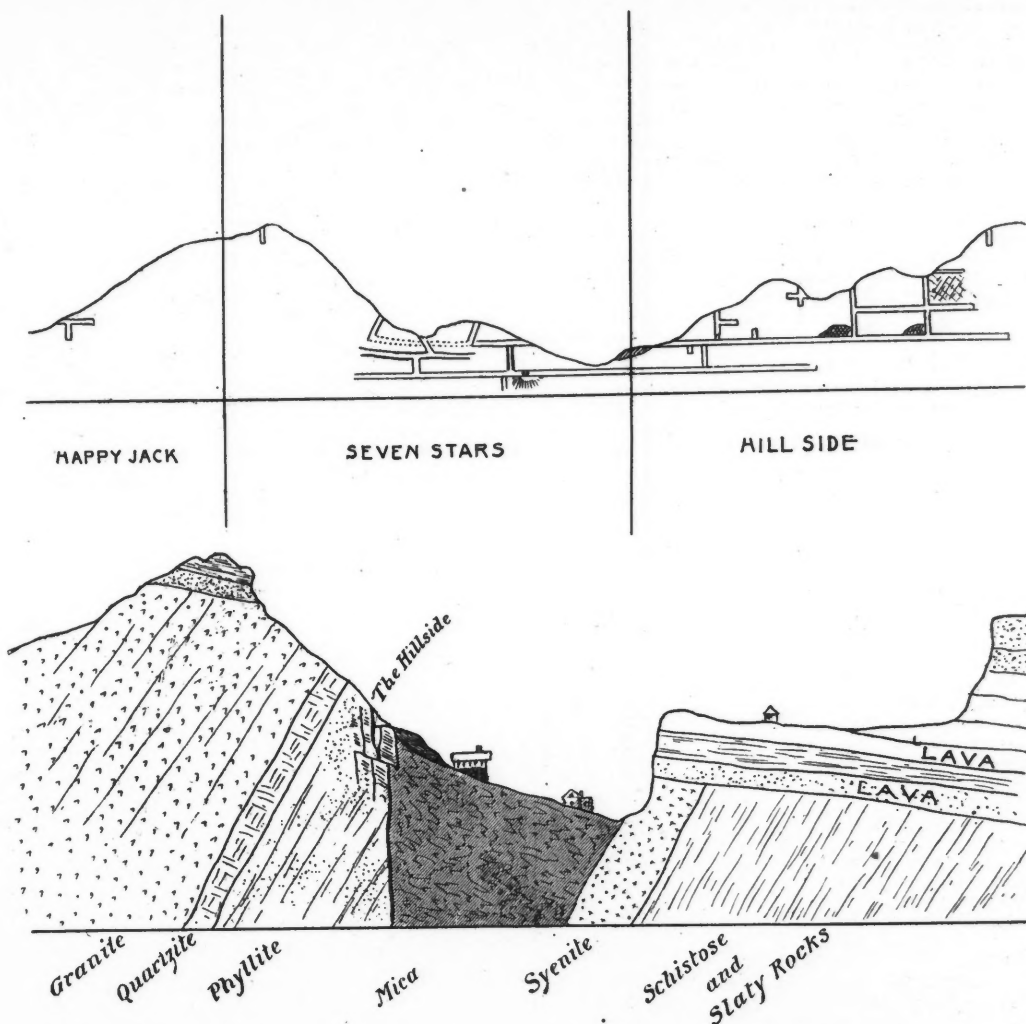
To the south and west of the Hillside half a mile is a great ragged mountain of felsitic rock. Along its contact and near it, with mica schist, a vein has been opened showing gold rock of fair grade and some high-grade lead ore (carbonate and galena).

The southern extensions of the Hillside proper are owned by a number of parties, all of whom have great expectations and fair prospects. Unfortunately, the great vein disappears under the Malpais south of the Hillside, and it cannot be definitely ascertained without tunneling whether or not these south end claims are on the same crevice. At any rate the character of the rock is changed, being, on the claims referred to, a contact of mica schist and quartz porphyry.

The Hillside mine was one of the most difficult of mines to discover. The vein at the surface is so thoroughly decomposed and so soft that it cast no float whatever, and croppings appear at only a few places on the

had not come. One lucky day, however, I came up here again, and went around the hill on the Happy Jack, and came down along the mountain side, passing down the gulch right over the Seven Star mine, and went on down to the creek to get a drink. I was tired and worn, but thought I would go up the next little gulch a way, and as I walked along I saw about a foot of iron-stained rock and climbed up to it. I knocked off a few pieces and saw at once that it was good ore. I then commenced to search for the continuation of the vein, for it was not afloat. I traced it easily, and by night-fall had located the Hillside; but I was not quite ready to go back to camp; and as the Pleiades came up over the eastern rim of the mesa I found a name for the second location and called it the Seven Stars. The Happy Jack was located afterward. Our first shipment was taken out of the Hillside within a few feet of the surface and it weighed only 3,000 pounds. That was our starter and here is the result of it."

It is true that this great property has paid its way from the date of its discovery. Expensive roads had to be built; lumber cost \$60 a thousand and there was every hardship and difficulty to face and overcome, but the plucky miners who had packed a grub stake for so long have their reward at last, and there is not a miner in the southeast who has not heard of Arizona's newest bonanza, the Hillside mine.



vein, and yet when one is once placed on it the course is not difficult to determine.

There are a dozen little shafts and cuts on it showing the crevice to be continuous for over 3,000 feet. I found everything in and about the mine conducted in a thoroughly business-like and miner-like fashion, and it reflects great credit on the superintendent who has built up this great property from the day of its discovery by himself.

There have been mined from the Hillside vein about 4,200 tons of ore, 620 of which were shipped to Colorado reduction works, returning \$102,000. A lot of 200 tons is now being shipped, which will realize about \$30,000.

Of the ore on the dumps there is a large quantity rich enough to ship, but, much of it being free milling, the owners prefer to hold it with a view of putting in a mill at some time, perhaps in the near future.

Of the value of the mine I have nothing to say, but it is great, very great, and I have given these facts thinking they will be of interest to all mining men.

In the course of conversation with Mr. Lawler, I asked him how he came to discover the mine, and he told me the story substantially as follows:

"About three years ago I and my partner, B. T. Riggs, determined to come over to this section. I have some copper property a mile or two south of here which I had been developing for a number of years. We intended to prospect from the copper mines northward as far as the Atlantic & Pacific Railroad. We started with a horse, packed with grub, and about \$10 in our pockets, and finally made our camp down the creek. I came up around here and even walked over this mine; but my day

Trials of Centrifugal Pumping Engine.—A paper read before the Institution of Civil Engineers by Herbert Garvey Sheppard on the Reclamation of Lake Aboukir gives the results of trials of two "Invincible" centrifugal pumps, furnished for the work by Messrs. John and Henry Gwynne, of London. The pumps had suction pipes 48 inches in diameter, and were each worked by a horizontal direct-acting compound surface-condensing engine, with cylinders 17 and 32 inches in diameter and 27 inches stroke. The circulating water was pumped by two independent 6-inch pumps. Two Galloway boilers 7 feet by 20 feet are used. The diameter of the pump fan is 6 feet 9 inches, that of the pump-casing being 15 feet 6 inches outside. The engines were specified each to discharge 175 cubic meters (228.9 cubic yards) per minute, with a lift of 11 feet, and a consumption of 2 kilograms (4.41 pounds) of Welsh coal per actual H. P. per hour in water raised. The results of the trials showed that with a boiler pressure of 80 pounds, and 80 revolutions per minute of engine and pump, one engine discharged 174.4 cubic meters per minute through a lift of 9 feet, the effective work in water raised being 110 H. P., and the total indicated horse power of the engine 198.4 H. P., the efficiency of the pump being thus 0.55. The coal used per indicated horse power per hour was 2.07 pounds, and per actual horse power in water raised 3.74 pounds. The other engine, with the same boiler pressure, and 90 revolutions per minute discharged 195 cubic metres per minute through a lift of 8.87 feet, equal to 119.9 H. P. in water raised, the total indicated horse power of the engine being 197.5 H. P. and the efficiency 0.60. The coal used per indicated horse power was 2.33 pounds, and per actual horse power in water raised 3.85 pounds. The economy of the pumps therefore came well within the specifications.

THE NITRATE DEPOSITS AND TRADE OF CHILI.

A good description of the nitrate deposits of Chili, and a history of the important industry now established in that product, is comprised in a report by Consul-General Walker, from which we take the following:

The chief deposits of the crude nitrate of soda are found in the province of Tarapacá, formerly a part of Peru, but ceded to Chili in 1881 as a war indemnity, on condition that after 10 years it may be restored to Peru, provided a majority of the voting population of the province shall so elect, and upon the payment to Chili of \$10,000,000. Upon such conditions it is not probable that this territory will ever revert to its former owner; for, in addition to the money difficulty, a serious one in the present disorganized condition of Peruvian finances, the large accessions of population to Tarapacá since its annexation to Chili have been mostly from that Republic, and these new-comers will naturally be averse to restoration.

The province of Antofagasta, acquired by Chili from Bolivia, and joining Tarapacá on the south, and having similar geological and climatic features, is also rich in nitrate deposits. A point a few miles south of Taltal, in this province, in latitude 25° 45' S., may be considered the southern limit of the nitrate belt, its northern being in latitude 19° 12' S., its extreme north and south length being thus shown to be 260 geographical miles. Its average width is not more than 2½ miles. This narrow strip of nitrate lands stretches along the eastern slope of the coast range of barren, verdureless mountains which wall in the Pacific Ocean, from the northern limit of Peru to the Straits of Magellan, upon which, for more than 2,000 miles, not a drop of rain ever falls, and upon which there is not a tree, shrub or any living vegetation. Some of its peaks reach an altitude of 4,000 or 5,000 feet above the sea level, but the usual height of the range is about 2,000. The average distance from the coast to the nitrate beds is about 14 miles, but many of them are not more than 10.

As early as 1813 some effort had been made to develop these nitrate deposits. During that year the Spaniards exported 22,723 quintals; but, the war of independence breaking out about that time, little was done to develop these mines of wealth until 1852. During that year an Englishman, George Smith, and José Sanders, a Spaniard, established small refining works at Iquique, under the name of the Tarapacá Nitrate Company. Encouraged by their success, numerous other similar establishments sprung up at different points along the coast, and by the year 1875 the nitrate trade had attained so important a development as to attract the attention of the Peruvian Government to it as a source of national revenue. In that year a law was passed providing for the acquisition of the nitrate deposits and refining establishments by the favorite method of "expropriation," and more than 60 different properties, belonging to companies and individuals, were taken possession of by the Peruvian authorities. Certificates were given in payment, to be redeemed through bills of exchange on London, drawn against shipments of nitrate.

The war with Chili broke out before any material portion of this indemnity was paid, but, as the owners of the expropriated property had been fully dispossessed, Chili, during the progress of the war, took possession of it as national Peruvian property. At the end of the war the outstanding certificates issued by Peru, principal and interest, were found to amount to £5,400,000 (\$26,276,400). Chili, having fallen heir to the property, was morally bound to satisfy all mortgages and liens upon it, or to restore it to its original owners. After a few years of unsatisfactory experience in carrying on nitrate production for Government account, she wisely determined to adopt the latter alternative, and on June 11, 1881, the President of the Republic issued a decree ordering the restoration of the expropriated nitrate properties to their original owners. The conditions of this restoration were the delivery to the Chilean Government of a minimum of three-fourths of the certificates in amount given by Peru to the dispossessed owners, and a deposit of money, equal in amount to that of the deficient certificates, to be returned upon the delivery of the latter.

This wise and just measure gave an immediate and powerful impulse to nitrate production, and has proved a very advantageous arrangement for the Chilean treasury. It has not, however, been unattended with some disadvantages and dangers to the commercial prosperity of the Republic. The English companies, organized under the policy of restoration, are making strenuous efforts to secure a monopoly of the nitrate trade. Success in these efforts would signify diminished production to secure high prices, a large falling off of Government revenue from exports, and the ruin of small operators, who now contribute so largely to the aggregate of nitrate production and to the prosperity of the Republic. This is no idle fear, and doubtless the Chilean Government is alive to the danger.

The London nitrate companies, and the fabulous fortunes so suddenly acquired by their skillful manipulations, had their origin in this policy of restoration. Their history is not without interest.

During the short and unsatisfactory experiment made by Chili in carrying on nitrate production for government account, an Englishman was employed as nitrate inspector, who, by means of his official connection with the government, ascertained, it is said, its intention in favor of the ex-owners of nitrate properties long before the public had any such knowledge. Forming a combination with another Englishman, whose name has since become widely known in connection with the nitrate trade, and with still another Englishman, the manager of a Valparaiso bank, the combination hastened to Lima, where the Peruvian certificates were mostly held, and succeeded in purchasing, it is said for less than half their face value, certificates which carried with them the right of redemption of eight or ten of the most valuable of the nitrate properties in the whole province of Tarapacá. For instance, they acquired the property of the Ramirez Company, it is said, for £5,000, and afterward sold it in London for £50,000. In this way, and at corresponding prices, they secured the "Peruana," the "Bien Retiro," the "Jaspampa," the "Virginia" and others—the very cream of the Iquique and Pisagua properties. Upon the success of these purchases the combination transferred their operations to London, and within the last six years have floated eight stock companies (limited) with an aggregate capital of £5,875,000 (\$28,587,750), the shares of which, it is believed, are still largely held by themselves. The splendid showing of profits which they made enabled them to put the stock of these companies on the market at a high rate, notwithstanding the enormous figures at which they were capitalized; and these prices have been well maintained. I have no recent quotations at hand, but I am informed

that in most, if not all, of these companies their shares still command a high premium.

In addition to the English companies above alluded to which have a substantial basis in valuable nitrate properties, several self-named nitrate companies have been organized in London, with enormous nominal capital, which are purely speculative, being based on neither Government concessions nor the ownership of nitrate or other property in Chili. To what extent their promoters have succeeded in abstracting sovereigns from the pockets of credulous investors I cannot say.

The wise and liberal policy of the Chilean Government in encouraging small and independent establishments is an obstacle to the formation of a monopolistic "trust" or combination of the English companies, for the control of the nitrate trade.

At the time of my recent visit to Chili as special commissioner a large and imposing representation of these companies arrived at Santiago for the purpose, it was said, of obtaining such concessions and changes in nitrate regulations as would render them masters of the situation and give them a virtual monopoly of the nitrate trade. How far they succeeded in their designs I have no positive information, but I am convinced that the impolicy of strengthening the hands of the would-be monopolists was fully appreciated at Santiago. On the other hand, I am convinced that the investment of American capital in the nitrate business of Chili would be favorably regarded by both government and people as tending to impose a wholesome obstacle and check to the monopolistic tendencies of the English companies, which may be considered *pro tanto* under one management.

The possibility of so strange a fact as the existence in open air of enormous deposits of salt so deliquescent and easily destroyed by moisture as the nitrate of soda, is partially accounted for by the strange meteorological fact that where they are found it never rains. This rainless region extends from the northern part of Peru, in about the south latitude, 4 degrees, to about latitude 30 degrees S., and inland from the shores of the Pacific to the main cordillera of the Andes, an average distance of about 90 miles. The country within these limits is a perfect desert, except along the borders of the few streams which, rising in the snow mountains, force their way into and across the desert to the Pacific, furnishing along their course water for irrigation, such as the river Rimac, which runs through the center of the city of Lima, and irrigates the broad fruitful valley lying between that city and the sea coast.

I have already explained that the nitrate beds are found on the eastern slope of the coast range, which, often precipitous on its western face, on its eastern faceslopes gently down to the valley of Tamagrauel, which separates the coast range from the main cordillera of the Andes. This valley with an average width of 10 miles, stretches from the hills of Caricoles, which connect the two Andean ranges, in latitude 22° 40' S., to Aguas Blancas, in latitude 25° 45', south of which point the country becomes very broken, and the nitrate deposits disappear.

This valley is wholly devoid of all the characteristics which we usually associate with the word, such as groves of green trees, verdant pastures, running streams, etc. Instead, the eye wanders over a scene of treeless, verdureless, waterless desolation. It is true, on the eastern side of the valley there is found an occasional weak spring, where feeble attempts at cultivation have been made, but with indifferent success, as the soil is so thoroughly impregnated with salts of various kinds as to render its profitable cultivation impossible, even with a sufficiency of water for irrigation.

The point on the slope of the mountain where the deposits of caliche are found is some 500 or 600 feet higher than the valley, but it diminishes in quantity and richness as the valley is approached, and disappears entirely at the bottom.

An examination of the workings of these beds discloses the following conditions:

- (1) That the surface to the depth of 8 or 10 inches is covered with a layer of fine loose sand.
- (2) That underneath the sand is found a conglomerate of amorphous porphyry, feldspar, chloride of sodium, magnesia, gypsum, etc., cemented by the sulphate of lime into a hard compact mass to a depth of 6 to 10 feet, called the "costra," or crust.
- (3) That below this crust the caliche or impure nitrate is found, presenting to the view a variety of colors, yellowish-white, orange, bluish-gray, etc.

The nitrate deposit being reached, which, like the crust, is found cemented into a rock-like mass of from 4 to 6 feet deep, is quarried by blasting with a coarse-grained powder, of which as much as 150 pounds is sometimes used at a single blast. Neither dynamite nor nitroglycerine is used, as it would shatter and pulverize the caliche so as to occasion a serious loss.

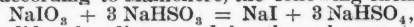
After being brought to the surface the caliche is carefully assorted by experts, called "particulares," broken into pieces double the size of an orange and carted to the refinery establishment, situated on the pampas or on the sea coast, or carried to Iquique, Pisagua, Patillos and Antofagasta by rail, each of these places having connection by narrow-gauge railways with the nitrate deposits, and which, consequently, are rapidly becoming the chief centers of nitrate production and export. Of course, if water and fuel were obtainable near the deposits it would be more economical to carry on the process of elaboration there, but as these essentials can be had more conveniently at the sea coast it would seem to be cheaper to bring the caliche to the fuel and water. The fuel used is bituminous coal, brought by sea, mostly from the coal beds of southern Chili, while water is obtained chiefly by condensation, and for domestic purposes is brought in boats from Arica and other points on the northern sea coast. Some attempts have been made to obtain water by sinking surface wells, but as it never rains in these regions success, of course, was impossible. No efforts, as far as I know, have been made to obtain artesian water, but the fact that the snow mountains are comparatively near seems to indicate that an abundant supply might be obtained at no great depth.

Mr. George Smith, who did so much for nitrate development in Tarapacá, estimates that there is a sufficiency of crude nitrate in that province alone to yield 68,000,000 tons of the commercial article; while Mr. Billingham, in his interesting pamphlet entitled "Estudio sobre la geografía de Tarapacá," estimates the total capacity of the nitrate beds at

178,011,104 English tons. The mean of these two widely differing estimates would be 120,505,552 tons, an amount sufficient to supply the world's uses, at the present rate of consumption, for many centuries.

The conversion of impure caliche into commercial nitrate of soda is effected by means of lixiviation, or leaching. For that purpose elaborate and expensive machinery is employed, a detailed description of which would be out of place in this report. It will suffice to say that the caliche is dissolved in water at a high temperature, in long tanks, from which the solution is carried in pipes to enormous shallow pans, and the water evaporated by artificial heat, the vapor being conveyed to a condenser, and the water thus distilled saved for further use.

It is found that in every 100 kilos. of impure nitrate there are 50 grms. of iodine, and that in a crystallization of the nitrate the mother-liquor, called, technically, *aqua vieja*, holds it in solution. In order to extract it this mother-liquor is drawn off into a separate tank and charged with sulphite of soda, with (according to Malhohère) the following chemical reaction:



forming the iodide of sodium; and by the subsequent addition of a further quantity of sulphite, precipitating the iodine, which, containing more or less impurities, is refined by sublimation and condensation.

The importance of the nitrate trade will be seen from the following figures: The export of nitrate of soda from the ports of Taltal, Antofagasta, Iquique, Pisagua, and Topilla, (Iquique furnishing two-

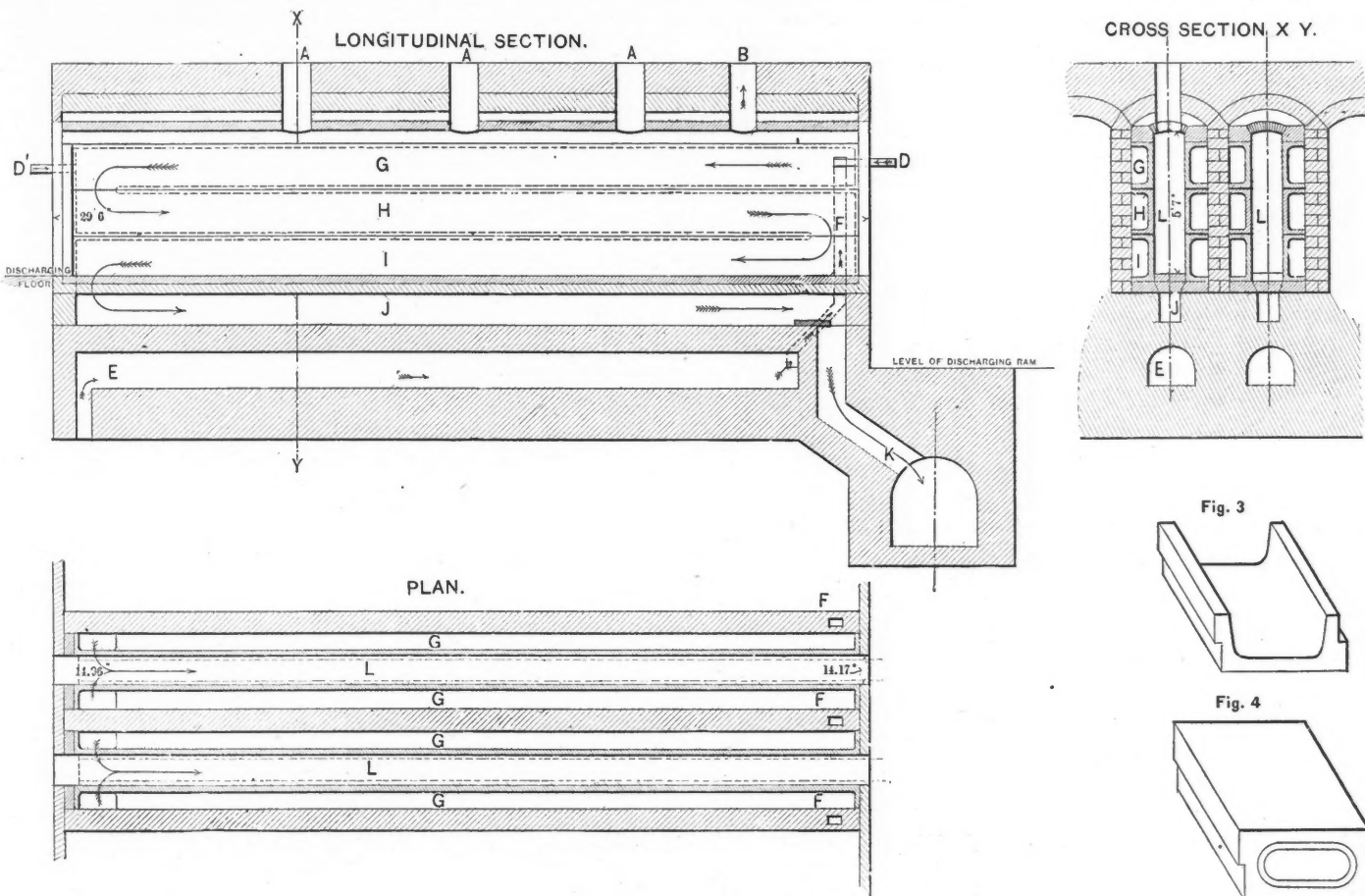
THE SEMET-SOLVAY OKE OVEN.

In designing this coke oven an especial endeavor is made to transfer to the central retort in which the coking occurs as large a proportion as possible of the heat generated by the combustion of the gases in the flues which surround it. This is particularly important. For, before entering these flues, these gases are deprived not only of their sensible heat, but of a considerable proportion of their combustible matter, by passing through condensers, which recover from them sulphate of ammonia and tar as by-products.

The course of the gases is as follows: On escaping from the coking coal in the retort *L*, they pass through the opening *B* in its roof (the other openings *AA* are for charging the coal), and thence to and through the condensers. The stream of gas issuing thence is split, and just enough is taken back to the coke ovens to keep their temperature up to the necessary point, the rest being led off and burnt beneath boilers. Actually about half of the gas goes to the coke ovens.

The doors have asbestos joints, and all the other openings have faced joints, so firmly contrived that luting is wholly avoided. So completely is the air thus excluded from the retort, that the coke, when drawn, shows no trace of combustion.

Results.—Since the preliminary note on this coke oven, published in the *Revue Universelle* in 1883, when it was still under trial at the Belle Vue



SEMET SOLVAY COKE OVEN.

thirds of the whole) for the 10 years ending the 31st of December, 1888, was 4,574,440 English tons, valued at \$231,411,182 upon which export duties were collected at the rate of 1 dollar per 100 kilos., to the amount of \$87,470,622. During the same period the exports of iodine amounted to 1,588,074 kilos., with a total value of \$19,333,757 upon which the Government collected in export duties \$1,172,576.

The export duties on nitrate for the year 1888 amounted to \$17,447,882.12, and it is estimated by the minister of the treasury that for the current year (1889) the amount will exceed \$19,000,000.

Canal Projects in France.—The project for making Paris into a port is now completed, and nothing remains but the sanction of the Government to put the works into the hands of the contractors. Hitherto the Government has kept aloof from the proposals until its promoters were in a position to carry out the undertaking to a successful issue, a caution engendered by the recent failures of French engineering undertakings. The promoters have now raised the necessary capital, amounting to £5,400,000, and it is probable that the sanction of the Government will be given to the project, and the work of canalizing the Seine with a view to allowing the passage of sea-going vessels from Havre to Paris will be proceeded with, and extensive docks will be constructed at Pantin, on the northeast of the city. Another proposal is for the construction of a canal to connect the Mediterranean with the Bay of Biscay, with the intention of intercepting a great part of the shipping which at present passes through the Straits of Gibraltar. If these two projects be carried out, they will have an immense effect on the trade of France.

colliery, the system has passed to the commercial stage, and four batteries of 25 ovens each, and treating from 400 to 440 tons of coal daily are in use at the Havre colliery. The cost of each oven is estimated at \$920, to which must be added \$320 for the condensing apparatus for the by-products. Each oven cokes a four-ton charge of coal in 22 hours. The discharging is continuous, so that there is a regular and continuous supply of gas to condensers and boilers.

It passes through the pipes *DD'* into the upper of the three flues which stand on either side of each retort. Here it meets preheated air, entering through the flues *E* and *F*. Gas and air burn, sweep four times the length of the retort, and through the flues *G*, *H*, *I*, *J*, and pass thence under boilers through the flue *K*, and thence to the chimney, where their temperature is about 200 degrees C (392 degrees F).

Details of Construction.—In order that the heat developed in the flues *G*, *H*, and *I* may pass readily to the charge coking in *L*, the walls of these flues are made very thin. Details of the pieces which compose these flues are shown in figures 3 and 4. The piece shown in figure 4 is stronger than the other, but dearer. The relative merits of these two forms are not yet decided.

The partition walls which support the massive roof are wholly independent of these thin and necessarily rather fragile flue-pieces. The joints of the latter are made very thin, and are rebated, and the total extent of joint is made very small, in order to oppose the passage of the gas direct from the retort *L* into the flues *G*, *H*, and *I*, which would, of course, lessen the yield of by-products. The cast-iron end-doors of the retorts are shielded by double sheet-iron doors to retain the heat. The roof is made extremely thick, and the air is preheated by passing through

the flue *E*, to cut off the escape of heat outward from the apparatus. To improve the combustion the gas is admitted partly at *D*, where it meets the whole of the air, and partly at *D'*. The little fire-places usually employed for igniting the gas are suppressed, and it is thus possible to give the rational downward path to the burning gas and air.

The coal contains:

Water.....	4.5 per cent.
Tar.....	1.5 per cent.
Other volatile combustible.....	10@11 per cent.
Ash and fixed carbon.....	84@83 per cent.

It yields 81 to 82 per cent. of coke, 13 to 15 pounds of ammonia (recovered as sulphate of ammonia), and 31 to 34 pounds of tar, per 2,240 pounds of coal charged.

The outlay for labor in operating and maintaining ovens and condensers is not above \$0.26 per ton of coke, or perhaps \$0.06 above that of treatment in a common Belgian oven. The value of the by-products is \$0.36 per ton of coke, so that the net gain due to their recovery is estimated at \$0.30 per ton of coke.

It must be admitted that these results are remarkable. The extremely rapid coking indicates that the chief defect of the Belgian oven, its low temperature, has been overcome to a great extent. Further evidence is needed as to the efficiency of the coke in the blast-furnace. It is hard to believe, however, that the Belgian oven, which is applied with such great advantage to so many classes of coal in Continental Europe, cannot be advantageously used for many kinds of American coal. It was not so long ago that sulphuric acid makers here would use nothing but brimstone, till Mr. W. M. Chadwick, co-operating with the Orford Company, finally broke the spell, and compelled others to use pyrites or stop. It may

this invention eliminates the loss of capacity and of power which is necessarily incident to the old valves, opening only by overcoming the resistance of the springs, as with them the pressure on the outside of the cylinder during the admission of air is greater than on the inside, so that the piston, on its return stroke for compressing the admitted air, must traverse a certain portion of the stroke before the enclosed air attains a full atmospheric pressure, *i. e.*, before compression actually commences.

Indicator cards show these new cylinders to be filled with air at atmospheric pressure, and in some cases the line runs as much above the atmospheric line as it runs below it in other compressors.

The necessity, when the old valve type is employed, of using the hot, dusty air immediately surrounding the compressor is here obviated; the inlet pipe affords ample opportunity for connecting a conducting pipe with the compressor from outside the room or the building—an opportunity of special value in the frequent cases where economy or other considerations require the cool air or gas to be led back to the compressor.

As the air-admitting valves, which in the old valves are placed in the cylinder head, are dispensed with, the surface space thereby gained, which is considerable, the volume of air let in being about four times as great as the volume discharged, has been made available for water jacketing with enhanced cooling effect by being situated in the cylinder head, with which the air is in contact during the whole stroke and where it is hottest. Indicator cards taken on air cylinders of this compressor show a pressure line approaching the isothermal more closely than any other, except, perhaps, those which inject water into the cylinder. The disadvantage of using bad water and the necessity of moving a body of water back and forth in the cylinder have thus been eliminated at the same time as an increased cooling has been obtained.

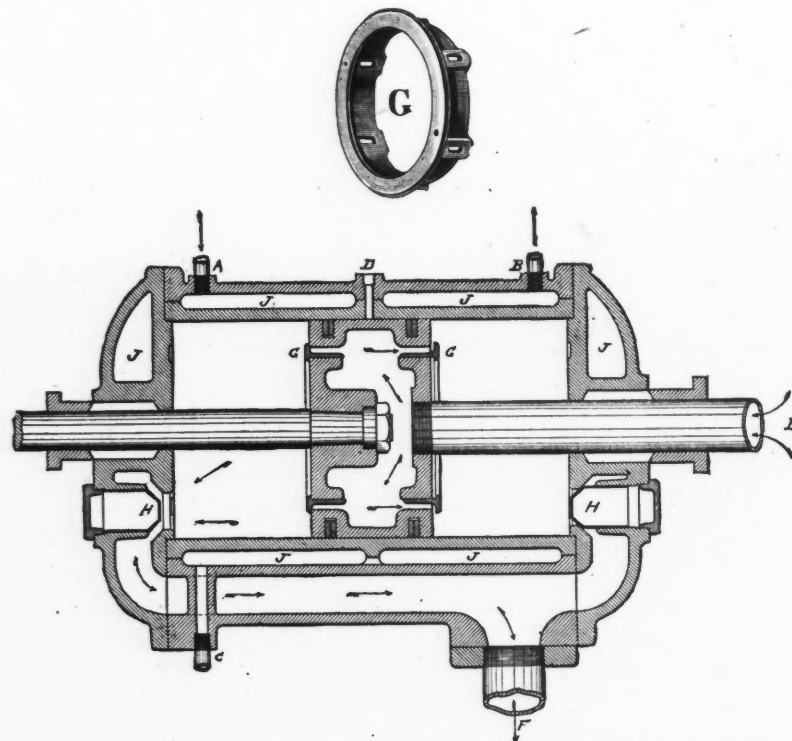


FIG. 1.—SECTIONAL VIEW OF SERGEANT'S PISTON INLET COLD AIR CYLINDER

well prove the same with the Belgian oven. Pyrites failed repeatedly till the right man appeared.

SERGEANT'S PISTON INLET COLD AIR CYLINDER.

An important improvement in air compressing machinery has lately been made by the Sergeant-Ingersoll Rock Drill Company.

The air inlet valves are large metallic rings, fig. 1, *G*, which open and close without being operated by springs or other devices. When the piston travels in one direction, the ring valve on that face of the piston which is toward the direction of the movement is closed, whilst that on the other face is open, thus simultaneously letting off at one end of the cylinder compressed air, and at the other, *E*, taking in free air. On reversing the stroke the valve that was closed opens, the one that was open closes simultaneously, owing exclusively to the momentum. When the piston starts upon its return stroke, the valve on the other side is for a moment left behind until, when fully opened, it is caught by pins provided for that purpose and carried along by the piston and again closed by the stoppage of the piston at the other end of the stroke just at the right time. Instead of offering any resistance to the influx of the air, as is the case with valves operated by springs or admitting the air through circuitous passages, this device facilitates its admittance. The air constantly enters through the center of the piston in whichever direction this moves, and the air flows from this reservoir alternately to either end of the cylinder in conformity with the motion of the piston. In fact, through the air inlet pipe at *E* an uninterrupted and uniform column of air rushes into the cylinder at a high velocity and consequently with a considerable momentum. When on its reversal the piston retards this rush, the inflow is not checked immediately, but carried along by its momentum, and is thus accumulating in the cylinder a greater pressure than that of the external atmosphere. In that way the full amount of air is secured and utilized at the moment when the cylinder is filled; or, in other words,

The sectional cut shows the clearance spaces to be reduced to a minimum; there are no counter-sunk spaces in the cylinder heads for inlet valves, only a single annular space to take the face of the large ring inlet valve. As the valve covers this space at the end of each stroke, there is no dead space.

As to wear, the ring inlet valves are hardly subject to any, and the inlet pipe extending through the cylinder-head serves as a bearing and support for the piston, thus reducing and making uniform the wear in the air cylinder. Besides, the large ring valves admit a large area of inlet with a small throw of valve, quickly opening a large supply port and enabling the compressor to run at a high speed with no decrease in efficiency and with safety to the rapidly moving parts.

A Test of Foreign Armor-Plates.—The Naval Board, which met at the Annapolis Proving Ground to complete arrangements for testing armor-plating of American manufacture from American materials, will make a series of tests upon some foreign armor-plates. The chief of the Bureau of Ordnance recently purchased from the works in Creusot, France, a newly invented nickel-steel plate, which is claimed to be better than the all-steel plates heretofore turned out by this firm. This plate is eight feet long, six feet wide and ten and one-half inches thick, or the same dimensions as the American armor plates. Commodore Folger has also purchased from the same works an all-steel plate, which is to be used in testing armor-piercing projectiles. It is probable also that Cammell & Co., of Sheffield, England, which firm furnished some of the plating for the large monitors, will have a compound plate, made of soft iron and faced with steel, for test in competition with the Creusot nickel-steel plate. The tests of these plates will be under similar conditions to those prescribed for the armor-plates of American manufacture, but foreign-made plates will not be used in armoring any of the ships, the object of their tests being solely or use in studying the best kinds of armor and projectiles.

EXPERIMENTS ON COMPOUND ENGINES.

Professor Osborne Reynolds recently read a paper before the Institution of Civil Engineers on the triple expansion engines and engine trials at the Whitworth Engineering Laboratory, Owens College, Manchester. A copy of the paper with the full discussion upon it has come to hand, and from it we condense the following.

The engine was built for the special purpose of the laboratory, to represent the most approved principles in engine construction, and to afford the utmost facilities for experiments on the use of steam throughout the entire range, and, if possible, beyond the limits hitherto accomplished in practice. It was decided to have three separate engines working on separate brakes. All were of the inverted cylinder type, with walls and covers separately jacketed with steam at boiler pressure, and so arranged that they could be worked with or without steam in any or all of the jackets. Each engine was designed to work at any steam pressure up to 200 pounds per square inch, to run at any piston speed up to 1,000 feet per minute, and to have expansion gear to cut off from zero up to $\frac{3}{4}$ of

III as a compound condensing engine, I and II as a compound non-condensing engine, III as a single condensing engine, and I or II as a single non-condensing engine.

The surface condenser is of the torpedo-boat type, of thin copper, 14 inches in diameter and 4 feet long. It has about 160 square feet of heating surface, and receives the steam by an 8-inch exhaust pipe from the 12-inch engine.

The boiler is of the locomotive type, with iron tubes and fire-box, the shell being of steel $\frac{3}{8}$ inch thick. The tubes are 2 inches in external diameter and 8 feet long, giving 160 square feet of tube surface. The fire-box is $\frac{3}{8}$ inch thick, 2 feet 3 inches \times 2 feet 4 inches, 4 feet high, giving 42 square feet of heating surface. The area of the grate as used is not more than 4 square feet.

The brake dynamometers, the indicating gear, the gauge for jacket water, and the tumbling-bay and tank for the condensing water are of a permanent character. Provision is also made for measuring the temperature of the gases in the smoke-box as they emerge from the tubes, and in the flue as they leave the water-heater, and for measuring the tempera-

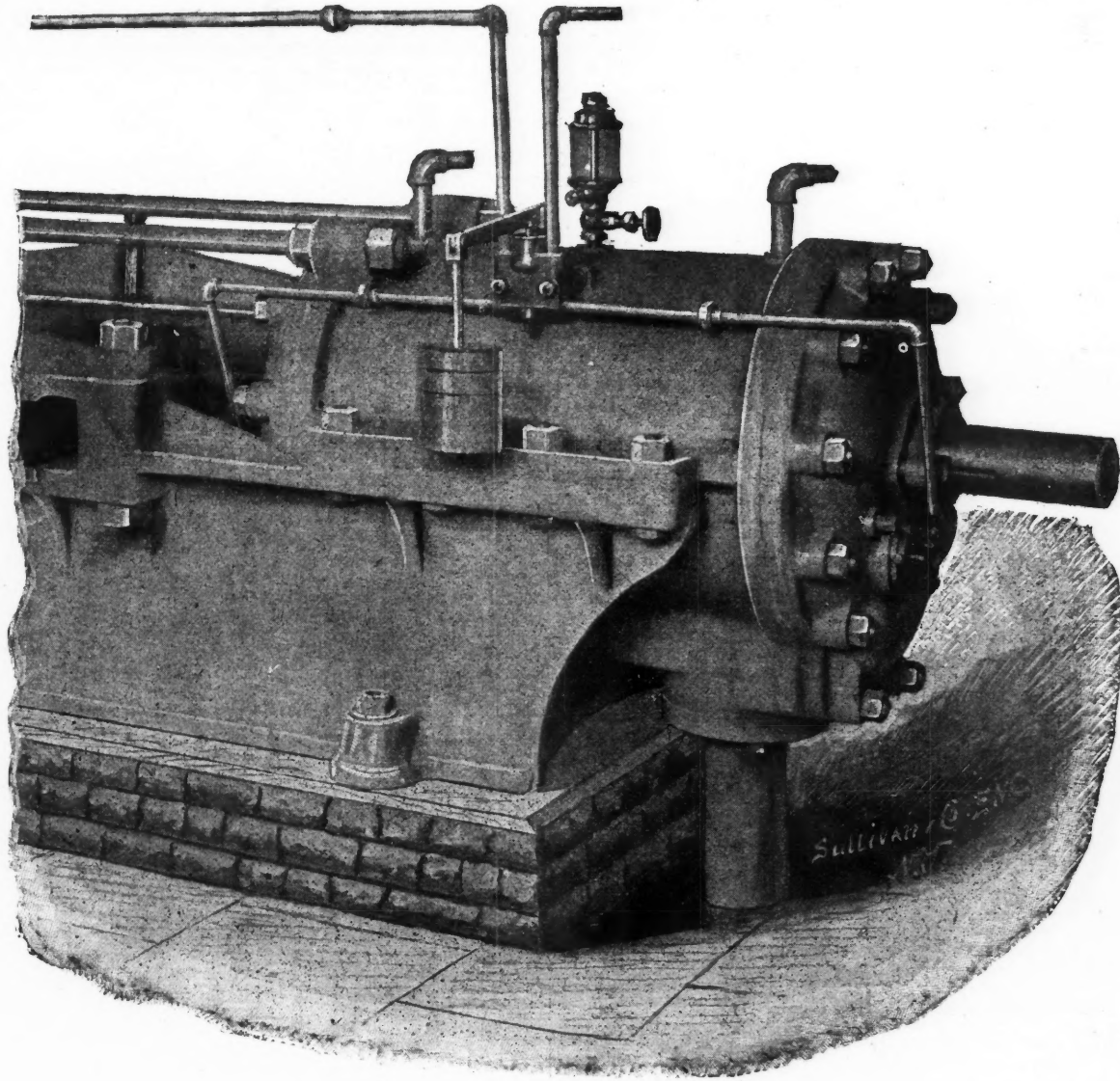


FIG. 2.

the stroke. One engine was furnished with air pump and surface condenser; the other two engines were furnished with alternative exhausts, either into the atmosphere, or into steam-jacketed receivers supplying steam to the next engine, each of the receivers having also an alternative supply of steam direct from the boiler. The sizes of cylinders of the three engines were as follows: No. I, 5 \times 10 inches; No. II, 8 \times 10 inches; No. III, 12 \times 15 inches.

The design of the engine contains many novelties. To obtain completeness in jacketing, both ends or covers, as well as the walls, were jacketed, the water being drained from the lowest point in the jacket spaces. To diminish the resistance of the passages these were abnormally large, the area of the ports being 13 per cent. of area of the piston, and the steam chests were very large.

To diminish clearance, the ports were made straight and the valves brought as close as possible to the cylinder, double valves being used. The pistons were formed to occupy the space in the cylinder, except $\frac{1}{8}$ inch clearance at the ends. The result is that in engine No. I the clearance space shut in by the main valve is 4 per cent. and 1.7 per cent. more by the rider, and in engines II and III the clearance shut in by the main valve are 6 per cent. and 2.5 per cent. more by the riders. To obtain an adjustable cut-off, Meyer expansion valves were used on the backs of the main valves. Arrangements were made to allow of the engines Nos. I, II and III being worked as a triple-expansion condensing engine, II and

III as a compound condensing engine, I and II as a compound non-condensing engine, III as a single condensing engine, and I or II as a single non-condensing engine.

The condensing water is drawn from an iron tank 20 feet \times 10 feet \times 10 feet; a permanent mercurial gauge in the engine room always shows the level of water in this tank.

The water after leaving the condenser enters a cast iron tank, 4 feet \times 18 inches \times 18 inches, from which it issues over a tumbling-bay 4 inches wide; in the tank are bafflers and a float, with a scale graduated to show in pounds per minute the quantity running over the bay. The water is then caught in a second receiving tank and conducted to an underground concrete tank 20 feet \times 9 feet \times 11 feet, the level of water in which is shown in the engine-room by a water-gauge, and also indicated outside by a float. This tank, which has been accurately measured, affords a very exact means of checking the indications of the float in the tumbling-bay.

The upper tank holds 12,000 gallons of water, which can be passed through the condenser before the tank is empty. When the upper tank is empty, if more water is required the quadruple centrifugal pump is set in motion, which raises the water at the rate of 10,000 gallons an hour from the lower to the upper tank; but it is seldom necessary to resort to this. The temperature of the condensing water is measured by a thermometer in the pipe leading to the condenser, and after leaving the condenser by a thermometer in the float-tank.

The water from the hot well flows into an oil-separating tank, from

which it overflows on opening a cock, and is caught in a 100-pound tip can after Mr. Bryan Donkin's pattern, from which it may be tipped into the feed tank, so that the feed and hot-well discharges are measured at one operation.

The condenser is furnished with a mercurial gauge, which shows the absolute pressure in the condenser; also with a Bourdon vacuum-gauge; and the temperature of the discharge from the hot-well is measured by a thermometer in the hot-well. The water, resulting from radiation and condensation, is measured in the water separator.

The pressures in the receivers are shown by Bourdon gauges, graduated to pounds.

Each engine is provided with a counter for recording the revolutions. The hydraulic brake dynamometers are a very important feature of the system. They are the result of a special investigation as to the possibilities afforded by hydraulic brakes, undertaken by the author during the time when the engines were under the consideration of the committee and before anything was decided.

Having had a great deal of experience with almost every conceivable form of friction brake, the author had arrived at the conclusion that, although it is possible to construct such brakes to work with almost any degree of accuracy, certain inconveniences and drawbacks attend their use, which, in all cases, leave much to be desired, particularly where, as in a case like this, work on the brake is the sole object of the engines.

Having occasion to use a dynamometer for measuring the resistance on the shaft of a multiple steam turbine at a speed of 12,000 revolutions per minute, which was engaging his attention in 1876, the author made use of a brake having a centrifugal pump suspended on the shaft and working into itself. The resistance, or head against which the pump was working, was regulated by a valve between the exit and inlet passages; that is, in the external circuit made by the water. This was brought before the Mechanical Section of the British Association in 1877. At the same meeting Mr. William Froude gave an account of his hydraulic brake for measuring the power of large engines, in which the resistance was regulated on the same principle as that adopted by the author, namely, by adjusting diaphragms or sluices in the passages between the revolving wheel and the casing. In other respects Mr. Froude's brake differed essentially from any of those previously used, being designed to obtain a maximum resistance with a wheel of given size. For this purpose Mr. Froude invented an internal arrangement which affords a resistance out of all comparison with any other form.

Since great resistance, admitting of small brakes, was of extreme importance for these engines, the first step in the special investigation was the construction of a model Froude brake with a 4-inch wheel, the object of which was to ascertain how far the sluices would act in maintaining a constant resistance at any particular speed, and what was the minimum resistance when the sluices were closed.

The model having been satisfactorily tested, it was decided to arrange the engines with the shafts in line, with three brakes on the shafts; and the brakes, with 18-inch wheels, were designed according to the resistance given by the model.

The brakes were constructed by Messrs. Mather & Platt at the same time as the engines, and the engines started with the brakes and automatic gear complete. During the twelve months they have been running the brakes have demanded and received no attention whatever. They are easily tested for balance. They have neither fixed nor spring attachment, except the bearing on the shaft. They are loaded on a 4-foot lever, with 2-inch play between the stops. When the speed of the engines reaches about 20 revolutions per minute, the levers rise (whatever load they have on) and, though always in slight motion, they do not vary one-half inch until the engines stop; during the run the load on the brakes may be altered at will without any other adjustment.

Before commencing the trials, the object to which they were to be directed, and the manner in which they should be conducted, were carefully considered, and it was decided:

1. That the purpose of the trials should be the elucidation of the general laws of the action of steam in the steam engine, and the more general circumstances on which these laws depend.
2. That, from the commencement, the trials should be systematic; certain definite conditions being aimed at, and the trials under each set of conditions continued until consistent results should be obtained, showing how far the conditions had been achieved.
3. That there should be no casual or unrecorded trials, but that all trials should be considered of the same degree of importance.
4. That observations should be noted and reduced on special forms according to a definite system, to be carefully preserved for future reference; and that a synopsis of the mean results of each trial should be entered forthwith in a special record for ready comparison.

The trials have all so far been conducted as part of the regular work of the laboratory, under the superintendence of the author, Mr. Foster assistant in the laboratory) having general charge of the appliances. The detailed observations were taken and reduced by students (about 14 in each trial) under the supervision of Mr. McKinnon, demonstrator at the laboratory.

Diagrams were taken every half hour simultaneously from the six ends by six students, who had charge of their respective indicators for the trial. The same students also reduced the diagrams in the intervals. The three counters are read every ten minutes by three students, who have respectively charge of the counters and running of the three engines, calculating the brake horse power as the trial proceeds, and noting any circumstance connected with the resistance or running of the engine.

One student has charge of the 100-pound tip-can, which measures the water from the hot-well, and another has charge of the condensing water, noting the temperature and quantity given by the float every ten minutes. Another student measures the rate of discharge from the jackets every half hour. A student watches the coal-weighing and firing. A student takes the temperature of the hot-well and feed before and after passing the economizer, and the temperature of the air in the smoke-box and flue before and after passing the economizer. Each student reduces his observations as he proceeds, so that within a few minutes of the end of the trial the reduction is completed.

The results are then examined by Mr. McKinnon, checked and entered

in the permanent record, the original diagrams and notes of each trial being carefully preserved.

In the day-trials the fire is lighted the first thing in the morning, and steam is got up quietly. As the steam rises it is blown freely through the jackets to heat the engines. If the trial is to be made with jackets, the blowing through all the jackets is continued until the boiler pressure, reaches 200 pounds on the gauges. Should the trial be without jackets, the jacket-covers on the low-pressure engine are closed when the pressure has reached about 40 pounds, and the air cock is opened, those on the intermediate cylinder when the pressure reaches about 80 pounds, and those on the high-pressure cylinder at 200 pounds. In all cases the engines are started and are allowed to run just as required for the trial for one hour. The engines are then stopped fifteen minutes before trial, the fire is drawn and the readings of the counters and level of the water in the boiler and tanks are taken; 14 pounds of wood and 14 pounds of coal are allowed for the waste of relighting, starting and stopping. The run then commences; the coal is weighed out in charges of 100 pounds, each charge being shot from the scale-pan into the hopper in the firing-chamber, and completely consumed before the next weighing is admitted.

The boiler is fed continuously by the feed pump, either from the water from the hot-well, or, in some trials, from the water from the condenser. The runs have generally been for six hours, except when forced draught is used, in which case they are about four hours. After the last coal has been put upon the fire the engines are run as long as steam can be kept up, care being taken to bring the level of the water in the boiler at stopping exactly to that at starting.

The ashes which fall through the grate bars are burned during the trial, and the ashes after the trial are generally weighed, but no account is taken of them, nor of any fuel that may be left in the grate.

This was adopted, after trying several systems, as being workable and very definite; nor does it appear, on comparing the results from the long with those of the short trials, that the one has any sensible advantage over the other. During the experiment the regulator is fully open and a definite quantity of water run through the condenser. The engines, therefore, take all the steam the boilers will produce, the load on the brakes just balancing the pressure of steam, so that the speed is regulated by the rate at which steam is made in the boiler.

The trials commenced in March, 1888, and were continued at the rate of two a week till June. In all, 20 trials were made and recorded. These early trials with 200 pounds pressure triple expansion, with and without steam-jackets and various degrees of expansion, gave very definite results. But they also revealed the fact that the linings of the cylinders leaked at pressures above 170 pounds per square inch, and that the joints in the jacket-pipes could not be made to hold. They also showed that, notwithstanding the precautions taken, the jackets were liable to fall off in efficiency.

At 250 revolutions per minute the thermal efficiency of the engine with jackets was:

$$\frac{\text{Heat equivalent of indicated work per minute}}{\text{Heat discharged} + \text{heat equivalent of indicated work}} = 0.175$$

$$\frac{\text{Coal per horse power per hour}}{\text{Heat discharged} + \text{heat equivalent of indicated work}} = 1.48 \text{ pounds.}$$

The leaks, however, tended to confuse the diagrams, and opportunity was taken of the long vacation to reset the linings of the cylinders.

The trials were continued in October, when the linings proved to be perfectly tight, and although at first the jacket pipes leaked occasionally, the leakage was not of any sensible magnitude.

The jackets were, however, still found liable to fall off in effect at low speeds. The trial with jackets was, therefore, repeated many times, small alterations being made in the jacket-pipes until consistent results were obtained with speeds of 250 revolutions per minute, giving thermal efficiency, calculated as before, of 0.20, coal per indicated horse power per hour, 1.33 pounds.

Corresponding trials without the jackets were then made, followed by trials at higher and lower speeds with and without the jackets. These furnish a complete series of trials of triple-expansion engines working with about 200 pounds boiler pressure at piston speeds from 250 to 1,000 feet per minute.

The checking of the results.—The system, rendered possible by the use of a surface condenser, of accurately measuring the water which has passed through the engines, as well as the heat discharged from the condenser and the feed water gives a certainty to the results of the trials not otherwise to be obtained. There will always be a loss between the water supplied to the feed pump and that received by the engines; hence, unless the loss is definitely known, the actual water received by the engines can only be surmised.

In the first 40 of these trials the water discharged from the engines after being measured has been returned to the boiler, the deficiency being carefully ascertained, and in no case where this has been done has the deficiency amounted to less than one-half pound per minute, although there were no visible or perceivable leaks of any sort from joints or glands, and the boiler, when tested before and after the experiment with water pressure, has shown no leak. Great pains have been taken to find where this water went, but without success, though it certainly did not go through the engines.

The importance of this point in determining the action of the steam in the cylinder is fundamental. It is only by knowing the quantity of water passing through the engines that it is possible to compare the actual diagrams with a theoretical diagram, and the difference between the feed and the hot-well discharge would in these engines generally amount to from five to ten per cent., and would vitiate any such comparison. As it is, all comparisons have been made from the water discharged from the hot-well.

It is not the intention of this paper to establish a complete theory of cylinder condensation, though it may be well to state that before designing the engines the theory was carefully considered and formulated, leaving only the arbitrary constants to be determined from the experiments. For anything like a complete determination of these constants, the experiments have not sufficiently advanced; but this is not necessary to show that, in the case of a series of cylinders all jacketed up to boiler pressure, the law of condensation would be precisely that which is shown in the diagrams.

Whenever the bounding surfaces are colder than the steam adjacent to

in air is conveniently expressed as 30 quadrants per second, in common glass, 20 quadrants per second, and so on. As to the bole, I feel it is too small to be frequently useful, and that a multiple of it might be adopted with advantage. The only thing I think of which strikes a blow less than a bole is a single gas molecule.

"A milligramme falling four meters in vacuo onto felt strikes with about one bole. The impact of a one-ounce rifle bullet at 1,100 feet a second, or 30 grammes with the velocity of sound in air, is about one megabole.

"To start or stop a 300-ton train at 50 miles an hour needs an impulse of more than half a million megaboles.

"As to the barad, it seems a satisfactory unit, especially if megabarad be definitely accepted as 'one atmosphere.'

"But for most purposes the barad is very small. A pound weight per square inch is 89 kilobarads; the vapor tension of water is, at 0 degrees C., 6,000 barads, and of ether is a quarter million of them. The greatest electric tension which air can stand without disruption, or one-half gramme weight per square centimeter, is 490 barads.

"The energy of sunlight at the distance of the earth can be estimated from Pouillet's data as 1.2 million ergs per second per square centimeter, or $\frac{1}{2}$ horse-power per square foot, or 1,200 watts per square meter, or 40 ergs per cubic meter, or 4 foot-tons per cubic mile, or 40 microbarads.

"Tenacities can be expressed in megabarads or atmospheres; thus of steel the tenacity is, say, 8,000 atmospheres; of glass 600, and of cement 20.

"Coefficients of elasticity may be stated in atmospheres per unit strain, but are usually very large. For instance, the rigidity of steel is nearly a megatmosphere per unit angle, and its Young's modulus is two megatmospheres per unit elongation. Thomson's old estimate of the rigidity of ether lies between a barad and a kilo-barad per unit shear.

"The force of a dynamo acting on a ton produces an acceleration of ten kynes per second, and is a suitable unit for hoist and colliery tackle. A dynam per square meter is a kilo-barad. A dynam per square centim is ten atmospheres, and is a suitable unit for expressing tenacities and coefficient of elasticity.

"A dynam-second is a big sort of bole."

"A dynam-second is a big sort of bole," and all the new units are a big sort of bore. The poor engineering students of the next ten years are to be pitied if they have to be instructed in this jargon of terms, and then by the time they get into practice have to unlearn them, and learn a new set. It is to be hoped that American writers and professors will be very slow in introducing any of these new terms. In fact, there ought to be a prohibitive tariff upon them, until they have established their usefulness in the country of their origin. "Lightly flamed and purely insular gibberish" many of them are indeed, and probably most of them that are adopted by committees will be used in few text books and in scientific papers for a few years only, and then pass into oblivion. We have already seen the adoption and the disuse within a few years of some electrical terms, such as the Weber.

One trouble with the inventors of new terms is that they wrongly fancy that a necessity exists for a single word to express a compound idea. Such as kine, instead of miles per hour, or feet per second; barad, instead of pounds per square inch; coulomb, instead of ampere hour, and the like. The very fact that the so-called barbarism "knots per hour" has crept in, expressing a velocity as a distance divided by time, instead of by the word knots alone, meaning a speed, shows that the ordinary and easiest method of expressing the compound idea of speed (that is, distance traversed in a unit of time, necessarily bringing in two ideas, distance and time) is to express it by a compound word or phrase containing two or more words.

The fact that the British Association Committee appointed in 1887 has not yet made a report is evidence of the difficulty that any such committee must have in framing new names which will be generally acceptable. It would probably be a good thing for them to defer their report for five years more, so as to give the world a chance to test the proposed units in practice a while before finally adopting them. By the end of that time it will probably be found that most of the new units are not wanted at all, and that the world can get along with the units it has, pounds, feet, seconds, grammes, meters, etc., and the compound units derived from them, such as feet per second, foot pounds, etc., together with the electrical units already in universal use, such as the ohm, volt and ampere.

THE DETERMINATION OF PHOSPHORUS IN IRON.

In order to obtain the whole of the phosphorus in a state precipitable by molybdate without evaporating down the nitric solution and igniting the residue, Herr Meinecke and Mr. Wood recommend oxidation with chromic acid. They dissolve 4.375 grammes of the metal in a covered vessel in 40 to 50 cubic centimeters of nitric acid at specific gravity 1.3 (if the iron is very manganiferous 40 cubic centimeters are sufficient). When the solution is completed, 30 cubic centimeters of dilute sulphuric acid are added (1 vol. acid to 1 vol. water), and the liquid is evaporated down to 15 to 20 cubic centimeters. From $2\frac{1}{2}$ to 3 grammes chromic acid in crystals (not more) are then added, and the liquid is boiled for ten minutes to complete the oxidation of the carbon compounds and of the phosphorus acid. It is let partly cool and water is carefully added. If the evaporation has been carried too far, manganese peroxide may separate out and retain phosphorus; if this happens the peroxide must be reduced by the addition of oxygenated water. It must be remembered that all samples of oxygenated water met with in commerce contain phosphoric acid in small quantities. Hence, if much of this reagent has to be used, account must be taken of this impurity. The solution contains, in an insoluble state, only a little graphite and silica; it is made up to 250 cubic centimeters, filtered through a dry filter, and 100 cubic centimeters are taken by means of a pipette. The acid is partially neutralized by means of ammonia, heated to 85 to 90 degrees and 50 to 100 cubic centimeters of the molybdic reagent are added. It is convenient to precipitate in a vessel so large that it may be only half full. In this case, by leaning the beaker after the precipitate is settled, we may uncover a part of the bottom. If we then cautiously bring back the beaker to its normal position, that part of the bottom remains free from deposit. If, after the lapse of half an hour, we find that no fresh deposit is formed,

we know that the precipitation is completed, and we then draw off the clear supernatant liquid by means of a small syphon. The precipitate is collected on a filter as small as possible, washed at first with an acid solution of ammonium nitrate, then with pure water, and is lastly transformed into molybdenum phosphomolybdate, $P_2O_5 \cdot Mo_2O_7 \cdot O_{6.5}$, by a moderate ignition. Each gramme of the product corresponds to one per cent. of phosphorus. Herr von Reiss in the analysis of steels uses potassium permanganate instead of chromic acid and obtains satisfactory results. The author has used the same process, slightly modified, with success in the analysis of cast metal rich in carbon. He dissolves 4.375 grammes of the metal in 40 cubic centimeters of nitric acid. If the sample is rich in manganese there is obtained on the addition of permanganate an immediate precipitate of peroxide. The results are always satisfactory on operating as follows: To the nitric solution of the metal there are added 25 cubic centimeters of nitric acid at specific gravity 1.4; then 5 cubic centimeters permanganate at 15 per thousand, and the liquid is boiled. After a few minutes a fresh portion of permanganate is added, and then a third under the same conditions. There is then produced a manganic precipitate, which a new and final addition of permanganate increases. The liquid is then boiled for a few minutes longer, cooled quickly, and the oxide is removed by oxygenated water added in small successive proportions. The liquid contains all the phosphorus in the state of a phosphate precipitate by molybdate.—*Revue des Mines.*

THE FUELS OF CENTRAL TEXAS IN RELATION TO THE BESSEMER ORES.

Written for the Engineering and Mining Journal by Dr. Theo. B Comstock.

In a recent communication I promised to give attention to a subject of great economic importance to the region in Central Texas which has been outlined by the State Geological Survey as an iron ore district. The First Annual Report of the Survey for 1889 is now available, and from it in part, as well as from information gleaned by others and myself, the following general statements are made up.

Since the announcement made in April in these columns there has been some development of the mineral resources within a radius of fifteen to twenty miles of Llano, and that town has grown somewhat in consequence. Capitalists are certainly turning their attention this way, and some cautious and well-informed investors have taken hold with apparent zeal. These facts have acted as a stimulus to speculation in mining property and a genuine boom in real estate has accompanied this. As is usual in such cases, the predictions for the future of the district are based largely upon what men untrained in metallurgy are pleased to consider the natural results of the existence of ore-bodies in their vicinity. Some there are who seem to regard nature as in no way concerned, believing, possibly, that the traffic in real estate, mining property included, is dependent upon no other element than professional booming. With this last subject the writer has nothing to do. But there is apparently a very general impression among well intending citizens and investors, that the one thing lacking to make of Llano County, or a portion of it, a metallurgic success, is the erection of smelting plants. For the purposes of this article, it may be granted that a little labor and capital could soon unearth enough ore of the best quality to supply several large furnaces with material for long campaigns, and that with moderate distance railroad building and such progress in industry in the southwest as may be reasonably anticipated soon, there would be near and satisfactory markets for the products of such works. Even with everything else favorable also, prudence, in view of the history of iron and steel manufacture, might dictate the slow making of haste; for railroad building in Texas is not brisk at present, and Llano's experience with a partially graded line should make her wise overmuch. There will be time enough and money enough for iron works when the markets are made and ready access to them assured. But, for argument's sake, and to convince enthusiasts that our cause is theirs in every honorable sense, let us assume that all these desiderata are so near fruition as to be practically secured. Even then the smelting plants must seek other localities unless there be found close at hand an adequate supply of fuel suitable for metallurgic use. If that can be laid down at Llano, or in the vicinity of the works of that region, as cheaply as at any other point, more than half the problem is solved; but, conversely, if not so, then more than half remains unsolved, and iron and steel manufacture from Llano ores must take place at points remote from the mines. To say nothing of the advantages of those cities in Texas which have already secured positions which preclude the building up of rivals without extraordinary advantages, the one item of fuel supply is all-important. Recently much has been said of the availability of the timber of the mineral belts in the manufacture of suitable charcoal. The adaptability of the oak and mesquite as far as quality alone is concerned, may pass unquestioned, but the element of quantity is of prime importance. There is comparatively little large timber in the wooded portion of the Central Region, scrub oak of several varieties being interspersed irregularly with moderate-sized mesquite. The cost of collecting, burning and delivering coal from these sources would be much greater than in densely-wooded areas, and the supply within working distance of the furnace, could not long be relied upon. Every estimate of cost per ton of pig for smelting is higher than it should be to insure successful competition with existing plants in other districts. I have seen no quotation from any report below \$12 to \$12.50 per ton, and these are of necessity somewhat conjectural, being based upon very cursory examinations of the fuel resources. It has been claimed that an assumed difference in the cost of \$3 to \$3.50 per ton against the Texas works would be fully offset by the superior quality of the product. But it is to be remembered that greater distance from markets and absence of an urgent demand will overbalance any possible advantage of this kind, which is really misstated from a careless way of handling the facts. Besides this, when the comparison is made with actual southern practice in Alabama, the discrepancy is nearly double what has been assumed in most estimates. The Llano ores, as I have clearly stated elsewhere, are remarkably pure and well adapted for the manufacture of steel, but there is no proof that they will make better steel than is now made at our best mills elsewhere. The fallacy in the reasoning of the "experts" quoted lies in their placing this quality advantage of the ore more than once to the credit side in

their calculations. Their cost per ton for other districts is not the very lowest, but a high average rate for the best quality of iron from such ores as are there used. Their cost assumed for Llano is also the best grade of iron to be made from the local ores. If the superiority of these ores be granted, this advantage has already been credited in the original estimate of cost. Were they less rich and less easy of reduction, the cost of treatment would be increased beyond these estimates. The cost of transportation is in no wise affected, so far as the ton of pig iron is concerned. We, therefore, must admit that, with present conditions, the extra value of Llano iron ores, such as it may be, lies wholly in the ore, and not in what may be done to it here in Texas. The very interesting subject of the prospective history of iron manufacture in the State is not now in question. The sole object of this paper is to determine whether the fuel supply at Llano is now or can soon be made sufficient and cheap enough to render home smelting a profitable industry. If this question be affirmatively answered, the prompt erection of plants by experienced iron workers will follow as a matter of course whenever they can be satisfied that markets can be made available for their products. If a negative conclusion be reached, it is nobody's fault, but to be sure, but certainly no wise business man could embark in an enterprise which must fail from the nature of things. I know that the people of Texas are not represented by an individual who remarked that he wanted Eastern fools to sink their money in such enterprises. If one or two failures arise from investments in opposition to the dictates of engineering judgment and business prudence, this region will be set back years beyond its just deserts, and all industries will be throttled at their birth.

It is the writer's calm judgment, based upon very careful study of the region, that the Llano iron ore district must for a considerable period, if not permanently, be a mining region, *par et simple*, and not a smelting point, for the simple reason which will be conclusive enough to any competent metallurgist, that an immediate supply of fuel is lacking. That once acquired, the whole situation is changed, but the prospect for such attainment is not flattering at present. The mining and shipping of high-grade ore is an industry from which adequate returns may be anticipated as soon as the building of railroads has put the district in communication with well equipped smelting plants near to fuel.

Not a few who understand the situation fairly have expressed the hope that the discovery of coal in adjoining counties may overcome the difficulty and make smelting practicable in Llano. Of course, no engineer for a moment thinks of any urgent necessity for local smelting, but the idea is a charming one to many superficial observers, who cannot dissociate the mining of the ore from its metallurgy. For the benefit of such persons, it seems necessary to explain here the economic relations between the transportations of coal and of ore. Freight rates on ore are very low in comparison with the traffic on coal, because the former is less bulky for the same weight. Again, ore goes out as back freight for cars which would otherwise be unloaded and unremunerative, and with much coal as ingoing freight, the rate per ton must be largely increased to offset the non-paying return trips and the greater number of cars required for the more bulky freight. These are the items which are commonly overlooked by enthusiastic investors, but the engineer has these constantly in mind in balancing the conditions which make for success or failure, profit or loss, in mining and smelting enterprise.

But to say that Llano's destiny is mining chiefly, does not of necessity imply that Texas plants will not consume a large share of the ore raised from this territory. There is a limit to the distance to which even such choice ores may be economically shipped, and it is a matter of no little importance to Llano citizens to know whether there are fuel resources near enough to justify the hope of successfully establishing reduction works at a reasonable distance. The writer is one who firmly believes in a masterful development of the resources of the Southwest far beyond the anticipations of those who have not examined them critically. Texas, by reason of her vast territory and varied mineral accumulations, is destined to attain a position of self-dependent independence which must be rare among the States. Her citizens do not yet begin to realize the capabilities of her natural products, but ere many years the present system of importing what might be more profitably manufactured at home will give place to an export trade of very respectable proportions.

The utilization of water power is attracting much practical attention in some sections, and much may be expected from this source, as soon as the lesson has been fully learned that enterprise begets its like and the offspring of indolence is retrogression. In many other directions progress is apparent, but the actual mineral resources of most concern are not most fully appreciated as yet.

It is not generally known that coal is somewhat abundant in the State and that fuel of possible value in metallurgical operations is accessible in different directions. The Central Mineral Region, as it is called, in parts of which the iron ores abound, is practically destitute of coal. This fact has been ascertained beyond a doubt by the Geological Survey, the reported "finds" in this tract being invariably anything but coal, except in several isolated cases where very small patches of carboniferous rocks carrying traces of this mineral have been left by erosion. But the true coal measures occur at surface over a considerable area northward, and they probably also underlie other territory, in portions of which testborings are now being made, watched with keen interest by members of the State Geological Survey.

Nothing like a satisfactory estimate of the State's resources in coal is now possible, but it has been ascertained that a number of beds of workable thickness occur in the territory occupied by the coal measures, chiefly north of the Colorado River, west of Lampasas County. These have been but partially explored, although some successful mining has ensued at points within easy access from railroads. It is apparent that certain capitalists, who believe their interests to be enhanced by the throttling of the coal mining industry in Texas, have made large purchases for the purpose of preventing such a development as will conflict with their own business as public carriers. A keener insight might convince such persons that a different policy would eventually yield better returns even to transportation routes, but the "futures" in which they deal are rarely such as work to the benefit of the public. Much more is to be expected from the lines of railroad now slowly pushing into the fields from Texas trade centers. The Fort Worth & Rio Grande R. R. is, perhaps, most likely to

tap the coal fields within a reasonable period, but it must not be understood that the primary object of such construction is connected with the metallurgic use of this fuel. Mr. Ralph S. Law, of the Geological Survey, who has given the subject careful attention, expresses a fear that the coals of the Central field are unsuited for use in iron metallurgy, and no other conclusion can be reached from a review of such analyses as have been published.* The percentage of sulphur is high, but it is not certain that a fair average of the coal field has yet been obtained. There is also some well-grounded hope that the objectionable ingredient is so largely contained in seams of *pyrite* that the product may be benefited by washing. The coking quality of some of the coal has been found satisfactory.

The lignites of the Tertiary are looked upon by some as the probable source of a good metallurgic fuel. These have been shown by the Geological Survey to be of especially good character in some particulars. The ash of some is remarkably low and the fixed carbon relatively high as well as the volatile matter, and the sulphur is very much lower than in the carboniferous coals now mined.† There is room for experimentation which may lead to important economic results, hints of which have been given by the Survey Chemist, Mr. J. H. Herndon.

Another class of fuels is referred to by Dr. Penrose under the titles of Laredo and Eagle Pass coals. These contain but little water, much volatile matter and fixed carbon with medium percentages of ash, and sulphur lower than the average of lignites. They make a very satisfactory fuel for general purposes, but their metallurgic applications are not yet tested to any notable extent.

The question whether Texas can utilize the bessemer and other high-grade ores which are abundantly distributed over large areas, is quite a different one. The answer to this may be best given by pointing to the already very successful industry in Cherokee County, where ores of less value than those of the Central region are being reduced by the aid of an abundance of timber for charcoal. Texas uses have been found for the product of these furnaces in part at least, and the developments which are being made at all commercial centers in the State, must, ere long, attract such manufactures as will create a heavy demand for bar and structural and malleable iron, which can best be supplied from native sources.

The future of iron and steel metallurgy in Texas is full of wonderful possibilities; but for this very reason is it wise to build slowly and surely. Mere speculation in mining property cannot bring the boon of prosperity to such an industry; nor will the great rewards in this field, more than in others, fall to those who enter the lists without experience and forethought, and abundant capital.

The real needs of the mining belts are: 1st. *transportation facilities*. These must be secured before any material progress can be assured. The nearest railroad point to Llano is more than 30 miles distant, although ores could be raised from outcrops not so far removed. But there is no standard gauge track within 40 miles of Llano, or, say 30 miles of the nearest of the richest ore-masses. The citizens of Llano have done nobly in providing all but a heavy cut of a well-graded road to strike the San Antonio & Aransas Pass Railroad at Comfort, on the Kerrville branch. The financial difficulties of that company will probably prevent any further construction in that direction. A telegraph line has just been completed to Llano from Fairland Station on the Austin & Northwestern (narrow gauge) Railroad, along a route surveyed for a railroad. What may be expected from that source is problematical in the present state of affairs. Rumors of a probable extension of the Fort Worth & Rio Grande Railroad into this territory have been periodically afloat, and some other less definite projects have been proposed. There can be no doubt that either one of the cities of San Antonio, Austin or Fort Worth would eventually reap rich reward from the building of feeders into the region, and the one which first sows the seed is most likely to benefit from the trade established.

Outside capital judiciously placed in such enterprises cannot fail to return good dividends, if handled properly.

When the capabilities of this tract of central Texas are clearly understood it will excite great surprise that it could have gone so long untouched, but the history of Texas land dealings is sufficient to explain many anomalous features of this nature. It will not be long ere the resources of this district will be appreciated, if only injudicious enterprises be avoided and the hyenas of the mining business be kept away.

IMPROVEMENTS IN THE MANUFACTURE OF COPPER.

The improvements in copper smelting, by P. C. Gilchrist, relate to the separation of copper from impurities, more especially arsenic, antimony and tin. In roasting of white or pimple metal, for the production of blister copper, in the treatment of metallic bottoms for the removal of arsenic and conversion into blister or into refined copper, and also in the toughening and refining of blister copper, reverberatory furnaces are used, lined with shrunk dolomite, magnesia, chrome iron ore or other basic or neutral lining by which means it is possible to maintain during the operation of refining a basic slag instead of the acid slag as hitherto. A purer product is thus obtained, together with a larger yield and increased output. It has been found that a suitable amount of lime to add when charging white metal containing 75 per cent. of copper, is from 2 to 3 cents per seven tons of white metal charged. The metal should be melted down slowly under air. Much less slag will be formed than is usual in sand-lined furnaces. A good heat should be kept on the furnace throughout the charge. It is often advantageous to add a few shovelfuls of lime to the slag shortly before tapping the charge. Care must be taken not to form too thick a slag or the operation will be retarded. It is often convenient to charge in also some copper oxides or slags, and to subject the surface of the latter to the action of an air blast, the oxidizing action of which materially assists the diminution of the arsenic. The object of the smelter should be to obtain as little slag as possible, and with a low percentage of copper in it, skimmings of slag

* A Preliminary Report on the Coal Fields of the Colorado River. By Ralph S. Law. First Annual Report of Geological and Mineralogical Survey of Texas, 1889. E. T. Dunbar, State Geologist, Austin, State Printing Office, 1890.
† See analyses quoted in "A Preliminary Report on the Geology of the Gulf Tertiary of Texas from the Red River to the Rio Grande." By R. A. F. Penrose, Jr., in Report of State Geologist, 1889, page 98.

should be made three or four times, as desirable. When the sample begins to show a blister fracture a few shovelfuls of lime are to be added once or twice until the bath is ready for tapping. The slags obtained when working as described will not average more than 30 per cent. of copper, whereas when working with the ordinary sand bottom the slag usually averages 55 per cent. of copper, besides weighing considerably more per ton of blister produced. It was found when treating 400 tons of metallic bottoms in a basic lined furnace that there were obtained 323 tons of blister and 107 tons of slag, averaging 25 per cent. of copper, and that when treating an equal weight of metallic bottoms in a sand-lined furnace there were obtained 191 tons of blister only and 221 tons of slag, averaging 55 per cent. of copper. A slag in which there is no more silica than 20 per cent. should be worked with, as with more siliceous slags the elimination of the impurities takes place more slowly.—*Journ. Soc. Chem. Ind.*

A NEW METHOD OF PREPARING MANGANESE.

A new method of preparing manganese, by which the metal can be obtained in a few minutes in tolerably large quantities, and almost perfectly pure, is described by Dr. Glatzel, of Breslau, in a recent number of the *Berichte*. A quantity of manganous chloride is dehydrated by ignition in a porcelain dish, and the pulverized anhydrous salt afterwards intimately mixed with twice its weight of well dried potassium chloride. The mixture is then closely packed into a hessian crucible and fused in a furnace at the lowest possible temperature, not sufficient to volatilize either of the chlorides. A quantity of metallic magnesium is then introduced in small portions at a time, the total quantity necessary being about a sixth of the weight of the manganous chloride employed. Provided that the crucible has not been heated too much above the melting point of the mixture of chlorides, the action is regular, the magnesium dissolving with merely a slight hissing. If, however, the mixture has been heated till vapors have begun to make their appearance, the reaction is extremely violent. It is, therefore, best to allow the contents of the crucible, after fusion, to cool down to a low, red heat, when the introduction of the magnesium is perfectly safe. When all the action has ceased, the contents of the crucible are again heated strongly, and afterwards allowed to cool until the furnace has become quite cold. On breaking the crucible, all the potassium chloride is found to have been volatilized, leaving a regulus of metallic manganese, fused together in a solid block, about three parts of weight being obtained for every two parts of magnesium added. The metal, as thus obtained, is readily broken up by hammering into fragments of a whitish-gray color, possessing a bright metallic lustre. The lustre may be preserved for months in stoppered glass vessels; but when exposed to air the fresh surface becomes rapidly brown. The metal is so hard that the best files are incapable of making any impression upon it. It is so freely magnetic that a powerful horse-shoe magnet, capable of readily lifting a kilogramme of iron, has no appreciable effect upon the smallest fragment. It was noticed that the introduction of a small quantity of silica rendered the manganese still more brittle, and caused it to present a conchoidal fracture, that of pure manganese being uneven. The specific gravity of the metal, former determinations of which have been very varied, was found to be 7.3921 at 22 degrees C. This number, which was obtained with a very pure preparation, is about the mean of the previous determinations. Dilute mineral acids readily dissolve the pulverized metal, leaving a mere trace of insoluble impurity. It is also satisfactory that practically no magnesium is retained alloyed with the manganese, and the introduction of carbon is altogether avoided by the use of this convenient method.—*Kuhlow*.

SOCIETIES.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

Among the candidates for membership of the American Society of Mechanical Engineers are E. R. Archer, chief engineer, and P. F. Greenwood, of the Tredegar Company, of Richmond, Va.; Chas. F. Foster, of the Heine Safety Boiler Company, St. Louis; Chas. M. Jarvis, president of the Berlin Iron Bridge Company; Daniel Simonds, of the Simonds Manufacturing Company, Fitchburg, Mass., and Hollon C. Spaulding, general manager of the Thomson Monster Elevator Company.

Panama Canal Accounts.—The report of the liquidators of the Panama Canal Company has been presented to the Tribunal of the Seine. According to the report the total expenditures of the company thus far amount to 1,373,000,000f. The assets, on March 3, were 16,000,000f.

MacIvor's White Lead Process.—The latest worker in this field is Mr. R. W. Emerson MacIvor, M. A., F. I. C., who has devised a process of great chemical beauty, based on the fact that lead oxide is rapidly acted upon by a cold solution of ammonium acetate, with formation of hydrated oxide and basic acetate of lead. By the passage of carbonic acid through the mixture, the hydrate and acetate are converted into a basic carbonate, and ammonium acetate is re-formed with theoretically no loss. There is thus a cycle of operations. The two raw materials, lead oxide and carbonic acid, are present in the finished product, while the ammonium acetate is used over and over again. The process has been in operation on an industrial scale for the past nine months. The process being a wet one, and conducted in the cold, there is an absence of the fine poisonous dust unavoidable in the Dutch method. It is proposed to make a further step in the way of economy by replacing the lead oxide used as raw material by carbonate ore, which would be calcined at a moderate heat, yielding carbonic acid and lead oxide. From the moment the ore enters the furnace to be calcined, until it reaches the washing vat in the shape of white lead, a period of eight to 12 hours elapses, while with the Dutch process three to four months are required. There are no traces of crystals in the finished product, and the cost of this product is at least £2 per ton less than the metallic lead with which the Dutch process starts. Mr. Watson Smith estimates the cost of a ton of white lead made by this process at £11 13s. 5d., while white lead cannot be made by the Dutch process at less than £18 per ton.

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

- The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent Office:
- PATENTS GRANTED TUESDAY, JULY 1ST, 1890.
- 431,026. Process of Manufacturing Red Lead. Meinhard Alberg, New York, N. Y.
 - 431,028. Pipe or Tubing. James C. Bayles, East Orange, N. J.
 - 431,030. Apparatus for Transmitting Motion. William C. Boone, Brooklyn, N. Y.
 - 431,039. Apparatus for Transmitting Motion. William J. M. Dobson, Brooklyn, N. Y., Assignor to William C. Boone, same place.
 - 431,041. Machine for Making Tubes. Michael E. Fitzpatrick, Bridgeport, and William Geddes, Waterbury, Conn.
 - 431,044. Process of Making Antimony Fluorides. Oscar O. B. Froelich, Jersey City, N. J.
 - 431,063. Car-Coupling. Marion C. Lankford, Florissant, Colo.
 - 431,066. Clutch for Connecting and Disconnecting Shafts. Gabriel Leverich, South Orange, N. J.
 - 431,069. Stone Crusher. George Lowry, Northampton, County of Northampton England.
 - 431,087. Stop for Hydraulic Motors. Isaac H. Venn, Yonkers, Assignor to Otis Brothers & Co., New York, N. Y.
 - 431,121. Friction Clutch. Edward A. Muller, Cincinnati, O., Assignor to the Bradford Mill Co., same place.
 - 431,131. Apparatus for Drilling Wells. Wesley Webber, Pittsburg, Pa.
 - 431,144. Hand Rock Drill. Simon Ingersoll, Glenbrook, Conn., Assignor of one-third to Edward T. Bromfield, same place.
 - 431,156. Water Motor. Henry T. Trumble, Kalamazoo, Mich.
 - 431,172. Railway Support and Cross Tie. James M. Price, Philadelphia, Pa.
 - 431,179. Rolling-Mill. John H. Bickley, Dover, N. J.
 - 431,180. Duplex Valve for Pumping-Engines. Marshall T. Davidson, Brooklyn, N. Y.
 - 431,209. Friction Clutch. John J. Hayes and Oren S. Feleh, Brooklyn, N. Y.
 - 431,213. Electric Motor for Railway Cars. William M. McDougall, East Orange, N. J.
 - 431,231. Feed Water Heater and Purifier. George F. Lynch, Milwaukee, Wis.
 - 431,232. Conveyer. Fredrick H. C. Mey, Buffalo, N. Y.
 - 431,237. Apparatus for burning hydrocarbon oil as fuel. John P. Swift, Wood's Holl, Mass.
 - 431,239. Mining Machine. John M. Walter, Peoria, Ill.
 - 431,253. Railway Rail Bed. Charles M. Culp, South Bend, Ind.
 - 431,261. Rolling Mill. James Hempbill and Joseph Fawell, Pittsburg, Pa.
 - 431,286. Solar attachment for transit instruments. Walter Scott, Hot Springs, S. D.
 - 431,289. Blasting Car. Andrew R. Shannon, Watertown, Assignor of one-half to Moffet, Hodgkins & Clarke, Syracuse, N. Y.
 - 431,294. Almagamator. Samuel L. Townsend, Ohio, Colo.
 - 431,313. Pneumatic Ore Concentrator. Charles Ballard, Pueblo, Colo.
 - 431,322. Hydrocarbon Oil Vaporizer and Burner. George Botsford, New Haven Conn.
 - 431,371. Steam Pumping Engine. Joseph L. Lowry, Pittsburg, Pa.
 - 431,405. River Dredge or Excavator. James M. Sherman, St. Louis, Mo.
 - 431,441. Almagamator. Henry Cook, Philadelphia, Pa.
 - 431,446. Friction Clutch. Lester D. Dana, Waupaca, Wis.
 - 431,476. Clip for Wire Ropeways. Bartlett McIntire, San Francisco, Cal., Assignor to the Vulcan Iron Works, same place.
 - 431,479. Hydrocarbon Burner. William Powell, Cleveland, Ohio.
 - 431,480. Sectional Steam Boiler. Nat W. Pratt, Brooklyn, N. Y.
 - 431,484. Protractor. Justus Roe, Patheogue, N. Y.
 - 431,492, 431,494, 431,495, 431,496. Reciprocating Electric-Engine System. Chas. J. Van Depoele, Lynn, Mass.
 - 431,505. Making White Lead. Paul Bronner, Stuttgart, Germany.
 - 431,535. Apparatus for the Manufacture of Gas. William J. Taylor, Chester, Assignor to the Taylor Gas Producer Company, Camden, N. J.
- TUESDAY, JULY 8TH, 1890.
- 431,607. Pulp-Distributor. Florencio E. Monteverde, San Francisco, Cal.
 - 431,611. Railway Rail Joint. Isaac S. McGiehan, New York, N. Y.
 - 431,623. Rolling Mill. Paul H. Sack, Duisburg, Germany.
 - 431,626. Feed Device for Rolling Mills. Charles M. Schwab, North Braddock, Pa.
 - 431,642. Journal Bearing. Sumner A. Bemis, Springfield, Mass.
 - 431,682. Device for Supplying Superheated Steam to Furnaces. Moses E. Alley, Madison, Wis.
 - 431,704. Lubricator for Steam Engines. Joseph A. Mumford, Hantsport, Nova Scotia, Canada.
 - 431,729. Air Engine. Eden Sprout, Rockville Center, and George H. Robinson and Cornelius S. Bushnell, New York, N. Y., executors of John Ericsson, deceased.
 - 431,733. Miner's Lamp Wick. Frederic M. Anton, Monongahela City, Pa.
 - 431,734. Miner's Lamp. Frederic M. Anton, Monongahela City, Pa.
 - 431,739. Hydraulic Nozzle for Water Wheels. William Buhlman, Chicago, Ill.
 - 431,747. Art of Blasting. John A. Kurtz, Pittsburg, Pa.
 - 431,748. Mode of Rolling Sheet Metal. Bernard Lauth, Howard, Pa.
 - 431,749, 431,750. Rotating Shaft. Carl G. P. de Laval, Stockholm, Sweden.
 - 431,786. Sectional Coal Truck. George A. Thompson and Daniel E. Harris, Brooklyn, N. Y.
 - 431,811. Power Transmitting Device. Edward H. Johnson, New York, N. Y.
 - 431,839. Steel or Metal Railway Tie. William Burdard, Port Jefferson, O.
 - 431,863. Centrifugal Ore Separator. Stephen D. Smith, Orlando, Fla.
 - 431,864. Apparatus for the Manufacture of Iron and Steel. Charles Adams, St. Louis, Mo., Assignor of one-half to Ralph W. Carroll and Ferdinand Protzman, Sr., both of Pittsburg, Pa.
 - 431,864. Process of Reducing Iron Ore. Charles Adams, Pittsburg, Pa., Assignor of one-half to Ralph W. Carroll and Ferdinand Protzman, Sr., both of same place.
 - 431,890. Tool for Extracting Drill-Rods, etc., from Wells. James Hart, South Strabane, Pa.
 - 431,912. Process of Making Aluminum. Curt Netto, Dresden, Germany.
 - 431,920. Apparatus for Sinking Well Pipes. Charles A. Sellon, Pike, N. Y.

DIVIDENDS PAID BY MINING COMPANIES DURING JULY AND SINCE JANUARY 1ST, 1890.

NAME OF COMPANY.	Paid in July.	Paid since Jan. 1st.	NAME OF COMPANY.	Paid in July.	Paid since Jan. 1st.
Alice, Mont.....	\$25,000	\$50,000	Horn Silver, Utah.....	\$50,000	\$100,000
Atlantic, Mich.....	60,000	60,000	Idaho, Colo.....	7,750	7,750
Aspen, Colo.....	20,000	100,000	Iron Mountain, Mont.....		25,000
Badger Ontario.....		37,500	Jay Gould.....		22,000
Bangkok-Cora Belle, Colo.....		3,000	Kearsarge, Mich.....		100,000
Boston & Mont., Mont.....		400,000	Little Chief, Colo.....		10,000
Caledonia, Dak.....	8,000	32,000	Little Rule, Colo.....		30,000
Calliope, Colo.....		55,000	Mammoth, Utah.....	40,000	240,000
Calumet & Hecla, Mich.....		1,000,000	Matchless, Colo.....		2,500
Candelaria Con., Mex.....		30,000	May Mazappa, Colo.....	10,000	10,000
Centennial-Eureka, Utah.....	15,000	30,000	Metropolitan, Mich.....		250,000
Central, Mich.....		20,000	Montana Ltd., Mont.....	40,178	141,022
Champion, Cal.....		10,000	Napa, Cal.....		40,000
Coeur d'Alene, Mich.....		20,000	New Guston, Colo.....		50,000
Cortez, Nev.....		10,000	Ontario, Utah.....	75,000	225,000
Cons. Cal. & Va., Nev.....		60,000	Oro, Colo.....		100,000
Cumberland, Mont.....		162,000	Osceola, Mich.....		150,000
Daly, Utah.....	37,500	15,000	Parrot, Mont.....		72,000
Deer Blue Gravel, Cal.....		262,500	Poorman, Colo.....		2,000
Don Enrique, Mex.....		20,000	Puzzler, Col.....		5,000
Elkhorn, Mont.....		3,000	Quicksilver Pref., Cal.....		128,739
Franklin, Mich.....		50,000	Reed & National, Colo.....	5,000	15,000
Granite Mountain, Mont.....	200,000	1,400,000	Quincy, Mich.....		120,000
Hecla Cons., Mont.....		15,000	Republic, Mich.....		100,000
Homestake, Dak.....	12,500	87,500	Silver Mfg. of L. V., N. M.....	25,000	75,000
			Tamarack, Mich.....	120,000	360,000

PERSONAL.

Hon. Abram S. Hewitt, of Cooper, Hewitt & Co., has sailed for home, and will arrive at an early date.

Mr. Joseph Lanson Wills, M. E., of Buckingham, Quebec, Canada, has returned from his extensive tour in the West Indies, and has now gone to London to confer with the organizers of the new "phosphate trust."

On and after the 13th instant offers for the sale of silver bullion in lots of not less than ten thousand ounces will be considered at the Treasury Department at 1 o'clock P.M., on Mondays, Wednesdays and Fridays of each week, instead of at 12 o'clock M., as stated in department circular of the 1st instant.

The Appeal Court at Paris has affirmed the sentence of six months' imprisonment imposed on M. Secretan for his connection with the questionable operations of the recent copper syndicate, but has reduced the fine of 10,000 francs imposed on him to 3,000 francs. The court rescinded the sentence of three months' imprisonment imposed upon M. Lavoissiere, but sustained the decision of the lower court, fining him 600 francs.

OBITUARY.

Elijah Shaw, of Annsville, N. Y., is dead, at the age of 88 years. He long carried on an iron foundry and machine shop.

Mr. N. L. Lary, of this city, died at Clifton Springs, N. Y., on the 6th inst., at the age of 65 years. Mr. Lary for 22 years past and up to the time of his death was the partner of ex-Senator Peter Ward, of Newburg, in the railroad contracting business.

Alfred Kellogg Seymour, of Utica, N. Y., died at Cottage City, Mass., on the 2d inst., aged 53 years. He was a native of Hecla, N. Y., and graduated at Hamilton College in the class of 1857. He was for some years engaged in the manufacture of hardware at the Hecla Iron Works.

William H. Adams, who was known throughout the country as a contractor, died at Elizabeth, N. J., on the 4th inst. Mr. Adams was 58 years of age. He constructed the first sewer in Elizabeth and paved many streets. Some years ago he went to Washington, where he constructed the famous P street sewer and executed other large contracts. For the past ten years he has held the contract in Washington for the cleaning and repairing of the streets.

Mr. William D. Jones, of Philadelphia, Pa., died at Bedford Springs, Pa., on July 23d. He was born in Kentucky in 1847, near Middlesboro, and was identified with the railroad interests of the South and Southwest. Mr. Jones, with his brothers and sisters, owned the entire site of what is now the town of Middlesboro. Two years ago he sold 1,000 acres covering this site to an English syndicate for \$300,000. Mr. Jones was also the founder of the town of Big Stone Gap, Virginia, which is the center of a rich mineral region.

INDUSTRIAL NOTES.

Hecla Furnace, of the Hecla Iron and Mining Company, at Ironton, O., which has been undergoing repairs for some time, was put in blast last week.

The Shenandoah Furnace Company, of Shenandoah, Va., has increased its capital stock from \$250,000 to \$500,000, and will begin the erection of a merchant mill as soon as possible after approval of plans.

Messrs. J. F. Turner and E. J. Wright, of Dadeville, Ala., and Mr. William Gray, of Birmingham, are reported to have bought about 2,000 acres of mineral lands around the town of Kellyton, and will open mines.

The stone barn of the Thomas Iron Company, at Hokendauqua, Pa., was burned at midnight on the 5th inst., and with it all the patterns accumulated for 30 years. The fire is believed to have been incendiary. Loss, \$35,000.

About 300 men went out on strike at the Carbon Iron Works, at Pittsburg, Pa., on the 4th inst. There was a dispute pending between the firm and the puddlers, and when eight of the 16 furnaces were started with colored men the rest of the employes struck.

The Tyler Tube and Pipe Company are about ready to start their tube and pipe mill, recently erected at Washington, Pa. They will make their own skelp iron, having put in an 18-inch, 3-high Garrison roll train for that purpose. The firm is erecting a number of dwelling houses near the new works to be occupied by the workmen.

The City Council of Galveston, Tex., has set apart \$25,000, which sum, or so much as may be necessary, is to be expended in boring an artesian well at some point in the city not yet decided upon. This well is to be in the nature of an experimental one; that is, it is intended to go down (starting with a 12-inch or larger pipe) at least 2,500 feet or further, until a vein of good water is struck.

Ella Furnace, of the Wheeler Furnace Company, at West Middlesex, Pa., is undergoing repairs at present that will cost about \$40,000. Workmen are engaged in tearing down the hot blasts and removing the machinery, which will be replaced by two new blowing engines and two hot blast stoves, to be erected by J. P. Witherow, of Pittsburg. The furnace will not be ready to resume operations before November next.

Carnegie, Phipps & Co., Limited, of Pittsburg, have abandoned the making of merchant steel at their Beaver Falls mills for the present. This has been done for the purpose of concentrating the work of the various departments, it having been found to be more profitable to make the merchant steel at their Upper and Lower Union Mills in Pittsburg, instead of making it in Beaver Falls and also in Pittsburg.

The Oliver & Roberts Wire Company and the Pittsburg Wire Nail Company have consolidated their interests, and will be known to the trade hereafter as the Oliver & Roberts Wire Company. The new concern is chartered under the State laws of Pennsylvania. The officers are: H. W. Oliver, president; George T. Oliver, vice-president; W. H. Cassidy, treasurer; Stephen W. Tener, secretary; Henry Roberts, general superintendent.

The Steel and Iron Improvement Company, of Pittsburg, is erecting an experimental furnace in the Black Diamond Steel Works of Park Bros. & Co., Limited, in that city, for making steel direct from the ore by the Adams process. The process is controlled by the first-named company, and has been tried at the works of the Premier Steel Company at Indianapolis, Ind., with what is claimed to be very satisfactory results.

Cutting the Continental Divide of the Rocky Mountains, on the line of the Colorado Midland Railway, which, when completed, will be the third largest tunnel in the United States, is now likely to be pushed with vigor to an early finish, the contract having been finally let to Mr. M. H. Keefe, of Helena, Mont. The complete double outfit of tunneling machinery, boilers, air compressors and rock drills are to be furnished by the Ingersoll-Sergeant Rock Drill Company, 10 Park Place, New York.

It is reported that the interests of the Trumbull Iron Company, owner of a rolling mill at Girard, and also the Warren Mill, at Warren, and those of the Youngstown Rolling Mill Company, at Youngstown, O., will be consolidated. The stockholders of these mills have had the matter of consolidation under consideration for some time, and it will probably take place soon. If the change is made, it is proposed to have the main office at Youngstown, and transact the business at that place. It is also proposed to make Henry Wick manager of the three mills.

A press dispatch says that the members of the Board of Control of the Steel Rail Manufacturers' Association of the United States held their annual meeting at Long Branch, N. Y., on the 7th inst. At the close of the meeting a member said the conference showed that the market was firm at present prices, and the indications were that prices would advance rather than decline. The aggregate sales for the seven months ending August 1st showed an increase of 125,000 tons over the sales of the corresponding time last year. The mills all had work enough to keep them busy for the next sixty or ninety days. A radical advance in prices, he said, was hardly to be expected.

The Baldwin Locomotive Works, of Philadelphia, Pa., have recently completed, or are now building locomotives weighing 150,000 pounds each for the Northern Pacific, Philadelphia & Reading, Cornwall & Lebanon, Pennsylvania & Northwestern, Central of New Jersey, St. Paul, Minneapolis & Omaha, and Wilmington & Northern railroads. The use of these locomotives is rapidly extending, and the only obstacle to their immediate introduction on many roads is the insufficient strength of bridges. A large proportion of the work in hand is for export. Three locomotives for the railroad from Jaffa to Jerusalem, in Palestine, were recently shipped. Three compound express passenger locomotives are building for a broad gauge railroad in Brazil, and one narrow gauge 10-wheeled compound freight locomotive for the Mexican National Railroad. The orders which the firm has will keep the works fully occupied from five to six months.

CONTRACTING NOTES.

The Taunton Locomotive Works, of Taunton, Mass., have made a contract with the Wainwright Manufacturing Company, of Boston, to construct steam heaters for the latter company for a period of one year. Negotiations have been pending for three months, and are only just completed.

Wm. Swindell & Bros., Pittsburg, Pa., have just completed two of their heating furnaces with beds 6 feet 6 inches by 14 feet, and four of their gas producers, for the Montreal Rolling Mill Company. They have closed a contract with the Dominion Bridge Company for a complete gas producing plant of the most improved design. They have put in operation one gas heating furnace for the Chrome Steel Company, Brooklyn, and one of the

same pattern for the Phoenix Horseshoe Company, Poughkeepsie, N. Y., and have contracted with Sanderson Brothers' Steel Company, Syracuse, N. Y., for one 30-foot steel melting furnace and four gas producers.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If anyone 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.

- 990. A second-hand mill for crushing ore. Colorado.
- 991. A 60 H. P. Corliss engine. Texas.
- 992. Hoisting machinery for sinking a shaft 500 feet deep. Montana.
- 993. Estimate on a small ferro-manganese plant. Georgia.
- 998. Machinery for a saw mill, sash and door factory; also planing and matching machine. Florida.
- 999. Lathe for crank handles, wood gauge lathe and bolting saws. Tennessee.
- 1,000. 100 hydrants for water-works. Pennsylvania.
- 1,001. A complete saw mill outfit to saw 50,000 feet yellow pine per day. Georgia.
- 1,002. Everything necessary to build and equip three-fourths of a mile of horse car street railway. Tennessee.
- 1,003. A complete outfit for water-works. Georgia.
- 1,004. Electric light machinery. Georgia.
- 1,006. A small second-hand safe. New Jersey.
- 1,007. A good second-hand engineer's transit. North Carolina.
- 1,011. A 15 horse-power engine and 20 horse-power boiler. Alabama.
- 1,012. A 20-inch lathe, 10 feet between centers; an 18-inch lathe, seven feet between centers and a 24 x 24 x 6 planer. Alabama.
- 1,013. A bolt and pipe cutter, and a 24-inch drill back gear. Alabama.
- 1,014. All kinds of wagon and carriage material. Florida.
- 1,015. Correspondence with reliable parties able to furnish hand and steam fire engines. South Carolina.
- 1,016. Planer, lathe, and picket machines. Tennessee.
- 1,017. Machine lathe with 36-inch or 40-inch swing, that will take from 12 to 14 feet between centers. Ohio.
- 1,018. A first-class second-hand Corliss engine of about 150 horse-power. Minnesota.
- 1,019. Estimates for lighting a town of 1,700 inhabitants with electric lights. Georgia.
- 1,020. Engine and boiler. Tennessee.
- 1,021. A new or second-hand engine for immediate service in laying track and other construction purposes. Kentucky.
- 1,022. Two 75 horse-power or one 150 horse-power automatic engine, two 100 horse-power tubular boilers, and wire rope or other transmission of power; machinery for wheel mills (8 to 10-ton wheels), corning mills, making powder kegs (sheet iron), and grinding damp nitrate soda fine; boiler iron retorts and furnaces combined for making charcoal; also steam pumps. Ohio.
- 1,023. Ammonia machinery. Georgia.
- 1,024. Prices on machinery to manufacture cheap furniture, sash, doors and blinds. Georgia.
- 1,025. Shafting, pulleys, emery wheels, blast blowers, tuyere irons, etc. Alabama.

AMERICAN GOODS WANTED ABROAD.

- 982. Salmon, oysters, butter, lobsters, preserved fruits in one-pound tins; also American asparagus in ordinary sized tins. Chili.
- 983. Condensed milk, cheese in the English cheddar system (finest), cooked ox tongue, compressed corn beef, and candles in packages. Chili.
- 984. Hams and bacon of finest quality. Chili.
- 985. 1,000 Mason patent glass jars to hold two pounds net of preserves, to be packed in cases of 50; each jar to be encased with wood or paper wrapper, which will be supplied by us. Cases to be neatly made of one-inch white pine something like butter cases. West Indies.
- 986. Quotations net f.o.b. for nests of trunks,

20, 24, 28, 32 and 36 inches long, in lots of 25 to 50 nests. West Indies.

987. White mountain hanging hammock chairs in lots of 20. West Indies.

988. India rubber stamps. West Indies.

989. Quotations f.o.b. New York on complete plant for canning (especially fish); want list of everything needed, such as boilers, engine, kettles, machines for making and soldering cans, making boxes, etc. Republic of Colombia.

994. Catalogues, price lists, etc., of electrical lighting and motive power machinery. Mexico.

995. Shoes, dies and other fittings. Mexico.

996. An 80 H. P. Corliss improved engine. Mexico.

997. Small ice machines for family use. Mexico.

1,005. Contractors wanted for rebuilding 1,500 houses in iron and brick, which latter is made here. Martinique.

1,008. Prices and particulars of a plant for a meat canning factory. Canada.

1,009. Prices and particulars of a plant for a beet sugar factory. Canada.

1,010. Prices and particulars of a plant for a tannery. Canada.

GENERAL MINING NEWS.

The Assistant Secretary of the Treasury has replied to an inquiry from the manager of the St. Helena Smelter, Trinidad, Colo., stating that copper ore cannot be imported in bond for smelting and exportation of the resulting matte or blister copper without the payment of duty, and that no drawback can be allowed on the exportation of copper matte or blister copper, as such product is not, in the opinion of the department, a manufactured article within the meaning of the law.

ARIZONA.

COCHISE COUNTY.

SILVER KING MINING COMPANY.—Superintendent J. O. Groves makes the following report for the week ending July 26: The face of the northeast drift on the 980 level is in porphyry. The total length is 137 feet. The advance is 14 feet and a force of four miners was employed. The bottom of the Bilk shaft is in hard porphyry with small seams of quartz running through it. The total depth below the 980-foot level is 55 feet. The number of feet sunk during the week was 12. A force of nine miners was employed. Tailings worked in pans, assay value, 10½ oz.

Bullion on hand:
269 lbs. value \$2,400
600 lbs. amalgam value 900
Total on hand \$3,300

CALIFORNIA.

AMADOR COUNTY.

AMADOR GOLD MINE.—At this mine, says the San Francisco Post, things are running along smoothly. The mill is kept going, with from 40 to 50 stamps in motion. The sulphurets, of which the rock turns out considerable quantities, are said to be of high grade.

NEVADA COUNTY.

IDAHO MINING COMPANY.—It is now said on the authority of Superintendent Coleman that the big deposit of ore recently found on the 1,700 level of the Idaho mine at Grass Valley does not go up. Whether it goes down or not is a matter of development.

SAN BERNARDINO COUNTY.

It is reported that an English syndicate called the San Jacinto Estate, Limited, has bought the old San Jacinto tin mine and 50,000 acres of land, and a press dispatch says that it is asserted that the company will put up a plant at a cost of \$250,000, open up the mines, build dams, and establish a mining town on a big scale. It is claimed that there are over 50 tin-bearing veins on the property, and the ore is said to contain 10 per cent. of tin. The property was in litigation for 23 years and the title was not settled until 1883. In the directorate of the syndicate appear the names Lieut.-Gen. Sir John Stokes, J. R. Frances, of Swansea, and N. J. West, of Cornwall. The purchase price of the property was \$400,000, and the capital of the company is fixed at \$2,525,000. There are 500,000 shares of stock, which is to be unloaded on the general public at \$5 a share. Debentures will be issued at 8 per cent. to the amount of \$625,000, payable in five years.

A telegram from San Francisco says that the sale of the San Jacinto property was completed on the 6th inst., by the first payment of \$350,000 cash through the Bank of California, and the deed was delivered to the purchaser, the San Jacinto Estate Company, of England.

SHASTA COUNTY.

IRON MINE.—This mine was abandoned some years ago by a company that bankrupted while trying to develop it. Recently it was reopened, and last month's clean-up amounted to \$24,000. Improved methods of mining and milling have made the difference between profit and loss.

GEORGIA.

BARTOW COUNTY.

GEORGIA MANGANESE AND IRON COMPANY.—Near Emerson a tract of nearly 400 acres of manganese and iron lands has been purchased by this company, which will develop the property.

IDAHO.

SHOSHONE COUNTY.

ST. JOE PLACER MINING COMPANY.—Articles of incorporation of this company have been filed at Helena, Montana. The incorporators are John F. Firch, president; Harry U. Doering, vice-president; C. D. Henderson, secretary; John M. Howard and H. B. Thomas, all of whom constitute the board of directors for the first three months. Its place of operation is on the St. Joe River, about 25 miles from Superior, Mont., where the company owns a tract of 360 acres of ground. The ground taken up comprises a basin four miles long and a side gulch one and a half miles long. There being a great abundance of water, even in a dry season, the company, it is said, will work the mine with hydraulic machinery. It is the intention of the management to put in a bedrock flume at the mouth of the basin where the bedrock shows, and where some men made a few dollars in gold dust per day by a crude way of working the ground. Higher up in the basin on the rim rock, as much as \$20 per day per man was made with a rocker, and the deeper into the basin they went, the richer it grew. The original workers could not go deeper than the top level of the basin on account of the water, which could not be kept down even with horse-power. The ground is free from boulders and is of a regular placer gravel, easily worked. All the side streams running into the basin carry gold and have been located. The company has been incorporated with a capital stock of \$1,000,000, consisting of 500,000 shares at \$2 each, 225,000 of which are set aside as treasury stock.

MICHIGAN.

COPPER MINES.

The St. Mary's Canal Mineral Land Company in a circular announces the sale of 960 acres of its land to the Pacific Copper Company, now being organized, for which it is to receive 20,000 shares of Pacific Copper Company's stock, with \$10 per share endorsed as paid, and the further consideration that an additional 20,000 shares, to be sold at \$10 per share to provide means for development, shall be offered to its stockholders. It is estimated that an expenditure of about \$30,000 will be sufficient to test the Atlantic lode, which is known to traverse the section embraced in the Pacific Company's property. The total cost of opening and equipping the mine with modern machinery over and above the cost of the land will be about \$500,000. The stock now to be sold will yield \$200,000, and the balance will be obtained either by the sale of treasury stock, of which there will be 10,000 shares, as stated above, or by assessment on the 40,000 shares of issued stock. Stockholders of the St. Mary's Canal Mineral Land Company, at the close of business August 2d, 1890, are entitled to subscribe at \$10 per share for as many shares of the Pacific Copper Company's stock as they hold in this company. Payments to be made to the treasurer of the Pacific Copper Company as follows: Two dollars per share September 15th, 1890, and the remainder as called for, not earlier than January 1st, 1891, and not more than \$4 per share to be called in any one month. No subscription will be received after September 1st, 1890, and any part of the stock offered, which may not be subscribed for in response to this circular, will be taken at the same price, under an agreement made with several of our large stockholders.

ALLOUEZ.—One hundred and twenty-six tons of mineral were produced in July and 135 tons in June, and 136 tons in July a year ago, a total of 389 tons from January 1st, against 845 tons last year.

ATLANTIC.—This mine had a mineral product in July of 207 tons, a gain of three tons over June and loss of four tons from last year. This makes 1,397 tons this season and 1,513 last season.

CALUMET & HECLA.—This mine yielded 3,531 tons of mineral in July, compared with 3,396 tons in June, and 2,830 in July, 1889, making 23,514 in 1890 and 19,704 in 1889.

FRANKLIN.—This mine's mineral product in July, 246 tons, compares with 238 tons in June and 201 tons in July of last year, a total of 1,499 tons this year and 1,337 tons last year.

KEARSARGE.—This mine produced 71 tons of mineral in July, a decrease from 86 in June and 97 tons in July of last year, making 591 tons this year and 664 last.

OSCEOLA.—The mineral output of this mine in July was 230 tons, against 230 in June and 206 in July, 1889, making 1,605 tons for the year, against 1,397 tons.

PENINSULA.—This mine's mineral output was 52 tons in July, and 66 in June and 61 tons in July, 1887. This swells the total for the year to 479 tons, nearly all a gain.

MISSOURI.

JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, Aug. 4.

The sales of zinc ore, for the week ending Saturday, were rather light in comparison to the amount produced, owing to the prices offered by the ore buyers being unsatisfactory to the mine operators. There is a good demand for spelter in the Eastern

markets, and what this district now requires is more smelting capacity, as the district can produce more crude ore than the present smelters can handle, many smelting schemes have been talked up for the district, but they do not seem to materialize.

The following is the amount of ore sold from the different camps during the week: Joplin mines, 1,424,057 pounds zinc ore and 164,650 lead, value \$20,630.

Webb City mines, 737,180 pounds zinc ore and 54,300 lead, value \$9,781.76.

Cartersville mines, 841,080 pounds zinc ore and 44,090 lead, value \$10,905.11.

Zincite mines, 157,600 pounds zinc ore, value \$1,883.

Lehigh mines, 80,000 pounds zinc ore, value \$1,040.

Carthage mines, 225,000 pounds zinc ore and 8,000 lead, value \$4,965.

Galena, Kan., mines, 546,000 pounds zinc ore and 100,000 lead, value \$8,556.

All districts total value, \$57,769.87.

Mayor R. B. Tyler has sold a one-half interest in a lease on 40 acres on the Judge Norton land lying east of the city to Robert Evans, of Tennessee.

The Anderson Lead and Zinc Company has commenced active development on the Webb tract of land just north of the famous Furgeson mines west of Joplin. Should they open up as large ore bodies as the Furgeson land, the cave springs district will become famous.

The Educators Mining Company, organized by W. A. Nickle and others, will begin prospecting in Jay Bird Hollow, east of Joplin, to-day.

The J. H. Wasson Lead and Zinc Company has just purchased forty acres of undeveloped land near the famous old Cox diggings, and will commence active developments at once. The company is composed of J. H. Wasson, F. M. Dice, and P. C. Somerville of Indiana.

Almost all the treasury stock of the 1,000 acre Lead and Zinc Company is said to be taken, and developments will soon commence.

The Petre Mining Company is running along smoothly and keeping up a steady output.

Mr. John N. Wilson, an old-time Joplin mine operator, has just returned from an extended trip throughout the Western States and Territories. He says that the lead and zinc mines of this district are good enough for him.

Geo. H. Huchison & Co. have just sold a forty-acre tract of land three miles east of Joplin to a party of Texas cattle men, who propose to dig for lead and zinc.

D. Boaz, of the Great Western Lead and Zinc Company, was in the city last week looking after his numerous mining interests.

Mr. F. S. Hammond, an old-time Montana mine operator, called at the JOURNAL office to learn something about the lead and zinc mines.

Mr. W. C. Fletcher, an expert electrician of St. Louis, Mo., is in the city, building dynamos for the electric plant now being put in at Webb City by W. M. Leckie, manufacturer of mining machinery.

Mr. O. B. Steen, of the firm of Chas. Matt & Co., has just returned from an extended trip through the East.

MONTANA.

UNION SMELTING AND REFINING COMPANY.—Arrangements have been completed whereby the Helena and the Great Falls smelters and the Chicago refining works all pass under the control of this company, which is a new corporation. The consolidation of these interests, says the Butte Miner, means not only a union of the capital of the old companies, but the accession of new capitalists to the business. The company will have a capital stock of \$400,000, which will be increased as may be rendered necessary with the extension of its business.

Among the stockholders are the Seligmans, Abram S. Hewitt, Edward Cooper, Walter S. Gurnee and others, of New York and other Eastern cities, and ex-Governor Hauser, A. J. Seligman and other Montana capitalists, who have held large interests in the Helena works. The president of the new company is W. S. Gurnee, of New York; O. R. Allen, vice-president, and Harry Child, manager. Mr. Allen is to have special charge of the Helena smelter, and Mr. Child will be in charge of that at Great Falls.

All the conditions attending the new arrangements are reported to be most favorable. The new company takes hold with the backing and co-operation of the railroads. Mr. Oakes and the management of the Northern Pacific have made all the desired revisions of the tariff schedules, so as to enable the smelting business in Montana to compete with Colorado.

DEER LODGE COUNTY.

COMBINATION MINING AND MILLING COMPANY.—According to the recently issued annual report of this company, whose mines and works are located near Philipsburg, the total returns from the sale of the bullion and concentrates received during the year amount to \$177,515.90, and the value of bullion in transit for which returns have not been received is \$31,027.14, making the total net value of the year's output \$208,533.04. The average price which the bullion netted for the year was 94½ cents per fine ounce. The present credit to the company is \$30,961.27, of which \$3,632.75 was the balance at the beginning of the year, leaving \$22,328.43 as the year's profit.

The value in bullion *en route*, supplies on hand, live and rolling stock, buildings erected, machinery purchased and cash on hand at end of year was \$77,622.12, then deducting home department account and outstanding indebtedness, \$30,961.23 is left as net profit. The actual gain in assets and value of the plant and equipment for the year is largely in excess of the profit, as shown by the balance sheet. This gain for the year is shown to be \$32,616.22. Considering the fact that the hoisting plant and much other property of the company were destroyed by fire during the year, the report shows the affairs of the company to be in good condition.

LEWIS & CLARKE COUNTY.

UTAH AND MONTANA MINING COMPANY.—Articles of incorporation of this company have been filed at Salt Lake City, Utah. The company is formed for the purpose of conducting a general mining and milling business, and owns the Mountain Queen and Charles Rathbone mines. The capital stock is placed at \$1,000,000, divided into 200,000 shares of the par value of \$5 each. The officers are T. W. Wampler, president; A. B. Sawyer, vice-president; M. N. Rathbone, treasurer and secretary.

NEVADA.

STOREY COUNTY—COMSTOCK LODGE.

Following is a statement of the total ore and bullion yield of the Comstock lode mines during the quarter ended June 30th, 1890, compiled from the sworn statements of superintendents, now on file in the County Assessor's office:

	Tons.	Bullion.
Con. Cal and Virginia.....	35,485	\$512,879.27
Savage.....	6,178	90,912.40
Hale & Norcross.....	13,233	85,749.81
Con. Imperial.....	212	3,217.60
Overman.....	4,233	75,943.22
Crown Point.....	9,960	137,362.35
Justice.....	2,333	54,114.59
Alta.....	4,200	50,148.39
Chollar.....	5,881	97,914.94
Yellow Jacket.....	4,801	65,608.38
Challenge.....	750	10,338.28
Confidence.....	98	1,292.69

NEW MEXICO.

SANTA FE COUNTY.

SANTA FE COPPER COMPANY.—The *New Mexican* devotes four columns to a publication of Consulting Engineer F. M. F. Cazin's report of May 25th last on the Santa Fe copper mine, and to a review by him of Capt. John Daniell's report on the same property. We extract the following: "There is nothing the matter with the Santa Fe Copper Company's copper and gold mine that would appear as a justification for ceasing its energetic operation. Much costly work has been done, the uselessness of which might have been known beforehand; and other work has been omitted, the absolute necessity of which would have been evident to competent management at a very early period of the mine's operation. In this regard it may be simply said that all the work, specially in the mine, has been done in following ore streaks right from the surface, while all and any attempt to uncover other or new ore bodies where they must reasonably be supposed to exist has been omitted. With all this, such as the mine is to-day, ore can be broken sufficient to produce therefrom on an average 2½ tons of copper per day. But most of this ore will require mechanical concentration. While I therefore would advise an energetic resuming of such an operation of the mine as will both produce ore and prepare new stoping ground, I would recommend to delay the starting of the furnaces until provision be made for a concentration plant, of limited capacity, near the furnaces, so as to handle such part of the present mine production as will require concentration. Such a smaller plant can be erected within a few weeks, and operations of the furnaces need not be delayed until a large concentration mill be erected for also treating the accumulated low-grade ores, being the refuse from former operation, or such ores as may be considered too low for treatment with the limited capacity of plant now immediately required." Mr. Cazin was of opinion that the product could easily be made five tons of copper per day if ample funds and able management were provided at the mine.

PENNSYLVANIA.

COAL.

A telegram from Mt. Carmel reports unusual activity in that section in opening up new coal works. A contract has just been awarded for the erection of a mammoth breaker on Big Mountain. Another structure, with a daily capacity of 1,500 tons, is to be completed by the Midvalley Coal Company by the first of next year. The new operations will employ 1,500 hands.

A dispatch from Irwin says that the strike at the gas coal mines in the district at Westmoreland and the Penn Gas Coal companies is still on. The companies, on the 5th inst., ordered all tools of the strikers to be removed from the mines. A large mass meeting was held near Irwin and resolutions passed to remain out. About 1,000 men are out.

READING COAL AND IRON COMPANY.—This company has put into operation the first of the four new collieries the construction of which was begun about two years ago. The output from this

breaker will add 250,000 tons a year to the business of the road. Three more collieries are expected to be finished and in operation by April 1, 1891. When finished the four new breakers will enable the company to increase its production of coal about 1,000,000 tons per annum.

OIL.

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

	1890.	1889.
	Gals.	Gals.
From Boston.....	1,035,159	2,753,649
Philadelphia.....	83,240,266	80,774,684
Baltimore.....	6,680,364	2,682,564
Perth Amboy.....	8,388,698	11,091,395
New York.....	235,890,030	248,298,687
Total.....	335,884,517	345,631,279

SOUTH DAKOTA.

PENNINGTON COUNTY.

HARNEY PEAK TIN MINING COMPANY.—The incline shaft of the Coats Tin mine at Hill City has reached a depth of 145 feet. The first level was opened at a depth of 76 feet below the surface, from which drifts have been run a distance of 145 feet along the vein each way from the shaft. Three hundred feet of the lode is here exposed with well defined walls in ore the entire distance, the vein carrying from five to nine feet in width. The second level has also been opened 126 feet below the surface. The 145 feet of shaft and 440 feet of tunnel disclose 40,000 tons of good milling ore in sight in the mine, and 2,000 tons of assorted ore on the dump. The mine is equipped with a No. 10 Knowles' pump, an air compressor for power drilling and two 15-horse power reversible engines with the necessary boilers and attachments all inclosed in a substantial building over the shaft. A large amount of machinery, hoisting engines, air compressors, etc., was put in last year, and more is being put in this year.—*Exchange.*

UTAH.

SUMMIT COUNTY.

LACKAWANNA COAL COMPANY.—Articles of incorporation of this company have been filed. The corporation is formed for the purpose of carrying on a general coal mining business. It owns 160 acres of coal land, of the value of \$256,000. The capital stock is placed at \$250,000, divided into 250,000 shares, of the par value of \$1 each. The principal office is in Salt Lake City. The officers are: T. C. Aldrich, president; J. S. Salmon, vice-president; C. B. Aldrich, general manager; W. W. Aldrich, secretary and treasurer. The company is to exist for a period of fifty years.

ONTARIO SILVER MINING COMPANY.—The eastern drain tunnel has reached a distance of about 5,200 feet or about one-third of the length to be run, which is nearly three miles. It is still the intention of this company to sink the No. 2 shaft to a depth of 1,560 feet, which will be the tunnel level, and then drift ahead to hasten the completion of the big tunnel. The work of straightening the lower part of the shaft has commenced, and when this work is finished, sinking the other 200 feet will likely be resumed. The new compressor, which is capable of running 28 drilling machines, is ready for use.

FOREIGN MINING NEWS.

BRITISH COLUMBIA.

(From our Special Correspondent.)

NELSON, July 31.

HOT SPRINGS DISTRICT.

AYESHA AND NEOSHO.—These two claims are likely to be among the great ore producers of the camp. The former is a contact between lime and schist and runs in a northerly and southerly direction. The width of the ore body is undetermined, but must be considerable, judging from the outcrop. The shaft is only 25 feet deep, but discloses a fine body of solid galena, carrying 35-40 ounces in silver and 60-70 per cent. lead, as well as a small quantity of copper pyrites. The Neosho was discovered last fall, and shows a two-foot body of high-grade ore, carrying blende, copper pyrites, ruby silver, native silver and silver glance. The clean ore assays as high as 605 ounces in silver.

COLUMBIA MINING COMPANY.—This company has been organized by Brickell & Herb, of Spokane Falls, to open up and develop the Eden, Protection, Coronation, Crescent, Lakeview and Black Chief claims. The property extends in a continuous line for nearly two miles, showing galena and "carbonate" ore in many places, but no depth has yet been attained on any of the claims.

FOURTH.—This claim, located on the 4th instant, now shows a promising ledge of galena and "carbonate" ore nearly 10 feet wide. Two assays gave \$78 and \$392 per ton.

KOOTANIE TRADING AND SMELTING SYNDICATE.—The purchases made by this company last week included the Number One mine, the United claim, a two-thirds interest in the Great Eastern, and a one-half interest in the Jessie R. claims. More development has been done on Number One than on any other claim at Hot Springs, and a large

quantity of ore has been shipped from the mine. The ore-body occurs in grey limestone (often shaly), runs about N 15° W, and is pockety in character. The ore is chiefly composed of galena and blende, with a little iron and copper pyrites, wire and ruby silver. The gangue is sometimes quartz, sometimes siliceous limestone. The continuity of the ore-body in depth is an open question. At the present time there is more than 400 tons of ore on the dump which will assay from 40 ounces in silver upwards.

The United was discovered last summer, and only a little work has been done on it. A six-foot vein—apparently a true fissure—of fine and coarse-grained galena has been exposed, but the silver contents are not high. Work is being done on this claim and the Number One.

The Jesse R. and the Great Eastern are undeveloped, but promising prospects near the Number One.

LADY OF THE LAKE.—The ledge has been tapped by the tunnel, and the showing is so favorable that further development is the order of the day.

NELSON DISTRICT.

EAGLE CREEK GOLD MINING COMPANY.—The ledge at the Poorman has improved considerably of late, and the force of men at the mine has been increased. Some of the owners are wisely considering the idea of tunneling into the hill at the lowest available point, so as to tap the vein much below the present level.

FORTY-NINE CREEK.—A hydraulic plant is being placed on this creek, and with every probability of success. The gold is coarse, and seems to occur in more than paying quantities. There is an ample supply of water and the fall is good. The bench is about 25 feet deep and can be easily worked.

PACIFIC BULLION MINING COMPANY.—Two of the claims which figure as this company's property—viz., the Water Jacket and the Grey Eagle—are in the Nelson District, the other two being at the Hot Springs camp. For the benefit of investors in the company's stock it may be added that there are no less than six sets of stakes on the Water Jacket, so that the ownership of the claim is open to question. The claim was originally located by L. C. Dillman, of Spokane Falls, but he failed to re-record it this spring, although he paid a man to attend to the business for him. Since then five other records of the property have been made. The Grey Eagle is at present a prospect of unknown value.

TOUGHNUT.—This claim joins the Water Jacket on the east and is regarded as a valuable property. Work has been recommenced on it and will be mainly confined to sinking the shaft now down 40 feet. Much headway will not be made on the tunnel until a wagon road has been constructed from Nelson to bring machinery to the mine. The vein is about 4 feet wide. The ore consists of galena, iron and copper pyrites, blende and tetrahedrite, while the gangue is made up of quartz, dolomite, and much shattered and mineralized rock matter.

TRAIL CREEK.—The discovery of ore on this creek, referred to in the *ENGINEERING AND MINING JOURNAL* of July 19th, is likely to prove more important than was then anticipated. For two or three claims were located near the creek a few years ago, but no development work was done. This spring, however, large deposits of ore were discovered a mile or so north of the former locations, and upward of 20 claims have been recorded. The ledges—at present five in number—are in all probability true fissure veins. They occur in syenite, have an easterly and westerly course, and are often of considerable width—20 feet and upward. The ore is for the most part refractory, carrying more or less antimony, lead, copper, zinc, iron, manganese, etc. The bulk of the ore runs well in gold (\$25, \$31, \$40 per ton), and low in silver (3 oz., 6 oz., 8 oz.), but the Homestead and a few other claims show ore carrying more value in silver (31 oz., 62 oz.), than in gold (\$11.20, \$12.80). Development is being actively prosecuted, and prospectors are beginning to overrun the country. The claims are well situated for stipping purposes, it being only four miles to the Columbia River, by means of which communication is made with Colville, Spokane Falls or Revelstoke. Application has already been made for permission to purchase 320 acres of land on each side of the Columbia—for real estate purposes, of course—and the nucleus of a mining town will soon be seen there. The present locations are 5½ miles up Trail Creek on the west side of the Columbia River, about 30 miles south of Sproat's Landing, and 12 miles north of the international boundary.

WEST KOOTANIE DIVISION.

Considerable activity prevails at the Hot Springs camp and on Trail Creek. Nelson is rather quiet. The chief want of Hot Springs has been cheap transportation for the ore, especially from the mines to the lake. This, of course, is being remedied by the wagon road now in course of construction, but wire rope tramways would do much better, and could be easily erected. There is a good opening for a company to organize with this end in view; also for the erection of a concentrating plant. Several fine creeks enter the Kootanie Lake near the town, and a dynamo plant could thus be kept in motion for the supply of power to the mines which are compactly grouped together. A company with enough capital would soon

trol many of the mines, and, at the present time, could purchase a number of promising claims for a small sum.

CANADA.

PROVINCE OF ONTARIO.

(From our Special Correspondent.)

PORT ARTHUR, Aug. 4, 1890.

BADGER SILVER MINING COMPANY.—This company shipped to-day to Geo. W. Robinson, 91 Wall street, New York, 17 tons of shipping ore and concentrates, having an assay value of \$37,000. Superintendent Shear says he can safely guarantee, from the developments made on Nos. 2 and 3 veins, regular monthly shipments of \$40,000 for the balance of this year. Chas. Brent, M. E., has been engaged for the past week in making a new plot of the Badger property, which now includes the Porcupine.

Development work is being vigorously pushed at Nos. 1 West End 2, 3 and 4 veins. In the breast of No. 1 level, west from No. 2 shaft, the vein strike is a little more southerly, having the same dip as before, and carrying silver in greater quantity than at any point yet opened on this vein. Several stringers came in on the hanging wall at a point from 75 to 100 feet west from the shaft, every one of which was filled with argentite. Almost all the ore taken out of this part of the vein is high-grade shipping ore, averaging about 7,000 ounces to the ton.

BEAVER MINING AND MILLING COMPANY.—This company shipped two carloads of ore and concentrates on the 2d inst. to Balbach & Sons, of Newark, N. J., valued at \$40,000. They have about a carload and a half now on hand at the mine, equal in quality to the shipment mentioned, and it is expected they will make regular monthly shipments of from \$25,000 to \$40,000 in value, as the capacity of the mill and the quantity and quality of the ore on the dump will enable them to do this, to say nothing of the ore in the mine, as well as new ground opened up, the extent of their different veins giving them excellent opportunities for development work on a large scale.

ELGIN MINE.—A No. 4 Blake steam pump and a Copeland & Bacon steam hoist have been purchased for this mine. Heretofore all the hoisting has been done by horse power. The mine is not more bothered with water than that a Blake No. 4 will have ample capacity to keep it clear. Capt. Hooper is increasing the force of miners as fast as he can engage them, and sinking and drifting are being pushed with all possible speed. Elgin will probably make a good record as a producer when everything gets into regular swing.

THE SHUNIAH WEACHU MINING COMPANY.—Captain Thompson is continuing the exploratory work, which commenced some time ago, and has resulted, up to date, in the discovery of seven separate and distinct veins, making nine veins in all on this company's property.

The discovery of these seven veins has been rendered additionally interesting by the fact that the dip of these veins toward the main vein is directly in proportion to their distance from it, and from all approximate calculations these veins should all cut the main vein at a slight depth below the chert.

The average width of these veins is 15 inches, some of them widening out in places to two feet. Silver has been taken out of every one of them, giving assays all the way from 25 to 1,400 ounces to the ton so far; development work on them has been confined to surface stripping, excepting the two nearest to the main vein, on which some sinking has been done with the most satisfactory results. It is the desire of the superintendent to explore these veins with a diamond drill, in order to know their true worth with the minimum of expenditure in time and money.

The assay department, which is under the charge of Arthur L. McEwen, M. E. & Ch., is kept busy on the product of No. 1, 2 and 3 veins. The old or No. 1 adit, which was abandoned at a point 183 feet from No. 3 shaft, is now being pushed through with all possible despatch in order to improve the ventilation and general facilities for handling the ore at No. 3. They are sinking No. 3 shaft, and sinking and drifting at No. 4.

IRON.

ATICOKAN RIVER.—Messrs. W. H. Arnold and J. E. Marks have located a tract of iron lands containing 1,280 acres on the Aticokan River, west of Steep Rock Lake. The ore outcrops in a bluff and can be traced for four miles continuously, excepting in a few low places where it is covered with a few feet of drift and soil. Where the overlying drift and soil are sufficiently washed off to expose both walls, they show a width of 70 feet.

Over two hundred explorers are at present out on this range, many of them coming from the Vermilion and Gogebic iron ranges.

4 B.—This property is situated 12 miles east of Port Arthur on the line of the Canadian Pacific railway. Active mining operations were commenced a short time ago by Messrs. Goddard and Chamberlain, of Toronto. The property comprises 178 acres and is traversed by two strong heavily mineralized silver lodes, having a general north-east and south-west strike. At a depth of five feet some very good specimens of silver were taken out. This property was purchased by the above named gentlemen, about four

months ago. For a one-fourth interest in the lands, which they offered for \$800 at the time of purchase, they refused \$5,000 a few days ago. They also own 7 Z, 15 Z, 4 A and 5 A along the shore of Thunder Bay, about three miles east of 4 B. Every location is traversed by one or more veins, and will be opened up as fast as circumstances will allow. 4 A and 5 A adjoin the 3 A mine, which was operated so successfully some years ago by Buffalo capitalists, but, owing to some legal entanglements, has been tied up ever since. I understand that the difficulties have been overcome, and it is now offered for sale.

GUNFLINT LAKE.—The Caldwell iron locations are located on the northwest shore of Gunflint Lake, about two miles from the International boundary line. This property was examined recently by Captain Williams, of Kingston. It is owned by the Kingston and Pembroke Mining Company, which is composed of Chicago and New York capitalists.

Capt. Williams informs me that his report was most favorable, and that the company has decided to send in a party of miners to open up the property, so as to be able to make shipments as soon as the Port Arthur, Duluth & Western railway is completed to that point. In making the examination Capt. Williams sunk three test pits, extending over a distance of half a mile. No. 1 pit was sunk on the westerly end of the outcrop, to a depth of 10 feet, where the ore was found in place, and of a good quality, assaying as follows: Metallic iron, 61 per cent.; silica, 2'16; phosphorus, '020; sulphur, '0014; titanium, '000.

No. 2 pit was sunk at a point 100 feet higher than No. 1; about midway between it and No. 3 it gave 51 per cent. metallic iron, with no deleterious ingredients in appreciable quantities. The outcrop occurs along the face of a hillside and is covered almost continuously to a depth of 8 or 10 feet with float ore. The hill is from 100 to 150 feet in height, with a sloping face. There is a strong needle attraction clear up to the top.

FRANCE.

DEPARTMENT OF ISERE.

A cablegram says that another explosion of fire damp has occurred in the Villeboeuf coal pit at St. Etienne. One hundred and fifteen of the men employed in the pit succeeded in making their escape uninjured. The mine first took fire and the explosion followed. Twelve men were injured, of whom two died subsequently. This makes the second disaster at St. Etienne within two weeks.

DIVIDENDS.

Aspen Mining and Smelting Company, dividend No. 15, of 10 cents per share (\$20,000, payable August 15 at the office of the company, No. 54 Wall street, New York City. Transfer books close August 12th and reopen August 16th.

Caledonia Gold Mining Company (Black Hills), dividend No. 21, of eight cents per share (\$8,000) payable August 15th, at the office of Laidlaw & Co., No. 14 Wall Street, New York. Transfer books close August 8th and reopen August 16th.

Silver Mining Company of Lake Valley, dividend No. 5, of 5 cents per share, \$25,000, payable August 13 at No. 119 S. Fourth street, Philadelphia, Pa. Transfer books close August 6th and reopen August 14th.

ASSESSMENTS.

COMPANY.	No.	When levied.	D't'nt' in office.	Day of Sale.	Am't per share.
Alliance, Utah.....		July 7	Aug 12	Sept. 1	.10
Barnes Sulphur, Utah.....		July 17	Aug. 25	Sept. 13	.02
Belcher, Nev.....	40	June 27	July 31	Aug. 21	.50
Bodie, Cal.....	12	June 16	July 22	Aug. 22	.25
Bona Fors, Cal.....	1	June 19	Aug. 11	Sept. 5	.05
Con Imperial, Nev.....	28	July 17	Aug. 20	Sept. 11	.05
Con. Pacific.....	12	June 21	July 28	Aug. 20	.10
Crocker, Ariz.....	9	June 16	July 25	Aug. 15	.15
Exchequer, Nev.....	29	July 10	Aug. 14	Sept. 4	.25
Golden Prize, Nev.....	4	June 19	July 30	Aug. 18	.25
Silver King, Ariz.....	3	June 9	July 17	Aug. 11	.20
Teirakoff, Cal.....	4	June 9	July 26	Aug. 23	.01
Union Con., Nev.....	41	July 21	Aug. 26	Sept. 15	.25

MINING STOCKS.

For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Minneapolis, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 183 and 184.

NEW YORK, Friday Evening, Aug. 8.

The week just passed at the Consolidated Stock and Petroleum Exchange has been dull, if possible even duller than before. To-day the sales were smaller than we remember to have seen for months past. It is more than discouraging to

people who are endowed with "bullish" proclivities to see the inaction which pervades everybody and everything at the Exchange. Everybody grumbles except the philosophic few whose equanimity of mind is never disturbed either by prosperity or adversity.

We overheard one dealer in mining stocks say that he didn't know why some of the "boys" found it necessary to rusticate in order to recuperate from the effects of a year's hard work. "Why," said he, "I wanted to enjoy a truly restful time and calm. I desired to put business entirely out of my mind. I wanted to do absolutely nothing, so I stayed here."

On the whole, the week under review has been one of the dullest of the many very dull weeks that have been felt at the Exchange this year.

The copper stocks suffered from the general dullness and only very moderate transactions are reported. Of Calumet & Hecla 10 shares at \$303.25 were sold. Of Kearsarge 100 at \$19.13. Huron, 200 shares at \$7.25. Tamarack, 10 shares at \$205.

Of the Black Hills shares, Caledonia shows transactions aggregating 900 shares at \$2. This company has declared a dividend of 8 cents per share, payable August 15th. Sullivan Consolidated was firm at \$1.

Horn Silver was moderately firm at \$3.45@3.60. Holyoke shows more sales at 3 and 4 cents. Ontario was quiet at \$45.25.

Of Alice 600 shares were sold at \$2.60. Other Montana stocks do not appear to be favorites at the Exchange.

In the Comstocks we note sales of Consolidated California and Virginia at \$3.95. Belcher at 24@25c. Ophir, \$5@5.75. Savage, \$3.75@3.80. Sierra Nevada, \$3.20. Yellow Jacket, \$3.35@3.55. Alta, \$1.25@1.80. Best & Belcher, \$3.25. Bullion, \$2.90. Chollar, at \$2.95@3.30. Comstock Tunnel at 17c. Exchequer at 95c. Julia at 40@45c. Mexican at \$3.25@3.45. Potosi at \$7.25. Union Consolidated at \$2.85 and Utah at \$1 and 75c., the latter being quoted at the close.

Phoenix of Arizona declined during the week, but kept moderately firm at 1.10@1.20. The concentrators have been started at the property, and Mr. Bradstreet reports the discovery of some new bodies of ore. The stock is still a favorite one may be gathered from the fact that 8,800 shares were sold, or almost one-fifth of the total number of the various shares sold during the week.

Poor El Cristo is neglected at 70@75c. Nobody seems to know anything about the property, and, what is worse, nobody seems to care. Even rumors about some portentous movement on the part of its controllers are wanting. Rappahannock at 6@7c. was traded in to the extent of 5,300 shares. Information received by Mr. J. A. McPherson, the president of the company, says that operations are in force now, and that mining proper will be commenced soon.

Astoria was traded in to the extent of 2,000 shares at 4c. Mono was quiet at 60@65c. Plymouth was lower than for some time past, 100 shares at \$6 being sold. Quicksilver preferred was stationary at \$41. The common stock was not traded in.

Standard declined from 60c. to 55c. Sutler Creek was steady at \$1@1.05, closing at the latter figure. Brunswick Consolidated was sold during the week at 6c.@7c. It is reported that some of the "insiders" are buying up all the stock at low prices.

We note sales of Freeland, aggregating 7,000 shares, at 40@45c. Leadville Consolidated was firm at 12@13c. Other Colorado stocks were lost in the general dullness.

Silver Mining Company, of Lake Valley, as prophesied in these columns, has declared a dividend of 5 cents per share, payable on August 13th. Two hundred shares at 75 cents were sold during the week.

Boston.

Aug. 7.

(From our Special Correspondent.)

Copper stocks have been very much depressed the past week, and lower prices have been reached for almost every stock on the list. The decline has been most marked in the stocks which have been selling largely on their future prospects, but at the same time the dividend paying mines have also suffered in sympathy. The cause of the decline can be accounted for in part by the closeness of the money market, as it is difficult to borrow money on this class of security, and weak holders are obliged to sell their stocks, consequently there has been more or less liquidation going on, and considerable borrowing of stocks which would indicate short selling, and it looks as if the short interest was quite large. If so, and stocks have passed into strong hands, we shall expect to see a sharp reaction; in fact, there are indications of it to-day, as parties who have been selling the past few days are trying to buy stocks, and the market is in much better condition than yesterday. Calumet & Hecla, on forced sales, sold down to \$299 yesterday, the lowest price since May 13th. To-day it sold up to \$302.

Allouez has been one of the firmest stocks on the list, selling down to \$7½, but recovering to \$8½. It is said that there is a large short in the stock,

and that good buying is noticed by parties who believe in its future. This mine has all the chances of Centennial and Kearsarge, and at a smaller risk. It is now earning \$1.50 per share, and with its prospective increase in production, looks cheap on its merits. Centennial and Kearsarge have both been active at the decline, the former selling down to \$23 and the latter to \$18.50. Boston & Montana has suffered heavily this week, selling down from \$61 1/2 to \$55 1/2, and Butte & Boston from \$21 1/2 to \$18. These stocks will be among the first to rally when the market turns, and the purchaser of yesterday and to-day will, we think, make a good investment.

Osceola dropped from \$44 to \$33, selling to-day at \$39 ex dividend of \$1 per share.

Franklin declined from \$25 1/2 to \$23 1/2, but it has not been pressed very heavily for sale, the decline being in sympathy with the rest of the market.

Atlantic lost \$2 from the opening price, selling down to \$20 and recovering to \$21.

Quincy is so strongly held that but little of it comes on the market in such times as these, consequently it does not show any decline; in fact, it sold at \$1.27 1/2 @ \$1 1/4, which is no lower than last week.

Tamarack was more or less affected by the depression, but declined only \$7, selling at \$2.05 as its lowest point.

The speculative list of low-priced stocks has hardly been heard from this week. Arnold declined to \$1 1/2; Huron from \$8 @ \$6 1/2, assessment paid.

The reports from Huron are of a favorable character. The eighth level of No. 10 shaft is showing very rich in stamp copper as well as in mass and barrel ore. At the price it is now selling we are inclined to think there is money in buying it.

National sold at \$2; Hungarian at 46c; Pontiac at 50c; Ridge at \$1 1/4, and Tecumseh sold at \$3 1/2. Santa Fe declined from 75 @ 52c. The reports regarding the property cannot be said to warrant an advance in its 500,000 shares over present price.

The silver stocks have been extremely quiet. Catalpa declined to 34c, and Crescent to 16c. No transactions in Dunkin or Breece this week.

3 P. M.—The market closed fairly steady, although there were some weak spots.

Quincy declined to \$123 on sale of 50 shares. Calumet dropped again to \$290.

Boston & Montana advanced to \$57 1/2. Butte to \$18 1/2.

Centennial sold at \$30, but lost three-fourths on final sale.

Huron sold at \$7 and Albany closed at \$8 1/2 bid, \$9 asked.

By Telegraph.—Allouez, \$83; Boston and Montana, \$58 1/2; Centennial, \$30 1/2; Franklin, \$24; Osceola, \$41 1/2; Kearsarge, \$21 1/2; Atlantic, \$22; Huron \$7 1/2; Butte and Boston, \$18 1/2; Arnold, \$112; Tecumseh, \$4; Tamarack, \$209.

Table with columns: Company, Opening, H., L., Closing, Sales. Includes Kansas City and M. Co. entries.

Total 16,000 Pit sales. * Buyer 30. \$ Seller 30. \$* Seller 60. † Bid. ‡ Asked. †† Buyer 60.

Denver. Aug. 4. (From our Special Correspondent.)

The market was quiet during most of the week, but improved somewhat on Saturday. Many brokers are still in the mountains. News that President Taylor had placed the building bonds in Boston encouraged the sale of certificates of membership and a general advance of properties and projected improvements in the immediate vicinity of the Exchange building. Bids are all in, and letting of the contracts will undoubtedly take place this week. Foreign shipments and the advance in silver are having a good effect in nearly every camp in the State, as is shown in the demand for miners, an increase in wages, larger output, and a general overhauling of old properties to work, sell, lease or bond. Many old dumps are being "investigated," and low rates by the Denver & Rio Grande and other railroads in time will increase the tonnage very materially.

To-day's business was more like old times, and many sales were for Eastern customers.

You can look for a general advance in prices and an increase in sales, legitimate and honest,

and the future of Colorado mining especially will be upon this basis.

Prices and sales during the week ending August 4th, 1890:

Table with columns: Company, Opening, H., L., Closing, Sales. Includes Alleghany, Amity, Bangkok, etc.

Table with columns: Company, Opening, H., L., Closing, Sales. Includes Argonaut, Aspen United, Big Indian, etc.

Total for the week 19,100

* Buyer 30 days † Buyer 60 days. ‡ Seller 60 days. a Asked. b Bid.

Lake Superior Iron and Gold Stocks.

(Special Report by David M. Ford, Houghton, Mich.)

Table with columns: Name of company, Par value, Bid, Asked. Includes Ashland Iron Co., Aurora Iron Co., etc.

Table with columns: Name of Company, Par value, Lowest, High. Includes Gold Lake Mfg. Co., Grayling Gold & Silver Co., etc.

* Actual sales were made at this price.

Table with columns: Company, Bid, Asked. Includes Algoma, Aurora I. M. Co., Badger Silver Mfg. Co., etc.

St. Louis. Aug. 6. (From our Special Correspondent.)

This week's business on the Mining Exchange was poor. On Wednesday last sales amounted to but 775 shares and the week closes with a total of only 23,685. Central Silver and Mickey Breen were the only stocks in which any interest was taken. There was but one incident that furnished a topic for conversation in mining circles; that was the declaring of dividends by three mining companies.

On the last day of the month the Granite Mountain, Bi-metallic and American & Nettie companies declared dividends of 30c., 25c. and 10c., respectively, making the total sum to be paid out amount to \$280,000. Of this amount the Granite Mountain contributes \$200,000, payable on Aug. 9th. This is their sixty-eighth dividend. The Bi-

metallic's second dividend equals \$50,000, payable on the 9th.

The American & Nettie will distribute \$30,000, payable on August 11th. This latter dividend has long been expected, and its declaration is a source of relief to the market. It is said that after paying the dividend the company will have \$10,000 left for running expenses and \$40,000 surplus for the next dividend. Although the dividend has been declared, the stock continues to fall off on call.

The window of Mr. James Campbell, the broker's office, is ornamented by twelve large and four small gold retorts received from the Gold King mine. On Monday eight retorts, weighing 222 pounds, were received; they are valued at \$45,000. The sixteen retorts are worth \$67,000. Gold King had a trade this week, the first since the mine was sold; it amounted to 1,100 shares at 4c.

Granite Mountain has weakened slightly this week, ten shares going at \$46. Its semi-weekly shipment was 22 bars, containing 33,000 ounces of silver and 92 ounces of gold.

A \$700 38-ounce gold retort was received from the Little Albert.

This week's shipment of the Bi-metallic contained 26,934 ounces of silver and 22 ounces of gold.

At the company's request Buckskin was removed from the call for the present.

Towards the end of the week trading was somewhat revived by a sale of 6,000 shares of Central Silver at 16 1/2 @ 21 1/2.

Tourtelotte made a fair showing this week, the first in a long time.

Mickey Breen was very erratic one day this week, jumping from \$1.22 1/2 up to \$1.30, and then as suddenly falling to \$1.17 1/2.

PRICES AND SALES FOR THE WEEK ENDING AUGUST 6, 1890.

Table with columns: Company, Opening, H., L., Closing, Sales. Includes Adams, American & Nettie, Aztec, Bi-metallic, etc.

Salt Lake City. July 29.

Table with columns: Company, Opening, High, Low, Closing, Sales. Includes Alice, Mont., Anebor, Utah, Alliance, Utah, etc.

* Buyer, 30 days. † Seller, 30 days. ‡ Assessment paid. a Asked. b Bid.

PIPE LINE CERTIFICATES. (Specially reported by Messrs. Watson & Gibson.)

The petroleum market this week has shown some signs of animation and prices have advanced about 3 1/2 cents per barrel. The idea is that the Standard, which owns the bulk of the Ohio oil, as well as that of Pennsylvania, will be interested in putting up the price of the latter, which they could do without any expense to themselves for the purpose of making the former look cheap when it comes to be dealt in on the Exchanges, as it will be within a fortnight. There is a better export demand for refined oil and the whole petroleum situation has a bullish outlook.

Table with columns: Opening, Highest, Lowest, Closing, Sales. Includes Aug. 2, 4, 5, 6, 7, 8. Total sales in barrels 257,000.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 2.....	89	89½	89	89¼	14,000
4.....	89¼	89½	89¼	89¾	41,000
5.....	89¾	90½	89¾	90	109,000
6.....	89¾	90½	89¾	90	36,000
7.....	90½	92	90½	91	207, 00
8.....	91½	93	90¾	92¾	425,000
Total sales in barrels.....					832,000

COAL TRADE REVIEW.

Statistics.

New York, Friday Evening, August 8.

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 August 2d, 1890, compared with the same period last year:

Regions.	Aug. 2, 1890.	Aug. 3, 1889.	Difference.
Wyoming Region Tons	380,585	474,425	Dec. 93,830
Lehigh Region .. "	108,960	141,939	Dec. 22,979
Schuykill Region. "	230,166	253,930	Dec. 23,770
Total.....	719,715	860,294	Dec. 140,579
Total for year to date.....	18,882,563	19,176,428	Dec. 293,865

PRODUCTION OF BITUMINOUS COAL for week ending August 2d and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

	1890.		1889.
	Week.	Year.	
Phila. & Erie R.R.....	2,770	77,905	41,002
Cumberland, Md.....	84,141	2,153,633	1,767,579
Barclay, Pa.....	3,275	87,242	68,403
Broad Top, Pa.....	11,641	303,495	184,359
Clearfield, Pa.....	75,583	2,454,937	1,761,439
Allegheny, Pa.....	2,826	753,665	444,330
Beach Creek, Pa.....	49,638	1,100,833	853,298
Pocahontas Flat Top.....	49,311	1,127,670	1,006,714
Kanawha, W. Va.....	35,273	1,194,802	1,020,951
Total.....	314,458	9,054,182	7,148,135
* Estimated.			

WESTERN SHIPMENTS.

Pittsburgh, Pa.....	11,290	503,395	353,360
Westmoreland, Pa.....	8,383	765,732	800,594
Monongahela, Pa.....	12,130	273,923	214,941
Total	31,803	1,543,050	1,368,844
Grand Total.....	346,261	10,597,232	8,516,979

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending August 2d, and year from January 1st, in tons of 2,600 lbs.: Week, 211,437 tons; year, 3,151,602 tons; to corresponding date in 1889, 2,587,056.

Anthracite.

What there is of a market in hard coal is fed on expectation. The anticipated August activity has not yet made itself visible and the consumer continues to be eagerly looked for, and looked for in vain. Despite the comparative lack of sales the tonnage moving from the mines continues large—larger, it is understood, than the output agreed upon justifies.

According to the figures at hand the July output of 3,000,000 tons will be found to have been exceeded by between 200,000 and 300,000 tons, but there is a feeling of confidence that stocks will attain to healthy proportions in two or three weeks. Certainly at this writing the yards are in a very plethoric condition, and the coal is still piling up.

A majority of the leading men in the trade are out of town, and there is very little pretense made of anything like business being done or expected for a week or so yet. The companies' list prices f.o.b. for August remain: New York harbor for free-burning coals: Stove, \$4; egg, \$3.75; broken and chestnut, \$3.65; pea, clear free-burning, \$2.50 f.o.b.; other grades, 10 cents to 30 cents less; buckwheat, \$1.60 to \$1.80 f.o.b.

Bituminous.

Although there is plenty of soft coal being mined and moved forward, the trade is very dull and listless. Stocks are increasing, and have slightly affected the former firmness. Though on the whole the prices quoted below may be said to prevail, it is certain that many parties are doing business on a lower basis.

Inquiries continue to come from Central and South America and the West Indies, where Cardiff coal has monopolized the market for years. It is confidently stated that within a few years American bituminous coal will largely displace the English coal. Taking all the circumstances into consideration, some of the American operators state that they can place soft coal at Southern points within a trifle of the Cardiff prices, and freer shipping facilities will enable them to reach them in time, so that they can realize a living profit.

Freights to Boston are weak and boats plentiful. Prices remain: Baltimore, \$2.40@2.50 f. o. b.; Philadelphia, \$2.50@2.60; in New York harbor, \$3.25; alongside, \$3.50.

Boston.

Aug. 7.

(From our Special Correspondent.)

The anthracite coal market is rather weaker. Everybody has coal which they want to sell. The exceeding dullness of trade is becoming more than

monotonous. The report of stocks at tidewater does not represent the tremendous amount of coal on hand, as much coal is stored in the interior. Actual transactions are so scarce that it is hard to say what the market is; but it is very weak on domestic sizes, and stove coal is down very close to the lowest figures of the season, viz: \$3.50@ \$3.60 f.o.b. at New York. Egg and broken sizes are not so weak, but still can be had at about the same price as stove. Some of the jobbers endeavor to keep up their spirits in the belief that we shall not have three mild winters in succession; but this is not only pretty cold comfort but far-fetched also. The simple fact is that no retailer is justified in buying ahead of his wants so long as there is no sufficient restriction of production to market requirements. He can save the interest on his money by waiting with little or no chance of seeing higher prices. The only inducement to buy now is that of very low freights from New York.

The bituminous movement is small on new orders. Prices are fairly firm at \$2.25@2.40 f.o.b. Freights have continued to decline, and are now quoted as low as 55@60c. from New York, and 80@90c. from Philadelphia. Rates at Baltimore have touched \$1, but \$1.05 is a fairer rate to quote. These figures show how stagnant the coal trade is. They are a godsend to the soft coal shippers who sold f. o. b., and will help them out considerably if they only last through August. This is doubtful, however.

The retail trade here is dull and unchanged. Quotations are nominally the same as for several weeks past.

The receipts of coal at this port have been as follows:

	For the week		Since Jan. 1,	
	1890.	1889.	1890.	1889.
Anthracite.....	37,134	43,522	943,817	836,944
Bituminous	13,858	32,656	564,783	594,753
Total	50,992	76,178	1,508,600	1,431,697

Buffalo.

Aug. 7.

(From our Special Correspondent.)

There is no improvement in the anthracite coal trade, and none expected for several weeks. The schedule of quotations unchanged, with no likelihood of variation this month. Bituminous coal is fairly active, and the market firm, with supply adequate to the demands of the trade.

Incidents connected with the trade are hard to find. The warm weather has caused an exodus of business men from our city, and the coal trade is well represented among the absentees. Small local orders for anthracite are few and far between, and there is but little evidence on our streets that winter supplies are being stored.

Car service charges are now enforced at all stations on the line of the New York Central Railroad.

Navigation was stopped at Sault Ste. Marie from July 31st at 4 P. M. until August 4th at 10 A. M., in consequence of the breakage of a discharge valve in the canal. One hundred and seventy-five vessels were delayed.

The coal traffic through the Sault Ste. Marie canal from the opening of navigation to June 30th this year was 684,729 net tons, as compared with 419,943 tons in 1889, 670,007 tons in 1888, and 417,715 tons in 1887.

The Lehigh Valley Coal Company have rescinded the order to work its mines on half time.

Lake freights on coal quiet and unchanged; steady feeling. The shipments of coal from this port from July 31st to August 6th, both days inclusive, aggregated 51,790 net tons, namely, 20,000 to Chicago, 14,660 to Milwaukee, 3,050 to Toledo, 4,250 to Superior, 780 to Racine, 380 to Saginaw, 740 to St. Clair, 305 to Gore Bay, 2,700 to Marquette, 900 to Houghton, 30 to Cheboygan, 100 to Alpena, 550 to Ludington, 2,410 to Escanaba, and 35 to Serpent River; total thus far this season 883,080 net tons.

The rates of freight were 60c. to Chicago; 50c. to Milwaukee, Green Bay, Escanaba, Portage and Houghton; 55c. to Racine; 40c. to Superior, St. Clair and Marquette; 60c. to Gore Bay, in Georgian Bay; 30c. to Toledo; 70c. to Ludington, and 40c. to Duluth.

No coal charters by canal reported. Canal movement of coal for fourth week in July: Receipts, 2,324 net tons; shipments, 660 net tons.

Railroad receipts and shipments at this port are not reported by request. Receipts of coal by lake thus far this season, none. Shipments by lake westward for month of July, 244,320 net tons as compared with 293,330 tons in 1889 and 361,830 tons in 1888; for season to August 1st, 841,290 net tons as compared with 918,930 tons in 1889 and 1,150,830 tons in 1888. The receipts of coal by canal for month of July, 5,666 net tons as compared with 11,008 tons in 1889 and 20,871 tons in 1888; the shipments, 1,887 net tons as compared with 1,227 tons in 1889 and 1,735 tons in 1888. The total receipts of coal by canal this season to August 1st, 8,180 net tons as compared with 30,945 tons in 1889 and 47,602 tons in 1888; the shipments, 3,490 net tons as compared with 2,943 tons in 1889 and 4,668 tons in 1888. The aggregate shipments by lake westward show a falling off this year of 77,640 net tons as compared with the figures of 1889 and 318,540 net tons as compared with the figures of 1888. Canal movement light.

The shipments of coal by lake from Buffalo thus

far this season to August 1st were distributed about as follows:

Buffalo to	Net tons.	Buffalo to	Net tons.
Chicago.....	331,260	Menominee.....	600
Milwaukee.....	144,210	Detroit.....	17,070
Toledo.....	48,400	Ashland.....	1,150
Racine.....	20,750	Hancock.....	1,800
Green Bay.....	6,650	Escanaba.....	650
Saginaw.....	9,660	Houghton.....	1,150
Kenosha.....	2,900	Bay City.....	2,320
Washburn.....	7,700	Marquette.....	7,450
Duluth.....	44,140	Ontanagon.....	100
Superior.....	92,350	Cheboygan.....	950
Gladstone.....	14,780	Owen Sound.....	500
Pt. Burwell.....	10	Marine City.....	920
Lake Linden.....	550	Pt. Arthur.....	900
Charlevoix.....	100	Michigan City.....	1,150
Wallaceburg.....	200	Sault Ste. Marie.....	1,540
Sandusky.....	500	Sheboygan.....	1,000
Alpena.....	500	Vessels from Tona-	
Asceda.....	580	wanda not report-	
Pt. Huron.....	2,690	ing at "Custom	
Windsor.....	650	House".....	60,080
Manitowoc.....	1,810		

Lake freights hence during July were as follows: 60c. to Chicago; 50c. to Milwaukee; 40c. to Duluth and Lake Superior ports; 30c. to Sandusky, Detroit and Toledo. A year ago the rate to Chicago was 60c. per net ton.

Chicago.

Aug. 6.

(From our Special Correspondent.)

The coal market of this city shows no change whatever from last week, supply and demand being quite satisfactory. The first of August did not bring any advance on July quotations, as some predicted, but business at current rates is continually improving, and there seems to be a better feeling among dealers generally, the result of which will be more harmony and firmness in terms and prices. The continuance of the forward buying movement promotes activity, but without any change in prices for bituminous. The growing inquiry for structural and other manufactured iron tends to give the coke and soft coal markets a volume and activity that are very gratifying.

We continue to quote retail prices large egg \$5.75, small egg, range and chestnut, \$6.

On cars, f. o. b. Chicago, grate \$5, stove, range and chestnut \$5.25.

The figures for bituminous remain firm and unchanged also. They are, per ton of 2,000 pounds: Green and Sullivan County (Ind.), shaft, \$2.25@2.40; Jackson Hill, \$3.25; Hocking Valley, \$3; Ohio Central, \$3; Erie, Briar Hill, \$4.15@4.2; Indiana Block, \$2.35; Youghiogheny, \$3.35; Surday Creek, \$3; Connellsville, \$5.20.

Pittsburg.

Aug. 7.

(From our Special Correspondent.)

Coal.—We regret to have to report no improvement in values. The Ohio River remains closed, so far as navigation is concerned, with the desire of the coal owners that it may so remain for some time. In this event prices may improve in the lower markets, which would help coal owners very materially.

Nominal rates in pools:
Per 100 bushels, 1st pool..... \$4.75 3d pool..... \$3.90
2d pool..... 4.50 4th pool..... 3.25
Railroad coal, \$5.00@5.50.

Connellsville Coke.—Trade continues in a very healthy condition; shipments are on the increase, and values are steadily maintained. Most of the works are making five and six days. The opinion prevails that six days will soon be the rule, not the exception. The car supply was ample. There is still talk of a strike at Rainey's works if the scale is not signed. Active ovens, 12,675; idle, about 2,500; 310 ovens have been fired since last report. Shipments increased during the week, 75 cars; total shipments for the week, west of Pittsburg, 3,800; east of Pittsburg, 1,200; Pittsburg, 1,625; total, 6,625; shipments in tons, 119,250. The rates were for 2,000 pounds f. o. b. cars at ovens. Blast furnace coke, \$2.15; foundry coke, \$2.45; crushed coke, \$2.65.

Freights to Pittsburg 70c. per ton, Mahoning and Shenango Valleys, \$1.35; St. Louis, \$3.30; Cleveland, \$1.70; Chicago, \$2.75.

FREIGHTS.

From Philadelphia to: Alexandria, .85; Braintree, 1.00; Boston, Mass., .80@.90; Naponset, *.85; York, 1.90; Norfolk, .70; Richmond, *.85; Washington, 185.

*And discharging. †Alongside.

METAL MARKET.

New York, Friday Evening, Aug. 8.
Prices of silver per ounce troy.

Aug.	Sterling Exch'ge	Lond'n Pence.	N. Y. Cts.	Aug.	Sterling Exch'ge	Lond'n Pence.	N. Y. Cts.
2	4.88½	51¼	1.13	6	4.88½	50¾	1.11½
4	4.88½	Holiday	1.12¼	7	4.88½	50¾	1.11½
5	4.88½	51¼	1.12½	8	4.88	51	*

* 1.12 to 1.12¼.

India council bills were allotted this week at an advance of ¼d. per rupee. After the rapid advance of last week the market has been inclined

toward a reactionary weakness at nominal figures, but closes firmer. No London shipments have been made this week.

The United States assay office at New York reports total receipts of silver for the week to be 200,000 ounces.

Domestic and Foreign Coin.

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

	Bid.	Asked.
Trade dollars.....	\$.85	\$.88
Mexican dollars.....	.87	.89
Peruvian soles and Chilean pesos.....	.80	.80
English silver.....	4.86	4.90
Five francs.....	.94	.95
Victoria sovereigns.....	4.90	4.93
Twenty francs.....	3.86	3.90
Twenty marks.....	4.74	4.78
Spanish doubloons.....	15.55	15.70
Spanish 25 pesetas.....	4.80	4.85
Mexican doubloons.....	15.55	15.70
Mexican 20 pesos.....	19.50	19.60
Ten guilders.....	3.96	4.00
Bar silver.....	1.12½	1.13½

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 remains at 5 per cent. During the week the bank lost £290,000 bullion, and the proportion of its reserve to its liabilities was reduced from 38.57 to 36.60 per cent., against a decline from 36.54 to 36.18 per cent. in the same week of last year, when its rate for discount was 3 per cent. On the 7th inst. the bank gained £278,000 bullion on balance. The weekly statement of the Bank of France shows a gain of 1,575,000 francs gold and a gain of 1,350,000 francs silver.

Copper.—While the market is free from excitement, the tone continues very firm and the demand quite satisfactory for all sorts. The Lake companies are still selling at 17c. for near deliveries and the quotations for Arizona and casting brands remain the same as last reported, viz.: 15½@15¾c. for Arizona and 14¾@15c. for casting.

About the European markets there is nothing of much interest to report, and the movements in the London market for Chili bars and G. M. B. copper have been comparatively unimportant during the week just closed, although the tendency of prices has been toward a higher level, and the latest cable advices indicate a very steady feeling. Last week's closing quotations for Chili bars and G. M. B.'s were £57@£57 2s. 6d. spot and £57 10s.@£57 12s. 6d. three months, while our cable advices give to-day's closing prices as £57 10s.@£57 12s. 6d. spot and £57 17s. 6d.@£58 three months.

For refined and manufactured sorts, the latest quotations are as follows: Best selected, £65@£66; strong sheets, £70@£71; India sheets, £65@£66; English tough, £62@£63, and yellow metal, 6¼d.

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

To Liverpool.	Copper matte.	Lbs.	
By S. S. City of Richmond.	227 bbls.	223,995	\$10,000
To Mexico.	Copper.		
By S. S. Orizaba.....	50 casks	25,000	3,937

Tin.—Consumers' orders have been coming into the market pretty freely and the consumption is unquestionably very good, but business of a speculative nature has been almost suspended for the time being.

This week's arrivals will be rather heavy, but holders of the metal evince no disposition to press sales, and there does not appear to be anything to justify the expectation of lower values.

The London market has fluctuated from day to day to a moderate extent, the lowest figures touched during the week being £94 spot, and £94 7s. 6d. three months, and the highest £94 10s. and £94 17s. 6d. three months, while the latest closing quotations received by cable to-day, viz., £94 5s.@£94 7s. 6d. spot and £94 15s.@£94 17s. 6d. three months, mark an improvement for the week as compared with last week's closing quotations of about £94.

Lead.—The market has become decidedly firmer, and after the sale of a few lots late in the week at 4'40 there are now buyers at 4'45@4'47½. The amount of business doing is limited, as offerings are small and buyers are holding back. In London the latest quotations are: English lead, £13 5s. Spanish lead, £13.

The St. Louis Lead Market.—Messrs. John Wahl & Co. telegraph us as follows: "Lead presents no material novelty. There is a good demand on the quiet for all lots offered at market rates, which are 4'25c. for common and 4'27½c.@4'30c. for corrodng. Producers appear to have general confidence in future values, and do not care to sell much beyond the current output at present values. We regard the market for the metal in rather a healthy condition."

The Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: "There has been but little change of importance in the value of lead during the week, though quotations have hardened a trifle. There has been some demand for spot desilverized lead owing to refiners being temporarily oversold. Business for the past week has been quiet at 4'30c.@4'35c., and the latter is the market price at the close."

Spelter continues fairly steady at last week's quotations, viz.: 5'45@5'50. The latest London

quotations are ordinaries, £23; specials, £23 7s. 6d. **Antimony.**—We have to reduce quotations somewhat and now quote Cookson's, 23½@24c.; L. X., 21@21½c.; Hallett's, 20@20½c.

Nickel remains very firm at quotations given last week, viz.: 80@85c.

Quicksilver.—The market for this metal is quiet but firm, and has shown more activity during the week than it has for some time. Quotations are: London, £10 10s., and New York, \$55@56.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, August 8.

The iron market, generally, could scarcely be duller than during the past week. No transactions worth mention are reported, and there is very little indication of an immediate revival of business. The market is firm throughout, as stocks are comparatively small, and the expectation of an active market as soon as the hot season has passed seems to prevail everywhere. It is allowed by common consent that trade will remain dull during August.

American Pig Iron.—There has been no movement in American pig iron during the week beyond small transactions. Some persons in the trade state that business is picking up, but diligent inquiry failed to find any sign of the revival. Prices remain firm, as follows: Southern No. 1, \$17.25@18; No. 2, \$16.50@17; Northern, No. 1, \$18@18.50; No. 2, \$17@17.50.

Scotch Pig Iron.—Although the prices which have been quoted for some time for Scotch pig iron still prevail, and are firmly maintained, the business in this iron is almost at a standstill. The transactions for the week foot up about 350 tons. No. 1 Coltness, \$23.50; Dalmellington, \$20.50; Eglinton, \$19.25.

Spiegeleisen and Ferro-manganese.—The expectation of an early rise, in sympathy with that in foreign markets, has not been fulfilled yet. The market is lifeless, and any price quoted can only be the figure asked. Dealers ask, for 20 per cent. spiegeleisen, \$30.50@31, and would probably take something off to secure a decent order. Ferro-manganese, 80 per cent., is still quoted at \$74@75, though in some quarters \$71.50@72 is stated as the price. It is safe to say, however, that any 80 per cent. ferro-manganese offered in good faith at anything below \$73.75 would find plenty of buyers.

Steel Rails.—The South has been taking some steel rails at current prices, and that is about all there is to record of the market. Prices remain firm, because no one is buying and no one is selling. Inquiries from Western parties have been coming in during the week, and one of these related to a lot of 25,000 tons for a Pacific road. There is little expectation, however, that this market will get much of the supply of steel rails to the West just now. Prices remain firm at \$31.

Rail Fastenings.—No business is reported, and last week's prices prevail: Spikes, 2c.; angle plates, 1'75@1'80c.; bolts and square nuts, 2'70c.; hexagonal nuts, 2'95@3c.; complete joint, iron and steel, according to weight.

Tubes and Pipes.—The summer dullness which has characterized the other branches of the iron trade has not been observed in tubes and pipes. The makers are kept busy, and several large contracts are pending. Ruling discounts on car lots: 47½ per cent. on butt, black; 40 on galvanized; 60 on lap, black, and 47½ on lap, galvanized; 40 on 1½-inch boilers; 50 for 2 to 4-inch, and 52½ on larger than 4-inch casing, all sizes, 50 per cent.

Merchant Steel.—Stock taking is nearly over, and the mills which have been closed for repairs are about to reopen. What little business is doing is at the prices which have been quoted for four weeks: Best English tool steel, 15c. net; American tool steel, 7½@10c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3¾c.; open-hearth machinery, 2¾c.; open-hearth spring, 2¾c.; tire steel, 2¾c.; toe calks, 2¾c.; flat file, 4¾c.; mill file, 5¾c.; taper file, 7¾c.; first quality sheet, 10c.; second quality sheet, 8c.

Old Rails.—There is still plenty of demand, and no supply. The market would take thousands of tons at \$24.50, although \$25 is asked for tees and \$26 for doublers. But those who ask this price would find it very difficult to supply old rails in any large quantity even at a slight advance over quoted figures.

Structural Iron and Steel.—Business in structural iron and steel is slightly affected by the season, but the temporary lull is not due to lack of orders or supply. Since the beginning of the year all concerned have been working at full pressure, and the demand has continued to increase; We quote: Universal plates, 2'20@2'28c.; bridge plates, 2'15@2'20c.; angles, 2'10@2'15c.; tees, 2'65c.; beams, 3'10c.

Chicago.

(From our Special Correspondent.)

The Chicago iron market is reported by sellers as being in a very satisfactory condition. Prices are held firm, and in some lines look toward an early advancement. Many heavy buyers for im-

plement and other manufacturers have been holding off for a drop, but the present indications are that they will be compelled to come in at the present stiff rates during this month in order to be in time for the opening up of their various works in September. Very many large consumers have yet to get their orders accepted. The immense industrial enterprises in prospect and already developed in and near Chicago exert an influence plainly felt, as these mean an enormous consumption of iron and steel in the erection of the various plants now, as well as an enormous consumption of material to be used in the manufacture of their several proposed products. The volume of business in pig iron is surprisingly large for midsummer, and the market maintains the strength which has characterized it of late, especially so in local irons of all grades. Lake Superior charcoals are very firm and furnaces are so far sold ahead as to make them indifferent as to near future orders. In some cases they have advanced their figures already. Taking everything together the situation may be said to be one of hopeful confidence.

Pig Iron.—The indications are that those who have their purchases now on the ground that there will be a great surplus in the production of the raw material will come to the conclusion ere long that they have been "left." Furnaces are well supplied with orders, and there are but few reports of any intended cessation of work in this direction. The production of pig is very large, but the consumption is greater. This undeniable fact points to a better trade during the approaching Autumn. We quote to-day for cash per ton of 2,240 pounds, f.o.b. Chicago, for Nos. 1 and 2, Lake Superior charcoal No. 3, for car wheels, Nos. 4 and 5 for malleable, \$20.50@21; Lake Superior coke Bessemer, \$18.50; Lake Superior coke Bay View No. 1, \$17@17.50; No. 2, \$16@16.50; No. 3, \$15.50@16; Southern coke No. 1, \$16.50@17; No. 2, \$15.50@16; No. 3, \$15@15.50.

Southern charcoal, \$19@19.50; standard Southern car wheel, \$24@25; Ohio softeners, Hanging Rock, \$18.50@19; Jackson County, \$18@19; Hanging Rock cold blast, \$26@28; warm blast, \$23@25; No. 1 Scotch, according to brands, \$26@27; American Scotch, \$19@20; Bay View Scotch No. 1, \$17; No. 2, \$16; Chicago Scotch No. 1, \$17; No. 2, \$16; Emma Scotch, \$19@19.50; Black band, Hubbard Scotch, \$19.50; Hasleton, \$20.25; soft Silvery, \$18; Welston No. 1, \$19; No. 2, \$18.50@19; Hamilton No. 1, \$18; Norton No. 1, \$17.75@18.25; Zanesville No. 1, \$18.75@19.25.

Bar Iron.—Chicago mills are well supplied with work for weeks to come. Trade is active and no shade can be gotten in prices. Dealers have great confidence in the good character of business during the balance of this year. Bottom figures are: Valley Mills, \$1.70, f. o. h. Youngstown. Local mills are asking \$1.85@1.90, half extras, and \$1.80 for car iron.

Black Sheet Iron.—No sheets can be had at factories for early delivery. Former prices are firmly maintained. Quotations are \$1.10 f. o. b. mill for No. 27. Store prices are \$3.40@3.50 for No. 27, \$3.30@3.40 for Nos. 25 and 26, and \$3.20@3.30 for No. 24. Smooth sheets at stores have advanced 60 cents per cwt.

Galvanized Sheet Iron.—Demand good, with the maintenance of the recent advance in discounts. Discounts for both cheap and standard brands are now 62½ per cent. on Juniatta and 62½ and 5 per cent. on charcoal from store. Jobbing lots are quoted according to quantities.

Merchant Steel.—The satisfactory demand of last week continues. Prices are unchanged. Tool steel, \$7.75@8; specials, \$12@12.25; open-hearth machinery, \$2.75; Bessemer machinery, \$2.50@2.60; open-hearth spring, \$2.60@2.65; tire, \$2.50@2.60; toe calk, \$1.70@2.80; crucible sheet, \$7@10; crucible spring, \$23.75.

Car lots are: Tire steel, \$2.20; toe calks, \$2.40@2.50; Bessemer bars, \$2.25@2.30; machinery, \$2.60@2.80, f.o.b. Chicago, 60 days.

Heavy orders are being taken for plow steel; tool steel is in good demand, and above quotations are held very firmly.

Plates, Tubes, etc.—Heavy mill orders have lately been placed. Prices are very firm. Orders for small amounts are numerous.

We quote as follows: tank iron, \$2.70; tank steel, \$2.90; heavy sheets from 10 to 14, \$2.90@3; steel sheets 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; hoiler rivets, \$4@4.25; fire box iron; and steel, \$4.75@5.50; hoiler tubes 4½ inches and larger, 52½ per cent.; 2 to 4 inches 50 per cent., and 1¼ inches and smaller 45 per cent.

Structural Iron.—The local demand for structural irons was never better than at present since the days of the fire. New buildings are going up every where, and many more are in contemplation, to say nothing of additions to, and alterations being made in several of the finest structures in this city; prices are rated strong and are firmly adhered to. We quote: angles, iron and steel, in car lots, f. o. h. Chicago \$2.30@2.40; universal plates, \$2.50; sheared plates, \$2.50; tees \$2.70@2.80; beams and channels \$3.20. Store prices are: angles \$2.50@2.60; tees \$2.80; beams and channels \$3.70.

Nails.—Prices for steel cut nails underwent no change last week from \$1.90 per keg per car load. Wire nails are moving upwards, the present figure f. o. b. Chicago is \$2.40. Owing to the increased cost of billets and wire rods, prices are likely to advance soon.

Scrap Iron.—Both supply and demand have been light during the past week. Prices are unchanged. We quote: Country mixed scrap, \$13.50 @ \$14, according to condition; No. 1 mill, \$14 @ \$14.50; light wrought, \$9.50; horse shoes, \$19.50 @ \$20; axes, \$23; cast machinery, \$12.50 @ \$13; stove plates, \$9.50 @ \$10; borings, \$8.50 @ \$8.75; wrought turnings, \$11.50 @ \$12; No. 1 railroad shop or forge, \$19.50 @ \$20; track scrap, \$19.50.

Sheet and Bolt Copper, 25c., pound rates; sheet brass, copper and brass wire, 20 per cent. discount factory delivery.

Louisville, Aug. 5
(Special report by HALL BROS. & CO.)

There is but little to add to our last report, as the situation is practically the same in so far as buying and selling is concerned, though we hear of some concessions to move lower grades that have accumulated. Foundry grades are scarce and held firm. Reports show there is not three week's available stocks, and as furnaces are well booked for some months there is no occasion for alarm. It is not an uncommon thing that quietness should prevail at this season of the year, and it is not at all doubtful that the present lull will shortly pass away. We quote as last:

Hot Blast Foundry Irons.

Southern Coke No. 1	15.00 @ 15.25
" " No. 2	14.25 @ 14.50
" " No. 3	14.00 @ 14.25
Mahoning Valley, Lake ore mixture	17.75 @ 18.75
Southern Charcoal No. 1	17.00 @ 17.50
" " No. 2	16.50 @ 17.00
Missouri " No. 1	18.00 @ 18.50
" " No. 2	17.00 @ 17.50

Forge Irons.

Neutral Coke	13.75 @ 14.00
Cold Short	15.50 @ 17.00
Mottled	12.75 @ 13.25

Car Wheel and Malleable Irons.

Southern (standard brands)	22.00 @ 23.00
(other brands)	18.00 @ 19.00
Lake Superior	22.50 @ 23.00

Pittsburg, Aug. 7
(From our Special Correspondent.)

Raw Iron and Steel.—Trade during the week has not been very active; the extreme heat that prevailed interfered with business very materially, and sent a number of buyers as well as sellers in search of a spot out of town where there was a chance to obtain a little fresh air. The result was there were but few dealers left to talk business. Certain descriptions of iron were not so firm as at date of last report, that is for spot iron or this month's delivery; but sellers were far from eager to contract for late deliveries. Although the volume of business in crude iron has diminished to a certain extent and for certain descriptions during the past few weeks, trade is still fair. Taking the season of the year and other matters into consideration, on the whole the market may be set down as being in a healthy condition, and iron men generally seem pretty well satisfied with the present position of the trade, as well as with the outlook for the fall and winter. There is little expectation of any appreciable increase in the demand during the present month, but there is no fear that the consumption will not take care of all the output at the present rate of production, and thus prevent any accumulation of unsold stocks. A leading dealer has this to say: "There is a sufficient supply of most grades of pig-iron to enable orders for quick delivery to be filled without difficulty; but the disinclination of furnace men to book orders at present prices, for delivery the next three months, is a good indication of the reliance they place in the future. The past few weeks have cleared the market of its irregularities, and there is scarcely anything left in the way of exceptionally low priced iron."

The undertone is strong, nevertheless, and concessions from quoted rates are becoming less frequent as well as less important, a feature which is usually preliminary to definite advance. From the East is reported a steady market without any change in values; demand and supply run even. City furnace iron shows no depreciation in values; makers have set their figures, from which they show no disposition to recede. Bessemer, the demand has been light, prices weaker; gray forge holds its own, sales restricted; muck bar steady, unchanged; steel slabs and billets are firm at last week's figures; skelp iron steady, unchanged; bloom and rail ends fair tendency upward.

Coal and Coke Smelted Lake Ore.

2,000 Tons Grey Forge	\$15.65 cash.
2,000 Tons Bessemer, August, September	18.75 cash.
1,500 Tons Grey Forge	15.65 cash.
1,000 Tons Bessemer at furnace	19.00 cash.
1,000 Tons Grey Forge	15.50 cash.
1,000 Tons Bessemer, August, September	19.00 cash.
500 Tons Grey Forge	15.50 cash.
500 Tons Grey Forge	15.25 cash.
300 Tons White Southern	14.50 cash.
100 Tons White Bessemer	14.90 cash.
100 Tons No. 1 Foundry	17.50 cash.
100 Tons No. 2 Foundry	16.50 cash.
100 Tons Mottled	14.80 cash.
100 Tons Mottled	14.80 cash.

Coke Native Ore.

500 Tons Grey Forge	15.25 cash.
300 Tons Grey Forge	15.25 cash.
50 Tons No. 2 Foundry at Furnace	16.00 cash.
50 Tons Silvery	17.25 cash.
50 Tons No. 2 Foundry	16.50 cash.

Charcoal.

75 Tons Cold Blast	29.25 cash.
75 Tons Warm Blast	27.25 cash.
50 Tons No. 2 Foundry	22.75 cash.
50 Tons No. 2 Foundry	22.50 cash.

Muck Bar.

1,000 Tons Neutral, August and October	23.50 cash.
500 Tons Neutral, August	29.25 cash.
500 Tons Neutral	29.40 cash.

Steel Slabs and Billets.

1,000 Tons Steel Slabs and Billets	31.50 cash.
750 Tons Billets, Cleveland delivery	32.50 cash.
500 Tons Billets	31.25 cash.
500 Tons Billets at Works	30.75 cash.

Skelp Iron.

800 Tons Sheared Iron	22.5 4 mo.
300 Tons Wide Grooved	187 1/4 4 mo
200 Tons Narrow Grooved	177 1/4 4 mo.

Steel Wire Rods.

500 Tons American Fives, Sept	47.00 cash.
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Ferro-Manganese.

100 Tons 80 per cent., f. o. b. Balt.	70.25 cash.
25 Tons 80 per cent., f. o. b. Phila.	70.50 cash.
25 Tons 80 per cent., Pittsburg	75.00 cash.

Bloom and Crop Ends.

600 Tons Crop Ends	22.00 cash.
600 Tons Bloom Ends	22.25 cash.
500 Tons Crop Ends	23.00 cash.

Bloom and Rail Ends.

1,000 Tons Bloom and Rail Ends	21.75 cash.
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Steel Blooms.

500 Tons, Large Size	31.80 cash.
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Old Iron and Steel Rails.

500 Tons American Ts	27.25 cash.
450 Tons	27.01 c + sb.
500 Tons Old Steel Rails	27.75 cash.
300 Tons Old Steel Rails	23.00 cash.

Prices.

Coke or Bituminous Pig—	
Foundry No. 1	\$17.50 @ 17.75
Foundry No. 2	16.25 @ 16.50
Gray F. No. 3	15.50 @ 15.75
" " No. 4	15.00 @ 15.25
White	14.50 @ 14.75
Mottled	14.50 @ 14.75
Silvery	17.50 @ 18.25
Bessemer	18.50 @ 19.00
Low Phos.	21.50 @ 22.50

Charcoal Pig—

Foundry No. 1	23.50 @ 24.50
Foundry No. 2	22.00 @ 22.75
Cold Blast	25.00 @ 26.00
Warm Blast	24.00 @ 25.00
10 + 12% Spiegel	30.00
Seaboard	30.00

Philadelphia, Aug. 8.
(From our Special Correspondent.)

Pig Iron.—Business is restricted to pressing wants. Even the rolling mill people are not anxious for early winter iron. Foundry men and stove makers are keeping only moderate stocks ahead. Salesmen report it a difficult matter to induce buyers to make long or large contracts. Three or four large makers have refused to shade forge-iron below \$15.50. The usual quotations for No. 1 are \$18 to \$18.50; for No. 2 \$16.50 is named. Southern iron is not arriving, but makers claim they are shipping as usual to other northern points. Bessemer is dull at \$19 at furnace.

Foreign Material offers for 20 per cent., spiegel are made at \$30.50.

Blooms.—Charcoal blooms are selling well and contracts for anthracite have been closed for delivery during the next three months.

Billets.—The importers' quotations for billets is having the effect of hanging up some business for the present on domestic blooms. Quotations: \$32.50 @ \$33.

Muck Bars.—A heavy business has been done in muck bars this week and prices are \$30. Buyers are hurrying up.

Merchant Bars.—A great deal of refined iron is selling at 175 in interior mills. Business is good and mills are filling up. Highest city quotation 185.

Sheet Iron.—Heavy fall orders for heavy sheets have been booked this week at makers' terms. All mills are well sold up.

Skelp Iron.—It looks to-day as if some belated buyers would pay the penalty of delay to the extent of about \$2 per ton. Grooved sold to-day at 180.

Nails.—The factories are turning out a heavy supply of nails and stocks are pretty well under control.

Wrought Iron Pipe.—The mills are oversold at full card rates.

Plate and Tank.—Urgent buyers paid a tenth more to-day for the assurance of delivery at dates specified. A great deal of new business is coming in for steel plate especially. Ship plates are 2-25 and 2-40, respectively, for iron and steel. Bridge plate, 2-30 @ 2-50.

Structural Material.—Brokers intimate that sheared plates, angles and ties will be marked up a tenth before the close of the month. Beams 3-10c.; angles, 2-20c.; plates, 2-35c.

Steel Rails.—Inquiries for large lots from Southern roads have been entertained this week, and offers have been made at \$30 @ \$30.50. Asking prices, \$31 @ \$32.

Old Rails.—Scarcely any stock is to be had, and brokers are scouring the South by correspondence for urgent customers. Quotations, \$25.

Scrap.—There are more buyers in market, and prices are firmer. No. 1 best, \$23; old car wheels, \$18.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Aug. 8.

Heavy Chemicals.—There is a good demand for alkali, and the market, though quiet, is strong. Nothing new has been learned concerning the Chemical Union. It is understood that the final arrangements are now being made by the committee, and that ere long the Union will be a fact.

Caustic soda is scarce on the spot. There is some business doing at the following prices: 60 per cent., 3-10c. @ 3-12 1/2 c.; 74 to 76 per cent., 2-85c. @ 2-90c.; 77 per cent., 2-87 1/2 c.

Caustic Soda Ash.—Not a very great volume of business is being transacted in caustic ash. There appears to be an indisposition on the part of sellers to get rid of their stock at buyers' offerings. We quote: 145c. @ 150c.

Carbonated Soda Ash.—The market is rather quiet in this article, which is quoted at 155c. @ 160c. for 48 per cent., and 150c. @ 160c. for the 58 per cent., according to quantity and brand.

Sal Soda.—This article is quiet and uninteresting. Quotations are: 102 1/2 c. @ 110c.

Bleaching Powder.—Bleach is rather scarce and very little is coming in. This has been without any appreciable effect, for it continues dull at 145c. @ 150c.

Acids.—The market for acids does not show the slightest feature of interest. Business during the week under review has not been as good as during the previous week, and prices still remain low. We repeat our quotations:

Acid, per 100 pounds in New York and vicinity: Acetic, \$1.75 @ \$2.25; muriatic, 18-degree, 80c. @ \$1.25; muriatic, 20-degree, 90c. @ \$1.50; sulfuric, 22-degree, 90c. @ \$1.75; nitric, 36-degree, \$2.75 @ \$3.50; nitric, 40-degree, \$3.25 @ \$4.50; nitric, 42-degree, \$3.75 @ \$4.75; sulphuric, 60-degree, 70 @ 80c., and sulphuric, 66-degree, 80c. @ \$1.

Fertilizing Chemicals.—There has been some inquiry for supplies for future delivery, but on the whole midsummer dullness reigns in the fertilizer market. Some interest was aroused among the trade by the news of the failure of two well-known firms, of which mention is given in our Notes of the Week. Quotations are fairly well maintained. We quote: High grade dried blood, \$1.85 @ \$1.90. For the low grade the price is \$1.80 @ \$1.85; Azotite, \$1.90 @ \$1.95. Tankage, high grade, 9 to 10 per cent. ammonia and 15 to 20 per cent. phosphate, \$19 @ \$20 per ton, and low grade 7 to 8 per cent. ammonia and 25 to 30 per cent. phosphate, \$18 @ \$18.50. Fish scrap, \$20 @ \$20.50 per ton f. o. b. factory. Sulphate of ammonia, \$3.15 @ \$3.25. Concentrated tankage, \$1.80 @ \$1.85. Refuse, bone black, guaranteed 70 per cent. phosphate, \$18 @ \$18.50 per ton. Dissolved bone-black is nominally 55c. 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, unground, \$20 @ \$23; ground, \$25 @ \$26.

Charleston rock, undried, \$5.75 per ton; kiln-dried, \$7 @ \$7.25 per ton, f. o. b. vessels and cars respectively at the mines. Freights by sail from Charleston to New York, \$2.75 @ \$3.50 per ton. Charleston rock, ground \$11.50 @ \$12, ex vessel at New York.

Quotations are for 48 to 52 per cent. sulphate of potash, \$1.12 1/2 per 100 pounds for shipments from date; high grade manure salts, basis 90 per cent. sulphate of potash, \$2.37 1/2 per 100 pounds.

Kainit.—There has been a number of inquiries, especially from the South. A cargo of 500 tons arrived and was delivered on contracts. Quotations remain: \$9.75 for invoice weight and \$10 for actual weight.

Muriate of Potash.—There were no arrivals of muriate during the week. Stocks are very light and arrivals are taken up promptly by consumers. The agents of the Sales Syndicate state that it would be advisable for consumers, notably those from the South, to order ahead, inasmuch as in the fall and winter orders rush in and somebody has to be disappointed. Quotations are: \$1.77 @ \$1.82, according to quantity and port.

Nitrate of Soda.—Mr. F. B. Nichols sends us the following interesting statistics issued under date of the 1st inst.:

	1890.	1889.	1888.
Stocks in store and afloat in Atlantic ports, July 15, bags	75,621	76,737	106,884
Arrivals	9,851	36,176	Nil
	84,702	112,973	106,884
Previously reported, 431,218; total arrivals to date, 440,899; same time '89 304,317; same time '88, 343,506.		58,627	84,682
Stocks			92,533
To arrive, 335,500; visible supply, 392,127; same time '89, 292,682; same time '88, 307,533.			
Stocks with dealers in store and afloat here: Deliveries fortnight ending Aug. 1	26,075	28,291	14,351
Previously reported	407,923	277,844	279,692
Total deliveries to Aug. 1	433,998	306,135	294,043
Sales spot	1.63 1/2 @ 1.70	1.85 @ 1.90	2 @ 2.15

"The deliveries continue large, showing an active demand throughout. Nevertheless, spot prices are low cost, and a further concession was made during the month. As the lowest transactions are ex vessel, it appears that holders have a dread of putting into store when large quantities are yet to arrive. The fact is, more nitrate was bought than was wanted, under the mistaken notion that a thing is cheap if the price is low. The drift in Chili is to produce more than the world wants. Consequently, a steady decline of price followed in the effort to stimulate consumption. Labor troubles in the mining districts interfered considerably with the production, and were being used to raise values, but political dissensions disturbed exchange, and nitrate has recently been offered below any previous price. The producers are fighting on the principle that the longest arm gets the persimmon; but the best thing they can do is to make a liberal appropriation to stimulate the agricultural demand in this country which has already begun, and only needs pushing now to bring forth results that will settle the differences on the coast for many years to come. The arrivals in July were 'Ada Browne,' at Boston; 'Magellan,' at Philadelphia, and 'Hiram Emory,' 'Criccieth Castle,' and 'Edward Kidder,' at this port."

Brimstone.—Brimstone is higher on the other side, but there has been no corresponding advance here. Buyers are holding off, though spot quotations are lower than those for future delivery. We quote this week, best unmixd seconds on the spot, \$19.75; best unmixd thirds, \$19. Quotations for seconds, to arrive, \$20.25; thirds, \$19.50.

NOTES OF THE WEEK.

Announcement was made on the 29th ult. of the failure of J. E. Tygert & Co., manufacturers of fertilizers, Philadelphia, Pa. An approximate estimate places the assets of the firm at \$348,000 and liabilities at \$317,000. The suspension was caused, it is said, by the refusal of creditors to renew notes of the Peninsula Bone Fertilizer Company, of Smyrna, Delaware, upon which J. E. Tygert & Co. were heavy indorsers. Nearly all the paper is held by banks, the firm's name being involved to the extent of about \$55,000. The firm of J. E. Tygert & Co. is composed of J. E. and H. S. Tygert, and has been in existence for about eighteen years. It formerly did a business of between \$400,000 and \$500,000 a year. The firm was the principal owner of the Peninsula Bone Fertilizer Company.

The firm of H. S. Miller & Co., manufacturers of fertilizers at Newark, N. J., was this week reported to be temporarily embarrassed for ready money, and some of its paper went to protest a few days ago. The business was started in Newark in December, 1887, by the firm of H. S. Miller & Co., composed of Horace S. Miller and Alfred Lister. On June 28th last the business was incorporated into a stock company, under the New Jersey laws, with a capital stock of \$400,000, of which it was said \$225,000 had been paid in. Alfred Lister was the president, Horace S. Miller vice-president, and S. B. Schenck, treasurer. Mr. Lister was the capitalist of the concern, and held

the controlling interest, it is said, in the stock of the company. The liabilities are reported to be about \$500,000, with nominal assets largely in excess of that amount. The assets consist of a large plant, real estate, factory, machinery, etc., accounts, bills receivable and stock on hand. Friends of the company say that there are enough assets to pay all the debts and leave a large surplus, if time can be had to realize upon the assets.

A meeting of the creditors was held at the Astor House on the 5th. A plan was proposed by the firm, viz.: All the creditors are to extend the time of payment of their claims for four months after maturity, with interest. In the meantime H. S. Miller & Co. are to carry on manufacturing as heretofore, but under the supervision of a committee of creditors, consisting of C. G. Rockwood, president of the National Newark Banking Company, Newark, N. J.; Charles Hyde, president of the City Bank of Plainfield, N. J.; and Frederick W. White, the well-known fertilizer broker of this city. An agreement embodying the plan was drawn up, and was signed by all the creditors present. The statement submitted shows the assets of the firm to be above \$750,000 after payment of all debts and liabilities. There is to be no interruption to the business, and the firm states that orders from dealers will be filled promptly.

Liverpool. July 30.

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

There is little of interest to report in the position of heavy chemicals, the demand generally having fallen off during the past week.

As regards the proposed "chemical union," makers are still very sanguine that this will be carried through successfully, but there are rumors of some hitch in the financial arrangements, and the position as regards the formation of the syndicate seems less favorable than was the case a short time ago.

Soda ash is in request, and makers having little to sell, prices have advanced, quotations ranging as follows: Caustic ash, 1 1/2 d. up to 1 3/4 d.; carbonated ash, 1 1/4 d. @ 1 1/2 d., according to brands.

Soda crystals are in demand and strong at £3 5s. up to £3 10s. per ton, while there is little offering for August delivery.

Caustic soda continues scarce for prompt delivery and prices are rather dearer. At the same time the demand has fallen off at the close, and values seem inclined to droop again. Nearest quotations on the spot are as follows: 60 per cent. £8 17s. 6d. @ £9, 70 per cent. £9 16s. 3d. @ £10, 74 per cent. scarce at £10 15s. @ £11, 76 per cent. none offering.

Bleaching powder has gone very dull, and £5 15s. is nearest spot value for hard wood.

Chlorate of potash steady at 5d. per pound and little offering.

Bi-carb. soda is in request at £5 15s. per ton and upwards for one-hundredweight kegs, according to brand and quality, with usual allowances for larger packages.

Sulphate of ammonia is steady at about £11 12s. 6d. @ £11 15s. per ton for good gray, 24 per cent. in double hags f. o. b. Liverpool.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, August 8.

Lime.—There is but little if any change in the state of affairs which has prevailed in this market for some weeks past. Arrivals are not more numerous, and vessels continue scarce. There is a fair demand, but nothing of any interest has been developed during the week. The rupture of the association has hardly caused comment, and nobody seems to know what will take place among the ex-members of the trust. Quotations are well maintained as for some weeks past. Rockland, common and finishing, 90c. and \$1.20. St. John, common and finishing, 85c. @ 95c.; Glen Falls, common and finishing, 85c. @ 1.10.

Cement.—There was a particularly good demand for cement during the month of July, notably for the foreign article. A great many consumers feared that the McKinley bill would become a law, and bought ahead of their actual requirements, in order that the advance in price due to the higher tariff might not affect them. The price has already risen 10 or 15 cents per barrel. There is a good demand for the various brands just now, which are quoted: Rosendale, 85c. @ \$1.10 per barrel; Portland, American, \$2.15 @ \$2.45; foreign, \$2.40 @ \$2.50; special brands, \$2.60 @ \$2.85; Roman, \$2.75 @ \$2.95; Keene's coarse, \$4.50 @ \$5.50; Keene's fine, \$7.25 @ \$8.50.

Bricks.—Both the demand and the supply have been good during the week. More or less uncertainty has been created by the labor difficulties, but no serious trouble has as yet resulted. As has been before stated, a boycott was declared on four brick yards, consequently no builder employing Knights of Labor could use the product of the boycotted people. The association of brick manufacturers met and declared that builders must not discriminate against the proscribed manufacturers. Some consumers fear the boycott and others do not, but thus far nothing really serious has resulted. Prices this week are: Haverstraws, \$5.50 @ \$6; Uprivers, \$5.25 @ \$5.75; Jerseys, \$4.25 @ \$5.25; and Pales, \$3 @ \$3.25 per thousand.

NOTES OF THE WEEK.

A meeting of the delegates of the different unions of journeymen freestone cutters from the States east of the Allegheny mountains was held in Philadelphia on the 5th inst., for the purpose of organizing a general union or to unite all the local unions.

The Brick Manufacturers' Association held an adjourned meeting in the Astor House on Monday to consider the boycott which the Board of Walking Delegates of the building trades of New York has put on bricks from Verplanck's Point. The manufacturers had sent a committee of three to visit all the brick manufacturers along the Hudson and in New Jersey, and the committee reported that it had secured the signatures of 97 per cent. of the manufacturers visited to an agreement not to send bricks to the New York market as long as the boycott is kept up. The manufacturers decided that they would continue sending bricks to New York until next Monday, so as to give the walking delegates one week to make up their minds. If by that time the boycott is not raised they will boycott the market.

IMPORTS AND EXPORTS OF METALS AT NEW YORK FROM JULY 26 TO AUGUST 2 AND FROM JANUARY 1.

Table with multiple columns listing imports and exports of metals (Steel, Iron, Copper, etc.) with quantities and values. Includes sub-sections for 'IMPORTS', 'Steel and Iron Rods', and 'EXPORTS'.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, and Date and amount of last dividend. The table lists numerous mining companies and their financial details.

Gold, Silver, Lead, Copper, Non-assessable. This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. Non-assessable for three years. The DeWolfe & Co. previously paid \$276,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia, \$240,000. Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,560,000 in dividends. \$1,000,000.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for Name and Location of Company, Dividend dates (Aug. 2-8), and Sale prices. Includes companies like Adms, Alice, Argent, Belcher, etc.

* Ex. dividend. Dealt in at the New York Stock Ex. Unlisted securities. Assessment paid. Assessment unpaid. Omitted July 15. Dividend shares sold, 15,896. Non-dividend shares sold, 32,020. Total New York, 47,916.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for Name of Company, Dividend dates (Aug. 1-7), and Sale prices. Includes companies like A-lantic, Bodle, Bonanza, etc.

Boston: Dividend shares sold, 23,064. Non-dividend shares sold, 31,494. Total Boston, 54,558.

COAL STOCKS.

Table with columns for Name of Company, Par value of shares, and Dividend dates (Aug. 2-8) and Sales.

**Sales in New York, 25,895; in Philadelphia, 16,444. Total sales, 107,492.

San Francisco Mining Stock Quotations.

CLOSING QUOTATIONS.

Table with columns for Company, and Closing Quotations for Aug. 1-7.

STOCK MARKET QUOTATIONS.

Baltimore, Md.

Table with columns: COMPANY, Bid, Asked, L. H. H. H. Includes entries for Atlantic Coal, Balt. & N. C., Big Vein Coal, etc.

Birmingham, Ala.

Table with columns: COMPANY, Bid, Asked, L. H. H. H. Includes entries for Ala. Coal & I. Co., Ala. Conn. C. & C. Co., etc.

Pittsburg, Pa.

Table with columns: COMPANY, B., A. Closing. Includes entries for Allegheny Gas Co., Bridgewater Gas Co., etc.

St. Louis, Aug. 6.

CLOSING PRICES.

Table with columns: COMPANY, Bid, Asked. Includes entries for Adams, Colo., American & Nettle, etc.

Table with columns: Central Silver, Cleveland, Colo., Cleveland & Anr., etc.

Trust Stocks, Aug. 8.

The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange: CERTIFICATES...

Foreign Quotations.

Table with columns: COMPANY, Highest, Lowest. Includes entries for Almada, Mex., Amador, Cal., etc.

Paris, July 24.

Table with columns: Belmez, Spain, Callao, Venez., Callao Bis, Venez., etc.

CURRENT PRICES.

These quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Table with columns: Acid-Acetic, Muriatic, 18°, Muriatic, 20°, Muriatic, 22°.

Table with columns: Nitric, 36°, Nitric, 42°, Oxalic, Sulphuric, 60°, Sulphuric, 66°.

Alkali-

Table with columns: Refined, 48 p. c., Refined, 58°, Alum-Lump, Alum-Grain, etc.

Brimstone-See Sulphur.

Table with columns: Brimstone, Sulph. Am. prime white, Sulph., foreign, etc.

London.

Table with columns: COMPANY, Highest, Lowest. Includes entries for Almada, Mex., Amador, Cal., etc.

THE RARER METALS.

Table with columns: Aluminum, Arsenic, Barium, Bismuth, Cadmium, Calcium, etc.

THE RARER METALS.

Table with columns: Aluminum, Arsenic, Barium, Bismuth, Cadmium, Calcium, etc.

BUILDING MATERIAL.

Table with columns: Bricks-Pale, Jerseys, Up Rivers, Haverstraw seconds, 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.