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The Table of Contents will be found at the end of the reading matter, page 351.

No stronger argument could be adduced for the need of greater efficiency in the Navy than the report that comes from Washington, that the boilers of the "Ossipee" are to be repaired at a cost of \$20,000, while new boilers could be put in for \$30,000. The only reason why the latter course, which would be far more economical in reality, is not adopted, is the saving of time effected by patching up worn-out boilers instead of taking them out and replacing by new ones, and the "Ossipee," or some other ship which does not yet exist, is required for foreign service. Any engineer and most men of business will at once recognize that to expend \$20,000 on repairing old boilers is a most wasteful proceeding.

A MOVEMENT has been started to erect a monument to the joint memories of FULTON and ERICSSON in Trinity churchyard. The idea is a happy one, and should receive cordial support, but we have a vivid and painful recollection of the desperate struggle necessary before sufficient money could be got together to provide a pedestal for the Statue of Liberty, also the apparently moribund condition of the Grant and Centennial Arch Memorial funds, and for this reason we are not sanguine as to the result. The idea originated out of an application which has been made, and which is likely to be granted, for the interment of the great Swedish inventor's remains in the Livingston Manor vault, which would, as it happens, place them immediately next to the grave of ROBERT FULTON, so that a joint memorial would seem to be especially appropriate.

WE are glad to see some sensible criticisms by the Dead-wood Pioneer on the subject of the New York Herald's championship of the Harney Peak scheme, and the unproved assertions of limitless tin supply in Dakota. The Pioneer, is, however, too charitable in its view when it says that "the assertion of Mr. AMOS J. CUMMINGS that \$3,000,000 has already been invested proves nothing except that \$3,000,000 has been invested." On the showing of the Harney Peak people themselves, their monthly expenditure does not much exceed \$22,000, so that even supposing they had been working with this energy for fifteen months, their expenditure would not have exceeded \$350,000, and in what has the balance of \$2,650,000 been invested? Certainly not in paying for the claims or in plant. If invested in the promoters' pockets, it will line them with silver, but will not aid in producing tin from Dakota. Our contemporary winds up its remarks by saying:

Over two years ago R. D. KELLY, of the Pioneer, made a tour of the tin mines, returned loaded with fine specimens and fuller of enthusiasm than Mr. CUMMINGS, and yet not a pound of the ore is on the market today. This newspaper mining should cease and give the men who invest their money a show. Reports from the mines continue most encouraging, and while we hope and believe that tin does exist in paying quantities, we do not know it.

THERE are rumors afloat that the prolonged stay in Washington and the frequent conferences of Minister RYAN with Mr. BLAINE are with the ob-

ject of framing a reciprocity treaty to be submitted to the Mexican government, to overcome the difficulties arising out of the Treasury instructions of Mr. WINDOM, and the consequent retaliatory action on the part of our neighbors. Something of this kind is stated as a fact by the Washington correspondent of the Iron Age. If true, and if such a treaty is framed on a basis acceptable to Mexico, it would aid materially in extracting some good from the Pan-American Congress when the fatigued delegates are permitted to return to their labors in Washington. Minister RYAN has presented to the State Department the following statement, prepared by the Mexican Foreign Office, showing the value of the commerce of Mexico with this country for the past year, as an argument in favor of some effort being made to retain the *status quo ante* the Treasury instructions, or to improve on it.

The imports from this country were of the total value of \$19,264,673, of which \$8,731,835 went in free of duty. Of dutiable goods the principal receipts were cotton, provisions, drugs and chemicals, iron and steel. The exports to the United States aggregated \$31,059,626 in Mexican currency, as follows: Merchandise, \$13,144,510; precious metals, \$17,915,116. The apparent balance of trade in favor of Mexico is \$11,794,953, but the difference in currency reduces this balance to \$2,209,067.

THE AMERICAN CHEMICAL SOCIETY.

In the issue of the ENGINEERING AND MINING JOURNAL for June 8th, 1889, we referred to the proposed formation of an American chemical society, a plan for which was to be discussed at the Toronto meeting of the American Association for the Advancement of Science. In accordance with this plan an afternoon was devoted to the consideration of the suggested organization before the chemical section, and in the discussion Professors BARKER, REMSEN, CLARKE and PRESCOTT each took an active share. For the most part the gathered chemists evinced their desire for a national society, but the conservative expressions of opinion from certain of the older members led to the loss of the resolution recommending the continuation of the committee with instructions to draw up a plan of organization, and subsequently a committee was appointed, with instructions to canvass the ground and report at Indianapolis at the next meeting. This committee consists of Professors CLARKE, of Washington; BOLTON, of New York; HART, of Easton; WARDER, of Washington, and ELLIS, of Toronto.

That a national organization of chemists is desirable is certain, and that it could exist and hold the same relation to the chemical industries of this country as the American Institute of Mining Engineers does to the mining industries is also true. To this end it seems to us that the plan followed by the Society of Chemical Industry in Great Britain is the best one to adopt, viz., a national organization with local sections, holding its annual meeting in connection with that of the American Association. A fear that a new chemical society was to be created has been expressed by the more conservative chemists, but in the minds of those who are most active in the matter it is consolidation of those existing that is desired.

Let the American Chemical Society of New York, the Chemical Society of Washington, and the Chemical Section of the Franklin Institute, appoint delegates to meet and confer for the purpose of considering ways and means of consolidation. They should decide upon such points as the following:

1. The establishment of local sections at Boston, New York, Philadelphia, Washington, Baltimore and other large centers.
2. The date and place of meeting for the election of officers.
3. The preparation of a financial scheme so that the cost of management should be equitably divided among the different sections.
4. The publication of a suitable journal.

The establishment of a National Chemical Society should come from united action of the existing societies and not from without.

THE DYNAMITE GUNS OF THE VESUVIUS.

THE final official tests of the dynamite guns forming the equipment of the fast cruiser "Vesuvius" took place last week, and have resulted satisfactorily. Commodore GOODRICH, chairman of the trial board, reports that the tests were successful beyond anticipation. According to the account in the *Army and Navy Gazette* by one present—

One regulation shell was first fired from each gun to satisfy the requirement as to the range. These shells are about 7 feet long and 10 inches in diameter, hold 200 pounds of explosive gelatine, and weigh 483, 504 and 505 pounds, respectively. All three were as steady in flight as a shell from a high-powered rifle. With a loss of pressure of 105 pounds in the firing reservoir, the first shell fell 32 yards beyond the mile buoy; with a loss of 80 pounds, the second fell 250 yards over the line, and the third, with a loss of 73 pounds, ranged 100 yards beyond the buoy. The time of flight was between 11 and 12 seconds. This demonstrated conclusively that a loss of 70 pounds in the firing reservoir would satisfy the contract as to range.

It now remained to test the rapidity. The projectiles used in this test were not of the regulation pattern, but they weighed between 20 and 50

pounds more, being full calibre wood and iron dummies. It was not expected that these dummies would be steady in flight, as the center of gravity was not at the proper point to insure steadiness; but they answered all purposes in testing the operations of loading and proving the capacity of the air reservoirs.

Starting with a shell in the gun, five shots were fired from the gun in 4 minutes 23 seconds; the losses of pressure in the firing reservoir at the different discharges being 70 pounds, 74 pounds, 74 pounds, 76 pounds and 78 pounds, respectively. The variation in the loss of pressure was due to the fact that the dummies vary several pounds in weight.

The middle gun was then tried, and starting with the gun unloaded, five shots were fired in 4 minutes 48 seconds. The losses of pressure in the firing reservoir were 105 pounds, 109 pounds, 114 pounds, 104 pounds, and 96 pounds, respectively.

Five shells were next fired from the starboard gun in 6 minutes 58 seconds, the losses of pressure in the firing reservoir being 118 pounds, 112 pounds, 105 pounds, 120 pounds, and 118 pounds respectively. With one shell loaded in the port gun, therefore, the 15 shots were fired in 16 minutes 9 seconds, or, taking into consideration the time necessary to load all 15 shells—that is, starting with the three guns empty—the 15 shots were fired in 16 minutes 50 seconds.

When the test began the air pressure in the storage reservoirs was 2,000 pounds per square inch. After the 15 shots had been fired the pressure was between 1,200 and 1,300 pounds per square inch, which was sufficient for at least ten shots more. Had the air pumps been kept running during the firing five more shots could have been provided for. It is thus demonstrated that the "Vesuvius" can fire 30 shells—all she can carry—without stopping to fill the air reservoirs. This is double the capacity demanded by the contract, and the rapidity was nearly twice as great as was required.

A vessel that can deliver and explode 3 tons of high-class dynamite a distance of a mile with any approach to accuracy is a most formidable agent for attack or defense.

THE ELECTRIC WIRE QUESTION.

The numerous deaths caused by high-tension electric light wires in this city have at length aroused public opinion to such a pitch as to force the municipal authorities to take the matter in hand seriously. So far, well and good. But these spasmodic agitations are apt to be carried to an excess and to overshoot the mark. The corrective measures proposed and to be adopted may, if hurriedly acted on, do much injury to legitimate business and to the public.

Several modes of restriction have been advocated by the press and by the advisers of the officials, and much ignorance of the conditions has been displayed. All are agreed that *something* should be done to prevent further loss of life, so far as possible. The question is to select and enforce the best regulations. The first idea was to put all wires, including low-tension light wires, telegraph wires and telephone wires, underground. This plan is an eminently proper one, for other reasons besides securing safety; but the popular belief that putting the wires in subways will do away with all accidents is a fallacy, as has been abundantly proved by the experience with buried wires in Germany. Even if the wires were perfectly safe when buried, they have to be handled in repairing and in making connections, live high-tension wires being in proximity to dead and harmless ones, just as in the overhead system; and at all events the wires have to be led up from the subways and exposed at many points or they could not be used. Still, the subway system, in spite of unavoidable imperfections, is a decided improvement, and it is an outrage that the construction of the necessary conduits has been so long delayed.

The next step was to remove all pole wires from lines where the subways had been made and were ready to receive them. It was right that the city should enforce the law on this point where the companies failed to conform to it.

Then followed a move to cut down all light wires "not properly insulated." The trouble is that it is practically impossible, or almost so, to determine which wires should be classed in this category and which should not. A wire may be safely insulated and stand all tests one day, and on the next day it may become dangerous or deadly because of abrasion or chemical decomposition of the covering. In deciding upon the wires to be removed, there is danger on the one hand of cutting down safe wires and on the other of overlooking unsafe ones; and in the act of removal itself, if done hastily, accidents may occur to line-men and passers-by. The daily press has been responsible for the mistaken ideas prevalent about insulation. The truth of the matter seems to be that perfect insulation is possible temporarily, but there is no absolute certainty that the insulation may not be impaired or destroyed by unforeseen accidents unless protected at an expense which is prohibitory.

Finally, the officials, the press and the public have been misled as to the distinction between dangerous pressure and safe limits. Possibly limiting the tension of currents to be carried by light wires may be the best ultimate solution of the problem; but it is only fair to the arc light com-

panies that the people should understand that a good deal of the philanthropy shown by electricians, who have advocated a limitation of tension, has in reality been mainly a matter of "business." The head man of a company furnishing incandescent lights only, which can be maintained by low-pressure currents, can well find it convenient to pose as a public benefactor, while at the same time he secures the shutting out of competing arc light systems. This has not yet been noticed by the newspapers and the general public.

Meanwhile, the Board of Health recommends that continuous currents of over 700 volts and alternating currents of over 250 volts should be forbidden.

It is evident that some definite regulations should be enacted, and when once made should be fixed so that the companies will know just where they stand and what to look forward to in planning future operations. Let us have, first, safety; then justice to all. Snap decisions and tentative schemes should give way to careful investigation and a final deliberate action.

RAILROADS IN CHINA.

In our issue of October 5th we drew attention to the important results now on the eve of being attained by the imperial edict lately decreed in China. The terms in which the construction of the first trunk railroad are ordered are clear and decisive; so much so, that we think it of interest to give the translation made for our contemporary the *North China Herald*, to show how, after much deliberation and determined opposition, the importance of the matter is really appreciated by the powers that be. The edict is as follows:

EDICT DATED 27TH AUGUST, 1889.

"The admiralty has submitted a memorial on railways, in which it recommends that the suggestion of CHANG CHI-TUNG to build a line direct from Lu-kow K'iao to Hankow should be carried out. This, the admiralty is of opinion, should be commenced from both ends as a tentative measure; in the south, from Hankow to Sin-yang Chow; in the north, from Lu-kow Kiao to Chéngting Fu, leaving the intervening sections for a future period. LI HUNG-CHANG will consult with the admiralty on the details of the necessary arrangements to be made with a view of at once giving effect to the scheme proposed. CHOW FU, Provincial Judge of Chihli, and the Taot'ai P'AN CHÜN-TEH, are selected, from their experience in railway affairs, to superintend the carrying out of the preliminary steps.

"The Sovereign is of opinion that to make a country powerful railways are essential, but recognizing the fact that at the outset the people will have doubts and suspicions, orders the Viceroy and Governors of Chihli, Hupeh and Honan to issue explanatory proclamations to them, exhorting and commanding them to throw no impediment in the way. It is the Imperial desire that all shall work together to make this great work a success."

Our remarks as to the impossibility of the recommendations of the commissioners being carried out with respect to the exclusive employment of Chinese material and manufacture for the construction and equipment of the railroad, are already justified, and we learn that the construction and equipment plant is to be obtained by tender. The construction of the line is to be commenced at both ends, the southern half from Hankow northward being entrusted to Viceroy CHANG CHI-TUNG, who suggested this road as the pioneer of the Chinese railroad system. The northern half is in the hands of Viceroy LI HUNG-CHANG, well known as the most enlightened and progressive man in China, and under whose auspices the Kaiping-Tientsin mineral line has been built. The construction of this section will be in charge of Mr. KINDER, engineer of the Kaiping line, who has, as our readers will remember from Professor CHURCH'S communications to the JOURNAL, deservedly earned the confidence of the Chinese authorities, and is competent in every way for the projected work. He, with the whole of the engineering and administrative staff, native and foreign, with the exception of one engineer, will be transferred to the new line, and on this section at least we may expect as few delays as possible in the carrying out of the work.

Already, the Viceroy LI has contracted for a loan of about \$6,000,000 at 5 per cent. for the first section, and has announced his policy of raising the money in this manner through the foreign banks established in China as required.

The affair having thus taken such a tangible shape, we again call the attention of our manufacturers to it, as although it is scarcely probable that we can compete for the supply of the rails, yet we can undoubtedly, and with more than a fair chance of success, tender for the plant required in construction, and for the locomotives and rolling stock.

Furthermore, there is the question of bridges, in which branch of engineering skill, it is admitted, that the builders of the United States are second to none in ingenuity, design, and most important of all, in a case of competition, in price; and in this enterprise there is an opportunity in crossing the great Yellow River, of showing again our superiority, as was done in Australia with the Hawkesbury bridge against all European competitors. This great engineering work will, it is said, be let by separate contract.

NEW PUBLICATIONS.

A DICTIONARY OF THE FOSSILS OF PENNSYLVANIA AND NEIGHBORING STATES. By J. P. LESLEY, State Geologist of Pennsylvania. Vol. 1., A-M., series number P4. Published by the Board of Commissioners for the Geological Survey, Harrisburg, 1889. Cloth, 8vo, xiv. + 437, - errata, xxxi, + list of publications 10 pp. Illustrated with numerous wood cuts.

The object of this compilation is to furnish the quarrymen, miners and prospectors of Pennsylvania a simple reference catalogue of the fossils of the State so far as they have been identified, or which, because of their occurrence in the same horizons in the adjoining States of New York, Ohio, Indiana and Kentucky, may be likely to be discovered in Pennsylvania in the future. The list is arranged alphabetically, which is the most convenient form for popular use. The illustrations accompany the names, references and localities, so that a comparison of specimens with the figures can readily be made. They are fac-simile reproductions of wood cuts of earlier geological reports of the Pennsylvania and other State surveys, including many figures long out of print or inaccessible to any but a few palaeontologists and those living in large cities or near the older educational institutions, where the libraries may be consulted. The plan is a practical and a commendable one. It would be of still greater utility if it could have been carried out in full; that is, if each of the catalogued fossils were figured in connection with the text; for descriptions unaccompanied by illustrations are unintelligible to the unprofessional reader. Professor Lesley suggests that similar catalogues for all of the States and Territories of the Union are greatly to be desired. Perhaps in time we may see a nearly complete list for the whole country, which shall be accessible to all mining men, who would thus be able in many cases to determine geological horizons, and consequently the bearing upon mineral deposits of certain classes, without having had a special training in geology and palaeontology.

Professor Lesley is one of those who do not believe in an evolutionary sequence of life forms. In his introduction to the present volume he goes somewhat out of his way to say:

Those who please to speculate on the evolution of life may amuse themselves with traces of resemblance, but they cannot find a single proof, however slight, for the actual hereditary descent of the living creatures of our age from those of preceding ages. From the dawn of time onward to the present time, each age has had its own special fauna and flora, its peculiar shapes of animal and plant, by which it and its rock strata can be recognized by the geologist.

Evolutionists do not claim that fossils show an unbroken, progressive series of life forms in regular sequence. They admit the incompleteness of the record and the wide gaps in time and conditions which separate geological horizons from each other, and which exist even when the successive formations have been laid down conformably. But, as a matter of fact, instances are offered, as in the evolution of the horse and in the descent of birds from reptiles, which afford strong presumptive evidence of a natural sequence.

THE ORIGIN OF THE GOLD DEPOSITS NEAR OURAY, COLO.

Written for the Engineering and Mining Journal by F. M. Endlich, M.E.

During the past five or six months the immediate vicinity of Ouray, Colo., has attracted much attention, and the news of its newly discovered "gold belt" caused widespread excitement. The stories which circulated at first had a suspicious flavor about them, but it has been shown that they were "founded on fact."

The popular mind has conceived within this "gold belt" a series of caves filled with gold in various forms all but coined. In point of fact, a zone of caves has been found, containing gold ore of unusual richness. In order to obtain some insight into this curious occurrence I recently visited the principal mines of the "gold belt," and made such examinations as the time at my command would permit. The result of these I herewith submit.

A very concise review of the geology of the region may serve to establish the relative horizon of the gold deposits. In Uncompahgre cañon, above Ouray, a vast mass of metamorphic quartzites and some schists appear, overlaid by erupted rocks of tertiary age. Probably the latter belong to the series of andesites and trachytes, but the question is open. Capping these beds, which reach a thickness of several thousand feet at places, occurs what is locally known as the "volcanic breccia," a conglomerate made up of fragments and boulders of various erupted rocks. Ouray itself is located on the morainal debris of glaciers which swept down Uncompahgre and Sneffels cañons. Below the town the unaltered paleozoic beds commence (although they extend up Sneffels Creek also), showing alternations of sandstone and shales, with an occasional bed of limestone.

About 1,600 feet above the level of the town a prominent ledge of quartzite crops out along the mountain face, and it is in the upper portion of this quartzite that the "gold caves" have been found. The quartzite bed is about 70 to 90 feet thick, and forms a bold escarpment for a long distance. It is (at the American mine) overlaid by 60 feet of dark shales, bituminous near their base, strongly metamorphosed by heat higher up. A massive bed of porphyritic trachyte, about 120 to 400 feet in thickness, covers the shales. This bed may be intrusive, with more shale above it, at least at some points. Surmounting all this the "volcanic breccia" forms the crest of the ridge.

A more or less thorough metamorphosis of shales and sandstones is noticeable for a distance of 400 to 500 feet below the porphyritic trachyte, indicating an unusually strong or long-continued action of heat. The upper portion of the quartzite shows vugs, nests and caves of varying dimensions within the 20 or 30 feet nearest the bituminous part of the shale. Upon opening, these caves are found to be partly or entirely filled with a yellow or brown auriferous clay. The bottom and sides of the cave may be encrusted by metal-bearing minerals such as *Anglesite*, *cerussite*, *pyrite*, and various sulphides or the products of their decomposition. The quartzite, which has been "baked" until it glistens like freshly-broken porcelain, is traversed by vertical cleavage-fissures in various directions. Many of these fissures are mere cracks, others widen out to a foot or more. They seem to extend below the present horizon of the caves. These cracks, too, are filled with more or less auriferous substances, which, however, bear less the character of clay deposits than those in the caves. The dimensions of the latter vary from the size of an ordinary

"bug hole" to 7 or 8 feet in height and 20 to 30 feet in lateral extent. It has been noticed (in the Nettie mine) that some of the caves extend upward to the contact of the quartzite with the overlying shale, but this is not the rule.

Concerning the formation of these caves and their filling, several hypotheses have been advanced. The most plausible one to me is that which assumes it to be a case of *replacement*. It is well known that many, perhaps a majority, of sandstone beds which are overlaid by argillaceous shales contain almond or lentil shaped inclusions, more or less regular, of the shales within their upper portions or measures. Such inclusions may be sufficiently numerous to form a definite horizon, and may extend for considerable horizontal distances. Curiously enough, the shale lying immediately upon the quartzite is but little metamorphosed for 10 or 15 feet, and carries bitumen. Whether the original inclusions in the unaltered sandstone were bituminous or not, or whether this substance was deposited at this particular horizon in consequence of distillation due to the heating of the entire series of beds, cannot be determined at the present stage of the workings. I am, however, inclined to the former view, assuming that, locally at least, above the quartzite the bitumen failed to find vents for escape, and, incidentally, prevented the complete metamorphosis of the shale itself.

The sandstone, being fissured during its transformation into quartzite, would offer an escape for the bitumen contained in the inclusions, and the shale would, by the process of heating and consequent volatilization of the hydrocarbon compounds, become more or less disintegrated. Whether or not this condition of affairs existed, it is an easy matter to imagine the gradual removal of the shale inclusions, after once free access and egress for solvent and transporting agents has been established by the formation of numerous, properly located fissures. With equal readiness, too, could passing solutions deposit various substances in the places of those previously or synchronously carried away.

This brings us to the question concerning the source of supply of the metalliferous substances. It is a well-known fact that the quartzites of this region are more or less auriferous, and that nearly all of the erupted rocks are metal-bearers. The relative position of the caves makes it improbable that they should have received all of their gold supply from the surrounding quartzites. The porphyritic trachyte above alluded to, and in part, perhaps, the "breccia," have, undoubtedly, supplied the greater portion of the ore found within the caves and fissures. (Mr. Dunham, manager of the American and Nettie mines, has obtained good assays of gold out of porphyritic trachytes and porphyries near his mines.) In the vicinity of the American and Nettie mines a number of small dikes have been observed, which look like porphyry. The rock is pyritiferous, and the pyrite carries gold. Some of the dikes cut across the quartzite, and they, too, have probably added their share toward the enrichment of these singular deposits.

Presumably the ore was originally deposited in the form of sulphides from (thermal?) aqueous solutions. Some minerals belonging to this class remain undecomposed even now. Subsequent oxidation then produced the present forms. The caves are remarkably well supplied with fresh air from unseen sources, and roots of plants and nests of mountain rats are found many feet below the surface. This shows that decomposing and oxidizing agents certainly must have had free access. A noticeable feature lies in the occurrence of *heavy spar* as a lining of some fissures and intermixed with the ores. This mineral frequently forms the gangue-rock of veins in the districts lying within the erupted region, and is often associated with good ore. It points to a common origin of the ore from the igneous rocks.

In character and appearance the caves bear out the suggestions above made as to their origin and method of filling. Many of them show distinct shelving, which is not due to any secondary accretions. Nearly all of those which contain appreciable quantities of rich ore are in direct connection with some vertical fissure. The sides and roofs of the caves often show a more or less delicate tracery of honey-combed quartzite, due rather to the original intermingling of quartz-sand with the shale inclusions on their edges than to a secondary deposition of pyritiferous quartz and subsequent decomposition. On the other hand, the ore in the fissures is usually "frozen" to the quartzite, without any honey-combing whatever, or it loosely fills the space between two smooth walls. Signs of attrition by water are not wanting and add their testimony in favor of replacement. I am inclined to regard the clay in the larger caves as a remnant of the original shales which, after the expulsion of the bitumen, were changed by the deposition of ferruginous minerals and subsequent washing out. In some cases a hard *clay-iron stone* lines certain portions of the caves and is impregnated with native gold.

The gold is generally found native in wires of varying thickness. Silver seems mostly to be in combination with sulphur. Tellurides are suspected, but not yet proved. Whether the vicinity of carbonaceous matter in the overlying shales has had any influence upon the reduction of the gold is not easy to determine, but seems possible.

The commercial aspect of the "gold belt" has proved eminently satisfactory thus far. The American, Nettie and Cascade mines are the leading ones, although there are several others of great promise. From the two first-named nearly 200 tons of ore have been shipped by this time, which ran from 16 to 40 ounces in gold by the car, and carried some silver besides.

The prospects of the "gold belt" would seem to depend upon the simple question pertaining to the extent of the replacement of the shales in horizontal (or nearly so) directions. It would be premature to say much upon this point at the present stage of developments, but the guess may be hazarded that, with increasing depth (towards the interior of the mountain), the ores will become sulphuretted, and a difference in value will thus be found, commensurate with the relative density of the auriferous materials. There seems no ground, however, for any assumption that would lead to the expectation of either increasing riches or an appreciable diminution. The topographical position of the quartzite reef where now under work is, essentially an accident, and presumably exerted no perceptible influence upon the accumulation of metallic values; while, on the other hand, it no doubt greatly facilitated the decomposition of the ores.

Taking it altogether, this gold-bearing zone presents most interesting features and is eminently worthy of detailed and exhaustive study.
SOCORRO, N. M.

WILLIAM RICHARD JONES.

Many of those most prominently identified with the gradual perfecting of our steel industry are men who, by their industry and mechanical skill, have risen from the ranks to take charge of works. Without the advantages of a technical education and without diplomas or degrees they have worked out one of the greatest industries in this country. Prominent among this class was the distinguished inventor and ironmaster whose name is at the head of this article, and whose sad death we have recently recorded.

Mr. Jones was born in Luzerne County, Pa., on February 23d, 1839. He was a son of the Rev. John G. Jones, who came to this country from Wales in 1832, and settled first in Pittsburg and then in Hazleton, Pa. His education was of the most meager character, and at the age of ten he was apprenticed to the Crane Iron Company, of Catasauqua, Pa., serving at first in the foundry department and then passing to the machine shop, where he made his ability so apparent that before he was fifteen years of age he was earning journeyman machinist's wages.

In 1856 he removed to Philadelphia, where he followed his trade, but remained there only a short time. Subsequently he went to Clearfield County, where he worked as a lumberman, raftsmen, and farm hand until 1858. He went to Johnstown in 1859, and was employed as a machinist by the Cambria Iron Works. Three months later he removed to Chattanooga, where he remained until compelled by the civil war to return to the North. A year later, July 31st, 1862, he enlisted in Company A of the 133d Pennsylvania Volunteers, and became corporal. This regi-

His inventions include a device for operating ladles in Bessemer process, and improvements in hose couplings, for which he received letters patent in December, 1876, also during the same month he patented fastenings for Bessemer converters. Among his other inventions were washers for ingot molds (1876); hot beds for bending rails (1877); apparatus for compressing ingots while casting ingot moulds (1878); cooling roll journals and shafts (1881); feeding appliance for rolling mills, and the art of making railroad bars (1886); appliance for rolls, apparatus for removing and setting rolls, housing caps for rolls and roll housings (1888); and apparatus for removing ingots from molds (1889). At the time of his death the Patent Office had passed favorably on a new method invented by him for mixing metal taken from blast furnaces and charged into two receiving tanks, but the letters patent had not been received. This is regarded as his greatest invention.

Captain Jones had rare executive ability, and showed great tact in his management of men. Although at times forced to meet the demands of the workmen with determined opposition, still he showed great consideration for their welfare, and during a strike never made any attempt to start the works until he had first notified the leaders when he was going to resume. During the trying times that followed the Johnstown disaster he did a noble work. With several hundred workmen he at once proceeded to that stricken city, and was said to have been the coolest and most efficient man there when clear-headed men were so greatly needed.

In 1888 Captain Jones was called to the responsible place of consulting engineer to Carnegie, Phipps & Co. He was a member of the American Institute of Mining Engineers, of the American Society of Mechanical



Wm R Jones

ment served with the Army of the Potomac, and he took part in the battles of Fredericksburg and Chancellorsville. He was badly wounded at the crossing of the Rapidan before the last named battle, but refused to leave the ranks, although suffering greatly. When his term of service expired he returned to Johnstown and again worked for the Cambria Iron Works. He then organized Company F of the 194th Pennsylvania Volunteers, and was mustered in as captain on July 20th, 1864. Captain Jones was assigned to the command of the Provost Guard in Baltimore, which place he held until June 17th, 1865, when he was mustered out of service. In this command he behaved with tact and courage, and was publicly complimented by General Lew. Wallace.

Capt. Jones then re-entered the service of the Cambria Iron Company as assistant to the chief engineer, and in that capacity aided in the construction of the company's steel converting and blooming mill plants. He subsequently became master mechanic and finally general superintendent of the Edgar Thomson Steel Company, and directed the building of the furnaces designated by the letters A, B, C, D, E, F and G. His improvements and inventions have made these furnaces the best in the world.

Engineers, and of the Engineers' Society of Western Pennsylvania, and of the Iron and Steel Institute of Great Britain. He was a prominent member of the Grand Army of the Republic, and in 1888 was chosen its Senior Vice-Commander in Pennsylvania. His death occurred on September 28th, and was the result of injuries received from the bursting of furnace C of his work, when the molten metal was thrown over him.

No man connected with the steel works of this country was more highly esteemed, and in his death the community has sustained the loss of one of its most able and progressive mechanical engineers.

The Profits of the Eiffel Tower.—The Eiffel Tower Company has proved a most profitable investment. The net receipts of the concern already amount to more than its nominal capital, viz.: 5,100,000 francs, and the shareholders have been reimbursed their whole outlay. The receipts last month were about two per cent. per diem on the above capital, so that the net profit to the stockholders will be ultimately very large.

NOTES ON THE WING.

From a Traveling Co respondent.

To persons interested in the matter of water works in small cities, the reports of the Binghamton water works should be studied. The works are owned by the city. They are run at a surprisingly low cost, and very efficiently. The question whether a city should own its water works, or obtain its supply from a private corporation, seems to be settled in Binghamton in favor of public ownership.

Cornell University, Ithaca, N. Y.—Your correspondent made a brief call at Sibley College, the mechanical engineering department of Cornell University, on the day when it was being overrun with students registering for the coming year's work. The freshman class in Sibley College alone numbers 150, which will severely tax its exceptionally fine accommodations. The college has had a remarkable growth since Professor Thurston became its director, four years ago. Its workshops and testing laboratories are finely equipped, and the incoming class will have advantages offered them for study of mechanical engineering, both theory and practice, which could not have been obtained anywhere in the world a few years ago.

A new building for the civil engineering department, costing \$100,000, is now finished, and a new chemical laboratory, to cost about as much, is in progress. Work is under way on the foundation for the new library building, which will cost, when completed, about a quarter of a million of dollars. There seems to be no lack of money at Cornell. Its location, on the top of a high plateau, overlooking the city of Ithaca, is indescribably beautiful. The writer has visited Yale, Harvard, Princeton, and dozens of other colleges in this country, besides Oxford and other colleges in England, but none of them seem to have the peculiar charm of Cornell.

Professor Thurston has just returned from the Paris Exhibition, where he has been serving on the jury. He is at work on a new book on steam engines and boilers, which will probably be issued in a few months.

The Straight-Line Engine Works, Syracuse.—These works are showing the best evidence of prosperity in the erecting of a commodious new shop, immediately adjoining the present one. Professor Sweet, the president of the company, has just returned from Europe, and is full of English ideas. One of them he is introducing into the new shop, viz., the "saw-tooth" roof, which is almost universal in England, but is rarely seen here. The northern slope, or nearly vertical portion, of the saw tooth is of glass, giving the best possible way of lighting the shop. If this roof is successful under the heavy snow storms common in Syracuse, it should be adopted in other parts of the country. The walls of the new shop are now up, and over the arched entrance to the office, carved in stone, are the words, "Visitors always welcome." This idea is, however, not taken from England. It is more American than English, but it is not universally adopted here, for within three minutes' walk of the Straight-Line Engine Works is another factory where the first object that meets the caller's eye is a notice: "Please do not ask to see our men or to visit the factory during working hours."

One of the most interesting tools in the engine works is what is called a traversing machine, invented by Professor Sweet. It looks like a planing machine, but instead of the planer tool holder there is a vertical spindle, which holds either a drill or an end or a side milling cutter, as may be desired. The bed of the machine has a longitudinal motion, with variable automatic feed to suit the requirements of milling; the spindle has an automatic and variable feed in the cross-head, and the cross-head has a similar motion up and down on the uprights. So the rotating drill or milling cutter, in addition to its rotation, may have three other motions relative to the piece being cut, lengthwise, crosswise and up and down. The tool is used for machining the beds of the straight-line engine, and for a variety of other work. It ought to come into general use. On the whole, the Straight-line Engine Works is a very interesting place to visit, and it will be more so after the new works are finished. May they live long and prosper, with their cheerful motto, "Visitors always welcome," over the door.

Rochester, N. Y.—One of the leading industries of Rochester is the brewing of beer. It has been highly profitable, and some of the profits appear in the shape of fine, tall buildings for office and other business purposes, erected in the principal streets of the city. Recently, the English syndicates have been buying the breweries at enormous prices, making five-year contracts with the managers to continue running them. Opposition breweries are already talked of. If these are built, and divide the trade with the old breweries, the prospect for dividends to our English capitalists becomes rather shadowy. What becomes of all the money that American owners receive when they sell out to the Englishmen? It is an interesting question. It must be invested somewhere, and no doubt it is re-invested in the United States. It must be giving a stimulus to industry, giving the country at least a temporary increase of prosperity.

Horizontal Turbines.—There is an interesting electric light plant here, in which the motive power is furnished by two horizontal turbines on the same shaft, which take the water in opposite directions, so as to neutralize the end thrust which a single turbine would have. The shaft being horizontal, there is no need of the bevel wheels used with vertical turbines. Query: Why are these horizontal turbines not more commonly used?

The Woodbury Engine.—The Woodbury Engine Company are doing a good business with their new high speed automatic engine. They are now shipping two of them to Japan and one to Canada. This engine has been only about two years on the market. It is of the common fly-wheel governor type, with double disk crank, and both shaft bearings on the frame. The frame is exceedingly strong, and no expense seems to have been spared in its construction. It has a novel and effective way of balancing the slide valve by means of a relief plate on the back of the valve, which has a very delicate adjustment to and from the valve. This engine ought to take rank with the very best engines of its type.

A Step Backward in Engineering.—In the electric light station in Rochester there is a curiosity in steam engineering. An Armington and Sims and a Porter-Allen engine are running side by side. Each has its automatic fly-wheel governor cut-off disconnected, and the engine is governed by an old style Judson throttling governor. It is claimed that better regulation is secured thereby. There is a Woodbury engine in the

same room which is governed by its fly-wheel governor as usual, and is said to be doing all right. The automatic steam-engine men had better look into this matter. Their engines will get a "black eye" if they allow them to be fitted with old style governors in this fashion.

Buffalo.—Buffalo is showing signs of great business prosperity in the increased traffic in its streets and in the improvement in its buildings. The new Iroquois Hotel is a fine piece of architecture. A lesson to monument builders here is seen in the fine soldiers' monument, which is surrounded by a scaffold erected for the purpose of taking it down to give it a new foundation. The old one was not strong enough, and the safety of the monument was endangered.

The usual bran new scheme for utilizing the water power of the Niagara River is again projected. This time it takes the form of an immense tail race to be dug parallel to the river for fifteen miles, with numerous cross canals or head races running from the river, each one furnishing one or more turbines which will drive dynamos to furnish electric power. It is proposed to excavate the tail race by hydraulic power, on the same principle as hydraulic mining is done in the West. If the tail race, canals and machinery can be hidden from the view of visitors to Niagara Park, and the amount of water taken not be great enough to diminish the apparent volume flowing over the falls, the aesthetic objections to the use of the water power will be overcome, and the engineer's reproach, "why is so great a water power going to waste?" will be done away with.

Dunkirk.—Dunkirk is a town not often seen by the ordinary traveler, except from the train as he rushes through it, but it contains one of the famous locomotive works of the country, the Brooks Locomotive Works. It is a splendidly arranged works, equipped with modern machinery, and is doing a prosperous business. Mr. Edward Nichols, well known to many of the readers of the JOURNAL, has been the general manager of the works for the last two years, since the death of its founder, Mr. Horatio G. Brooks. Mr. Brooks was one of nature's noblemen, and the works are a monument to his skill and enterprise. A technical night school for apprentices is carried on in a fine school room built over the office.

The Dunkirk engineering Company is the name of a new concern which is operating a machine works here. They propose to make a specialty of hydraulic machinery. A pump of their make, a two-cylinder compound for a new hydraulic lift for the locomotive works, shows excellent design and construction. Mr. Charles F. White, who was for several years instructor in shop work in the St. Louis Manual Training School, is connected with these works. They will probably take high rank among engineering establishments in the near future.

Erie, Pa.—Erie is famous as the city where more steam boilers are made than in any other city in the country. The common tubular and the portable are the leading styles. The boiler works are now having a "boom;" they are all crowded with orders—a good sign of the general prosperity of the country. The Stearns Manufacturing Company, makers of saw mills and general machinery, as well as boilers and engines, have a splendid new shop. The Erie City Iron Works are building an immense foundry, which will be one of the finest in the country. It will have four traveling cranes, covering every portion of its molding floor. It is also building a new pattern shop, and other improvements are projected. T. M. Nagle, boiler and engine builder, has purchased ground for the erection of a new works which will be begun shortly.

Indicated Horse-power Developed per Ton of Boiler.—The following figures show the indicated horse-power developed per ton of boilers of different types:

Peninsular and Oriental steamers.....	16 6
H. M. S. Anson.....	21 3
Locomotive boiler of torpedo catcher.....	43 0
boat.....	48 0
Thornycroft's water-tube boiler.....	55 0

A New Forest Clearer.—An invention has been patented in New Zealand which, if it does all that is claimed for it, will make clearing of forest land a much easier matter. It is a composition with which trees can be poisoned, mingling itself with the sap and circulating through every branch and leaf, utterly destroying the life and rendering the standing tree in three months' time dead and rotten, and so highly inflammable that when fired it burns away literally root and branch, for the fire creeps even down the roots into the ground, consuming them so thoroughly that the land can be ploughed afterward. It is available also for old stumps, thus doing in a month what nature takes years to accomplish. The process of inoculation is simply the boring of a hole about six inches into the tree with an inch auger, filling with composition and afterward plugging with cork, tough clay, or other suitable substance. It has had several trials, and is stated to have done effectual work in all cases. In one instance 700 acres having been cleared with it, every tree, it is claimed, being successfully dealt with. It is also very inexpensive, not costing more than a few cents for a large tree.

Solution for Depositing Metallic Cobalt.—The cobalt salt, preferably the chloride, is dissolved in a sufficiency of water at a temperature of about 100 degrees F., and a concentrated solution of Rochelle salt added until the bulky precipitate at first formed has almost entirely redissolved. The solution, filtered if necessary from any insoluble precipitate, is electrolyzed with the utmost ease by connecting the article intended to receive the deposit with the negative electrode of any single cell battery. The opposite, or positive electrode, which is composed of a zinc rod immersed in a saturated solution of either ammonium chloride or common salt, and protected from contaminating the cobalt solution by the intervention of a porous pot surrounding the zinc. On completing the circuit the cobalt is immediately deposited in a uniform layer, and at the same time presenting a perfectly bright surface. On substituting nickel chloride in place of the cobalt salt, metallic nickel may be similarly deposited. It has also been observed on several occasions that by employing a solution holding both nickel and cobalt salts in solution that the deposit thus obtained was considerably darker as regards shade, and also more durable than when cobalt alone was used, the deposit thus produced consisting of both nickel and cobalt in almost exact proportions. Zinc and several other metals may be also deposited by the same means.—H. N. Warren in Chemical News.

AMERICAN RAILROAD BRIDGES.

By Theodore Cooper, M. Am. Soc. C. E.*

(Continued from page 315.)

In 1812 Lewis Wernwag built his "Colossus" bridge over the Schuylkill at Fairmount, Philadelphia. (See Plate IX.) It had a clear span of 340 feet $3\frac{1}{2}$ inches. The eastern abutment was founded on the rock, and the western one on piles driven to the rock. This bridge was destroyed by fire September 1st, 1838.

In 1814, he built the New Hope Bridge (Plate IX.) over the Delaware River, consisting of six arch spans of 175 feet; versed sine of arch, 13 feet. Each span consisted of three arch ribs, formed of four sticks 6×15 inches, dressed to the curve and confined by iron clamps and bolts.

Wernwag's practice was to saw all his timbers through the heart, to detect unsound wood and permit good seasoning of the timbers. He used no timbers of a greater thickness than 6 inches, and separated all the sticks of his arches by cast washers, to allow free circulation of the air.

In 1810 he built a wooden cantilever bridge over the Nashamony River, Pa. He called it his "Economy" bridge, and claimed that it could be used to advantage up to 150 feet spans.

From this date to 1836 he built many bridges. In 1830 he built his first railroad bridge at Manoguanay, on the Baltimore & Ohio Railroad.

His last bridge was the railroad bridge over the Canal and Potomac River, at Harper's Ferry, in 1836.

The previously mentioned bridges with spans of any magnitude appear to have been arch bridges.

The first marked step toward bridges of the modern truss form was the wooden lattice bridge, patented by Ithiel Town, January, 1820 (Plate X).

til 1840, when William Howe patented the truss which was the basis for the present Howe truss bridge. Plate XI.

This form of truss grew rapidly into favor, from its simplicity of construction, perfection of detail and satisfactory action under service. For

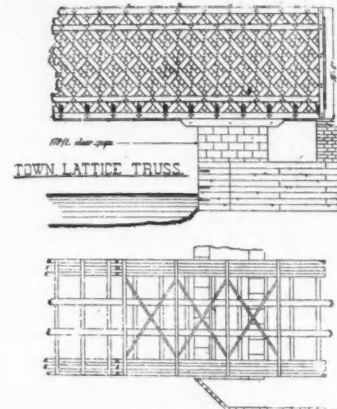


PLATE X.

some years it has been the standard form of wooden bridge in use upon our railroads.

The chords and braces are made of timber, and the vertical web mem-

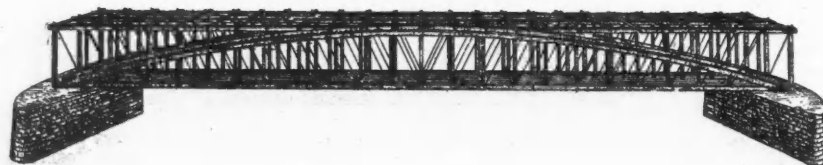
**PATENT BRIDGE "COLOSSUS"***Across the River Schuylkill at Philadelphia.**Single Arch 340 feet $3\frac{1}{2}$ inches.**Built by Lewis Wernwag.***BRIDGE erected over the DELAWARE***at NEW HOPE.**Built by Lewis Wernwag*

PLATE IX.

The horizontal members or chords of this bridge were composed of two or more parallel sticks, spaced so that the diagonal web members or lattice work would pass between them. The timbers were usually 2 to 4 inches in thickness, and 10 to 12 inches wide. The web members were placed closer together for the longer spans. The chords were also made in two sets for the longer spans, one placed above the other.

The web members at every crossing and at their junction with the chord pieces were fastened with wooden treenails.

The timbers being of one size and of reasonable dimensions, were readily obtainable. The absence of all bolts, straps or rods of iron, and the simplicity of the mechanical operations required to connect together the parts of this bridge, made it a cheap and popular structure.

A great number of bridges of this class, up to spans of 220 feet, were built throughout the United States, both for highway and railroad purposes. There are many of them still in existence.

These bridges were made of uniform section throughout. In order to get sufficient support at the ends, they were usually extended over the abutment a distance about equal to their depth, and were made continuous over all the piers.

From the thinness of the web system the trusses were apt to warp, and as they aged they became very flexible, owing to the want of rigidity of the treenail connections.

Mr. Town claimed, at least in his later pamphlets (1881), that these trusses could be made of wood, wrought or cast-iron.

The next step toward simplicity and concentration of parts appears to have been the truss known as the Long truss, patented by Brevet-Lieutenant-Colonel Long, of the United States Engineers, in March, 1830, and November, 1839.

This also was a form of truss in which iron did not enter as a necessary part, the connections being made by framing the parts together, or by use of wooden keys or treenails. Many bridges were built of this form, but it never became widely popular.

Both the Lattice and the Long bridges were combined with the arch in many cases, especially for the longer spans.

No further important advance in the styles of the trusses was made un-

* Transactions of the American Society of Civil Engineers.

til 1840, when William Howe patented the truss which was the basis for the present Howe truss bridge. Plate XI. This form of truss grew rapidly into favor, from its simplicity of construction, perfection of detail and satisfactory action under service. For some years it has been the standard form of wooden bridge in use upon our railroads. The chords and braces are made of timber, and the vertical web mem-

bers (tension) of round iron, with screw ends, usually upset to give a stronger section through the screw threads than in the body of the rods. The chords are made of uniform section throughout, and both the top and bottom chords of the same number of timbers, and timbers of the same width and spacing. The sticks of the lower chord (for through bridges) are made deeper than those of the top chord, on account of the loss of section from splicing, the lower strains used in tension and to resist the bending strains due to the cross floor timbers, which rest directly on the lower chord. The chord sticks are spaced two or more inches apart, to allow the passage of the vertical rods without cutting away any of the timber, to give room for the packing and splice blocks and to admit free circulation of air between the timbers. The number and length of the chord timbers are arranged so that no more than one stick need be spliced in any one panel of the truss. The chord sticks may be spliced either with oak or iron splices.

The braces and counterbraces are square-ended, and rest upon the inclined faces of the angle blocks. They are held from displacement by lugs or dowels. The angle blocks were formerly made of oak, but now are made of cast iron. They are provided with square-faced projections, which are let into the chord timbers, to take up the horizontal shear of the braces by direct fiber compression.

The "gib plates," as the plates on which the nuts of the web rods bear are called, are usually made of thick, flat plates of wrought iron.

The space between the chord timbers below the angle blocks contains cast tube blocks, made a little short to allow for the shrinkage of the timber.

The vertical shear of the braces is transferred through the angle blocks and these tube blocks to the gib plates and web rods, thus avoiding any crushing action across the fibre of the wooden chord pieces.

The timber in a properly designed Howe truss is only strained longitudinally with the fiber.

The very wide experience in this class of bridges has enabled the American bridge builders to so proportion them in all their details that the best results can be obtained from the material at a moderate cost. But for the two objections, their liability to destruction from fire or from decay, no better railroad bridge up to 150 feet spans could be desired.

For most of our country the cost of good timber makes iron bridges the cheaper, at first cost, for spans over 150 feet.

Very few Howe truss bridges are now being built upon the older and financially better roads, all wooden bridges being replaced with iron structures.

In April, 1844, Thomas W. and Caleb Pratt patented the truss known as the Pratt truss. It differed from the Howe in making the diagonal members of the web system of iron (tension) and the vertical members (compression) of wood, the reverse of the Howe principle. While many bridges were built upon this form, it never succeeded in attaining an equal popularity with the Howe, as it required a greater quantity of the more expensive material, wrought iron, and was not so well suited to the joint use of the two materials, wood and iron.

It became, however, the favored form, afterward adopted for iron bridges, and is therefore one of the steps in the development of American bridges.

In addition to the general forms of structures heretofore mentioned, the variations of these broad types and other special forms were numerous. Each individual builder had his own favorite at some time. It would be impossible and useless to take up those numerous individual cases, though they undoubtedly served a good purpose in the general evolution.

The development of wooden bridges was entirely empirical. They were generally of uniform section, and their proportions determined either from the result of previous failures or from the study of models. The advancement was, however, toward simplicity of form and construction, and greater perfection of the details of the connection of the parts.

2. IRON BRIDGES.

As early as 1786 the need of a material for long span bridges, more suitable than wood, engaged the attention of thinking men.

bridges to be sent to any part of the world." Soon after this his interest in bridges was obliterated by his interest in the French Revolution. His bridge was sold to satisfy his creditors.

In the memoir from which the above information is taken, dated 1803, he proposes that the Congress of the United States erect an experimental arch of 400 feet span "to remain exposed to public view, that the method of constructing such arches may be generally known." He offers to furnish the proportions of the several parts and to superintend its construction without compensation.

From this time no further consideration seems to have been given to the use of iron for bridges until about 1830, when Long and Town both suggested that their bridges could be made in iron or wood.

In 1833 August Canfield took out the first patent for an iron truss bridge.

The first iron truss bridge built is believed to be the one erected over the Erie Canal at I rankford, N. Y., in 1840, by Mr. Earl Trumbull.

"The truss was a combination of the truss and suspension principles, and was formed of—first, seven cast-iron sections or panels of about 11 feet in length and 7 in depth, cast solid, each segment consisting of an upper chord, a pair of diagonal braces and half of a hollow cylindrical post at each end (of the segment), except that the end segments had full cylindrical posts at the abutments. These semi-cylinders being bolted or clamped together in series, formed full cylindrical posts, which were flanged at the bottom, and through which were passed vertical bolts securing them to wooden transverse floor beams. Second, two wrought-iron suspension rods (1½ inches diameter) attached to the top end of the end posts, and sagging in a parabolic curve, so as to pass under and support the two centermost floor beams, and under lugs cast at proper elevations upon the posts intermediate between the centermost and the end posts, whereby such intermediates were supported. Cross-sections of chords and diagonal braces of the + formed section."

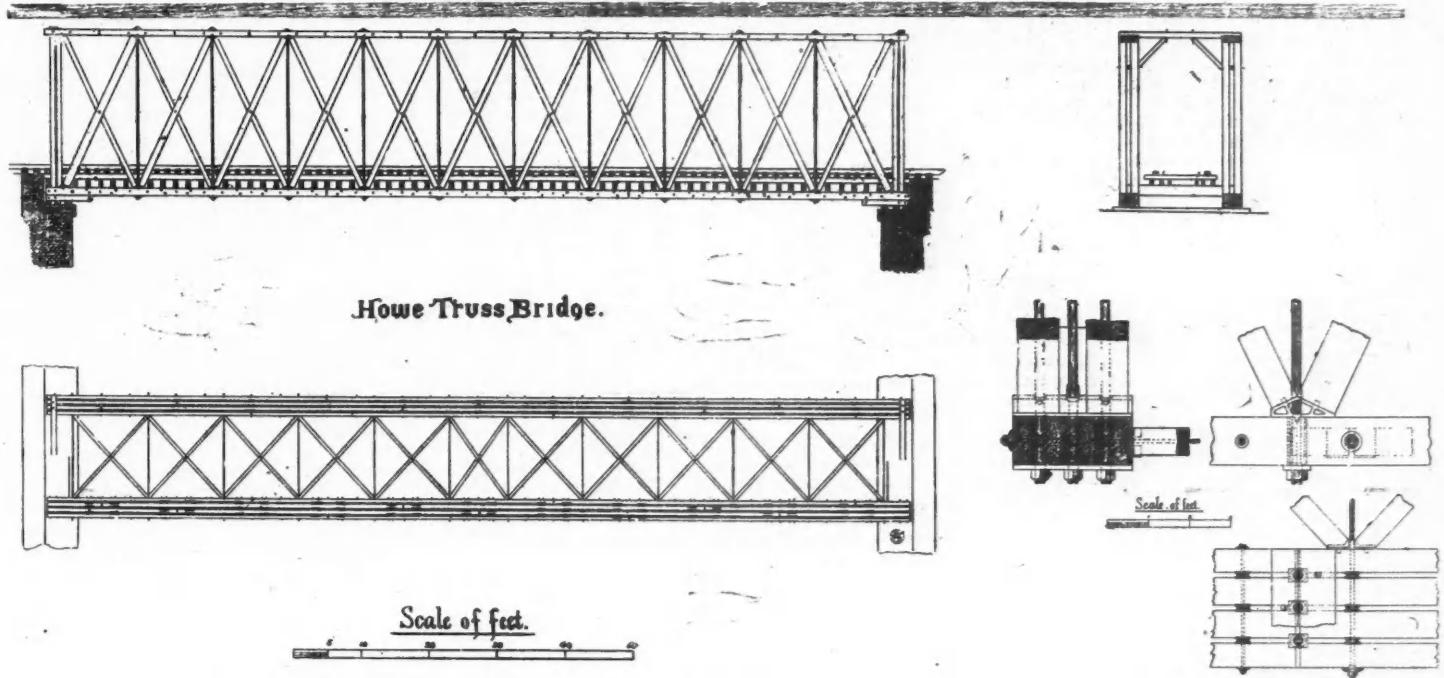


PLATE XI.

Thomas Paine, in 1803, wrote as follows, giving an account of his advocacy and efforts toward the construction of iron bridges:

"As America abounds in rivers, I turned my attention, after the Revolution was over, to find a method of constructing an arch that might, without rendering the height inconvenient or ascent difficult, extend at once from shore to shore over rivers of three, four or five hundred feet, and probably more. The principle I took to begin with and work upon, was that the small segment of a large circle was preferable to the great segment of a small circle. The architects I conversed with in England denied the principle; but it was generally supported by mathematicians, and experiment has now established the fact."

It should be borne in mind that the only iron bridge then in existence in England was the cast-iron arch over the Severn near Coalbrook Dale; which arch was nearly a semi-circle, having a span of 100 feet and a versine or rise of 45 feet.

Between 1786-87 Paine made three models, "one in wood, one in cast iron and one in wrought-iron connected with blocks of wood representing cast-iron blocks." This is Paine's wording; but as the Wearmouth Bridge was copied after Paine's model or bridge afterward built from this model, it would be clearer to say, the last model consisted of wooden blocks representing cast-iron voussoirs, spliced together by wrought-iron bands fitting into recesses in the blocks and secured by screws.

This last model he took to Paris in 1787, and presented it as a model for an arch bridge of 400 feet span to the Academy of Sciences for its opinion. Its committee, consisting of M. Le Roy, Abbe Bosson and M. Borde, the last two celebrated mathematicians, reported that an arch upon the principle and construction of the model might be extended to the span proposed—400 feet. Paine then had a couple of arch ribs of 90 feet span and 5 feet rise cast at the foundry of Messrs. Walker, at Rotherham, Yorkshire, and tested with double their own weight. On the success of this experiment Paine had a complete bridge of five arch ribs of 110 feet span and 5 feet rise made by the same founders and sent it to London, "as a specimen for establishing a manufactory of

In the same year (1840) Mr. Squire Whipple built his first iron bridge. It was a bow-string truss bridge in which the compression members were of cast iron and the tension members of wrought iron. He took out letters patent for this style of bridge April 24th, 1841. A large number of bridges on this plan with spans from 50 to 100 feet have been built, and some few with spans as long as 180 feet.

In 1846-47 James Millholland built a boiler plate tubular girder 55 feet long for the Baltimore & Ohio Railroad at Bolton Depot.

In 1846 Frederick Harbach patented an iron Howe truss; the top chord and braces were of cast iron and the lower chord and vertical rods were of wrought iron. Each chord and the main braces were hollow cylinders in pairs, the lower chord was of boiler iron riveted together as continuous tubes. The braces and chords were connected by cast-iron saddles shaped to fit the chords.

A bridge of this style, 30 feet clear span, 6 feet depth and 4 feet panels, was built in 1846-7 on the North Adams branch of the Boston & Albany railroad near Pittsfield, Mass.

About 1847-50 Nathaniel Rider built a number of bridges for the New York & Harlem, Erie and other railroads. The Rider bridge was composed of parallel top and bottom chords and multiple systems of vertical posts and diagonal ties. The top chord and posts were of cast iron; the lower chord and ties of flat bars and of wrought iron. A wedge was inserted at the top of each post to tighten up the systems. The members were bolted together. The failure of one of these Rider bridges on the Erie Railroad in 1850, following the failure in England of the bridge over the River Dee, influenced the officials of that road to the decision that iron bridges were untrustworthy, and to direct that all iron bridges, consisting of several Rider bridges and some which had been built by Squire Whipple, be removed and replaced with wooden structures.

"The first impulse to the general adoption of iron for railroad bridges was given by Mr. Benjamin H. Latrobe, chief engineer of the Baltimore & Ohio Railroad. When the extension of this road from Cumberland to Wheeling was begun he decided to use this material in all the new

bridges. Mr. Latrobe had previously much experience in the construction of wooden bridges in which iron was extensively used; he had also designed and used the fish-bellied girder constructed of cast and wrought iron; he had adopted on the older portions of that road the Bollman plan of bridge for short spans. For the bridges west of Cumberland he adopted the plans submitted by Mr. Albert Fink, his assistant."

(TO BE CONTINUED.)

THE CATORCE MINING DISTRICT.

Written for the Engineering and Mining Journal by R. E. Chism, M. E.

As the traveler, riding southward over the Mexican National Railroad, approaches the southern boundary of the State of Coahuila he sees in front of him, rising from the monotonous level plain, the deep blue mass of an enormous mountain of rugged and irregular form which little by little grows upon the view until it fills the entire eastern horizon. The eye contemplates with astonishment and awe the desolate aspect of this tremendous mass. Scarcely a tree or a shrub can be seen upon its sides, while here and there belts of dead-white show where the decomposed rocks refuse the scanty crop of brown herbage which on the rest of the slope defies the burning sun of noon, the cold of night and the aridity of the extenuated atmosphere. Deep ravines, wierd and dried up like the rivers of the moon, furrow the sides of the range and narrow toward the jagged peaks of the summits. Not a sign of life except some specks in the deep blue sky where the vultures circle slowly round and round and cast fantastic shadows on the brooding mountains.

At one point a sharp eye can discern the dim outlines of a few houses perched near the very summit of the ridge, but in a few moments even these disappear from view, and this is all that the outer world can see of the great mining camp of Catorce, shut deep in the heart of one of the greatest mineral ranges on the continent.

A little farther on the train stops at the station of Catorce. The town, now invisible, lies some eight miles to the eastward, and by a two hours' ride on horseback, half way over a gently ascending plain, half way through a cañon, where the trail mounts heavenward by a series of twists like those of a corkscrew, the traveler may arrive at one of the most characteristic little cities in all Mexico, quite worthy of a visit for itself, aside from the mineral wealth that lies beneath the surrounding hills.

The city of Catorce lies in 23 deg. 33 min. 20 sec. north latitude, and at 101 deg. of longitude west of Greenwich, and at 1 deg. 27 min. 30 sec. west of the meridian of the City of Mexico. The main plaza of the town lies 2,474 meters (8,160 feet) above the sea level. The variation of the magnetic needle in September, 1887, was 8 deg. 13 min. to east.

The railway station is 374 miles from Laredo, Texas, 465 miles from the City of Mexico, and 103 miles north of the city of San Luis Potosi.

HISTORY.

In the summer of the year 1772 the first mineral discoveries at Catorce were made by some people from a neighboring ranch, who came up the same cañon through which passes to-day the road to the railway station and found the Descubridora mine. This mine is situated about three kilometers to northwest of the town, quite away from any of the rich veins. It has never been of any importance, as the ore is scarce and of low grade.

The next discovery was made about three years after the first one. A person named Ventura Ruiz, who is called a negro, and who may have been an African, but is more likely to have been a dark-complexioned Mexican, entered the mountain from the south through a cañon which leads to the Viga ranch. He was following a horse that had strayed away from its pasture, and as he was overtaken by the night very near the site of Catorce, he sat down and made a fire to cook his supper and to protect him from the cold which at night in those elevated regions is often intense. The fire happened to be on the outcrop of the San Agustín vein, and in the morning a long piece of shining silver appeared in the ashes. This place is now the Milagro mine, often called the Negrito mine in remembrance of the discoverer.

Other explorers were attracted to the spot by the fame of this discovery, but probably the most fortunate of these was Bernabe Antonio Zepeda, who pulled up a bush one morning to throw on the fire and found a lump of native silver hanging to its roots. This was in 1778, and the vein he found was the Veta Madre (mother vein), often called the Purissima.

A population soon assembled and before the end of the century the city of Catorce had been built about as it now is. The church alone cost more than one million of dollars, there was a public storehouse of immense dimensions, an ample hospital and a town hall and jail, all of which exist to this day, and it is probable that the changes in the past ninety years have been almost imperceptible. That all this work should have been accomplished on a site so unpropitious, composed of mountains, gulches and precipices, in so short a time, shows how much money there must have been in circulation at that period. In effect the value of the precious metals taken out of this district between the years 1779 and 1812 is estimated at from \$150,000,000 to \$200,000,000. It is recorded that ores yielding less than 500 ounces per ton were despised during the early years of the camp, and that when the share of the common miners was one-third of the ore raised, some of these individuals were often known to lose two or three thousand dollars in a morning at a cock fight. The cost of exploitation at this time was reckoned as only about ten per cent. of the value of the ores. During the years of the war of Independence the mines at Catorce were neglected, but they were started up again at the conclusion of the struggle, and the very first steam engine in Mexico was erected for the draining of the Concepcion mine on the Veta Grande. As the mines got deeper, large capital was necessary to keep them drained or to open tunnels. The times when one revolution succeeded another without cessation were most unpropitious for the investment of capital in this way, and the mines had then commenced to reach the transition zone, where the more rebellious silver ores began to appear, and it was supposed that further exploitation would soon become unprofitable. About the year 1850, when the district was completely paralyzed, a few merchants of the town associated themselves together and commenced to work the San Agustín mine. This was the beginning of a new era for Catorce, as it was soon found that the "negros" or sulphide ores were even richer than the ordinary run of chlorides and work has been prosecuted with some

energy ever since. In a word, there is scarcely a single mine of any note in the district that has not yielded from \$10,000,000 to \$40,000,000. In 1873 the San Agustín mine gave \$150,000 profit in one week, and the profits of the La Luz mine at certain times are said to have been even more enormous.

At present, August, 1889, I learn that there are 36 mines in operation in the district. A number of these mines had been idle for some time, but were started up soon after the opening of the Mexican National Railroad, owing to the impulse given to mining by the advent of numerous American ore buyers whose ready money transactions enabled and encouraged the poorer miners to go to work with a much smaller capital than had before been possible.

At present the population of Catorce is about 6,000. There is a small town about two miles down the gulch called "los Catorce," which has a population of about 1,800. The word "Catorce" means fourteen, and its use as a name refers to the fact that fourteen Spanish soldiers were killed in the gulch by a party of marauding Indians years before the mines were discovered.

The different mining companies now in operation pay out about \$14,000 a week, of which the Concepcion mine disburses some five thousand dollars. These sums go to laborers and ore carriers, and for horse feed, timber, fuel, candles, powder, dynamite and for the salaries of employes. The working miners are paid by a share of the product, as I will explain farther on.

One feature in mining work, as carried on in this camp, is the comparatively small number of salaried employes. Including superintendents, clerks, time-keepers and boss miners, there are only about ninety of these in the whole district for a working force of about one thousand men.

TOPOGRAPHY.

Catorce lies on the north side of a ravine which runs from east to west, deepening toward the west and carrying a trifling stream of water from the drainage of the mines. On the western side of the town a tremendous precipice, some 500 feet high, descends to the bottom of the gulch, which is here little more than a cleft in the mountain. The town itself is built upon a steep slope descending to the same ravine a little higher up. There is not one piece of level ground large enough to build a house upon in the whole town, and the phenomenon is constantly presented of a one-story house in front, with a descent of two or three stories to its back yard.

The main street runs from east to west, with many ups and downs, and there is another street or two of the same kind approximately parallel to it. The cross streets, from north to south, run down the slope, and have a grade which I have often heard estimated as about 45 degrees. As a matter of curiosity, I measured the steepest of these streets with a hand level and found that its actual slope is 13 degrees. All of the streets are paved with small cobble-stones, worn by the traffic of many years, and assisted to a slippery polish by the grease and slops thrown out from the houses. The unaccustomed visitor navigates these pavements with fear and trembling, but the Catorce people move around without the slightest hesitation.

Catorce is so completely shut in by the mountains that the longest view to be had, even from the church tower, is not over a mile or so, the distance to the summits of the range. At the extreme northern edge of the town there is an outlook down the cañon and away over the plains to the mighty mountains beyond. It is the few houses in this outskirts of the town that can be seen from the railroad as I have already mentioned.

The main plaza of the town is some 2,500 feet above the railroad station, and it is almost needless to remark, after the description I have given of the road up the cañon, which is the least precipitous of the two approaches, that no wheeled vehicle of any kind ever disturbs the promenaders along the streets.

The whole mountain is a part of the eastern Sierra Madras, but is on the extreme western part of that system, and is, in fact, almost entirely isolated. It is about thirty-five miles long from north to south and some eighteen miles across from east to west. At the southern extremity of the mountain is the Maroma mining camp, situated in the remains of the dense forest which formerly covered the whole range. The Maroma camp, I may say in passing, has a bad reputation, as the veins are said to be narrow and far from rich.

To eastward the mountain ends in a very remarkable double peak, called the "Fraile," in which is situated the famous mine of La Paz and other mines of less importance. The town of Catorce and its surrounding mines lie in the northwestern part of the mountain.

The highest peak is the Leona, 2,975 meters (9,810 feet) above the sea level. The Barriga de Plata (Silver Belly) peak, which contains some of the richest mines, is 9,670 feet above the sea. The whole range is cut up by tremendous gulches, which have slopes of between 25 and 35 degrees. The destruction of the forests, whose very roots have been dug up and turned into smoke long ago, has been followed by the disappearance of whatever soil there may have been, so that the mountain is almost bare rock, with the very scantiest herbage that can be imagined.

The more important and deepest water courses in this district are approximately parallel to the more important veins, so that the latter can be reached by cross tunnels of comparatively short lengths.

To explain the general features of the topography of the camp, we will take the mouth of the Purissima tunnel as a starting point. The main creek has at this point a direction from southeast to northwest, flowing in the latter direction. Some yards below the mouth of the Purissima tunnel there is a branch which runs or rather rises in a direction northeast by north to its source near the Padre Flores mine.

Ascending the main creek, we find that about five hundred yards above the tunnel mouth the creek divides into two. One of these branches turns nearly due east. It pursues this course for some 1,200 meters, and then turns to the southeast again, following this course for 1,100 meters, when it again turns to the east, and has its source about 1,000 meters further on. During the last two portions of its course the stream is paralleled on its northern bank nearly all the way by the Cochino tunnel, which partially drains the Concepcion mine.

Returning to the fork and ascending the other branch of the stream, we find that it follows a course nearly due south for some 1,100 meters from the junction and then turns to the southeast for some 2,000 meters, where the branch forks again and passes out of the mining territory. As the

first branch is paralleled on its northern bank by the Cochino tunnel, so is this branch paralleled on its northern bank by the Chorro tunnel, a work of great magnitude belonging to the San Agustin mine.

These two branches of the main creek and their affluents determine a spur between them, which narrows from southeast to northwest to the junction of the two branches. The spur carries the San Agustin vein on its southern side, but is barren of mineral on its northern side, except at the head of the northern branch of the creek, where is located the Purissima mine and shaft.

Near the head of the same northern branch of the creek are the head waters of other creeks (more properly, water courses, as all are dry as a bone in ordinary times) belonging to another system, which flow to the northeast into a valley on the east side of the range called the Protrero. The watershed formed at the head of these two systems is a ridge which contains all the best mines of Catorce, with the exception of the Purissima and the San Agustin mines. This whole formation will be better understood by a glance at the map which accompanies this paper.

The mining zone measures from the church in Catorce two kilometers (1 1/2 miles) to the west, the same distance to north, six and a half kilometers (4 miles) to east, and say three kilometers (1 1/2 miles) to the south. This quadrangle contains all the mineral wealth of the camp as far as it is

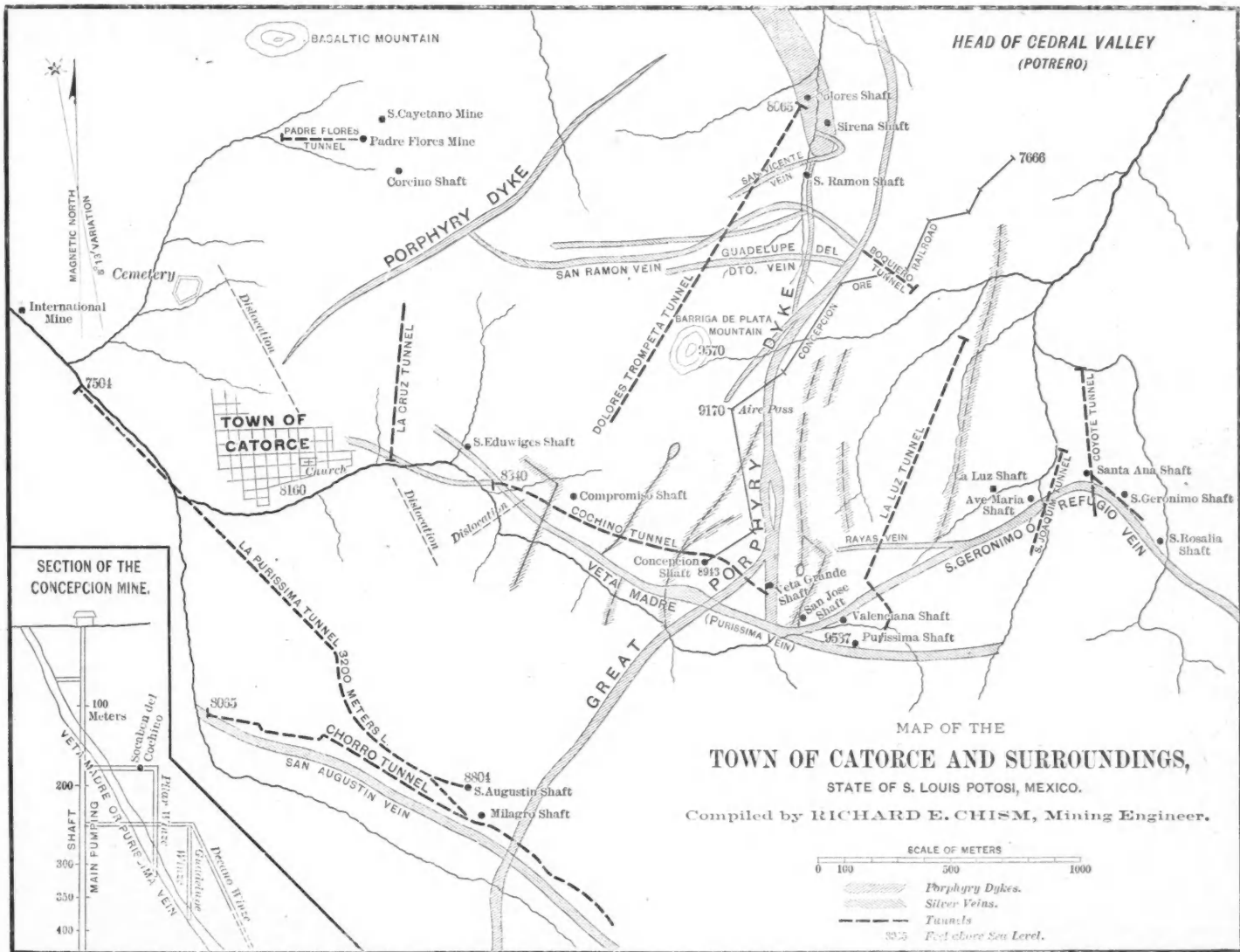
by the dyke itself upheaving as it broke through. It would probably be more exact to suppose that the anticlinal was formed first by a gradual folding, rather than by a sudden rupture, and that the molten or dissolved materials of which the dyke is composed sought an outlet under pressure and so occupied the fissure which they found ready formed.

There are several dislocations in the Western formation caused by upheavals and folds, but I believe that they are of limited extent and thickness, and that the veins are always readily found beyond.

The passage of the veins through the stratified rocks seems to have altered the latter to a certain extent, especially the clay slate in which the proximity of a vein is plainly indicated by a change in the color and texture of the country rock.

VEIN STRUCTURE.

The veins of Catorce are found principally in the limestone rock. In the Refugio tunnel seven veins, only two of which were before known, were encountered in running 1,000 yards, and the discoveries of the same kind in other tunnels have been equally numerous, so that it is evident that besides the known veins the district is mineralized in great abundance by many others. The veins generally strike in directions varying between south 30 degrees west to due west, and the dip usually is between 60 and 80 degrees, almost always to north but sometimes to south.



MAP OF THE TOWN OF CATORCE AND SURROUNDINGS, STATE OF S. LOUIS POTOSI, MEXICO.

Compiled by RICHARD E. CHISM, Mining Engineer.

now known. The area is 14 1/2 square miles; it has produced nearly a dollar for every square yard and probably has an equal or greater amount left to reward future exploitation.

GEOLOGY.

The whole of the mining belt at Catorce is divided into two sections by a vast dyke of porphyry, which traverses the district from northeast to southwest, being at its nearest point some 1,509 meters to east of the church at Catorce.

On the eastern side of this dyke the formation from the surface to a depth of some 400 meters is entirely limestone. At the above depth the formation changes to a clay slate containing some beds of conglomerate.

To the west of the porphyry dyke the formation is more complicated and several varieties of metamorphic rocks, principally of a shaly or slaty nature, come to the surface. The oldest rock, and the predominating one, is the same clay slate which underlies the limestone on the other side of the dyke.

To the north of the Padre Flores mine, at a distance of, say, two kilometers from the center of the town, there is a high peak of compact basalt containing olivine, augite and magnetite.

On the eastern side of the great porphyry dyke, the stratified rocks strike north and south, with a very slight dip to east; to the west of the dyke the strike of the stratified rocks is about the same, but their dip is to westward, varying in amount from 60 degrees to nothing. The dyke determines an anticlinal which the older theories would say was caused

The thickness of the veins varies from 3 to 60 feet, but the Purissima or Veta Madre vein in the lower workings of the Concepcion mine has a thickness of over 80 feet. The wider portions of the veins often contain cavities, resembling the ordinary caves found in limestone, partially filled with decomposed quartz, mixed with solid quartz and oxides of iron. These materials usually carry native silver and chlorides, or chlorobromides or iodides of silver. When the veins are narrower they consist chiefly of quartz and calcite, always with more or less ferruginous clay.

The most important veins are the Purissima or Veta Madre, the San Geronimo, often called the Refugio, and the San Agustin. Other veins of less note are the Dolores Trompeta, the San Ramon, the Sereno and San Jose de los Villanos. Besides there there are some other metallic deposits of a transitory or irregular character.

The Purissima and the San Agustin veins are the oldest of all, and are probably contemporary. The Refugio, or San Geronimo, Sereno, and San Ramon veins are more recent, and form another set of contemporaries.

The Purissima vein has a course of between N. 80 deg. W., S. 80 deg. E., and N. 60 deg. W., S. 60 deg. E., with a dip of from 50 to 65 deg. toward the NE. The body of the vein is of hard quartz, heavily charged with iron oxides. There is also a varying proportion of calcite, which is most abundant in the eastern part of the vein, coinciding with the appearance of large quantities of chloro-bromides and iodides of silver.

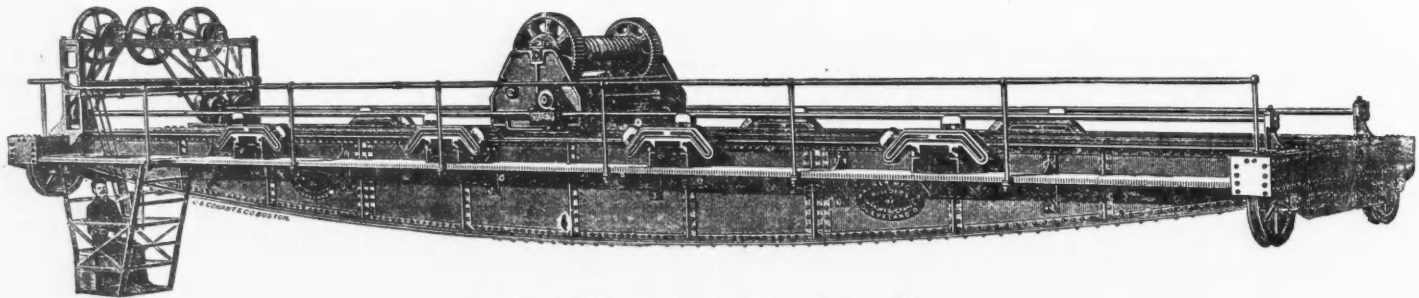
The principal mines on this vein, naming them from east to west, are the Purissima, Valenciana, San Jose de Santa Ana, Guadalupe de Veta

Grande (often called the Santa Prisca), Concepcion, Guadelupito, Estrella, Zacarias, San Miguel, Dolores Medellin, and Santa Eduvigis. Of these mines the Concepcion is the only one that is now worked under its own name; the rest are either idle or are included within the claims of other mines worked by consolidated companies.

Although the Santa Eduvigis is the most westerly mine that has been regularly worked on the Purissima vein, it seems quite probable that good prospecting might find an extension of the vein still farther to the west. There is a branch of this vein which leaves it in the claim of the Dolores mine, and diverges toward the south, where it enters the northeastern part of the town of Catorce, where its outcrop can be plainly seen. I am not aware that any work has ever been done on this branch of the Veta Madre, though its presence may have given rise to the legend current in the town that the Catorce church is located over an immense bonanza. The Internacional mine, to northwest of the town, is said to be located on an extension of this branch of the Veta Madre.

The San Geronimo or Refugio vein commences to be worked at a point some four kilometers (2½ miles) a little to the south of east of Catorce, on the Alta Gracia claim. It runs from this point something over a thousand meters on a course between N. 60 deg. and 70 deg. W., to the San Geronimo claim, where it curves and finally strikes about S. 60 W. for, say, 1,500 meters, to a junction with the Purissima vein, in the claim of San Jose de Santa Ana. The dip of this vein is to north, but on the San Geronimo, Santa Ana and Campanita claims—that is to say, for a distance of some six hundred meters at the bend, the vein is entirely vertical. In the rest of its course the dip is about 75 degrees. The mines of the San Geronimo vein are the Alta Gracia, the Santa Rosalia, the San Geronimo, the Santa Ana, the Campanita, the Senor de Matehuala, the Refugio, also called the Luz; the Naranjera, the Cinco Senores and the San Jose de Gracia.

The San Agustin vein is entirely apart from the veins just mentioned, and a considerable distance to the southward of them; it is approximately parallel to the Veta Madre in its western extension. The western extremity of the San Agustin vein is at a point about 1,200 meters southwest of the church in Catorce, and from this point it strikes to the eastward on a course between S. 40 E. and S. 75 E., and can be traced several thousand meters in that direction. It is a much narrower vein than the Purissima or the San Geronimo, and has more poor spots, although it has produced large quantities of silver, and, indeed, sustained the camp for some years.



WALKER'S ROPE DRIVE POWER TRAVELING CRANE.

The most westerly claim is the Chorro; then follow the Promontorio, San Antonio, Santa Maria, San Agustin, Milagros, Refugio, San Eduardo, and the Los Angeles mines.

The San Ramon vein is northeast of Catorce. It runs from east to west, dipping to the north and contains the San Ramon and the San Francisco del Pipi mines.

Just south of the San Ramon vein and parallel to it is the vein of Guadalupe del Desierto which contains the Guadalupe del Desierto and the San Juan Boquero mines.

The Sereno vein lies at the mouth of the Dolores Trompeta tunnel. Its continuation to the westward is nearly at right angles to its previous course. The continuation is known as the Dolores Trompeta vein, and on the two are located the Dolores Trompeta and the Sereno mines.

The San Jose de los Villanos vein lies to the southward of the San Geronimo vein, to which it is approximately parallel, and it has a dip to north of about 60 degrees. This vein contains the San Rafael, the San Miguel, the San Jose de los Villanos and other mines of no importance, except the La Luz mine, which is included in the Refugio claims.

The Escondida mine has a short vein running east and west near the mouth of the Dolores Trompeta tunnel. This vein joins the San Vicente vein, and both are narrow and hard quartz veins, which are not thought well of.

The Filosal mine has a wide, handsome vein, of reddish quartz of low grade and of limited extent.

The Candelaria mine was opened on a bunch of calcespar without course or dip, but which inclosed some nodules of rich ore.

In the Gibraltar mine no regular vein has ever been encountered. In the Mina de los Pobres (Poor Men's mine) the vein is narrow and has small quantities of rich ore in nodules wide apart. The Ollas mine has no vein, but chance bunches are found of free milling ore. The Merced mine has a vein running east and west, which had one bonanza soon exhausted. The Descubridora mine, found in 1772, the first mine opened in the camp, is about three kilometers (two miles) northwest of the town. It yielded very little and has long been abandoned.

The Padre Flores mine was bought by a poor priest for seven hundred dollars soon after the town began to be settled and was then only a prospect hole with only the very slightest signs of a vein. At the depth of twenty meters the priest encountered some native silver and a little lower down he broke into a great cavity full of a loose powder which was nearly all silver chloride or something of that nature. Sacks of it were filled with scoops and sold at the mouth of the mine at a dollar a pound. Twenty-one meters (seventy feet) lower down another cavity, larger than the first, was discovered full of the same ore. The two cavities produced

in two years about seven millions of dollars. Since that time the efforts made to discover another bonanza have been entirely unsuccessful. The vein in this mine has been cut off by an intrusive porphyry dyke and may possibly be found by careful exploration on the other side of the intruder. There are also signs in the mine of a contact between slate and limestone which may have been the location of the ore bodies.

The San Cayetano and the San Andres Corsino mines, adjoining the Padre Flores mine, are on narrow veins which carry little or no silver. The veins of the two San Francisco mines, of the Jerusalem, the Miraflores, and the Desengaño mines are of the same character.

Besides these veins there are many others which are at present not important enough to mention.

(TO BE CONTINUED.)

IMPROVED ROPE DRIVE POWER TRAVELING CRANE.

We illustrate herewith an improved rope drive power traveling crane of 12 tons capacity, 52 feet, 8½-inch span, recently built by the Walker Manufacturing Company, of Cleveland, Ohio, for Ranken & Fritsch Foundry and Machine Co., of St. Louis, Mo.

The main cross girders forming the bridge are made of steel plates, reinforced by steel angle and tee irons, all thoroughly riveted and secured together. The main truck wheels supporting the bridge are of cast iron with chilled rims, and are secured to steel axles supported in bronze bearings. The longitudinal traverse of this crane is effected by means of a cross shaft connected by spur gearing with the axles of a pair of the truck wheels, in connection with the driving mechanism located at one end of the bridge.

The trolley carrying the hoisting mechanism is supported on low steel rails secured to the top of the main girders, and consists of heavy cast-iron sides mounted on cast-iron wheels having chilled rails, which are secured to steel axles operating in bronze bearings. The cross traverse is effected through a cross shaft supported in improved tumbler bearings, which are secured to the main cross girder, the shaft having feather seats throughout its length, and on which a steel worm is carried, which engages with a worm wheel having a phosphor-bronze rim, this wheel being secured to a shaft on the trolley having connection through spur gearing with the axle of one pair of the truck wheels of the trolley. The hoisting mechanism consists of a heavy cast-iron barrel, with right and left hand spiral groove for the chain, which admits of the block ascending and descending perpen-

dicularly, thus maintaining an equally distributed load on each of the two main cross girders. The barrel is secured to a steel spindle supported in bronze bearings, and is operated by spur gearing in connection with worm gearing similar to that already described, and arranged so that one movement disconnects one set of gears while connecting the other. The barrel is also fitted with a ratchet and pawl as an additional safeguard.

The driving mechanism is located at one end of the bridge.

On the ends of the three upper, or driving shafts, rope pulleys are secured, which are driven by an endless rope; from these shafts open and cross belts convey power for manipulation of the crane. The crane has a platform with hand-railing along one side of the main girders, and also has a cage on the same side at one end of the bridge, in which the operator sits and commands a view of the entire shop and crane. The seat in this cage is a tool box, in which all necessary tools may be kept. The three operating levers, giving six motions to the crane, three of which may be in operation at the same time, are conveniently located for the operator.

SOME NOTES ON THE RARE ELEMENTS FOUND IN THE LEADVILLE SULPHURETS.

Written for the Engineering and Mining Journal by F. L. Bartlett, Portland, Me.

In working some low grade sulphurets from the Iron Silver mine, of Leadville, by my new process for the manufacture of pigments, I have made a peculiar discovery, which I believe will interest many. By my process I have been able to eliminate the following list of the rarer elements: Selenium, cadmium, thallium, gallium and possibly indium and some others. In addition to these, and in connection with them, I also find mercury, antimony, arsenic, and one unknown substance. It seems to me that the finding of mercury in these ores is new, at least I am not aware that this metal has ever before been found in the Leadville ores.

In order to make the matter plain it becomes necessary to explain the method of extraction. This, as will be seen, is quite different from anything before attempted. The ores in question were the heavy zinc sulphurets, containing some 35 per cent. of zinc, 6 per cent. of lead, with very little rock. The novelty of the method consists in treating the ores, without previous roasting, to a partial distillation, the fume coming off being cooled and collected in cloth bags. This fume is mostly zinc and lead, but, as can be easily understood, contains many other elements, in fact, must contain about all the volatile matter in the ore, whatever its nature. It will be also understood, that not having been previously roasted, the fume must contain any mercury that may have been in the

ore, however slight in quantity, also that the rarer elements closely allied to sulphur will be there. The fume thus collected is subjected to a refining process, which further condenses the rare elements. This refining process consists in subjecting the fume to a red heat in closed tubes; the fume being constantly stirred while under the influence of the heat, the object being to drive off any and all of the lighter elements as sulphur, arsenic, antimony, etc., which might interfere with the color and quality of the pigment. It follows that if the fume from this last operation be condensed and collected that this will be the double refined essence of the light volatile elements contained in the original ore.

The amount obtained from a ton of ore in this condensed form is, of course, very small, being, I should say, not more than two pounds. This condensed material is a mixture of various colors, but when well mixed takes a dull red color. It has an acid reaction from the presence of sulphuric acid, and has a garlicky odor.

It dissolves in boiling nitric acid, leaving a residue of lead sulphate, and a gummy substance of a peculiar nature which I have not yet been able to determine. This gum does not appear to have come from the fuel used in the original ore treatment; in fact, it is wholly unlike tarry matter and is incombustible—that is, will not burn—but can be volatilized at a high heat. I have not had time as yet to determine if it is an organic substance or not; of course, it is possible that it comes from the fuel. In separating the elements previously mentioned, I have followed the methods outlined by Fresenius. Selenium, cadmium, thallium, mercury, and arsenic are quickly and easily obtained. Indium, as before stated, I am not sure about, and my tests on gallium have not been all that I could desire; still I am quite sure that they are there.

In addition to these elements enumerated, there are certainly others which I am not able to determine, and in working the stuff one is constantly getting precipitates where not expected.

The amount of mercury in the fume varies; it runs from 2 to 10 per cent. The cadmium also varies a good deal, as does the other elements, depending on the manner in which the fume has been collected. All the fume contains more or less zinc and lead, and sometimes free sulphur.

To say the least, this material is an interesting compound, and to any one who has the time it will well repay one for working upon it.

The writer hopes to be able to make this material a source of extraction, in some quantity, of the elements selenium and cadmium, possibly some others.

In regard to the presence of mercury, I would say that no fuel or other ore has been used with the Leadville ore from which the mercury could by any possibility have come. As a matter of fact the ore was worked alone, and the fuel was the same as was used before any mercury was found, thus proving that it must have come from the Leadville ore alone.

The writer will be glad to send samples of this compound to any one having a desire to make an analysis of it. As an assistance to its determination I will say that the following elements will be sure to be found. How many others may be present I will not attempt to say. Zinc oxide, sulphide, sulphate and sulphite, lead sulphate, lead sulphide, free sulphur and sulphuric acid (usually), cadmium, selenium, thallium, indium (?) gallium, arsenic, antimony, carbon and mercury.

A Monster Hydraulic Press.—At the iron-works at Croyet-Fourneyron, in France, there has just been constructed for the Lyons arsenal a hydraulic press which is believed to be the largest in the world. The sole plate on which the press rests is a solid mass of iron weighing 35,000 kilograms, and the weight of each of the columns supporting the top part (which is of steel, weighing nearly 12,000 kilograms) is 8,270 kilograms.

Guatemala Railroad Sold.—C. P. Huntington and C. F. Crocker have sold the road running from San Juan de Guatemala to Guatemala to the government of the State for \$4,000,000. The road will now be extended, it is said, to Port Ysabel, on the Gulf coast, a distance of 250 miles, the capital for the enterprise having already been subscribed by a syndicate of French capitalists. Port Ysabel is only three days' distance by steam from New Orleans, and the new road is expected to open a large traffic between New Orleans, Guatemala and San Francisco.

Profitable Dredging at Santander.—During the dredging operations now going on in the port of Santander, Spain, the well-preserved remains of a war ship were encountered at the entrance to the harbor, partly buried in sand and mud, which must have gone down in that spot four centuries ago. As the dredges could not remove the old hull, the Spanish government ordered it to be blown up, and to employ divers for saving what could be saved. The work has turned out a very profitable one, and great care is consequently displayed. The vessel dates probably from the end of the fifteenth or the beginning of the sixteenth century. Guns and other equipments raised show the united coats-of-arms of Castille and Arragon, and some bear the scroll of Isabella la Catolica, others the crowned F of Ferdinand the Catholic. As among the numerous arms found on board there are many of Italian or French origin, and the vessel appears to have served as a transport, it is generally supposed that she belonged to the expedition of Gonzalo de Cordoba against Naples, and that she foundered on her return from Italy, laden with trophies and plunder, on entering the port of Santander. This surmise is supported by the fact that among the coin saved there are, besides Spanish coinage of the time of the Catholic kings, numerous coins with the head of Charles VIII. of France and the various Italian States of the time. Since the discovery was made, the diving and saving operations are carried on with great energy, as it is hoped to meet with valuable finds from an expedition which was particularly rich in plunder.

Determination of Copper and Arsenic in Pyrites.—R. Nahnsen (*Chemiker Zeitung*).—For determination of copper 12.5 grammes of the dry finely pulverised sample are placed in a beaker of thin glass 17 centimetres in height, and covered with 10 cubic centimetres water and 1 cubic centimetre strong sulphuric acid. Cubing the glass covered with a porcelain capsule, nitric acid of specific gravity 1.4 is gradually added until effervescence no longer occurs. The liquid is let boil over a moderately strong flame, the porcelain capsule is removed, and the liquid is boiled, while being frequently shaken round and round until it becomes tough and scarcely yields to shaking, and yellow saline particles begin

to separate out. The paste is then quickly brought into solution by means of warm water, which should be kept ready at hand. The cold solution is transferred to a 250 cubic centimetres flask, filled up, and filtered through a dry filter. Two hundred cubic centimetres (= 10 grammes pyrites) of the solution thus freed from silica and lead are treated for some hours with a brisk current of sulphuretted hydrogen until the precipitate clots together and the liquid appears transparent. It is filtered and washed with pure water, while being frequently crushed with a glass rod. Sulphuretted hydrogen water is here unnecessary if the sulphuretted hydrogen has been allowed to act until the liquid appears quite clear. The portion of the precipitate on the filter is rinsed back with a minimum of hot water to the main mass, and so much strong solution of sodium sulphide is added that the liquid, after being heated to a boil for a few minutes, shows no undissolved sulphur. It is diluted with hot water, let stand in a warm place until clear; the solution which contains the arsenic and antimony, and is quite free from copper, is filtered off, and the deposit of copper sulphide is washed with hot water. Traces of iron sulphide which still adhere to the copper sulphide are removed by hot water to which a few drops of hydrochloric acid have been added, the residue is washed until free from chlorine, and the copper determined as sulphide. The copper sulphide is tested for the presence of cadmium or bismuth by dissolving it in nitric acid and treating the solution for some time with ammonium carbonate in heat. The precipitate formed is weighed as oxide and deducted. For determining the arsenic the dissolved sulphuretted hydrogen is expelled from the 200 cubic centimetres of solution by a current of carbonic acid, and arsenic sulphide is extracted from the washed precipitate by means of ammonia. The further treatment may be conducted volumetrically (Leroy W. McCay, *Chemical News*, XLVIII., 7), or gravimetrically (B. Fischer, *Chemiker Zeitung*, IX., 1,613).

BOOK RECEIVED.

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

A Dictionary of the Fossils of Pennsylvania and Neighboring States Named in the Reports and Catalogues of the Survey. Vol. I., A-M., Report 4, 1889, Geological Survey of Pennsylvania. Compiled by J. P. Lesley, State Geologist. Published by the State, Harrisburg, Pa., 1889. Pages 437 and index. Illustrated.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

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

PATENTS GRANTED OCTOBER 15TH, 1889.

- 412,721. Converter. John W. Bookwalter, Springfield, O., Assignor to the Bookwalter Steel and Iron Company, Jersey City, N. J.
 412,723. Journal-box for Railway Cars. Patrick Browne, St. John, New Brunswick, Canada. Assignor of one-half to James Stratton, same place.
 412,741. Ore Separator. James B. Freeman, Los Angeles, Cal.
 412,767. Converter. Rodney F. Ludlow, Springfield, O.
 412,768. Process of Making Steel. Rodney F. Ludlow, Springfield, O.
 412,792. Crystalline Calcic Tetrphosphate, and the Process of Making the Same, Jacob Reese, Pittsburg, Pa.
 412,793. Process of Making Phosphates. Jacob Reese, Pittsburg, Pa.
 412,797. Railway Rail Fastening. William Salisbury, Cleveland, O.
 412,800. Process of Making Lead Chloride. Waldron Shapleigh, Camden, Assignor to the Electric Storage Battery Company, Gloucester City, N. J.
 412,811. Car Coupling. Christopher C. Warren, Chunkey's Station, Miss.
 412,820. Sectional Steam Boiler. Amasa Worthington, Brooklyn, N. Y.
 412,823. Rotary Pulverizer. Robert Yates, Omaha, Neb., Assignor to himself and Charles Kaestner and Frank A. Hecht, both of Chicago, Ill.
 412,832. Device for Casting Ingots. Thomas Brady, South Chicago, Ill.
 412,834. Coupling for Permanent Ways. Robert Cardwell, Liverpool, and Samuel Watson, Manchester, County of Lancaster, England.
 412,843. Draw-Bar Stop for Railroad Cars. George W. Cushing, Omaha, Neb.
 412,849. Lubricant Bearing. Philip H. Holmes, Gardiner, Me.
 412,852. Rolling-Mill. Julian Kennedy, Latrobe, and Henry Aiken, Homestead, Pa.
 412,854. Dynamo-Electric Machine. John A. Kingdon, London, England.
 412,875. Apparatus for Burning Petroleum. George Collings and Edward H. Weatherhead, Cleveland, Ohio.
 412,882. Thermic-Motor. Cephas F. L. Gardie, Nantes, France. Assignor to the Societe Anonyme des Moteurs Thermiques Gardie, same place.
 412,893. Process of Manufacturing Steel Bodies Having Layers of Different Carbons. John Pedder, Pittsburg, Pa.
 412,905. Metal-Founding Apparatus. George W. Van Tine, Elizabeth, N. J.
 412,915. Rod-Rolling Mill. Andrew J. Day and Henry Roberts, Pittsburg, Pa.
 412,919. Machine for Manufacturing Converter Bottoms. William L. Groff, Steelton, Pa.
 412,924. Electrical Metal Detector. Jesse F. Kester, Terre Haute, Ind., Assignor of one-fourth to Owen E. Duffy, Washington, D. C.
 412,936. Heating Furnace. Henry Swindell, Allegheny, Pa.
 412,940. Ball and Socket Pipe-Coupling. Thomas Aldcorn, New Durham, N. J.
 412,949. Conveyor. William R. Crow, Buffalo, Assignor to himself and Edward R. Ulrich, Jr., Springfield, Ill.
 412,984. Instrument for Taking and Transferring Measurements. John H. W. Schmidt, Davenport, Iowa.
 413,013. Ore-Separator. William Bainbridge, Omaha, Neb.
 413,014. Ore-Mill. William Bainbridge, Omaha, Neb.
 413,031. Tower for the Elevation and Storage of Coal. Addy L. Clark, Brooklyn, N. Y., Assignor to the Clark-Howard Excavator and Conveyor Company, of New Jersey.
 413,047. Road Scraper and Grader. John C. Gordon, Monmouth, Ill.
 413,053. Railroad Rail. John R. Haldeman, Bloomington, Ill.
 413,059. Elevator-Bucket. Lyman D. Howard, Philadelphia, Pa., Assignor to the Clark-Howard Excavator and Conveyor Company, of New Jersey.
 413,063. Truck-Transferring Device. Lyman D. Howard, Philadelphia, Pa., Assignor to the Clark-Howard Excavator and Conveyor Company, of New Jersey.
 413,066. Car-Axle Box and Lubricator. Ambrose Inemer and Patrick Lyston, Baltimore, Md.
 413,067. Rail Joint. Edgar P. Killinger and Joseph U. Wolff, Adwolf, Va.
 413,091. Pneumatic Dredge. Carroll L. Riker, Esopus, N. Y.
 413,103. Leveling Instrument. Carl T. Strauss, Riga, Russia.
 413,123. Counter-Balance for Mining Cages. Richard H. Arthur, Inglewood, Victoria.
 413,127. Composition for Basic Brick. Ernest Bertrand, Kladno, Bohemia, Austria-Hungary. Assignor to the Pottstown Iron Company, Pottstown, Pa.
 413,141. Rolling Mill. Patrick F. Hanley, Homestead, Pa.
 413,148. Dynamo Electric Machine. Gustav Pfannkuche, Cleveland, O.
 413,151. Electric Railway Car. Frank J. Sprague, New York, N. Y., Assignor to the Sprague Electric Railway and Motor Company, same place.
 413,153. Metal Founding Machine. Harris Tabor, New York, N. Y., Assignor to the Tabor Manufacturing Company, same place.

PERSONALS.

Mr. Charles Stocks has been appointed superintendent of the Pittsburg Mine of Nevada County, Cal.

Mr. Andrew W. Smythe, of Louisiana, has been appointed Superintendent of the Mint of the United States at New Orleans.

Mr. J. J. Rochford, of Rapid City, Dakota, is in New York. Mr. Rochford is widely known in mining circles in the Black Hills.

Dr. Francis Wyatt, the well-known chemist, of New York, has been in South Carolina for a month, examining the phosphate beds and the general outlook of the phosphate industry for English capitalists.

The members of the American Society of Civil Engineers held their regular monthly meeting Wednesday evening in New York city, and listened to a paper presented by Professor J. B. Johnson on "The Strength and Resistance of Cast Iron."

In the partial list of awards given at the Paris Exposition to American exhibitors in our issue of October 5th, no mention was made of the Sprague Electric Railway & Motor Company of this city. This company received a gold medal for electric apparatus.

The National Convention of the Brotherhood of Locomotive Engineers was held in Denver, Colo., this week. Chief Arthur is bitterly opposed to the scheme of federation with the Knights of Labor and other railroad organizations, and it is stated will fight it to the last ditch.

Mr. Robert Robinson has been appointed general manager of the Dickens-Custer Mining Company's mills and mines at Custer, Idaho, vice Messrs. Nicholas and John Treweek. Mr. Robinson has had long experience as manager in Virginia City and other Nevada towns, in California and Montana.

Messrs. Claude Marks and Sidney Woolfe, joint proprietors of the *Financial World and Mining Record*, and Mr. Marix, of the *Financial Times*, were arrested in London, on the 15th inst., on the charge of attempting to blackmail the promoters of the Crystal Reef Gold Mining Company, Limited, Messrs. Marcus Bebro and James Potter Abbott.

We have received No. 4 of the first volume of the "American Amateur Photographers," edited by Messrs. F. C. Beach and W. H. Burbank. This paper presents a handsome typographic appearance and contains numerous pictures of interest. The items of experience contained in its pages will be gladly read by those who make amateur photography their hobby.

Mr. C. Gustavus Memminger, M. E., a graduate of the University of Virginia of 1884, has been appointed assistant chemist in the analytical laboratory of Messrs. H. C. Wolterck & Co., of Chattanooga, Tenn. Mr. Memminger is one of the many professional gentlemen who have secured valuable engagements through the column of Positions Vacant published in the *ENGINEERING AND MINING JOURNAL*.

Dr. H. Carrington Bolton will give a lecture upon Researches on Sonorous Sand in the Peninsula of Sinai, illustrated by projections of original photographs and specimens, before the New York Academy of Sciences, on Monday evening, October 21st, 1889, at 8 o'clock, in Hamilton Hall, Columbia College, Forty-ninth street and Madison avenue, New York City.

At the meeting of the Franklin Institute, in Philadelphia, Pa., Wednesday evening, a working model of the Palmer horse street car starter was exhibited and explained by the inventor, John H. Palmer. Mr. Alexander Crawford Chenoweth, of New York, engineer in charge, made an interesting address on "The New York City Aqueduct—its Engineering Features and Designs." Mr. Jules Juvenet spoke of "The Ramie Industry in the United States, and a description of new machinery and processes for utilizing the fiber, with illustration, of machinery and products."

The American Gaslight Association, composed of gas engineers from all over the country, held its seventeenth annual session at Baltimore on the 16th inst. The following were unanimously elected officers for next year: President, Emerson McMullen, of St. Louis; Vice-Presidents, John P. Harbison, Hartford, Conn.; William Henry White, New York, and A. E. Bardman, Macon, Ga.; Secretary and Treasurer, C. J. R. Humphreys, Lawrence, Mass.; Members of the Council, for one year, B. E. Challe, Topeka, Kan.; for two years, S. D. Steiness, Pawtucket, R. I.; Walton Clarke, Philadelphia; Charles R. Faber, Toledo, Ohio; Thomas G. Lansden, Washington, D. C.; William H. Pierson, Toronto; G. C. Ramsdell, Vincennes, Ind., and C. W. Blodgett, Brooklyn, N. Y. Papers were read by E. C. Jones, Walton Clarke, John Young and President Slater.

OBITUARY.

James Prescott Joule, F. R. S., the English scientist, is dead, aged 71 years.

Joshua J. Turner, aged eighty years, senior partner in the firm J. J. Turner & Co., phosphate manufacturers, of Baltimore, died in that city on the 17th inst.

Charles Edward Anderson, who died on the 13th inst., was a civil engineer of prominence, and was engaged at different times in works of large importance

and extent. Mr. Anderson was born in this city September 5th, 1807. After graduating from Columbia College in 1826, he began special courses of study in civil engineering, and then went abroad to Germany and Austria, where he occupied a number of important diplomatic positions.

Sir Daniel Gooch, eminent engineer, died in London on the 15th inst. He was 73 years of age, and was born at Bedlington, Northumberland, England. He studied the profession of an engineer at Newcastle under Robert Stephenson, and in the large iron works of South Wales. For 27 years he held the position of chief locomotive engineer to the Great Western Railway, and he served as Chairman of the Board of Directors of that company. He was elected to Parliament for Crickdale in 1865, and about the same time he became Chairman of the Telegraph Construction and Maintenance Company and a director in the Anglo-American Cable Company. The dignity of a baronet was conferred upon him after laying the Atlantic Cable, November 13th, 1866.

INDUSTRIAL NOTES.

The Virginia Steel Company is said to contemplate building two furnaces at Max Meadows, Va.

The furnace of the Talladega Iron and Steel Company, at Talladega, Ala., was blown in on the 5th inst.

Stack No. 2, of the Spearman Iron Company, at Sharpville, Pa., is being relined and repaired preparatory to being put in blast.

An English syndicate is examining the Princess Furnace property and the Roaring Run Furnace property in Botetourt County, Va., with the view of purchase.

The Sheffield & Birmingham Coal, Iron and Railway Company, Sheffield, Ala., has blown in its A furnace after making repairs, and has blown out its B furnace for work of the same nature.

The firm of Messrs. Geo. N. Gray & Co. will operate the new Hecla Furnace in Lawrence County, O., under the name of the Hecla Iron Company. The furnace is to be 50 feet high, with a 10-foot bosh.

The iron works located on the river bank near Tonawanda, N. Y., which have been closed for the past sixteen years, have been put in operation by their new owners, the Tonawanda Iron and Steel Company.

The stem of a new coast defense vessel for the U. S. Navy was successfully cast at the Pacific Rolling Mills, in San Francisco, Cal., on the 15th inst. Sixteen thousand pounds of molten steel were poured into the mold for the stem.

The Reading Iron Works, of Reading, Pa., which failed six months ago, has mailed all its creditors circulars, offering them 4 per cent. mortgage bonds, guaranteed by the Reading Railroad Company at the rate of 50 per cent. of their claim.

The contract for six buildings of the Hotchins Nut and Bolt Works, to be erected one mile south of Greensburg, Pa., has been let. The work, it is said, will begin at once, and the works are expected to be in active operation by January 1st.

The Secretary of the Navy has rejected the bids for steel sent in as replies to the Texas advertisements. The bids in every instance were exorbitant, and in consequence new advertisements will have to be issued inviting steel workers to make other offers.

The employes of Lowell's Iron Foundry at Manchester, N. H., who have not been paid off since September, have placed attachments on such property as they could find. Other attachments followed from creditors. A. H. Lowell, agent of the works, cannot be found.

The Carbon Iron Company, of Pittsburg, has recently turned out some big work in the shape of eye-bars for the Merchants' bridge at St. Louis. These bars are 8½ by 2½ inches and 62 feet 8 inches long, weighing over two tons each. They are claimed to be the largest eye-bars ever put in a bridge.

The Brunswick Pottery of Brunswick, Ga., of which Mr. Will Huber is president and general manager, began operations on the 11th inst. They advise us that they have orders ahead for two months for jugs, ornamental garden urns, and artificial stones. After January 1st the company will begin the manufacture of pressed bricks.

The firm of Rogers, Meacham & Shields, of St. Louis, has been dissolved and a new partnership formed, styled Rogers, Brown & Meacham, to transact pig iron commission business in the St. Louis territory. The firm represents blast furnaces that make pig irons of every grade, including Lake Superior and Southern charcoal, Southern coke and Ohio softeners.

The Fuel Gas and Electric Engineering Company, of Pittsburg, Pa., announces that mechanism has been perfected whereby artificial fuel gas can be produced at a less cost than is expended in piping natural gas from the wells. The process is as yet a secret, as all the patents are not yet secured. The company promises to be able to furnish the gas very shortly.

Representatives of firms engaged in the barb wire industry were in secret conference in Chicago, on the 17th inst., with the view, it is understood, of forming a trust. There have been several similar conferences during the past six weeks, but this one is the largest yet held. The principals in the negotiations are said to be G. S. Douglass, of New York, and J. S. Gates, of St. Louis.

The capital stock of the Roanoke Iron Company, of Roanoke, Va., was increased to \$400,000 at a meeting of the stockholders on the 11th inst., and the board of directors authorized to purchase a site and award the contract for building a furnace of 150 tons daily capacity in the western part of the city. A site has been secured, and the capital stock subscribed, it is said, to build a forge for the manufacture of iron and steel tools, blacksmith forges and small stationary engines.

The Bucyrus Foundry & Manufacturing Company, of Bucyrus, Ohio, the well-known builders of steam excavating machinery, is running its plant day and night. Last year the company added \$12,000 worth of heavy tools to its plant, built a new erecting shop for heavy works, 180 x 45 feet, fitted with overhead traveling cranes and all the modern improvements, and sold and shipped 48 steam shovels and 16 dredges, besides a large number of railroad wrecking cars and other machinery of various kinds.

Mr. G. W. G. Ferris, bridge engineer, of Pittsburg, Pa., has control of the erection of two new steel bridges across the Ohio River at Wheeling. They will be put up by the Wheeling Bridge Company, and will cost about \$500,000. One of the bridges, it is said, will have a span of 525 feet, which is the longest in the country, the next in length being the Foughkeepsie Bridge, with a span in the clear of 521 feet, as illustrated in the *ENGINEERING AND MINING JOURNAL* of February 2d, 1889.

A press dispatch from McKeesport, Pa., says that the manufacturers whose interests are concentrated in that city have formed a syndicate for the building of a belt railroad line, not to cost more than \$500,000. It will be known as the Youghiogheny Connecting Railroad, and will bring into close communication with each other, Wood's Mill, the National Tube and Rolling Mill, the Monongahela Company's furnaces, Demmler Iron and Steel Works, Howard Glass Works, Allegheny Bessemer Steel Works and the Duquesne Tube Works.

The Pittsburg *Commercial Gazette* for October 9th says: "The output of the Homestead Steel Works for the past two or three weeks exceeds all previous records. On Monday the greatest single day's record was surpassed. The five-ton converters averaged nearly three heats per hour, representing about 700 tons for the day. The open-hearth department turned out several 1,800-pound ingots. Armor-plates weighing 1,800 pounds have been turned out without a flaw. At the Edgar Thomson Works at Braddock the record for Monday was 1,080 tons of finished steel rails—the greatest single day's output."

The new hydraulic press made by the Scaife Foundry and Machine Company of Pittsburg, Pa., for the manufacture of steel railroad ties, is in successful operation by Messrs. Carnegie, Phipps & Co., at the Homestead Works. The capacity of the press is 80 ties an hour, and the work done is in every way satisfactory. The ties are being manufactured for account of the Standard Metal Tie and Construction Company of this city, and are on view at the offices of that company, 15 Cortland street. The first shipment of 700 ties has been made this week to Chicago, to be laid on the tracks of the Chicago & Western Indiana Railroad, where they will be submitted to the severest tests.

A successful dynamometer test of the Tripp anti-friction journal bearing was made Tuesday in the yard of the New York & New England Railroad, Boston, by J. B. Henney, Superintendent of Motive Power, and other officers of the road, and in the presence of representatives of the Thomson-Houston Company and many others. The test on cars numbered 150 and 156 of the Master Car Builders' standard journals showed a draughting strain of 600 and 800 pounds respectively, and on the twelve-wheeled Pullman car "Clypso" a strain of 700 pounds. Car 158, with Tripp bearings, commenced running January 28th, 1889, and was guaranteed to run one year without any attention or additional lubrication, and has now run over 18,000 miles. This car was moved with a strain of 250 pounds, showing a saving of power of over 60 per cent. in favor of the Tripp bearings. The Tripp Manufacturing Company, 33 India Wharf, who are the sole manufacturers of these bearings, are about closing important contracts with roads in New England, Western and Southern States.

CONTRACTING NOTES.

Eighteen bids were received for the construction of an iron bridge over the Clarion River, at Clarion, Pa. The contract was awarded to the Wrought Iron Bridge Company, of Canton, O., whose bid was \$10,450.

The bids for the asphalt paving of Madison avenue between Thirty-second and Thirty-third streets, Thirty-sixth and Forty-first streets, Forty-second and Forty-eighth streets, and Fifty-eighth street between Madison and Fifth avenues have been opened by Commissioner Gilroy, of the Department of Public Works, New York City. The Sicilian Asphalt Company bid the lowest, the total figure being \$121,100. The Taylor Company bid \$134,250. On the contracts for the paving of Park avenue between Thirty-fourth and Fortieth streets the Barber Asphalt Company's bid of \$44,100 was the lowest. The estimates made by the lowest bidders on both these pavements were much higher than the estimates of the department's engineers, but their figuring was predicated on the idea that the guarantees were for five years, whereas

on these contracts the guarantees are for fifteen years, the contractor to get 70 per cent. of his money thirty days after the completion of the work, 30 per cent. at the end of six years, and 3 per cent. annually for the remainder of the time for which the guarantee runs.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

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

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

No charge will be made for these services.

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

These services are rendered gratuitously in the interest of our 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.

AMERICAN GOODS WANTED ABROAD.

233. Pump, to pump 50,000 gallons per day (10 working hours) a distance of four miles, with an elevation of 500 feet, engine and pipe; state price f.o.b. New York, also freight by car lot, to Guaymos and to Hermosillo, Mexico.

234. Mine pump. Mexico.
235. Catalogues, mining machinery, pans and settlers, shoes and dies. Mexico.
237. Catalogues of brick-making machines. Mexico.

239. Shooks wanted. Size and thickness of wood for boxes: 30 gross lots No. 4, side, 10 x 3 1/2 x 1/2 in.; ends, 5 x 3 1/2 x 3/8 in.; bottoms, 10 x 5 1/2 x 3/8 in. 30 gross lots No. 7, sides, 11 1/2 x 1/2 in.; ends, 6 x 3/8 in.; bottoms, 11 1/2 x 6 1/2 x 1/2 in. 10 gross lots No. 8, sides, 12 x 4 1/2 x 1/2 in.; ends, 6 1/2 x 4 1/2 x 3/8 in.; bottoms, 12 x 6 3/4 x 1/2 in. 10 gross lots No. 10, sides, 14 1/2 x 4 1/2 x 1/2 in.; ends, 6 1/2 x 4 1/2 x 3/8 in.; bottoms, 14 1/2 x 6 3/4 x 1/2 in. Australia.

260. Particulars, prices, etc., wanted of a new gun and blasting powder, invented by Mr. Hengst—, Sydney.

261. Parties wanted, to arrange for a private brand of oil. Sydney.

307. Dredge for Gravel Mining. Europe.

265. Heating apparatus, furniture, etc., for a hotel now being built. Virginia.

266. Wanted, one mile 2-in. wrought iron water-pipe; two miles of 4-in., 6-in., 8-in. and 10-in., and one mile of 12-in. C. I. water-pipe, all sizes; 3/4-in. to 4-in. gas-pipe, and malleable iron fittings, lamps and lamp posts. Virginia.

267. Boiler, engine, pump, pipe, etc.; 20 horse-power horizontal boiler and 20 horse-power engine; inspirator, belt, pump, and necessary piping. Price, delivered in Georgia, to be stated.

268. Electric street railway; complete equipment, two miles, 30-pound steel rails. Virginia.

269. Machinery and supplies; bank cars, coal machines, pumps, rails, spikes, picks, shovels, and augurs. Alabama.

270. Roofing. Alabama.

271. Powder, caps, and fuse. Alabama.

272. Oil and mining lamps. Alabama.

273. Lead smelting furnace, also one to reduce nickel ore. Kentucky.

274. Brick dryer with daily capacity of 40,000 brick. Tennessee.

275. Second-hand iron lathes, drill press, planer and machinis' tools for repair shop. Alabama.

276. Pipe, etc., 2,000 feet 2-inch gas pipe, gasometer and regulator. Kentucky.

277. Wood-working machinery, full set for planing mill with engine and boiler for running same. Virginia.

278. Hot-air engine or other power to pump water. Georgia.

279. Floor tiling. Georgia.

280. Felting to put under tin roof. Georgia.

281. Furniture and carpets. Georgia.

282. Cook range and boiler. Georgia.

283. Insulators, brackets, wire, etc. Alabama.

284. Fan for supplying planer shavings to boiler furnace. North Carolina.

285. Engine and boiler, 60 horse-power. Alabama.

286. Engine, boilers, shafting and pulleys, 100 horse-power engine; 125 horse-power boiler, and 100 horse-power boiler. Indiana.

287. Brick machines, etc. Three or four brick machines, one repressing machine and other articles incident to the manufacture of brick. Capacity of plant about 100,000 brick per day. Indiana.

288. Mill for grinding plaster of paris and Portland cement, capacity 50 tons per day. Arkansas.

289. Light narrow-gauge steel rails. Arkansas.

290. Barrel factory machinery. Arkansas.

291. Plaster of paris furnace, also Portland cement furnace. Arkansas.

292. Pump for hydraulicking or stripping surface with pipes (5-inch), hose and nozzles (150 feet pressure). Arkansas.

293. Hoisting engine and wire rope for hoisting on quarry incline. Arkansas.

294. Boiler and engine, 60 H. P. Arkansas.

295. Laundry machinery, complete outfit, for city of 10,000 inhabitants. Kentucky.

296. Engine and boiler, portable, 6 H. P. Tennessee.

297. Planer, matcher, and mortiser. Tennessee.

298. Roller mill, capacity of 20 to 30 barrels flour per day. Tennessee.

299. Machinery for manufacturing furniture. Texas.

300. Machinery for water-works, and perhaps electric light plant. North Carolina.

301. Electric light plant, shafting, pulleys, belting, machine shop tools, exhaust fan, etc. Kentucky.

302. Small mill for grinding fish scrap, new or second-hand. Connecticut.

303. Tile machine, shafts, belting, etc. Georgia.

304. Boiler and engine; 25-horse power boiler, and 20-horse power engine for saw-mill. North Carolina.

305. Saw-mill. North Carolina.

GENERAL MINING NEWS.

Shipments of iron ore from the mines of the district mentioned below for the season up to and including October 9th, as reported by the Marquette, Mich., Mining Journal, were as follows:

	Tons.	Tons.
Marquette, Marquette District....	1,196,507	669,477
St. Ignace, " " " " " " " "	189	188
Escanaba, " " " " " " " "	41,732	97,090
Gladstone, " " " " " " " "	738,580	661,859
Menominee District....	16,901
Escanaba, " " " " " " " "	35,297
Gogebic District.....	1,355,998	884,960
Ashland, " " " " " " " "	221,890	152,792
Two Harbors, Vermillion District.	1,311,710	880,268
	715,696	327,439
Total, tons.....	5,674,321	3,673,885

*The shipments from Gladstone, Marquette District, are shipments from the Republic mine, and from Gladstone, Menominee District, shipments from the Chapin and Ludington mines.

TENNESSEE COAL, IRON AND RAILROAD COMPANY.—Official reports show that this company during September, from the Tracy Cuy division, received 12,622 tons of coal and 12,214 tons of coke, making a total for the nine months of 125,886 tons of coal and 92,454 tons of coke.

ALABAMA.

DE BARDLEEN COAL AND IRON COMPANY.—The mines of this company at Johns and Adger are reported to be producing from 600 to 700 tons of coal each daily. Slope No. 3, at Sumter, mile and one-half south of Johns, on the Birmingham Mineral Railroad, is being rapidly driven to the basin of the same seam of coal on which slopes Nos. 4 and 5 are now working. It is now at a depth of 700 feet and near on to the basin. When this is reached headings will be turned, and in a few months this mine will also, it is said, produce 600 tons of coal per day. Slope No. 1, a short distance south of Sumter, and generally known as Old Slope No. 1, on which work was at one time abandoned, is to be put into operation at once. When slopes Nos. 3 and 1 get into working order the company will have four mines, with a capacity for an output of from 2,500 to 3,000 tons of coal per day. Work on the 400 coke ovens is being rapidly pushed forward.

ARIZONA.

COCHISE COUNTY.

TOMBSTONE MINING AND MILLING COMPANY.—This company is reported to be working only three of its claims at present—the Lucky Cuss, Westside and northwest shaft of the Toughnut. About sixty men are employed by the company in prospecting and development work, only sufficient ore being extracted, it is said, to pay running expenses.

COLORADO.

EAGLE COUNTY.

DAYTON GOLD MINING AND SMELTING COMPANY.—This company is to be formed under the laws of Colorado to work the Cleveland Gold Mine at Holy Cross, which was sold on the 3d inst. to parties in Dayton, O. W. H. Bowers, of Denver, for the present will have charge of the property until a superintendent is appointed. Mr. Bowers states that a mill, capable of treating 100 tons of ore each day, will be erected and active work on mine and mill will be commenced at once.

GILPIN COUNTY.

ELKHORN MINING COMPANY.—This company has been incorporated under the laws of the State of Colorado by M. A. Lawrence, John Best, E. M. Smith and R. W. Patterson. The object of the company is the working of the Hattie Myrtle mine in Pleasant Valley district and for the purchase of other mines. The capital stock is \$100,000, shares of \$1 each, non-assessable. M. A. Lawrence and R. W. Patterson are the directors of the company. The principal place of business is in Central City.

LUTZ.—It is reported that the firm of Williams & Randall, of Denver, have purchased these mines at Central City, known as the Lutz and the Lutz Extension lodes. The property is 3,000 feet in length.

GUNNISON COUNTY.

(From our Special Correspondent.)

EIGHTY-EIGHT GROUP.—This consists of ten claims bonded for \$40,000 and leased for two years at 20 per cent. royalty on \$50 per ton of ore, to Henry Tourtelotte and Mr. Boothby, of Aspen.

JIMMIE MACK.—This mine is supplied with 10 H. P. Sprague electric motors for hoisting from 370

feet incline 72 degrees. Levels every 50 feet. On the third level, 150 feet north, 3,200 tons of ore were treated at the mill, averaging 20 ounces silver and one-half ounce in gold. The dry ore is chloridized and treated at the Brunswick mill, 20 stamps capacity, 25 tons per day of 24 hours. The lead or smelting ore is shipped by wagon to St. Elmo, a distance of 12 miles with a cost of \$8.50 per ton. From St. Elmo to Denver the cost is \$6.50 per ton by rail.

ROBERT E. LEE.—This mine is three miles southwest of Tin Cup, on east Gold Hill. The country rock is limestone. The vein, 14 feet wide, dips east at an angle of 20 to 35 degrees. A shaft 70 feet connects a level of 150 feet and a cross-cut incline, 30 feet to the vein. The ore, Galena and lead carbonate, assays 15 to 700 ounces silver, and 35 per cent. lead. The quartz ore shows native gold, silver and sulphuret, rich in gold and silver.

LAKE COUNTY.

(From our Special Correspondent.)

FOREPAUGH.—The Tip-top ore chute connects with the south end of the Forepaugh. The course of lode location is north and south. The adjoining claim is the Alpha, course east and west. The Forepaugh shaft is 450 feet deep, 376 feet to the ore body. A level 150 feet north, 20 degrees east, is being driven to eventually connect with the Bankok ore chute.

MATCHLESS.—The north 800 feet of this property is being worked by this company, employing 40 men. The developments consists of two shafts with cages, One, No. 5, 280 feet in depth and 250 feet from the north end line; the other shaft, No. 6, 300 feet deep and 350 feet south of No. 5 shaft. The two shafts are connected by a drift running north on the 200-foot level. A drift at the 300-foot level encountered a body of argentiferous iron ore, 32 feet high, 50 feet wide and 100 feet long, with an average value of 10 ounces in silver, 40 per cent. iron (excess over silica). At the north end was found a body of sand carbonate, 30 feet square and 16 feet thick, averaging 30 ounces silver and 35 per cent. in lead. Occasional pockets of galena are found in this ore body, assaying 400 ounces of silver and 31 per cent. lead. Northeast of the sand carbonate, another body of argentiferous iron ore, 20 feet square and 10 feet thick, is shown. The mine is shipping about 50 tons per day, 20 tons from the lessees working the south end and 30 tons from the company's ground in the north end. The unexplored territory is 100 feet wide by 500 feet in length, near the east side line. Mr. A. V. Bohn is manager, and Mr. George Bowes, Superintendent.

PARK COUNTY.

GOOD SAMARITAN CONSOLIDATED MINING COMPANY.—This company has been organized, with a capital stock of \$1,000,000, shares \$1 each, to operate the Shelby and Good Samaritan mines near Fairplay. The incorporators are R. G. Peters, John A. Thompson and G. E. Squires.

MINNEHAHA MINING AND MILLING COMPANY.—This company has been incorporated by A. Mosttwork, W. J. Woodsey, H. E. Mills, and John Butler, with a capital of \$250,000.

PITKIN COUNTY.

(From our Special Correspondent.)

ASPEN MINING AND SMELTING COMPANY.—Shipment for September amounts to 1,750 tons of lead ore, average value 25 to 100 ounces silver, 10 to 30 per cent. lead, and 250 tons of dry ore.

ASPEN MINE.—Owing to insufficient regulations, transportation and support, two miners have lost their lives in the Aspen mine recently. The management and the State Inspector of Mines would do well to study "Accidents in Mines and their Prevention." This mine paid a dividend of \$170,000 last month.

The J. C. Johnson, Regent, Iowa, St. Joe, Lulu S., Empire, Red Chief, were sunk too far east of the contact, cutting the quartzite, requiring inclines and levels to upraise the ore instead of overhead stoping. Not a single shaft in the camp is supplied with a cage for economical hoisting. Duplicate pumps found serviceable in Leadville are considered too expensive here. High-grade ore is required to pay for costly mining.

The Apex suit, Bonnybel vs. Durant, will have a rehearing before Judge Moses Hallett, on November 11th. Ten expert witnesses will be retained.

DAKOTA.

PENNINGTON COUNTY.

CLEVELAND TIN MINING COMPANY.—In a statement to the Committee on Mining Societies of the New York Consolidated Stock and Petroleum Exchange, Mr. S. C. Williams, the secretary of this company, says that its only liabilities are for current expenses, and do not exceed \$500; that the title to the property is clear; that no legal proceedings are pending against the company, and that development work is still in progress.

HERMOSA HYDRAULIC COMPANY.—In conversation with an ENGINEERING AND MINING JOURNAL reporter this week, Mr. G. W. Chadwick stated that this company, to which we referred in our issue of July 13th, paid dividend No. 24 on October 5th of one cent per share, aggregating \$5,000, and that as dividends of the same amount have been paid consecutively, the total paid by this company, of which he is the moving spirit, is \$120,000. It would be well for readers to refer to our remarks concerning this enterprise in the issue above mentioned.

IDAHO.

SHOSHONE COUNTY.

(From our Special Correspondent.)

The mines in the Coeur d'Alenes are actively pushing ahead their development work, but most of the prospectors have stopped shipping ore and concentrates,

because the smelting and railroad companies have raised the freight and smelting charges. The smelting companies of Montana have combined with the Northern Pacific Railroad Company to fleece the miners.

WASHINGTON COUNTY MINERAL MANUFACTURING COMPANY.—This company at Mineral City has erected a 15-ton leaching plant. The ore is roasted in a reverberating furnace.

MICHIGAN.

The Detroit Dry Dock Company, Detroit, Mich., has closed a contract with the Inter-Ocean Transportation Company for the construction of one of the largest steel steamships on the lakes.

COPPER MINES.

CENTENNIAL.—A vertical exploring shaft has been commenced on the north half of the section (12), about 60 feet on the back of the vein.

MONTANA.

DEER LODGE COUNTY. GRANITE MOUNTAIN MINING COMPANY.—Various reports have been circulated in reference to this company, and in answer to a letter in reference to the above the secretary writes us as follows, under date of October 11th: "We consider our property improving, instead of deteriorating, and have recently discovered new ore chutes in what was formerly considered unmineralized ground, and lower developments show conclusively the continuance of our well-known ore bodies to depth."

SILVER BOW COUNTY.

BUTTE AND BOSTON MINING COMPANY.—This company started up its new 100-ton blast furnace on the 9th inst.

COLORADO MINING AND SMELTING COMPANY.—The annual statement of this company, filed on the 7th inst., shows the principal offices at Denver and Butte. The capital stock is \$1,000,000, all of it paid in real and personal property.

OHIO.

LAWRENCE COUNTY.

A correspondent writes us that a seam of 32-inch coal, overlying a seam of block ore 8 inches thick, has been discovered near Ironton, on the property of Geo. N. Gray.

OREGON.

CLAKAMAS COUNTY.

OREGON IRON AND STEEL COMPANY.—The furnace of this company, at Oswego, has been in blast for the past year, and still continues making 30 to 40 tons of pig iron per day. The fuel used is charcoal made in kilns.

MULTNOMAH COUNTY.

PORTLAND SMELTING COMPANY.—The company's plant at Sinnott, seven miles north of Portland, is progressing finely and nearing completion. All the necessary machinery, etc., is on the ground.

PENNSYLVANIA.

COAL.

OAKDALE.—This colliery was put in operation on the 10th inst. for the first time. The colliery is located at Delaware, three miles from Pottsville, and is owned by Schwenk, Robinson & Co.

COKE.

It is rumored in Pittsburgh that preparations are being made to export Connelville coke to Europe.

OIL.

The demand for petroleum for shipment to China and Japan is said to be unprecedented, and freights have gone up.

An oil well was struck on the 15th inst., at Chartress, just outside the city limits of Pittsburg. It is reported to be flowing at the rate of 1,000 barrels a day, and is said to be the largest well ever struck so close to the city.

The National Transportation Company, of McKeesport, which furnishes the fuel gas for the National Tube Works and Rolling Mill, has just awarded the contract for drilling six more wells in the Grapevine field.

Exports of refined, crude, and naphtha from the following ports, from January 1st to October 12th, were as follows:

Table with columns for 1889 Gals. and 1888 Gals. Rows include From Boston, Philadelphia, Baltimore, Perth Amboy, New York, and Total exports.

UTAH.

SUMMIT COUNTY.

DAILY MINING COMPANY.—According to the statement of this company's operation for the first six months of 1889, furnished us by Messrs. Lounsbury & Co., the gross receipts during that period were \$901,841.76, including the cash balance of \$424,728 17 held on January 1st.

ONTARIO SILVER MINING COMPANY.—For the past nine months this mine, according to the above-named paper, has produced in bullion, fine ounces, \$ 719,847.88. The values of the ore sales for the same period were \$649,427.67.

WASHINGTON.

OKONAGAN COUNTY.

[From our Special Correspondent.]

ARLINGTON MANUFACTURING COMPANY.—This company is erecting a 50-ton crushing, washing and leaching plant near its mine, to treat the ore by the Russell process, which will cost between \$80,000 and \$90,000. It is erecting a large sized Stetefeldt furnace for the roasting. It has 250,000 brick burning, and intends to burn 200,000 more before the winter sets in.

There is considerable development work going on in this and adjoining districts.

WYOMING.

FREMONT COUNTY.

CARISSA GOLD MINING COMPANY.—It is reported that \$100,000 has been subscribed in the East for working this mine at South Pass. Seventy-five thousand feet of logs have been contracted for, it is said, and a twenty-stamp mill will be put up at once; also a boarding and bunk house for the men.

MEETINGS.

American Contracting and Dredging Company, 45 Exchange place, October 22d, at three P. M. Transfer books close October 18th and re-open October 24th.

Central Mining Company, 76 Wall street, New York City, November 14th, at twelve o'clock noon.

Crescent Mining Company, at McCormick & Co.'s Bank, Salt Lake City, Utah, at 10:30 A. M.

Edison Electric Light Company, 44 Wall street, October 23d, at twelve o'clock noon. Transfer books close October 10th and re-open October 23d.

DIVIDENDS.

Calumet & Hecla Mining Company, dividend of \$5 per share, aggregating \$500,000.

Champion Mining Company dividend No. 1 of 10 cents per share, payable at No. 522 Montgomery Street, San Francisco, Cal., on and after October 15th.

Daly Mining Company, dividend No. 31, of twenty-five cents per share, aggregating \$37,500.

Homestake Mining Company, dividend No. 134, of 10 cents per share, aggregating \$12,500, payable October 19th, at Lounsbury & Co., Mills Building, New York City. Transfer books close October 19th.

Idaho Gold Mining Company, of Grass Valley, Cal., dividend No. 239 of \$5 per share or \$15,500.

Ontario Silver Mining Company, dividend No. 160, of fifty cents per share, aggregating \$75,000.

FINANCIAL STATEMENTS.

The following statement shows the financial balance of the principal mining companies having offices in San Francisco on September 1st and on October 1st, 1889. The comparison shows what progress, if any, has been made toward a dividend paying position.

Table with columns for CASH ON HAND and INDEBTEDNESS. Rows include various companies like Alpha, Alta, Andes, Benton, Best & B., Bulwer, Bullion, Bodie Co., Challenge, Crocker, Con. Cal., & Va., Cale'nia, C'nf'd'ce, Con. N.Y., E. Sierra, Nev., Exch'g., F o u n d, Treas., Gould & Curry, Hale & N., Imperial, Ind'ence, Julia, Kentuck, Loco'tive, Lady W., Mex'can, Mono, Ophir, Ov'man, Peerless, Peerless, Scop'ion, Silver Hill, Sil.King, Sierra N., St. Louis, S'ndic'te, Utah C., Un. Con., Weldon.

a Cash in bank and unsold bullion on hand valued at \$74,196.82, with further shipments to arrive before the close of the fiscal month.

b Cash in bank and unsold bullion on hand valued at \$100,582, with further shipments to arrive before the close of the fiscal month.

Table with columns for INDEBTEDNESS. Rows include Belle I., Belcher, C r o w n, Point., C'mw'th., Chollar., Con. Imp., Del Mo., Grand P., Holmes, Kent'cky, Keyes, Navajo., Nev Q., N o r t h, C'w'h., N. Belle, Isle., Occid'tal., Potosi., Savage., Seg. Bel., & M. C.

a With assessment now delinquent to be collected. b With bullion at the mine as an offset.

ASSESSMENTS

Table with columns for COMPANY, No., When levied, D'n'q't in office, Day of Sale, Am't per share. Rows include Alliance, American Gulch, Mont., Apex, Atlas, Balt. & Vict., Best & Belcher, Chicago Mill & Mfg. Co., Crown Point, Del Norte, Florence, Grand Prize, Grey Eagle, Golden Prize, Hartery Cons., Hartford, Livermore, Lockport, New La Plata, North Belle Isle, N. Bonanza, Peer, Potosi, Scott Bar, Sierra Nevada, Silver Hill, Union, W. Y. O. D., Young America.

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 353 and 354.]

New York.

FRIDAY EVENING, Oct. 18.

The week in the mining share market has been quiet and featureless. Transactions have been comparatively moderate in volume, averaging ten thousand shares a day, which, although small in comparison with the reported dealings of former days, is at present, at least, much freer from the "washed" transactions which have so often been made to create a value for a doubtful stock.

The monthly financial statements of the principal mining companies having headquarters at San Francisco on October 1st, published in another column, are not particularly encouraging. The shareholders in the Tuscarora mines apparently have a prospect of nothing but assessments in the immediate future.

financial condition of the Comstock properties is not improved.

It appears to be doubtful if Consolidated California & Virginia will pay a dividend in November. The stock during the week has fluctuated from \$5.37 1/2 to \$6.00, with sales of about 1,500 shares.

As might be expected in view of the contemplated suit against the new owners of the Suro Tunnel, to which we referred last week, there has been some inquiry for the old Suro stock, and about 6,000 shares have been secured at 8@9c.

Eureka Consolidated opened on Saturday last at \$4.40 and declined to \$3.50 on Tuesday, recovering finally to \$4.30 to-day. The sales here have amounted to only a few hundred shares.

Not a sale of any share of the mines of Tuscarora is reported, with the exception of Navajo to-day at 40c. Barcelona sold at 30@25c.

The only sale of the "Bodies" reported is one of Bodie Cons. at 80c. Mono, Standard and Bulwer are inactive.

Among the Colorado shares, Ward Cons. appears to have settled down to 50@50c. Little Chief is quiet at 36c. Leadville Cons. sold at 10c. and Iron Silver at \$1.35.

Nothing is being done in Horn Silver. Ontario has declared its 161st dividend of \$75,000. The stock sold at \$35@35.25; Stormont at 5c.

From the quietude which has prevailed all through the list, the Dakota shares have not escaped. Caledonia was sold once at \$2.60 and Deadwood Terra at \$1.50.

Phoenix, of Arizona, was quiet at 50@55c. until to-day, when an inquiry for 1,000 shares advanced the price to 60c. As soon as this quotation was made, A. De Cordova who is said to represent a short interest in the stock, offered 100 shares down to 54c., with no buyers.

Rappahannock fairly active at 5c. Mutual Mining and Smelting opened at \$1.15, advanced to \$1.50.

United Copper changed hands at \$1.10@1.20. Shoshone sold at the lowest figure yet named for the stock, and a number of packages of stock certificates were disposed of at 2c., while some sold for a single "copper."

Silver King declined from 60c. to 50c. Kingston and Pembroke sold at 75c. St. Joseph lead is quoted at \$15.

With reference to our remarks in a recent issue on the price at which Colchis shares were being offered for sale in Boston, we wish to point out to avoid misconception that these shares are not treasury stock and offered for sale by the company, but are offered for sale by R. H. Whitney & Co., who purchased them from the company, thus providing the company with funds to erect a suitable milling plant.

Boston. Oct. 17. From our Special Correspondent.]

There has been quite a good demand for the better class of copper stocks the past week, and prices have responded upward. The feeling is prevalent that we have seen the lowest prices for the year, and that good stocks bought now will pay well for the investment.

Tamarack is also in good demand, but there is very little for sale, the stock being held by strong parties, who do not care to part with it at the present quotations.

Central, the first time for six months (viz., April 13th), was reported with a sale of 20 shares at \$20, and 5 shares at \$11.

National sold at \$1, but later at 75c. Ridge sold at \$1. Santa Fe advanced to 57 1/2c., but could not hold the advance and declined to 50c. Bonanza sold at 50c. There were no sales of Franklin or Atlantic this week; \$9 is bid for the former, and \$8 1/4 for the latter.

Silver stocks are quiet. The only reported sales of Dunkin were at 77 1/2c.

3 p. m.—Market closed firm. Boston & Montana, \$35. Tamarack, \$106 1/2. Quincy, \$50. Santa Fe declined to 45c. on sale of 500 shares. Calumet & Hecla, \$222 bid, \$225 asked.

Denver.

In this column, in our issue of October 5th, a correspondent addressed a letter to the Mining Industry of Denver, in regard to the transactions at the newly-opened mining exchange in that city, inquiring (1) Whether or not these sales are bona fide transactions? (2) To what extent do they represent a purely commission business? (3) What is the form of application for "listing," and what steps are taken to ascertain the value of properties making such application and to prevent the listing of "wild cats?"

Pittsburg. Oct. 17.

(From our Special Correspondent.)

Your article on La Noria created quite a flurry on Fourth avenue (our Wall street), and the conclusion reached on its perusal was that the half had not been told. It is quietly hinted that the company owes over or near to the insignificant sum of \$100,000.

This week sales of La Noria have been made at five-eighths of one dollar per share; par, \$25 per share. More is wanted, apparently, at this price, and the management still run the company's affairs on the "speak easy" system of saying nothing.

The gas stocks are all in the dumps again, owing, doubtless, to the repeated cries of shortage of gas that gas is gradually weakening in fields now known, none will deny who wish to speak the truth.

We all hope that this may not be the case with us, but the truth must be told, and no one here denies that the old fields are fast running down in pressure, owing to the tremendous drain on the wells.

Local stocks and local funds are in a healthy condition. Bank, bridge, traction and passenger railway stocks are all active and higher.

Bank, bridge, traction and passenger railway stocks are all active and higher. Electric, air-brake, insurance and some other stocks having had, in some cases, large advance in prices lately, are now inclined to sell at slightly lower prices.

from \$50 [par] to \$44 1/2. But it has since rallied to the starting point.

The company employs about one thousand hands, and sold last month three hundred and ninety thousand dollars worth of electrical appliances, including lamps, while at present their orders exceed one million dollars.

Electric Stocks.

A dispatch from Cleveland, Ohio, says that the reports from the East about the purchase of the Brush Electric Company by the Thomson-Houston Company for \$3,250,000 are not exactly correct.

A rumor was afloat in New York city this week that this alleged sale was only the beginning of a general consolidation of all the arc light companies in order to effectively oppose Edison.

PIPE LINE CERTIFICATES.

(Special Report by Messrs. WATSON & GIBSON.)

The petroleum market continues without feature. A new well was opened about four miles from the Court House in Pittsburg, but it had only a passing effect upon the market.

NEW YORK STOCK EXCHANGE.

Table with columns: Opening, Highest, Lowest, Closing, Sales. Rows for Oct 12-18.

Total sales in barrels..... 3,122,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

Table with columns: Opening, Highest, Lowest, Closing, Sales. Rows for Oct 12-18.

Total sales in barrels..... 2,187,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Oct. 18.

Statistics.

PRODUCTION OF ANTHRACITE COAL for week ended October 12th and year from January 1st.

Table with columns: Tons of 2,240 lbs., Week, Year, 1888, Year, 1889.

Total..... 756,109 27,290,026 29,298,276

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

Production for corresponding period:

Table with columns: 1884, 1885, 1886, 1887, 1888, 1889.

PRODUCTION OF BITUMINOUS COAL for week ended October 12th, and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

Table with columns: Tons of 2,240 lbs., Week, Year, 1888, Year, 1889.

* Week ending October 7.

WESTERN SHIPMENTS.

Table with columns: Tons of 2,240 lbs., Week, Year, 1888, Year, 1889.

Grand total..... 284,285 9,447,386 12,061,757

PRODUCTION OF COKE on line of Pennsylvania R. R. for week ending October 12th, and year from January 1st, in tons of 2,000 lbs.: Week, 91,118 tons; year, 3,353,073 tons; to corresponding date in 1888, 3,082,586.

Anthracite.

Anthracite coal continues to move more freely than heretofore. Indeed, with the month of October so far gone, it would be more than strange were anything else the case. Prices in some instances are claimed to be a little nearer the circular rates, but there has been no general improvement, while the sales agents continue to discuss the condition of the trade at their usual meeting without attempting to advance them. The trade is fairly active, and some of the dealers, particularly in the East, who have delayed purchases, now find themselves in more or less urgent need of coal. The statistics of production show a continued decrease in the output, and stocks at tide water are also believed to be lessened. In the case of the Delaware & Hudson Canal Company this cannot be said, as the company has a large stock at Honesdale and is desirous of shipping as much of this to market as possible before the close of navigation. Prices may be quoted as follows: Stove, \$4.25; chestnut, \$3.85; egg, \$3.90; pea, \$2.50. Pea and buckwheat sizes are scarce.

Mr. John H. Jones, Chief of the Bureau of Anthracite Coal Statistics, sends us the following statement of production for month of September, 1889, compared with same period last year, compiled from the returns furnished by the mine operators:

	Sept., 1889.	Sept., 1888.	Difference.
From Wyoming Region	1,769,570	2,116,797	Dec. 347,226
From Lehigh Region	512,233	628,248	Dec. 115,954
From Schuylkill Region	905,018	1,171,279	Dec. 266,261
Total	3,186,822	3,916,325	Dec. 729,442

	For year, 1889.	For year, 1888.	Difference.
From Wyoming Region	13,703,875	16,111,451	Dec. 2,437,575
From Lehigh Region	4,569,542	3,844,577	Inc. 724,964
From Schuylkill Region	7,313,872	7,549,587	Inc. 235,714
Total	25,587,289	27,535,616	Dec. 1,948,325

The stock of coal on hand at tide-water shipping points, September 30th, 1889, was 877,237 tons; on August 31st, 1889, 795,749 tons; increase, 81,488 tons.

Bituminous.

Soft coal retains the same prevailing characteristics that we have noted for some weeks past. Cars are not any more plentiful. The disparity in rates on vessel freights between Baltimore and Philadelphia to the Sound ports and Boston has been removed, according to the latest quotations, but there is still a notable difference between the cost of freights at Philadelphia and New York, a difference which shippers believe to be unreasonably large. The most interesting topic of the trade is the meeting of the Sea Board Association, which is to be held at Philadelphia next Tuesday. We presume that the commissioner and the board of governors appointed in the early part of the year for the regulation of the trade and the correction of its abuses will render a report of their work, and incidentally show how faithfully the terms of the compact have been adhered to. At any rate a report of some kind will be looked for, and altogether the meeting, if largely attended, promises to be unusually interesting and lively. Its stated object is said to be the revival of the association for next year's trade, but producers very naturally ask, "If the same elements are to be combined in the same manner under the same management, what guarantee have we that the result next year will be any more satisfactory than it has been during the year 1889?" The demand for coal continues active, the scarcity of cars being the only hampering feature. We continue to quote as follows: \$2.60 f.o.b. Philadelphia and Baltimore, and \$3.20@3.25 f.o.b. New York.

Boston.

[From our Special Correspondent.]

The anthracite coal market is constantly improving, and is now in pretty fair shape. The retail output is satisfactorily large, and the retailers in this vicinity are not too easily satisfied. The f.o.b. market at New York is on a basis of \$4.15 to \$4.25 for stove coal. When a price under \$4.15 is named one has to be careful to know just what he is buying. There is considerable stove to be had at from \$4 to \$4.10. The steam sizes of anthracite are well sold up, and delivery is rather slow. Broken and egg is in good supply. The local line and pocket trade is rather quiet, and there is no especial difficulty about getting cars enough at present. At the rate that domestic coal is going into consumption there will be a good live trade shortly.

The bituminous movement is notable for the amount of small piecing out orders in the market. A good many manufacturers seem to have bought less coal at the opening of the season than they required. Cumberland coal is in good demand at \$2.60, f. o. b. and current freights, and there is none too much of it at those terms. It is to be hoped that the B. & O. road will not have another year the trouble in shipping which has existed for some weeks past. Some of the best kinds of Clearfield coal are in excellent call on small lots at \$2.50@2.60, f. o. b. The rush to ship is not yet over. In another month contracts will be well out of the way, in most cases.

The freight situation does not show lower rates, but rather higher, notwithstanding the fact that the number of new vessels in the coasting trade is beginning to be noticeable. The haste of the bituminous shippers to

fill contracts tends to keep freights up, particularly at Philadelphia, where \$1.35 has been paid and \$1.40 is asked. At Baltimore rates are \$1.30@1.40, and at New York \$1.15@1.25. Bituminous shippers who are caught on delivered contracts are bringing coal along at a loss of 25 to 35 cents per ton, but we hear of no one going back on their contract. Barges are scarce, particularly for Sound ports, and bring full prices. The opinion seems to be that freights will not decline materially if the weather remains cool and seasonable.

Retail trade is very good. Dealers are having a good business and are making a fair profit. The combination seems likely to hold for an indefinite time—until something happens. The skies are clear now apparently and coal is being sold at very reasonable prices.

Receipts for the week have been 46,462 tons anthracite and 19,321 tons bituminous, against 33,363 tons anthracite and 18,707 bituminous for the same period of 1888. Since January 1st receipts have been 1,272,484 tons anthracite and 731,446 tons bituminous.

Mr. Albert C. Betteley, very well and favorably known in the coal trade here, has associated himself with the Gay & Parker Company, and will strengthen the already strong and enterprising party in that concern.

Mr. C. H. Sprague, of the Chesapeake & Ohio agency here, continues quite seriously ill.

Buffalo.

Oct. 16.

[From our Special Correspondent.]

Your correspondent is in Louisville, Ky., attending the 21st annual meeting of the National Board of Trade.

There are no changes to note in the situation of the market in relation to anthracite and bituminous coal. The following statistics are forwarded as matters of interest.

The shipments of coal from October 10th to 16th, both days inclusive, aggregate 49,350 net tons, namely 32,920 to Chicago, 8,200 to Milwaukee, 3,600 to Duluth, 2,800 to Superior, 1,630 to Toledo, 200 to Bay City; total for season to date, 1,715,575 net tons. The rates of freight were 60c. to Chicago, 60c. to Milwaukee, 30c. to Duluth, 30c. to Superior, 30c. to Toledo, 60c. to Radine, 30c. to Detroit, 30c. to Windsor. The receipts by canal, second week in September, 2,819,980 net tons; the shipments, 1,021,490 net tons.

Pittsburg.

Oct. 17.

[From our Special Correspondent.]

Coal.—We can report a firm market and an improved demand; the shortage of natural gas at many points has caused several parties to prepare for cold weather with coal; of course, the gas men say the deficiency is only temporary, still it is better to be on the safe side. The amount of coal in the various pools loaded for shipment does not exceed 7,000,000 bushels. Price of mining ranges from 2c. to 2½c. per bushel.

The nominal rates are:
PRICE OF COAL PER 100 BUSHELS = 7,600 LBS.
First pool.....\$4.75 Fourth pool.....\$3.25
Second pool..... 4.50 Railroad coal..... 5.00@6.00
Third pool..... 3.90

Railroad Coal advanced to the following: ¾ coal, 90c. per 100 bushels, f. o. b. cars at works; 1½ coal, \$1, f. o. b. at works.

Connellsville Coke.—The situation is about the same as last week—coke plentiful; cars not to be obtained; stocks accumulating and furnacemen calling for coke. The price of coke for October is as follows, f. o. b.: Furnace, \$1.50; dealers, \$1.65; foundries, \$1.80; crushed, \$2.30. Freights from ovens to Pittsburg 70c. per ton; to Mahony and Shenango Valleys, \$1.35; St. Louis, \$3.65; Cleveland, \$1.70; to Chicago, \$2.75.

FREIGHTS.

From Baltimore to: Boston, Mass., 1.30@1.35; Bridgeport, 1.20; Brooklyn, 1.00; Charleston, .75@.80; Fall River, 1.20; Galveston, 3.00; New Bedford, 1.20; New Haven, 1.20; New London, 1.20; New York, N. Y., 1.00; Portland, 1.35@1.35; Portsmouth, 1.35@1.40; Providence, 1.20; Richmond, Va., .70; Salem, Mass., 1.35; Savannah, 1.00; Somerset, 1.20; Williamsburgh, N. Y., 1.00.

From Philadelphia to: Alexandria, .85; Baltimore, .60; Boston, Mass., 1.25@1.35; Charleston, .80; Fall River, .80@.90; Galveston, 3.50; Georgetown, D. C., .85; Gloucester, 1.35; Lynn, 1.25@1.40; Milton, \$1.40; New Bedford, .80@.90; New York, .90; Norfolk, Va., .80; Portsmouth, Va., .80; Portsmouth, N. H., 1.35; Providence, .80@.90; Richmond, .95; Salem, 1.35; Savannah, 1.10; Washington, .85.

From New York to: Bath, Me., .90; Boston, Mass.; .75; Charlestown, .75; East Boston, .75; Lynn, 1.00; New Haven, .60; Portland, .75; Portsmouth, N. H., .85; Quincy Point, .75; Salem, Mass., .75; Sangus, .80.

* And discharging. † Alongside. ‡ And towage.

METAL MARKET.

New York, Friday Evening, October 18.
Prices of silver per ounce troy.

Oct.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.	Oct.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.
12	4.86¼	"	93¼	16	4.86	43	93½
14	4.86¼	†	93½	17	4.85½	42½	93¼
15	4.86	‡	93½	18	4.85¼	42½	93¼

* 42 13-16. † 42 15-16.

Council bills advanced ¼d. on this week's allotment.

Silver market has been strong on good demand for shipment but closes unsettled and nominal. Weakness in sterling exchange has also tended to lower prices for silver.

United States Assay Office at New York reports total receipts of silver for the week 135,000 ounces.

Of the silver bullion purchased on the 17th inst. by the Treasury Department, 200,000 ounces, equivalent to \$280,000 in standard dollars, were destined for the mint at San Francisco, which is to be started into activity again after its long period of idleness. It is stated that the coinage is now some \$1,300,000 in arrears, owing to the summer's interruptions, and must be brought up to the normal point.

Foreign Bank Statements.

The governors of the Bank of England at their weekly meeting made no change in its minimum rate for discount, and it remains at 5 per cent. During the week the bank gained £290,000 sterling bullion, and the proportion of its reserves to its liabilities was raised from 33.70 to 36.02 per cent., against an advance from 34.26 to 36.02 per cent. in the same week of last year, when its rate of discount was 5 per cent. Thursday the bank lost £25,000 bullion on balance. The weekly statement of the Bank of France shows a decrease of 5,125,000 francs gold and 3,950,000 francs silver.

Domestic and Foreign Coin.

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

	Bid.	Asked.
Trade dollars	73	75
Mexican dollars	73¼	75
Peruvian soles and Chilean pesos	72	73¼
English silver	4.83	4.88
Five francs	.94	.95
Victoria sovereigns	4.85	4.89
Twenty francs	3.88	3.93
Twenty marks	4.74	4.78
Spanish doubloons	15.55	15.75
Spanish 25 pesetas	4.80	4.85
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.65
100 guilders	3.96	4.00

Copper.—The feeling generally in regard to our copper market continues to be hopeful, and values may now be regarded at a pretty safe level, with the chances in favor of somewhat higher prices before very long. Nothing of much importance has transpired during the past week, but there can be no question that the bona-fide demand for all kinds of copper for consumption in this country is now enormous. The producing companies have no stocks worth speaking of (and in fact some of them are understood to be pressed for deliveries), and the stocks in warehouse belonging to foreign bankers are not at present offered in the market. The prices still quoted are 11c. for Lake and 10c. for casting sorts.

European advices report the state of things there as generally very steady, and although the consumptive demand may not be quite as active as it was a short time ago, yet business continues very satisfactory. Further sales of Boston & Montana matte have taken place in Liverpool at the comparatively low price of 8s. per unit (which is certainly not in keeping with the present value of Chili Bars), but some Anaconda matte has also been sold during the past week at 8s. 3d. According to private cable advices, the statistics of visible supplies show a decrease of 900 tons for the first half of October.

During the week the London market for Chili bars and G. M. Bs. has been very steady with comparatively small fluctuations, the closing prices to-day being spot £43 to £43 2s. 6d., and three months, £42 7s. 6d. to £42 10s.

The latest London quotations for manufactured and refined sorts are as follows: English tough, £47 to £48, best selected, £49; strong sheets, £56; India sheets, £52 to £53.

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

To	Copper.	Lbs.	\$14,454
To Hamburg—			
By S. S. Welland	2,102 bags	244,000	10,000
To Liverpool—			
By S. S. Strabo	213 bls	224,889	10,000
" " " "	1,047 bags	103,270	7,000
" " " "	5,130 sacks	559,982	24,800
" " " "	238 bars	104,812	9,500
" " " "	2 casks	2,500	250
" " " "	375 pigs	112,214	10,005
" " " "	4 casks	5,000	500
" " " "	687 pigs	218,706	20,000
To Leghorn—			
By S. S. Victoria	277 casks	165,867	16,785
" " " "	206 pigs	56,884	5,690

Tin.—The consumptive demand for this metal is exceedingly heavy at present and, although considerable shipments have arrived lately, almost all went immediately and directly into consumption. Under these circumstances spot tin still remains very scarce and comparatively high prices can still be obtained for prompt and early deliveries. It now seems very probable that supplies will continue scarce through the whole of next month (November), if not even longer. Our closing quotations to-day are: Spot, 20½@21c.; October, 20½; November, 20½; December, 20½. Advices from London report that market also very firm, with a strong tendency to still higher prices. The latest closing prices received by cable to-day are: Spot, £91 to £91 5s.; three months, £91 15s. to £92, being an advance of about £1 5s. for the week. Spot tin is also becoming rather scarce in the London market, and latest advices from the Straits are to the effect that the shipments for this year are not expected to exceed those for 1888.

Lead.—Throughout the greater part of the week the tone of the lead market was very dull at gradually drooping prices, but without any movement of importance. All interest seems to be centered in the long looked for decision of the Secretary of the Treasury on the Mexican silver lead ore question. An article which appeared in the New York Herald on Thursday was generally interpreted as an indication that the decision would be in favor of those desiring the exclusion of such importations, and the effect was to produce rather a "bullish" feeling in lead, but to-day (Friday) another article in the Times takes quite the opposite view, and thus again discourages the sanguine holders of lead and leaves the market to-day with rather an easier feeling, but there is still a strong undertone observable. Our closing prices are spot, 3'90; October, 3'90; November, 3'92½; December, 3'95.

The Chicago Market.—Messrs. Everett & Post telegraph us as follows to-day: Our market has been easy during the week, and although the nominal quotation has been 3'80c., sales of several hundred tons were made at 3'70c. Market closes dull, at 3'80c. asked.

The St. Louis Market.—Messrs. John Wahl & Co. telegraph us as follows to-day: Nothing new to report. Business continues very dull, with little prospect of immediate improvement. The demand is extremely light and prices almost nominal. Common and Refined obtainable and only lightly saleable at 3'70c.

Antimony.—The great scarcity continues without any abatement, and prompt or early supplies are becoming more and more difficult to secure. The demand seems really to be greatly in excess of the supply, and naturally prices are very buoyant. We quote to-day: Hallett's, 17½@18c.; Cookson's, 20c.

The latest London quotations are: Hallett's, £70; Cookson's £72 10s. @ £73.

Spelter remaining steady at 4.10 for prime Western. The latest London quotations are: Ordinaries, £21 7s. 6d.; Specials, £22 2s. 6d. @ £22 5s.

Nickel.—Increased importations have eased this market considerably, and round lots are now obtainable at about 70c. per pound.

Quicksilver.—This market is quiet and unchanged. We quote in London £9 5s.; in New York, \$49 to \$49.50, and for jobbing quantities in this city, 65 to 66c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, October 18.

Pig Iron.—The gradual but close absorption of the available supplies of the first-class brands, together with the influence of the rapidly advancing prices in the West, are beginning to have an apparent effect upon this market, and prices show an advancing tendency. The president of the Thomas Iron Company informs us that while his company is now delivering iron to customers on old contracts at 17 per ton, on and after November 1st this price will be advanced to \$18 for No. 1, which was the opening price for the year. Some weeks ago 500 tons of Sloss Iron & Steel Company's iron here sold at \$18 for January delivery, and this company is practically out of the market for immediate delivery, as is also the Tennessee Coal, Iron & Railroad Company. In general, therefore, prices show a stiffening, and it is very doubtful if any No. 1 foundry iron can now be obtained for \$17. In other quarters there have been sales during the week aggregating 15,000 tons. Quotations in detail are as follows: Northern brands, No. 1 Anthracite Foundry, \$17@18; No. 2, \$16@17; Gray Forge, \$15.50@16.00. Southern brands, No. 1 Coke Foundry, \$17@18; No. 2 \$16@16.50, and \$15.50@15.75 for Gray Forge.

We have received a communication from the secretary of the Metal Exchange objecting to the reference made in this column last week to a belief entertained in some quarters that the quotations of pig-iron warrants on the Metal Exchange were "fictitious." In justice to Mr. Schriver, we may state that no reflection was intended upon the Metal Exchange, and that it was not meant to imply that this institution was guilty of intentionally publishing false quotations, but reference was intended to a statement made to us that the greater part of the pig-iron warrants now issued are held by the Pig Iron Storage Warrant Company, and that the high quotations for the same are made, perhaps openly on the floor, by the brokers in the employ of that company, and for the purpose of showing furnace agents that iron stored on warrant commands the top of the ruling quotations, and more than other brands not so stored. This belief is strengthened by these facts; that iron of the standard grade dealt in by the warrant system has been sold for delivery to a warrant yard as low as \$16.25; that we note reported sales of warrants on the Exchange amounting to 1,000 tons at \$17.50 for January delivery; that if these are bona fide, it is apparent that some one is paying \$17.50 for iron which can be bought at \$16.25, put in yard at a cost of 25 cents per ton, with 2 cents per month per ton additional storage, an action which genuine buyers are not likely to take. This is the reason of our informant's belief that these quotations are artificial, although in some cases bids from cut-siders may have been innocently made. According to the statement of the warrant company there has been no increase in stocks in yards nor in the amount of iron for which there are contracts to store outstanding. Quotations on the metal exchange this afternoon for second call included the following bids: November,

December and January, \$17; February, \$17½; March, \$17½; April, \$17½; May, \$17½. Bessemer pig is quoted at \$20 to \$22.

Scotch Pig.—Glasgow market continues excited and advancing, prices having risen 2s. 6d. since Wednesday. Cable quotations to-day report Scotch warrants at Glasgow at 55s. 7d. as compared with 41s. 7d. at this time last year. Quotations for the leading Scotch brands here have risen proportionately, the last asking prices being \$26.50 for Coltness; \$25.50 for Summerlee; \$23 for Dalmellington, \$23.50 for Clyde; \$25.50 for Langloan.

Spiegeleisen and Ferro-Manganese.—Quotations for these articles are very unsettled on account of the scarcity of supplies for early delivery. Nominally Ferro-manganese, 80 per cent. for prompt delivery is quoted at \$85 to \$90. Deliveries later can probably be obtained at \$80 to \$82.50. Spiegeleisen, 20 per cent., is quoted at \$33.

Steel Rails.—Rail mills are very busy and prices very firm. A contract for the Seattle, Lake Shore & Eastern, which was reported closed last week, was not finally consummated until this week; the contract was for 10,000 tons, and was placed with an Eastern mill. The Northern Pacific has taken an option, it is reported, on 30,000 tons from the Illinois Steel Company. During the week, in other quarters, from 12,000 to 15,000 tons have been contracted for. Among the important inquiries in sight are those of the Atchison, Topeka & Santa Fe, which will probably want rails when further progress is made in re-organization of the company, and the Chicago, Milwaukee & St. Paul will also want its usual annual supply. So far as can be learned, there have been few transactions at a figure higher than \$31 at mill, but it is improbable that any purchases can be effected at this figure, \$32 being the uniform price at the Eastern mills. At Pittsburgh, the Edgar Thompson Steel Works asks \$35. The rapid advance of the last fortnight has brought about a closing of a number of options which were given during the summer at a low price. Of course, all of the mills have a large number of contracts made at that time at \$27, \$28, \$29 for delivery running to the end of the year.

Billets, Slabs and Rods.—The demand for wire rods has caused American wire mills to advance their prices to a parity with those of the foreign article. Both American and foreign wire rods are now quoted at \$49, the advantage in price being slightly in favor of the American product. Billets are quoted at \$34. Nail slabs are held at \$33. Foreign nail slabs are quoted at \$40, at which figure the quotation is, of course, purely nominal.

Structural Iron and Steel.—There has been no change in the situation in this line of material. No further advance in price has been made, but nearly all the mills are busy on heavy contracts. A number of large ship-plate orders for government use are pending. Quotations in detail are as follows: On wharf, Bridge plate, 2'25c.; angles, 2'25@2'35c.; tees, 2'6@2'7c.; steel angles, 2'35c.; beams and channels, on wharf, 3'1c.

Steel plates are held as follows on wharf: Tank and ship, 2'3@2'5c.; shell, 2'8c.; flange, 2'85@3.; fire-box, 4c.

Iron plates are quoted as follows on wharf: Common tank, 2'25c.; refined, 2'3@2'4c.; shell, 2'4@2'5c.; flange, 3'5@3'7c.; extra flange, 3½@4c.

Bar iron at mill is quoted at 1'65@1'7c. for common, and 1'75@1'8c. for refined. Deliveries from store are quoted as follows: Common, 1'9c. base; refined, 2c. base; "Ulster," 3@3'1c. base; "Norway," 5c.; shapes, and Norway nail rods, 5c.

Merchant Steel.—During the week a number of contracts for next year's delivery have been made; some at present quotations and others at a slight advance. Prices of the cheaper grades are particularly firm. Quotations are as follows: Best English tool steel, 15c. net; American tool steel, 7½@10c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3½c.; open-hearth machinery, 2½c.; open-hearth spring, 2½c.; tire steel, 2½c.

Rail Fastenings.—A moderate volume of business is reported in this line, with prices firm at the advance named last week. Trade is otherwise without feature of interest. Quotations are now as follows, delivered: Spikes 2'10@2'15c.; angle fish-plates, 1'95@2c.; bolts and square nuts, 2'9@3c.; bolts and hex. nuts, 3@3.25c.

Pipes and Tubes.—Trade in this department continues very active. The regular meeting of the Wrought-Iron Tube and Pipe Association will be held next week. No further advance is at present anticipated. Rates of discount on wrought-iron pipe remain as follows: Butt welded, plain and tarred, 50 per cent. discount; galvanized, 12½ per cent. discount; lap-welded, plain and tarred, 62½ per cent. discount; galvanized, 50 per cent. discount. A discount of 57½ per cent. is allowed on boiler tubes of 2 inches and larger, and 52½ per cent. on 1½ inches and smaller.

Cast-iron pipes remain at \$25@28, according to size.

Old Materials.—Prices for old rails have further advanced. During the week a lot of 500 tons has been sold for shipment from the other side at \$25.25, and quotations from primary points indicate that the cost of material will be higher. Inquiries are being made throughout the country for domestic rails. Wrought scrap iron is firm at \$21 to \$22 on board cars at Jersey City. The quotation of \$20 noted in this column last week was a typographical error.

The following statistics, prepared by Messrs. Vivian, Younger & Bond, show the total stocks in boxes of tin plates at Liverpool, Bristol, Swansea, Newport, Llanelly, and Cardiff on the various dates named:

	1889.	1888.	1887.	1886.
January 1.....	308,461	207,741	311,648	293,244
April 1.....	351,266	248,559	291,876	393,075
July 1.....	342,739	225,996	206,474	196,861
October 1.....	360,525	191,046	201,966	282,216

Louisville.

Oct. 16.

(Special Report by HALL BROS. & Co.)

A decidedly firmer tone has pervaded the market during the past week, and not only have prices stiffened, but the available supply is very light. Buyers find it difficult to obtain either the grades or deliveries desired, and trading in consequence has not been in such large quantities as it otherwise would have been. Furnaces are refusing to sell except such odd lots as they may have, and then for immediate or nearby delivery, while some of the buyers have displayed anxiety to place orders for extended shipment. There are some exceptions, however, and occasionally a round quantity for extended delivery is reported sold. There has been some movement in charcoal iron, though the bulk of the demand has been for coke metals.

Hot Blast Foundry Irons.

Southern Coke No. 1.....	\$15.75@16.25.
" " No. 2.....	13.25@15.50.
" " No. 3.....	15.00@15.25.
Mahoning Valley, Lake ore mixture.....	18.50@19.00.
Southern Charcoal No. 1.....	17.50@18.50.
" " No. 2.....	17.00@17.50.
Missouri " No. 1.....	19.00@19.50.
" " No. 2.....	18.50@19.60.

Forge Irons.

Natural Coke.....	14.75@15.00.
Cold Short.....	14.25@14.50.
Mottled.....	13.50@14.00.

Car Wheel and Malleable Irons.

Southern (standard brands).....	23.00@23.75.
" (other brands).....	18.50@19.50.
Lake Superior.....	22.00@22.50.

Philadelphia.

Oct. 18.

(From our Special Correspondent.)

Pig Iron.—The stimulus which active demand has been imparting to crude iron for the past four or six weeks has been weakened by the disappearance from the market of a goodly number of large buyers who have contracts placed for about all the material they expect to use for the next two months. Only small sales have been made since Monday, and most of these have been in foundry iron. In several instances, buyers purchased at a little less than they had been led to believe they could; but the iron sold was rather poor; the special brands are very hard to get at any price, and as high as \$18.50 was readily paid yesterday for a dozen small lots to fill out work. No. 2 iron brings \$17 for the asking, and there are a few brands of forge for which \$16 is asked; but most of the iron sold and inquired for went at \$15.50 or \$15.75.

Foreign Material.—Spiegel is quoted at \$33, and ferro-manganese at \$85 to \$87.50.

Blooms.—Prices are merely nominal; one lot of nail slabs was taken at \$34.50; tank is strong at \$35; shell, \$37; flange, \$41 to \$42; fire-box, \$42 to \$43; anthracite blooms, \$43; scrap, \$33.

Muck Bars.—Muck bars rule firm at \$29 to \$29.50. Two or three manufacturers are willing to book late orders, but the rest are not, unless they can have 50 cents more than current quotations.

Manufactured Iron.—The only news from the interior mills yesterday and to-day is that the buying that has been done this week has been done by the smaller class of consumers, who are piecing out, and therefore there are no indications as to future probabilities. The only fact known is that the consumption of iron is heavier now than 30 days ago. Quotations, 1'80 to 1'95, according to quality.

Skelp Iron.—Skelp will not be sold under 1'85 for grooved, and it will take 2'15 as an offer for sheared to find a hole where an order could be put.

Nails.—Every little cross-roads buyer in three or four States is after a few kegs. The large buyers have already pretty well supplied themselves, and expect to stock up at lower than quoted rates as soon as they are in need. The bills made out now are mostly at \$2.10 for iron and \$2.20 for steel.

Wrought-Iron Pipe.—A goodly number of small orders have been placed this week in anticipation of the advance, of which there has been a great deal said lately.

Sheet Iron.—The only concessions heard of this week were for four carload lots. There are very few large buyers in the market, but as many ones as ever. Soft steel sheets have been selling very freely all week as well as common galvanized iron.

Plate and Tank Iron.—A fractional advance was announced on Monday, in answer to mail correspondence for large lots of steel plate. The brokers handling business are the authority for the statement that the inquiries for iron and steel plate at this time are larger than they have been for twelve months. Sales of iron plates were made at 2'20c., and for steel, 2'40c., and these are considered bottom figures. Universal plates are 2'30c.; shell, 2'60c. for iron and 2'80c. for steel; iron flange, 3'25; fire box, iron or steel, 4c.

Structural Iron.—New customers for early deliveries of structural material have not had their business taken care of this week as they desired. Mills are so overcrowded with work for delivery between now and December 1st, that nothing is taken unless there is something in it. Beams and channels are 3'10c., and there are rumors that very urgent buyers have

volunteered an additional tenth, to complete work which was not taken care of two months ago. Angles are 2-25c.; tees, 2-75c.

Steel Rails.—It is impossible to obtain any satisfactory information from rail makers as to new customers or new sales, or even as to what is the bottom figure at which large orders would be taken this week. But it is understood from outside sources that \$31 is the bottom price here; as high as \$33 has been named for small lots. There are rumors on the street to-day that two or three Southern roads will delay the placing of large orders no longer. The additional allotment recently ordered, will, at the present rate, be taken up by about the first of December.

Old rails.—Old rails have advanced; spot lots are quoted to-day at \$26. There is a great deal of inquiry this week, because of the urgent needs of buyers, and there seems to be no escape from them but to pay brokers' prices.

Scrap.—No. 1 is \$22; choice, \$23; old steel rails are offered at \$20; old fish plates, \$27; cast scrap, \$15.50.

Pittsburg. Oct. 17.

[From our Special Correspondent.

Raw Iron.—We can report a steady demand for leading descriptions; prices show little change since the date of our last report. Bessemer has evidently reached top prices for the present, at least the demand shows a slight falling off, which is natural, as the sales reported for the two weeks ending October 12th exceeded 200,000 tons. Such an amount of transactions was never heard of before. These enormous sales have to a certain extent made both buyers and sellers pretty independent. For instance, those who have purchased sufficient stock to tide them over the next two months, believe the advance is about over, and will wait and watch the market before securing more stock. The seller, on the other hand, will talk about higher prices, and will refuse to listen to concessions. The result will be a falling off in transactions. The valley furnace men have exalted ideas of the value of iron; they have done well and sold an immense amount of iron, and are talking about prices for Bessemer that rather astonishes consumers; the latter can afford to wait and take the chances of the market. The advance in the British market fully keeps pace with ours. Last week the advance in Glasgow was three shillings, bringing mill iron to \$17, American currency, with other grades in about the same proportion. This leaves the iron contest on this side the ocean altogether in our own hands. There is no doubt the most strenuous efforts will be made to prevent inflation, and so far all advances that have been made were of a strictly legitimate character, and so far as could be learned no iron was purchased on speculation. Standard brands of mill iron are held firmly. Muck bar is firm. Steel slabs and billets find ready purchasers at current prices. Old iron and steel rails are firm at present quotations. New steel rails are firm for present and future delivery. Ferro-manganese and spiegel are firm at quotations. Bloom ends and steel wire rods maintain prices current last week. The following transactions will show the real situation.

Coal and Coke Smelted Lake Ore.

6,000 Tons Bessemer, January and February.	21.20 cash
4,000 Tons Bessemer	20.15 cash.
4,000 Tons Bessemer	20.00 cash.
3,000 Tons Bessemer, January and February.	21.50 cash.
2,000 Tons Bessemer, November	20.75 cash.
2,000 Tons Gray Forge	16.50 cash.
1,500 Tons Bessemer	20.80 cash.
1,000 Tons Bessemer	20.70 cash.
1,000 Tons Mill Iron	16.50 cash.
1,000 Tons Gray Forge	17.00 cash.
1,000 Tons Gray Forge	16.75 cash.
1,000 Tons Bessemer	21.00 cash.
500 Tons Mill Iron	16.25 cash.
500 Tons No. 1 Mill	17.25 cash.
500 Tons No. 1 Mill	17.20 cash.
600 Tons Mill	16.80 cash.
500 Tons Low Phos.	25.50 cash.

Coke, Native Ore.

1,000 Tons Gray Forge	16.50 cash.
500 Tons Gray Forge	16.25 cash.
500 Tons Gray Forge	16.50 cash.
500 Tons Gray Forge	16.50 cash.
500 Tons Gray Forge	16.50 cash.
500 Tons Gray Forge	16.75 cash.
250 Tons Gray Forge	16.50 cash.

Muck Bar.

2,000 Tons Neutral, November and December	30.80 cash.
2,000 Tons Neutral, December and January	31.50 cash.
1,500 Tons Neutral, November and December	31.00 cash.
1,000 Tons Neutral	30.50 cash.
1,000 Tons Neutral	30.75 cash.
500 Tons Neutral	30.75 cash.

Steel Wire Rods.

250 Tons American Fives	46.00 cash.
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Steel Bloom Ends.

2,000 Tons Bloom Ends	23.75 cash.
500 Tons Bloom Ends	22.50 cash.
400 Tons Short Pieces	21.50 cash.

Old Iron Rails.

1,500 Tons American Ts.	27.00 cash.
1,000 Tons American Ts.	26.75 cash.
1,000 Tons American Ts.	27.00 cash.
500 Tons Light Rails	26.50 cash.

Ferro-Manganese.

300 Tons 80 per cent., ex ship Balt.	88.00 cash.
200 Tons 80 per cent.	87.50 cash.
40 Tons 80 per cent.	90.00 cash.

Spiegel.

200 Tons 20 per cent.	40.00 cash.
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Steel Slabs and Billets.

5,000 Tons Billets	33.50 cash.
2,000 Tons Billets	34.00 cash.
1,000 Tons Slabs and Billets	35.00 cash.
500 Tons Billets	34.40 cash.
500 Tons Billets	34.50 cash.

Skelp Iron.

1,000 Tons Sheared Iron, per 100 lbs.	2.25	4 mo.
375 Tons Narrow Grooved, per 100 lbs.	1.80	4 mo.
250 Tons Wide Grooved, per 100 lbs.	1.90	4 mo.

Prices.

Coke or Bituminous Pig—		
Foundry No. 1.	18.00@18.25	
Foundry No. 2.	17.00@17.25	
Gray F. No. 3.	16.50@17.00	
No. 4.	15.50@15.75	
White	15.50@15.75	
Mottled	15.50@15.75	
Silvery	16.50@19.00	
Bessemer	20.50@21.00	
Low Phos.	25.00@25.50	
Charcoal Pig—		
Foundry No. 1.	23.50@24.50	
Foundry No. 2.	22.00@22.25	
Cold-Blast	25.00@28.00	
Warm-Blast	24.00@25.00	
10 + 12" Speigel	35.50	
20" Speigel	40.00	
Muck-Bar	30.00@31.00	
Steel Blooms	33.50@35.00	
Steel Slabs	33.00@34.50	
Steel Cr'p Ends	23.00	
Steel Bl. Ends.	23.00@23.75	
Ferro-Man., 80%	87.50@87.75	
Steel Billets	33.00@35.00	
Old Iron Rails.	27.00@28.00	
Old Steel Rails.	21.00@22.00	
No. 1 W. Scrap.	20.50@21.50	
No. 2 W. Scrap.	18.00@19.00	
Steel Rails	33.50@34.00	
" light sec.	34.00@37.00	
Bar Iron, nom.	1.80@ 1.90	
Iron Nails	2.25@ 2.30	
Steel Nails	2.25@ 2.30	
Wire Nails	2.25@ 2.35	

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Oct. 18.

Heavy Chemicals.—In this department the two factors to which we referred last week, viz., increased consumption and increased cost of fuel, labor and salt, continue to sustain prices, and for the present the tone of the trade is improved.

Caustic soda is in light supply on the spot, and for 70 and 74 per cent. quotations are firm. The figures quoted here are \$2.40 and \$2.45, according to quantity; for 60 per cent. \$2.60 is asked. American producers are understood to be well engaged for some time to come and the English makers with the present cost of raw materials are unable to make any concessions in price.

Bleaching powder is still rather scarce on the spot, and as high as 2c. is quoted for lots in this position; for futures higher prices are temporarily asked; \$1.85 is the latest quotation.

Carbonated soda ash continues in good demand, and for "Tennants" as high as \$1.30 has been paid.

Caustic soda ash is in light demand. A small quantity of a rather unknown brand has been sold in jobbing quantities as low as \$1.20, which, for small lots, is probably below the market price, but large quantities can be bought at about this figure.

Writing to an English contemporary from Newcastle on October 2d, a correspondent says: Bleaching powder is meeting with inquiry for delivery over next year, but makers for the most part refuse to sell until they are assured respecting the cost of the coal which they will require. At present the coal owners are asking prices which range from 50 to 75 per cent. higher than the figures of the current year's contracts. The general idea seems to prevail that manufacturing coals cannot be dearer than the quotations now made, and a waiting policy appears to be that which is most favored by the majority of alkali works proprietors. Some sales of bleach for delivery over next year have been made directly to consumers, paper makers principally, and at a price which will leave a loss to producers, even under favorable conditions of purchasing coal and other raw materials. Some of the alkali makers have made contracts with the sulphur ore companies for their consumption of sulphur ore for a period extending to December 31st, 1893, at the same price as the contracts now running, and in a few days it is anticipated that all the manufacturers on the Tyne will have fixed for their ore consumption up to that date.

Acids.—During the week circulation has been given to a report calculated to create the impression that there is a serious lack of harmony among the acid manufacturers. Such a report as this, at present, is as injurious to the interests of the trade as it is unfounded. As the ENGINEERING AND MINING JOURNAL has from time to time stated, thus far there have been no serious dissensions. Of course, it is a difficult matter to secure a perfect uniformity of thought and action in any such matter as this, and the members of the acid trade have never been noted as a particularly harmonious collection of individuals, but nevertheless the experience of the past few months, even with only a temporary agreement, has apparently convinced all of the benefits, in fact, of the necessity of some combination. All are not agreed as to how far this should be carried, and one firm in particular, whose head formerly acted as chairman of the meetings, is understood to be averse to any very strict organization, but it has given the assurance that any arrangement of prices which may be entered into by the other members of the trade shall be adhered to by it. The usual meeting was held this week. Trade continues good at the schedule prices.

Fertilizing Chemicals.—There is a moderate jobbing trade and an increased inquiry for crude material from the south. On the whole, however, business is not as good as was expected and suffers by comparison with the volume of the trade of former years. Ammoniates continue firm at a slight advance over the quotations last named. In detail the usual price list of ammoniacal material is as follows: Azotine, \$2.15; dried blood, city, low grade, \$2.10@ \$2.12½; high grade, \$2.20. For tankage, high grade, 9 to 10 per cent. ammonia and 15 to 20 per cent. phosphate, \$22.50 is quoted, and low grade, 7 to 8 per cent. ammonia and 25 to 30 per cent. phosphate, \$21.50. Fish scrap, \$22@23 per ton, f. o. b. factory. Sulphate of ammonia at \$3@3.05 per cwt. Concentrated tankage, \$2.15. Refuse bone-black, guaran-

teed 70 per cent. phosphate, \$20@21 per ton. Dissolved bone-black is 90@95c. per unit for available phosphoric acid, and acid phosphate 79@80c. per unit for available phosphoric acid. Steamed bones, unground, \$20@23.50; ground, \$27.

Charleston rock, undried, \$5.75 per ton; kiln dried, \$6.75@7 per ton, both f. o. b. vessels at the mines. Charleston rock, ground, \$11, ex-steamer at New York.

Double manure salts are in limited request at the official prices: \$1.15 for futures and \$1.20 for spot, on the basis of 48 per cent. potash. High grade sulphate of potash, basis 90 per cent., is inactive at \$2.32½@2.35 for the limited amount in store. Futures are officially quoted at \$2.50.

Muriate of Potash.—Arrivals this week have been lighter than usual, amounting to only 100 tons, but there is sufficient on the spot to meet all current inquiries. We continue to quote the syndicate price, \$1.80.

Kainit.—There have been no transactions of importance in this article during the week, and prices remain at the official figures, \$10 per ton actual weight and \$9.75 per ton foreign invoice weight.

Miscellaneous.—Brimstone is firmer owing to higher prices at primary points. We quote for best unmixed seconds on the spot \$20 per ton. There are no thirds on the spot and none to arrive immediately unsold.

Nitrate of soda is firmer and more active. F. B. Nichol's statistics, issued this week under date of the 15th inst., show that the arrivals during the fortnight ended on that date amounted to 15,488 bags at this port and 6,080 bags at Charleston. Deliveries during the same period aggregated 23,447 bags. The supply on the spot is thus decreased to 55,979 bags, of which all but 4,000 are in store or afloat at New York. Arrivals this year to date amount to 398,600 bags against 406,000 bags in 1888. Deliveries to date amount to 428,621 bags, as compared with 366,431 bags during last year. Quotations last year at this time were from \$2.17½@2.22½. Quotations at present are from \$1.90@1.95. In speaking of the trade during the fortnight, Mr. Nichols says: "A good business was done in the fortnight, and something over 7,000 bags left the stores. The Valparaiso market continues above the views of buyers. The list to arrive includes two of the distressed vessels, having proceeded on their voyages. The arrivals include the "Cassandra" and "Annie Reed" at this port, and "Seatoller" at Charleston."

NOTES OF THE WEEK.

Phosphate Shipments.—Our Charleston correspondent reports shipments of phosphate rock from that port during September, amounting to 9,591 tons of crude rock against 14,285 tons during the same month last year. Of the crude rock shipped from Charleston last month none was received at New York. Baltimore got 2,960 tons; Weymouth, 1,515 tons; Wilmington, Del., 601 tons, and the remainder was shipped to inland points via South Carolina Railroad and the C. & S. R. R. No shipments were made to foreign ports. Reports from Montreal show that shipments from that point from August 17th to September 20th amounted to 3,326 tons, of which the greater amount went to London, Liverpool and Glasgow. The value of ground phosphate exported from Ottawa County, Quebec, mine to the United States, for the quarter ending with September, is stated as 776 tons at \$10 per ton. These are said to be the largest shipments from Ottawa County recorded for any quarter during recent years. The Canadian phosphate industry is generally reported to be flourishing.

Results from the use of artificial fertilizers in England. Sir John Lawes, says an exchange, has just issued his annual records of experiments in the growing of crops with various manures at Rothamsted. On one field he has grown wheat for 46 years in succession, and it is not a little remarkable that the mean produce of two plots never manured during 36 years has averaged for that period 13¼ bushels an acre, or more than the average yield of America, India, Russia or the Argentine Republic. On another plot, to which 14 tons of farm-yard manure per acre has been annually applied, the average yield for 36 years has been 33¼ bushels. The increase has paid handsomely for the manure. Much higher averages—up to 36½ bushels—have been obtained by the use of costly dressings of artificial manure, but the results have not been remunerative. Cheaper dressings of artificial manure have paid fairly. The most remunerative one for barley would probably have paid better than any other for wheat also, but has not been tried by itself. This consists of 275 pounds of nitrate of soda and 3½ cwt. (392 pounds) of superphosphate of lime, which gave a crop of 45¼ bushels of barley per acre on an average for thirty-six years, as compared with 17¼ bushels grown on the unmanured plots. This is the mixture most commonly used by English farmers for wheat as well as barley, only, as they pursue a rotation of cropping, they apply only about half the quantities named above, less manure being required in ordinary farming than when a white-straw crop is grown every year, as at Rothamsted.

Liverpool.

Oct. 9.

(Special report by Messrs. J. P. Brunner & Co.)

There has been a strong demand for caustic soda lately, and for 70 per cent. prices have had a smart advance. Other lines of chemicals are also better, and more doing all round. Soda ash in demand for carbonated, and for some brands higher prices asked. Caustic ash, however, continues quiet and little doing for prompt delivery.

We quote: Caustic ash, 48 per cent., ½d. to 1½d.; high test, ½d. to 1½d. Carb. ash, 48 per cent., ½d. to 1½d.; high test, ½d. to 1½d.

Soda Crystals.—Some fair American orders were booked at the close of last week at £2 10s., but the article being now scarce, makers have advanced their prices to £2 15s.

Caustic Soda.—With a large continental demand for 70 per cent., prices for this strength have been run up from £7 12s. 6d. to £7 15s., which are quotations to-day, and business done at these figures. There is little 70 per cent. to be had for this month, and we may see even higher prices. Sixty per cent. scarce at £6 10s. to £6 12s. 6d.; 74 per cent. in demand, and £8 5s. paid for a fair quantity, while some makers now hold for 5s. per ton more money; 76 per cent., £8 15s. to £9. For delivery over all, 1890, £7 10s. to £7 12s. 6d. are nearest quotations for 70 per cent.

Bleaching powder is very scarce for prompt delivery and £7 2s. 6d. to £7 5s. are quotations, but for October delivery a little might possibly be had at £7. It is said to-day that the committee have granted permission for makers to relax the restriction to some extent for this month, but particulars are not stated. Over all next year contracts have been made this week for softwood, on rails at makers work at £5 10s. to £5 12s. 6d., while there are now buyers at the lower figure, but no sellers. Chlorate of potash in good request at 4½d., and there is little offering. For contracts over all 1890, 5d. is asked. Bicarb soda selling freely at £4 15s. per ton and upwards, for one-cwt. kegs, according to brand and quantity, with usual allowances for larger packages. Sulphate ammonia rather better at £12 per ton for good gray, 24 per cent. f. o. b. Liverpool.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, Oct. 18.

Bricks.—During the week the brick market has retained the main characteristics noted in our last report, the only perceptible change being that these features have become more strongly developed, and the top prices then named have been confirmed by actual transactions. As the season during which manufacture is possible draws to a close, makers are reserving their supply in yards, which are

not so full as usual at this date, owing to reasons previously given. Shipments to this city from river points have consequently been decreased, and local receivers, who all along have been complaining over the depression of values and narrow margin of profit, have taken advantage of the shortage of available supply to advance asking prices from 12½c. to 25c. per M. over the figures quoted last week. As stated in our last report, when the advance of prices had just begun, there has been no material improvement in the demand, the stiffening of rates being due only to the action of the makers and sellers. Along the Hudson and in New Jersey very few, if any, of the makers have stopped work for the season as yet, but a number are making preparations to do so shortly. Clo- ing quotations are: Haverstraws, \$6.50@£7; up-rivers, \$6.25@£6.75; Jerseys, \$5.25@£5.75; pale, \$3.25@£3.75.

Lime.—The demand continues fair. The supply of Rockland lime has scarcely been sufficient for current inquiries, and will probably continue so next week, as the schooner "Anna Holton" bound here on Wednesday off Vineyard Haven with 1,700 bbls. on board and another vessel lime-laden, also for this port, caught fire, and was obliged to put up in Vineyard Haven. Late advices, however, indicate that the latter cargo will probably be saved.

CONTENTS.

Table listing various articles and their page numbers, including Naval Shortcomings, Memorial to Fulton and Ericsson, Harney Peak and the Deadwood Pioneer, Rumored Reciprocity Treaty with Mexico, An American Chemical Society, The Dynamite Guns of the Vesuvius, The Electric Wire Question, Railroads in China, A Dictionary of the Fossils of Pennsylvania and Neighboring States, The Origin of the Gold Deposits near Ouray, Colo., William Richard Jones, The Profits of the Eiffel Tower, Notes on the Wing.

Table listing various technical and industrial topics and their page numbers, including Indicated Horse-Power Developed Per Ton of Boiler, A New Forest Clearer, Solution for Depositing Metallic Cobalt, American Railroad Bridges, The Catorce Mining District, Traveling Crane, Improved Rope Drive Power, Some Notes on the Rarer Elements Found in the Leadville Sulphurets, A Monster Hydraulic Press, Guatemala Railroad Sold, Profitable Dredging at Lautander, Determination of Copper and Arsenic in Pyrites, Books Received, Patents Granted, Personals, Obituary, Industrial Notes, Contracting Notes, Machinery and Supplies Wanted at Home and Abroad, Illustrated.

Table listing various mining news and stock market information, including Mining News by state (Alabama, Arizona, Colorado, etc.), Financial Statements, Meetings, Dividends, Assessments, Mining Stock Markets, and Mining Stock Tables.

IMPORTS AND EXPORTS OF METALS AT NEW YORK OCTOBER 5 TO OCTOBER 12, 1889, AND FROM JANUARY 1.

Table of imports and exports for various metals including Spelter, Antimony, Pig Lead, Tin, Tin Plates, and Copper Matte, with columns for Week, Year, and Tons.

Table of imports and exports for various metals including Iron, Steel Sheets, Billets, Forging, etc., and Charcoal Iron, with columns for Tons and Corres. date.

Table of imports and exports for various metals including Old Rails, Scrap Iron, Copper Matte, and Copper Ore, with columns for Tons and Corres. date.

Summary of total imports and exports for various metals, including Tin, Tin Plates, Copper Matte, and Copper Ore, with columns for Total and Corres. date.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES

Main table containing 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.

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. † This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. ‡ The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia, \$240,000. § Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,350,000 in dividends. ¶ 1,500,000

NEW YORK MINING STOCKS QUOTATIONS.

Table with columns for Dividend-Paying Mines and Non-Dividend-Paying Mines. Includes company names, dates (Oct. 12-18), and sales figures.

*Ex. dividend. *Dealt in at the New York Stock Ex. Unlisted securities. †Assessment unpaid. Dividend shares sold, 11,470. Non-dividend shares sold, 37,257. Total New York, 48,720.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for Name of Company, dates (Oct. 11-17), and sales figures for Boston mining stocks.

Boston: Dividend shares sold, 8,308. Non-dividend shares sold, 6,300. Total Boston, 14,608.

COAL STOCKS.

Table with columns for Name of Company, Par value, dates (Oct. 12-18), and Sales figures for coal stocks.

**Of the sales of this stock, 30,570 were in Philadelphia, and 62,935 in New York. Total sales, 180,479.

San Francisco Mining Stock Quotations.

Table with columns for Company, Closing Quotations (Oct. 11-17), and Sales figures for San Francisco mining stocks.

STOCK MARKET QUOTATIONS.

Table with columns: COMPANY, Bid, Asked. Includes Baltimore, Md. and Birmingham, Ala. sections.

Table with columns: COMPANY, Bid, Asked. Includes Kansas City, Mo. and Pittsburg, Pa. sections.

Table with columns: COMPANY, H., L., Closing. Includes Kansas City, Mo. and Pittsburg, Pa. sections.

Table with columns: COMPANY, H., L., Closing. Includes Kansas City, Mo. and Pittsburg, Pa. sections.

Table with columns: COMPANY, Bid, Asked. Includes St. Louis, Mo. section.

Table with columns: COMPANY, Bid, Asked. Includes Cleveland, Colo., Cleveland, Idaho, Golden Era, Mont., Golden King, Golden West, Gold Pioneer, Gold Run, Granite Mountain, Mont., Ingram, Iron Clad, Ivanhoe, Colo., L. X. L., Colo., Keystone, Little Giant, Major Budd, Mont., Mexican Imp., Mex., Montrose Placer, Mountain Key, Mountain Lion, Neath, Colo., Old Colony, Pat. Murphy, Colo., Phillips, Colo., Pine Grove, Idaho, Queen of the West, Idaho, Raspberry, Mont., San Francisco, Mont., San Pedro, Small Hopes, Colo., Silver Age, Colo., Tourtelotte, Colo., West Granite, Mont., Wire Patch, Yuma, Ariz.

Auction Sales of Stocks. The following securities were sold at public auction in New York City this week: 200 shares California Mining Company, 32 shares New Jersey Iron Mining Company, 150 shares Empire Coal Gas Company, 63 shares Montezuma Silver Mining Company, 200 shares Horn Silver Mining Company.

Table with columns: COMPANY, Par value, Market price. Includes Electric Stocks section.

Table with columns: COMPANY, Par value, Market price. Includes Trust Stocks section.

Table with columns: COMPANY, Highest, Lowest. Includes Foreign Quotations section.

Table with columns: COMPANY, Bid, Asked. Includes United Mexican, Mex., U. S. Placer, Colo., Viola Lt., Idaho, Paris, Oct. 3, Belmont, Spain, Boleo, Mex., Callao Bis, Venez., East Oregon, Ore., Forest Hill Drive, Cal., Golden River, Cal., Lexington, Mont., Ouray, Colo., Rio Tinto, Spain, Tharsia, Spain.

CURRENT PRICES. These quotations are for wholesale lots in New York.

Table with columns: CHEMICALS AND MINERALS. Includes Acid-Acetic, Muriatic, Nitric, Oxalic, Sulphuric, Sulphur, Alum-Lump, Alum-Refined, Aqua Ammonia, Ammonia-Sulph., Arsenic-White, Asbestos, Asphaltum, Barytes, Borax, Bromine, Chrome Yellow, Cobalt, Copper, Cream of Tartar, Emery, Feldspar, Fuller's Earth, Gypsum, Iodine, Kaolin, Lead, Litharge, Magnesite, Manganese, Mercuric Chloride, Mineral Wool, Mica, Ochre, Phosphate Rock, Pumice Stone, Pyrites, Quartz, Rotten Stone, Salt-Liverpool, Salt-Turk's Island, Salt-Cake.

Table with columns: COMPANY, Bid, Asked. Includes Saispeter, Soda Ash, Soda Caustic, Sal, English, Sal, American, Nitrate, Strontium-Nitrate, Sulphur-Roll, Flour, Crude Brimstone, Tale-Ground French, Vermillion-American, Vitriol-Blue, Zinc Oxide, Paris, Red Seal.

Table with columns: THE RARER METALS. Includes Aluminum, Arsenic, Barium, Bismuth, Cadmium, Calcium, Cerium, Chromium, Cobalt, Didymium, Erbium, Gallium, Glucium, Indium, Iridium, Lanthanum, Lithium, Magnesium, Manganese, Molybdenum, Niobium, Osmium, Palladium, Platinum, Potassium, Rubidium, Ruthenium, Selenium, Sodium, Strontium, Tantalum, Tellurium, Thallium, Thorium, Tungsten, Vanadium, Yttrium, Zirconium.

Table with columns: BARE MINERALS. Includes Molybdenite, Gadolinite, Zircon, Cerite, Orthite, Rutile, Thorite, Ytrotitanite, Columbite.

Table with columns: BUILDING MATERIAL. Includes Bricks, Portland Cement, Lime, Cement, Slate, Phosphorus, Plumbago, Potassium Cyanide, Mineral Wool, Mica, Ochre, Phosphate Rock, Pumice Stone, Pyrites, Quartz, Rotten Stone, Salt-Liverpool, Salt-Turk's Island, Salt-Cake.

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.