

THE ENGINEERING AND MINING JOURNAL.

(Incorporated.)

253 BROADWAY, NEW YORK.

TELEPHONE. 3095 CORTLANDT. P. O. BOX, 1833.
CABLE ADDRESS, "MINGERING, N. Y."

JAMES H. MCGRAW, President. F. J. PRATT, Treasurer.
LUCIUS S. BIGELOW, Vice-Prest., and Gen'l Mgr.

CHICAGO (Tel., 73 Harrison) . . . 737 Monadnock Building
DENVER 206 Boston Building
SALT LAKE CITY Dooly Building
SAN FRANCISCO Mills Building
VANCOUVER, B. C., Molsons Bank Building
LONDON, ENG., 20 Bucklersbury, 368

DAVID T. DAY, PH.D. Editor in Chief
EDWARD W. PARKER Managing Editor
FREDERICK HOBART Associate Editor
ROSSITER W. RAYMOND, PH.D., M.E. Special Contributor

SUBSCRIPTIONS

Single Copies, 15 Cents.

United States, Canada, Mexico, yearly, 52 copies, In advance, \$5.00
Other countries in Postal Union, \$7.00
By Bank Draft, P. O. Order or Express on N. Y.
English Subscriptions Payable at London Office, £1 8s 9d

CHANGE OF ADDRESS

Please give your old as well as your new address

NOTICE TO DISCONTINUE

Should be WRITTEN to the New York Office in every instance

ADVERTISING COPY

Should be at New York Office by 10 A. M. Tuesday of
issue week

Copyright, 1901, by ENGINEERING AND MINING JOURNAL
Entered at New York Post Office as Second Class Matter

Published Every Saturday.

Vol. LXXII. DECEMBER 14, 1901 No. 24

CONTENTS

Market Conditions	780
For Education	780
Combinations in the Coal Fields	780
Copper and Copper Stocks	780
Notes on Hydro-Electric Development Recently Completed near Guadalajara, Mex.	M. A. Viele 781
Mining in Ecuador	781
*Oil of the Northern Rocky Mountains	Bailey Willis 782
Cost of Mine Development in British Columbia	785
The Black Hills Forest Reserve	Edward M. Griffith 785
*Montana Corundum	Leverett S. Ropes 787
The Mines of Tonapah Lake, Nevada	787
The Annual Meeting of the American Society of Mechanical Engineers	788
*Louisiana Rock Salt—Avery's Island	Harold A. Tutcomb 789
A New Mexican Tariff	790
Recent Decision Affecting the Mining Industry	790
Abstracts of Official Reports	790
Books Received	791
New Publications	791
Correspondence	791
Questions and Answers	792
*The New Cyclone Pulverizer	793
*Tests of Steam-Pipe Coverings	793
*Patents	795

*Illustrated.

DEPARTMENTS

Assessments	803
Chemicals, New York, Liverpool	806
Coins, Foreign	807
Dividends	803
Financial Notes	806
Imports and Exports of Metals and Minerals	807
Industrial Notes	807
Markets: Coal, United States and Foreign	804
Slate	805
Iron and Steel	805
Pig Iron Production	805
Metals: Gold, Silver, Copper, Tin, Lead, Spelter, Antimony, Platinum, Quicksilver, etc.	807
Minerals: New York, Liverpool	806
Mining News: United States, and Foreign	797
Mining Stocks: United States and Foreign	803
Personal	796
Prices Current of Chemicals, Minerals, etc.	810
Schools, Technical	796
Societies	796
Stock Market Review: New York, Salt Lake, San Francisco, London, Paris	803
Stock Quotations	808
Trade Catalogues	797

THE EXTENT to which Australian gold shipments have been diverted from London is shown by returns just received. The exports of gold from Australian ports for the period from January 1 to October 15 of this year amounted to a total of £10,133,102, an increase of £624,681 over the corresponding period in 1900. Of the total this year the amount shipped to the United States was £1,900,000, while £2,650,000 went direct to South Africa, £1,571,961 to India and £173,832 to China. Thus about five-eighths of the gold exports were to countries other than Great Britain, and only three-eighths of the total went to London direct; though a part of that sent to India found its way to London through later transactions.



THE REPORTING of gold production in fine metal, instead of in bullion of varying and uncertain value, is a matter which we have often urged as necessary, if such statistics are to have any actual or comparative value. We are pleased to see that our esteemed contemporary, the *Australian Mining Standard*, which has often criticized our statements in the past, is at last a convert to our views. In its issue of October 17 it speaks very clearly on this point, and urges a reform in the methods adopted by the mines departments of the Australian States. We are much gratified at securing the co-operation of so able and influential a contemporary in bringing about a change which is necessary, if we are to have complete and reliable statistics on the important question of the world's gold supply.



DREDGING in New Zealand has been a method extensively adopted for working river beds and flat placers for gold, with much success. In fact, as we have noted from time to time, New Zealand practice in dredging has attracted notice all over the world. While there are many successful companies at work, the boom in New Zealand has been carried too far, and the latest advices from the island report the collapse of a number of companies. Thus in the month of August no less than 68 mining licenses and leases were forfeited or surrendered, meaning the break-down of that number of companies; and many others are expected to follow. There are still left many sound and successful companies, however, and probably the failure of the wild-cats will be beneficial rather than otherwise.



SILVER seems to have reached its present low price chiefly through a decline in current demand, which was not accompanied by any corresponding decrease in the supplies offered. For the reduction in sales the East is largely responsible, the small movement to China this year, to which we have heretofore referred, being the chief factor. Not only has buying for China been very light in this country and in London, but it has left a larger quantity of Australian silver for shipment to Europe than is usually the case. While it is generally extremely difficult, if not impossible, to obtain figures having any approach to accuracy on the quantity of silver absorbed for use in the arts and manufactures, there is no reason to believe that the demand from this source has shown any diminution this year. It is to the decrease in shipments to China and the absence of any large special orders for coinage or other purposes that the present drop must be attributed.



THE CONTRAST between English and American railroad methods in handling coal is shown in a striking light by a report which we find in recent

English exchanges. The London & Northwestern Company, which is the largest carrier of mineral traffic in the United Kingdom, coal furnishing over 60 per cent of its freight traffic—and which, it may be noted, is the only British company which reports ton-mileage and train-mileage fully—last year reports an average coal train load of 100 tons only. This is only a little over one-fifth of the train-load carried on our more important coal roads, the Norfolk & Western reporting last year an average of 461 tons, while the Chesapeake & Ohio and the Pennsylvania were still higher. The London & Northwestern charges nearly three times as much as our roads, its average mineral rate being 1.4 cents per ton-mile, but complaints are made that the coal rates are too low for profit. No wonder we are told that the company is considering the question of using heavier rolling stock, for which its road-bed is well suited.



THE COAL trade in California is beginning to feel the effects of the supply of fuel oil coming from the new fields of the State, on which development has been carried on. Although business and manufacturing have been fairly active in California this year the coal receipts at San Francisco and the other ports have fallen off considerably; the reduction at San Francisco for the eleven months ending with November having been nearly 10 per cent. Under ordinary circumstances coal would have been scarce, but we find that the supply has been apparently abundant, and prices rather below than above last year's level. The substitution of oil for coal has been made by manufacturers and large consumers, and has not affected the consumption of coal as household fuel, to which purpose it may be that it will be mainly confined, should oil continue to be supplied as abundantly as at present. The oil developments in California will undoubtedly be of great benefit to the manufacturing industries of the State, which have been heretofore affected by the high cost of coal.



THE IMPORTANCE of forest conservation to mining interests is not by any means so well understood or so generally appreciated as it should be. Not only is the supply of the timber needed in mining to be considered, but the indirect effect of the forest on water supply is not to be neglected. This is especially the case in a mountain region like Colorado, where great damage has been done by past neglect of this question, by injudicious methods of lumbering and by forest fires. Attention is drawn to the present forest condition in that State by a timely article in the *Forester*, for November, which quotes several excellent authorities to show how the forests have already suffered, and the urgent need of proper measures to preserve what still remains. Colorado has too little timber now, and that which still remains is in danger of rapid destruction, to the great injury of the mining interests. The questions of preventing further injury and, if possible, of promoting the growth of new forests to replace those destroyed, are important, and should receive immediate consideration from those who are most directly interested.



A DECISION of some importance to smelters treating imported ores in bond has been rendered by the United States Board of General Appraisers. The question arose in relation to Mexican ores carrying lead and antimony, which were treated at the Guggenheim Smelter at Perth Amboy, N. J. There was

no dispute as to the general terms of the law, which, so far as pertinent, read as follows:

"Section. 29. . . . Ores or metals in any crude form requiring smelting or refining, . . . imported into the United States to be smelted or refined and intended to be exported in a refined but unmanufactured state, shall, under such rules as the Secretary of the Treasury may prescribe, . . . be removed . . . into the bonded warehouse in which such smelting or refining, or both, may be carried on, for the purpose of being smelted or refined, or both, without payment of duties thereon, and may there be smelted or refined, together with the other metals of home or foreign production: *Provided*, That each day a quantity of refined metal equal to 90 per centum of the amount of imported metal smelted or refined that day shall be set aside, . . . and the exportation of 90 per centum of metals hereinbefore provided for shall entitle the ores and metals imported under the provisions of this section to admission without payment of duties thereon."

Under this section of the tariff law regulations have been prescribed by the Treasury Department, and are now in effect and are generally understood. The point raised by the appellants in this case was with regard to the quantity of metal imported in ores or base bullion, and the manner in which that quantity should be ascertained. In brief, the issue made by the protest was whether the 90 per cent of metals exported in order to cancel the bond should be estimated upon the basis of the quantity of pure metal determined by assay to be actually in the imported ore or bullion metal as and when imported; or upon the basis of the refined metal recovered by and after the smelting or refining process is applied to the base bullion or ore imported.

After carefully examining the law and such decisions as have been made in parallel cases, the Board of General Appraisers comes to the conclusion that the actual quantity of metal recovered by smelting or refining cannot be taken into account; and that the determination must depend upon the assays made in accordance with the Treasury regulations. The 10 per cent allowance was intended only to cover wastage in smelting and consequent loss from those assay values. The point has been under discussion for some time, and affects a large amount of business.



MARKET CONDITIONS

The coal and iron markets this week are practically a repetition of the previous week. Great activity is everywhere apparent, and business is limited only by the possibilities of transportation. The close of lake navigation has found the coal shippers to the Northwest with a considerable part of their contracts unfulfilled, owing to the impossibility of getting the coal to the lower lake ports in time; and considerable all-rail shipments will be necessary later in the season.

The car-supply question has been the leading factor in the market everywhere. Not only are coal mines tied up for lack of cars, but the steel mills are unable to make deliveries to buyers and in Western Pennsylvania and Ohio furnaces have been forced to bank for lack of coke and ores. With the closing of lake navigation a large number of cars that have been hauling coal to lower lake ports are released and can take other business. The relief thus gained is not likely to be marked, however, as transportation is affected by lack of motive power as well as cars. With an increasing demand from the South for cars and with stormy weather liable to affect transportation along the important trunk lines any day, the outlook is that the railroads will be unable to give adequate service to all shippers before next spring. At present the scarcity of coal cars is felt more by bituminous producers than by the anthracite companies. It must be remembered also that the yearly demand for cars

to move cotton to Southern ports is now felt. The leading lines have placed and are now placing very large orders for equipment, but it will take some months at least to fill them. This scarcity is an illustration of the immense volume of business which the country is now transacting.

The copper market is fully treated in another article on this page. In the other metals there is little change to note, except that spelter is firmer and that the tension in spot tin has been relieved. Silver still remains at a low price.



FOR EDUCATION

During the past week two munificent gifts to educational purposes have been reported. Mrs. Jane L. Stanford, widow of the late Leland Stanford, has transferred to the Stanford University of Palo Alto, California, property to the value of \$30,000,000, of which about \$18,000,000 are in revenue-producing stocks and bonds, the balance being in real estate. Part of the real estate included in the deed was property that had previously been given to the university by Senator Stanford, but the titles to which were found defective. This action of Mrs. Stanford makes the Palo Alto institution so far as financial backing is concerned, one of the best in the country, and we expect to see it take rank with such universities as Yale, Harvard and Johns Hopkins.

The second gift is that offered by Andrew Carnegie in a letter to President Roosevelt, in which, according to the press despatches he proposes to donate \$10,000,000 which shall be used for the benefit of students desiring to pursue their studies beyond the ordinary collegiate course. The details of Mr. Carnegie's plans have not been made public but it is stated that the Government is to be asked to become the guardian of the fund, as it is now the trustee of the Smithsonian fund and that no appropriation of any kind is to be asked.

The City of Washington is now, to one who desires to make it so, a great university for higher education. Our Government has been most liberal in its encouragement of science through the scientific bureaus which it has established. The bureaus of animal industry, pomology, forestry, etc., of the Agricultural Department, the Fish Commission, the Geological and the Coast and Geodetic Surveys, the National Museum, the Bureau of American Ethnology and a number of other Government scientific offices have gathered together in Washington a body of scientists such as is not to be found in any other city of the globe. These have founded societies devoted to different branches of work, biology, geology, anthropology, geography, philosophy, chemistry, statistics, etc., and there is scarcely an evening during the winter in which one or more of these societies is not in session. Every opportunity is given to the student to continue his investigations; the laboratories, museums and libraries of the Government bureaus are practically free to him. Mr. Carnegie's idea seems to be to make this Government aid to science more comprehensive, more accessible and possibly more systematic. It is not to establish a separate university. We hope the plan may be successfully carried out.



COMBINATIONS IN THE COAL FIELDS

The spirit of combination is extending its influence into the bituminous coal mining industry, and it may not be long before it is found that all of the principal fields are under the control of a few allied interests. It is now nearly three years since the combinations were effected among the Pittsburg operators. During this year the mines in the Fairmont region of West Virginia have "gotten together" and the Po-

cahontas Coal Company has secured control of practically all the coal lands of McDowell and Mercer counties in West Virginia, which constitute the chief part of the celebrated Pocahontas field. Still another combination is now trying to obtain control of the coking-coal mines of the New and Kanawha River regions located in Fayette and Kanawha counties in West Virginia.

It is to the West Virginia fields that our great iron and steel industries must look for their supply of coke in the future. The Connellsville field is not yet exhausted, but it cannot last forever, and its end may almost be said to be in sight. From this standpoint it would appear that the interests behind the efforts to secure control of these coking fields are allied to the United States Steel Corporation, which in order to keep itself upon an entirely independent basis must have a strong grasp on the fuel situation. It is not without the pale of possibility that the now independent combinations may merge into one large one following the example of the Steel Corporation. It appears that Pittsburg interests dominate the affairs of the first large coal combination, the Pittsburg Coal Company, as the officers of that organization, elected from the Cleveland constituency have resigned, the cause of the resignation being internal dissensions, in the settlement of which Pittsburg held the stronger hand.

Whether or not this combining business is going to extend to other coal fields remains to be seen. A few years ago it would have been considered impossible for any combination to dominate the soft coal industry, owing to the vast extent of territory it covers, and the possibility for small operators to compete in the markets, and upset the plans of the would-be monopolists. But conditions have changed somewhat and it is not safe to predict that one thing or another is impossible of accomplishment. In the coal mining industry, however, conditions are such that any marked advances in price by the combinations would invite competition of a dangerous character. Their safety would lie only in giving the consumers a part of the benefits obtained through the lessened cost of production attendant upon large operations. At present the threatened competition of fuel oil is discouraging much investment in coal lands outside of the coking fields.



COPPER AND COPPER STOCKS

For the first time in our financial history copper stocks have been the leading interest in the stock exchanges during the past few weeks. The fluctuations of Amalgamated Copper shares have furnished the sensation of the stock markets, and the sales of those shares have furnished a very large proportion of the business. Industrial stocks during the past three or four years have taken a prominent part in the speculation which was formerly confined almost wholly to railroad securities; but among those shares copper stocks have held—except in Boston—a very subordinate place. Amalgamated Copper took rank among the large industrials owing to the amount of its capital, but was not at all a leading stock until the decline in its quotations began, a few weeks ago.

This decline was started by rumors to which we have heretofore referred, most of which have had very little basis; but once started it was hastened by the uncertain state of the copper market and by the absence of any real public knowledge of the company's position. We have often taken occasion to refer to the bad policy of secrecy as to company affairs, and to the infringement on the rights of stockholders involved in withholding from them information as to the management of the properties they own. The Amalgamated is a very conspicuous offender in this

respect. It owns no tangible property directly, whatever value its shares may have derived from the company's holdings of the stocks of other corporations. There is, of course, a general idea that those holdings include controlling interests in several important copper companies; but just what their amount is and what the results of their operations are or have been, is not known from any statement made by the company. Under such circumstances the stock is peculiarly liable to be affected by market rumors, and to abrupt fluctuations in consequence. If the fall is greater than circumstances warrant—which is quite possibly the case—the managers have only their own policy to blame. If the holders or outside speculators suffer heavy loss, they deserve no sympathy; for no cautious investor should put his money in a stock of which he really knows nothing. It is of little use, however, to reiterate now what we have often before said with regard to the policy of management to which the Amalgamated Company so strictly adheres.

This condition lends itself especially to operations of a kind, with which the late movement in Amalgamated may be classed, if popular belief is to be considered. This belief, which is shared by some careful observers, is that the stock has been forced down in large part by the operators who control the company. An opportunity to sell stock at 130 and buy it in at about half that price is certainly one not to be neglected, and the depressing conditions of the market may very probably be used for such a purpose.

In the foreign stock markets a similar movement has been going on and there has been extensive trading in Rio Tinto shares in Berlin and Paris, as well as in London.

The condition of the copper market, which is intimately connected with these movements in stocks, is difficult to define. The present position is unprecedented, and there is nothing in the past to guide the observer. The collapse of the Secretan corner in copper, to which references are frequently made, was under entirely different conditions from those now existing. At the same time there is a general anticipation that prices must be reduced before long, and in consequence business is almost at a standstill, buyers taking only the limited quantities which their daily necessities require. It is reported that contracts have been placed for future delivery, but with a guarantee to meet the market in case of a fall. Naturally the terms of such agreements are not obtainable for public information, but that they should be made at all is significant. Meantime copper is being sold in London at prices equivalent to 12 to 12½ cents in New York for standard, which is equal to 13 to 13½ cents for electrolytic or refined copper. This is from 2½ to 3 cents below the nominal New York quotations, and shows a condition which cannot last.

We are still of the opinion, which we have heretofore expressed, that the very large consumption of copper in this country during the present year has gone far to make up for the light demand in Europe, and that the unsold accumulations of the metal are far smaller than the "bears" on Amalgamated stock would have us believe. The existence of any surplus at all is, however, a disturbing element, and must have an unfavorable effect.

Just how the present situation will work out it is difficult to tell. While there has been little or no increase in copper production during the present year, it is apparently somewhat in excess of the consumption, a condition which naturally lends itself to lower prices. A forced reduction of output is a slow process, and is virtually impossible as long as there are important independent producers who will not join in such a movement. This now seems to be certain, and is an element not to be neglected.

NOTES ON HYDRO-ELECTRIC DEVELOPMENT RECENTLY COMPLETED NEAR GUADAJARA, LAJARA, MEXICO

By M. A. VIELE.

About nine kilometers from the City of Guadalajara a hydro-electric plant has just been completed on the Rio Grande de Santiago. The river at this point flows through a deep cañon or barranca, the stream falling rapidly, and the wall of the cañon being so precipitous that it is only with considerable difficulty that the canal carrying water from the diverting dam to the power house could be constructed.

The power house is situated at the river, 500 meters below the surrounding table-lands and is reached by a precipitous mountain trail. The water of the river is diverted into the canal by a dam and head-gates at a point where a good foundation for the dam was easily obtained. The dam is of concrete, and during the first few hundred feet of the canal the river side is constructed to act as a spill-way in order to discharge the flood waters during the rainy season. The canal is 3,400 meters in length; of trapezoidal section 5 meters at the water line, 3 meters at the base, and under ordinary conditions with a depth of 2 1-2 meters. The grade is 0.8 per cent, and it is calculated that 15,000 liters per second can be delivered to the wheels at the end of the canal, with a head of 65 meters.

At several points along the canal are several small mountain streams, which are ordinarily dry, but during the rainy season become miniature torrents. These are carried over the canal in conduits made by throwing iron I beams across the canal and building masonry conduits on them. At the lower end of the canal the waterway is divided into three equal channels, as the proposition was put through by three different parties, each of whom was entitled to one-third of the water available. Only one of these parties is at the present time utilizing the power—Enrique Schondube.

The power-house, which has been constructed, is complete in all details. Three water wheels have been installed, made by J. M. Voith, of Germany, and these wheels are connected to revolving-field, high-voltage alternators, manufactured by the Allgemeine Electric Company of Germany. The generators are each of 530 k.w. capacity; 16 pole, 450 revolution per minute, three-phase, 60-cycle, and deliver current to the line at 10,000 volts. On the extension of the shaft of each generator is mounted a direct current exciter and each of these exciters is capable of furnishing the excitation current for any two of the generators.

At the present time current is being transmitted to the City of Guadalajara, where the company has entered into a contract to supply 400 h.p. for 20 years to the government for a lump sum of \$279,000 in silver. The balance of the power is available for mining, metallurgy, and other purposes, and it would seem that with this power, ready for distribution, some of the properties in the immediate vicinity could be operated much more advantageously than it is possible to operate them at the present time. The distance of transmission from the power-house to the City of Guadalajara is 9 kilometers.

One of the interesting features in connection with the development is the fact that in order to get the water wheels, generators and other machinery down to the power-house, it was necessary that no one piece should weigh more than 3,000 pounds. This meant splitting all the apparatus up in small pieces, necessitating the electrical apparatus being wound in place, and at the time of the writer's visit, one of the employes of the Allgemeine Company was winding the third generator; the first two having already been wound and connected up. It is interesting to note that the winding is all done by hand, requiring very skilled labor and a considerable length of time. In similar machines manufactured by the best companies in this country, instead of having them hand-wound, the windings in the armature would have been made

in the shape of formed coils, which could easily have been placed in slots, ready to receive them, held in place by wedges and the connections soldered up.

This would not only make it possible to erect machines in shorter time with more absolute assurance of perfect insulation, but would enable the work to be done by less expensive artisans, and in case of any difficulty from burn-outs, etc., the repairs could be made in shorter time with less difficulty, instead of taking a considerably longer period.

Everything about the dam, canal, power-house and apparatus shows the most careful attention, the details of work performed are along well established lines, and the plant is operating in a way to reflect great credit on the engineers who had charge of its construction and design.

MINING IN ECUADOR.

We have been favored with some extracts from a private letter written by an American engineer now in Ecuador, containing some notes on that country, which are of interest.

The outlook for mining in Ecuador seemed promising, as a railroad was being built into the interior where mineral deposits seemed sure to exist, but after several months of prospecting it has been found that that section is almost entirely covered with volcanic rocks, mud, ash, and debris, and all mineral formations covered from view. The writer had charge of the prospecting parties, and they prospected quite thoroughly the entire region north of a line drawn east and west through Guayaquil. The central portions are quite thickly populated by Indians of all degrees of mixture, to the direct descendants of the Spanish. The languages are Spanish and Quichua, the latter said to be the language of the Incas. None of these Indians are savage, being held pretty closely by their religion. Farming, stock-raising and crude liquor making are the main industries. Rubber, cacao and cinchona are some of the valuable products, and these, with sugar, rice, woods, coffee and hides are the main exports.

The Andes form two ranges, known as the Eastern and Western Cordilleras, reaching average altitudes of 13,000 feet, with peaks running up to 19,000 and 22,000 ft. covered with perpetual snow; nearly all of these are or have been active volcanoes, of which there are now some 28 in about 200 miles of the Andes.

To the south and in the region where the line of railway is not designed to go, the country is different and minerals are more or less plentiful with old mines in existence, but few or none now worked. The country is nearly all mountainous, and as the hills, they slope to the Pacific and the valley of the Amazon, many rivers of large volume are formed.

After the failure to find indications of mineral deposits, the prospecting force was cut down to three men in the field and one assayer. These are still at work.

There are old Spanish families here who own haciendas and have sufficient means, but lack the energy to take up new enterprises. Some foreign assistance is required.

Among new constructions to be undertaken soon are the railroad, a water and irrigation plan on a large scale, and an electric lighting plant for Quito. All of these show opportunities for profit.

COAL IN PRUSSIA.—In the nine months ending September 30 the production of coal in Prussia is reported as follows, in metric tons:

	1900	1901.	Changes.
Coal	75,826,875	75,761,092	D. 65,783
Brown coal (lignite)...	24,339,863	27,431,551	I. 3,091,688
Totals	100,166,738	103,192,643	I. 3,025,905

There were 277 collieries producing coal and 378 mines and open pits from which brown coal was taken. The total number of persons employed was 452,046.

OIL OF THE NORTHERN ROCKY MOUNTAINS.*

By BAILEY WILLIS.

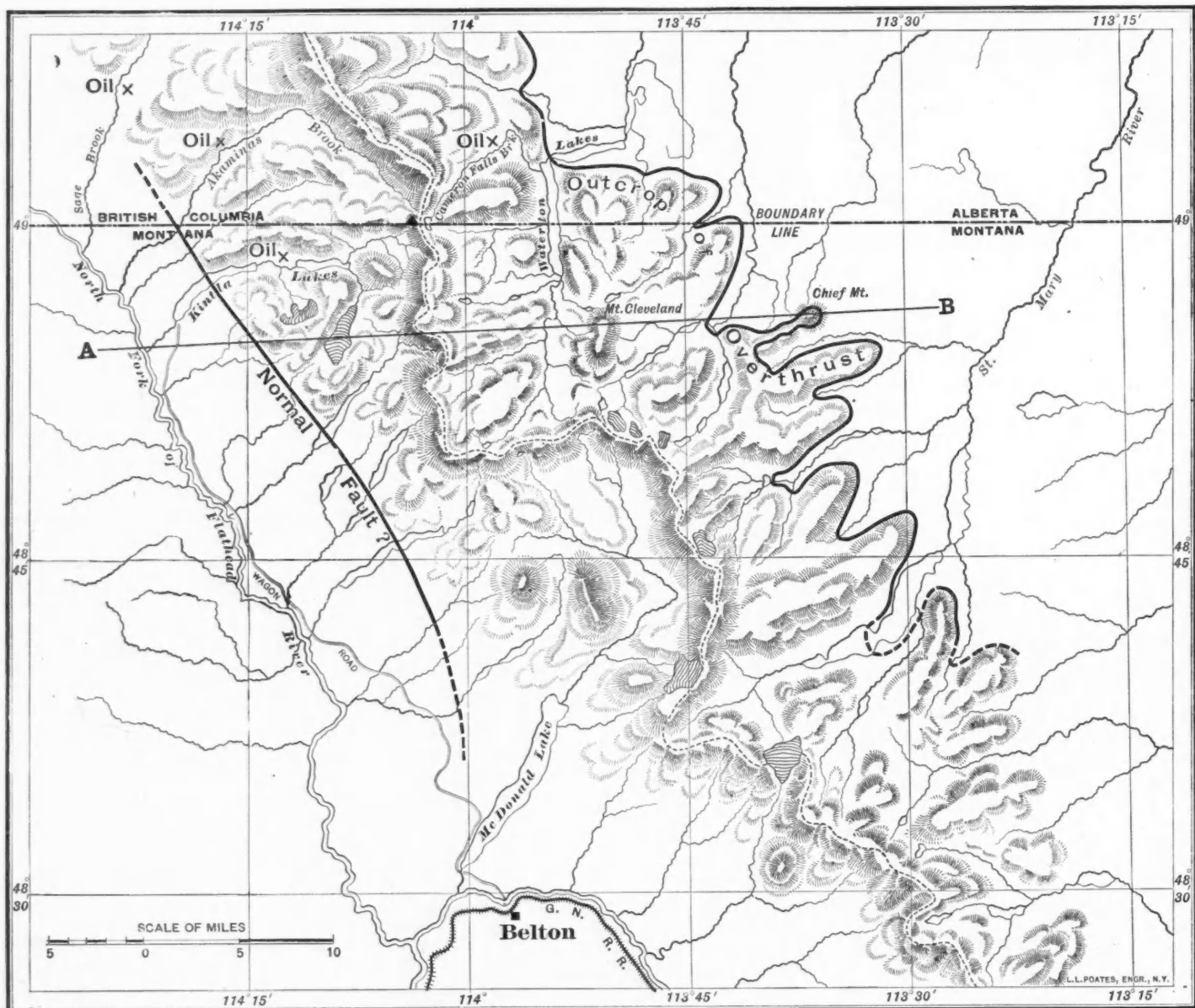
I. KNOWN OCCURRENCES OF OIL.

In Canada.—The occurrence of mineral oils as a seepage upon the waters of springs and streams in the vicinity of the 49th parallel in the main range of the Rocky Mountains has long been known. They are sufficiently conspicuous to have attracted the attention of the Indians. They were probably found by trappers of the Northwest Fur Company, 1806-1818, and their existence has been current information to all who later traversed that remote region down to the present time. Nevertheless, the first

the brook, I noticed a powerful odor of petroleum. Descending to the edge of the water and stirring the stones and gravel in the bed of the stream, considerable quantities of oil at once rose to the surface and floated away. Crossing to the right bank it was again seen coming out of the bank some inches above the then level of the stream. Here, skimming it off the surface of a shallow pool, a wine bottle full was soon collected."

After crossing the divide of the Rocky Mountains and camping on Akamina Brook, Dr. Selwyn again states: "About 4 miles north of the 49th parallel, the trail came down to the level of the brook, and here on the edge of the beaver dam pool were ledges

describes as follows: "At about a mile and a half higher up" (10½ miles above its mouth) "the creek leaves the high mountains which border its upper course in a northeasterly direction up to the main watershed some 14 miles distant, and here at the edge of the water on the left bank I found hard dark flinty shales like those at the beaver dam pool on the Akamina dipping S. 25° — 30° West, 25°. Directly the layers of this rock are raised, the oil rises and spreads over the surface of the water in such abundance that a short time suffices with the aid of a tin cup to collect a bottle full. Here, also, a considerable quantity of gas escapes from the cracks and joints in the rock and ignites freely on the applica-



SKETCH MAP OF NORTHERN ROCKY MOUNTAINS, MONTANA AND CANADA, SHOWING OCCURRENCES OF OIL SEEPAGES.

account of them which the writer has discovered is contained in the report of the director of the Canadian Survey, Dr. Selwyn, for 1891. During the summer of that year Dr. Selwyn visited several localities on the Canadian side of the line which he describes as follows:†

Cameron Falls Brook is a stream rising in a lake on the International Boundary near longitude 114° west, flowing northeasterly for about 7 miles and thence south by east into upper Waterton Lake. It is shown on the accompanying map in a north central position. After stating that he ascended this stream about a mile and a half above its sharp turn toward the south Dr. Selwyn says: "While still in the saddle and on the trail 8 or 9 feet above

of hard dark blue shale dipping E. 30° N. 12°. Lifting layers of this at and below the water, a quantity of dark green circular patches of oil rose to the surface, and a precisely similar result followed by stirring up the mud in the bottom of the pool. This place is about 15 miles in a direct line W. 10° S. from the occurrence on Cameron Falls Creek, the main watershed of the Rocky Mountains and Mountains Kirby, Spence and Yarrell intervening. Oil is said by the Indians who frequent this region to occur at other points in the Akamina Valley, both above and below that recorded. The Akamina joins the Flathead in Montana about 4 miles south of the International Boundary. The beaver dam oil is of a dark greenish black and does not apparently differ much from that of Cameron Falls Creek."

Sage Creek is a stream entering the Flathead a short distance north of the 49th parallel, and upon it Dr. Selwyn observed an occurrence of oil which he

described as follows: "Less than half a mile higher up on the right bank and on the opposite or west side of the valley oil was again found issuing from the base of a bank of drift which has here filled the valley and caused the stream to make a sharp bend eastward to the base of the opposite mountain. No rock was exposed here, but every one in the bed of the creek, especially on being broken or rubbed, gave out a strong odor of petroleum. The oil collected here, a sample of which can be seen in the Museum, differs entirely in appearance from those of Cameron Falls Creek and Akamina or Kishenenah Creek. Some of it was of a light lime yellow, but most of it nearly the color of pale brandy and of a very powerful petroleum odor."

Dr. Selwyn's visit in 1891 to the springs thus described was initially occasioned by an excitement concerning petroleum in the vicinity of Pincher Creek, a stream on the northeast side of the mountains about

*Published by permission of the Director of the United States Geological Survey.
†Summary Reports on the Operations of the Geological Survey, 1891. G. R. C. Selwyn, Director. New Series, Vol. VI., pp. 11A-12A.

20 miles north of the boundary. The country all about had been staked with oil claims, and an experimental boring was made which, however, was abandoned when a copious flow of water was obtained. This boring appears to have been east of the main range and in rocks of Cretaceous age.

In the United States.—In recent years these occurrences of oil have aroused interest and have led to renewed excitement which centers about Kintla Lakes on the eastern side of the North Fork of the Flathead Valley, Montana, close to the International Boundary; see northwest corner of the map. Several hundred claims have been staked and prospect holes opened, most of the latter being, however, only such as are required by law to give validity to the claim title. In the United States the chief promise of success lies in a seepage of oil upon a water pool on the north side of the valley between upper and lower Kintla Lakes, where water and oil gather from gravel and clays of glacial deposit that fill the ravine. This occurrence is in a general way in a position similar to that occupied by the seepages north of the Boundary; that is, it lies in the western slope of the

distances of 15 miles northeast and 30 miles east of the western occurrences of oil, and it affords slender data for a judgment of the thickness of these old rocks below the oil seepages. Part of them may be wanting in that region, or there may be greater thickness than is discovered at the eastern outcrop.

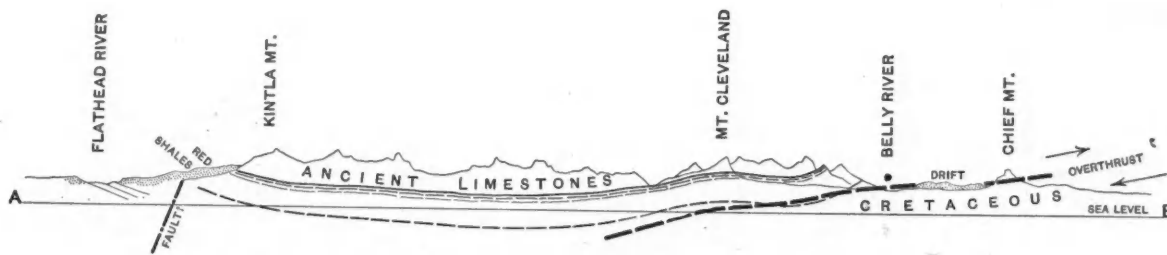
Geologic Structure.—The structure of the range is of great interest from the economic and scientific points of view. It is indicated in the accompanying section along a nearly east and west line. The strike of the strata is in general northwest. The old rocks just described are flexed in a very gentle syncline. The strata of the western edge of the mountains dip usually a few degrees northeastward, whereas those on the eastern side dip in a similar manner a few degrees southwestward. There are departures from this general rule in that the strata are locally horizontal and within the range there are slight dips to be found contrary to the prevailing direction, giving rise to gentle anticlinal flexures. Along the western side, the mountain mass is probably separated from the rocks beneath the Flathead Valley by a normal fault. Evidence on this point is that west of the

pendis, and the depth of boring and the results which may follow therefrom appear to depend upon the extent of the fault beneath the range, as will appear more clearly in the paragraph on the discussion of the origin of the oil.

ORIGIN OF THE OIL.

Under this head should be considered (1) the source of the oil, (2) the reservoir in which it may be contained and (3) the cover by which it is confined. The source of the oil is presumably in the observed rocks, which fall in this regard into two great series: the early Paleozoic and older formations constituting one, and the Cretaceous beds the other.

1. *Possible Source.*—The early Paleozoic rocks are extensively exposed down to the base of the section described above. They are indurated limestones, quartzites and shales which contain a surprisingly small amount of organic matter. Nothing suggestive of asphalt or petroleum has been found in the rocks themselves and, so far as they have been seen, it seems highly improbable that they could yield oil in any recognizable amount. However, the base of the section is not seen at Kintla Lakes and, where ob-



SECTION ACROSS NORTHERN ROCKY MOUNTAINS, MONTANA, ON LINE A B ON MAP.

mountains on the edges of strata which here, as on Akamina Creek, dip gently northeast. Seepages are reported to occur in a somewhat similar position near Bowman Lake, and the writer was informed that oil had been found on a pool west of the North Fork of the Flathead Valley, not far from the mouth of Akamina Creek. While there are undoubted occurrences of petroleum in this region, as described by Dr. Selwyn and seen by others, including the writer, too much confidence should not be placed in the various reports of oil springs, since even with the best intentions the average prospector may readily mistake a film of oxide of iron on marshy pools for petroleum.

GEOLOGY.

Stratigraphy.—The rocks of the eastern Rocky Mountain range through which these oils rise to the surface are very old quartzites and siliceous limestones, together with thick beds of greatly indurated shale, which is also very siliceous and often cemented by silica so as to transform it into argillaceous quartzite. They are known to be of early Paleozoic or pre-Paleozoic age. The entire series as exposed here and in the eastern front of the Rocky Mountain range consists of the following formations:

	Feet.
Siliceous red shales and quartzites, yielding casts of salt crystals.....	800
Siliceous limestones, usually weathering a buff color.....	4,000
Alternating red and green shales.....	1,200 to 2,500
Grayish and greenish thin-bedded siliceous shales, highly indurated.....	2,800
Limestones, the upper part thin-bedded and the lower massive.....	1,500

Approximate estimated thickness...10,300 to 11,500
 Their thickness as exposed above the level of the Kintla Lakes is about 6,000 feet. The oil appears near the top of the 2,800 feet of the thin-bedded grayish shales beneath the red and green shales; that is, 3,500 to 4,300 feet above the base of the series as exposed on the eastern side of the mountains. At Kintla Lakes the depth of this base below the surface is, however, an inference from the facts observed at

Flathead Valley occur rocks of the same character and sequence as those which form the mountains east of it, and they also dip toward the northeast, so that their extensions beneath the valley lie several thousand feet below the continuations of the same strata in the mountain mass. The break thus indicated cannot be identified by direct observation because the eastern part of the valley is filled with glacial drift and the supposed fault scarp facing the southwest has been deeply eroded by streams and glaciers.

On the eastern side, these old rocks of the Rocky Mountain chain are limited by a fault of another kind. Where they face the eastern plains with precipitous outcrops, one may descend from the cliffs of ancient limestone to slopes of much more recent Cretaceous sandstone and shale and, following the deep indentations of the valleys, one may trace for miles the contact of the older rock resting upon the younger. Chief Mountain is a conspicuous peak of limestone, probably of pre-Cambrian age, which rests upon Cretaceous beds and is completely isolated. This relation is brought about by an overthrust in consequence of which the older strata have ridden forward upon the surface of the Cretaceous formations. The structure of the overlying limestone exhibits numerous fractures which show the direction of relative movement to have been toward the northeast, whereas the Cretaceous rocks immediately below the overthrust have been disturbed and crushed as though pushed under to the southwest. Metalliferous mineral deposits occurring in the old rocks of this portion of the Rockies are of greater age than the overthrust fault, and it accordingly cuts them off at their contact with the Cretaceous.

The structure of the Cretaceous strata is to be seen only along the eastern front of the range and in the plains further east. Under the overthrust mass of ancient rocks below the zone affected by the fault, the Cretaceous generally dips gently southwestward. A few miles further east is a belt of sharply tilted strata dipping both southwest and northeast.

The great overthrust fault, by which Cretaceous rocks occur beneath the Rocky Mountain range, is presumably a fundamental fact upon which the occurrence of oil in the seepages already described de-

served in the eastern slope of the mountains, it is cut off by the great overthrust. We, therefore, cannot say that no other sedimentary rocks conformably underlie this series, nor could we positively assert that if such older strata exist, they could not yield oil, but the evidence at hand is against such an hypothesis. The oldest limestones seen are believed to be of pre-Cambrian age and no rocks of that time have thus far been found anywhere containing organic remains in sufficient amount to produce oil. On the implied assumption that the oil is derived from organic material, its source in these old rocks is so doubtful that it may be set aside from practical consideration.

The Cretaceous beds, on the other hand, are known to contain oil in many distinct and extensive districts. References to the Canadian reports could be made in support of this statement, but the general fact is too well known to require such proof. Occurrences of oil in the Cretaceous immediately adjacent to the Rocky Mountains are, it is true, not definitely known, but the conditions for the accumulation of oil in the disturbed belt of strata outcropping east of the range are very unfavorable. Where the Cretaceous rocks disappear under the overthrust Paleozoic mass on the eastern side of the range, they consist of black shales and sandstones full of organic material. It is most probable that the oil is distilled from these beds.

2. *Nature of Reservoir.*—A reservoir in which oil in any quantity might accumulate from this source should naturally be an extensive stratum of porous rock so situated that the oil penetrating it could not escape. No such stratum is definitely known to exist. It is true of the uppermost members of the Cretaceous, as it is of the lowermost formations of the pre-Cambrian, that they are cut off by the overthrust fault, and it is entirely possible that a porous sandstone of Cretaceous age may underlie the Rocky Mountains; but so far as the writer's observation and reading go, such an hypothesis is without foundation in observed fact. On the other hand, in the shattered condition of the uppermost Cretaceous sandstones and the lowermost pre-Cambrian limestones a reservoir of limited capacity is presumably

established in both of them along the zone of the overthrust, and it is reasonable to suppose that any oil generated in the Cretaceous would rise and occupy this broken zone.

3. *The Cover.*—The cover of such reservoir may be found in the overlying Paleozoic strata. These present a structure which is alike unfavorable to free escape of any accumulating oil, and at the same time sufficiently open to permit small quantities to reach the surface from very considerable depths. Throughout the entire thickness of 10,000 feet of shale, quartzite and limestone, joints planes of nearly vertical position divide every formation. They are an effective condition of the development of cliff walls many hundreds of feet in height and a universal phenomenon throughout the length and

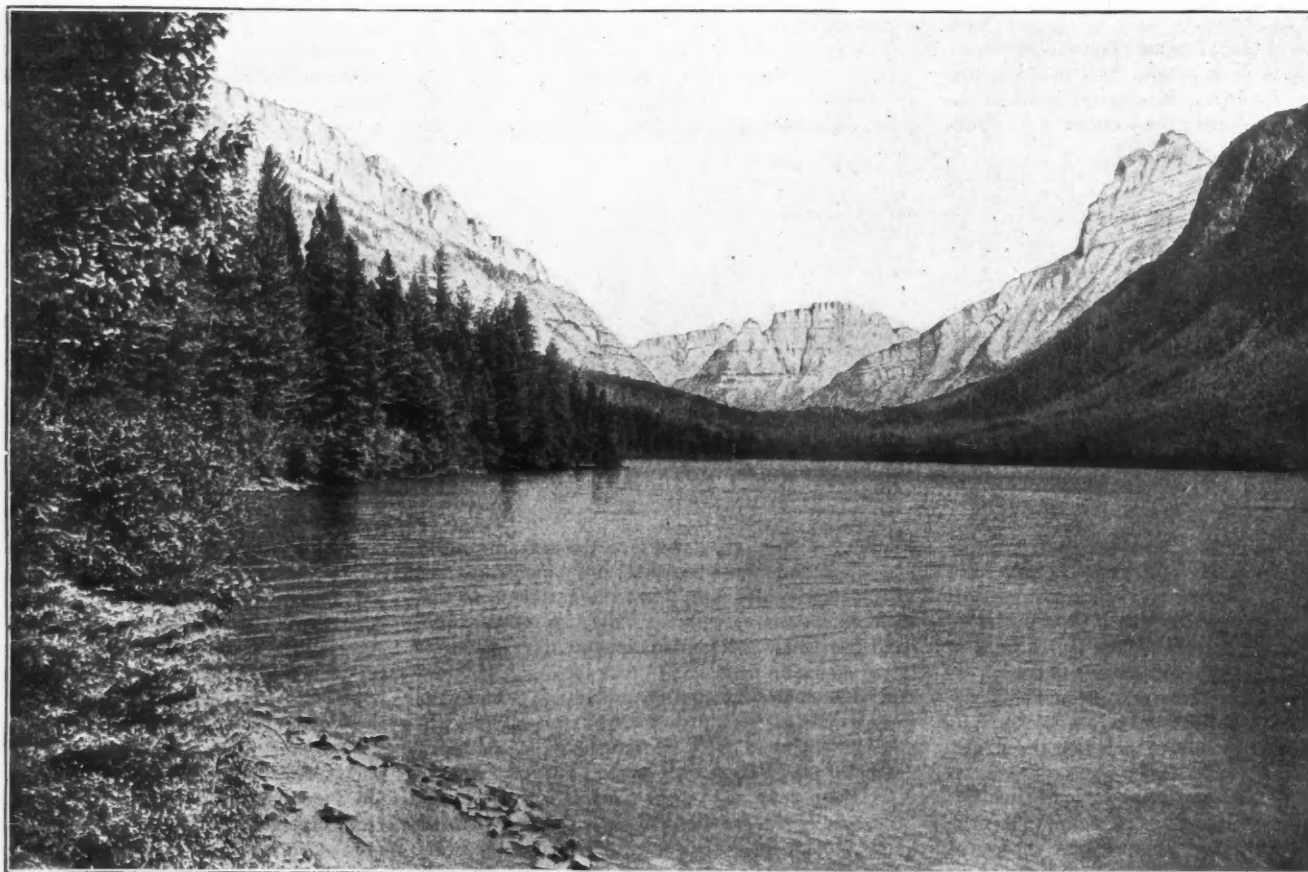
hypotheses of development of an overthrust fault, the Cretaceous is probably overturned beneath the Paleozoic. This condition would not, however, affect its importance as a source of oil. It is reasonable to suppose that the plane of the overthrust was originally flat and corresponded to an approximately flat attitude of the Paleozoic rocks. Where the latter have now synclinal and anticlinal structure, they probably took on that attitude after they were pushed forward over the Cretaceous, and it is, therefore, not unlikely that the zone of faulting was flexed with the overlying strata. If so, the most favorable opportunities for drilling should lie upon the anticlinal areas in the Paleozoic rocks.

Again, there is a difficult choice of localities to be made with reference to the overthrust and its pos-

BRITISH COLUMBIA—CAMP MC KINNEY.

By WM. M. BREWER.

The oldest lode mining camp in British Columbia is Camp McKinney. The Cariboo Mine was discovered in 1884 by prospectors who had followed up the Okanagon River from United States territory in search of placer gold. The discovery of rich gold-bearing quartz float on Rock Creek, a tributary of Kettle River, was followed by the location of the vein, which had furnished the float, and later the foundation for the present town at Camp McKinney was laid. Mining operations were commenced on the Cariboo group of mineral claims, which to-day embrace the Cariboo, Amelia, Okanagon, Saw Tooth, Alice, Emma and Maple Leaf, all of which adjoin.



LOWER KINTLA LAKE, LOOKING EAST—BOUNDARY MOUNTAINS.

breadth of the range. Along these joint planes it is probable that oil and gas as well as water slowly make their way to the surface, not by any direct course, but by a series of ascents and offsets, the latter occurring along bedding planes where impervious strata overlie more pervious beds. The only condition controlling the course which might be traversed by the oil is that it must in general continuously ascend. This is consistent with a long route by which it might come to the western outcrop, chiefly along the bedding planes from strata beneath the heart of the range. The fact that the seepages along the western side of the range appear from strata beneath the red shales which are relatively impervious bears upon this hypothesis.

PROSPECTING.

To prospect for oil under the above described conditions is obviously an extremely difficult task. Following out the theory of occurrence in anticlines, the prospectors should look for oil on one of the broad flexures which may be supposed to affect the fault zone as well as the overthrust rocks. In general, where the Paleozoic and Cretaceous are found in contact on the eastern side of the range, they both lie in a nearly flat attitude with a gentle dip to the southwest. It is not probable, however, that the Cretaceous maintains this position far under the mountains, since upon any of the usual

sible extension under the mountain. It is clear that if a bore hole be put down too near the eastern margin it may penetrate the possible reservoir for oil at a point which is open to the outcrop and from which the oil has gradually evaporated. On the other hand, if the drill should be driven down too far west, it may go through the Paleozoic and pre-Paleozoic rocks to great depth without meeting with any reservoir such as has been indicated. Under these conditions, an anticlinal district, well within the eastern margin and not too far west in the range, would seem to offer the best opportunity. Such a structural condition exists, for example, in the vicinity of Mt. Cleveland between Belly River and Waterton Lake. Even in the most favorable locality it is probable that the drill must go deep and with but slender chance of success.

If the inference as to the irregular line of ascent of the oil from its unknown source be correct, the particular point at which the oil escapes to the surface is not significant as an indication of the position of a subterranean reservoir.

IRON AND STEEL EXPORTS.—Exports of iron and steel, including machinery, from the United States, for the 10 months ending October 31, were valued by the Bureau of Statistics of the Treasury Department at \$85,912,136.

It having been demonstrated that the ore was free-milling, high grade, and the vein of sufficient extent to warrant the erection of a stamp mill, notwithstanding the inaccessibility of the camp, the Cariboo & McKinney Mining and Milling Company, of Toronto, some years later acquired the claims, erected a 20-stamp mill and began operations. The mill was equipped with a good concentrating plant. Up to October of last year dividends to the amount of \$459,337 have been paid. That is in brief the history of the camp.

During the years this group of mines has been in operation, a large number of other locations have naturally been recorded, and at one time the district in the immediate vicinity was one of the most active in the province, but to-day no work except that on the Cariboo is being done.

The most notable among the mines which have been partially developed, but are at present idle, are the Waterloo and Fontenoy, located as extensions of the Cariboo vein, and the Sailor and Minnehaha locations in the near vicinity.

The discontinuance of work on these properties and the failure to fulfill the expectations of the promoters have seriously injured the camp. Of course various reasons are given for the failures, but the observations of the writer during a recent trip lead him to the opinion that lack of ore of high enough

grade and of sufficient extent really caused the suspension of work.

The development of the Cariboo group has been a work where the greatest skill coupled with economy and conservatism were requisite. Fortunately for the shareholders, such have been the characteristics shown by the management; otherwise, despite the high grade and extent of the ore body this group would not have had the enviable record it possesses.

A visit to the underground workings with Mr. Keane, the superintendent, convinced the writer of the correctness of his opinion. Every level to the lowest (or 400 feet) was visited, and the complications in the structural geology examined. A series of faults which have thrown the ore body towards the south several feet each time have occurred at unexpected and frequent intervals, causing a vast expenditure for dead work of a prospecting nature. A careful study of this system of faulting has demonstrated that a certain degree of regularity occurs, but also that the complications have become more pronounced with depth. Consequently, although the ore body is of sufficient extent, provided these irregularities did not occur, to furnish a supply for more stamps, yet because of them the management has wisely preferred to continue operations with a small plant continuously, rather than with a larger one and be compelled to hang up stamps for lack of sufficient ore.

Prospecting for extensions to the Cariboo vein have so far resulted in failure. This may be accounted for by the fact that all work done in the past has apparently been performed too far to the north, allowance not having been made for the faulting to the south. Veins have been exposed on the Waterloo and Fontenoy claims to the east from the Cariboo workings, but that on the Waterloo appears to be parallel to the Cariboo rather than an extension of it. At the point where the writer took samples it carried very low values. The vein exposed and exploited on the Fontenoy has its line of strike towards the north, or at right angles to the line of strike of those on the Waterloo and Cariboo. The Fontenoy vein is refractory rather than free-milling, and until either a smelter or chlorination plant is available the ore cannot be treated.

At present the nearest smelter is at Greenwood, some 30 miles distant by wagon road, so that, although samples taken from the dump by the writer gave good returns by assay, it would not be practicable to treat the ore under present conditions.

In addition to the zone of auriferous quartz ores, there occurs a zone of pyrrhotite ore about 3 miles southeasterly from Camp McKinney. This is traversed by the new cut-off stage road to Midway and Greenwood, which will prove an assistance to the prospectors in enabling them to haul their supplies in by wagon instead of packing.

There does not appear to have been much development attempted on this zone, although some of the outcroppings are quite extensive. The fact that the ores are purely smelting propositions and that there are no railroad connections between the smelters and the camp holds back development. The long wagon haul prohibits shipment and has undoubtedly had a strong influence towards retarding progress. The country rock is a diabase or an igneous rock strongly resembling it. The ore appears to possess the same characteristics as the Rossland gold-copper ores, but so far as developed the bodies are not as extensive, nor do the surface indications suggest the maintenance of continuity any great distance.

A cursory examination leaves the impression that the ore bodies are lenses of greater or less magnitude. Undoubtedly the prospects are sufficiently promising to warrant thorough exploitation, but inaccessibility will most certainly retard the progress of the district. However, there is some rumor that both the Canadian Pacific Company and the Great Northern are reaching forward with the view of tapping the Similkameen District to the northwest from midway the present terminus of the Columbia & Western branch of the Canadian Pacific. Should the rumors prove true, and the near future see the building of one or more railroads into the Similkameen, the mine

owners interested in Camp McKinney may be in a position to show that a branch line would be a profitable investment.

Leaving Camp McKinney and traveling towards the west, the Okanagan River is reached and the mining camp of Fairview. This has been brought into some prominence since 1898 by reason chiefly of the operations of the Fairview Corporation, which acquired the Stenwinder, Tinhorn and other mineral claims, erected mills, tramways, etc., and after continuing active operations for a few years closed down for want of capital to continue development.

During the past two years the additional capital needed has been subscribed first by the Gooderham and Blackstock Syndicate, of Toronto, who obtained a working bond in consideration of advancing \$30,000 as a loan to be used for development. On the expiration of this bond it was forfeited, and the Fairview Corporation had to face the situation, and either repay the \$30,000 loan within a stipulated time or submit to a foreclosure. An assessment of 3 cents per share was levied on the shareholders of the old company, and operations resumed under the direction of Mr. Russell, the president, but under the immediate supervision of Mr. Cammbury, Sr., M. E., as superintendent.

The Tinhorn mill has been removed to the Stenwinder claim, and it is expected that with its present crushing capacity of about 80 tons per day, in the near future the solution of the problem as to whether success or failure is to be recorded will have been reached.

There is no doubt but that to a very great extent the progress of the country, which forms the watershed of the Okanagan River, and within the boundaries of which are embraced the mineral-bearing districts around Camp McKinney and Fairview, has been practically stopped by reason of lack of railroad transportation. At the present time there are two routes into these districts. Either from the Canadian Pacific main line at Sicamus Junction, thence to Okanagan Landing by branch line, thence by the tri-weekly steamer down Okanagan Lake to Penticton at the foot of the lake, thence by stage road about 30 miles to Fairview, or about 50 miles to Camp McKinney. Or by rail to Midway, via the Crows Nest Pass and Columbia & Western branches of the Canadian Pacific Railway, thence by stage about 30 miles to Camp McKinney, or about 50 miles to Fairview. Or instead of traveling via the Crows Nest Pass branch, the traveler can leave the main line of the Canadian Pacific at Revelstoke and travel thence to the Columbia & Western branch via the Arrow lakes.

When the natural resources of the country, especially surrounding Okanagan Lake are considered, it is surprising that no more steps have been taken to fully open up these districts by connecting the main points by railway lines, which at present can only be reached by stage road.

There are vast areas of which practically nothing is known by the prospector, agriculturalist or stock raiser, and as those sections which have been the easiest of access have demonstrated that they possess mineral wealth as well as large tracts suitable for agriculture and fruit-raising, as well as good stock ranges, it is quite probable that if railways were built the increasing population which would be attracted would thoroughly explore sections which are to-day inaccessible, so as to at least determine the resources, while those already proven of value would be more thoroughly developed and their value enhanced.

COAL PRODUCTION IN GERMANY.—The *Deutsche Kohlen Zeitung* reports coal production in the German Empire as follows for the 10 months ending October 31: Coal, 89,988,556 metric tons; brown coal or lignite, 36,566,732 tons; total, 126,555,288 tons. The production of coke is reported at 7,699,383 metric tons, and that of briquettes—chiefly from brown coal—was 7,709,045 tons.

COST OF MINE DEVELOPMENT IN BRITISH COLUMBIA

The interesting table below, which is taken from the report of the Center Star Mining Company for the year ending September 30, 1901, shows in full detail the cost of the development work done in the mine during the year:

	Sinking Main Shafts.	Sinking Small Shafts.	Raising.	Drifting.
Total advance feet.....	337	50.5	324.5	2,107
Cost Per Foot.				
1. Drilling	\$12.95	\$7.61	\$7.61	\$5.44
2. Blasting	4.80	1.77	2.05	0.95
3. Explosives	3.91	3.39	3.27	2.81
4. General Mine Supplies.....	2.35	1.54	0.97	0.67
5. Mine Lighting—Candles....	0.72	0.35	0.16	0.16
6. Mine Lighting—Electric....	0.62	0.27	0.19	0.16
7. Smithing	1.09	1.18	0.96	0.69
8. Shoveling—Direct	19.66	5.92	0.83	1.11
9. Shoveling—Apportioned ...	1.54	0.55	0.48	0.56
10. Timbering—Labor	9.60	1.23	3.05	0.17
11. Timbering—Material	3.16	0.12	0.74	0.95
12. Machine Drill Fittings.....	1.15	1.23	1.02	0.64
13. General Mine Labor	7.81	4.33	2.83	2.11
14. Hoisting Underground	14.28	7.27	...	0.16
15. Hoisting Main Shaft	2.19	0.92	0.71	0.65
16. Compressed Air	2.03	1.36	1.54	1.07
17. Mine Ventilation.....	1.29	0.81	0.47	0.33
18. Assaying	0.01	0.34	0.31	0.18
19. Surveying	0.59	0.24	0.23	0.17
20. General Expense.....	9.41	4.50	3.70	2.29
Total	\$99.16	\$44.93	\$31.12	\$20.37

The mine is at Rossland. The table above gives the work done during the year; we may add that this work made the total accomplished up to the close of year as follows: Main shaft, 927.5 feet; winzes and small shafts, 1,643 feet; raising, 1,841.5 feet; drifting, 11,289 feet.

THE BLACK HILLS FOREST RESERVE*

By EDWARD M. GRIFFITH.

The Black Hills Forest Reserve of South Dakota contains approximately 1,215,000 acres, including the Wyoming portion, which was added to the reserve by proclamation of President McKinley, September 19, 1898. Within the limits of the reserve, there is a population of about 25,000, who are chiefly engaged in mining, the annual output amounting to some \$3,000,000. Lead City, the principal mining center, where the Homestake Mine is located, has a population of 8,000 and is constantly growing, while Deadwood, its sister city, claims 5,000 people.

Custer, Hill City, Keystone and Spearfish, towns of from 1,000 to 2,000 inhabitants, lie along the line of the Burlington & Missouri Railroad, which crosses the Reserve from north to south. The Northwestern Line has a railroad on the east side of the hills, which enters Deadwood; and the Homestake Mining Company also operates a narrow gauge road from the eastern foothills to Lead. So the cities, mines, and lumber mills have excellent railroad facilities.

The character of the country, as its name implies, is hilly, the average elevation being 5,000 feet, with Harney Peak 7,408 feet the highest point. Granite is the prevailing rock on the east side of the Reserve, and limestone on the west.

Pinus Ponderosa, commonly called Yellow or Bull Pine, composes at least 90 per cent of the timber, and is the only species which reaches a merchantable size. Spruce (*Picea canadensis*) is found in the gulches, and on some of the steepest slopes, but is too short and limber to be of any commercial value. Aspen (*Populus tremuloides*) comes up readily after fires and serves as an excellent nurse for the young pines.

These bodies of pine timber are separated by long draws or gulches, which contain good agricultural land and usually enough water to serve the needs of a rancher. These draws are being rapidly settled upon by squatters, much to the delight of the forester, who sees in these strips of cultivated land, separating bodies of timber, excellent natural fire lines. These squatters have developed some very valuable farms and are a desirable, hard-working class of settlers, who are directly and deeply interested in the welfare of the Reserve. For this reason it is hoped that the General Land Office will not carry out its threatened policy of expelling them from the Reserve.

*Article in the *Forester*, November 1901.

The growth of grass, especially on the limestone soils, is very luxuriant, and will furnish feed for thousands of cattle or sheep. At present the law allows each rancher to run 120 head of cattle on the Reserve, but up to the present time no sheep have been permitted to graze within its boundaries.

Around the mining centers, in the northern part of the hills, forest fires have done considerable damage, but taking the Reserve as a whole, the amount of timber destroyed from this cause is surprisingly small. If the forest officers in charge of the Reserve can keep out the fires, the future of the forest is assured, for the natural reproduction of the pine, especially on the granite soils, is remarkably fine. Planting will only be necessary in one or two sections in the north, where all the seed trees and young growth have been destroyed by repeated fires.

The greatest enemy of the timber is the spruce and pine bark beetle (*Dendroctonus rufipinus*) which has destroyed the timber on whole townships in the northern hills. This tremendous spread was undoubtedly partly due to the old wasteful methods of logging, which left all except the best logs to rot in the woods and so furnished a breeding place for legions of beetles. The only remedy seems to be to cut out the beetle-killed and infected timber as soon as possible, and insist on clean logging. No timber should be cut in spring or summer, as the beetles breed in the fresh cut tops and stumps when the sap is up. This season only a comparatively small amount of timber has been killed and it is fair to infer that the worst of the destruction is over.

There are a large number of applications for timber, and the demand for lumber, mining timbers, ties, cordwood, etc., reaches 60,000,000 feet, board measure, per year. This is below the amount which could safely be cut, but the demand is steadily increasing. Cutting is limited to a certain diameter, usually 12 inches on the stump, and the contractors are obliged to work up the tops into cordwood, and pile the brush away from the young timber, so that it can be burned. All trees above 12 inches, which are to be cut, are marked by the ranger, and he must also scale all logs, ties, or cordwood.

Tie cutting has been carried on to a considerable extent, but the work is extremely unsatisfactory and the debris caused by the hewing of ties in the woods is a constant fire menace to the forest. The operations of the lumber mills, since they have been obliged to work the tops up into cordwood, are as praiseworthy as those of the mining companies. The latter are ready and willing to comply with any reasonable rules.

The forest force, which supervises the work in the Reserve consists of a supervisor, and under him a force of rangers, to each of whom a district is assigned, for which he is responsible. Twenty-eight rangers are employed in summer during the dry months, when there is the most danger from fire. The winter force numbers ten. Unfortunately these men are not trained foresters, and often do not understand their work or sympathize with the forest reserve movement.

The question of water supply is as important to the people of the hills as that of timber. Nearly all the main valleys and cañons contain small mountain streams, which generally have their rise in springs, but nevertheless many of them are apt to run dry in the summer. In the northern hills water is nearly as precious to the miner as gold, and in the foothills and plains streams are very valuable for irrigation. For this reason it is of the greatest importance that cutting be carefully restricted on the headwaters and slopes bordering on these streams.

Formerly the miners stripped the timber from the slopes of the streams on which their mines were located; now they are having the lesson of the relation of forests to stream flow driven home very forcibly. They are obliged to spend thousands of dollars building flumes to convey water from other streams, which have not been cut over. The mine owners especially have come to realize, by bitter experience, that their properties are nearly worthless without wood and water; and they will heartily sup-

port the Government in measures looking toward forest protection.

One of the greatest needs is for cordwood, and they are often willing to buy the dead standing and down timber without touching the green timber. Under such conditions, where there is a steady demand for cordwood, which can be made from the tops and dead timber, an adequate supply is in this way easily secured, while the forester can depend on a fine natural reproduction for restocking the blanks produced by lumbering. An excellent system of roads throughout the Reserve, makes practicable the transportation of lumber and logs for long distances.

The revenue from the sale of timber in the Black Hills Forest Reserve, is sufficient to pay for its supervision, and also that of the Big Horn and Teton Reserves in Wyoming. In point of revenue, demand for timber, population, and accessibility, it is the most important of all the forest reserves. Public sentiment favors it heartily, and the Reserve to be of great economic value to the community, only needs a thoroughly honest, efficient, and business-like administration, which, in the past, unfortunately, has often been lacking.

NEW COAL DISCOVERIES IN QUEENSLAND.—With regard to the recent discoveries of coal in the central part of Queensland, the *Australian Mining Standard* says that although the Dawson River District—the seat of the find—has been but imperfectly explored, quite a number of companies have been formed to take up locations and obtain coal—or, if not coal, certainly subscriptions from the public, and one or the other means profit to them. But every great discovery of this sort is marked by abuses, which it is the duty of the ordinary man to avoid, and which he can avoid by the exercise of a little discretion. Meantime, the point for consideration is that the anthracite is there, and if the exhaustive investigations now in progress show it to exist plentifully (as certainly seems to be the case from what has already been ascertained by Mr. Dunstan, the assistant Government geologist, who made the discovery), it is clear that paths of industrial activity hitherto closed to Australia have been made available. Mr. Dunstan found that the coal seam was 11 feet in thickness, and, as the coal-bearing country extends for a number of miles westward from the Dawson, he infers that the quantity of fuel is enormous. We may remind the reader that a sample of the coal from the outcrop gave the following analysis: Moisture, 2.82 per cent; volatile hydrocarbons, 11.15; fixed carbon, 81.87; ash, 4.16 per cent. If the average should fall considerably below this, the excellence of the coal will remain undoubted. At present, means of communication with the coast are inadequate, but this drawback will be promptly removed if the prospect of a big trade is opened up.

HOISTING ROPES IN BELGIUM.—The London *Colliery Guardian* says that the wire ropes used for winding in Belgium, chiefly in the Charleroi District, consist of 20 round steel-wire ropes wound on drums, 2 ditto wound on Koepe pulleys, 2 flat ropes of charcoal iron wire, and 76 flat steel-wire ropes, while the round ropes include one with flat strands. The wires for round ropes are mostly of 1.8 millimeters and 2 millimeters diameter, but in two cases the diameter is 1.5 millimeters, and in two others 2.3 and 2.8 millimeters. The drum engines are for the most part erected on shafts of slight depths and small outputs; but such is not the case with the engines for pulleys and flat ropes, which (the reverse of what occurs in neighboring countries) continue to be preferred in Belgium. The flat wire ropes are generally made by sewing together eight round ropes consisting of 4 strands of 7 to 13 wires; but one shaft, 940 meters deep, has flat ropes formed of 10 round ropes sewn together, while for 4 other shafts, less than 300 meters deep, the ropes are made up of 6

round ropes. The wire used is generally of 2 millimeters diameter, wires of 1.25 and 1.8 millimeters being, however, employed for two shafts. All the round ropes are of uniform section; but 12 of the flat ropes are of diminishing section, each of the three or four portions differing from the next by one wire per strand.

MINING TRADES UNIONS IN GREAT BRITAIN.—A recently issued report shows that at the close of 1900 there were 1,272 trades union organizations in Great Britain, having a total of 1,905,116 members. Of these 54 organizations, with 494,929 members, were connected with the mining and quarrying industries. This class of unions seems to have been much larger in numbers than the average union, since with only 4.25 per cent of the total number of organizations, they had 26 per cent of the members. There was one less mining union in 1900 than in 1899, but the number of members showed an increase of 74,708, or 17.8 per cent, during the year. The proportion of the total number of persons employed in mining in Great Britain, who are members of some union, rose from 48 per cent in 1898 to 56 per cent in 1899 and 63 per cent in 1900. The expenditures of the 54 mining unions in 1900 were: Dispute benefits, £11,664; unemployed, £4,419; sick and accidents, £33,852; funeral, £9,992; total, £59,927. These unions at the close of 1900 had funds in hand reported at a total of £720,695.

LEAD ORE PRODUCTION IN ENGLAND.—The output of lead ore in Derbyshire, England, in 1858, was 6,277 tons. In 1878 it diminished to 2,090 tons, from which figures it had somewhat revived, the output in 1900 being 4,395 tons. In the four northern counties in 1900 the production of lead ore was 7,176 tons. Of this Cumberland produced 1,321 tons, Durham 3,849 tons, Northumberland 520 tons and Westmoreland 1,486 tons. In the three years ended 1768 the average annual output of the Alston Moor mines alone was 8,244 tons, being considerably more than the present production of the whole of the four counties. According to the reports of the Inspectors of Mines, the total production of lead ore in 1900 was only 32,010 tons, while during the ten years ended 1882 it averaged yearly 73,357 tons.

IRON PRODUCTION IN GERMANY.—The output of the blast furnaces in Germany for October, as reported to the union of German Iron and Steel Union was 645,127 metric tons, against 742,720 tons in October, 1900; a decrease of 79,593 tons, or 1.31 per cent. For the 10 months ending October 31 the production was as follows, in metric tons:

	1900.	1901.	Changes.
Foundry iron	1,218,247	1,255,337	I. 37,090
Forge iron	1,323,961	1,135,922	D. 188,039
Bessemer pig	408,126	393,358	D. 14,768
Thomas (basic) pig	3,970,600	3,732,369	D. 238,231
Totals	6,920,934	6,516,986	D. 403,948

The decrease shown this year is 5.8 per cent. The falling off has been progressive during the four months since June, little reduction having been reported in the first half of the year.

ANCIENT HOT-BLAST FURNACES.—The London *Engineer* says that, if a recent theory be correct, the hot air blast for iron furnaces, patented by Neilson in 1828, was known in Southern Palestine 1400 years before Christ. In the Tel el Hesi mound have been found the remains of eight successive towns of dates from 1500 to 500 B. C. The most important object obtained from the mound is a cuneiform tablet, the first record of the pre-Israelite Canaan yet yielded up by the soil of Palestine; but another discovery of great interest is an iron blast furnace, whose arrangement is believed by Mr. Bliss to indicate a design to heat the blast of outside air before introduction.

MONTANA CORUNDUM.

BY LEVERETT S. ROPES.

That corundum existed in Montana has been known for some years, and its presence as a gem is also quite widely known. In the reports of the United States Geological Survey, mention is made of the occurrence in Montana of crystals of corundum not of the gem variety, but up to the beginning of the present year nothing was done to exploit any of these discoveries in an economic way for the production of the mineral in that State as an abrasive; and while considerable capital has become interested in the production of gems, not a dollar had been expended on "common" corundum. The locality now attracting the most attention is in the south central part of Gallatin County, and is included in the Gneiss area of the Three Forks Folio of the United States Geological Survey, on the headwaters of Elk Creek, as there shown, in the group of foothills between the Gallatin Valley and Spanish Creek Basin.

Corundum was discovered a number of years ago by Mr. Harris Kirk, who owns several thousand

spar vein and again becomes the larger part of the gangue. In this material under all three conditions, but generally under the first two, the corundum occurs in crystals, and to a slight extent in small grains, which are imperfectly defined hexagons. Crystals vary from minute perfect hexagons, a fraction of an inch, up to 8 and 10 inches in length and proportionate diameter, and weighing up to 1½ and 2 pounds. The percentage varies from 15 to 75 and the corundum is uniformly distributed through the pay streak, which averages, so far as developed, 28 inches, attaining a maximum width of 34 inches, while a streak of a few inches of the foot wall, so far only prospected at two points also, carries corundum in sufficient quantity to pay for mining and extracting. The full width as determined at these points is 8 to 10 feet.

A few feet farther north and beyond the main quartz reef of the ridge another small streak has been discovered at two points several hundred feet apart, but no work has been done to determine the extent of this.

The work so far done by the prospectors consists

The corundum has been shown to stand the fire for vitrifying and makes an excellent wheel under the silicate process.

There has been considerable prospecting over several miles and some claims have been staked out in addition to those above mentioned, and which a company has been organized to work. Active operations will be carried on by this company through the winter, and it is intended to add a complete mill early next year.

THE MINES OF TONAPAH LAKE, NEVADA.

BY OUR SPECIAL CORRESPONDENT.

Situated in a country very hard to prospect on account of lack of water, it can readily be understood why this district has remained undiscovered until about a year ago.

Within a year, a compact little town with 1,300 inhabitants has sprung up on top of this mineral belt. New buildings are going up every day, and as fast as the teams bring in lumber it is sold. It is no sooner unloaded than it is disposed of.

Upwards of 400 horses, in teams of from 12 to 20, are kept busy, and never fail of having a load both ways—merchandise to Tonapah, and sacked ore for the return trip. Even with this small army of horses for transporting the product, the immense piles of ore are being increased at the rate of 400 tons a day. The largest team can haul but 15 tons of ore out to the points from which shipments are made to the smelters. It is estimated, and can easily be figured, that with the gradual increase of production, it will take at least eight months after the first of the year to clear away all the high-grade ore that will have been taken out by that time, and then there will be from 10,000 to 20,000 tons of second class ore on the dumps. This second class ore with proper transportation facilities would be first class. It will range from \$20 to \$100 per ton.

While Tonapah ore has been thought to be a purely smelting ore, many consider it to be free milling, and tests to prove this are at present being made at several mills along the Carson River, notably at the Kinkaid Mill, Virginia, Taylor's Mill, Silver, and Rock Point Mill, Dayton. It is learned that the ore treated at Taylor's Mill worked to a satisfactory degree. A test of 14 tons was run through the mill, and 88½ per cent of the values was saved. The ore itself has the appearance of free milling, often containing particles of free gold, horn silver and black sulphurets. The ratio of gold and silver in the Tonapah ore is about 39 per cent value in gold and the rest silver, there being practically no other metal associated with it.

In smelting a great amount of flux is necessary; it requires about 1¼ tons of iron, copper or lead ore to 1 ton of the Tonapah ore.

Scarcity of water, which at first seemed quite a problem, is gradually being overcome. Water is being found in wells within a very short distance of the camp, and it is thought that with good artesian wells, plenty of water will be found for all purposes.

Upwards of 115 leases have been let on the different ledges belonging to the Tonapah Company and the other companies interested in this district, and in the majority of them work is being pushed as fast as possible. Some, it is true, have been forced to stop sinking shafts because of lack of funds. In practically every case, however, after the iron capping has been pierced, the rich ledge has been struck. There seems to be no change with depth, unless it is for the better.

In the main leases, the depth attained is about 180 feet, and here the body has improved and in many cases widened. In the company's shaft, the ore being taken out runs as high as \$700 for every foot in depth.

Two passenger and freight stage lines now operate to Tonapah, one from Candelaria, the other from Sodaville. The freight traffic is about equally divided between the two roads, that via Candelaria being a little longer, but with more favorable grade.

The increased traffic has caused the Carson &



MONTANA CORUNDUM COMPANY—34-IN. VEIN IN SHAFT.

acres of ranch land in these hills, and a crystal picked up on this land came to the notice of parties in Belgrade, who were familiar with its use, and negotiated a contract with the owner for the mineral in his hands and all joined in the location of four claims covering an intervening area.

In my examination of the property my time was limited and I was obliged to confine myself to the economic side of the proposition, so that my study of the geology was hurried. Briefly, the country is gneiss, a central body of coarsely crystalline orthoclase feldspar, with quartz and mica lying in the depression south of the corundum vein and forming a large part of the higher ridges to the south of this, while the northern rim of this basin is made up of the banded gneiss, in one long ridge abutting the upturned quartzite, and limestone to the east and spreading out in the high plateau to the west. In either direction the bands of quartz, prominent features of this portion of the gneiss, disappear and with this, so far as has been discovered, the corundum vein.

There are four principal bands of quartz separated by bands of hornblende and hornblende garnet schist, between which is a band of white friable feldspar with distinct walls and margins of vermiculite. At times the latter is distributed all through the feld-

of about 30 pits at intervals along the vein and proves the latter to extend for a distance of two miles, maintaining a uniform distance from the quartz near the top of the ridge.

About midway Elk Creek cuts through this ridge at a depth of about 800 feet below the average summit and while the slopes are much broken and covered with talus, the corundum has been discovered to a point half way down and will, when a persistent effort is made, be found to creek level. The quartz has a strike of south 56° to 66° west, varying slightly, and dips to the north at a very steep angle, maintaining a uniform dip to the creek. This cañon across the formation suggests a faulting, but no displacement is apparent from the relative position of the rocks on either side.

South of the quartz bounding the southern or lower (?) bed of hornblende (the foot wall of the vein) is a belt of iron and quartz at points in which small undefined patches and grains of greenish yellow corundum occur, giving to some specimens examined considerable abrasive power and suggesting the presence of emery. No work has been done on this under the present operations, but several years ago it was prospected as an iron mine at 2 or 3 points, and there shows a width of 6 to 10 feet.

Colorado Railroad to put on a daily train service in order to handle the cars of ore which are shipped regularly to Oakland. From there the ore is shipped by steamship to the smelters at Everett, Wash.

In the month of October the returns from shipments amounted to over \$100,000 net, and thus far this month over \$200,000 has been received. November's proceeds will reach at least \$250,000.

The expense of mining, handling, freight and treatment charges amounts to about \$45 a ton.

Some of the larger operators on the leases, who are unable to get ore hauled fast enough are simply piling it up until some future time.

The Tonapah Company, which has charge of the hauling, gives preference to the small leasers, as against the big ones, enabling the small leasers to pay their men, thus continuing with their work.

The principal leasers are Brougner Bros, Cutting & Brown, Lynch, O'Meara & Sullivan, Golden & Sinclair, Coslett & Co., and Beauchamp, Tamblin & Co.

It is estimated that each of these will produce over \$50,000 before the first of the year, while some of them will produce over \$100,000.

There are also many other leasers who will produce from \$5,000 to \$50,000 for their year's work.

The original cost to the Tonapah Company was \$336,000, and by the first of the year, with the royalty and other proceeds, the mine will have cost them nothing. Shafts will have been sunk from one end of the ledges to the other, to probably 200 or more feet, determining the ore in sight at that level. There will be thousands of tons of good ore, all blocked out, which the leasers will be unable to take out.

Outside the Tonapah Company work is progressing on several other properties, notably on the Gold Hill group, adjoining; Brougner Bros., T. L. Oddie and others are interested. Ore has already been struck in the Stone Cabin claim, and appears to be as rich as any in the camp.

The length of the Mizpah ledge has been proven for 1,300 ft., and a conservative estimate for the width placed it at 4½ feet. There are at present 10 shafts, which have reached a depth of 180 feet, all in rich ore, which figures out to over 1,000,000 cubic feet of ore in sight. Outside the Mizpah ledge are several others not so wide, but equally as rich, and in some places richer. There are the Valley View, the Burro 1, 2 and 3, and the Buckboard. Besides these are many auxiliary stringers, on which leasers are working and shipping very rich rock.

On Oddie Mountain, a company, known as the G. & H. Tunnel Co., is running a tunnel in to what is thought to be an extension of the Mizpah ledge. They are at present in about 300 ft. The croppings on the surface are alike in appearance to those of the Mizpah ledge.

Taking everything into consideration, this discovery at Tonapah is one of the greatest of late years, and should the ledge go down to any depth, as all signs indicate, the State of Nevada will again be among the leaders in production of gold and silver.

Nor is this particular section alone the only one of promise. Within 30 miles from here, in the Silver Peak district, are many fine properties which are attracting attention. Again, in all directions is country which has never been prospected for the reasons as stated at the first of this article.

The opening of Tonapah has brought many prospectors, who, unable to secure claims or leases in this section, are starting out in different directions, looking for other fields and it is more than likely that many new finds will be reported.

Many stories are being circulated in regard to Tonapah but all to its credit, and it is fair to state that these stories hardly tell half the truth.

IRON ORE IMPORTS.—Imports of iron ore into the United States for the 10 months ending October 31 were 807,547 tons, against 772,647 tons for the corresponding months in 1900; showing an increase of 34,900 tons this year. The larger part of these imports were from Cuba.

THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

SPECIALY REPORTED.

The twenty-first annual meeting of the society was held at its rooms, No. 12 West Thirty-first street, New York City, beginning on Tuesday evening, December 3. The first session was chiefly devoted to a social reunion of the members in the parlors and library, which were crowded to their full capacity, as is always the case in the New York meetings of the society. At 9 p. m. as many of those present as could be accommodated in the audience room listened to the annual address by the retiring president, Mr. Samuel T. Wellman. Its title was, "Early History of Open-hearth Steel Manufacture in the United States." It was illustrated by a series of colored drawings, on a scale of ½ in. to 1 ft., showing sectional views of furnaces built at different dates, from the 5-ton furnace of the Bay State Iron Company, built in 1869, to the latest monster rolling furnace of 200-tons capacity, designed this year and soon to be erected. After the address a light luncheon was served in the basement, and a "smoker" was held until a late hour.

The session on Wednesday morning was devoted to business of the organization, and it was the liveliest and one of the most important ever held by the society. The question to be decided was whether or not the annual dues should be increased from \$15 to \$25. An amendment to the constitution to this effect had been proposed at the Milwaukee meeting last spring, and it was recommended by a unanimous vote of the council, which had issued to the members two circulars urging its adoption. No previous reports of the Finance Committee had given the members any knowledge that the society was running behind-hand, and they supposed it was in a most flourishing condition, since it had paid off the \$30,000 second-mortgage bonds on its building during the past 10 or 11 years; but it now appeared that for the last 4 years the society had been running into debt at an average rate of \$2,500 per year, and that its floating indebtedness was now about \$13,000, of which about \$5,000 was caused by putting in new heating and ventilating apparatus and some other extraordinary expenses. The session was crowded on the floor and gallery, and the utmost interest was exhibited in the debate, which lasted nearly three hours. Vigorous speeches were made for and against the amendment, and some strong remarks were made on both sides, but all evidences of hard feeling were carefully suppressed, and the debate proceeded in the most orderly manner. Finally a ballot vote was called for, and as several members held great bundles of proxies, the result of the vote was not announced until the next morning. It was: For the amendment, 191; against, 647; irregular, 36; total, 874. So the proposition was voted down. The council announced that an executive committee of its members had been appointed, who would look into matters pertaining to the society's finances, and it is probable that a policy of retrenchment will now be adopted, so as to bring the expenditure within the income.

An adjourned session was held at 3 p. m., but as the vote was not ready to be announced, no business of importance was transacted, and it adjourned early. In the evening the usual annual reception and dance was held at Sherry's. It was attended by several hundred members and guests and was a most enjoyable affair.

On Thursday morning a professional session was held, and two papers were read and discussed. The first was entitled, "A Portable Accelerometer for Railway Testing," by F. B. Covey. The instrument consists of two vertical glass tubes, containing mercury and connected by a horizontal passage between them, the instrument being carried on a car in such a position that the horizontal passage is parallel to the direction of motion, any acceleration or retardation of motion will be indicated by a difference of level of the mercury in the two vertical tubes. The upward extensions of the tubes, above the mercury, is of small diameter, and they are partly filled with colored alcohol, which multiplies the indications of the mercury. The discussion of the paper led to the

belief that the instrument was a very poor one for the purpose, and that no accelerometer which depended upon the inertia of a pendulum or of a liquid could be relied on. An excellent instrument for automatically recording accelerations was described by one speaker. In it the revolutions of the car axle were recorded electrically on a moving paper, while at the same time an electrical device attached to a Seth Thomas clock recorded fractions of a second.

The second paper was entitled, "A Bonus System of Rewarding Labor," by H. L. Gantt. It describes the system recently introduced in the Bethlehem Steel Works for increasing the output of the machine department. By this plan a card is made out showing in detail the best method (so far as our present knowledge goes on the subject) of performing each of the elementary operations on any piece of work, specifying the tools to be used, and setting the time needed for each of these operations as determined by experiments. The sum of these times is the total time needed to complete the piece of work. If the man follows his instructions, and accomplishes all the work laid out for him, as constituting his proper task for the day, he is paid a definite bonus in addition to the day rate which he always gets. If, however, at the end of the day, he has failed to accomplish all of the work laid out, he does not get his bonus, but simply his day rate. As the time for each detail operation is stated on the instruction card, the workman can see continually whether he is earning his bonus or not, and if he finds any operation which cannot be done in the time set, he must at once report it to his foreman. As these cards are made out by a skillful man, with the records at hand, they invariably prescribe a better method for doing the work than the ordinary workman or foreman could devise on the spur of the moment.

As it is impossible for the men to earn their bonuses when their machines are out of order, it furnishes an automatic punishment for breakdowns, for the man not only loses his bonus on the day the machine breaks down, but on all subsequent days until the machine is running satisfactorily again.

This system is, so far as the writer is aware, a new one, but is based on the principles of Mr. Fred W. Taylor's system of elementary rate fixing, and is as far as possible removed from the old-fashioned method of fixing piece rates from records of the total time it has taken to do a job.

This system of instruction cards was introduced by the writer into Machine Shop No. 2, of the Bethlehem Steel Company, in June, 1899, with markedly beneficial results, which increased as the men making out the cards became more and more skillful and the cards were made out more and more in detail. Among the results we have obtained are:

First. A very large increase in output, averaging from 200 to 300 per cent.

Second. A falling off in accidents and breakdowns.

Third. A quickening of the intelligence of the men.

Tables given in the paper showed considerable gains in the output of the shops and in time on machines.

The discussion on Mr. Gantt's paper indicated a hearty appreciation of it by the members, and it was recognized as being one of the most important papers on the subject of methods of paying for labor that has appeared in a long time. Many comparisons of the bonus system with the premium system were made, and it was shown that one may be best adapted for one class of work and the other for another.

The afternoon was devoted to the ceremonies attendant on the dedication of a monument to Robert Fulton, in Trinity churchyard, where the remains of the great engineer have rested since his death in 1815. A large meeting was first held at the Real Estate Exchange, close by the churchyard, where addresses on Fulton's life and character were made by Admiral Melville and Professor Thurston. The party then entered Trinity Church, where a most impressive choral service was held, with music by the church choir, and an address given by the Rev. Robert Fulton Cray, D. D. of Poughkeepsie, N. Y.

a grandson of Robert Fulton. After this, the members repaired to the churchyard to view the monument. It consists of a pedestal surmounted by a large vertical slab of granite, containing an excellent bronze bas-relief, sculptured by Weinert, after the portrait painted by Fulton himself, which hangs in the rooms of the society. It is a highly creditable piece of work, and the whole occasion was a dignified and memorable one. It removes the reproach under which New York City has rested for three-quarters of a century, that of having no monument to Robert Fulton.

Professional sessions were held on Thursday evening and Friday morning. They were devoted to the reading and discussion of the following reports and papers:

A Silent Chain Gear; by J. O. Nixon. This paper describes and illustrates the new chain and sprocket gear developed by Mr. Hans Renold, which has been in successful use in Europe for the last five years. It appears to have many advantages over the ordinary chain gear.

The Bursting of Small Fly-Wheels; by C. H. Benjamin. Sixteen wheels, each 24 inches in diameter, were tested to destruction. The following conclusions are drawn: For wheels of moderate size and correct proportions, the solid rim is the strongest form; jointing the arms at the rim and webbing the rim has no important effect; joints in the rims are the principal source of weakness; probably no joint can be made more than one-third as strong as the solid rim; the flanged joint, with bolts, is the best that can be devised for cast wheels with solid rims; if joints are located between the arms, they should be reinforced by tie rods; the solid-rim wheel, with numerous steel-rod spokes, is the best form.

Preliminary report of the committee appointed to codify and standardize the methods of making engine tests. The committee consists of George H. Barrus, Francis H. Boyer, Beyan Donkin, D. S. Jacobs and George Richmond. The report is a pamphlet of 87 pages, including some discussions presented at and since the last meeting of the society. It was highly commended by several members who discussed it. It will be further revised by the committee and will probably be reported in its final form at the next meeting.

Final report of the committee on standardization of engines and dynamos. This report recommends standards for the following: Sizes of units, revolutions per minute for each size, sizes of shafts for center-crank and side-crank engines, length along the shaft required for the generator, height of axis or shafts over top of sub-base, width of top of sub-base, armature fit, overload capacity of engines and generators, brush holders, holding down bolts, keys and out-board bearings.

A New Valve Gear for Gas, Steam and Air Engines; by Ernest W. Naylor. This paper describes a 5-h. p. three-cylinder single action engine, fitted with an electro-magnetic valve gear. The steam and exhaust valves are set in the heads of the cylinders, and are operated, through levers connected to the valve spindles, by magnets, the time of opening and closing the valves being regulated by controllers. This engine has been run with steam pressures ranging from 1 to 70 pounds, and at speeds ranging from 60 to 875 revolutions per minute, and cut-offs from 2 to 60 per cent of the stroke. The gear has been applied to two Westinghouse engines, one simple and the other compound, but these have not yet been tested.

The Potter Mesh Separator and Super-Heater; by T. A. Scheffler. This paper describes a form of stream separator that has recently been extensively advertised. It is located inside of the boiler, and performs the functions of a dry-pipe. In the discussion it was subjected to severe criticism.

Working Loads for Manila Rope; by C. W. Hunt. This paper gives three tables showing the results of tests on manila rope; first actual power required, compared to the theoretical, for raising weights by rope and tackle; second, proper working load and size of sheaves for ropes from 1 inch to 1 3/4 inch diameter, at speeds from 50 to 800 feet per

minute; and third, efficiency of knots and splices of various forms compared to solid rope.

The Heat Engine Problem; by Charles E. Lucke. This is a pamphlet of 60 pages, containing a very exhaustive discussion of the theory and practice of gas, oil and hot air engines, and pointing out possible improvements in such engines. It is worthy of careful study by those interested in the subject.

Experiments on Spiral Springs; by Charles H. Benjamin and A. Roy French. This is a brief paper describing experiments on 27 different compression springs, properly called helical and not spiral, made from bars 0.5 to 1.31 inch diameter, of mean diameters from 2.6 to 7.9 inches and heights from 4.4 to 17.6 inches. The loads required to close the springs are given, and also the calculated co-efficients of torsional elasticity, and the torsional shearing.

Water Power Development at Hannawa Falls, N. Y.; by Wallace C. Johnson. The paper describes the utilization of a water power on the Raquette River in the northern part of the State of New York, near Pottsdam. It consists of a dam, a canal 2,700 feet long, estimated for a constant flow of 2,500 cubic feet per second, a forebay at the lower end of the canal with four penstocks and a power house containing a 1,250-h. p. wheel, with a working head of 84 feet and provision for three other similar wheels, and two 350 kw. 3-phase, 4,400-volt generators, directly connected to the wheel shaft. Adjoining the power house is a pulp mill, of a capacity of 100 tons per day. The paper is fully illustrated.

The How and the Why of the Porro Prism Field Glass; by Worcester R. Warner. This paper describes the optical principles governing the construction of the now well-known binocular field glass, introduced six years ago by Zeiss, of Germany, and now manufactured in improved forms by the Bausch & Lomb Optical Company, of Rochester, N. Y., and also by Warner & Swazey, of Cleveland, Ohio. The Porro prisms, used in these glasses are made by Mr. John A. Brashear, of Allegheny, Pa., and they are the most perfect ever made.

An Experiment on the Effect of Clearance on the Economy of a Small Engine; by Albert Kingsbury. The engine tested was a 5 by 7-in. plain slide valve engine, run single-acting. Variations in the clearance were made by inserting cast-iron rings under the back cylinder head. The results showed a progressive increase of the steam consumption per 1 h. p. per hour from 51.8 pounds, with 11 per cent clearance up to 55.6 pounds, with 32.5 per cent clearance.

LOUISIANA ROCK SALT—AVERY'S ISLAND.

By HAROLD A. TITCOMB.

Ten miles southeast of New Iberia, Louisiana, rising abruptly from the flat expanse of marsh and bayou, is a remarkable hill. The hill is perhaps 2 1/2 miles in length, somewhat less in breadth and 150 to 200 feet high. It is sometimes called Avery's Island, sometimes Petite Anse. The island is a beautiful spot, green with foliage, and here and there a mansion half hidden among the live oaks. This entire island is overlaid with a deposit of pure rock salt of unknown depth. A bore-hole nearly 2,000 feet deep failed to pass through the salt.

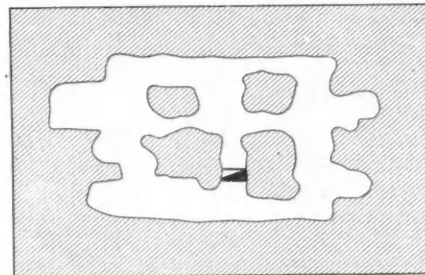
Above the salt, and forming the soil of the island, is a layer of sand and alluvium of varying thickness. The Petite Anse deposit of salt is one of five which have been found near the Gulf coast in Louisiana. All of them have been described by Mr. A. F. Lucas in an admirable paper read before the American Institute of Mining Engineers.* Mining at Petite Anse was carried on extensively for many years, but the workings were flooded because of their proximity to the surface and an insufficient strength of roof. Indian pottery and other relics have been found in the alluvium overlying the salt.

Since the date of Mr. Lucas' visit, the new shaft on Avery's Island has been completed, mining operations carried on, and salt prepared for market and shipped.

*Transactions American Institute Mining Engineers, Vol. XXIX. Pages, 462-474, September, 1899.

This mine presents several novel features. It could be expected by an engineer in "patent leathers," or visited by a lady, without the slightest danger of soiling one's attire. For 40 feet down from the surface the shaft has been close cribbed and the cribbing surrounded by cement so as to ensure the exemption of the mine from water. The cage then descends through 470 feet of solid salt, glistening like crystal in the torch light. Arrived at the bottom, one looks in vain for a pump—none is there.

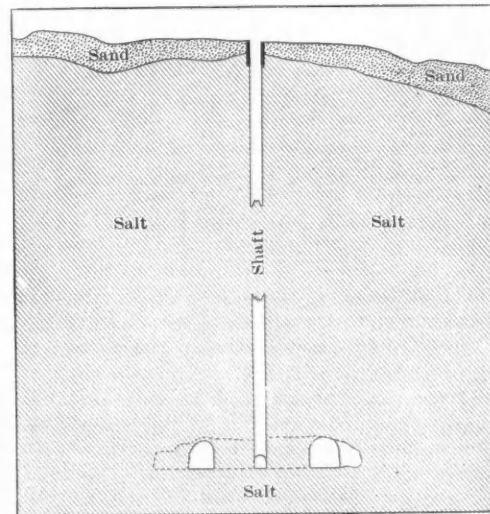
The salt is mined by a simple room and pillar system, about 50 per cent of the deposit being removed and 50 per cent left in pillars for the support of the roof. Galleries about 30 feet wide by 30 feet high were being driven at the time of the writer's visit. Through the courtesy of Mr. E. A. McIlhenny, fig-



PLAN

ures regarding cost of mining, etc., were obtained, and are given as follows: 30 holes bored per round, each hole 9 feet deep. A compressed air auger bores a 9-ft. hole in from 4 to 6 minutes. About 100 lbs. of 40 per cent dynamite (2 boxes), are used to load a round of 30 holes; 65 tons of salt are broken by each round, making the item of explosive cost about 10 cents per ton of salt broken.

Salt is loaded in 2 1/2 ton cars and hauled to shaft by mules, one mule to a car. On the surface the salt



SECTION

passes through a large building much resembling an anthracite breaker, where it is crushed, sized, sacked and loaded on cars for shipment. Every pound of salt mined goes directly to the breaker; for the product is of great purity and absolutely free from foreign matter such as sand, dirt, etc. Negro women are employed to fill the sacks. The total cost of mining and crushing is about 40 cents per ton.

In situ, the salt presents a series of lighter and darker colored bands or strata, somewhat resembling the strata of sedimentary rocks tilted at a high angle. Whether this appearance is a result of aqueous or other action, or was caused by shearing stresses which produced a varying axial arrangement of the halite crystals, the writer is unable to state.

COAL IN INDIA.—The Indian Government has appropriated 52,636 rupees for work in connection with the testing of the coal-bearing area in the Northern Division of the Dandot plateau. Sanction has also been accorded for the reopening of the block account of the Dandot Colliery.

A NEW MEXICAN TARIFF.

On November 1, 1901, the new tariff schedule adopted by the Government of Mexico went into effect. The following list contains the items related to mining and metallurgy, with the new rate of duty on each. The rates are expressed in dollars and cents, Mexican currency, per unit of measurement:

Crucibles of platinum.....	Free.
Tin bars and tin in bulk.....per gross kilogram	\$0.12
Lead in bars or pigs.....do.	0.12
Manufactures of lead, not specified—per legal kilogram	0.08
Lead in sheets and in tubes and pipes, and glaziers' lead per gross kilogram.....	0.05
Steel in bars, round, square, diamond-shaped, semi-circular, octagonal, or hexagonal per gross kilogram	0.05
Steel in cylindrical bars or of octagonal or hexagonal section or T-shaped for mines per gross kilogram	0.01
Plows and their loose parts or repair pieces.....do.	0.01
Axles and axle boxes of iron or steel for carts and carriages.....per gross kilogram	0.10
Ferromanganese containing 25 per cent or more of manganese.....per gross kilogram	0.05
Steel springs for carts and carriages,per gross kilogram	0.10
Posts, crosspieces, and pegs of iron or steel for overhead electrical conductors.....	Free.
Rails, fishplates and bolts, switches, ties, and frogs of iron or steel, for railways.....	Free.
Manufactured articles of tin and of iron, tin plated or nickel plated, wholly or in part, not specified whatever their weight per legal kilogram.....	0.20
Manufactured articles of iron or steel, enameled wholly or in part, not specified whatever may be their weight.....per legal kilogram	0.25
Manufactured articles of steel or iron, not specified, per legal kilogram.....	0.15
Nails, tacks, screws, bolts, nuts and nut caps of iron or steel, and iron or steel braces for construction purposes.....per legal kilogram	0.10
Tanks, cisterns, receptacles, or caldrons, of iron or steel, of more than 2,500 liters (660 gallons) of capacity per gross kilogram.....	0.01
Gauze of steel or iron wire, of all kinds, per gross kilogram.....	0.10
Carbonates of magnesia, baryta, or strontia, per gross kilogram.....	0.03
Emery, pulverized or granulated.....per gross kilogram	0.01
Spars.....do.	0.08
Ocher.....do.	0.07
Black plumbago.....do.	0.05
Paraffin candles.....do.	0.18
Tiles, ridge tiles, and ventilators of earthenware for roofs and clay pipes for drainage purposes, per thousand.....	2.50
Insulators of glass or porcelain for electrical conductors.....	Free.
Natural or artificial alizarin, per gross kilogram.....	0.07
White and colored varnishes.....per legal kilogram	0.20
Bicarbonate of potash and soda.....do.	0.08
Carbonate of potash and soda.....per gross kilogram	0.02
Color ground or in crystals.....do.	0.07
Prepared colors.....do.	0.12
Chloride or hypochlorite of lime, soda, or potash.....do.	0.01
Salts of strontia and baryta, not specified, per legal kilogram.....	0.08
Alkaline sulphates.....per gross kilogram	0.05
Pumps, suction and force, and extra parts of same, per gross kilogram.....	0.01
Globes for incandescent lamps.....per gross kilogram	0.15
Lamps for electric-arc light.....	Free
Wheelbarrows and carts.....per gross kilogram	0.01
Railway cars and coaches of all kinds, and extra parts of same.....	Free
Gears for carriages, stagecoaches, omnibus, and spring wagons, painted or unpainted.....per legal kilogram	0.60
Lubricating oils.....per gross kilogram	0.05
Asbestos packing for machinery.....per gross kilogram	0.04

COAL IMPORTS AND EXPORTS.—Imports and exports of coal and coke in the United States for the 10 months ending October 31 are reported below, in tons:

	Imports		Exports	
	1900.	1901.	1900.	1901.
Anthracite coal..	118	.....	1,394,073	1,768,684
Bituminous coal..	1,531,309	1,568,439	5,178,524	4,634,324
Coke .....	.....	.....	298,704	322,636
Totals	1,531,427	1,568,439	6,871,301	6,725,644

The imports of coal are almost all received on the Pacific coast. This year 1,197,145 tons came from British Columbia and 280,687 tons from Australia.

HEATING CRUCIBLES.—When a laboratory crucible is heated by a Bunsen burner, the temperature attained can be considerably increased by surrounding it with a casing of non-conducting material. Various means have been employed for this object, which can, however, be attained in a very simple manner by employing two cones of thin sheet iron united by their large bases, with asbestos between them, and surrounding the crucible, when the appliance becomes so simple that it can easily be made in any laboratory. In accordance with the experiments made on this furnace, which was devised by M. Albert Bruno, remarked M. Schloessing to the members of the Paris Academy of Science, it has the additional advantage of furnishing in a few instants a higher temperature than do fireclay casings. In two minutes 10 grams of lime carbonate are entirely transformed into quicklime without the aid of a blower.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALY REPORTED.

WASTAGE ALLOWANCE ON IMPORTED ORES SMELTED AND REFINED IN BOND.—Section 29, Act of July 24, 1897, providing for the smelting and refining of ores and metals in bond, and requiring that 90 per cent of the amount of metal smelted or refined that day shall be set aside and exported in order to release said bond, requires that such 90 per cent be of the metal as determined by assay or otherwise, to be contained in the crude bullion or ores prior to such smelting or refining. The purpose of said section is to make due allowance for wastage in the smelting or refining processes and nothing further.

Articles 1074 to 1089 of the *Customs Regulations* of 1899, designed to execute said section 29, are fully within purview thereof and comply with the intention of Congress therein, work no hardship or loss in so doing, and are valid.—Appeal of Guggenheim Smelting Company from Collector of Customs at Perth Amboy, N. J.; Board of General Appraisers.

ABSTRACTS OF OFFICIAL REPORTS

Center Star Mining Company, British Columbia.

This company owns a large property near Rossland. The capital stock is \$3,500,000. The report for the year ending September 30, 1901, shows net proceeds from ore sales, \$694,644; transfer fees, \$269; total receipts, \$694,913. The mining, development and general expenses were \$313,772, leaving a profit of \$381,141. To this is to be added \$50,000 profit on capital stock sold, making a total of \$431,141. Charges against this included \$175,000 for dividends paid—being 5 per cent on stock—\$182,122 debit balance from previous year, and \$13,890 provincial ore tax; a total of \$371,912, leaving a balance of \$60,129 forward to the current year.

The total ore mined was 72,645 tons, of which 68,123 tons were from the stopes, and 4,522 tons taken out in development work. Ore sales were 80,419 tons, including 7,774 tons on hand at the beginning of the year. The statement of values and charges is as follows:

	Total.	Per ton.
Full assay value at N. Y. prices of metals	\$1,457,479	\$18.12
Indirect charges, difference between N. Y. and smelters' prices.....	280,320	3.48
Smelters' gross assay value.....	\$1,177,159	\$14.64
Direct smelting charge, inc. freight.....	482,515	6.00
Smelters' net returns.....	\$694,644	\$8.64

Manager Edmund B. Kirby's report says: "The Center Star main ore-shoot is located in the 510-ft. space between the shaft and the Le Roi line on the west. In the upper levels the shoot has a dimension of about 300 feet along the vein, and shows a continuous body of pay ore extending from the surface down to a limit between the second and third levels, where it is changed into barren material or low grade ore. Between the third and fourth levels this again changes into pay ore, broken and separated by faults into three distinct ore bodies. At their intersection by the fourth level these bodies averaged \$12, smelters' gross assay value, but as their stopes rose in the block one body terminated, the second now shows signs of reaching its upper limit, and the third changed to an average grade of \$10, smelters' gross assay value. Between the fourth and fifth levels one of the ore-bodies extends half way down with an indicated grade of about \$12.80 smelters' gross assay value. Another evidently extends through the block to the fifth level, with an indicated grade of about \$9.30, smelters' gross value. The downward extension of the third body is unknown, but it terminates in the block, and does not reach the fifth level. The sixth level has covered only part of the distance between the shaft and the Le Roi line. It has been driven by a heading from the Le Roi workings in addition to that from the shaft and the unfinished distance between them is 270 feet. The vein so far as tested by this level is low grade or barren, but it is still possible that pay ore may exist in this unex-

plored portion. The shaft has reached the seventh level point at a depth of 927 feet.

"The vein and the variations of the ore-shoot are upon so large a scale that the conditions hitherto disclosed in the fifth and sixth levels are far from decisive in indicating the future chances of the mine. They may be due either to a large gap between the pay ore-bodies of the shoot or to the fact that the latter has taken an eastward trend so as to throw its downward continuation into the unknown ground east of the shaft. This territory, extending 1,040 feet east, is unexplored; the eastward extensions of the levels being as follows: Second level, 850 feet; third, 640 feet; fourth, 340 feet; fifth, 170 feet; sixth, 100 feet. The sixth level east which is intended to open up the entire distance is just under way. It is in the faulted ground, and has not yet reached the vein beyond.

"The ore sales during the year are 80,419 tons, averaging \$14.64, smelters' gross assay value. The average assay contents were: Gold, 0.663 ounce; silver, 0.38 ounce; copper, 1.30 per cent. The present mine ore reserves are estimated at about 44,000 tons, with an average smelters' gross assay value of \$15. If, as is probable, the fourth level second ore-body extends through to the fifth level and the third body continues 50 feet above its present back, these indicated extensions would contain about 20,000 tons, with an average smelters' gross assay value of \$9.50. The unknown downward extension of the third body will make some addition to this.

"The work of the mine progressed without interruption up to July 12, 1901, when it was suspended by a strike which is still in progress. The mining of the year was therefore limited to about 9½ months. During this period under the contract system and with the completed equipment the costs of work were reduced to a much lower figure than has hitherto been reached in this district. Excluding the storage ore sold and taking only the ore mined, the costs per ton, including general expenses and development, were \$2.09 for ore production and \$1.44 for development, a total of \$3.53 per ton of ore mined. On May 8, 1901, the smelting works of the Le Roi Mining Company, at Northport, Washington, became involved in labor troubles, and were closed by a strike. Operations were gradually resumed with a non-union force, but eventually the mines at Rossland were brought into the conflict through a sympathetic strike, which was begun July 12, and was declared to be for the purpose of aiding the Northport Union. The companies were further notified that the occasion was taken to demand an increase of wages for muckers and trammers, together with the adjustment of other grievances not specified, a reduction of hours, for carpenters, together with increased pay for overtime, reduced hours for blacksmiths, and a raise of wages for blacksmiths' helpers. The Center Star and War Eagle mines were included in the strike and have remained closed. The Le Roi and allied companies have gradually accumulated a non-union force, which is now at work. The strikers, now entirely defeated, are already disintegrating, and the Center Star Mine will soon resume operations.

"It is evident that the great scale of the vein and the comparatively small area explored makes it necessary to develop on the same large scale, and to place this development far in advance. In order to attain this end the ore reserves should for the present be applied only to clear off the small indebtedness remaining and to carry on this development. I must, therefore, advise that the ore production be limited to a rate sufficient for these purposes. Dividends must evidently be deferred until the new explorations expose ore faster than it is extracted."

IRON ORE EXPORTS.—Exports of iron ore from the United States for the 10 months ending October 31 are reported at 60,534 tons, against 46,846 tons for the corresponding period in 1900; showing an increase of 13,688 tons this year. This increase was chiefly in exports to Canada.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Catalogue of Canadian Birds. Part I. Prepared by John Macoun for the Geological Survey of Canada. Ottawa, Canada; Public Printer. Pages, 218.

Russia. Bulletin of Financial Statistics and of Legislation. Second Series. First year, 1901. St. Petersburg; printed by V. Kirschbaum. Pages, 558.

Riqueza Mineral de la Republica de Colombia. By Fortunato Pereira Gamba, Engineer of Mines. Bogota, Colombia; published by *La Cronica*. Pages, 256.

Annual Statistical Report of the American Iron and Steel Association. By James M. Swank, general manager. Philadelphia; published by the Association. Pages, 72.

Industrial Chronology of the Commonwealth of Massachusetts. 1901. By Horace G. Wadlin, Chief of the Bureau of Statistics of Labor. Boston; State Printers. Pages, 38.

Tables of the Trade and Navigation of the Dominion of Canada. Fiscal Year Ending June 30, 1901. Compiled from Official Sources. Ottawa, Canada; Public Printer. Pages, 540.

Kalendar fur Electrochemiker Sowie Technische Chemiker und Physiker. 1902; Fourth year. Prepared by Dr. A. Neuburger. Pages, 576; with Supplement of 448 pages. Berlin, Germany; M. Krayn. Price (in New York), \$1.50.

NEW PUBLICATIONS.

Annual Report of the Mine Inspector for Indian Territory for the Year Ending June 30, 1901. Luke W. Bryan, Inspector. Washington; Government Printer. Pages, 84; illustrated.

The coal mines of the Indian Territory are mainly owned or controlled by the railroads running through the territory. They have attained considerable importance, as the product during the year under review reached a total of 2,391,688 short tons, an increase of 491,561 tons over the previous year. The output of these mines is largely used by the railroads, which control them, but a considerable quantity of the coal goes to Texas, Arizona and Mexico. The number of accidents was considerable, and the mine inspector's work has not been light. The report contains many interesting particulars in relation to the various collieries, and is illustrated by reproductions of photographs showing different mines and their plants.

American Mines Annual. Compiled by George E. Vigouroux. New York; George E. Vigouroux & Company. Pages, 196. Price, \$5.

The necessity for a reliable directory of mines and mining companies is generally admitted, and does not require any restatement. In this case an effort has been made to supply the want in the case of metal companies, at least of those mining for gold, silver, copper, lead and zinc—iron mining companies not being included. The work of preparing a list of the companies included under the heads given is a large one, and it would be unjust to enter into a detailed criticism of its correctness without more careful examination and comparison than time has yet permitted. There are, however, certain points which a preliminary examination shows. The information given is exceedingly limited, being confined usually to the name and address of the company, a brief list of officers and the amount of capital stock. In many cases only name and location are given. The reader is not even informed whether the companies named are operating gold, silver, copper, lead or zinc propositions. An unnecessary economy of space—considering the price charged for the book—is exercised, the names of the companies being so much abbreviated that it would be difficult for the ordinary reader to interpret them. No discrimination has been

exercised, apparently, and there is nothing in the directory to show whether many of the companies named own any property or not. Upon the whole, we think that there is room for a great deal of improvement in the second edition of this *Annual*.

Annual Statistical Report of the American Iron and Steel Association. James M. Swank, General Manager. Philadelphia; the American Iron and Steel Association. Pages, 72. Price, \$3.

The statistical work of the American Iron and Steel Association has been so admirably done under the charge of its general manager that its annual report leaves no point where criticism can fairly be made. Mr. Swank's long experience in the iron trade and his mastery of its statistics have enabled him to present in clear and concise form the figures which show its progress during the year. In no other country are the figures of iron production and consumption so fully given; and there is little or nothing in relation to iron and steel production for which the figures cannot be found in this report.

In addition to the report itself, the book contains the interesting paper on "Iron and Steel at the Close of the Nineteenth Century," prepared by Mr. Swank for the *Annual Report* of the United States Geological Survey. In addition to the statistical figures, this paper contains a condensed historical summary of the progress of the iron trade in the United States—a subject of which no one is more competent to write than the author.

Recherches Minieres—Guide Pratique de Prospection et de Reconnaissance des Gisements. By Felix Colomer. Paris, France; Veuve Ch. Dunod. Pages, 272; illustrated. Price (in New York), \$2.75.

The object of this book, as defined by the author in his preface, is as follows: "It is superfluous to insist upon the influence which properly conducted explorations will have in facilitating the formation of mining companies. More than one concern has failed for want of sufficient studies before its formation. It is for this reason that we have endeavored to give, for the benefit of capitalists and engineers, some advice on the prospecting of a deposit, and on the more important indications directing exploration work by shafts, tunnels or borings."

The work is divided into three parts. In the first, on the study of surface indications, the author gives in condensed form the geological and mineralogical definitions most necessary for prospectors. He also treats at some length on the most approved methods of sampling and testing outcroppings. The second part relates to the methods of examining deposits by boring. Detailed notes are given on the methods of drilling, the accidents liable to occur in boring, the cost of boring, the advantages and the disadvantages connected with this class of operations. The third part considers topographical and general indications, and the use of photography in connection with local surveys. It also defines the principal minerals and the commercial and industrial value. In conclusion, it gives the ordinary methods for estimating the richness of a deposit. The object of the book is a good one, and it has the merit of being more practical and less theoretical than most French works of its class.

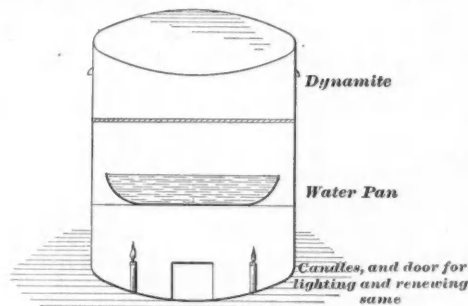
CORRESPONDENCE.

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

Thawing Dynamite.

Sir: We notice the inquiry made by W. M., in your issue of November 9, for a device for thawing dynamite. Thinking that our simple method may interest him, we send herewith a sketch of the heater we have made and now in use in our mine. We use a large lard or coal-oil can, which should

be fitted with a good tight cover. The can is divided into three compartments, about equal in size, by two sets of strong wires stretched across the can, crossing each other and forming gratings or shelves. A door is cut in the bottom of the can large enough to admit the hands easily. The top set of wires holds the frozen dynamite, and the lower set holds a pan partly filled with water. Two or more candles are placed on the bottom of the can. The heat from these lighted candles acting on the bottom of the water pan soon produces steam enough in the upper chamber to thaw the dynamite gradually. When the dynamite is thawed, the candles may be extinguished; and if the top of the heater is kept closed, we generally find the dynamite soft enough for use at any time during the day.



DEVICE FOR THAWING DYNAMITE.

We are using one of these devices at our mine, and find it very economical, as well as safe and practical.

THE CRYSTAL GRAPHITE COMPANY,
N. V. SMITH, Treasurer
Kansas City, Mo., Nov. 25, 1901.

An Opportunity for Metallurgical Analysts.

Sir: The writer recently had an opportunity to compare analytical results made by several chemists on a sample of slag. The lack of uniformity was startling, to say the least. Nothing like concordant results was obtained and some of the analysts were among the best known in the country. One cannot believe that our standard methods of analysis are at fault, but rather that the difficulty lies with the details of execution. The Association of Official Agricultural Chemists sends out every year samples of various products with directions for analysis. The samples are sent to whoever desires them and the results in some cases are far from correct. This is particularly true in the case of soils and ash, the various constituents of which are such as are found in ordinary metallurgical products. New works on quantitative analysis are almost a daily infliction and it is needless to say that 99 per cent of them are uncalled for. One author goes so far as to add sulphuric acid to the solution remaining in the beaker after decanting a barium sulphate precipitate of a sulphur estimation. Others recommend manipulations equally foolish. Too many students now use these books because the author believes he has simplified Fresenius. I venture to say that if the works of Fresenius and Sutton were used to the exclusion of all others in beginning quantitative analysis a better chemist would result. These works are classics, the language is so simple that any attempt to make them clearer results in confusion. The foundation for future accuracy is laid in using standard works and not in little text books. This does not, of course, apply to works on one subject, such, for instance, as gas analysis. The results from using rehashed text-books is only intensified by the employment of graduate students as instructors. Many of them follow the book closely and thus double the probability of error. The student becomes a works chemist and carries the erroneous ideas with him. Further than this, with no one to correct him, his results are constantly in error.

It seems to the writer than much good could be derived from a large number of analyses of the same

substance. The individual who considers his work without appreciable error might discover that all do not agree with him. The scheme has been tried on one or two constituents, but not to my knowledge on a complete analysis of a metallurgical product. The idea is not to test new methods, but to test the accuracy of individuals.

Through the kindness of the management of the Ducktown Sulphur, Copper and Iron Company, I am enabled to send to every chemist or assayer, who will so request, a sample of copper slag. A complete analysis using ordinary laboratory methods is to be made by the applicant as soon after receipt as convenient and results to be reported back to me to be published in this journal with such comments as are called for. Only such chemists as secure comparative results would be published by name, all others by number. This would avoid any embarrassment from lack of concordant results. The sample is such as is produced by the ordinary smelting of copper ores and is chilled in water. Every constituent present is usually met with in metallurgical products. The writer does not propose to let the matter drop with a simple tabulation of results, but will endeavor to discover the cause of discrepancies and remedy the same. Address all communications and requests to the undersigned.

THORN SMITH,
Chemist Ducktown Sulphur, Copper
and Iron Company, Limited.
Isabella, Tenn., Nov. 27, 1901.

The Institution of Mining and Metallurgy of London.

Sir: With reference to the article on the Institution of Mining and Metallurgy of London, which appeared in your issue of November 9, several members, wish me to point out that the remarks made in the article as to the rules of admission do not convey a correct idea. The article said: "The policy of the Council has always been to make admission to membership some index of the standing of the individual, and applicants have to pass a severe scrutiny into their abilities and personal character." One of the members of the Council now says that "The qualification test is not exacting, and there is no idea at all that being a member is equivalent to a 'hall-mark' of absolute reliability and good judgment"; and that "the one great desire of the Council is to have a large membership, and there is not the least wish to exclude any man who can meet the requirements of the by-laws." These by-laws provide that "every candidate for admission into the class of members shall be not less than 30 years of age and shall have been for at least five years in a responsible position with regard to, and shall be at the time of his candidature occupied in, practical mining or metallurgical work; or, he shall prove to the satisfaction of the Council that he is a fit and proper person, by reason of his attainments, to become a member; every candidate for admission into the class of associates shall be not less than 25 years of age, and shall at the time of his candidature be engaged in practical mining or metallurgical pursuits, and shall have been so engaged for a period of two years, if he shall have obtained the degree of associate of a recognized school of mines; and if not, for a period of not less than three years. Students shall be persons not under 18 years of age, who intend to adopt the profession of a mining engineer or metallurgist."

The views of these members are, therefore, at divergence from those expressed by the writer of the article. In making further inquiries on the matter, however, it is found that the publicly expressed statements of the president of the Institution, Mr. C. Algernon Moreing, do not coincide with these views and that the writer of the article took Mr. Moreing's statements as his text. At the annual dinner of the Institution on October 19, Mr. Moreing is reported by the *London Mining Journal* to have said:

"We have, as you know, a very strict professional qualification test, and instead of relaxing in any way this test, the Council from year to year have been more stringent in enforcing the regulations of that

test which we find in our by-laws, and it is most satisfactory to find that its enforcement of the qualification test has not been a bar to the increase of our numbers, as was sometimes feared it would be, but that the most eminent mining men from every quarter of the globe eagerly seek admission to this institution, and appreciate more and more every year the diploma which we confer upon them. The object of the founders of this institution was to give a 'hall-mark,' as it were, to qualified mining engineers by which they might be distinguished from the so-called eminent mining expert of the early Victorian era. I think I may say now, whenever the public see an eminent expert referred to in a mining prospectus, that they should look him up in the list of our members, and if he does not appear there, the odds are very great that he is not a qualified engineer, that he is not eminent, and that further inquiries are necessary."

These two views are so entirely divergent that some further information on the subject seems to be called for.

Some members of the Institution also object to the remark in the article that with such a severe test of admission as Mr. Moreing indicates, a more independent committee than the present Council should be examiners for admission, as many of them are not only experts, but mine and market operators and their disinterestedness might not always be free from doubt. It should be said that the expression "mine and market operators" does not mean market riggers and share-pushers. The fact is, however, that many of the members of the Council are members of firms or directors of companies which introduce mining properties to the attention of moneyed men and to the public, and they are extensive employers of mining men prospectors, metallurgists, etc. To such men it would be distasteful to sit on a committee of admission, if the objects of the Institution are as Mr. Moreing indicated. The public which does not know the members of the Council might not be convinced of their disinterestedness, though every one who knows them personally, as the writer of the article does, knows quite well that no considerations, except the actual rules of the Institution would influence their minds. These statements should remove some misconceptions as to the object of the article which seems to have crept into the minds of members.

THE WRITER OF THE ARTICLE.

London, Nov. 27, 1901.

(We should be pleased to receive communications on this question from any members of the Institution.—EDITOR E. & M. J.)

QUESTIONS AND ANSWERS

(Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert. Nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preferences will, of course, always be given to questions submitted by subscribers. Books referred to in this column can be obtained from the Book Department of the ENGINEERING AND MINING JOURNAL.)

Nickel Refining.—Where is nickel refined abroad, in England, France and Germany? Also in the United States?—M. N.

Answer.—Nickel is refined in England by the Vivians at Swansea, Wales; also by the Mond Nickel Company, which has its headquarters in London. In France the Societ  Le Nickel has works near Havre. In Germany the chief concern is Base & Selve, at Altona. In the United States the refiners are the Orford Copper Company, of New York, which has works at Constable's Hook, N. J.; the Canadian Copper Company, with works at Cleveland, Ohio; and Joseph Wharton, whose works are at Camden, N. J.

Vanadium.—For what is vanadium used, and in what form must it be placed for market? We have a quantity of it in crystalline form; we note that you quote it at \$1.19 per gram.—T. J.

Answer.—The vanadium quoted at the above price is metallic vanadium and there is little or no demand for it. There is some vanadic acid used in dyeing, and a small quantity in making ferro-vanadium, which is employed in making certain grades of steel. Your crystals are probably vanadic acid, an oxide of the metal, as it is not found anywhere in nature in metallic form. The demand for it in any form is not large enough to warrant any extensive prospecting for the ores.

Magnalium.—Kindly inform me with regard to constituents, uses and properties of the alloy "magnalium."—F. W. M.

Answer. Magnalium is an alloy of aluminum and magnesium, containing from 75 to 90 per cent of the former and from 10 to 25 per cent of the latter. Its color ranges from tin white through a blue white to brass yellow, according to the percentage of magnesium. The alloy is harder than aluminum, takes a fine polish, is not affected by exposure to the air, and can be worked as readily as brass. It has a lower specific gravity than aluminum alone, as the magnesium is lighter in weight. Its chief use will probably be in the manufacture of scientific instruments, where lightness and hardness are desired.

Charcoal in Matte Smelting.—What would be the probable efficiency in matte smelting of good mesquite charcoal, as compared with average coke, weight for weight?—T. D.

Answer.—The question of the relative efficiency of charcoal and coke was fully discussed in the ENGINEERING AND MINING JOURNAL, May 4, 1901, page 565. The comparative efficiency depends upon many circumstances, such as the nature of the ores, character of the charcoal, etc. In one case there quoted actual experiment showed that the proportion of charcoal employed varied from 12 to 20 per cent of the weight of the charge. In this case the charcoal was of fair quality only. The article above referred to will give you full particulars.

Lead Molybdate.—Who will buy lead molybdate, and what is the value if concentrated from a quartz gangue? I have in mind a large body of tailings carrying a small percentage of wulfenite. The conditions are such that it can be concentrated at very low cost—the tailings carry some gold and silver also. The point between profit and loss lies in the value of the molybdate. Can it be better prepared for the market than to make a fairly clean concentrate?—W. E. H.

Answer.—The only buyers of wulfenite in the United States are two firms which manufacture molybdenum and ferro-molybdenum. Their addresses are given in our advertising columns. The demand for molybdenum ores is necessarily a limited one, and any large addition to the supply could not be marketed at all; and would also probably break down prices. There is a small demand for lead molybdate also for chemical uses, but it is not sufficient to affect the market.

Raw Coal for Smelting Iron.—Can you inform me if coal of the following analysis and which does not coke, could be used for smelting iron ores (hematite). Moisture, 4.36 per cent; volatile matter, 33.56; fixed carbon, 50.84; ash, 9.14; sulphur, trace. The coal is hard and firm.—G. D. W.

Answer.—The coal of the Hocking Valley District in Ohio is somewhat similar in chemical composition to that given above. Twenty years ago Hocking Valley coal was used to a considerable extent for blast furnace use. It also is not a coking coal. With the development of the coking industry ironmasters in Ohio found it more profitable to use coke and the use of raw coal has been discontinued. It is still used to some extent however in Scotland. It is highly probable that this particular coal could be used for blast furnace purposes, especially if good coke is not cheaply available.

THE NEW CYCLONE PULVERIZER.

The accompanying illustrations show a new form of pulverizer and disintegrator which is being introduced in this country by E. H. Stroud & Company, of Chicago, as agents for the Central Cyclone Company, of London, England. These machines, it is claimed, are especially adapted for work where fine grinding and uniform work are required, and will do especially good work on such substances as coal, coke, cement, gypsum, graphite and the like. Fig. 1 in an outside view of the pulverizer, while Fig. 2 shows the disintegrator with

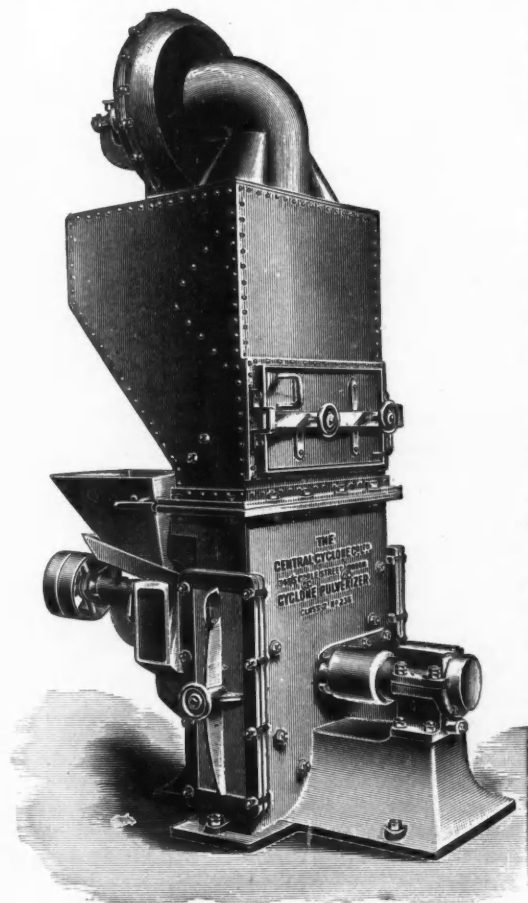


FIG. 1.—CYCLONE PULVERIZER.

the cover raised to illustrate the construction of the machine. It is stated that the pulverizers can be set to make any particular fineness of powder and the machines will not only grind the material, but will also automatically separate the ground product and deliver only such a uniformly fine powder that between 90 and 95 per cent of it will pass through the mesh desired. No sieves or screens are used in this machine. If it is desired to change the product and to set the mill upon another grade of fineness it can be done in a minute.

The pulverizer is of the attrition type, the work effected being due to the high velocity attained by the rotating star or mill wheel. The beater arms drive the material round at an enormous speed, and beat it between themselves and against serrated plates of hardened metal (especially made for this mill) with which the sides and periphery of the mill are lined, until it becomes small enough to fall through the screen or grating of a disintegrator, or to be carried off by the air current in a pulverizer, as the case may be. An important factor in the construction of all machines of high velocity is that of safety, and the rotating star, or mill wheel is in the case of these mills obviously subjected to a high centrifugal stress; but to eliminate any possibility of accident the design is so carried out that the stress per square inch does not exceed 1.5 tons when the maximum load is applied.

An important feature of the machine is the rotating star—shown in Fig. 2—which is composed

of a spindle or axle of mild steel carrying a cast steel boss into which beater arms made of a special steel are keyed. These grinding arms are the parts of the machine most liable to wear, and consequently renewals are from time to time necessary. The renewals are simply effected by disengaging the cotters which secure the arms, and it is done in a few minutes without unshipping the mill. The speed of these machines varies from 4,000 revolutions per minute in the smallest size to 1,200 in the largest size, and the destructive velocity attained is from 15,000 to 19,000 feet per minute.

The cyclone pulverizer is especially adapted for the reduction of solids to an impalpable condition and grading them at the same operation without the use of any graders, sieves, meshes, etc. The machine offers special facilities for a dustless system, the air generated by the exhauster returning through the truncated spout into the machine, where a strong induced suction facilitates the circulation, and this keeps the mill and its product cool.

The principal of the separation hood will be easily understood. The grist is flung up within range of the exhauster, which sucks away all particles of the required size or weight, the residue falling back upon the incline and into the mill for further reduction. This process is continuous, and the high suction draft induced by the rotating star keeps all passages clean, and, to a large extent mitigates objectionable clogging with damp substances. The exhauster discharges into any suitable chamber or collector.

In designing these machines especial attention has been given to the bearings, a necessary point in machines intended to work at high speeds. The two machines work on the same principle, but the disintegrator discharges through a grating or screen in the bottom of the mill, while the pulverizer is provided with a separation hood and an ex-

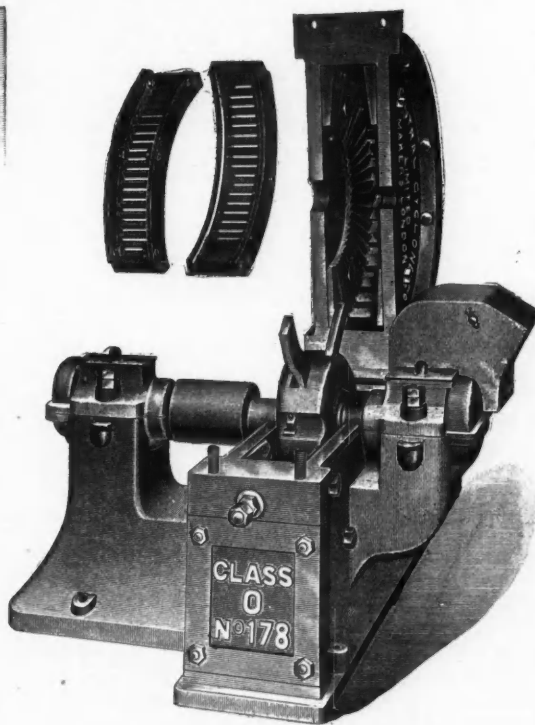


FIG. 2.—CYCLONE DISINTEGRATOR.

hauster, the fine particles being separated and carried off by the air current, when reduced to the required size.

PEAT IN GERMANY.—It is stated that the turf or peat beds of the German Empire cover an area of 4,942,000 acres, and it has been deemed a reproach to German science that with such a wealth of material the people should suffer for want of fuel. Great progress has been made in the manufacture and use of briquettes from brown coal or lignite, held to-

gether by a matrix of bitumen, either developed in the material itself by heating, or added as a by-product of gas and coke manufacture.

TESTS OF STEAM-PIPE COVERINGS.

We are indebted to Mr. George H. Barrus for a very full report on tests of steam-pipe coverings made by him at the Manhattan Railway power-house in New York recently. As the efficiency of such coverings is of much importance to all mills and mines using steam power, we give the substance of the report below:

These pipe-covering tests were planned with the object of ascertaining the efficiency, both comparatively and absolutely, of some of the leading coverings as ordinarily manufactured, sold and applied.

A few statements may be made regarding the general scheme of installation, the method of test and the leading results so far as yet worked out. First, as to the arrangement of the testing plant: It is divided into two sections, one for coverings designed to stand the highest pressures which are now regularly carried by the modern power plants, say 150 pounds per square inch, and the other for lower pressures such as have been in vogue for many years past, say 80 pounds. Many of the coverings have been tested day after day for a period of a month, and every one has been subjected to at least three days' run from 8 to 9 hours continuous test each day. The size of pipe selected for the leading tests is the ordinary standard 2-in. steam pipe, and the length selected, 100 feet for each pipe. That the effect of size of pipe on the results might be studied and exhibited, and at the same time the work brought into line with the practice of high-pressure power plants, especially as regards much of the engine and boiler room piping, two 10-in. pipes each 35 feet in length form a part of the 150-lb. section of the apparatus.

The 2-in. pipes in the 80-lb. section of the plant are numbered for reference 1, 2, 3, 4 and 5. The 2-in. pipes in the 150-lb. section are designated 6, 7, 8, 9 and 10; and the 10-in. pipes are numbered 11 and 12. To facilitate the handling of the apparatus and the ready collection and measurement of the water of condensation discharged from the pipes, the steam is first supplied to a central point on one of the long sides of a rectangular room, about 130 feet long and 22 feet wide, and the various pipes lead from this point outward to the two ends of the room and thence after turning they are brought back to points near the center where the various collecting casks and weighing scales are conveniently located. Although the pipes in each section set out from the same point, or rather from points in line with each other above the header, they do not arrive at their destinations of discharge in a similar line with each other, because in making the turn and return at the end of the room the outside pipes have the longer distance to cover.

The main object so far as the getting of the principal data is concerned is to properly secure and measure the water formed by condensation of the steam in the pipes. Precautions must be taken first to insure a supply of steam to the pipes free from water at the start—in other words, dry steam; second, suitable inclination or pitch of the pipes to insure the drainage of all the water formed by condensation to the drip-ends or the joints where it is discharged into the collecting casks; third, the thorough venting of the drip-ends of the pipes to prevent the collection of air in the interior, and fourth, the proper collection and measurement of all the water discharged. To secure dry steam at the start, the steam from the boiler first enters the central separator, which is merely a vertical 6-in. pipe, drained at the bottom by a steam trap, the steam entering through a 2-in. pipe at the top which descends inside about 18 inches; the steam, freed of its water, passing off at the two side branches, which are each of the 2-in. size. Before entering either header the steam passes through another separator, which is

likewise a 6-in. vertical pipe, drained at the bottom by a $\frac{3}{4}$ -in. valve, the entering steam likewise descending through a 2-in. pipe a distance of about 18 inches, and the dried steam passing off at the side into the end of the 6-in. header. As a further precaution the outer or dead end of either header is drained by a $\frac{3}{4}$ -in. pipe, connecting into the main drain pipe above the valve, and attached to the vertical portion of this pipe is a glass gauge to reveal to the eye any collection of water inside. Beyond all this, a steam calorimeter is attached to the side of either header, the sampling pipe of which draws from the center of the interior space. Starting with dry steam in the headers, which are protected by hair felt and canvas, a supply of dry steam to the pipes is secured by connecting to the top of the header and taking the steam in each case through a 2-in. angle-valve. The proper drainage of the water formed by condensation in the test pipes is secured by pitching them from the inlet end to the discharge end. The 2-in. pipes have a total drop from one end to the other of 16 inches. The 10-in. pipes have a total drop of 6 inches.

The venting of air is secured by the attachment of a $\frac{1}{4}$ -in. air pipe to each drip-end, at a point about $\frac{1}{2}$ in. above the line of the bottom of the pipe inside. The drip-end of each test-pipe is provided with a vertical drain pipe of the $\frac{1}{2}$ -in. size, provided at the bottom with a $\frac{1}{2}$ -in. globe valve. Attached to the pipe above this valve is a glass water gauge. By means of this glass gauge a knowledge is had of the exact state of the water condensed in the pipe, and by suitable regulation of the discharge valve the water can be kept drawn down continuously to the desired mark, and all the water discharged to the weighing cask as fast as it collects. To facilitate the easy regulation of the discharge water, a second discharge pipe of the $\frac{1}{8}$ -in. size is attached to the drip end of the lower gauge fitting, and this is provided with a $\frac{1}{8}$ -in. globe valve. The main dependence for the discharge of water into the casks is placed upon this pipe, and its outlet descends to within 6 inches of the bottom. That all the water discharged under the pressure to which it is subjected in the test-pipe may be recovered without loss of evaporation when the pressure is relieved, the cask is partly filled with cold water at the beginning of a test, and the highly heated water is quickly cooled. Each cask rests on an independent platform scale, which reads to $\frac{1}{4}$ lbs., and the rate of condensation in the pipe by any interval of time, such as a half hour, or an hour, is the increase of weight shown on the scales for that period of time. It will be observed that a considerable blow of steam occurs from the vent pipes. This is steam in every case, and not water of condensation from the test pipe, and it insures the complete ventilation, so to speak, of the interior.

The coverings themselves were bought in open market, and intended to be samples of the coverings which are ordinarily supplied by the various manufacturers in the ordinary course of business. They were applied by workmen familiar with the application of pipe coverings, under intelligent supervision, and well butted, jointed and secured. During the progress of the tests they have been frequently pointed up with cement where the joints through continued service have become defective, the same as would be done by the repair force having the care of a steam plant in commercial service, which is well kept up. Before the conclusion of the tests opportunity was given the representatives of each covering to visit the plant, examine his goods, criticize their application and where defective, correct the defects. It may be said, here, that where such defects have been found and corrected no appreciable improvement was produced, thus showing that the coverings were already well applied.

In planning the tests of the 80-lb. section of coverings two methods have been pursued. The four pipes, No. 2, 3, 4 and 5, have been tested with four different coverings, each of which has been in use without removal during the entire time of the tests, which commenced September 27. With the exception of one week, these coverings have been under test 8 to 9 hours per day, each day of the week throughout.

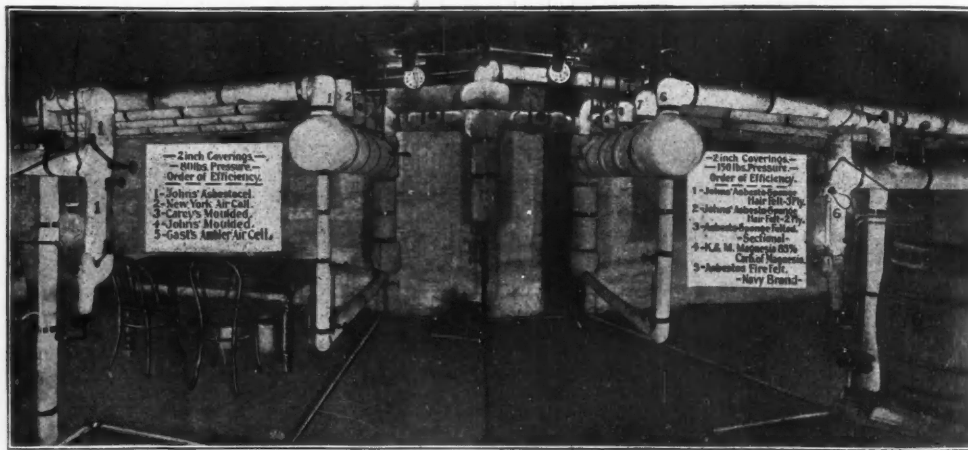
On the contrary, No. 1 pipe has been used for testing the same class of coverings, and one or two in addition, for shorter periods. First, the same class of covering as that on No. 5 pipe has been applied to No. 1 pipe and tested about a week. Then the same class of covering as that on No. 4 has been substituted and tested the second week; then the same as No. 3 the third week, and so on; thereby applying one by one the various coverings to the same pipe, and so far as attainable subjecting it to the same surrounding conditions. To a limited extent the same system has been followed on the 150-lb. section of 2-in. pipes; the endeavor being to obtain sufficient data to enable a reliable conclusion to be drawn regarding the effect of all differences of condition.

The tests started each morning with pipes empty and pipes and coverings cold. A period of $1\frac{1}{2}$ hours has usually sufficed to thoroughly heat the coverings, and after that time for 7 to $7\frac{1}{2}$ hours uniform conditions as to rate of condensation have prevailed. At the end of the day's run, the steam has been shut off from the headers, the pressure allowed to fall, and just before the pressure reaches zero the $\frac{1}{8}$ -in. drips are blown out and the water remaining in the pipes drained into pails through the $\frac{1}{2}$ -in. valves; the pails being subsequently emptied into the casks.

ends and with no circulation of steam through the pipe except that required to supply the loss by condensation, and the small amount escaping at the air vent, in no case being in excess $\frac{1}{2}$ horse-power of steam for any one of either the 2-in. or of the 10-in. pipes. To determine whether this method of test is applicable to the ordinary conditions of service where steam is moving through the pipe at a far greater velocity, pipes Nos. 1 and 6 were fitted at their drip-ends with steam discharge pipes arranged so as to obtain any desired current through the pipe without carrying away with the steam discharged any of the water condensed. The amount discharged was determined by passing the steam through a horizontal orifice $\frac{1}{2}$ -in. in diameter, and maintaining above it a pressure of about 15 lbs. by the gauge. This makes a current through pipe No. 1, having a velocity of about 18 ft. per second. It was found as a result of tests made first with no current, and then with the steam moving at the velocity mentioned, that the rate of condensation was unaffected, being the same with moving steam as it was with comparatively dead steam, and this was true whether the pipes were covered or bare.

The order of efficiency shown is tabulated as follows:

For 2-in. coverings, 80-lbs. pressure: 1, Johns' As-



APPARATUS FOR TESTS OF PIPE COVERINGS.

All the water resulting from the preliminary heating of the pipes and coverings and the draining of the apparatus at the end is collected and weighed in the casks, in addition to that condensed during the period of normal conditions. Half-hourly observations are made of the weight on each scale, so that the condensation due to the preliminary heating can be separately determined, and the record of the test ascertained for any smaller period desired than the whole day's run. The temperature of the air surrounding the pipes is shown by thermometers in japanned cases, which are suspended 24 inches below the coverings, and distributed in various parts of the room; and the condition of the air as regards humidity is shown by wet and dry bulb thermometers. The pressure in each of the two sections of the apparatus is shown by the gauges attached near each header, and the temperature of the steam by two thermometers placed in wells which are sunk within. The temperature of the water discharged from the pipes is shown by thermometers in No. 1 and 6 discharge pipes. The temperature of the outside surface of the coverings has been found by laying the bulb of a thermometer alongside the covering and protecting it from outside influence by a thick layer of hair felt tied on. Pans of water well protected by hair felt have also been used, encircling the upper half of the pipe, and their temperature taken. The presence or absence of air currents about the pipes has been frequently tested by using a delicate anemometer, pointed in various directions; but as a result of these observations no current has at any time been found of sufficient force to move the fan in the least. These tests have, as a rule, been made with pipe having dead

bestocel. 2. New York Air Cell. 3. Carey's Moulded. 4. Johns' Moulded. 5. Gast's Ambler Air Cell.

For 2-in. coverings, 150 lbs. pressure: 1. Johns' Asbesto-sponge Hair Felt, 3-ply. 2. Johns' Asbesto-sponge Hair Felt, 2-ply. 3. Asbesto-sponge Felted (sectional). 4. K. & M. Magnesia (85 per cent carbonate of magnesia). 5. Asbestos Fire Felt (Navy brand).

For 10-in. coverings, 150-lbs. pressure: 1. Johns' Asbesto-sponge Felted. 2. K. & M. Magnesia (85 per cent carbonate of magnesia). 3. Asbestos Fire Felt (Navy brand). 4. Watson's Imperial.

The minimum and maximum rates of condensation per hour for each of the coverings tested was as follows:

For 2-in. coverings, 80-lbs. pressure, length of test pipes 100 ft.: Johns' Asbestocel, from minimum, 13.46 to maximum 14.07. New York Air Cell, 13.88 to 14.14. Carey's Moulded, 14.18 to 15. Johns' Moulded, 14.15 to 15.07. Gast's Ambler Air Cell, 14.60 to 15.14.

For 2-in. coverings, 150-lbs. pressure, length of test pipes 100 ft.: Johns' Asbesto-sponge Hair Felt, 3-ply, 10.47 to 10.93. Johns' Asbesto-sponge Hair Felt, 2-ply, 11.21 to 11.29. Asbesto-sponge Felted (sectional), 11.20 to 11.57. K. & M. Magnesia (85 per cent carbonate of magnesia), 11.64 to 12.20. Asbestos Fire Felt (Navy brand), 13.18 to 14.

For 10-in. coverings, 150-lbs. pressure, length of test pipes 35 ft.: Johns' Asbesto-sponge Felted, 10.67 to 11.07. K. & M. Magnesia (85 per cent carbonate of magnesia), 13 to 13.64. Asbestos Fire Felt (Navy brand), 14 to 14.64. Watson's Imperial, 15.79 to 15.93.

For bare pipes: 2-in., 80-lbs. pressure, 55.75 to

60.30; 2-inch, 150-lbs. pressure, 71.78 to 72.20; 10-in., 150 lbs. pressure, 105.9 to 112.

The temperature of the air of the room ranged approximately from 50° minimum to 75° maximum.

PATENTS RELATING TO MINING AND METALLURGY
UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon receipt of 25 cents.

Week Ending November 26, 1901.

687,212. **STUB-AXLE FOR CARS.**—James H. Egbert, Anaconda, Mont., assignor of one-half to John S. Hickey, Anaconda, Mont. The combinations with a car-body, of a rigidly-mounted bearing-sleeves secured directly to the lower face of the bottom and provided with hollow lugs or bosses interlocked with the bottom of the car-body, fastening devices passing through the lugs or bosses and supported by the same, and independent stub-axes detachably secured within the bearing-sleeves.

687,229. **LIFTING MECHANISM.**—Artemus N. Hadley, Indianapolis, Ind. A winding-drum consisting of two parts, one of which may be rotated independently of the other, a clutch carried by one of said parts in position to engage the other, and means for returning one of said parts to its normal position.

687,258. **METHOD OF RECOVERING CYANIDES.**—William Orr, Salt Lake City, Utah, assignor to the Gold and Silver Extraction Company of America, Limited, Denver, Colo., a joint stock company of Great Britain. The method of recovering cyanide of potassium or sodium from weak solutions and from fouled mill solutions which consists in first adding to such solutions sufficient soluble salt of zinc, to precipitate the cyanide as the single cyanide of zinc, next separating and withdrawing the said precipitated zinc cyanide from such solution, next applying to the said precipitate a solution of alkaline hydrate, next adding to the resulting solution a soluble alkaline sulphide, and finally removing the precipitated zinc sulphide from said last-mentioned solution containing the desired cyanide of sodium and potassium.

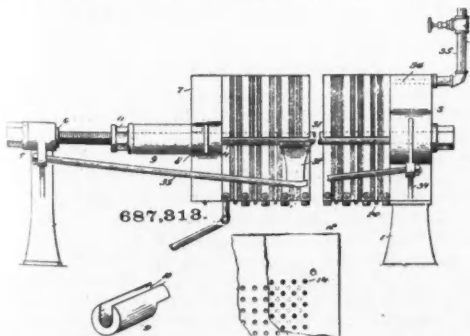
687,266. **PNEUMATIC SEPARATOR.**—Albert Raymond, Chicago, Ill. The combination of a tangential inlet in the throat thereof and horizontal fan-blowers in the said throat having blades set at an angle with the horizontal plane, means for feeding material upon the upper surface of said fan and any suitable means for rapidly rotating said blowers, whereby the material fed to said fans is agitated, separated and thrown upward into the separator by said fans.

687,272. **APPARATUS FOR BLUE-PRINTING.**—Edward Schildhauer, Chicago, Ill., assignor to Eugene Dietzgen Company, a corporation of Illinois. In a photographic-printing apparatus, the combination of a plurality of cylindrical plates of glass, frame-pieces bordering each of said plates of glass and making air-tight connection therewith, said frame-pieces and glass plates forming an upright cylinder; door-frames hinged to said cylinder, an air-proof diaphragm extending across each of said door-frames, means for making air-tight connections between said diaphragm and the cylinder-frame, a vacuum-tank, and connections between said tank and the space between said diaphragm and said glass plate for exhausting the air from said space.

687,304. **APPARATUS FOR CHARRING WOOD, ETC.**—Gustaf Grondal, Pitkaranta, Russia. The process of continuously carbonizing or charring wood, etc., consisting of passing the wood through a furnace, causing a gas indifferent to red-hot coals, to enter the furnace at a point where the coals are incandescent, thereby heating the gas and cooling the coals, passing said heated gas around a charring-muffle, but not in contact with the wood therein admitting air to the gas at this point to cause combustion to char the wood in the muffle.

687,312. **COMBINED EXCAVATOR AND ELEVATOR.**—Isaiah D. Hughes, Horton, Kan. The combination of a supporting running-gear having an axle-shaft, a pivoted frame carried by said running-gear, an endless traveling elevator carried by said pivoted frame.

687,313. **FILTER PRESS.**—Robert B. Hulme, Louisville,



Ky. A filter-press, comprising perforated filtering-plates arranged in pairs, the perforations of one plate of a pair being

staggered with relation to the perforation of the other plate, spacing-frames arranged between pairs of filtering-plates, pressure-receiving plates arranged between each double pair of filtering-plates, the said pressure-receiving plates having outlets, and receiving-chambers arranged between pairs of perforated plates.

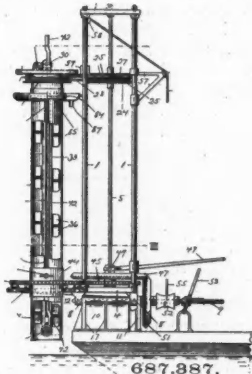
687,339. **FORGE.**—Walter S. Rockwell, New York, N. Y. The combination with a hydrocarbon-tank and a casing or furnace supported thereby and having two openings, of a burner communicating with the oil-tank and arranged to project a flame in the casing or furnace.

687,345. **DUMPING-CAR.**—Jacob J. Souder, Washington, D. C. In a railway-car provided with discharge-openings and longitudinally-hinged drop-doors, a longitudinal winding-shaft, and chains connecting said doors with said shaft.

687,350. **MANUFACTURE OF ARTIFICIAL FUEL.**—Alexander E. Tucker, Birmingham, England. The process consists in boiling dari to secure an agglutinant substance, mixing said substance with crushed coal or the like, and subsequently molding the mixture into blocks; said dari being a non-fibrous grain substance.

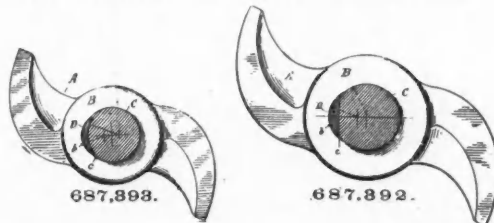
687,377. **PUMP FOR LIQUID OR GASEOUS BODIES.**—Jean N. Hochgesand, Paris, France. In a pump, the combination of a differential piston, a movable cylinder cooperating therewith, a fixed valve-seat with which the cylinder co-operates, said piston being of different diameters and the part thereof having the smaller diameter being adapted to drive the liquid which has entered the space in the fixed seat into the delivery-passage, whereas the part of the piston which has the larger diameter is adapted to suck up a certain quantity of liquid and then to press upon this liquid so as to forcibly apply this movable cylinder to its seat and thus insure a perfect tightness.

687,387. **PLACER-MINING MACHINE.**—Simeon M. Walcher, Kansas City, Kan. A cylindrical tube, a vertically-sliding support in which said tube is rotatably mounted, a



vertical frame or tower adjacent to said tube a vertical rotatable shaft supported by said frame, a sprocket-wheel driven by said shaft and supported by said sliding support, a sleeve or hub rotatably mounted upon said tube, a sprocket-gear secured to said hub, and a sprocket-chain connecting the said sprockets.

687,392 and 687,393. **SELF-FASTENING SHAFT-KEY.**—Martin P. Boss, San Francisco, Cal. The combination with

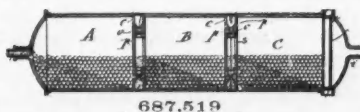


a shaft provided with a plane-faced (or concave-faced) key-seat therein, and a hub having a bore for the shaft and a counter-bore, of a plano-convex (or a concavo-convex) key conforming to said key-seat and counter-bore.

687,457. **ELECTRODE.**—Luke Hargreaves and William Stubbs, Farnworth-in-Widnes, England. The combination with an electric conductor and detachable anodes, of nipples of conducting material disposed between the conductor and the detachable anodes, and bolts for connecting the detachable anodes to the nipples and the nipples to the conductor.

687,469. **ACETYLENE-GAS GENERATOR.**—Nathaniel T. Worthley and Joseph Heaton, Brunswick, Me. The combination of a gas-generator, consisting of a central carbide-chamber, an inner water-chamber, an outer water-chamber a water-inlet from said inner chamber to said carbide-chamber, a gasometer, and connections.

687,519. **TUBULAR BALL-MILL.**—Meyer J. Davidsen, Copenhagen, Denmark. A tubular ball-mill, consisting of a



drum, vertical partitions arranged in pairs and dividing said drum into alternate grinding and conveying chambers, grinding-balls in the grinding-chambers, radial partitions or

blades arranged in the conveying-chambers for dividing the same into a number of cells.

687,505. **ELECTRIC FURNACE.**—Marcus Ruthenburg, Philadelphia, Pa. The combination with a hopper and a roller constituting the respective terminals of a heating-circuit; of bearings insulated from said hopper, and arranged to support said roller.

687,524. **MANUFACTURE OF CEMENT.**—Christian Fellner, Frankfort-on-the-Main, Germany. The combination of a hollow perforated rotatable body provided with perforations and increasing in diameter downwardly, a hollow axle communicating with said body and adapted to connect it with a supply of compressed air, and means for conveying material on top of said body.

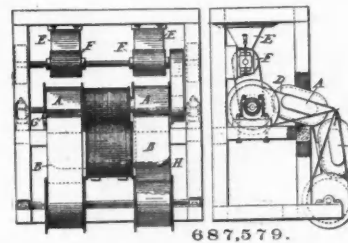
687,531 and 687,532. **INSULATING MATERIAL.**—Charles W. Jefferson, Schenectady, N. Y., assignor to the Mica Insulator Company, a corporation of New Jersey. An improved insulating material, consisting of layers of a pliable, adhesive, binding substance, and layers of the thinnest or primary mica scales, said layers united to form a solid pliable mass.

685,557. **MELTING-FURNACE.**—Henri J. J. Charlier, Philadelphia, Pa. A melting-furnace consisting of a body containing a storage-chamber and mounted so as to be free to turn around a horizontal axis, and means for supplying fuel in vapor or gaseous form.

687,567. **PROCESS OF HARDENING PLASTER OR OTHER POROUS SUBSTANCES AND OF FIXING COLORS THEREON.**—Jacques L. Kessler, Clermont-Ferrand, France. A mode consisting in subjecting the plaster to the action of solutions of silicates surcharged with alkali.

687,571. **MILL FOR POWDERING MARLS, BONES, CEMENT, ETC.**—Joseph Onions, Wolverhampton, England. A mill of the Chilean type, driven by gearing carried on an overhead frame.

687,579. **MAGNETIC SEPARATOR.**—Friedrich A. M. Schiechel, Frankfort-on-the-Main, Germany, assignor to the firm of Metallurgische Gesellschaft, A. G., Frankfort-on-the-Main, Germany. The combination of a magnet having a pole-piece arranged edgewise in a substantially vertical plane and means for projecting the material to be treated in a generally horizontal path or trajectory across the plane of said pole-piece, whereby the influence of the magnet shortens the trajectory of the paramagnetic particles and causes them



to fall on the near side of said magnet while the remaining constituents of the mass are carried on and fall on the opposite side.

687,586. **REFRACTORY IMPERVIOUS ARTICLES.**—William S. Rawson, Westminster, and Robert D. Littlefield, Thornton, Heath, England. Refractory, impervious articles composed of magnesium oxide and the borate of a metal.

687,612. **PROCESS OF CEMENTING IRON OR STEEL.**—Cleland Davis, United States Navy. The process of carburizing steel or iron plate, which consists in intensely heating one face of the plate by means of an electric current passing through the face of the plate from a carbon conductor, and during the operation screening the conductor and the part of the plate under treatment from the air.

687,651. **SELF-OILING CAR WHEEL.**—Frederick J. Bradford, Trinidad, Colo. A self-oiling car-wheel comprising a body or main portion made up of the hub provided with a plain outer face, the central bore having its outer end arranged flush with the outer face of the hub, the oil-chamber surrounding and connected with the bore.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Week Ending Nov. 9, 1901.

18,540 of 1900. **SHAKING TABLE.**—G. F. Wynne, Wrexham. An improved shaking table with quick forward stroke and slow backward stroke.

18,801 of 1900. **DYNAMO.**—C. Darrah and G. G. Patterson, Manchester. A special dynamo for use in electrically lighting miners' oil lamps.

18,864 of 1900. **LEACHING COPPER ORES.**—R. Seeman, London. Plant for extracting copper from carbonates by leaching with ammonia.

13,864 of 1901. **BRIQUETTING ORES.**—M. Ruthenburg, Philadelphia, U. S. A. Use of electric current for making particles of ore cohere into the form of bricks.

15,374 of 1901. **DIAMOND CUTTING.**—J. H. G. Sturman, New York, U. S. A. A machine for cutting diamonds into two halves axially.

16,162 of 1901. **BUNSEN BURNER.**—C. M. Kemp and G. H. Denny, New York, U. S. A. Improvements in Bunsen burners for regulating the relative supply of air and gas.

PERSONAL.

Mr. M. L. Effinger has returned to Salt Lake, Utah, from the East.

Mr. F. L. Butterfield is now manager of the Vandiere Mine, at Turret, Colo.

Mr. W. H. Davis has been reappointed mine inspector of the 5th Pennsylvania anthracite district.

Mr. Wm. J. Muse, has resigned as superintendent of the Montana Coal and Coke Company, at Horr, Mont.

Mr. W. Scott, superintendent of the Four Black Dogs Mine of Valdez, Alaska, has been in Seattle, Wash.

Mr. Allan G. Lamson has returned to Salt Lake, Utah, from the East, where he has been 3 or 4 months.

Mr. F. H. Osgood, of Seattle, Wash., returned to Grant's Pass, Ore., recently to visit his placer property at Waldo.

Mr. John Fordyce Balfour, of Benkoelen, Sumatra, was recently in San Francisco, Cal., and has gone to Scotland.

Mr. T. A. Rickard, of Denver, Colo., is at present at Butte, Mont., making an examination of the Farrel mining properties.

Mr. J. Audley Smith is superintendent of the new smelter of the Boston & Seven Devils Copper Company at Weiser, Idaho.

Mr. D. H. Jackson, recently returned from Nome, Alaska, and is about to take charge of his mining property at Tonopah, Nev.

Mr. J. H. Dugan, of Hazleton, Pa., succeeds Mr. H. C. Hoover as manager of the Chinese Engineering and Mining Company, Limited.

Mr. Thomas Ellis, Jr., recently returned from Alameda, Cal., to Mina de San Francisco, Ocotlan, Oaxaca, Mex., where he is superintendent.

Mr. H. V. Croll, manager for the Allis-Chalmers Company in Salt Lake, Utah, is making a trip through Montana in the interest of his house.

Mr. Richard Eames, Jr., interested in North Carolina mines, who has been in New York City purchasing machinery, has returned to Salisbury, N. C.

Mr. J. F. Costello has been appointed manager of the Northport, Wash., smelter of the Le Roi Mining Company, succeeding Manager Hussey, resigned.

Mr. Clarence P. Day announces his retirement from the vice-presidency of the *Industrial Press* to engage in the business of an advertising counsellor.

Col. Altman left Salt Lake last week for Chicago and the East in the interest of the Imperial and Majestic Companies mines, in Beaver County, Utah.

Mr. M. Fountain, who recently made an examination of the mines of the Clifton Consolidated Mining Company, at Clifton, Ariz., has returned to Paris, France.

Mr. Gardner F. Williams, general manager of the De Beers Consolidated diamond mines, at Kimberly, South Africa, has left San Francisco, Cal., for the mines.

Mr. P. Holland, who resigned as foreman of the Allison Ranch Mine, near Grass Valley, Cal., has accepted the superintendency of a mine at Quartzburg, Idaho.

Mr. J. Allen Veatch, manager of the Darien Gold Mining Company, will return next January from California to the company's property at Cana, Colombia, S. A.

Mr. Benedict Crowell, of the firm of Crowell & Peck, mining engineers and chemists, Cleveland, O., is in South America examining newly developed mineral deposits.

Mr. Joseph Taafe succeeds Mr. Patrick Holland as foreman of the Allison Ranch Mine, at Nevada County, Cal. Mr. Holland assumes a similar position at Quartzburg, Idaho.

Mr. A. A. Abbott, late superintendent of the West Clousa Mine, Anaconda, Mont., has resigned to become superintendent of the Holy Terror Mining Company, at Keystone, S. Dak.

Mr. W. W. Clark has resigned the superintendency of the Prairie Pebble Phosphate Company and has accepted another position with a leading Polk County, Fla., phosphate company.

Superintendent Chittenden, who will take charge of the Pioneer-Lynn Gold Mining Company, of Placer County, Cal., has arrived at the property. Mr. Leon S. Griswold is consulting engineer.

Mr. Albert Lockly, who was superintendent of the Overman and Caledonia mines, on the Comstock Lode, Nev., for nearly 30 years, has resigned and will make his future residence in Oakland, Cal.

Mr. J. Sidney Dillon has been appointed chief draughtsman at the Edgar Thomson Works, Braddock, Pa., to succeed Mr. Edward E. Slick, chief engineer of the plants of the American Steel Hoop Company.

Mr. Charles H. Thompson, formerly manager of the Victoria Coal and Coke Company, Capetown, W. Va., has been appointed chief engineer of the La Follette Coal, Iron and Railway Company, La Follette, Tenn.

Mr. Nathan Werbaugh, of the civil engineering corps of the Edgar Thomson Steel Works, of the Carnegie Steel Company, has resigned and is connected in a similar capacity with the Union Steel Company, at Donora, Pa.

Mr. C. S. Herzig, mining engineer, has returned to New York City after several months absence in Mexico and Arizona. Mr. Herzig has examined properties in Chihuahua, Parral, Oaxaca and Matehual, Mexico, and Tucson, Arizona.

Mr. Franklin Guiterman, a member of the Western executive committee of the American Smelting and Refining Company, left Salt Lake, Utah, for Denver, Colo., on December 6. Mr. Guiterman spent several days inspecting the new smelter in course of construction in the Salt Lake Valley.

Mr. John W. Dougherty has been appointed superintendent of the Pennsylvania Steel Company's plant at Steelton, Pa., to succeed Mr. H. H. Campbell, who recently resigned the superintendency of the works, but remains as general manager. Mr. Frank D. Carney, formerly engineer of tests at the steel works, has become assistant superintendent.

Mr. O. B. Warren, of Hibbing, Minn., assistant superintendent of the Mahoning Ore & Steel Company, on December 1 became superintendent of mines for the Donora Mining Company, of Duluth, the mining branch of the Union Steel Company. For the present he will make headquarters at Palmer, Mich., where the Donora Company will open the Volunteer Mine. Mr. Warren was mining engineer at the Volunteer in 1892-3 and knows the property thoroughly. He has been with the Mahoning 6 years and during the past 2 years has had charge of that company's extensive Vermillion Range explorations. Superintendent Keyes, of the Genoa Mine, Mesabi Range, goes with Mr. Warren to the Volunteer. Mr. A. Sullivan, for years at the Minnesota and Genoa, succeeds Mr. Keyes.

OBITUARY.

J. M. Gleaves, United States Surveyor-General of California, died recently in San Francisco, Cal., aged 48. He was long a prominent mining engineer in northern California and took a leading part in the work of the conservation of the waters of the State.

Peter Bowman, a pioneer anthracite coal operator, died at Mahanoy City, Pa., on December 4, in his 88th year. He was born in Northampton County on July 10, 1814. In 1848 he superintended the sinking of a slope near Tamaqua for the Little Schuylkill Railroad, Coal and Navigation Company. This was one of the first slopes sunk in the anthracite fields about Tamaqua.

Charles Hanson Toll, a prominent lawyer of Denver, Colo., died suddenly of apoplexy at his office on December 5. Mr. Toll was born in Baldwinville, N. Y., in 1851. He graduated from Hamilton College in 1876 and practiced law in Syracuse until 1879, when he moved to Colorado and settled at Del Norte. From 1880 until his death Mr. Toll was engaged in law practice in Denver, and was a recognized authority on corporation law. He married a sister of Senator E. O. Walcott, and had 4 sons. Mr. Toll was a prominent member of several Denver clubs, and had a wide circle of warm friends.

Simon A. Fraser, a director and the general works manager of the Nova Scotia Steel and Coal Company, Limited, died recently at his home in New Glasgow, N. S. Mr. Fraser was born in New Glasgow in 1857 and 1881 became associated with his brother, Graham Fraser, in the establishment of the Nova Scotia Steel Company. As an engineer he contributed considerably to the improvements in steel making appliances, one of his more important devices being the Fraser-Talbot mechanical gas producer. As the operations of the company extended repeated calls were made upon his energy in connection with the installation of the plants at New Glasgow, Ferrona and Sydney Mines, as well as the ore transportation and loading plants at the company's Wabana iron mine, in Newfoundland.

Samuel S. Chisholm died at the Majestic Hotel in New York City, November 26, at the age of 60 years. He had been in poor health for nearly 2 years. Mr. Chisholm was a Canadian by birth, his native place being Belleville, Ont. He had a school education, and became a school teacher to enable him to get a college education. He graduated at a law college in Toronto.

He went to Chicago, Ill., in the early 70's, and founded the *American Miller*, a publication devoted to grain milling. About 1880 he engaged in the manufacture of flour mill machinery, and remained in this business for several years. In '88 he established the firm of Chisholm, Boyd & White, for

the purpose of manufacturing dry press brick-making machinery. The firm later was merged into a corporation under the name of the Chisholm, Boyd & White Company, with works and office in Chicago.

In 1896 this company brought out and put on the market its line of briquetting machinery, which has been adopted by many prominent smelteries and blast furnaces in this and foreign countries.

Mr. Chisholm was secretary and treasurer and financial head of the Chisholm, Boyd & White Company. He was a member of the Chicago Club and of the Washington Park Club, and was well known in social and financial circles. He left a wife and 4 children.

SOCIETIES AND TECHNICAL SCHOOLS.

WASHINGTON AGRICULTURAL COLLEGE.—The mining department is being equipped with a blast furnace from the Allis-Chalmers Company, Chicago. It is a 20-in. round water jacket furnace, capable of being used for both copper and lead reduction work. It is also the intention of the department to put in next season a 7 by 10 reverberatory furnace for roasting ores. In order to do this it will be necessary to build an addition to the northwest corner of the mining building and also to shift the ore dressing machinery from the first to the second floor. The machinery for slime treatment and coarse concentration will be placed on the south side of the building.

AMERICAN CHEMICAL SOCIETY—NEW YORK SECTION.—The regular meeting at the Chemists' Club on December 6 was preceded by an informal dinner at the Hotel Savoy, at which about 40 members were present, among whom were: E. E. Smith, William McMurtrie, Prof. Benedict, A. A. Breneman, C. E. Pellew, H. Schweitzer, George C. Stone, W. E. Crane, Thos. J. Parker, A. C. Hale, E. G. Love, A. P. Hallock, D. D. Jackson, T. C. Stearns, Prof. E. H. Miller and Prof. Bogert.

Four delegates to the council were elected, after which the following papers were read:

W. H. Birchmore: "Notes and Studies on Moulds and Their Allies. Illustrated."

Edgar F. Smith, University of Pennsylvania, Philadelphia, Pa.: "The Value of Electrolytic Methods in Chemical Analysis."

Wilder D. Bancroft, Cornell University, Ithaca, N. Y.: "Analytical Chemistry and the Phase Rule Classification."

Francis E. Benedict, Wesleyan University, Middletown, Conn.: "Some Aspects of Ventilation."

Prof. Smith described the electrolytic methods of determining silver, copper, nickel, bismuth, cadmium, sulphur, molybdenum, uranium and mercury. These determinations, as well as numerous separations, are now so well understood that they may be effected in 2½ to 5 hours with a degree of accuracy far superior to ordinary gravimetric, or, perhaps, even volumetric methods.

INDUSTRIAL NOTES.

The Corundum Mining and Manufacturing Company, of Tree, Ga., has increased its capital stock from \$500,000 to \$750,000.

The Baldwin Locomotive Works, of Philadelphia, Pa., is reported to have secured a contract for 18 locomotives, to be used on the West Australian Government Railways.

We are informed that the death of Samuel S. Chisholm, of Chicago, Ill., will not in any way affect the business of the Chisholm, Boyd & White Company. It will continue as usual.

The A. Wyckoff & Son Company, of Elmira, N. Y., is exporting considerable of its acid-proof wood pipe. The demand for Mexican and Canadian mine operators is noticeably on the increase.

Messrs. J. M. Duke and C. F. Allen have formed a company under the name of the Precious Metals Recovery Company, with headquarters at 126 Stockton Street, San Francisco, Cal.

The Aurora Mining Company, of Joplin, Mo., is buying an entirely new plant, including machinery, boilers, engine, buildings, cars, etc., for its plant at Oronogo, recently swallowed by a bad cave-in.

The McKiernan Drill Company, recently removed its works from Paterson, N. J., to Dover, N. J., and is now in the market for equipment for a new forge and blacksmith shop. The concern manufactures mining machinery, rock drills, etc.

A large force of workmen has started the construction of the new cement mills of the Portland Cement Company near Florence, Colo. Machinery for the new works has been ordered. The plant will have a daily manufacturing capacity of 1,000 bbls. and be the largest works in the State, costing \$250,000.

The Salt Lake, Utah, Hardware Company, reports that it has the rolls, concentrating tables and engine almost ready for the California Mill at Park City, and

the cyanide mill for the Midas Mine, in the Clifton District at Deep Creek. The company says that there is a great increase in the demand for mining machinery throughout Utah.

The Chicago House Wrecking Company, of Chicago, Ill., is, it says, still crowded with business, and especially with orders for boilers. Shipments are made all over the country. It recently sold 2 boiler plants to firms within a radius of 100 miles of Boston. Three shipments were to South Carolina, 1 to Georgia and 1 to Florida.

The following changes are reported in the board of directors of the Empire Iron and Steel Company: Mark T. Cox, in place of W. L. Sims, resigned; Charles H. Zehnder, late president of the Dickson Manufacturing Company, in place of E. K. Sumerwell, resigned, and David B. Gamble, of Cincinnati, in place of W. E. Scarritt, resigned.

The Catherine Lead Company, of St. Louis, Mo., will hold a meeting January 18, at St. Louis, to decide upon a proposition for building a \$50,000 lead smelter near the site selected by the Federal Lead Company, east of Alton, Ill. The Alton Commercial Club has been asked to take the matter up and assist in securing the location of the plant.

The Galena Oil Company, of Franklin, Pa., manufacturer of Galena oil for engines, cars and machinery, has consolidated with the Signal Oil Company, and both corporations are of the past. The business transacted by each will be carried on by a new concern, the Galena-Signal Oil Company. F. H. Johnston, of Franklin, Pa., is secretary of the company.

It is stated that no change will be made in the existing wage scales of the employees of Duquesne steel works and blast furnaces, Homestead steel works, Edgar Thomson steel works and blast furnaces, and Upper and Lower Union mills of the Carnegie Steel Company, and the same wage rate will prevail at the different Carnegie works during 1902 as in this year.

E. P. Sears has retired from the Acme Machinery Company, of Salt Lake, Utah., he having disposed of his interests to J. B. Jensen, an experienced machinist and draughtsman, who will take charge of the building and construction department of the company. The company will have the exclusive manufacture and sale of the Jensen patent sampler, that has been attracting attention.

The Tyrone Foundry and Machine Company, of Tyrone, Pa., has the contract for a stone crushing plant for the Marquis Limestone and Clay Company, of Newcastle, Pa., to have a crushing capacity of 1,500 to 2,000 tons of furnace stone per 10 hours. The company is making a 5-jaw Morris improved stone crusher for the Blair Limestone Company, Limited, of Hollidaysburg, Pa.

The Salt Lake, Utah, branch of Fairbanks, Morse & Company represented by C. P. Mason, reports business active. Among the recent orders are: A 22 h. p. Fairbanks-Morse geared gasoline hoist, for the Salt Lake & Tonapah Mine in Tonapah, Nev.; a 100 h. p. steam hoist, for the Little Bell Mine, in Park City, Utah; and a complete hoisting plant for the Dixie Copper Mine, near St. George, Utah.

The American Steel and Wire Company's export shipments of wire nails in November, made through New York and other Eastern seaboard ports, amounted to 695 tons. The United Kingdom took 238 tons, in 8 lots. The foreign shipments of wire and wire nails, made through Eastern ports during November, aggregated over 4,500 tons. South America was the largest buyer of wire in November, taking 15 lots, amounting to 1,403 tons. South Africa took 1,115 tons, including one lot of 720 tons. The shipments to Mexico make a total of 240 tons in 7 lots.

The J. R. Alsing Company, manufacturers of and agents for crushing, drying and pulverizing machinery, states that the suit against Max F. Abbe has been decided in its favor, the court having granted an injunction against further infringement of patent No. 496,677, also against the use of the words "Alsing" or "Abbe" in connection with mills. The court also ordered an accounting for past infringement and the payment of costs. The company states that it intends to prosecute all parties making, selling or using a mill that infringes the patent in question.

The Trinidad Electric Company, Limited, in which Sir William Van Horne is interested, is about to contract for its lighting and power plants at Port au Spain, British West Indies. The lighting station is to be equipped with two 250-h. p. boilers, the contract for which was secured by Thayer & Co., of New York City. The Aultman & Taylor Machinery Company, of Mansfield, O., will build the boilers. F. W. Teele, lately connected with the Boston Elevated Road, is general manager of the Trinidad Company. The purchasing agent is H. I. Plummer, of New York City.

The Henry Electric Equipment Company is a Colorado corporation, of which C. F. Elliott, of Den-

ver, is president, and D. Carl Henry is secretary. These, with William Barber, of Colorado Springs, and J. H. Peabody and N. F. Handy, of Canon City, compose the directory. The stockholders are Colorado railroad men principally. The main purpose of the organization is to introduce and manufacture a new apparatus for lighting and ventilating trains. The late John C. Henry is the inventor. The apparatus encircles the axle of one of the wheels of a car, and no belt is used.

About two years ago, the F. M. Davis Iron Works, of Denver, Colo., had a most disastrous fire, completely destroying the old works. The plant as now rebuilt is modern in every respect, covering an area of about 4 acres, with a total floor space of over 70,000 sq. ft. The different departments are equipped with the most modern machine tools, driven by electric motors and commanded by electric and pneumatic cranes. At present, the company employs about 300 men, with a yearly output of over \$500,000. The firm's product is exclusively machinery for mining, milling and smelting ores.

Kenney & Co., of Scottsdale, Pa., manufacturers of coal mine and coke oven machinery, are about to equip their new shops. The plant, recently destroyed by fire, is to be rebuilt by a newly organized company under the same name and management as that of the former, but with a capital of \$125,000, all of which is subscribed. The officers are A. K. Stauffer, president; D. B. Stauff, secretary; Walter F. Stauffer, treasurer; T. C. Kenney, Robert Skemp, E. A. Humphries, J. R. Smith, J. I. Dick, E. L. Rutherford, all of Scottsdale, and Worth Kilpatrick, of Connellyville, Pa. T. C. Kenney is general manager.

The Stilwell-Bierce & Smith-Vaile Company, of Dayton, O., states that the following mining companies are installing Stilwell feed water heaters or have recently installed them: Imperial Gold Mining Company, Deadwood, S. D.; Jamison Coal and Coke Company, Jamison Siding, Pa.; Monongahela River Consolidated Coal and Coke Company, Troytown, Pa.; Raleigh Coal and Coke Company, Raleigh, W. Va.; Jamison Coal and Coke Company, Crabtree, Pa.; Modoc Coal and Mining Company, Gloucester, O.; Pittsburg Coal Company, (Lick Run Mine), Bruce, Pa.; Whitebreast Fuel Company, St. Davids, Ill.; Marquette Coal Company, New Cumberland, W. Va.; Federal Coal and Coke Company, Fairmont, W. Va.

TRADE CATALOGUES.

Silas S. Sweet, patent lawyer, of Des Moines, Ia., is sending out little pamphlets containing testimonial letters from parties who have secured patents through him. These pamphlets state the reasons that have gained Mr. Sweet his increasing practice.

The Western Forge Company of St. Louis, Mo., in a little 20 page pamphlet describes the Wilson shoes and dies for stamp mills. These shoes the company states are forged from high grade steel billets by special appliances, the result being a tough, hard mass of metal that will wear uniformly. Testimonials are given from western gold mines.

The Dimmick Classifier and the Dimmick Concentrator are described in circulars sent out by the Dimmick Concentrating Company, of Denver, Colo. The company states that a full sized classifier of its make and 2 full sized Dimmick tables have been installed at Henry E. Wood's ore testing works, at Burnham, a suburb of Denver, where tests can be made.

The Watt Mining Car Wheel Company, of Barnesville, O., states that it makes ore cars of every description. Some of its designs are shown in little illustrated pamphlets printed in either Spanish or English, that the company is sending out. The company states that the wheels and axles used are of improved pattern, dispensing with nuts, screws or rivets.

"The Inductor Type Generator," a technical treatise by Edward Heitmann, which ran as a serial in the *Electrical World and Engineer*, issues of October 5, 12, and 19, has been reprinted in pamphlet form with illustrations, making bulletin No. 123 of the S. K. C. system. A copy may be had by addressing the Stanley Electric Manufacturing Company, Pittsfield, Mass.

Catalogue No. 9, issued by the Allis-Chalmers Company, of Chicago, Ill., is a neatly illustrated pamphlet of 104 pages entitled "Concentrating Machinery." The pamphlet gives elevations of mills for concentrating tin, gold, silver lead and copper ores, and describes the various rock breakers, crushing rolls, screens, jigs and concentrating belts and tables made or sold by the company.

The DeRemer tangential impact water wheel is described in a 40-page illustrated pamphlet published by Jared R. and J. S. DeRemer, of Denver, Colo. The chief characteristic of this wheel is the V shaped lateral bars in the buckets which, the manufacturers claim, receive and stop dead the water after it issues from the jet, overcoming the glancing blow present in feeding a circle through a tangent and giving a very

high percentage of efficiency. The manufacturers offer in support of their claims the results of tests made at Cornell University and the testimonials of users.

The National Corporation Charter and Service Company, of Pierre, S. Dak., issues a little pamphlet describing the general corporation laws of South Dakota. The company states that the corporation laws of that State are extremely liberal and that the cost of incorporating is low, while the State levies no annual franchise tax. The National Company, states that it is prepared to get out charters, furnish resident incorporators and domiciliary officers and act as agent for oil or mining companies or for companies formed to develop patents or other tentative enterprises.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

(From an Occasional Correspondent.)

Copper Belle.—The main shaft is down over 300 ft., and at the 200-ft. level a large body of sulphide ore has been opened. The property is located at Gleeson, about 28 miles south of Cochise. Most of the carbonate ores have been extracted, and the company is smelting about 45 tons a day in a 70-ton Union furnace. About 50 tons of sulphide ore are being shipped daily to the Silver City Smelter.

COCONINO COUNTY.

(From Our Special Correspondent.)

Coconino.—The last of the machinery has been forwarded from Marysvale, Utah, for the Neill process leaching mill. The management reports an abundance of copper ore in sandstone formation. Aquilla Nebecker is manager.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Goldroad.—This group of 6 claims 25 miles north of Kingman and about 9 miles from the Colorado River, has been sold by Joseph Burkhart and Byron Erichbrecher, of Los Angeles, Cal., to a syndicate headed by Col. O. P. Posey, Clarence K. McCornick and William Bayley. The vein averages 14 ft. wide and is reported to carry about \$20 in gold per ton. It is opened to a depth of 200 ft. The Salt Lake purchasers will equip the property with a modern plant.

Savanic.—This mine, situated just across the Utah-Arizona line, forwarded to the Salt Lake Valley smelters for the week ending December 7 55,620 lbs. of first-class copper-gold ore. The property is principally owned by Salt Lake, Utah, men.

PIMA COUNTY.

(From an Occasional Correspondent.)

Azurite.—This mine, south of Tucson, which was sold some time ago on a judgment, will probably be recovered by the original owners in the near future.

PINAL COUNTY.

(From an Occasional Correspondent.)

Silver Bow.—This property, south of Red Rock, has just encountered a new ore body. A 70-ton copper furnace is to be erected.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Mahoney.—It is reported that the new company in working the shaft of the Mahoney, at Sutter Creek, has cut the apex of a good ore shoot, with values of \$10 per ton. The mine is just south of the Lincoln, which is under management of E. C. Voorheis. John Ross, Jr., superintendent of the Mahoney, has long been in charge of the Wildman-Mahoney.

Oncida.—The 60-stamp mill of this mine, between Sutter Creek and Jackson, is crushing 300 tons of gold ore daily.

Plymouth Consolidated.—This old mine, near Plymouth, which has been closed for many years, is to be reopened.

South Spring Hill.—Superintendent John R. Tregloan has completed the repairs to the shaft of this mine at Amador City. The mine is equipped with 40 stamps.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Asbestos Discovery.—Fine specimens of asbestos are reported from a claim on the old Rawhide ferry road, about 7 miles northeast of Copperopolis.

Angels Camp.—The principal mines have had to shut down for about 2 weeks owing to necessary repairs to the ditch which supplied them with water power.

Buena Vista Copper Company.—This company started work November 16. The ore on the old dump has been lying there since 1864. A hoist is to be erected, and the old shaft sunk deeper.

Gwin.—Twenty stamps are to be added to the already large mill of this mine.

Mead.—At this mine, in Rich Gulch, Julian Thurs, the superintendent, has had to put in steam power for hoisting and pumping, so much water having been encountered.

Oriole.—The main shaft is to be sunk 300 ft. deeper, or a total depth of 840 ft. Miners are now drifting on the 400-ft. level.

ELDORADO COUNTY.

(From Our Special Correspondent.)

California Slate Company.—This company, of San Francisco, has purchased the slate quarry near Placerville, at one time worked by the Placerville Slate Company. All the slate produced in California comes from this county, there being several quarries. The directors of the new company are F. S. Chadbourne, H. F. Ingersoll, F. S. Ingersoll, M. Glaser and H. S. Martinez.

Josephine.—The San Francisco Mining Company is developing this mine under the superintendence of J. M. Nougues, Jr. The main work is on No. 5 tunnel.

Julia.—This mine, near Pilot Hill, has been leased for a year with option to purchase to E. D. Ingraham, of Colorado.

Lone Star.—This drift mine, near Smith's Flat, is being reopened by a San Francisco company, which has let a contract to Marshall Hughes and Gregory Brothers to take out and mill 2,000 tons of gravel. If the returns are at all satisfactory, it is expected that the tunnel will be extended.

Pyramid.—The new 15-stamp mill at this mine, on Dry Creek, to be operated by either water or steam power, has started up. Superintendent Bluett has installed a steam hoist at the new 2-compartment shaft.

Roanoke.—The California Debris Commission is asked by D. Hartley to grant a permit to work this mine, near Placerville, by hydraulicing, the tailings to be deposited behind a dam on White Rock Creek.

South Sliger.—This mine, at Spanish Dry Diggings, will shortly start up with C. W. Keeney as superintendent.

HUMBOLDT COUNTY.

(From Our Special Correspondent.)

Copper Discovery.—D. W. Rice and associates are developing a copper deposit recently discovered at the South Fork Bridge.

Trinity and Arabia.—Plans are being made by Geo. D. Burtin and others interested in these mines to equip them with an electric plant.

KERN COUNTY.

(From an Occasional Correspondent.)

Associated Oil Company.—It looks as if the combine of Kern County oil interests would assume definite shape by January 1.

Barstow Mill.—This mill is running again with enough ore to keep going for 2 weeks.

Phoenix Mining Company.—This company has placed an order with the Llewellyn Iron Works, in Los Angeles, for a 5-stamp mill to be erected on its holdings at Randsburg. It will also put in a hoist, pumps and a rock breaker. George W. Lloyd, of Randsburg, is superintendent.

Stauffer Chemical Company.—This company, which recently purchased the Frazier Borax Mine, is preparing for extensive mining this winter. Beginning with January the company will ship 150 tons per month.

Vulture Mining and Smelting Company.—This company at White River, on the border of Tulare County, is running a tunnel in the Sandstone Mine, and expects to have it completed by spring.

MONO COUNTY.

(From Our Special Correspondent.)

Bodie Custom Mill.—J. S. Cain and A. S. McCone, who own cyanide plants at Bodie, are building a 10-stamp custom mill for the many leasers in the camp.

Benton Copper Mines.—At the copper mines near Benton, on the Carson & Colorado Railroad, S. G. Lewis, president of the Almono Gold Mine, Antelope Valley, has begun work. Eight locations have been made.

Golden Gate.—The mill of this mine, at Antelope Valley, has started up.

NEVADA COUNTY.

(From Our Special Correspondent.)

There is more activity in North Bloomfield District than for some time past. The Blue Gravel Company is employing quite a number of men.

Allison Ranch.—This mine at Grass Valley, is putting in a new compressor to be driven by electric power.

Brunswick Consolidated.—The shaft is being sunk to the 1,250-ft. level, and some new machinery is being installed.

Gaston Ridge.—Superintendent L. R. Poundstone has about 75 men at work and 30 stamps dropping. Several new buildings have lately been erected.

Grass Valley Consolidated.—This mine, formerly the Electric, in Grass Valley District, has installed a complete electrical power plant.

La Suerte.—A fire at this mine, 3 miles from Nevada City, caused the explosion of 300 lbs. of giant powder and a large quantity of giant caps, demolishing the modern hoisting plant and doing \$20,000 worth of damage. No one was injured. The miners below feeling the explosion, escaped through the drain tunnel.

Meadow Lake District.—A mill of 10 stamps and a small smelter are being erected in another attempt to work the very rebellious ores of the district. For many years there have been trials on the ores, but thus far no money has been made. The new men will try both smelting and milling.

Oil Fuel.—Oil is to be used as fuel at the new reduction works at Meadow Lake District. Wagons to haul 800 gal. each will convey the oil from the railroad at Truckee to Meadow Lake.

PLACER COUNTY.

(From Our Special Correspondent.)

Bob Lewis No. 2.—The men under Superintendent Jarvis are making about 10 ft. per day on the new tunnel to strike the channel on this drift mine. New buildings have been erected.

Eclipse.—F. D. Hussey, of Louisville, who recently bought this mine at Ophir, has also purchased the Otto Walter claim adjoining, and through the tunnel of the latter prospecting will be carried on.

Gold Blossom.—Superintendent Flanagan is re-timbering the shafts of this mine at Ophir, and the mine is to be operated again.

Rawhide.—This mine, on Texas Flat, 4 miles south of Blue Canyon, is putting in a new 10-stamp mill. The dam on the North Fork and 2,500 ft. of ditch have been completed. An aerial ropeway is used for bringing ore from the mountain side to the 3-stamp mill in use at present.

Spanish.—J. J. Blake and J. Smith, of Salt Lake, Utah, have a bond on this quartz mine at Forest Hill, owned by Ed. Bryant, J. Acuna and Jos. Reynolds. It is the intention of Superintendent Baker to sink 100 ft. and run the tunnel 100 ft.

Three Stars.—The new electric light plant at this mine, at Ophir, is in operation, and the electric tramway for hauling ore to the mill will soon be ready. Forty men are employed.

Washington.—Superintendent H. T. Bell has 38 men at work on this quartz mine near Forest Hill. The mill is running steadily.

Zelma Bell.—A. C. La Bue, of Oak Bar, Siskiyou County, is arranging to put in a scoop dredge of his own design on the gravel deposits of this mine on the South Fork of the American River, 7 miles south of Colfax.

PLUMAS COUNTY.

(From Our Special Correspondent.)

Austrian Mining Development Company.—This company owns the Franklin group of gold mines and several copper properties near Genesee Valley. A. Dadrogych, of San Francisco, the president, has been at the properties to start operations. The company thinks of putting in a new 42-in. water-jacketed furnace on its copper properties, and it now has plans under way for the installation of a complete 15-stamp water power mill on the Franklin group next spring. Oil may be used as fuel in the new furnace. The company's main office is in the Examiner Building, San Francisco, Cal. W. F. Russell is secretary.

Claybank.—Air drills are being put in this tunnel at La Porte. This bedrock tunnel is expected to tap an extensive gravel deposit during the coming year. Work has been in progress a long time.

La Porte District.—Hydraulic mining around La Porte is reported no longer prosperous. The heavy banks and the expensive impounding dams to comply with the law make it difficult to work with success. There used to be many of these mines around La Porte.

SACRAMENTO COUNTY.

(From Our Special Correspondent.)

Gold Dredging.—R. G. Hanford, who represents a company owning a mining dredger near Mississippi Bar, on the American River, is building another one on the opposite side of the river. He has also bonded many acres of land along the river from Folsom down expecting to work the ground by dredgers.

Gray Wing.—The extent of the very rich streak of gravel in this mine, near Folsom, is yet unknown. Single pans as high as \$136 have been found. Miners are now breasting 7 ft. in the drift. The Blue Ra-

vine Mine, close by, continues to yield very profitably, and has at times also shown remarkably rich streaks, such as that found on the Gray Wing, at a depth of 90 ft.

Natoma Grant.—A Folsom company of which Jas. H. Donnelly is president, has an option on this grant, near Folsom, and will shortly begin prospecting for gravel.

Perrazo.—This farm, adjoining the Blue Ravine, near Folsom, has been bonded by Hayward & Lane, and sinking for gravel will at once begin. This mine is near the Gray Wing Mine, where such rich gravel was recently struck.

SAN BERNARDINO COUNTY.

(From Our Special Correspondent.)

Bagdad.—The company working this mine recently milled 1,000 tons of ore at the Barstow Mill, which yielded \$17,000. E. H. Stagg is the general manager of the mines.

California & Nevada.—These claims, 5 miles west of Shasta, on Dog Gulch, have been bonded by W. T. Gillespie, of Redding, and W. A. Pryor, and R. Gray, of Shasta. There is a 60-ft. shaft, as well as a tunnel 160 ft. long on the property. The bonders intend organizing a company in the Eastern States to develop the claims.

Columbus.—Several tons of concentrates have been shipped from this mine on Providence Mountains, near Fenner. Fifteen stamps are to be added to the mill.

Copper World.—Work has again been started on this mine, and the smelter at Valley Wells will soon be ready. The mine has been idle for some time owing to litigation.

Malachite Copper-Gold Mining Company.—This company has been organized in Los Angeles with S. A. Barrett, president, and James B. Cook, secretary, to work 5 claims in the Ord District, adjoining the Brilliant Mine of the Osborn group.

Memoria Copper Mining Company.—This company has been organized to work claims in Stillwater District. The incorporators are J. A. Kahny, N. D. Fowler and E. M. Hobbs, of Redding; M. D. Merritt, of Oakland, and H. M. Le Baron, of Valley Ford, Sonoma County.

New Mining Road.—A contract has been awarded to George Miller to build a turnpike over the desert from Needles to the Boundary Cone, Gold Roads, Olla Oatman, Boxan and other mines, over which road the mines may haul ore to the reduction works. Several thousand tons are ready for shipment.

Price.—Development work is to be pushed on this group of 5 claims in Old Woman Mountain District. Some good ore has recently been found.

Woodstock.—This group, near Cottonwood, in the desert country is to be opened by a new mining company, having its principal office in South Dakota, and a branch office in San Bernardino. The directors are: W. A. Manson, Jr., M. Allison, B. F. Bledsoe and W. A. Liming, of San Bernardino, and Philip Lawrence, of Hudson, S. Dak.

TRINITY COUNTY.

(From Our Special Correspondent.)

Chloride-Bailey.—A 10-stamp mill has been shipped to this mine at Dedrick, at the head of Canyon Creek.

El Oro Mining Company.—Work has started on the 3,000-ft. tunnel at the Kindergarten group, Canyon Creek, by this company, of Brooklyn, N. Y. F. S. Taggart is in charge.

Lappin.—Frank O. Lappin is in charge of the work at this mine, at Deadwood, now operated by an Eastern company.

TULARE COUNTY.

(From Our Special Correspondent.)

Copper King.—Development work has started on the Copper King and Sure Shot ledges, near Porterville. The ore carries silver and copper.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

The men who have the bond on the Donella, Pleasant Hill and Ben Soulsby mines, near Arrastraville, are working energetically on development. The assay office, blacksmith shop, with the contents, have been removed from the Alameda Mine to the Ben Soulsby.

Dead Horse.—Work has resumed on this mine at Carter, most of the men being engaged in driving the north drift, 1,600 level.

Duffield.—A 5-stamp mill is to be erected on this mine at Arrastraville.

Dutch.—Ore is being stoped from the drift north of the 400-level, which shows free gold.

Eagle-Shawnut.—This mine has resumed operations, the ditch now supplying water.

Fidelity.—The 4-stamp mill for this mine is nearly ready to run. The mine is owned by Conlin Brothers & Graham.

Lost Fox.—At this mine, on the Middle Fork of the Tuolumne River, a saw-mill is being erected. The mine is to start.

Mohican Mining Company.—The 5-stamp mill on this property, near the mouth of the north fork of the Tuolumne River, is nearly completed. Good ore has been found.

Mountain Lily.—This quartz mine has closed down for the present. The Big Ben has also been closed down for the winter.

Mt. Jefferson.—The 20-stamps of this mine, at Groveland, are dropping steadily, and 8 men have been put at work.

Nat Clark Table Mountain.—In these diggings, near Columbia, John Woodside and others have tapped a channel of good-paying gravel.

New Albany.—The New Albany, North Extension and New Albany South mines, near Summerville, have been purchased by W. H. Martin, from W. A. Nevilles. The New Albany ditch is included.

Providence.—The 10-stamp mill is running steadily on ore from the 6th, 8th and 9th levels. The rich shoot recently found on the 3d level is increasing in size and value.

Ranchide.—Capt. W. A. Nevilles, who is in charge as owner, is making repairs to the main shaft, and is figuring on heavier machinery. The main shaft is now 1,800 ft. deep. There are two others, 500 and 300 ft. deep, respectively.

Sacramento Gravel Company.—This company's claim, near Columbia, has been bonded by parties who intend working it.

Tuolumne Power and Development Company.—This company has executed a mortgage to the North American Trust Company, of New York, in order to raise funds to install the electric plant near Jacksonville. The company gives as security its franchises and water rights, and the Margaret, Independence, Old Flag, Jefferson, Jackson, Washington and Franklin placer claims.

COLORADO.

BOULDER COUNTY.

(From Our Special Correspondent.)

Bondholder.—A car-load of machinery has been received at Ward for this company.

Boulder Oil Companies.—There are at present 12 or 15 derricks working or under construction in the vicinity of Boulder, but as yet no large quantities of oil have been found. Considerable machinery is arriving daily, and interest is growing. From 20 to 25 companies are prospecting the field.

Boulder Valley.—A party of Denver men has taken a lease and bond on this property, comprising 12 different claims near Gold Hill. A cross-cut is in 450 ft., and a contract for 100 ft. additional is let.

Concord.—A fine specimen of \$10,000 ore has been on display in Boulder, which was taken from the tunnel of this property at Wall Street. It shows much free gold. A large body of such mineral is reported. The mine is under lease and bond to Mr. Kent from Messrs. Werley & Eldred.

Evans.—This mine, at Summerville, is practically closed down, as nothing was found that warranted further development.

Richmond.—The company owning this mine at Salina is sinking a 3-compartment shaft about 300 ft. from the old one. A new house has been built, new machinery installed, and 3 car-loads of sawed timbers are being taken to the property. It is intended to sink 1,000 ft., while the old shaft will be abandoned or leased.

White Cloud.—The old shaft of this mine, near Gold Hill, has been abandoned, while a new one is being sunk, and a large new shaft house erected.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

Bonita Mill.—F. H. Clark has purchased the Mixsell Mill, at Idaho Springs, and is running on custom ores. The capacity is to be increased to 40 tons daily. Amalgamation and concentration are used.

Eastern & Western Gold Mining and Milling Company.—The Elm City claims have been bought by this company at Dumont, giving a group of 22 claims, including water rights on Mill Creek. An air connection is being made with the workings of the Chicago Belle shaft, after which sinking will be resumed. A tunnel is to be driven on the Elm City lode to reach the Chicago Belle Mine and develop it to 700 ft. The mine has some rich ore, running 31 oz. gold. There are about 2 ft. of pay ore. The owners live in Massachusetts.

Georgetown Deep Mining and Tunnel Company.—The tunnel started by B. F. Kelly to cut through Democrat Mountain at Georgetown has been driven 300 ft. by hand. Hendrie & Bolthoff, of Denver, have a contract to erect a power plant for \$15,000 by February 1. An 8-drill double-compound Norwalk

compressor is to be installed. Steam will be used for the compressor, and a large blower. The company controls 33 claims on the line, and has working contracts for 9 others.

Kokomo-Pioneer Company.—The new mill built at Dumont has closed temporarily until steam power can be added. The flume was not long enough to give a good head of water during the winter months, when it partially freezes. The 3 mines operated are all showing good-sized bodies of both smelting and milling ore. The Milton Mine has a new strike, the Pioneer has opened up the chute in a lower level, and the Kokomo has wide bodies of low-grade mineral.

Newhouse Tunnel.—The new electric locomotive is now hauling 16 cars of 4-tons each from the heading, which is in 13,000 ft., having passed into Gilpin County some time ago. The lodes to be cut for the next 2,000 ft. are owned by the tunnel company, and any strike made for the next 6 months will not be given publicity. The tunnel is 12 by 12 ft., and was driven cross-cut 260 ft. for November. Mining companies now working in the tunnel are the Sun & Moon, Bertha, Gem and Abbandwal, the former owned in Cleveland and the latter in Boston. Every company has ore. The depth under the apex of the mountain is over 2,000 ft. The Saratoga Mine is to install an air compressor to sink to connect with the tunnel which will cut the Saratoga lode in about 7 months.

Sun & Moon Mining and Milling Company.—At a meeting of the directors in Idaho Springs, J. U. May, of Cleveland, O., was elected president in place of J. W. Britton, deceased. C. A. Wimpfhemier, of New York City, was elected vice-president, and F. H. Townsend, of Cleveland, director to fill a vacancy. In the party visiting the mines were G. G. Sowden, of Cleveland, secretary-treasurer, and J. U. May, C. A. Wimpfhemier and Nathan Westheimer, of New York, directors. Instructions were given to Manager H. N. Sims to resume sinking the Minott shaft from 760 to 860 ft., and drive levels in both directions. The drift was also ordered ahead from the Newhouse Tunnel with 3 shifts. After passing under the Minott shaft a raise to connect with the surface workings will be started. The company is shipping 800 tons of ore per month. The mine has the best showing of ore in the county.

GILPIN COUNTY.

(From Our Special Correspondent.)

Alpha Gold and Silver Mining Company.—Development is carried on by Detroit owners and shipments are kept up. The milling ores run nearly \$13 per ton, while the smelting ore averages from \$75 to \$85 per ton. John Grant, Central City, is manager.

Bertha Mining and Milling Company.—In the Bertha shaft a 4-ft. crevice has been opened, carrying satisfactory values. The company is working on its vein in the Newhouse tunnel and taking out ore for the Bertha Mill. M. W. Tanner, Idaho Springs, is manager.

Calumet Gold Mining and Milling Company.—An upraise is being made from the 500 ft. level of the Wautauga, with the intention of continuing to surface, as a cage shaft. Employment is given to 50 men. The average daily output of good concentrating ore is between 40 and 50 tons. James Clayton, Idaho Springs, is manager.

Cashier Gold Mining and Reduction Company.—Preparations are being made to sink the main 400-ft. shaft of the Cashier Mines No. 1. Nearly 50 men are employed and steady shipments of fair grade concentrating and smelting ores have started. Development work goes on and heavier shipments will follow. Bert L. Campbell, Central City, superintendent.

Jenny Creek.—B. F. Pyle has leased and bonded this property in Kansas district to H. C. Coates, and development will go on all winter.

Ohio.—J. F. Milligan has installed a gasoline hoist and erected shaft buildings and started sinking. The property is situated in Russell District.

Ophir-Burroughs.—Local men are interested in a lease and bond, and are employing about 40 men. The output is steady and the ores of uniform grade. A new 100 h. p. hoist of improved pattern is being installed.

Oro Verde Mining and Milling Company.—Chicago and Eastern railroad men are working a big group of claims, opened by a tunnel running towards James Peak. In an upraise on the Ross vein, ore carrying assay values of between \$60 and \$70 per ton has been opened. The company is figuring on a mill in the spring. G. P. Goodier, Yankee, is manager.

GUNNISON COUNTY.

Augusta.—This company is developing the Augusta Mine on Augusta Mountain above Crested Butte. The new 6-drill compressor is in place and 3 8-hour shifts are busy on the long tunnel which is to cut the lead

at 2,000 ft., 1,600 ft. below the surface. The company is a regular shipper of smelting ore.

Buckeye.—Kansas City and Southern Missouri men have taken over this property adjoining the Excelsior Mine on Augusta Mountain above Crested Butte. O. V. Cole, formerly of Cripple Creek, is in charge. A tunnel is in 100 ft. The vein is reported 4 ft. wide carrying gold, silver and lead.

Iowa Mining Company.—This company, in the Tin Cup District, is developing a group of copper claims on Boulder Mountain. The property is equipped with pumps and an air compressor. Machine drills will be used to sink the new incline shaft.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Long & Derry Leasing Company.—The new shaft is being sunk to cut several veins crossing this ground, and high grade streaks of ore are already exposed. This ground has for 20 years been tied up through legal difficulties.

Mike & Starr.—The immense copper sulphide deposits are being operated through the Yak, and 30 tons a day are shipped to the Buena Vista smelter. The ore is of a very good grade.

Morocco Mining Company.—From the new A. V. shaft below 500 ft. the company is drifting for the extension of the Leadville basin ore shoots. Railroad extensions have been made. Messrs. Sheedy and Kountz of Denver head the combination.

OURAY COUNTY.

Blaine.—This group comprises 40 claims on the north side of Mount Sneffels. A force of 12 or 14 men will be employed all winter. A wagon road is completed from Ridgeway, the shipping point, 15 miles distant. A 1,200 ft. cross-cut tunnel is being run to drain the main workings. J. J. Carmichael is manager.

SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

Telluride Mining Association.—This association composed of the mine managers of the district, has in connection with the officers of the local Miners Union agreed on a 3 years' wage schedule, which it is believed, will prevent any labor troubles for that period. It is one of the results of the riot last July, when several men were shot by striking miners at the Smuggler-Union mines. The wages are as follows: Underground labor, 8-hour day, miners, \$3; machine men, \$4; trammers and shovelers, \$3; drivers, \$3.25; timbermen, \$3.50; timberman helpers and laborers, \$3; nippers, \$3; hoisters (engineers), \$4; station tenders, \$3; cage tenders, \$3.50. Outside labor: Engineers, \$4 for 12 hours; engineers (if hoisting men), \$4 for 8 hours; firemen, \$3.50 for 12 hours; blacksmiths and tool sharpeners, \$4 for 9 hours; blacksmith helpers, \$3.25 for 9 hours; laborers, \$3 for 10 hours. Tramway men; gripmen and loaders, \$3 for 10 hours; brakemen and linemen, \$4 for 10 hours.

Apprentices will be employed under special arrangement. All men are required to go to and from their work on their own time.

TELLER COUNTY—CRIPPLE CREEK.

Stratton's Independence.—This mine has now produced more than \$7,000,000, and has made a profit of over \$4,000,000. This handsome yield has come from the main workings, on the examination of which T. A. Rickard based the estimate of \$6,712,000 given in his report of March, 1899.

(From Our Special Correspondent.)

Black Belle Company.—At a meeting of the directors last week, S. S. Bernard, president of the El Paso Company, was elected a director, and Superintendent Bainbridge, of the same company, was elected manager. Work on company account will start at once. The property includes several claims on the top of Beacon Hill adjoining the El Paso and Gold Dollar.

Elkton Consolidated Gold Mining Company.—At a meeting of the directors last week the dividend was increased from 3c. to 4c. a share. It is reported that the mine has a wonderful strike in the north portion of the 7th level. The condition of the property warrants such an increase.

El Paso Gold Mining Company.—The directors have declared a dividend of 1c. a share. The dividend is payable on December 25. The mine is in excellent condition.

Katinka Gold Mining Company.—This company is to start a suit against the Mary McKinney Company to recover \$200,000 alleged to have been taken by the latter company out of the Chicken Hawk property owned by the Katinka Company. The outcome of the litigation will be watched with interest.

Mary Cashen Mining Company.—This company has decided to abandon work and has leased the property to C. E. Brady for 18 months. The company was unsuccessful, and it was thought better to entrust the work to a lessee who has been so successful as Mr. Brady. The property is situated on Bat-

the Mountain and adjoins the Gold Coin and the Mountain Dike.

IDAHO.

BLAINE COUNTY.

Croesus Gold and Copper Mining Company.—The articles of incorporation of this company have been filed for record at Hailey; the corporation is to exist 50 years. It is to mine in Idaho and Wyoming, and is incorporated under the laws of the latter State. The capital stock is \$2,500,000 in \$1 shares. The trustees for the first year are: E. Dickinson, John H. Ames, F. V. Mondell, Lewis T. Woll, H. C. Beeler, N. K. Griggs, and S. E. Rigg.

Federal Mining and Smelting Company.—This Omaha, Neb., concern, it is said, owns or controls 15 or 16 patented claims in the Little Wood River Mining District near the old camp of Muldoon, 25 miles from Hailey. The ore is reported to carry lead, silver and copper. W. T. Coad is president of the company, C. S. Cainer vice president and treasurer, Joseph Barker secretary, and Samuel Friend superintendent.

BINGHAM COUNTY.

Caribou Mining Company.—This company has its new 40-stamp mill at work. Mercur, Utah, men are chiefly interested and M. D. Stackpole, formerly with the Chloride Point Mill, is superintendent. An aerial tramway 1,750 ft. long connects the mine and mill.

(From Our Special Correspondent.)

Thunder Mountain Country.—F. W. Vogler, manager of the Redrock & Salmon City Stage Line, will put on stages in the spring from Salmon City to Thunder Mountain. This line will be the shorter of the various stage lines heading for that country, the distance from the railroad at Redrock being about 150 miles. This is about as near as it is possible to get to the country from the railroad.

SHOSHONE COUNTY.

Klondike Mining and Milling Company.—This company's stamp mill at Pierce City is reported in operation. C. T. Beckwith of Oberlin, O., is president of the company; John Bachtold, Walla Walla, Wash., vice-president, and Albert Niebergall, Walla Walla, secretary.

White Cross.—The mill on this claim on Moscow Mountain, near Moscow, has started work.

INDIANA.

VIGO COUNTY.

Coal Creek Mining Company.—This company is composed of Dan Davis, Gabriel Davis and Charles S. Davis. The company has purchased W. F. Lamar's mine on the north bank of Coal Creek and will equip it with modern machinery, increasing the capacity to 100 tons a day, which will be hauled to Terre Haute by teams.

MICHIGAN.

(From Our Special Correspondent.)

COPPER—HOUGHTON COUNTY.

Atlantic.—Exploration work on section 16 continues. Reports that the Baltic Lode has been encountered are erroneous.

Calumet & Hecla.—This company is making numerous improvements at Lake Linden, where the stamp mills and smelting works are located.

Tamarack.—Men are now constructing the foundation for an Ingersoll-Sergeant 2-stage cross-compound air compressor of 100-drill capacity in the compressor house at No. 5 shaft. The foundation will not be completed before next spring.

The foundation for the hoisting engine to be installed in the engine house is completed, and the concrete is now setting. Next summer the new engine, practically a duplicate of the one now in use, will be installed.

Underground at No. 5 shaft work is progressing well, and the shaft will become a producer on a large scale within a few months. Drifting on the vein at 2 levels is under way, and 11 drills are in use. During November 126 cars of rock were hoisted from No. 5, part of which were fit to send to the mill.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Adventure.—Work on surface is being pushed by the American Bridge Company, and although several buildings are started none are completed. Underground the reserves are reported continually increasing. The 60-drill Rand compressor recently went into commission.

Michigan.—The timbering of the old Minnesota workings is extremely hazardous owing to the quantity of loose rock, and work goes very slowly.

Victoria.—Work is under way in the main shaft below the 12 level. One, and possibly 2, new shafts will be started shortly by raising and sinking from the various levels. The lode runs up to 40 ft. wide.

MINNESOTA.

(From Our Special Correspondent.)

The Duluth, Mesabi & Northern road has sold 12 locomotives and will replace them with larger ones, and the Duluth & Iron Range has leased all its extra locomotives for the winter to the Great Northern Railway Company.

Additional steel car equipment will be bought shortly by the Duluth & Iron Range road, the experiments of the past season having been most satisfactory. Surveys are being made for a line from the Duluth, Mesabi & Northern to the Snyder & Oliver Mining Company's property, in section 22, T. 58, R. 20.

Changes are to be made in the legal department of the United States Steel Corporation in Minnesota as follows: Jos. B. Cotton, of Duluth, who had been attorney for the Rockefeller interests, will be general solicitor for the transportation interests of the corporation; Billson, Congdon & Dickinson, also of Duluth, will be general solicitors for the mining interests; F. B. Kellogg, of St. Paul, will be general counsel for both interests; C. A. Congdon, of the firm of Billson, Congdon & Dickinson, has been attorney for the Oliver Iron Mining Company, and Mr. Kellogg had been counsel for the Minnesota Iron Company.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

There are considerable stockpiles left on surface at the Sparta, the Cloquet, the Victoria, the Auburn, the Pillsbury, the Clark, the Burt and some other of the Mesabi mines probably not less than 1,000,000 tons in all.

Adams Mining Company.—This company has installed mules for tramping. Next year the mine will work from 3 shafts, 1 or 2 of those formerly worked being about exhausted. One of the steel shaft-houses has been moved to a new location. The mine with the Spruce, has shipped about 1,100,000 tons this year, of which the Adams proper sent down 800,000 tons.

Biwabik Mining Company.—This company is changing its 8-ton crusher and will run the ore to the hopper in cars, building a long trestle for the purpose. Screens will be added also. The mine has been stripped close to the east side, where it joins the Williams, and mining will follow in that direction another season. Its pump shaft, the old Cincinnati skip shaft, is being timbered new throughout.

Commonwealth Iron Company.—Officers of this Menominee Range company have been examining the property in T. 57, R. 21, belonging to the Northern Pacific Railroad, where exploration has shown some ore.

Franklin Mining Company.—This company shipped about 125,000 tons this year and is hoisting about 700 tons per day. Its Victoria stockpile, mined prior to 1900, is still unshipped. Its Union shaft has shipped far less the past season than anticipated, the owners, the Republic Iron and Steel Company, not requiring the quantity of Mesabi ore expected.

Newport Iron Company.—This company is considering a lease of the magnetite find a few miles north of the Mesabi formation in the N. W. ¼ of the S. E. ¼ of section 36, T. 59, R. 17, where C. H. Nichols and others are working in a shallow pit.

Snyder & Oliver Mining Company.—This company is opening the so-called McCahill property in 22, 23, and 27, T. 58, R. 20, and is sinking a shaft near the north line of 22 and just west of the line dividing 22 and 23. The shaft will be 4 compartment and will carry balanced 5-ton skips with a Webster Camp & Lane geared engine. Three large boilers are already in place. The mine is a large one and will ship as nearly as possible to its minimum the coming season. It is the property of H. W. Oliver, W. P. Snyder and others, of Pittsburg, Pa., and has a contract with the Duluth, Mesabi & Northern for transportation.

Sparta Iron Company.—This company has sold a lot of ore to be shipped all rail to Chicago this winter at prices not announced. The mine is now shipping some to Ashland also on a freight rate of \$1.15 a ton. The mine is in excellent shape, and a large amount of ore has been found under an immense horse of rock that was exposed in the early operations. It is expected that the Sparta and Malta will make a combined shipment the coming year of 600,000 tons. A big job of stripping will be done this winter.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

Joplin Ore Market.—Another advance in the price of zinc ore occurred during the week. The highest price was \$30.50. A large lot of ore belonging to the Granby Mining and Smelting Company, at Granby, was purchased early in the week, but the price could not be learned. It is thought this lot

contained nearly 1,000 tons and that the price was \$30 per ton. Another agent took a lot aggregating 350 tons at \$30 per ton. The Missouri & Kansas Zinc Miners' Association is exporting zinc ore to Europe, but will not give out the amount shipped or what is to follow. The district has experienced no disagreeable weather so far and there has been no curtailment of output. Very little zinc ore is in the bins and it is expected that next week will record a further advance in the price.

The lead ore situation remains unchanged at the same price as for the past 11 weeks, \$23.25 per 1,000 lbs. delivered. It is rumored that the Serage lead smelter, at Galena, Kan., has been sold to the lead combine and that it will be closed this week. The plant is being cleaned up.

During the corresponding week of last year the highest price paid for zinc ore was \$29.50 per ton, and that only for a few choice lots. The average price during the last week was much nearer the top price than at any time during the last 10 years. During the corresponding week of last year lead ore brought \$23 per 1,000 lbs., delivered.

The outlook is bright for both ores and the industry is very active. Much new land is being opened up, and a number of purchases of raw land in the mineral district are reported.

Following is the turn-in by camps of the Joplin district for the week ending December 7:

	Zinc, lbs.	Lead, lbs.	Value.
Joplin	2,332,490	578,510	\$47,271
Galena-Emple	1,275,020	201,730	22,163
Carterville	1,538,380	402,790	23,749
Aurora	1,045,180	47,840	11,900
Oronogo	620,340	34,270	9,333
Webb City	573,070	42,250	8,702
Duenweg	408,610	105,290	8,066
Cave Springs	406,500	27,300	6,733
Zinette	282,980	9,170	4,245
Spurgeon	191,870	106,080	5,104
Roaring Springs	255,940	3,250	3,147
Carthage	442,070	.....	6,210
Neck City	314,750	.....	4,504
Carl Junction	305,840	.....	4,588
Stotts City	204,430	.....	2,964
Sherwood	139,500	.....	2,803
Central City	144,410	1,720	1,744
Badger	127,960	18,860	2,193
Wentworth	64,000	.....	928
Total	10,735,140	1,579,060	\$182,697
Total, 50 weeks	491,497,380	67,476,980	7,543,230

Zinc values for week, \$145,702; lead, \$36,995; zinc value 49 weeks, \$5,992,484; lead, \$1,550,746.

MONTANA.

FERGUS COUNTY.

Philippine.—This group of claims, in the Armelis District, owned by Charles Rhoades, Otto Anderson and Joseph Meredith, is reported bonded to F. A. Case, representing New York men. The ore is a cyanide proposition, the gold values running, it is said, from \$2 to \$4.50 per ton. But a small amount of development work has been done.

GALLATIN COUNTY.

Montana Corundum Company.—This company has been organized under the laws of Montana to work the mines on Elk Creek, which have been developed during the past season by Messrs. McCoy & Klein, of Belgrade. The officers for the first three months as required by Montana statutes are: Columbus E. McCoy, president; Harris Kink, vice-president; Frederick L. Klim, secretary; Prestley S. Johnston, treasurer; Leverett S. Ropes, superintendent. These gentlemen also form the board of directors. Work was commenced November 30 on a shaft to open up the ore bodies previously located.

GRANITE COUNTY.

(From Our Special Correspondent.)

Royal.—The mine and 10-stamp mill of this company are situated 10 miles south of Flint station. The lessees are seeking a renewal of their lease, which expires December 12. The property under the management of the old Royal Company was very productive until the lead was lost. This was again found by the present operators.

MADISON COUNTY.

New York & Montana Mining and Milling Company.—This company, it is said, under the management of W. B. Holmes, has started the pumps on the Alameda Mine to prospect the old workings. It is said that when the mine closed some years ago there was 3 ft. of ore at the bottom of the 400-ft. shaft.

PARK COUNTY.

Saint Julien.—This old gold mine, 6 miles from Chico, is owned by Nolan Brothers, of Livingston, and W. A. Berry, of Detroit, Mich. It is equipped with an Elpas roller mill, with a capacity of 40 tons daily, and Cammett and Wilfley concentrators. The property is being developed by 4 tunnels, opening the vein to a depth of 1,300 ft. No. 1 tunnel is 150 ft. long; No. 2, 250 ft.; No. 3, 175 ft., and No. 4, about 500 ft.

POWELL COUNTY.

(From Our Special Correspondent.)

Northwestern Gold and Sapphire Mining Company.—This company owns 2 miles of ground on Dry Cottonwood, 10 miles from Race Track Station. During

the past season the company has put in a flume on bedrock, and brought in water by a ditch for hydraulic-ing, completed a drain and is ready to pipe gravel as soon as the water starts in the spring. A drift run to the left of the flume, at its head, reached the channel of the gulch. From a pit about 4 ft. square and 1 ft. deep, it is said that 1 lb. of sapphire crystals, and \$4 in gold was saved by panning. The gold is a bright shot, easily saved and worth \$18 an ounce. The company is a Butte concern. The officers are John Lenk, president; Paul Kohout, secretary; Nick Knoch, treasurer, and Albert Zieger, superintendent. The sapphires are of various colors; light, blue, pink, sea green, canary yellow, white and some ruby red.

NEVADA.

ELKO COUNTY.

(From Our Special Correspondent.)

Black Eagle.—This mine owned by Salt Lakers has sent a shipment of 24,570 lbs. of ore to the Salt Lake Valley smelters. Owing to the long haul by team to Oasis on the Oregon Short Line Railroad, only the best grades of ore pay to ship.

NEW JERSEY.

SUSSEX COUNTY.

New Jersey Lime Company.—This company has been organized through the consolidation of the Hamburg Lime Company, of Hamburg, and the White Rock Lime and Cement Company, of McAfee Valley. The consolidated company owns 9 lime kilns at Hamburg and McAfee, large limestone quarries and some 2½ miles of tramway. Its kilns have at present a capacity of 750 bbl. lime a day.

NORTH CAROLINA.

STANLY COUNTY.

(From Our Special Correspondent.)

Carolina Gold and Copper Company.—This company, organized under the laws of Arizona, and having mines in that territory, has purchased the Parker Gold Mine in this county and the Copper Knob Mine, in Ashe County, and will operate them. The Parker Mine has produced several hundred thousand dollars in nugget gold, and shows a large quartz vein carrying free gold and auriferous iron and copper pyrites. The Copper Knob Mine produces copper ore carrying good values in gold. This company is capitalized at \$2,500,000.

OREGON.

JOSEPHINE COUNTY.

(From Our Special Correspondent.)

Blue Gravel.—These mines which are practically an extension of the Old Channel deposit, have been purchased by Harvey & Thompson, and will be put in shape for business.

Old Channel.—The new reservoir of these hydraulic mines is completed. This, together with the widening of the 12-mile ditch to a capacity of 5,000 miners' inches, gives a good pressure in the 4 giants. The mines will work a gravel bank 2,850 ft. long and ranging from 100 to 210 ft. high. The gravel is loose, carries high values in coarse gold, and was mined last year at a cost of but 2.5c. per yd., beating all previous records of southern Oregon hydraulic mines. The property is owned by J. R. Harvey and William H. Thompson, of Chicago, Ill.

PENNSYLVANIA.

ANTHRACITE COAL.

Delaware & Hudson.—Work on the new storage plant at Honesdale is pushed.

Moffett.—The strike at this colliery at Sugar Notch where the men have been idle 2 months, is over. The Seneca Coal Company has bought the property and will pay the old scale of wages.

Northern Anthracite Company.—The large breaker being erected near Lopez is nearly completed. It will be 160 ft. high and 106 ft. long. The shaft is 125 ft. deep.

BITUMINOUS COAL.

Midland Coal Company.—This company is trying to secure a right of way for a road a mile or so west of the main line of the Western Washington road along Little Chartiers Creek.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Alder Creek Company.—The building for a 60-ton cyanide plant is completed in the Yellow Creek District. The boilers have been set and other machinery is arriving. The company will treat low grade quartzite ore.

Castle Rock Mining Company.—Spearfish people are advancing money for the development of a gold property in the Bear Gulch District. A tunnel has been run 120 ft.

Dakota.—This cyanide plant at Central City has been leased by Charles Henley and John Henton,

who intend to treat tailings from the Father De Smet stamp mill owned by the Homestake Company. The Homestake Company charges no royalty, for the tailings would go down the creek as waste. The company will soon take care of the tailings from this mill and also the other 2 on the north side of the hill, as soon as the new cyanide plant at Gayville is completed.

Denver-Dakota Company.—This company has completed plans for a 300-ton cyanide plant at Crown Hill, in the spring. The officers are: President, C. E. Giddings, Deadwood; vice-president, J. I. McLaughlin, Omaha; treasurer, Charles Krause, Deadwood; secretary, Charles M. Giddings, Deadwood. The company has patented this season 230 acres of ground. The plant will be built at Ross Springs. The property is east of the Deadwood-Standard and Spearfish Mining companies mines, at Ragged Top.

Golden Reward Company.—The tanks are being installed in the new 200-ton cyanide plant in Deadwood.

Homestake Company.—The stock of the Father DeSmet Company has been absorbed by the Homestake, and the DeSmet mill and hoist are now operated by the Homestake.

Spearfish Mining Company.—This company has the foundation for the new cyanide plant at Ragged Top, to take the place of the one burned, repaired, and work on the building has started. The new plant will be an improvement on the former one, the capacity being 50 tons per day larger. It is expected that the plant will be in operation by April.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Castle Creek Mining Company.—The first payment on the property on Wheeler Hill has been made by this company, composed of Pennsylvania men, and work will start immediately.

Deadwood-Ohio Company.—This company has encountered gold ore in the new tunnel. Eight men, from Chicago and Toledo, are here to consider a concentrating plant for the ore from the Mary Bell, on Smith Creek. The company controls 475 acres of ground.

Golden Slipper.—A new steam hoist has arrived at this mine and is being installed.

Hornblende Camp.—William Mendenhall, owner of the Benedict Mine, is about to make another test run. It is expected that the Yellow Bird Mine will start again this winter. A steam hoist will be installed. The shaft has been sunk 100 ft.

Lulu.—Minneapolis men have bonded this mine 4 miles east of Hill City. M. L. Day, of Deadwood, is superintending the work. The vein is reported 4 ft. wide, carrying free gold.

Ohio-Black Hills Gold Mining Company.—A tract of 475 acres of mining ground at Rochford has been sold to Toledo, O., men, and this company is to be organized with the following officers: President, B. W. Osborne, Toledo; vice-president, H. J. Mayham; treasurer, J. W. Pero, Fremont, O.; general manager, Asa Baldwin, Deadwood. The ground is cut on the north end by the Burlington Railroad and by Rapid Creek, water rights, with 1,650 in. of water, having been obtained. There are several veins of free-milling and concentrating ore, including the Mary Belle vein, which has been developed by a 200 ft. tunnel. A concentrating mill is to be erected. The company is capitalized at \$4,000,000 shares, par value \$1.

York Mining Company.—This company has elected as officers: President, G. G. Bennett, Deadwood; vice-president, J. T. Sharp, Hill City; secretary, James Graham, Hill City; treasurer, Estellene Bennett, Deadwood; superintendent, C. Miller, Hill City. The company has purchased 5 claims 7 miles north from Hill City, and a shaft will be sunk 200 ft.

Tycoon Mining Company.—Six Cedar Rapids, Ia., men have been at Keystone making an examination of the Ranger Mine, and have decided to make a test run of 200 tons of ore at the Holy Terror 10-stamp mill. The Ranger has a 100-ft. shaft and a 270-ft. tunnel.

UTAH.

(From Our Special Correspondent.)

Salt Lake Bullion Settlements.—The settlements at Salt Lake City for the week ending December 7 are: Bullion, \$188,700; cyanides, \$29,800, and gold bars, \$14,200.

BEAVER COUNTY.

(From Our Special Correspondent.)

Horn Silver.—This mine shipped 1,046,720 lbs. first-class ore to the Salt Lake Valley smelters for the week ending December 7.

Indian Queen & Belcher Group.—Men are drifting from the shaft, now down 150 ft. The property is owned by Morrison Brothers, T. A. H. Franklin and E. W. Genter, of Salt Lake, and is north of Copper Gulch.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—The following are the shipments from Tintic for the week ending December 7: Eureka Hill, 2 cars; Eagle and Blue Bell, 3 cars; Godiva, 3 cars; Gemini, 23 cars; Carisa, 15 cars; Lower Mammoth, 2 cars; May Day, 2 cars; Mammoth, 3 cars; Tesora, 9 cars; Uncle Sam, 5 cars; Yankee Consolidated, 7 cars; Tesora Mill, 1 car concentrates.

Ajax.—The raise from the 1,000-level in the lead shoot is now up about 40 ft. and shows nice shipping ore.

Cleopatra.—At 475 ft. water has been encountered in this Silver City mine. The material taken out is a heavy iron with a little silver and lead, similar to ore found in the Swansea.

La Reine.—This mine at Tintic has found ore on the level 75 ft. above the main tunnel. The mine is on Godiva Hill and has the Uncle Sam, May Day and Yankee Consolidated on the north. The ore resembles that from the Carisa and Victor on the south.

May Day Mill.—Two car-loads of concentrates being loaded from this dry process mill will reach Salt Lake by December 10.

Tetro.—In the winze 170 ft. below the tunnel level in this mine at Tintic a streak of carbonate lead ore has been opened that looks well.

FUTE COUNTY.

(From Our Special Correspondent.)

Banner Gold Mining Company.—The capital of this new company is \$125,000, divided into 500,000 shares. The company owns 9 claims in Gold Mountain District and a lease and bond on 14 claims. L. H. Bartholemew is president and secretary; J. D. Jewett is vice-president; Elnor Bartholemew is treasurer.

Mount Baldy Gold Mining and Milling Company.—This company has been formed in Salt Lake to work the Heary group of 12 claims in the Mount Baldy District. The capital is 300,000 shares of the par value of \$1 each. P. A. H. Franklin is president; George T. Henry, vice-president; Benj. D. Luce, secretary and treasurer. Lorin N. Morrison and Ada May Luce are the other directors.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Shipments.—The following are the shipments from Bingham for the week ending December 7: Last Chance, ore, 49,370 lbs.; Ben Butler, ore, 256,840 lbs.; Commercial, concentrates, 461,710 lbs.; Tewaukee, concentrates, 157,400 lbs.; Queen Mill, concentrates, 110,050 lbs.; United States, ore, 90,000 lbs.; Ashland, ore, 45,580 lbs.; Yosemite, ore, 23,000 lbs.; Columbia, ore, 122,160 lbs.

Bingham Consolidated Mining and Smelting Company.—The company forwarded from its smelter in Salt Lake Valley for the week ending December 7 210 tons matte to the Butte & Boston Smelter in Montana and 127 tons to the Highland Boy Smelter.

Germania Smelter.—This plant, John H. Tucker, superintendent, reduced over 12,000 tons of ore in November. The company employs 450 men. Construction work on the new smelter close to the Germania is reported progressing satisfactorily, and when completed the company will have a capacity for another 1,000 tons per day.

Utah Consolidated.—This company forwarded to the East about 180,000 lbs. of copper, gold and silver bullion from its smelter in Salt Lake Valley for the week ending December 7.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—The following are the shipments for the week ending December 7, Valeo, ore, 268,940 lbs.; Quincy, ore, 821,000 lbs.; Ontario, ore, 1,903,410 lbs.; Daly-West, ore and concentrates, 1,187,680 lbs.; Silver King, ore, and concentrates, 2,691,020 lbs.; Anchor, concentrates, 209,800 lbs.; California, concentrates, 122,700 lbs.; Loring Bros., concentrates, 138,850 lbs.

America Mining Company.—The company's property is situated about ½ mile west of the California Mine in Thaynes Canyon. The management has let a contract for 100 ft. of sinking on the incline shaft. Three ft. of ore is exposed, said to assay 16 per cent copper, 12 oz. silver and 80c. gold. Wm. Crome is secretary of the company.

Glencoe.—This mine is opening up some nice shipping ore in a large vein of milling ore that is being developed near Park City.

TOOELE COUNTY.

(From Our Special Correspondent.)

Stockton Shipments.—The shipments from Stockton for the week ending December 7 are: Ophir, concentrates, 918,440 lbs.; Hidden Treasurer, ore, 45,780 lbs.; Muscatine, ore, 45,000 lbs.

Mono.—This mine near Ophir, has struck in a cross-cut off the 2,200 ft. tunnel a silver lead ore said to give assays of from 50 per cent to 61 per cent lead, 53 oz. to 104 oz. silver and from 90c. to \$1.50 in gold, besides 3 per cent copper. This strike will give something like 1,300 ft. stoping ground.

Utah.—This mine at Fish Springs forwarded 74,700 lbs. first class silver lead ore to the Salt Lake Valley smelters for the week ending December 7.

WASHINGTON.

Pacific Coal, Oil, and Gas Company.—This company, through F. E. Snodgrass, of Spokane, its secretary and financial agent, has issued a circular worthy of notice among the mass of printed statements sent out by western oil companies. The circular states that the company, as well as others in the supposed oil district, under development failed to find oil and abandoned work. The basaltic rock proved very hard and the cost of reaching the required depth is much greater than expected. The situation did not warrant the company asking for the subscriptions and the company has been compelled to quit business. The officers of the company are John Hunner, president; John J. Humphreys, vice-president, and Wm. H. Shaw, treasurer.

FOREIGN MINING NEWS.

AFRICA.

GOLD COAST.

The British Colonial Office has taken the somewhat unusual course of publishing in London the following extract from an address made by the Governor of the Colony to the Cape Coast Chamber of Commerce in relation to the gold mining operations on the coast: "In talking about export trade, you will probably have noticed that I have said nothing about gold export. There is very little of it. In the first 6 months of this year only one company exported gold, and the gold output has been steadily decreasing for some years past. Such development as is proceeding seems to have checked rather than increased it. This is a somewhat discouraging state of affairs; but worse remains behind. Many hundreds of concessions have been registered in the colony this year, and notices of them have been filed in the Concessions Court. I never met a man—prospector, barrister, merchant, or official—who, when we talk of the gold industry, does not tell me that a large proportion of these concessions are not worth the paper on which they are written—in fact, a concessions industry has grown up which is quite distinct from the mining industry, and threatens to ruin it, and to permanently injure the future of the colony. The industry has, I regret to say, its centre in this town, where clerks and persons of no standing act as middlemen between the native chief who is willing to lease his stool lands to any person and to any number of persons who will give him money and the speculator who buys wholesale from the clerks the documents they have executed with the chiefs without inquiring whether the lands they refer to do or do not represent any value as a gold mining property. The speculator hopes to get back from a company the commission money he has paid to the middleman and the earnest money he has paid to the chiefs, and a very handsome profit to himself, while the company formed nominally to work the concession looks to the public, and not to the gold on the concession, to recoup expenses. It is difficult to protect people from the consequences of their own folly; but I certainly advise the public, before taking shares in any gold mining company, to see that its property has been satisfactorily reported on by a man qualified by his character, capacity, and knowledge to prospect for gold."

NATAL.

The Commissioner of Mines reports that in September there were 14 collieries in operation which produced 49,447 tons of coal, an increase of 9,091 tons over September, 1900. Exports of coal were 7,603 tons, and 20,675 tons were supplied to steamers in the port of Durban. The number of persons employed underground was 2,310; surface, 1,179; total, 3,489. Of these 177 were white men, 1,272 East Indian coolies and 2,040 negroes.

AUSTRALIA.

QUEENSLAND.

The Mines Department reports the gold production of the State for October at 77,619 oz. crude, which was equal to 57,638 oz. fine gold, or \$1,191,377. The output for October, 1900, was 50,551 oz. fine, showing an increase of 7,087 oz. this year.

Mount Morgan Gold Mining Company.—This company reports for October a total of 23,023 tons of ore chlorinated, the yield being 14,290 oz. gold; an average of 0.62 oz. to the ton. A supply of water has

been secured, enabling the works to treat the low-grade ore. In July and August only picked high-grade ore was treated on account of the scarcity of water.

CANADA.

BRITISH COLUMBIA—SLOCAN DISTRICT.

Slocan Ore Shipments.—The total amount of ore shipped from the Slocan and Slocan City mining divisions for the year 1900 was, approximately, 35,000 tons. Since January 1 to November 23, according to the New Denver Ledger, the shipments have been as follows:

	Week.	Total.
Payne	20	1,808
Last Chance	20	1,279
Slocan Star	—	3,488
Ruth	—	279
Bosun	40	460
Hewett	40	1,876
American Boy	44	1,330
Ivanhoe	20	1,177
Sunset (Jackson Basin)	—	681
Boverleigh	—	117
Wonderful	—	84
Arlington	—	4,608
Two Friends	—	40
Enterprise	40	600
Hartney	—	140
Black Prince	—	155
Goodenough	—	215
Miller Creek	—	20
Reco.	—	279
Sunset (Can. Gold Fields)	—	53
Silver King	—	14
Noble Five	—	59
Red Fox	—	103
Antoine	—	16
Queen Bess	—	1,199
Monitor	—	480
Corinth	—	81
Bondholder	—	26
Rambler	40	2,500
Surprise	—	200
Kaslo Group	—	10
Chaplin	—	15
Speculator	—	10
Ajax	—	10
Soho	—	60
Emily Edith	—	40
Phoenix	—	23
Alpha	—	40
V. & M.	—	20
Mont	—	22
Ruby	—	1
Esmeralda	—	6
Hampton	—	2
Capella	20	42
Fourth of July	—	12
Tamarac	—	5
Mary Durham	3	8
Buffalo	—	5
Sweet Grass	—	2
Total tons	267	23,695

CENTRAL AMERICA.

NICARAGUA.

El Mico Mining Company.—The 20 850-lb. stamps at the El Mico Mine began crushing on November 20, and are doing good work. This mill was erected under the supervision of C. A. Abbott. All the lumber used was imported from New Orleans. The mines are only 6 to 8 hours' travel from Roma, and only 30 minutes of this is by land.

Work is being pushed on properties of the Star Mining Company, San Francisco Mining Company and Prospect Mining Company. Brown & Harris, of Roma, and Bluefields are largely interested in the above-named properties. On El Mico there are several thousand yards of tunnels, and a 22-ft. ledge carrying good values.

EUROPE.

BELGIUM.

New Coal Field.—Under date of November 5, 1901, United States Consul Winslow, of Liege, reports the discovery of a soft-coal basin at Asch, in the Province of Limbourg, a few miles to the north of Liege. The coal much resembles that found in Westphalia, Germany. It contains from 18 to 20 per cent of volatile matter. The first vein was discovered at a depth of about 1,640 ft., and between this and 1,968 ft., 5 veins have been discovered, ranging from 2.6 ft. to 6.6 ft. It is thought this basin covers about 24,700 acres. A German company has begun to develop a mine, and the John Cockerill Company, which has extensive mills at Seraing and shipyards at Antwerp, has decided to build large works in the basin.

MEXICO.

CHIHUAHUA.

(From an Occasional Correspondent.)

J. S. Qualey has closed negotiations for a considerable amount of additional property in the Santa Eulalia District, near Chihuahua.

Cerro Colorado.—This mine at Parral, belonging to the heirs of Ismael Galan, is reported sold to a New York syndicate. The mine produces milling and smelting ores. It is said that the new company will put in an amalgamating plant.

Federal Copper Company.—The Columbia Mine, at Terrazas, near Chihuahua, has been purchased by this company. A hoisting engine has been purchased, and the company intends to sink a shaft. About 100 tons of ore, said to average 8 per cent copper, are being produced weekly.

Montezuma Lead Company.—This company, at Santa Barbara, has its new electric tramway in working order.

Pinos Altos.—This mine, in the Sierra Mojada District, is on the market. The monthly production is \$30,000, Mexican.

Santa Eulalia Mining Company.—The transportation facilities are to be extended so as to have railway spurs to all the company's properties. Shipments from the San Domingo Mine are about 160 tons of high-grade lead-silver ore.

The other producers in the Santa Eulalia camp are shipping about 100 tons a day over the Mineral Railway, most of which goes to Aguas Calientes. The producers are awaiting the completion of the El Paso Smelter, when shipments will be very largely increased owing to the difference of \$4 in freight rate between Aguas Calientes and El Paso.

GUANAJUATO.

(From an Occasional Correspondent.)

Orito.—A bond has been given on this property in the Santa Rosa District to Colorado parties. High-grade silver ore, some running 150 oz. to the ton, is being extracted. No ore is being shipped that carries less than 25 oz.

In the Santa Rosa District very little ore is sent to the smelters, nearly all being treated by the local reduction works using the Patio process.

Victoria.—Cripple Creek, Colo., people are operating this mine on the Mother Lode. The vein of silver has been encountered about 860 ft. from the surface.

JALISCO.

(From an Occasional Correspondent.)

Mexican Ore Reduction Company.—This company contemplates putting in another 25-ton Cornish roll mill on its property near Jalisco. The secretary's office is in the Phelan Building, San Francisco, Cal.

OAXACA.

(From an Occasional Correspondent.)

San Martin.—This mine at Oaxaca is reported sold for \$350,000 to Seattle, Wash., people. The product is silver, carrying gold values. A new combination process mill to treat 50 tons of ore, said to run \$80, Mexican, to the ton, is being put in.

SONORA.

Cobre Grande Copper Company.—Axel M. Hallenborg, a resident of New York City, who owns 8,000 shares of this company's stock and who holds promissory notes of the company for over \$40,000, brought suit in New York on behalf of the company, against it and its officers and directors, charging that these officers, acting fraudulently, formed a scheme, with confederates, to deprive the company of its mining property in Mexico.

The plaintiff secured an order in the present suit appointing a receiver of all the company's property, and granting an injunction restraining the Cobre Grande Company from collecting any debts or paying out or disposing of any of its property or effects. That order has been on appeal affirmed, with important modification, by the First Appellate Division of New York. Hugh J. Grant, of New York City, is appointed receiver of whatever property the company has in New York.

(From an Occasional Correspondent.)

Northern Sierra Madre Mining Company.—This company owns and works the Providentia (copper), Los Amigos (gold) and several other gold and copper properties near Ures. The vein on the Providentia is 100 ft. wide. The Los Amigos Mine was worked considerably over a century ago but the owner could not hold it against the Yaqui Indians. There are 3 incline shafts on the property 60 to 75 ft., besides an open cut 1,000 ft. long along the vein. There are estimated to be 100,000 tons of ore in sight running from \$12 to \$40 per ton. The company contemplates putting in a 10-stamp mill and a steam hoist. Advances from the company's superintendent state that in view of the practical subjugation of the Yaquis great activity in prospecting and mining prevails in this section. Four railroads are building into the region, one of which, the Stillwell road, built by Kansas City, Mo., men, will run within 6 miles of the company's property.

Senora Quartz Mining and Development Company.—This company, now working the El Tiro and La Yaqui gold mines, near Santa Ana, has plans under way for constructing a 14-mile iron pipe line, 3 1/2 in. in diameter or over, from Los Clenega to the mines and for installing a complete steam pumping plant. This new outfit will furnish water for milling and cyaniding, the properties being equipped with a 10-stamp mill, cyanide plant, etc. The main office of the company in San Francisco, Cal., will soon be removed to the Examiner Building.

MINING STOCKS.

Complete quotations will be found on pages 808 and 809.

New York. Dec. 13.

The speculative atmosphere of Wall street has again been discolored by unsubstantiated rumors about copper, and in consequence share values have fluctuated widely. As usual, Amalgamated has been the target, the bears forcing the price down to \$64 5-8 on December 3, the lowest price on record, which is less than one-half the high-water mark on June 17 last. Prices rallied to \$74 3-4 on Tuesday. Prices then saw-sawed until Thursday, when \$67 was touched, and \$68 1/2 was quoted at the close. Trading was large.

Buying of Anaconda has been comparatively small at \$29 1/4@32. On curb trading was one-sided, most attention being paid to Greene Consolidated, of Mexico. Strength was given this stock by the report of a rich strike on the property. Sales were reported at \$34@37 1-2. Buying of Tennessee was done at \$10 3-4@11 1-2, of British Columbia at \$10 1-2, Union at \$4 3-4@5 and White Knob at \$20@18.

In the California section little is doing. Quick-silver shares are lower; the common sold at \$3 7-8 and the preferred \$9 1-2. Standard Consolidated brought \$3.80.

Cripple Creek, Colo., shares were quiet. Elkton Consolidated was not strong, selling at \$1.45, notwithstanding the increased quarterly dividend. Isabella brought 33@32c.

The initial trading in Empire Consolidated quick-silver of California, on December 11 on curb, made a price of \$10 3-4 for the stock. The company has a total capital of \$5,000,000 in \$10 par shares, and includes in its properties in Lake and Colusa counties, the old Sulphur Banks land which has been a producer in the past. The company has just declared its first quarterly dividend of 3 per cent, payable January 15, and amounting to \$150,000.

Auction sales were 66 shares Horn Silver Mining Company, of Utah, at \$2.05 per share, and 17 shares New Jersey Zinc Company at \$230 1-4 per share.

Salt Lake Dec. 7.

(From Our Special Correspondent.)

The mining stock market on the Salt Lake Exchange closed for this week with an increase of business, 566,295 shares changing hands for \$375,356. Carisa, May Day and Uncle Sam Consolidated were the most active.

The governing board of the exchange arranged to have regular reports from the management of the mines listed on the exchange sent in to the committee appointed for that purpose, to give the public a chance of finding out the condition of the mines financially and otherwise. The secretary of the Tetro reported that the company was without a debt and with the pending assessment collected would have over \$3,000 in the treasury.

The secretary of the May Day stated there was \$11,429 in the treasury, that the mine was in good condition and open for inspection. There are about 20 other properties to hear from and if the committee carries out its intention carefully the mining interests of the State will be much benefited.

The annual meeting of the Godiva was held after the Gemini meeting and the same officers and directors were elected. Both properties are regular shippers but nothing is given out in reference to the earnings of either. The directors of the Uncle Sam Consolidated at Tintic held their regular monthly meeting in Salt Lake on December 7. After auditing accounts for November pay-roll the treasury was not in a position to pay the December dividend, which was accordingly passed.

San Francisco Dec. 7.

(From Our Special Correspondent.)

The market has been dull and rather weak. Orders have been lacking and the trading showed nothing of interest. Some prices are: Consolidated California & Virginia, \$1.60; Ophir, 68@69c.; Mexican, 14c.; Hale & Norcross, 13c.; Best & Belcher, 12c.; Challenge, 8c.; Savage, 4c.; Potosi, 2c.

The sales on regular call at the San Francisco Stock Exchange for the year to date compare as follows:

	1900.	1901.
January, shares.....	164,400	312,385
February.....	112,000	132,685
March.....	252,730	152,220
April.....	121,500	180,625
May.....	171,015	151,020
June.....	129,505	107,340
July.....	84,110	163,980
August.....	163,985	143,940
September.....	113,350	86,710
October.....	229,790	127,150
November.....	136,210	97,875
Total.....	1,678,595	1,655,830

Samuel Dixon, one of the oldest and most esteemed stock brokers of this city, a member of the San Francisco Stock and Exchange Board since April, 1869, died suddenly from heart failure December 4, aged

77 years. His death was formally announced at the 9:30 session of that board on Thursday, and after the list of stocks had been called an adjournment was taken until 2:30 this afternoon, out of respect to his memory. A committee consisting of Joseph L. King, Charles Stoutenborough and John Mackenzie was appointed to officially represent the board at the funeral.

Up to the end of August the comparison with last year was favorable, but the business of September, October and November has made a very poor showing.

Business on the Producers' Oil Exchange has been rather quiet, and prices somewhat weaker. Some quotations are: Hanford, \$99@100; San Joaquin Oil and Development, \$7; Twenty-eight, \$1.65; Sterling, \$1.10@1.15; Caribou, 75c.; Reed Crude, 35c.; Giant, 30c.; Apollo, 18c. The low priced stocks have been most in demand.

London. Nov. 26.

(From Our Special Correspondent.)

Though the South African market has as usual been confined within narrow limits this week, considerable interest has been roused among shareholders by the publication of the report of the Consolidated Gold Fields of South Africa for the year ended June 30 last. The profit made by the company during the year was naturally a comparatively small one, being only £200,000, as compared with figures running into millions while mining and development were being carried on. The previous year the profits made were undivided and were carried forward to provide funds for restarting the mines after the war is over. Allowance has already been made in the accounts for the expenditure of something like £300,000 in this direction, the expenditure being incurred by the companies some of whose shares are held by the Gold Fields company. The report contains a large amount of interesting matter relative to the condition of the mines and the future mining and industrial conditions, and it will go far to revive the market generally.

LeRoI continues to afford the chief source for speculation in the mining market, and the shares have fluctuated sharply and rapidly between £4 and £6. No official reports have come forward yet, but every speculator claims to have private information. The movements do not indicate in any way the real facts of the case and most of the statements made and rumors floated are wild and wide of the mark. One of the financial papers has published a report which is alleged to have been written by Mr. Bernard Macdonald for the company a few months ago on the general state of the mine and its prospects. The paper states that it is not quite sure that the report is a genuine one, though the probabilities are that it is. Until the authorship is confirmed it is hardly profitable to study it closely, but the main points are of interest. It is stated that there is actually in sight 1,000,000 tons of ore and another 400,000 tons are estimated as existing on undeveloped portions of ore shoots. The average grade of this ore is estimated at \$12.50 while the cost of mining, smelting, etc., is figured at \$9.34, so that a net profit should be made of \$3.15. The statement that at the deepest level the ore is of average grade and promises to be equal to that in the upper levels is also of interest. The public will look forward to the publication of this report officially and also to Mr. Frecheville's report which is promised some time about Christmas.

The market in West Australians has had another disturbing factor this week in the difference of opinion between the manager and the consulting engineer of Lake View Consols as to the amount and value of the ore reserves at that mine. The board of directors has decided to have an independent opinion on the subject, in order that the uneasiness among shareholders may be allayed. There has been quite a slump in West Australians generally over this incident. It will be remembered that several times before now, the subject of ore reserves has formed a considerable source of anxiety in the market for West Australian shares; and its recurrence at this particular opportunity when it was hoped that West Australian operations were to be on a more reliable basis is unfortunate from a market point of view.

For some time it has been felt that the Salt Union, Limited, which controls the salt supply in the north of England, was over-capitalized when it was floated some 14 years ago. It is a long time since the ordinary shareholders received dividends and the preference shareholders have not received anything for a year or two. Last year I mentioned that a scheme for writing down the capital was being considered, and I have now to report that the directors have arrived at a point in the negotiations when the proposed terms can be placed before the shareholders. It appears from the re-valuation of the assets of the company that the property is now estimated at £1,400,000 less than the book value, which stands at £4,136,721. It is therefore proposed to write down the capital by £1,300,000 so

as to bring it into line with the actual value. The present capital consists of £1,200,000 in debentures which carry £54,000 per annum as interest, £1,000,000 in 7 per cent preference shares, and £2,000,000 in ordinary shares. It is, of course, impossible to touch the debentures, but it is proposed to reduce the preference capital to £700,000, and the ordinary to £1,000,000. This proposition is now being considered by the shareholders and there is little doubt that it will be accepted. It should be stated that at the present rate of profits there will still be very little to distribute in the way of dividends among the shareholders, as the debenture interest swallows up most of the profits. The shares will, however, become of greater speculative value and an opportunity will thus be given to some of the tired shareholders to clear out.

The prospectus has been advertised this week of the Orange River Irrigation, Limited. It has been formed under the laws of the Cape Colony to acquire land on the Orange River, 60 miles below Prieska in Griguland and to turn it into arable land by irrigation. The scheme has no connection with mining, but it is being put before people who usually tackle mining propositions so that it has caused some attraction in the mining market. The district where the operations are to be undertaken is at the borders of the South African tract of desert. As foodstuffs are always being imported into South Africa, prospects for the reclamation of desert land are always welcome. This particular scheme depends entirely on the ability and energy of Mr. S. Weingarten, who has originated it and intends to be manager of it. It is, however, difficult to judge of the prospects of the scheme in England, and I do not hear that it is being taken up here very extensively.

Paris. Dec. 1.

(From Our Special Correspondent.)

The Bourse continues dull, and there seems little prospect of improvement before the end of the year—if then. In mining stocks the business has not been large.

The copper shares show as much activity as any shares in this department, but the uncertainty regarding the future of the metal is not encouraging higher quotations. The copper market is still the subject of much discussion, but no one seems to comprehend the conditions fully and the result is unsatisfactory.

The slight activity in the Transvaal gold stocks which was recently noted, has not lasted, and interest is subsiding again. It seems impossible to keep up any movement in these shares until something decisive occurs in South Africa.

The zinc and lead shares which have been very quiet of late have shown more activity. Vielle Montagne has improved, and Malfidano, under better management, shows signs of recovery from its heavy fall of a few months ago, while the price of zinc does not improve the new convention among the companies will, it is believed, help the market. In the

DIVIDENDS.

Name of Company.	Latest Dividend		Total to date.
	Per Date.	Per Share.	
Barreno, Mex.	Dec. 15	\$7	\$2,088
†Boston & Montana Copper.....	Dec. 20	5.00	750,000
*Central Lead, Mo.	Dec. 15	.50	5,000
*Daly West, Utah.	Dec. 16	.40	60,000
†Elkton Con., Colo.	Dec. 20	.04	100,000
El Paso, Colo.	Dec. 16	.01	9,000
El Paso, Colo.	Dec. 25	.01	24,250
*Empire State, Idaho.	Dec. 16	.10	50,554
*Gwin, Cal.	Dec. 20	.05	5,000
*Helena Con., Oregon.	Nov. 25	.00 1/2	6,500
*Homestake, S. Dak.	Dec. 26	.25	52,500
Homestake, extra.	Dec. 26	.25	52,500
*National Lead, pt.	Dec. 16	1.75	260,820
*N. Y. & Hond. Rosario.	Dec. 23	.10	15,000
North Star, B. C.	Dec. 15	.01 1/2	19,500
Ontario Silver, Utah.	Dec. 20	.30	45,000
Oscoda, Mich.	Dec. 23	3.00	287,700
*Quincy, Utah.	Dec. 15	.84	125,000
*Smuggler, Colo.	Dec. 18	.03	30,000
*Standard Oil.	Dec. 16	8.00	7,660,000
†St. Joseph Lead, Mo.	Dec. 20	.15	37,500
Santa Gertrudis, Mex.	Dec. 26	.22	6,336
Sorpreasa, Mex.	Dec. 26	2.18	2,093
†Tamarack Copper.	Dec. 30	10.00	600,000
†U. S. Steel, com.	Dec. 20	1.00	5,082,347

*Monthly. †Quarterly. ‡Semi-annual.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
Alta	Nev.	22	Dec. 20	.05	
Am. Oil & Ref.	Cal.	25	Nov. 25	Dec. 23	.05
Belcher	Nev.	8	Dec. 8	Dec. 31	.10
Cal. Dredging	Cal.	3	Nov. 25	Dec. 16	10.00
Con. Imperial	Nev.	3	Dec. 14	Jan. 15	.01
Goleta Con	Cal.	3	Nov. 29	Dec. 28	.10
Justice	Nev.	11	Dec. 17	Jan. 11	.05
Larkin	Cal.	11	Dec. 14	Jan. 6	.02
Mexican	Nev.	69	Dec. 17	Jan. 7	.10
Mohican	Cal.	2	Jan. 4	Feb. 3	.05
Overman	Nev.	9	Dec. 24	Jan. 15	.05
Reward	Cal.	3	Dec. 29	Dec. 30	.02
Ridge & Valley	Utah	3	Dec. 10	Dec. 30	.02 1/2
Seg. Belcher & Mides Con.	Nev.	6	Jan. 6	Dec. 31	.03
Sharp	Utah	4	Nov. 19	Dec. 16	.03
Showers Con	Utah	5	Nov. 30	Dec. 23	.02
Sierra Nevada	Nev.	6	Dec. 17	Jan. 6	.10
Tetro	Utah	21	Dec. 7	Dec. 31	.01
Utah Con.	Nev.	3	Nov. 30	Dec. 24	.05
Yuba Con.	Cal.	4	Nov. 19	Dec. 16	.03

lead shares the only notable point is a decided fall in Laurium; it is due to statements that the company's mines in Greece are becoming exhausted. The ores now mined are decreasing in quantity and of lower grade. The company is making explorations on lands which it owns, but the result is still uncertain.

Among miscellaneous stocks the Societe des Phosphates de Gafsa is attracting some attention. It appears that the company has secured control of some newly discovered deposits and that there is an opportunity to extend its operations. The competition of American phosphates is less severe, and it is now certain that the Algerian phosphates can be mined and sold at a lower cost than was at first believed to be possible.

In the metallurgical stocks some degree of firmness is again apparent, though the market is variable, some shares showing higher quotations, while some are lower. In general the situation is not strong, and it is apparent that orders are not coming in freely, and that a period of depression is to be faced.

The Russian metallurgical group again shows more firmness, and one might almost say that the great decline in values had been arrested. The Societe Drieproviennne has held its annual meeting and fixed the dividend for the year at 75 roubles, about 200 francs, per share. At the same time it was voted to increase the capital stock from 7,500,000 to 9,000,000 roubles by the issue of 6,000 new shares of 250 roubles par value. The payment of so large a dividend when new capital is required seems open to criticism. The Societe Krivoi-Rog, which operates iron mines, announces a dividend of 50 fr. a share for the year, a drop of 10 fr. from the previous year. The Russian coal stocks are a little stronger, and a few—notably Dombrowa and Sosnowice—have even gained a little in price this week.

The coal strike question is still under discussion. It is now suggested that perhaps a strike would be a lesser evil than continued governmental intervention between the miners' unions and the operators. If the State is to regulate miners' wages and guarantee old-age pensions, it will establish a bad precedent. If the coal miners carry their point, other classes of workmen may demand equal privileges. The steelworkers, the quarrymen, the painters—in a word, all trades—should be equally considered and protected; and they will probably present their claims in time.

Why not? It is only logical.

AZORE.

COAL TRADE REVIEW.

New York.

Dec. 13.

ANTHRACITE.

The best year in the history of the anthracite coal trade is nearing its end. It will be long remembered, not only on account of the great increase in production shown, but also on account of its having witnessed the first successful attempt to maintain a schedule of prices that did not discriminate and was binding on all the great producing companies. Jobbers and retailers at many points have complained of not getting favors or not being able to profit by the usual low prices during the period of midsummer dullness, but one man has been able to get his coal as cheaply as another and the dealer who took advantage of the spring discounts has now little cause for complaint. The output of coal during November is thought to have been about 4,500,000 tons. The output during December, if cold and stormy weather does not interfere, is likely to be about as great in spite of the holidays. So far, but a very small amount of coal has gone into storage at the great yards in Pennsylvania and New Jersey and the mines would ship more heavily were sufficient cars to be had. The closing of Lake navigation seems to have little effect on car supply and it is altogether probable that a lack of motive power on the main line roads is as an important factor in the present poor transportation facilities as is car supply. At any rate there is little prospect of the situation improving much for months.

In Lake Superior territory supplies of anthracite on the docks are better than was anticipated, but the indications are that all-rail coal will be needed before spring. At Chicago all-rail coal is arriving more freely. In spite of the poor car supply during the past 2 months arrivals of all-rail coal are about 250,000 tons ahead of the figures for this date last year. Receipts by lake also exceed the 1900 figures, though behind those of 1899. In general, it may be said that the supplies of coal at Lake Michigan points are about up to the average. The temperature this winter will determine the size of the shortage before Lake navigation opens again. Demand at lower lake points and at inland points in the East has been active. The various coal roads continue to try to restrict shipments to points along their own lines. Along the Atlantic seaboard business is generally brisk. Last week's cold wave brought out many orders. Milder weather this week has permitted a freer movement from the mines and along the coast. The steam sizes are in strong demand and prices are firmer. One

road has advanced its prices on pea and buckwheat (free burning) 50c. per ton. Certain producers in the Wyoming Valley are trying to get their customers to take Lehigh coals in place of their own free-burning grades. No doubt, the demand for the steam sizes is somewhat affected by the bituminous situation, particularly at New York Harbor points. The current prices for free-burning white ash coal, f. o. b. New York Harbor ports, are: Broken, \$4; egg, \$4.25; stove and chestnut, \$4.50.

BITUMINOUS.

The demand for coal in the Atlantic seaboard bituminous trade continues very strong. Speculative prices have advanced, and as high as \$3.50 is being paid for coals not of highest grade, f. o. b. New York Harbor shipping ports. The dominating factor in the trade is still car supply. This is extremely variable. Last week at times it was above 50 per cent of the total number wanted at the collieries. This week some companies say they are only receiving 25 per cent of their needs. The main line roads offer little hope of quick improvement and continue to lay the blame for the shortage on the country's great industrial activity.

In the far East coal is in considerable demand, but consumers there are thought to be well supplied as a rule. Along Long Island Sound consumers continue to call for more coal than producers, under existing conditions can possibly get forward. Dealers at New York Harbor points find it harder to get coal just now than those in any other territory, and it is here that the highest prices are paid for prompt delivery. Producers are still cutting their allotments of coal to the all-rail trade to supply the tidewater demand.

Transportation from the mines to the shipping ports is slow and irregular. Car supply at the mines continues short, averaging about 50 per cent of the total number wanted. In the coastwise vessel market vessels are scarce and in considerable demand. We quote current freight rates from Philadelphia as follows: Providence, New Bedford and the Sound, 90¢@95¢; Boston, Salem and Portland, \$1@1.10; Wareham, \$1.25; Lynn, \$1.20; Portsmouth, \$1.10@1.15. Rates from the further lower ports are 15¢@20¢ higher. There are considerable delays in loading at Chesapeake Bay points.

Birmingham.

Dec. 9.

(From Our Special Correspondent.)

The coal production in Alabama is as heavy now as it has been at any time this year. There is an active demand for the product, and the operators appear to be satisfied with general conditions. The shortage of railroad cars is still apparent, and there seems to be no hope in this direction for any better conditions this winter. New coal companies are still being incorporated in this district. During the past week the Lehigh Coal Company was incorporated by John Rutherford, of New York; Priestly Toulmin and E. K. Campbell, of Birmingham, with capital stock \$50,000. This company has acquired 2,000 acres of coal lands in Blount County, and as soon as a branch railroad line is constructed thereto mines with a daily capacity of 500 tons of coal will be opened. Other companies are now being formed to develop coal-fields in Walker County.

An estimate made as to the production of coal for the year 1901, announced by State Mine Inspector J. deB. Hooper, a few days since, is 9,211,804 tons, as against 8,273,362 tons during 1900; it is considered quite conservative. In the 10 counties in Alabama producing coal, it is believed there will be an increase in the total production for the year in every one except two—Cullman County, which produced 3,000 tons last year, and Shelby, which produced 120,417 tons last year. Jefferson County, the largest county in the State and the largest coal producing county in the State, is expected to show an increase of 484,000 tons of coal this year. The production in 1900 in Jefferson County amounted to 5,234,747 tons.

Alabama District, No. 20, of the United Mine Workers of America, is holding its convention this week in Bessemer. The election of officers will be the principal business transacted. The meeting will have no bearing on the coal market in this State.

The wage of the miners for the month of December remains unchanged. The investigation of the sales books of the Tennessee Coal, Iron and Railroad Company and the Sloss-Sheffield Steel and Iron Company revealed no increase in the average selling price of pig iron sufficient to warrant an advance in mining wages, and the miners receive 52½c. per ton for their work as during the month of November. The maximum is 55c. per ton.

Pittsburg.

Dec. 11.

(From Our Special Correspondent.)

Coal.—The closing of lake navigation has resulted in more railroad cars for the local coal trade, but the shortage is still severely felt. While it is known that the Pittsburg Coal Company was unable to fill all of its contracts in the Northwest the amount it was

short has not been made public. The shipments this season, however, exceeded all previous years. The Monongahela River Consolidated Coal and Coke Company succeeded in sending out 1,500,000 bush of coal on the rise in the rivers during the week. Fully 10,000,000 bush. could have been shipped but for the strike of the pilots, which remains unsettled. Another rise is expected this week, but it is not likely that it will be of any service to the shippers, as all of the available pilots are now down the river.

Connellsville Coke.—There was a slight gain in production and shipments last week. Prices remain unchanged at \$2 for furnace and \$2.50@2.75 for foundry. As a result of the car shortage there are large stocks of coke in the yards. Of the 21,833 ovens in the region 19,940 are active and 1,893 are idle. The production for the week was 237,643 tons, a gain over the previous week of 1,116 tons. The shipments for the week aggregated 10,515 cars, distributed as follows: To Pittsburg and river tipples, 3,363 cars; to points west of Pittsburg, 5,311 cars; to points east of Connellsville, 1,841 cars.

San Francisco.

Dec. 6.

(From Our Special Correspondent.)

Coal receipts at San Francisco in November were light, being only 96,209 tons, against 123,586 tons in November, 1900. These receipts, as reported, are only of coal coming by water, and do not include California coal, nor coal brought from Utah and Wyoming by rail. For the 11 months, ending November 30, the receipts compare as follows, the figures being in short tons:

	1900.	1901.	Changes.
Eastern U. S.	14,272	26,249	I. 11,977
Oregon	34,450	33,175	D. 1,275
Washington	588,533	593,912	I. 5,379
Total domestic	637,255	653,336	I. 16,081
British Columbia	548,009	435,365	D. 112,644
Australia	159,478	135,929	D. 23,549
Japan	6,100	.....	D. 6,100
Great Britain	70,964	66,300	D. 4,664
Total imported	784,551	637,594	D. 146,957
Total	1,421,806	1,290,930	D. 130,876

The total decrease this year was 9.2 per cent. This decrease in a period when business has been generally good, and the demand for fuel large, shows the extent to which oil is affecting fuel supply conditions on the Pacific Coast.

Foreign Coal Market

Dec. 12.

With the exception of some talk about further exports of anthracite to Germany, but little is heard about foreign shipments. Operators are finding some trouble in filling home orders just now, owing to shortage of cars, and are not looking for additional orders. There are some inquiries from France and Mediterranean ports.

Recent advices report that Italian contracts for 100,000 tons of best Welsh smokeless steam coal and 40,000 tons of best small steam coal, for delivery through 1902, have been placed with Cardiff firms. The coal is to be delivered at Genoa, and the contract prices are 21s. 9d., c. i. f., for large and 14s. 6d. for small coal. At current rates these prices are equivalent to \$3.90 per ton for large and \$2.16 for small coal on dock at Cardiff. These are somewhat below current quotations as reported this week.

Imports and exports of coal in Germany for the 10 months ending October 31, are reported as below, in metric tons:

	Imports.		Exports.	
	1900.	1901.	1900.	1901.
Coal	6,241,270	5,258,899	12,791,642	12,554,712
Brown coal	6,383,398	6,792,744	48,310	18,444
Coke	439,405	331,984	1,826,309	1,768,151
Totals	13,064,073	12,383,627	14,666,261	14,341,307

Imports of coal were chiefly from Great Britain; of brown coal or lignite, entirely from Austria; of coke chiefly from Belgium. Exports of coal and coke were chiefly to Austria, Holland, Belgium and Switzerland.

Messrs Hull, Blyth & Co., of London and Cardiff, report under date of November 30, that the prices of Cardiff coals remain steady, while Monmouthshire descriptions in view of the approaching holidays, are very firm. Quotations are: Best Welsh steam coal, \$4.08@4.26; seconds, \$4.02; thirds, \$3.90; dry coals, \$4.02@4.14; best Monmouthshire, \$4.02@4.08; seconds, \$3.54@3.78; best small steam coal, \$2.64@2.76; seconds, \$2.46@2.58; other sorts, \$2.16.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage but inclusive of export duty, and are for cash in 30 days, less 2 1-2 per cent discount.

The tone of the freight market remains unchanged, without any quotable difference in rates. Some rates noted from Cardiff are: Algiers, \$1.30; Marseilles, \$1.35; Genoa, \$1.29; Naples, \$1.29; Port Said, \$1.26; Singapore, \$2.88; Las Palmas, \$1.44; St. Vincent, \$1.62; Rio Janeiro, \$2.70; Santos, \$3; Buenos Aires, \$2.52.

SLATE TRADE REVIEW.

New York. Dec. 13.

The list of prices per square of No. 1 slate, standard brand, f. o. b. at quarries in car-load lots, is given below:

Table with columns for Slate Size (Inches), Location (Monson or Br'n-ville, Bangor, Bangor-Bibb, Alb'n or Jackson Bangor, Chap'n Keystones, Peach Bottom, Sea Gr'n, Unfaded Green, Red), and Price (\$).

A square of slate is 100 sq. ft. as laid on the roof.

The quarries of the Vermont sea green district report that the demand exceeds their supply, and that the past year has been one of the most successful in the history of the trade.

In other quarrying sections trade has been equally good, and prices more satisfactory than a year ago.

IRON MARKET REVIEW.

NEW YORK, Dec. 13.

Pig Iron Production and Furnaces in Blast.

Table with columns for Fuel used, Week ending (Dec. 14, 1900, Dec. 13, 1901), From Jan. '00, and From Jan. '01, with sub-columns for F'ces. and Tons.

The blast furnace report shows for December a moderate increase in the capacity of the active furnaces. It must be remembered, however, that during the past three or four weeks there has been practically a reduction in output, owing to the banking of furnaces which have been unable to get their supplies of ore and coke.

The general course of business continues unchanged and there is no evidence of any decrease in business with the close of the year.

It is given out, with official sanction, that no change in prices of Lake Superior iron ore will be made, and that quotations for next season will be practically on the same basis as those now ruling.

Our special correspondent writes that the iron ore shipments from Minnesota mines this year have been as follows, the name of the operating owner being given with each mine:

Table listing iron ore mines and their production in 1900 and 1901, including Mesabi Range, Adams, United States Steel, Ansville, U. S. Steel, etc.

The total for the Mesabi Range is 9,001,769 gross tons, against 7,809,535 last year, and that for the

Vermillion Range is 1,785,951, against 1,655,820 last year. The State's total, therefore, is 10,787,720 tons, against 9,465,355 the previous season.

The railroads shipped as follows: Duluth and Iron Range, 5,028,765 gross tons; Duluth, Missabe and Northern, 3,437,955 tons; Eastern Minnesota, 2,321,000 tons; total, 10,787,720.

Birmingham. Dec. 9.

(From Our Special Correspondent.)

The pig iron market in this district is firm, and indications are most favorable for a continuation. Some of the industries are easing down a little in their operation at the approach of the holidays, but the local consumption has not as yet decreased to any great extent.

An investigation of the sales books of two of the larger manufacturers in this district during the past week for the purpose of ascertaining the average price on which to base the coal-mining rate, resulted in obtaining the fact that the average price of all the iron sold during the month of November was between \$10 and \$11 per ton.

The following quotations are given: No. 1 foundry, \$12@12.50; No. 2 foundry, \$11.50; No. 3 foundry, \$11; No. 4 foundry, \$10.50; gray forge, \$10@10.25; No. 1 soft, \$12; No. 2 soft, \$11.50.

The steel industry in Alabama is active. The demand is strong, and some healthy orders are on hand. The shipments of steel billets show an increase each week. The plant of the Alabama Steel and Wire Company has let off its night shift for the holiday season.

The rolling mills in Birmingham and Gate City are working hard with heavy outputs. The mills at Bessemer met with a streak of bad luck last week, and a couple of departments have been closed down for necessary repairs.

The rolling mill department of the Alabama Tube and Iron Company, at Helena, Ala., is working steadily and considerable product is being stored so that when the tubing department commences operation there will be plenty of stock on hand.

There is still considerable talk in this State over the possibility of the Tennessee Coal, Iron and Railroad Company and the Republic Iron and Steel Company becoming part of the big steel company now being formed in the East.

The report of the Southern Iron Committee for the month of November showing shipments from the various districts in Alabama and Tennessee will be issued during this week. Manager W. A. Moody, of the Alabama Car Service Association, who has charge of the Southern Iron Committee's office, says that there is but little improvement in the car-shortage question.

Philadelphia. Dec. 12.

(From Our Special Correspondent.)

Pig Iron.—Fortunately for all concerned the pig iron market has quieted down, and transactions have been rare. Word from furnaces is to the effect that iron is being hurried to consumers as fast as it is cold. There were very few inquiries to-day or yesterday, and office people say they hope to be let alone till after the holidays.

Steel Billets.—Whether billets will be imported or not as has been rumored is a matter on which our people are not competent to speak. So far as they have expressed themselves they will take their chances and use up the stock they have under contract and pay more for their next supply if they must.

Merchant Bar.—Merchant bar has suddenly hardened in price. A minor cause is uncertainty as to deliveries. The greater cause is the rumors of big orders from car builders. The talk to-day is that bar iron is about to advance 0.1c., but if so it has reference to quick delivery, and very few mills are in a position to make quick delivery.

Nails.—Wire nails have been shaded within a few days and retailers have taken advantage of the opportunity to place orders which have been accepted on exceptionally favorable terms.

Plates.—A good retail week has been put in. There was a rumor last week that very large transactions had been closed in plate, but the parties concerned have very little to say concerning it beyond the fact that there are inquiries and abundant willingness upon the part of buyers, but that some of them are standing off for better quotations on February material.

Structural Material.—Approximately similar conditions surround structural material. Prices are firm on all business that has been heard of, but there are rumors which apparently have no foundation whatever that we are to see cut rates in shapes. This statement has been made, but there are no evident grounds for it to stand upon.

Steel Rails.—It is known that a good deal of business has been done in girder rails, and more of the same kind is coming.

Old Rails.—A great deal of business is hanging fire in old rails because of the wide difference between buyers and sellers. This is also true of heavy steel scrap. As to light scrap there is a better supply, but prices hold about at the old level.

Pittsburg. Dec. 11.

(From Our Special Correspondent.)

The feature of the iron and steel market this week is the firm and higher prices of raw material. Prices of gray forge and foundry No. 2 have advanced, and for small lots bessemer iron is higher. The United States Steel Corporation this week placed orders for its requirements of bessemer iron for January.

The switchmen's strike, while apparently a small affair, had a serious effect on the operation of the mills. Material was tied up and could not be delivered. As a result many mills were entirely closed or only in partial operation during the past two weeks.

Pig Iron.—The United States Steel Corporation has just placed orders for all the bessemer pig iron it will require for January, the price being \$15.25, Valley furnaces. The next amount purchased has not been given out, but it is believed to be about 50,000 tons.

Steel.—Several small lots of bessemer steel billets were sold this week at the minimum price of \$27.75. Billets are still scarce and it is believed a higher price may rule at the opening of the new year.

Sheets.—The sheet market is not weak as has been reported, but prices for prompt shipment on the ordinary gauges are not as strong as during the past few months. There is a good demand and a decided scarcity in the heavier gauges continues, mills being from two to three months behind in deliveries.

at 70 and 10 per cent off. Galvanized sheets for spot shipment are quoted at 70 per cent off.

Ferro-manganese.—Prices are a trifle lower this week, the leading producer quoting 80 per cent domestic at \$52.50.

New York. Dec. 13.

Pig Iron.—Many Northern furnaces have sold their output up to next June. Demand continues good. Northern irons advanced 50c. per ton on December 11. We quote for tidewater delivery: No. 1X foundry, \$16.65@17.15; No. 2X, \$16.15@16.65; No. 2 plain, \$15.65@16.15; gray forge, \$15.15@15.40. For Southern iron on dock, New York, No. 1 foundry, \$15.75; No. 2, \$15.25; No. 3, \$14.75; No. 4, \$14.25@14.50; No. 1 soft, \$15.75; No. 2, \$15.25@15.50.

Bar and Iron Steel.—Buying continues active. There is no change in prices. We quote 1.58c. for common bars in large lots on dock; refined bars, 1.63@1.68c.; soft steel bars 1.68c.

Plates.—Prices are unchanged. The market is firm. Eastern mills quote for tidewater delivery in carloads: Tank, 1-4-in. and heavier, 1.78c.; flange, 1.88c.; marine, 1.98c.; universals, 1.78c.

Steel Rails and Rail Fastenings.—Mills are taking few foreign orders; the domestic business already closed or in sight and the low prices abroad are sufficient reasons. Standard sections are still quoted at \$28 at Eastern mills; light rails at \$28@30, according to weight. Spikes are 1.80c.; splice bars, 1.55c.; bolts, 2.60@2.70c.

Structural Material.—There is little change in market conditions. Demand is good and prices are very firm. We quote for large lots at tidewater as follows: Beams, 1.75c.; channels, 1.75c.; tees, 1.80c.; angles, 1.75c.

CHEMICALS AND MINERALS.

(For further prices of chemicals, minerals and rare elements, see page 810.)

New York. Dec. 13.

Heavy Chemicals.—Contract deliveries were heavier and prices firmer, for domestic alkali, bicarb. soda, and caustic soda, owing to the fire at the No. 1 soda ash plant of the Michigan Alkali Company, at Wyandotte, Mich. The building was completely destroyed causing a heavy loss; but it is to be rebuilt as soon as possible.

Bleaching powder is quiet on spot at \$1.95 up per 100 lbs., according to make, while future contracts are still being taken at quotations below. Domestic chlorate of potash over next year is selling at \$7.75 per 100 lbs., while jobbers are recording transactions for this year's delivery at \$7.87 1-2 up, for crystals. Chlorate of soda for 1902 shipment is being booked at \$8.75 per 100 lbs., according to seller, while spot sales are reported at \$9.25@10.

Brunner, Mond & Co., Limited, of Great Britain, whose alkali is well known to American consumers, have declared an interim dividend at the rate of 30 per cent per annum on the ordinary shares for the half-year ended September last, and 7 per cent on the preferred shares. These dividends are the same as for the corresponding half of last year.

Prices per 100 lbs. are as below:

Articles.	Domestic.		In New York.	Foreign.
	F. o. b. Works.	In New York.		
Alkali 58%.....	87½@ 90	.....	.....	.....
Alkali 48%.....	90 @ 95	.....	.....	.....
Caustic Soda,				
high test.....	\$1.95 @ \$2.00	.....	\$2.25 @ \$2.50	.....
powd. 60%.....	.....	2.85 @ 2.75	.....	.....
70@74%.....	.....	3.00 @ 3.25	.....	.....
98%.....	.....	.....	3.75 @ 4.00	.....
Sal. Soda.....	.....	.....	.....	.....
Sal. Soda conc. 1.25 @ 1.50	.....	.....	.....	.....
Bicarb. Soda.....	1.00 @ 1.10	.....	1.37½@ 1.75	.....
Bicarb. Soda,				
extra.....	3.25 @ 3.50	.....	.....	.....
Bleach. Pdr.:				
Eng. prime.....	.....	.....	1.75 @ 1.85	.....
Other brands.....	.....	.....	1.70 @ 1.80	.....
Chl. Pot. cryst.....	8.12½@ 8.25	.....	10.00 @ 10.25	.....
Chl. Pot. powd.....	8.25 @ 8.37½	.....	10.50 @ 10.75	.....

Acids.—Consumers are buying in a better way, and an improvement in export business is noticeable. Oxalic continues weak, and 1902 sales are reported at \$4.37 1-2 per 100 lbs., a price that can yield but little profit to the producers. Small spot sales are being made at quotations below. Blue vitriol is unchanged notwithstanding the unsettled condition of the copper market. The foreign demand for blue vitriol is not expected to commence for some little time yet. Exports show an increase this year, the movement in the 10 months ending October 31 amounting to 47,295,925 lbs., against 41,870,762 lbs. in the corresponding period last year. This copper sulphate has gone largely to Italy, Austria, France and Holland. Our keenest competitor in foreign markets is Great Britain. In the 10 months ending October 31, the exports of copper sulphate from that country aggregated 78,565,760 lbs., against 88,957,120 lbs., in the same period last year. It is noteworthy that while these exports have fallen 11.7 per cent, the United States exports have increased 11.5 per cent.

Quotations are per 100 lbs. as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity.

Acetic, com'l 28%.....	\$1.80	Oxalic, com'l.....	4.87½@5.00
Blue vitriol.....	4.62½@4.75	Sulphuric, 50 deg. bulk	.....
Muriatic, 18 deg.....	1.50	ton.....	14.00@16.00
Muriatic, 20 deg.....	1.62½	Sulphuric, 60 deg.....	1.00
Muriatic, 22 deg.....	1.75	Sulphuric, 60 deg.,	
Nitric, 36 deg.....	4.00	bulk.....	18.00@20.00
Nitric, 38 deg.....	4.25	Sulphuric, 66 deg.....	1.20
Nitric, 40 deg.....	4.50	Sulphuric, 68 deg.,	
Nitric, 42 deg.....	4.87½	bulk.....	21.00@23.00

Brimstone.—New York received 2,336 tons this week. Demand is moderate as prices are too high to permit any large transaction. Best unmixed seconds sold on spot at \$23.50@23.75 per ton, while shipments are quoted at \$22.50@22.75. Best thirds are \$3 less than seconds.

Pyrites.—The Pennsylvania Salt Manufacturing Company received 3,085 tons of Spanish pyrites at New York this week: The market continues firm, and shows a good contract demand.

Quotations f. o. b. are: Mineral City, Va., lump ore, \$4.90 per ton, and fines, 10c. per unit; Charlemont, Mass., lump, \$5 and fines, \$4.75. Spanish pyrites, 12@14c. per unit, delivered ex-ship New York and other Atlantic ports. Spanish pyrites contain from 46 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Sulphate of Ammonia.—Lower. Gas liquor for shipment is quoted at \$2.75@2.77 1-2 per 100 lbs. Small demand generally.

Nitrate of Soda.—Dull and depressed, owing to the heavy store stocks amounting to about 100,000 bags at all ports. It is also understood that consumers have good-sized stocks, as deliveries to them of late have been very heavy. The coast and European markets continue unchanged. Freight rates are a trifle weaker. New York prices are \$1.90 per 100 lbs. for spot, and \$1.95 for shipments over next year.

Shipments from Chile to Europe in November were 3,200,000 qtls., and to the United States, 250,000 qtls.; total, 3,450,000 qtls. Loadings on December 1 were 1,700,000 qtls. for Europe and 100,000 qtls. for the United States; total, 1,800,000 qtls. The *Queen Louise* sailed for Hampton Roads on December 5 with 32,500 bags, which is included in the total sailings as above.

Phosphates.—Demand here is moderate while abroad superphosphate makers are slow in accepting the higher prices asked by our exporters.

Exports of phosphates from the United States in the 10 months ending October 31 were 648,450 tons, against 527,101 tons in the same period last year; showing an increase of 121,349 tons, or 18.7 per cent in 1901. Germany received the largest quantity, while the United Kingdom and France come next. Of this year's exports the Florida high grade rock shippers reported 373,281 tons, or 57.5 per cent of the total. These exports are distributed by Messrs. Auchincloss Brothers, as below, comparison being made with last year:

Destinations.	1900.	1901.	Changes.
Baltic ports.....	91,076	75,118	D. 15,958
Continental ports.....	179,475	244,514	I. 65,039
Mediterranean ports.....	3,852	20,454	I. 16,602
United Kingdom.....	25,047	33,195	I. 8,148
Australia and Honolulu.....	3,908	.....	D. 3,908
Total, tons.....	303,358	373,281	I. 69,923

The increase in the Florida rock exports this year is equal to 18.7 per cent, the same rate as for the whole United States exports, as shown above.

We quote:

Phosphates.	Per ton F. o. b.	C. I. F. Un'd Kingdom or European Ports.	
		Unit.	Long ton.
*Fla. hard rock (77@80%).	\$7.00@7.50	6½@7½d	\$10.53@11.31
*Fla. land pb. (68@73%).	3.00@3.25	5 @6d	7.00@ 8.40
*Fla. Peace Riv. (58@63%).	2.25@2.50	5 @5½d	6.00@ 6.80
*Tenn..... (78@80%), export.	3.50	6½@7d	10.53@10.92
*Tenn..... 75% domestic.	3.00@3.25	.....	.....
*Tenn..... 70@72% domestic.	2.25@2.50	.....	.....
*So. Car. land rock.....	3.50	4½@5d	5.67@ 6.30
*So. Car. river rock.....	2.75@3.25	.....	.....
Algerian, rock..... (63@70%).	.....	6 @6½d	8.04@ 8.70
Algerian, rock..... (58@63%).	.....	5½@5½d	6.30@ 6.80
Tunis, Gafsa..... (58@63%).	.....	5½@5½d	6.30@ 6.80

*Fernandina, Brunswick or Savannah. †Mt. Pleasant. ‡On vessels Ashley River.

Liverpool. Nov. 27.

(Special Report of Joseph P. Brunner & Co.)

In heavy chemicals deliveries on running contracts continue fairly brisk, but fresh orders are not coming in very freely, which is not surprising considering the heavy shipments during the past two months.

Soda ash is unchanged at the usual varying prices as to market. We quote nearest spot range for tierces about as follows: Leblanc ash, 48 per cent, £5 15s. @£6; 58 per cent, £6 2s. 6d. @£6 7s. 6d. per ton net cash. Ammonia ash, 48 per cent, £4 10s. @£4 15s; 58 per cent, £4 15s. @£5 per ton net cash. Bags, 5s. per ton under price for tierces. Soda Crystals are firm, at generally 3£ 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags; with special terms for certain export markets. Caustic soda is quite, but spot prices are unchanged, as follows: 60 per

cent, £9@£9 2s. 6d.; 70 per cent, £10@£10 2s. 6d.; 74 per cent, £10 10s.; 76 per cent, £10 15s. @£11 per ton net cash. Bleaching powder is steady at £6 17s. 6d. @£7 per ton net cash for hardwood packages, with special terms for certain export quarters. Chlorate of potash is held for 3d. @3½d. per lb. net cash, and being well sold, there is no pressure to sell on the part of makers. Bicarb. soda is in fair request at £6 15s. per ton less 2½ per cent for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few export markets. Sulphate of ammonia is well sustained at £11 5s. @£11 7s. 6d. per ton, less 2½ per cent for good gray 24@25 per cent in double bags f. o. b. here, and a fair amount of business passing in a quiet way. Nitrate of soda is in moderate demand on spot at £9 10s. @£9 12s. 6d. per ton, less 2½ per cent for double bags f. o. b. here, as to quality and quantity.

METAL MARKET.

New York. Dec. 13.

GOLD AND SILVER.

Gold and Silver Exports and Imports.

At All United States Ports in October and Year.

Metal	October.		Year.	
	1900.	1901.	1900.	1901.
Gold.				
Exports.....	\$441,962	\$3,808,543	\$53,046,883	\$36,489,019
Imports.....	10,731,375	5,483,964	50,720,485	40,883,932
Excess.....	I. \$10,289,413	I. \$1,685,421	E. \$2,326,396	I. \$4,404,884
Silver.				
Exports.....	\$6,103,354	\$4,737,689	\$53,605,245	\$26,225,618
Imports.....	3,031,894	3,070,516	33,302,234	25,551,880
Excess.....	E. \$3,071,560	E. \$1,667,573	E. \$20,303,011	E. \$683,936

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending Dec. 12, 1901, and for years from January 1st, 1901, 1900, 1899 and 1898.

Period.	Gold.		Silver.		Total Excess Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week.....	\$1,619,650	\$25,962	\$494,978	\$71,669	E. \$2,016,937
1901.....	45,780,389	4,637,055	29,659,459	2,508,761	E. 68,254,062
1900.....	36,702,993	10,816,591	37,150,023	4,621,062	E. 58,414,783
1899.....	11,746,386	13,823,349	23,205,408	3,716,665	E. 22,408,740
1898.....	8,600,024	98,157,091	33,023,503	3,109,952	I. 59,644,116

Exports of Gold went chiefly to France and Germany; of Silver, to London. Imports of Gold were from the West Indies; of Silver, from Mexico and South America.

Financial Notes of the Week

Business is beginning to show the effect of the approaching close of the year, when there is usually a quiet season for a time. The speculative markets are weak, on account of the fall in copper stocks, chiefly and partly because of higher rates for money, which may last over New Year's. Liquidation of foreign loans continues, and \$1,200,000 gold is reported taken for shipment to France and Germany by the steamers sailing in the middle of the week.

The statement of the United States Treasury on Wednesday, December 11, shows balances in excess of outstanding certificates as below, compared with the corresponding day last week:

	Dec. 4.	Dec. 11.	Changes.
Gold.....	\$110,381,735	\$114,714,088	I. \$4,332,353
Silver.....	7,946,278	7,410,399	D. 535,879
Legal tenders.....	7,381,938	7,424,080	I. 42,082
Treas. notes, etc.....	73,438	72,028	D. 1,410
Totals.....	\$125,783,449	\$129,620,593	I. \$3,837,144

Treasury deposits with national banks amounted to \$113,156,520, showing an increase of \$207,260 over last week.

The statement of the New York Banks, including the 63 banks represented in the Clearing House—for the week ending December 7—gives the following totals, comparison being made with the corresponding weeks in 1900 and 1899:

	1899.	1900.	1901.
Loans and discounts.....	\$681,464,300	\$806,442,500	\$881,552,000
Deposits.....	744,085,500	861,044,700	938,958,100
Circulation.....	14,411,300	30,607,900	31,988,400
Specie.....	143,989,100	162,804,400	169,530,700
Legal tenders.....	48,911,800	58,157,900	71,815,500
Total reserve.....	\$192,880,900	\$220,962,300	\$241,347,200
Legal requirements.....	186,021,375	215,261,175	234,732,525
Balance surplus.....	\$6,859,525	\$5,701,125	\$6,607,675

Changes for the week this year were increases of \$5,382,800 in loans and discounts, and \$11,400 in circulation; decreases of \$1,710,400 in deposits, \$6,655,800 in specie, \$578,700 in legal tenders, and \$6,806,900 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to

dollars and comparison is made with the holdings at the corresponding date last year.

Table with columns for Gold and Silver for 1900 and 1901, listing countries like N.Y., England, France, Germany, Spain, etc.

The returns of the Associated Banks of New York are of date December 7, and the others December 5, as reported by the Commercial and Financial Chronicle cable.

The pressure to sell cash silver having been taken away, the market has improved to a moderate extent, and there has been a very fair inquiry at current rates.

Shipments of silver from London to the East for the year up to November 28, are reported by Messrs. Pixley & Abell's circular as follows:

Table showing silver shipments from India, China, and The Straits for 1900 and 1901.

Arrivals for the week this year were £180,000 in bar silver from New York, £8,000 from the West Indies, £11,000 from Australia, and £10,000 from Chile.

Indian exchange continues steady, Council bills selling in London at 15.97d. per rupee, with a strong demand. The low price of silver has stimulated buying for Indian account to some extent, but shipments are not yet very large.

The coinage executed at the mints of the United States in November and the 11 months this year and 1900, is reported by the Bureau of the Mint, Treasury Department, as below:

Table showing coinage statistics for November 1901 and 1900, including Denomination, Prices, Value, and 11 months totals.

Table titled 'Prices of Foreign Coins' listing various currencies like Mexican dollars, Peruvian soles, etc., with Bid and Asked prices.

OTHER-METALS.

Daily Prices of Metals in New York.

Table showing daily prices of Silver, Copper, and Spelter in New York, with columns for month, exchange, and price per lb.

London quotations are per long ton, (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's.

Copper.—The market continues in a state of uncertainty. Consumers in this country are fighting shy of purchases, awaiting further developments, and it is only from abroad that any reliable information can be gathered.

The market for standard copper in London, which closed last week at £55, opened firm on Monday at the same price, ruled steady for a couple of days, but declined again on Thursday upon renewed selling.

Refined and manufactured sorts we quote: English tough, £66@£67; best selected, £67@£68; strong sheets, £75@£75 10s.; India sheets, £72@£72 10s.; yellow metal, 6d.

Exports of copper from New York and Baltimore during the current week are reported by our special correspondents as follows: To Germany, 420 tons; Holland, 449; France, 575; England, 150; Italy, 54; Spain, 9; Japan, 5; total, 1,662 tons.

Imports were 40 tons copper at Baltimore. Tin.—Has been quite active, but prices have ranged within narrow limits. Lower figures were accepted at the close, owing to the weaker tendency of the foreign market.

The foreign market, which last week closed at £113, opened firm on Monday at the same figure, declined to £111 on Wednesday and further £2 on Thursday, on which day the closing quotations were called as £109@£109 2s. 6d. for spot, and £104@£104 2s. 6d. for three months prompt.

Lead.—Has ruled very quiet indeed and dealings are confined to this year's delivery. It is rumored that an arrangement has been arrived at between the miners and the smelting company, but as yet nothing definite has transpired.

The foreign market continues weak and the closing quotations are called as £10 10s.@£10 12s. 6d. for Spanish and £10 15s.@£10 17s. 6d. for English lead.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is unchanged. Soft Missouri and chemical lead are quoted 4.22 1-2@4.25c, according to brand and delivery; desilverized, 4.32 1-2c.

Spelter.—Continues quiet, but firm. So far as we can learn, the proposed smelter combination has not yet gone through and it is considered very doubtful that it will. The ruling quotations are 4.15@4.20c. St. Louis, and 4.30@4.35c. New York.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us that spelter is strong, but very dull. The asking price is 4.20c.

Silesian Spelter Market.—Herr Paul Speier writes from Breslau under date of November 30 that the market has been rather flat. Prospects are not improving and there is some backward action on futures.

Imports and exports in Germany for the 10 months ending October 31, are reported as below in metric tons:

Table showing imports and exports of Spelter, Zinc sheets, Scrap zinc, Zinc ore, Zinc white, and Lithopone for 1900 and 1901.

The chief exports of spelter were 15,036 tons to Great Britain; 14,722 tons to Austria-Hungary and 9,789 tons to Russia.

Antimony.—Is in fair demand; Cookson's 10c.; Hallett's 8 1/2@8 3/4c.; Hungarian, Italian, Japanese and U. S. Star, 8@8 1/2c.

Nickel.—The price continues firm at 50@60c. per lb., according to size and terms of order.

Platinum.—Consumption continues good and prices are strong. Ingot platinum in large lots brings \$20@ \$21 per oz., in New York.

Chemical ware (crucibles and dishes), best hammered metal from stock in large quantities, is worth 82c. per gram.

Quicksilver.—The nominal quotation in New York continues \$51 per flask, but the metal can still be had for somewhat less, \$49 for large orders.

mestic trade, and \$43@\$44 for export. The London quotation is £9 per flask, with the same price quoted from second hands.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Table listing prices for various metals and alloys like Aluminum, Ferro-Tungsten, Magnesium, Manganese, Alum-bronze, Nickel-alum, Bismuth, Chromium, Copper, Ferro-Molyb'dum, Ferro-Titanium, and Ferro-Titanium.

Variations in prices depend chiefly on the size of the order.

Average Prices of Metals per lb., New York

Table showing average prices of metals per lb. for New York from January to December 1900 and 1901.

The prices given in the table for copper are the averages for electrolytic copper. The average price for Lake copper for the year 1900 was 16.52c.; for the month of January, 1901, it was 16.77c.;

Average Prices of Silver, per oz., Troy.

Table showing average prices of silver per oz. Troy for London, N.Y., and other locations from 1899 to 1901.

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

UNITED STATES.

Table showing United States statistics for Ores and Metals and Minerals, including articles, long tons, imports, exports, and domestic production.

Table showing United States statistics for Minerals, including asphalt, brimstone, cement, coal, coke, copper sulphate, graphite, nitrate of soda, phosphate rock, pyrites, and salt.

The figures for copper are those given by the Treasury Department. The statement made by Mr. John Stanton for the Associated Copper Companies will be found monthly in our metal market. These figures give the exports for October as 6,016; ten months, 74,126 tons.

Import Duties.

Metals.—The duties on metals under the present tariff law are as follows: Antimony, metal or regulus, 1/2c. a lb. Lead 1 1/2c. a lb. on lead ores; 2 1/2c. a lb. on pigs, bars, etc., 2 1/2c. on sheet pipe and manufactured forms. Nickels, 6c. a lb. Quicksilver, 7c. a lb. Spelter or zinc, 1 1/2c. a lb. on pigs and bars, 2c. on sheets, etc. Copper, tin and platinum are free of duty.

Minerals.—Duties are: Asphalt, crude, \$1.50 per ton, and refined \$3 per ton. Coal, bituminous, 67c. long ton; coke, 20c. ad. val. Cement, Roman Portland and hydraulic, in bulk, 8c. per 100 lbs. and in packages 7c. Copper sulphate, 1/2c. a lb. Salt in bulk, 8c. per 100 lbs., and in bags, etc., 12c. Brimstone, anthracite coal, graphite, phosphate rock, pyrites and nitrate of soda are free of duty.

STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing companies like Alamo, Amalgamated, and others with columns for par value, dates Dec 5-11, and sales.

Coal and Industrial Stocks.

Table of coal and industrial stock quotations for New York, listing companies like Am. Agr. Chem., Am. Car & Fdy., etc.

PHILADELPHIA, PA. §

Table of stock quotations for Philadelphia, PA, listing companies like Am. Alkali, Am. Cement, etc.

§Reported by Townsend, Whelen & Co., 308 Walnut St., Philadelphia, Pa. Total sales 9,376 shares.

MEXICO.

Nov. 30.

Table of stock quotations for Mexico, listing companies like Durango, Ca. Min. de Penoles, etc.

BOSTON, MASS.

Table of stock quotations for Boston, Mass., listing companies like Adventure Con., Actna Con., etc.

Official Quotations, Boston Stock Exchange. Total sales, 210,218 shares. *Ex-Dividend. †Assessment paid.

ST. LOUIS, MO.*

Dec. 9.

Table of stock quotations for St. Louis, MO, listing companies like Am. Nettie, Catherine Lead, etc.

*From our Special Correspondent.

SPOKANE, WASH.

Dec. 6.

Table of stock quotations for Spokane, Wash., listing companies like Black Tail, Crystal, etc.

SALT LAKE CITY.*

Dec. 7.

Table of stock quotations for Salt Lake City, listing companies like Ajax, Anchor, Bullion Beck, etc.

*By our Special Correspondent. Total sales, 596,295 shares.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.

LONDON.

Nov. 30.

Table of stock quotations for Colorado Springs, Colo., listing companies like Acacia, Alamo, Anaconda, and others with columns for par value, high/low prices, and sales.

Table of stock quotations for London, listing companies like Alaska Goldfields, Anaconda, and others with columns for authorized capital, par value, last dividend, and quotations.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. *Ex-dividend.

PARIS.

Nov. 21.

Table of stock quotations for Paris, listing companies like Acieries de Creusot, Anzin, and others with columns for country, product, capital stock, par value, latest dividend, and prices.

TORONTO, ONT.

Table of stock quotations for Toronto, Ont., listing companies like Ontario, British Columbia, and others with columns for name of company, par value, and sales.

Colorado Springs (By Telegraph.)

Table of stock quotations for Colorado Springs (By Telegraph), listing companies like Acacia, Alamo, Anaconda, and others with columns for par value, high/low prices, and sales.

MONTREAL, CANADA.

Dec. 5.

Table of stock quotations for Montreal, Canada, listing companies like Big Three, California, and others with columns for name of company, par value, and sales.

CHEMICALS, MINERALS, RARE EARTHS, ETC. CURRENT WHOLESALE PRICES.

Abrasive—			Barium—			Graphite—Am. f.o.b. Provi-			Metallic, brown—		
Cust. Meas.	Price.		Cust. Meas.	Price		Cust. Meas.	Price		Cust. Meas.	Price	
Carborundum, f.o.b. Niagara Falls, Powd., F. FF. FFF.. lb.	\$0.08		Oxide, Am. hyd. cryst..... lb.	\$0.02 ⁹ / ₄		dence, R. L. lump..... sh. ton	8.00		Red..... sh. ton	18.00	
Grains..... "	.10		Sulphate (Blanc Fixe)..... "	.02		Pulverized..... "	30.00		Ocher, Am. common..... "	9.25@10.00	
Corundum, N. C..... "	.07@.10		Barytes—			German, som. pulv..... lb.	.01 ¹ / ₄ @.01 ¹ / ₂		Best..... "	21.25@25.00	
Chester, Mass..... "	.04 ¹ / ₂ @.05		Am. Crude, No. 1..... sh. ton	9.00		Best pulverized..... "	.01 ¹ / ₄ @.02		Dutch, washed..... lb.	\$.04 ¹ / ₂	
Crushed Steel, f.o.b. Pittsburg..... "	.05 ¹ / ₂		Crude, No. 2..... "	8.00		Ceylon, common pulv..... "	.02 ³ / ₄ @.03 ¹ / ₄		French, washed..... "	.01 ¹ / ₄ @.02	
Emery, Turkish flour, in kegs..... "	.03 ¹ / ₂		Crude, No. 3..... "	7.75		Best pulverized..... "	.04@.08		Orange mineral, Am..... "	.08@.08 ¹ / ₂	
Grains, in kegs..... "	.05@.05 ¹ / ₂		German, gray..... "	14.50		Italian, pulv..... "	.01 ¹ / ₄		Foreign, as to make..... "	.08 ¹ / ₂ @.11 ¹ / ₂	
Naxos flour, in kegs..... "	.03 ¹ / ₂		Snow white..... "	17.00		Gypsum—Ground..... sh. ton	8.00@8.50		Paris green, pure, bulk..... "	.12 ¹ / ₂	
Grains, in kegs..... "	.05@.05 ¹ / ₂		Bauxite—Ga. or Ala. mines:			Fertilizer..... "	7.00		Red lead, American..... "	.05 ¹ / ₂	
Chester flour, in kegs..... "	.03 ¹ / ₂		First grade..... lg. ton	5.50		Rock..... "	4.00		Foreign..... "	.07 ¹ / ₂ @.08 ¹ / ₂	
Grains, in kegs..... "	.05@.05 ¹ / ₂		Second grade..... "	4.75		English and French..... "	14.00@16.00		Turpentine, spirits..... gal.	.37 ¹ / ₂	
Peekskill, f.o.b. Easton, Pa., flour, in kegs..... "	.01 ¹ / ₂		Bismuth—Subnitrate..... lb.	1.40		Infusorial Earth—Ground..... "			White lead, Am., dry..... lb.	.04 ¹ / ₂ @.04 ³ / ₄	
Grains, in kegs..... "	.02 ¹ / ₄		Subcarbonate..... "	1.65		American, best..... "	20.00		American, in oil..... "	.05 ¹ / ₂	
Crude, ex-ship N. Y.; Abbott (Turkey)..... lg. ton	26.50@30.00		Bitumen—"B"..... "	.03 ¹ / ₂		French..... "	37.50		Foreign, in oil..... "	.07 ¹ / ₂ @.08 ¹ / ₂	
Kuluk (Turkey)..... "	22.00@24.00		"A"..... "	.05		German..... "	40.00		Zinc, white, Am., ex dry..... lb.	.04 ³ / ₄ @.04 ¹ / ₂	
Naxos (Greek) h. gr..... "	.26.00		Bone Ash..... "	.02 ¹ / ₄ @.02 ³ / ₄		Iodine—Crude..... 100 lbs.	2.45		American, red seal..... "	.06 ¹ / ₂	
Garnet, as per quality..... sh. ton	25.00@35.00		Borax..... "	.07 ¹ / ₄ @.07 ³ / ₄		True..... "	.04		Green seal..... "	.07	
Pumice Stone, Am. powd..... lb.	.01 ¹ / ₂ @.02		Bromine..... "	.40		Oxide, pure copperas col..... "	.05@.10		Foreign, red seal, dry..... "	.05 ¹ / ₂ @.08	
Italian, powdered..... "	.01 ¹ / ₂		Cadmium—Metallic..... "	1.40		Purple-brown..... "	.02		Green seal, dry..... "	.06 ¹ / ₂ @.09	
Lump, per quality..... "	.04@.40		Sulphate..... 100 lbs.	2.00@2.50		Venetian red..... "	.01@.01 ¹ / ₂				
Rottenstone, ground..... "	.02 ¹ / ₄ @.04 ¹ / ₂		Calcium—Acetate, gray..... "	1.25		Scale..... "	.01@.03		Potash—		
Lump, per quality..... "	.06@.20		"brown..... "	.85		Kaolin—(See Clay, China.)			Caustic, ordinary..... "	.04 ¹ / ₂ @.06	
Rouge, per quality..... "	.10@.30		Carbide, ton lots f.o.b. Niagara Falls, N. Y., or Jersey City, N. J..... sh. ton	75.00		Kryolith—(See Cryolite.)			Elect. (90%)..... "	.06 ¹ / ₂	
Steel Emery, f.o.b. Pittsburg..... "	.07		Carbonate, ppt..... lb.	.05		Brown..... "	.07 ¹ / ₄ @.08				
			Chloride, com'l..... 100 lbs.	.75@.80		Nitrate, com'l..... "	.06 ¹ / ₂		Potassium—		
			Best..... "	1.00		"gran..... "	.08 ¹ / ₂		Bicarbonate cryst..... "	.08 ¹ / ₂	
Acids—			Cement—			Lime—Com. abt. 250 lbs..... bbl.	.80		Powdered or gran..... "	.14	
Boric, crystals..... "	.10 ¹ / ₄ @.11		Portland, Am., 400 lbs..... bbl.	1.70@2.00		Finishing..... "	.90		Bichromate, Am..... "	.08 ¹ / ₂	
Powdered..... "	.11 ¹ / ₄ @.11 ³ / ₄		Foreign..... "	1.65@2.25		Magnesite—Greece.			Scotch..... "	.08 ¹ / ₂ @.09	
Carbonic, liquid gas..... "	.12 ¹ / ₂		"Rosendale," 300 lbs..... "	.95		Crude (95%)..... lg. ton	6.50@7.00		Carbonate, hydrated..... "	.04@.04 ¹ / ₂	
Chromic, crude..... "	.20		Slag cement, imported..... "	1.65		Calmed..... sh. ton	14.00@15.00		Calcined..... "	.08 ¹ / ₂ @.09 ¹ / ₂	
Hydrofluoric, 38%..... "	.05		Ceresine—			Bricks..... M	170.00		Chromate..... "	.35	
48%..... "	.05		Orange and Yellow..... lb.	.12		Am. Bricks, f.o.b. Pittsburg..... "	175.00		Cyanide (98@99%)..... "	.24@.25	
Best..... "	.25		White..... "	.13 ¹ / ₂		Magnesium—			Kainit..... lg. ton	9.05	
Sulphurous, liquid anhy..... "	.08		Chalk—Lump, bulk..... sh. ton	2.45		Carbonate, light, fine pd..... lb.	.04 ¹ / ₂		Manure salt, 20%..... 100 lbs.	.86	
			P' per quality..... lb.	.03 ¹ / ₄ @.06		Blocks..... "	.06@.07		Double Manure salt, 48@53%..... "	1.12	
Alcohol—Grain..... gal.	2.53		Chlorine—Liquid..... "	.30		Chloride, com'l..... "	.01 ¹ / ₂		Muriate, 80@85%..... "	1.83	
Refined wood, 95@97%..... "	.60@.65		Water..... "	.10		Fused..... "	.20		95%..... "	1.86	
Purified..... "	1.30@1.50		Chrome Ore—			Nitrate..... "	.60		Permanganate, pure cr..... lb.	.12 ¹ / ₄ @.12 ³ / ₄	
			(50% ch.) ex-ship N. Y..... lg. ton	24.75		Sulphate..... 100 lbs.	.75@.95		Prussiate, yellow..... "	.13 ¹ / ₂	
Alum—Lump..... 100 lbs.	1.75		Sand, f.o.b. Baltimore..... "	33.00		Manganese—Powdered,			Red..... "	.37@.37 ¹ / ₂	
Ground..... "	1.85		Bricks, f.o.b. Pittsburg..... M	175.00		70@75% binioxide..... lb.	.01 ¹ / ₄ @.01 ¹ / ₂		Sulphate, 90%..... 100 lbs.	2.11	
Powdered..... "	3.00		Clay, China—Am. com., ex-			Crude, pow'd..... "			Sylvinit..... unit	3.34	
Chrome, com'l..... "	2.75@3.00		dock, N. Y..... lg. ton	8.00		75@85% binioxide..... "	.01 ¹ / ₄ @.02 ¹ / ₄		Quartz—(See Silica.)		
Aluminum—			Am. best, ex-dock, N. Y..... "	9.00		85@90% binioxide..... "	.02 ¹ / ₄ @.03 ¹ / ₄		Salt—N. Y. com. fine..... sh. ton	2.00	
Nitrate..... lb.	1.50		English, common..... "	12.00		90@95% binioxide..... "	.03 ¹ / ₄ @.05 ¹ / ₄		N. Y. agricultural..... "	1.50	
Oxide, com'l, common..... "	.06 ¹ / ₂		Best grade..... "	17.00		Carbonate..... "	.16@.20		Saltpetre—Crude..... 100 lbs.	3.50@3.55	
Best..... "	.20		Fire Clay, ordinary..... sh. ton	4.25		Chloride..... "	.04		Refined..... "	4.25@5.25	
Pure..... "	.80		Best..... "	6.00		Ore, 50%, Foreign..... unit	.23@.24		Silica—Best foreign..... lg. ton	10.00@11.00	
Hydrated..... 100 lbs.	2.60		Slip Clay..... "	5.00		Domestic..... "	.30		Ground quartz, ord..... sh. ton	6.00@8.00	
Sulphate, pure..... "	1.50@2.00		Coal Tar Pitch..... gal.	.08		Marble—Flour..... sh. ton	6.00@7.00		Best..... "	12.00@13.00	
Com'l..... "	1.15@1.25		Cobalt—Carbonate..... lb.	1.75		Mercury—Bichloride..... lb.	.77		Lump quartz..... "	2.50@4.00	
Ammonia—			Nitrate..... "	1.50		Mica—N. Y. gr'nd, coarse..... "	.03@.04		Glass sand..... "	2.75	
Aqua, 16°..... lb.	.03		Oxide—Black..... "	2.28@2.30		Fine..... "	.04@.05		Silver—Chloride..... oz.	.85	
18°..... "	.03 ¹ / ₂		Gray..... "	2.28@2.40		Sheets, N. C., 2x4 in..... "	.30		Nitrate..... "	.39 ¹ / ₂	
20°..... "	.03 ¹ / ₄		Small, blue ordinary..... "	.06		3x3 in..... "	.80		Oxide..... "	85@1.10	
26°..... "	.05 ¹ / ₄		Best..... "	.20		3x4 in..... "	1.50		Sodium—		
Ammonium—			Copperas..... 100 lbs.	.30@.35		4x4 in..... "	2.00		Bichromate..... lb.	.004	
Carbonate, lump..... "	.08 ¹ / ₄ @.08 ³ / ₄		Copper—Carbonate..... lb.	.18		6x6 in..... "	3.00		Chlorate, com'l..... "	.08 ¹ / ₂ @.08 ³ / ₄	
Powdered..... "	.06@.09 ¹ / ₄		Chloride..... "	.25		Mineral Wool—			Hyposulphite, Am..... 100 lbs.	1.60@1.65	
Muriate, grain..... "	.05 ¹ / ₂		Nitrate, crystals..... "	.35		Slag, ordinary..... sh. ton	19.00		German..... "	1.70@1.90	
Lump..... "	.08 ¹ / ₂		Oxide, com'l..... "	.19		Selected..... "	25.00		Peroxide..... lb.	.45	
Nitrate, white, pure (99%)..... "	.12		Cryolite..... "	.06 ¹ / ₂		Rock, ordinary..... "	32.00		Phosphate..... "	.02 ¹ / ₄	
Com'l white, 99%..... "	.09 ¹ / ₄		Explosives—			Selected..... "	40.00		Prussiate..... "	.10 ¹ / ₂	
Com'l gray..... "	.07		Blasting powder, A..... 25 lb. keg	2.65		Nickel—Oxide, No. 1..... lb.	1.00		Silicate, conc..... "	.05	
Sulphuret com'l..... "	.16		Blasting powder, B..... "	1.40		No. 2..... "	.60		Com'l..... 100 lb.	.77 ¹ / ₂	
Arsenic—White..... "	.08 ¹ / ₂ @.09 ¹ / ₂		"Rackarock," A..... lb.	.25		Sulphate..... "	.20@.21		Sulphate, com'l..... 100 lb.	.01 ¹ / ₂	
Red..... "	.07@.07 ¹ / ₄		"Rackarock," B..... "	.18		Oils—Black, reduced 29 gr.:			Sulphite crystals..... "	.02 ¹ / ₄	
Asphaltum—			Judson R. R. powder..... "	.10		25@30, cold test..... gal.	.06 ¹ / ₄ @.10 ¹ / ₄		Flour..... "	1.90	
Ventura, Cal..... sh. ton	32.00		Dynamite (20% nitro-glycerine)..... "	.13		15, cold test..... "	.10 ¹ / ₄ @.11 ¹ / ₄		Flowers, sublimed..... "	2.15	
Cuban..... lb.	.01 ¹ / ₂ @.03 ¹ / ₄		(30% nitro-glycerine)..... "	.14		Zero..... "	.11 ¹ / ₄ @.12 ¹ / ₄		Tar—Regular..... bbl.	1.90	
Egyptian, crude..... "	.05 ¹ / ₂ @.06		(40% nitro-glycerine)..... "	.15		Summer..... "	.06 ¹ / ₄ @.09 ¹ / ₄		Oil barrels..... "	3.80	
Trinidad, refined..... sh. ton	35.00		(50% nitro-glycerine)..... "	.16 ¹ / ₄		Cylinder, dark steam ref..... "	.08 ¹ / ₄ @.10 ¹ / ₄		Tim—Crystals..... lb.	.20@.21 ¹ / ₄	
San Valentino (Italian)..... lg. ton	16.00		(60% nitro-glycerine)..... "	.18		Dark, filtered..... "	.11 ¹ / ₄ @.15 ¹ / ₄		Oxide..... "	.42	
Seyszel (French), mastic..... sh. ton	21.00		(75% nitro-glycerine)..... "	.21		Light filtered..... "	.14 ¹ / ₄ @.17 ¹ / ₄		Uranium—Oxide..... "	2.25@3.00	
Gilsonite, Utah, ordinary..... lb.	.03		Glycerine for nitro (32 2-10° Be.)..... "	.13@.13 ¹ / ₄		Extra cold test..... "	.21 ¹ / ₄ @.26 ¹ / ₄		Com'l..... "	.07@.09 ¹ / ₄	
Select..... "	.03 ¹ / ₂		Feldspar—Ground..... sh. ton	8.00@9.00		Gasoline, 86°@90°..... "	.14@.19		Carbonate..... "	.15	
Barium—			Flint Pebbles—Danish, Best..... lg. ton	14.75		Naphtha, crude, 68°@72°..... bbl.	9.05		Chloride..... "	.91	
Carb. Lump, 80@90%..... sh. ton	25.00@27.50		French, Best..... "	11.75		"Stove"..... gal.	.12		Dust..... "	.05 ¹ / ₂ @.05 ³ / ₄	
92@94%..... "	26.00@29.00		Fluorspar—			Linseed, domestic raw..... "	.48@.55		Sulphate..... "	.02 ¹ / ₄ @.02 ³ / ₄	
Powdered, 80@90%..... lb.	.01 ¹ / ₂ @.02		Am. lump, 1st grade..... sh. ton	\$14.40		Bolled..... "	.57		Boron—Nitrate..... lb.	\$1.50	
Chloride, com'l..... 100 lbs.	1.67 ¹ / ₄ @1.76		2d grade..... "	13.90		Calcutta, raw..... "	.85		Calcium—Tungstate (Scheelite)..... "	.60	
Chem. pure cryst..... lb.	.05		Gravel and crushed, 1st gr..... "	13.40		Ozokerite..... lb.	.11 ¹ / ₂		Cerium—Nitrate..... "	11.00	
Nitrate, powdered..... "	.05 ¹ / ₂		2d grade..... "	12.40		Paints and Colors—			Bidymium—Nitrate..... "	35.00	
			Ground, 1st grade..... "	17.90		Chrome green, common..... "	.05		Erbium—Nitrate..... "	40.00	
			2d grade..... "	16.50		Pure..... "	.16		Glucium—Nitrate..... "	20.00	
			Foreign, lump..... "	8.00@12.00		Yellow, common..... "	.10 ¹ / ₄		Lanthanum—Nitrate..... "	30.00	
Fuller's Earth—Lump..... 100 lbs.	.75		Powdered..... "	11.50@14.00		Best..... "	.25		Lithium—Nitrate..... oz.</		