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THE COMPLETION of a railroad line into the Republic District in Washington will mean much for that district, and also for the smelting works in British Columbia, which are much in need of ores of the class which the Republic mines can furnish them. The smelters will therefore be able and willing to take those ores even when they carry only moderate values. The Republic Camp has been in a very quiet condition for some time past, and the miners look forward to the opening of the railroad connection very anxiously.



COPPER PRODUCTION in the United States in January, as reported by Mr. John Stanton as statistician for the companies, was the smallest for many months. The total was 18,955 tons, which was less by 948 tons than the small output reported for December; and less by 3,724 tons than that of January, 1901. The falling off was, to judge from the reports given in our news columns, most marked in the Montana mines, though there was probably a decrease in Arizona also. The Lake Superior region showed little change.

On the other hand the exports of copper from the United States showed a very large increase—5,008 tons over January, 1901, and were even 986 tons greater than the high figures of January, 1900. The large foreign buying on the fall of prices in December serves to explain this heavy movement.



THE COAL mines of New South Wales have been suffering from the same trouble as our own, the short supply of cars at the mines and the delay in transporting coal to consuming points. In New South Wales there is only one party to blame, the railroads being owned by the State; and the responsible minister has been bombarded with complaints accordingly. His explanations indicate a growth of traffic, for he says that the Railroad Department had been hampered by contractors' delays in delivering 40 new locomotives and 1,250 cars ordered especially for the coal traffic. Of the cars it may be noted that 450 are steel cars built in the United States. They are smaller than are usually employed here, their capacity being only 15 tons each.



THE CONDITIONS now prevailing in the copper market, and the various elements affecting that market make it very difficult at the present time to predict the future course of prices. To understand the position it is well to know just what the conditions are, so far as production, consumption, stocks, etc., are concerned. The carefully prepared article on another page presents a summary of the present situation, and comparisons with past years, which will be found of much interest to all who desire to study the question. At the present time the copper market is simply drifting, in the absence of any settled policy of the leading producers—a condition which is not favorable either to producers or consumers. The immediate tendency seems to be towards lower rather than higher prices. It was reported this week that an agreement had been reached between the conflicting parties in the Butte District, and that Mr. Heinze was to be placed in charge of the Amalgamated properties as manager; but this, we believe, has no foundation in fact.

THE REPORTS of Lake Superior traffic for the season of 1901 again show that in the chain of the Great Lakes the United States has the most extensively used system of waterways in the world, and the cheapest transportation. The report shows that the traffic passing through the Sault Ste. Marie Canal between Lake Superior and the lower lakes—which is estimated to include about half of the total business on the Lakes—amounted last season to 28,403,065 net tons of freight, valued at \$289,906,865. The transportation of this freight amounted to the enormous total of 23,383,861,987 ton-miles, the average distance it was carried being 823.3 miles. The average rate paid for transportation was 0.099 cent per ton-mile, or 82 cents for the whole distance.

About 70 per cent of this freight was iron ore; and it is the existence of the Lake route with its possibilities of cheap transportation on a great scale which has made the great iron ore deposits of the Lake Superior region available and has had the most important part in putting the iron trade of the United States in its present position.



THE QUESTION of modernizing and improving its plant has been seriously taken up by Bolckow, Vaughan & Company, Limited, one of the largest and best known iron making companies in Great Britain. In two prosperous years the company had accumulated a good surplus which is to be used in extending and in partially rebuilding its works. As a preliminary step the company is having two new blast furnaces erected on the "American system." The plans for these have been drawn up by Mr. Roberts, of Philadelphia, and the work is to be put in hand at once. The company is also putting in a large number of new by-product retort ovens for the recovery of tar, ammonia, benzine, etc. These, however, do not embrace the whole of the alterations that Bolckow, Vaughan & Company have in contemplation. It is intended eventually to erect five new blast furnaces, with all accessories, four of which are to be continually in blast, the other being held in reserve. These five new furnaces will take the place of some 18 to 20 of the present furnaces, and, when completed, it will mean that the whole of its works in the Cleveland District will be entirely reorganized and placed upon the most up-to-date basis at a total cost of about \$2,500,000. The new furnaces will effect great economies in working, it is expected. This is another instance of the effect American practice is having on British ironmasters.



THE LABOR troubles at Iquique, Chile, the distributing center in the nitrate of soda industry, are now settled, but have alarmed consumers, and this is aggravated by the opening of the buying season in Europe, where the present visible supply is 200,000 tons less than last year. This shortage is keenly felt, since the deliveries to European consumers in January were 14,000 tons greater than last year, and are expected to increase from now until early June. Even with the strike at Iquique over, it is feared stocks will be completely exhausted by the end of March. Realizing this, importers have raised their prices, and at New York are asking \$2.25 per 100 pounds for spot, and \$2.20 for early arrivals. These prices are the highest in two years, and compare with those at which the ill-fated New York "corner" bought early in 1898, expecting to raise the price to \$4 for spot during the Spanish-American War.

An advance in the market price will not help consumption, since nitrate of soda has aggressive competitors in sulphate of ammonia and other fertilizers. It is also well to consider that the shortage in the visible supply of nitrate is only temporary, and that the modern oficinas in Chile can quickly replenish stocks, since their producing capacity is larger than the quota allotted them by the combination



GEOLOGIC WORK IN ALASKA.

The United States Geological Survey has already done a large amount of work in the Territory of Alaska, and a number of valuable reports in the form of bulletins and monographs have been published as a result of these investigations. It is with pleasure that we note that the work in Alaska is to be vigorously pushed during the coming summer, and parties will be sent out as soon as the season is sufficiently advanced. As the period during which work can be carried on in this region is necessarily short, it is essential that such time as is available should be utilized to the utmost advantage. The work for the coming season has been placed in charge of Mr. Alfred H. Brooks, who is designated as geologist in charge of geologic work in Alaska. Mr. Brooks has spent several seasons in Alaska, and has contributed a great deal to the knowledge of the mineral resources of the Territory. Most of the reliable information we have had in regard to the Nome and Copper River regions has been furnished by the reports of Mr. Brooks and his associates.

In addition to having supervision of the work done in Alaska by all geologic parties, Mr. Brooks will have the direction of the work of geologists attached to the topographic parties in the Territory. Associated with him in the geologic work for the coming season are Messrs. Walter C. Mendenhall and F. C. Shrader, geologists, and Mr. Arthur J. Collier, assistant geologist. All of these men have had extended experience in Alaskan work during the last five years.



CONSOLIDATIONS IN THE ENGLISH STEEL TRADE.

The firm of Vicker's Sons & Maxim, of Sheffield and Barrow, in England, continues to expand by acquiring and consolidating with other businesses. The firm is a consolidation of the firm of Vickers, the steel makers of Sheffield, with the Maxim-Nordenfelt Company. Afterwards the business of the Naval Construction and Armaments Company, of Barrow, was acquired, and now it has been decided to consolidate with the firm of William Beardmore & Company, of Glasgow. Beardmore's have a high reputation as producers of armor-plates, ship-plates and other heavy material of the kind, and they are also shipbuilders on the Clyde. It is stated that after this consolidation has been effected a new shipbuilding yard will be built on the Clyde, and the shipbuilding yard at Barrow abandoned, or, if possible, sold to the Government. There is no doubt that Barrow is not a convenient shipbuilding center, and the transfer of the firm's scene of operations to Glasgow will be a wise move.

The firm of Guest, Keen & Company, of South Wales and Birmingham, is also actively pursuing its policy of absorbing other businesses. It is now announced that a consolidation with the firm of Nettlefolds, of Birmingham and Monmouthshire, has been arranged. Nettlefolds have for long been the leading producers of screws and wire nails in England, and at one time Mr. Joseph Chamberlain was connected with it. It is only quite recently that the firm of Guest, Keen & Company was formed to acquire the

Dowlais properties and the business of the Nut and Bolt Company of Birmingham. Soon afterwards the iron works of the Cyfarthfa Company was absorbed, and it is now rumored that the Ebbw Vale Company is to join the same consolidation.

These changes are of much interest, as showing a tendency to consolidation in the British iron trade, which is of much importance, and which is working on parallel lines to the movements of the past two years in the American trade.



COMPETITION IN WHITE LEAD.

The attention of the white lead trade has been directed lately toward the new developments in the manufacture of that substance. Heretofore the National Lead Company has been the controlling factor, although a large and increasing production has been made by the outside interests. Lately the Union Lead and Oil Company, owning extensive mines in Southeastern Missouri and the new Bailey process of corroding (which it is expected will lead to a great economy in the manufacture of white lead) has been preparing to enter the field, having erected a large plant at Brooklyn, N. Y. The prospect of this new competition has among other things caused a depression in the value of National Lead stock, of which the preferred fell a short time ago to as low as 74, with subsequent recovery to 86; it is now about 82.

It will be remembered that a consolidation between the Union Lead and Oil Company and the American Linseed Company was seriously contemplated last summer, but fell through when it turned out that the control of the American Linseed Company rested with Standard Oil interests, which are also supposed, we do not know with what correctness, to direct the policy of the National Lead Company. Subsequently it was rumored that there was to be a consolidation of the National Lead Company, the Union Lead and Oil Company and the American Smelting and Refining Company, which found considerable credence, inasmuch as there is believed to be, or to have been, a considerable community of interest in the ownership of the three companies, while certainly their business interests are dovetailed in such a way that a harmonious policy is desirable. However, these rumors, several times repeated with more or less circumstantial evidence, have been as often denied. Incidentally it may be remarked that the mines of the Union Lead and Oil Company have not yet been brought to the stage where they are important as producers. The latest report in the daily newspapers has been to the effect that officials of the National Lead Company not only have no intention of entering a consolidation with the Union Lead and Oil Company, but are prepared to test the claims of the latter to the extent of a trade war if necessary, which is a contingency that will hardly be regarded with equanimity by the 3,000 or more stockholders in the National Lead Company. However, the management of the National Lead Company has always been conservative, too conservative in the opinion of some of its critics, and knowing the white lead business so thoroughly as it does, the necessary grasp upon it should be maintained. The white lead business of the United States does not appear to have been expanded recently to the extent it should, as is shown by the following statistics of production in the United States as reported by the Geological Survey:

Year.	White Lead.	Zinc White.	Barytes.
1895	90,513	20,710	21,520
1896	88,608	20,000	17,068
1897	95,658	25,000	26,042
1898	96,947	33,000	31,306
1899	110,197	40,146	41,894
1900	98,210	48,840	67,680

The importations of each of the above substances into the United States are comparatively unimportant.

An increasing and promising export trade in zinc white has recently been developed. It is said that the increased domestic consumption of zinc white and barytes is due to some extent to the demand of the rubber and other trades in which white lead is not a competitor, but it is evident that they must also have gained on white lead in use as pigments, the growth in their production during six years having been so striking, while that of white lead has been so insignificant.



THE LEADVILLE SITUATION.

The situation in the Leadville District in Colorado is not altogether bright at present and there are many complaints from mine operators there. Some of these seem to be justified, while there is doubtless a very imperfect understanding of the market conditions. The ores of the district have been practically all going to the smelting works operated by the American Smelting and Refining Company, and until within the past few months there have been comparatively few complaints with the exception of the grumbling about rates, which is really chronic in the district. Recently, however, the Smelting Company has been taking all the iron sulphides it can get, thus giving the leading producers of that class of ore—such as the Greenback, the Iron Silver, the Moyer and the Yak—an open market and enabling them to produce up to their full capacity. This market, however, applies only to those properties which have iron exclusively and the trouble which has arisen is in connection with the lead sulphide ores. The market for these is at present completely tied up, the American Smelting & Refining Company declining to take the ores of that class, its plea being that it is not receiving siliceous ores enough to enable its plants to handle the full production. In consequence of this a number of important mines in the district—including such properties as the A. M. W., the Small Hopes, the Marian, the Resurrection and the New Monarch—are practically tied up and are unable to dispose of the product of their mines. As these mines are the best in the camp the situation is a bad one both for the operators and the miners employed.

At the present time there are practically no independent smelters to which recourse can be had. The Boston Gold Copper plant before it closed down was handling a large part of the lead sulphide ores of the New Monarch Company; there is no certainty that this plant will be started up again, although the Boston Gold Copper Company is settling up its old accounts at 75 cents on the dollar. The New Monarch Company is completing a plant of its own at Salida which will handle ores from its own mine and possibly 500 tons daily from other properties. A smelter is also approaching completion at Buena Vista, but this will not handle a very large quantity, probably only 200 or 300 tons a day.

While the production of iron sulphide ores cannot be increased to any very great extent, the output of lead sulphides could easily be maintained at 1,000 tons a day over the present figure if there was a free market, but of this there seems to be no chance at the present time.

We are informed that some of the leading mine managers of the district have announced that if the present conditions continue they will be forced to shut down entirely, a course which will naturally be very injurious to the camp. The feeling in Leadville is that the Smelting Company is discriminating against the district. It is doubtful, however, whether this is really the case as the company has no apparent reason for doing so. The fact is that the market, as we have already noted, is overshadowed by the large stocks of lead which have been

carried for the past two years and the Smelting Company has every reason for restricting production for a time. The Leadville people are in all probability not suffering more than some other districts. The present condition, however, is likely to last since it will doubtless take a considerable time to work off the surplus stocks of lead, in view of the almost total absence of export demand, although business in this country is absorbing a large quantity of the metal. Meantime, it is quite possible that the result may be some further action toward the establishing of an independent smelter at some point convenient for the handling of Leadville ores.



LAKE SUPERIOR TRAFFIC.

We have heretofore given the general figures for Lake Superior traffic; but we find many interesting details for that of the past season in an article in the *Cleveland Marine Review*, from which we take the following extracts:

There is no measure of the port to port commerce of the Great Lakes, and therefore no way of determining the total commerce of the lakes. However, it is fair to assume that more than half the commerce of the lakes passes through the canals at Sault Ste. Marie and it is an extremely fortunate circumstance that these records are reliably kept by the officials in charge of the United States and Canadian canals. General Superintendent Joseph Ripley, of the Sault Ste. Marie Canal, has just submitted to Col. G. J. Lydecker for transmission to the Secretary of War the exhaustive report of canal commerce for 1901. This goes into all manner of details regarding the canal traffic and it is, indeed, interesting. The report shows that \$23,217,974 was paid as carrying charges to the vessels that moved 28,403,065 tons of freight through the canals in 1901, and that the total value of the freight was \$289,906,865. The cost per ton per mile of moving this freight was 0.099 cent, against 0.118 cent for 1900 and 0.105 cent in 1899. The high rate for 1900 was, of course, influenced by the fact that the great bulk of the iron ore shipped during that year was carried at the contract rate of \$1.25, made in the boom period preceding the opening of navigation.

The total freight traffic of 28,403,065 net tons is the maximum traffic in the history of the canals. It exceeds the traffic of 1900 by 2,759,992 tons, or 11 per cent. The total number of passengers was 59,663, an increase of 1,108, or 2 per cent. The season of navigation was open for a period of 246 days, during which time the average monthly traffic was 3,463,788 tons.

The American canal passed 25,582,038 freight tons, being an increase of 1,974,684 net tons over the year 1900, or 8 per cent; the number of passengers was 29,701, a decrease of 6,612, or 18 per cent as compared with 1900. The Canadian canal passed 2,821,027 freight tons, being an increase of 785,308 net tons or 39 per cent. The number of passengers was 29,962, being an increase of 7,720, or 35 per cent as compared with 1900. Of the total freight the American canal passed 90 per cent and 50 per cent of the total number of passengers; the Canadian canal 10 per cent and 50 per cent respectively.

The total vessel passages through both canals numbered 20,041, as against 19,452 for the year 1900, an increase of 589, or 3 per cent; the total lockages numbered 11,321, which is an increase of 636, or 6 per cent. The American canal was opened April 26 and closed December 11, 1901; season, 230 days. The Canadian canal was opened April 20 and closed December 21, 1901; season, 246 days.

While the traffic exceeds that of the preceding year by 11 per cent, yet this is less than the average annual percentage of increase; but the actual gain of 2,759,992 tons is the largest for any one year excepting that of 4,021,146 tons in 1899. The gain was made wholly after September 1. The falling off in the early part of the season was due to the ice blockade in the St. Clair River and to the marine engineers'

strike. The depth of water in channels permitted a safe draft of 17½ to 19 feet during the season.

The following table will prove interesting as showing the distribution to other lakes of freight bound eastward from Lake Superior and also the districts from which the freight bound to Lake Superior originated:

East Bound.	
From Lake Superior to—	Net tons.
Lake Michigan ports.....	2,211,476
Lake Huron ports.....	917,919
Lake Erie ports.....	19,716,465
Lake Ontario ports.....	241,882
Total.....	23,087,742
West Bound.	
From lower lake ports to Lake Superior—	
Lake Michigan ports.....	91,359
Lake Huron ports.....	187,517
Lake Erie ports.....	5,015,636
Lake Ontario ports.....	20,811
Total.....	5,315,323

The number of registered vessels of 400 to 500 feet in length using the canals in trade to and from Lake Superior was 71; of 300 to 400 feet, 152; of 200 to 300 feet, 303; of 100 to 200 feet, 282; and of less than 100 feet in length, 85.

The records show that 408 different vessels in a single trip of each carried a total of 1,696,360 net tons. The maximum traffic for a single day was on September 2, when 230,156 freight tons were passed by 150 vessels whose registered tonnage amounted to 202,525 tons. The minimum traffic for a single day was on April 24, when 1 ton of freight passed through the canals by 9 vessels whose registered tonnage amounted to 1,092 tons.

The steamer *Presque Isle*, owned by the Cleveland Cliffs Iron Company, is credited with having moved the largest amount of freight through the canals during the season—161,375 net tons. This vessel also had the honor of moving the largest amount of freight during 1900 with a total of 195,550 tons to her credit during that year. The New York Central & Hudson River Railroad Company's steamer *Buffalo* had the greatest number of miles run to her credit—41,370. The greatest number of mile-tons—132,822,226—is credited to the Aetna Steamship Company's steamer *J. J. Albright*. The Pittsburg Steamship Company's barge *Manila* carried the largest single cargo through the canal—8,288 net tons. The steamer *William Edenborn*, owned by the same company, carried 8,222 net tons.

MUSEUM COLLECTIONS OF GEMS.

BY GEORGE F. KUNZ.

Among the gifts relating to minerals and precious stones, made by public spirited citizens within the past year three are to be noted as of special interest. One of these is the museum and library established at Paris Hill, Maine, largely through the agency of Dr. A. C. Hamlin, of Bangor, the noted tourmaline specialist. An old and staunch granite building, long used as the Oxford County jail, was vacated; its use was then obtained from the heirs who owned it, and the building completely refitted and arranged for a museum and library. With a steel roof and skylight added to the granite walls, the remodeled structure is well adapted and entirely fireproof. All this was done by Dr. Hamlin, who has now placed in it, in suitable cases, a full representative collection of the remarkable minerals of Oxford County—given partly by himself and partly by the late Messrs. S. R. & J. L. Carter, of Paris. The building is also to serve as a library, and a secure repository for historical documents, etc., of local interest and importance.

The other notable events of similar character have occurred in the City of New York, in the presentation of two remarkable collections to the American Museum of Natural History, by the liberality of J. Pierpont Morgan, Esq. One of these was the double collection from the Paris Exposition of 1900, displayed there by Tiffany & Co., of New York, and prepared by the writer. This collection comprised an exhibit of over 1,000 American precious and ornamental stones, shown in the United States section, and one of foreign gems, in the section of Diversified Industries. Both of these contained the finest ob-

tainable specimens, whether cut, or in perfect crystals, rolled pebbles, or broken pieces, many of them of great value, unique and remarkable. As now presented and combined with the previous gem-collection from the Paris Exposition of 1889, they form for the Museum the finest exhibit of gems in existence.

The other gift of Mr. Morgan to the American Museum is that of the cabinet in general mineralogy formed by Mr. Clarence S. Bement, of Philadelphia, long celebrated for its elegance and completeness, and considered by eminent authorities as probably the finest private mineralogical collection in the world. It contains over 10,000 specimens, selected for their perfection and beauty, and equally for scientific completeness, even to the very rarest and least known varieties. Many forms of precious stones in the natural state were included, among them many of the choicest ever obtained. The acquisition of this unrivaled collection by the Museum at New York is an event in the history of mineralogical science in this country and these two valuable collections so accessible in our great metropolis are of incalculable value as study collections to the many mining engineers who must at one time or other visit New York; \$250,000 would not duplicate them.

At the recent Pan-American Exposition in Buffalo many splendid collections were exhibited, alike by States, companies and individuals, and many have been well described in this journal. These were shown principally in the Mines Building, which was the most systematically arranged of all the buildings of the Fair. Precious stones were seen in several magnificent displays. At a central point in the Mines Building was a collection of the gems and precious stones of Pan-America, containing many objects especially remarkable. This exhibit, loaned by Tiffany & Co., of New York, was prepared by the writer at the request of the United States Geological Survey. North Carolina, Georgia, Maryland, Oregon and other States each showed some gems in their natural or cut forms.

This grouping of American gem products was made at the request of C. D. Walcott, Director of the United States Geological Survey, and was carried out by Dr. David T. Day.

COMBINATION IN THE SCOTCH OIL TRADE.—The London *Economist* of February 8 says: "A movement is on foot in Scotland for a combine in the mineral oil trade. But even while this project is being discussed one of the companies concerned is constrained to haul down its flag. The directors of the Linlithgow Oil Company have this week issued a circular intimating that it has been resolved to suspend payment and to convene a meeting of shareholders to consider the advisability of winding up. Such an event has not been unlooked for. This company has never been a brilliant success, and for the last few years has been financially weak. But the stoppage of the Linlithgow Company should help rather than retard the scheme of amalgamation, for what there may be worth preserving from the wreck will doubtless be procurable on favorable terms. This output of the Scotch oil trade is a mere bagatelle compared with the yield of America and Russia. Not even in Scotland would it be possible for a combine to put up prices artificially against the consumer. A monopoly of production in Scotland is advocated, not with the object of obtaining a monopoly of supply, but for the purpose of reducing the costs of production to the lowest possible point, and of developing the industry by concentrated and well-directed effort."

PEAT FOR LOCOMOTIVE FUEL.—The Vislanda-Bolmen Railroad, Sweden, have been making an experiment with pressed and dried peat as fuel with a train consisting of locomotive, 15 loaded freight cars, and one passenger car. The distance was about 22 miles, and the test was very successful, the locomotive steaming freely and making time without difficulty.

THE COOS BAY COAL FIELDS.—II.

By CLEVELAND ROCKWELL.
(Continued from page 238.)
THE BEAVER HILL MINE.

This mine is on a branch of Beaver Slough in Sec. 17, T. 27, S. R. 13, W., and a branch of the railroad from Marshfield to Myrtle Point has been built to the locality. The mine was first opened in 1894, but the method of development and subsequent working was such as to make the mining unprofitable; the property became embarrassed by litigation, and operations were discontinued. The mine is now a wreck, having been devastated by both fire and water. The following account of development work refers exclusively to the opening of Mine No. 2. Mine No. 1 was opened first in 1894, and work on No. 2 began in 1898. The entire section of the coals and rocks developed at this point is stated by Prof. J. S. Diller to be about 550 feet, including 15 feet of coal in 5 beds ranging from 1 to 7 feet of coal in each. The mining here is entirely confined to one bed of coal, and, according to the same authority, is identical geologically with the Newport bed. The vein consists of 6 feet of workable coal divided by two partings of sandy shale, each of 6 or 7 inches thick. The lowest strata or bench contains considerable bony material near the bed-rock, but also carries much good coal, and the upper benches consist of clean solid coal throughout. The company owns 480 acres of coal-bearing land. The strike of these beds is northeast and southwest, with a dip at the surface of about 45° to the southeast, but following the coal as depth is reached it is probable the angle of inclination will grow less. The borings made during prospecting operations indicate that as the strata approach the synclinal or bottom of the basin they gradually flatten out to a comparative level. The quality of the coal is better than that of the Newport bed, and is considered the best yet produced in the basin, though there are indications that the coals now being developed in the mine of the Crescent Coal Company will prove of equally good quality. The mine is opened on the northeast side of the tide land marsh nearly opposite the opening of the old No. 1. Entrance to the tunnel is about 70 feet above sea level, and is driven a distance of about 1,500 feet. Including this adit the openings and galleries represent about 4,025 lineal feet of workings, and as far as developed no faults have been encountered. The workings follow the dip of the vein to a point about 750 feet below sea level, and the plans of the company do not contemplate going deeper from the present opening for the reason that the topographical features of the ground are such that a new opening will provide a shorter haul of the coal after hoisting. Mining is done entirely by powder, pick and shovel. The coal is hoisted to the levels by means of a stationary engine and the cars are then drawn out of the mine by mules. The sandy shales and sandstone forming the roof are tender and weak, and a complete system of timbering is found necessary. A compressed air engine furnishes the power for the pumps and for driving the ventilating fans, and a complete plant for washing and screening is installed at the mine bunkers from which the coal trains run to the commodious shipping bunkers at Marshfield. I am informed that the company intends to erect new bunkers at a point nearer the mine at deep water on Isthmus Slough. No coal has been produced here except from the development work, and this product has been disposed of in the local market for domestic purposes or to vessels plying in the coastwise trade. The present plan of development will be continued for another year, and it is expected by that time the company will be prepared to mine and ship an output of 1,000 tons per day. The plan of working will be to mine the coal from the deepest and most distant galleries first and successively, letting the ground cave as the coal is removed, thus obviating the necessity of complete timbering and effecting an enormous saving in

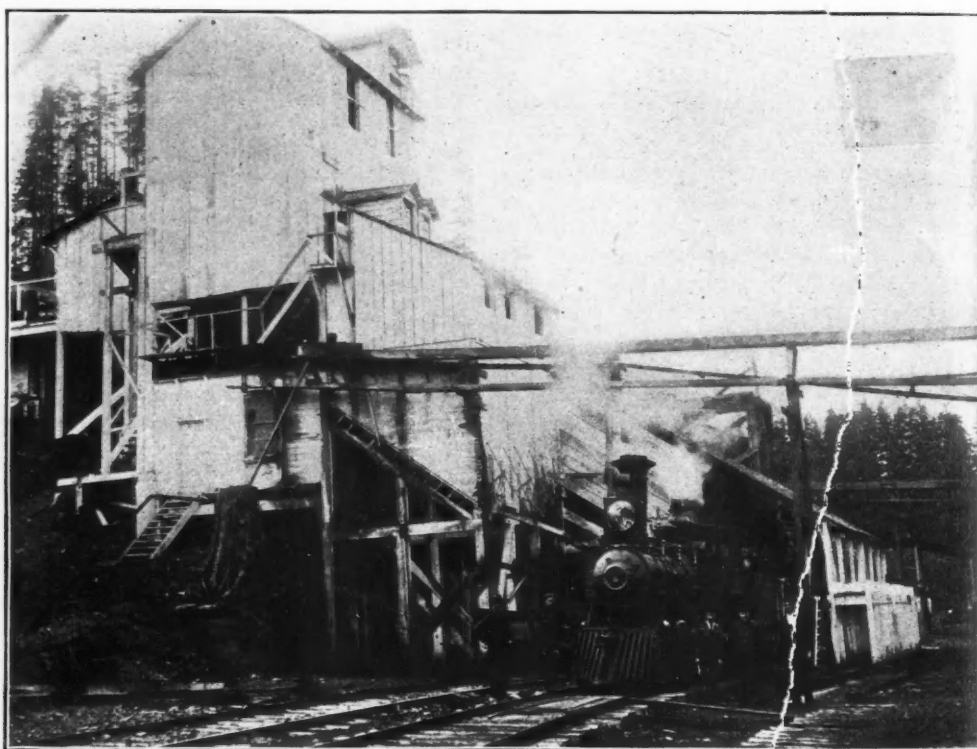
the working expense. Indeed, the whole scheme of development has been directed to this end as the most economical and efficient.

The Beaver Hill Mine is owned by Mr. J. D. Spreckels, of San Francisco, Cal., and Mr. W. S. Chandler is the superintendent and resident manager, to whom I am indebted for much information and assistance in examining the property. The accompanying views show the location of the camp from the railroad trestle, looking up the gulch or slough, and a near view of the bunkers near the mine tunnel. The bunkers are shown on the right hand in the view, looking from Marshfield. The following analysis of the coal was given by Mr. Chandler:

	Moisture.	Vol.	F. Carbon.	Ash.	Sulph.
At Beaverton (Klondike):					
Middle Bench.....	15.47	37.83	42.60	4.70	0.00
Bottom Bench.....	14.30	35.95	40.40	9.35	Trace
Garden Gulch:					
Middle Bench.....	14.84	32.60	50.21	2.35	Trace
Bottom Bench.....	16.30	33.46	42.67	7.57	"
King Gulch:					
Middle Bench.....	15.49	35.87	44.59	4.05	Trace
Bottom Bench.....	14.78	35.20	40.25	9.77	"

A large amount of money has been spent in past years in opening up different mining property in

and installation of machinery for extensive operations in mining, and the mine was very thoroughly opened for economical mining. Shortly after the removal of coal began, operations were suspended by injunction issued by the courts, and litigation ensued. The real cause of the trouble could not be ascertained, but it is certain that the mining of coal as a commercial proposition was not one of them. Over \$80,000 has been expended in opening the mine, most of which will be a complete loss. At the time of my visit the property was being dismantled, the machinery sold by the receiver and the rails removed from the bed of the branch railroad. The tunnel, or adit, had been driven through to a connection with the workings of the Old Beaver Hill Mine No. 1 on the other side of the hill, about a mile away. The shales in this basin swell so much that a tunnel abandoned and allowed to fill with water is soon destroyed by crushing and caving, and cannot thereafter be used. The coals of the Beaver Slough basin dip under the extensive marshes lying along both sides of the Coquille River from Beaver Slough to Coquille, and appear again, in the hills above



BUNKERS AT BEAVER HILL COAL MINE, OREGON.

almost every portion of the Coos Bay field. Thorough prospecting at a very moderate expenditure of money would have doubtless demonstrated in the majority of these instances that the coal could not be mined for any great length of time profitably, and that the conditions were such that the mining would not be a good commercial proposition.

In a great many instances mines were opened by parties without sufficient capital, and the development with depth required much money to make it efficient or profitable. The inevitable result has been in many instances disastrous to the projectors. When the price of the product in the market is low it is only those who can command capital and operate on an extensive scale that can expect to succeed.

BEAVERTON.

At this point a new mine was opened on a branch of Beaver Slough in Sec. 18, T. 27, S. R. 13, W., to which a branch of the Coos Bay, Roseburg & Eastern Railroad, was extended. The mine was opened by an adit on the northeast side of the ravine, but little above tide level and by a slope at a much higher level on the southwest side.

A great deal of work has been done in building and equipment of the necessary shops, dwellings

and below Riverton. The situation of the measures is such as to afford the best facilities for economical mining, the croppings lying high above tide level, affording opportunities for short tramways from mine to bunker over which the coal cars may be run by gravity and sea going vessels can lie at the bunkers and take on cargo. On account of these advantages a great many different mines have been opened in this part of the field. The coals and associated rocks at Riverton are embraced in a total thickness of about 600 feet of strata, within which are disclosed four distinct beds of coal besides four seams of carbonaceous and leafy shale. The section contains an aggregate of 15 feet of coal, the lowest bed of the series being 7 feet thick, separated by two 5-inch partings, but the lower bench of 30 inches thickness is quite bony. Below the coal service lie the massive sandstones which form prominent bluffs along the river shores. This bottom bed is supposed to be the same bed of coal as that mined at Beaver Hill and the Newport Mine at Libby, the coals lying above this here not appearing at all in the typical Newport basin. At that locality the Newport coal lies so high topographically that not much over 100 feet of the formation is found above the coal.

All the coals embraced within the section noted

above have been opened and worked at different points along this part of the Coquille River, and considerable coal has been removed. A mile or two south of Riverton the strike of the coal croppings gradually changes to a northeast and southwest direction, conforming to the shape of the southeastern limits of the Beaver Slough basin, which lies just beyond Fat Elk Creek. The dip of the strata is generally to the northwest, or away from the edge of the field on this side. A section of the coal-bearing formation exhibits a total thickness of about 504 feet of coal and associated rocks, composed of sandstones in the lower series and soft shales in the upper. Five different seams of coal are disclosed in this section, the lowest of which rests on the 150 feet of solid sandstone. These different seams aggregate a total thickness of not less than 33 feet of coal and coaly shale. Some of the seams contain coal of excellent quality and good workable thickness, and are profitably mined, but several veins, though carrying much good coal, are so mixed with bony shale and clay as to cause serious trouble in mining. The coals about Riverton have not been positively identified with these strata, but it is stated on the authority of Prof. Diller, who has made a careful study of the whole field, that from an examination of the structural characteristics of the different seams they belong to the same geological horizon.

Leaving the main basin for a few moments the coals found in the Coquille basin are here briefly described. The exposures four miles south of Coquille in the vicinity of Harlocker Hill have been well opened by prospectors, and considerable coal has been mined. Here are seven seams of coal disclosed in a section of associated rocks of about 537 feet in thickness. The coal and coaly shale in this series aggregated 27.4 feet, comprising over 12 feet of good coal, several seams of which are of workable thickness. These coals dip to the northwest as much as 20° on the north side of Harlocker Hill, but southwest of the hill they incline to the southeast or towards the hill. Croppings appear at elevations above the river of 200 feet, but the average dip to the northwest would carry the main part of the basin far below the river level, leaving but about one square mile of this part of the basin above drainage level. The coals about the northern part of the basin near Coquille have been opened and exposed, and some coal mined for domestic uses. Three seams of coal are developed in this locality, aggregating 13 feet, but the coals are much mixed with bony matter and clay, and at present no mining is in operation. The top seam lies quite level, and is 5 feet thick, including about 18 inches of red clay and bony shale.

The next seam, lying about 40 feet below, has 27 inches of good coal, with 3 inches of bony material between. The lowest bed, 40 feet below the middle one, is 26 inches thick, and is also bony. On the whole, the Coquille basin does not give indications of proving a valuable field for successful commercial development.

Resuming the notice of the Beaver Slough basin, there has been a great amount of prospecting done near Coaledo and along the head of Beaver and Noble Creeks. In Sections 14, 15, 22 and 23 are a group of mines, the property of the Beaver Creek Mining Company, formerly the Utten mines. Seven veins of coal have been found here, forming a thickness of coaly shales and coal of over 32 feet. But two of these seams have been mined, the lower seam lying in two benches with a 6-inch parting. The upper bench of 28 inches is of good quality, but the lower one of 42 inches carries some shale. The upper bed lies in two benches with 38 inches of good coal on top with 2 feet of shaly coal beneath with a parting of 2 inches of clay. The coals at these mines, though quite important, have been greatly disturbed by upheavals, and strike and dip at various angles within moderately short distances, a fact that makes successful mining somewhat uncertain.

At Henryville, on Isthmus Slough, in Sec. 34, T. 26, R. 13, a great deal of mining was done at one time, but the old workings are now abandoned. An incline was run 1,750 feet on the eastward dip of the upper seam, reported to be 9 feet thick of dirty coal. At the mouth of the incline a vertical shaft, 375 feet deep, followed by a boring to a total depth of 555 feet, showed the presence of three more coal seams. Seam No. 2 from the surface developed 3½ feet of clean solid coal. No. 3 was said to be 6 feet thick in two benches with a 3-in. clay parting, and No. 4 to be 5 feet 8 inches in thickness.

In the vicinity of Sumner, both north and south, at the head of Catchings Slough, which is near the eastern limits of the coal-fields, many openings on the croppings have been made. The average width of the basin here is about 5 miles. At these places, though some thick veins containing much good coal have been discovered, they are found to be much mixed with clay and sand, indicating washings from the land bordering the coal-field. On Catchings Slough about one mile north of Stock Slough, a coal vein has been found with a thickness of 4 feet 7 inches, but divided by three partings of clay, each about 1 inch thick. The quality is described as good, and the coal is interesting from the fact that it is the only coal in the Coos Bay fields that will make even a fair coke.

One mile east of Glasgow two beds of coal have been opened and a little coal taken out, but mining operations are not now in progress. At this place there are two veins opened with about 180 feet of rocks between them. The upper vein holds 5 feet of coal separated by a lower parting of 8 inches of shale and one above of 1 inch of clay. The coal is soft and air-slacks badly. The lower bed has also been opened, and a seam 8 feet 2 inches thick developed. Three partings divide the seam into four strata, one of which consists of 33 inches of good coal. Approaching the northern end of the basin, near Haynes and North sloughs, the coal formation dips 30° southwest under the sand-dunes of the coast line and the ocean.

In the South Slough basin the different coal seams have been prospected and opened in a great number of places from the town of Empire along both sides of South Slough and Hatchet Slough to the most southerly bend of the Coquille River three miles above Parkersburg, a distance north and south of 20 miles.

The development and prospecting work can be described here only in a general way. In the vicinity of Cape Gregory a section of the coal-bearing rocks is well exposed, but disclosing only one thin bed of coal.

Along the western border of the basin many croppings appear where the strata incline to the eastward at high angles, but they lie much flatter as the middle of the basin is approached at the head of South and Hatchet Sloughs. One of the first coal cargoes shipped from Coos Bay was produced from a mine lying about a mile south of Empire. These veins of 3, 5 and 6 feet in thickness were found dipping eastward at an angle of 70°, and the strata were much disturbed and broken. On Sections 17 and 18, T. 26, S. R. 13, W, a large bed was opened with a total thickness of 9 feet or more of a bony structure on an inclination of 70° to the west. Wherever the coals have been opened on veins having a dip approaching the vertical they appear, as would be expected, more or less broken and shattered, and are unprofitable to mine.

In Section 2, T. 27, S. R. 14 W openings on coal have been made, one of which exhibits a section having 7 feet of coal of good quality, favorably situated for economical mining. The measures are gently inclined at angles of 18° to 20°. Still farther south in Section 26 a large seam of coal was developed, having a thickness of about 9 feet, a larger amount than any other bed in the Coos Bay field. The section shows 18 inches of coal on top, underlined by a parting of 6 inches of shale. The

middle bench is 36 inches depth, of excellent coal over a 3-in. clay parting, and the bottom bench is composed of 44 inches of coal somewhat crushed and also bony at the bottom. This bed has been traced to the northwest under Sections 23, 14, 10 and 4, and also to the south in 35 and 36. To the northwest the dip is high towards the east, and in places is vertical, but to the south around the head of Hatchet Slough the dip does not exceed 40° to the eastward.

It is conjectured by Prof. Diller that this series may underlie the Newport bed so deeply as to be beneath the formation composing the great Westport Arch. Still farther south in Section 24, T. 28, R. 14, and also on the south side of the Coquille River, several coal veins have been found that show some indications of being an extension of the measures mentioned above.

It may be seen by reference to the foregoing partial list of the numerous prospects and mines developed during the 45 years or more past that the general characteristics of the Coos Bay fields have become pretty well known. The coals have been laid down throughout such a long lapse of Tertiary time that the correlation of the beds in different parts of the field have not been sufficiently made out. The field is so large that it is possible future explorations for coal may develop beds of equal value as commercial propositions to those hitherto made known. It seems evident that the late developments of petroleum in California will furnish a fuel for steam and manufacturing purposes that will lessen the demand for the more expensive coals, both domestic and foreign, which are now supplied to the San Francisco market. Petroleum having not yet been adapted to domestic use, however, the demand for coal for that purpose will not thereby be diminished; on the contrary, as the population of the towns increases in the future as in the past, the demand will more likely be greater than now. Coos Bay coal is quoted at the yards in San Francisco as selling at \$5.50 per ton. If it can be mined and laid down there for that price at a profit to the operator the Coos Bay fields will be able to turn out coal for a great many years to come.

The United States Government has expended for the improvements at the mouth of the Coquille in jetties the sum of \$184,300, and the work is still incomplete. A large sum has also been spent for improvements of the channel of the Coquille between Bandon and Myrtle Point. Seven or eight sawmills are in constant operation at different points along the river. Two mines at Riverton are engaged in mining and shipping coal; a woolen mill and salmon cannery are operated at Bandon, besides numerous creameries at different localities.

Commercial Statistics of Coos Bay.

	Tons.	Tons.	Tons.
1896.	144,934	1898.	103,039
1897.	115,896	1899.	116,567
		1900.	104,294

For the year 1900 the shipments embrace 39,622 tons of coal and 39,886 tons of lumber. The Government has expended about \$793,000 in the construction of jetties for improvement of the bar and about \$27,000 in dredging and other work in the bay and Coos River. In the preparation of this paper I have availed myself of the valuable and complete report on the geology of the fields by Prof. J. S. Diller in the annual report of the United States Geological Survey for 1897-8, Part III.

AMERICAN ORE CARS IN SCOTLAND.—The Caledonian Railway Company has just obtained delivery of twenty 30-ton wagons built for it by the American Car and Foundry Company, of Philadelphia. The orders for the wagons were placed months ago, and the deliveries are beyond the specified date. They are of the bogie pattern, and will be used chiefly for the carriage of iron ore. They are the first consignment of 50 ordered by the Caledonian Company.

THE GOLD MINES OF PHILIP OF MACEDONIA.

By J. E. SPURR.

North of Saloniki (the ancient Thessalonica) in Macedonia, there lies a broad alluvial plain through which the little river Galliko meanders. From this plain, as from a sea, high hills and low mountains rise, with a distinct groin at their base, as in the desert regions of Nevada. To the south the mountains rise in height till they culminate in the snow-covered mass of Olympus, within Greek territory.

At the Gulf of Saloniki, the old alluvial plain is just above sea-level. From its perfectly level surface rise at intervals curious isolated mounds, shaped like an inverted flower-pot. These have every ap-

pearance of being artificial, and it is only by observing the multiplication of such forms higher up the drainage, and their transition into commoner ones, that one perceives that they are the last remnants of a higher plain, the rest of which has all been swept away by the swinging erosion of the streams. The higher one ascends the Galliko, the higher rises the general level of the old alluvial plain above the river bottoms.

Ordinarily there is little even here, but when the frequently heavy rains occur, and the swollen stream subsides, the Turk or Bulgarian turns out and proceeds to scrape the top dirt from those bars which

the California gold-pan or the Mexican *batea*. (Fig. 1.) The next is a sluice about 8 feet long, with cross-ruffles, all hewn out of one piece of wood. One end of this sluice is elevated on a pile of stones, or on a forked stick carried for the purpose. (Fig. 2.) The gold-washer fills the sluice, either directly, with a "grubbing hoe," or by dumping a number of panfuls into it. Then with a long handled wooden bucket he ladles water into it until most of the gravel is washed away, when he finishes the operation with the gold pan (*pudnitza*).

It is probably owing in large part to the fact that these gravels have been washed over so many centuries that the best values come from the surface.

hardly satisfy an Alaskan miner—nor even a California Chinaman. I have found that the average content of the gravels in the best places (except where enriched by torrents) is about 4 cents to the ton; and that the skim of surface gravel deposited after rains holds about 10 cents to the ton. Working according to the method described, the peasant can handle 2 or 3 tons a day, making an average wage of 9 or 10 cents; in one especially rich place, 10 to 15 cents. After the rains he may earn from 18 to 30 cents a day. The great traditional find of the district was a little over \$4 in one day, two years ago. This being the case, I think there is hardly likely to be a stampede from the Klondike. I have estimated that perhaps 200 men on an average work daily in favorable weather in this district, and that the average yearly production is not far from \$6,500.

The Old Gravels.—The gold in the gravels of the present streams is very unequally distributed, and there are certain places where the torrents are sure to leave a relatively rich layer. I found that these rich spots were just below certain old channels in the Tertiary gravels. These channels, now the banks of the streams, are attacked by the swollen waters, and the gold is concentrated on the surface farther down. I was able to locate several of the old stream courses. In general the Tertiary drainage seems to have corresponded roughly with the present, for the present high rock divides have probably long existed; in detail, however, there is naturally no correspondence, so that the present river may cut across the old channel at right angles.

It follows from what I have said concerning the fact that the present streams have sometimes cut through the old gravels to bedrock, and sometimes not, that the bottom of the old channels, where we should expect to find the most gold, is sometimes above, sometimes below the present stream bed. Unfortunately for facility in working, the most important ones seem to occupy the latter position. In some cases, where the bottom of the old channel was



FIG. 1.—MACEDONIAN PANNING GRAVEL WITH A "PUDNITZA."



FIG. 2.—SLUICE OF THE MACEDONIAN GOLD WASHERS.

In this auriferous district the streams in their higher courses flow over bedrock, while in the lower portions their bottoms as well as their sides are formed by the old alluvium which often rises high up on the hills between the drainage lines. The character of the alluvium within these mountains mark it as a river-made deposit, and we may provisionally refer it to the Pliocene. Following an early Pleistocene uplift, the evidence of which is marked over all those portions of European Turkey which I have visited, the rivers began to cut down through their old deposits. The analogy with the auriferous gravels of California is evident.

The Creek Gravels.—It is in the beds of the present streams that the country people occupy themselves, when they have no more profitable work, in washing the gravels for gold. Their apparatus is crude, but its very simplicity is advantageous. The gold-washer easily takes his whole outfit on his back and walks over the hills to his work in the morning, returning with it at night. The first item is a wooden gold-pan, of a model far superior to

have been inundated at high water. This surface dirt, which is the sediment brought down during the storm, is then found to be several times richer than the ordinary gravel.

In one creek I found that the gravels contained very little gold, while the turf which grew along the edges of the gravels, and over which the stream intermittently flowed, contained a considerable amount. I was at first inclined to attribute this chiefly to the mechanical effect of the grass in catching the gold carried over it by the water; but noticing that the particles were rather coarser than those usually found in the gravels, I concluded that in part at least this illustrates the principle, frequently observed, of the precipitation of gold from solution by organic matter.

The wages earned by these gold-washers would

only a few feet below the river, excavations have reached the bedrock, showing a relatively rich layer of coarse gold lying on it; but in perhaps the most promising locality no exploration has been made, and the distance to bedrock is unknown.

In general, these old gravels (except in the direct channels) contain only sparsely disseminated gold. On an average, I have estimated about half a cent to the ton. In the former channels, however, I have found an average as high as 9 cents to the ton, but this only for the lower portions. Naturally therefore there is not sufficient attraction to make the peasant attempt to wash them, except occasionally, when they are close to water; but he has prospected them. At one locality there is a sealed-up tunnel, which is probably Byzantine or Roman, and seems to have been run for prospecting or mining.

Tradition says it was sealed up when full of refugees, in time of war. Therefore it is very probable that the ancients also worked these old gravels somewhat. They had the exceedingly economical method of using large gangs of slaves (chiefly prisoners of war) in this work, and thus, no matter how small the output, the enterprise was profitable to the monarch who stamped his effigy on the coins produced.

The Veins.—The gold in the ancient alluvium has been derived from the erosion and oxidation of veins in the bedrock; also these veins have, to a slight extent, furnished directly some of the gold to the present creeks. The bedrocks are part of a great metamorphic terrane and are constantly mica-schists and gneisses. Intrusive rocks (basaltic) occur, but are not abundant so far as observed. Veins of white quartz cutting the schist are abundant, but they are generally barren. Some of them, however, carry calcite, gypsum, chalcocopyrite, arsenopyrite, pyrite, blende, and galena. When one of these crosses a gulch, the peasants usually recognize the locality immediately below as containing an unusual amount of gold; and from the decomposed outcrop of some of the veins I panned grains of gold coarser than ordinary. But assays, so far as made, show only a trifling quantity of the yellow metal.



FIG. 3.—MACEDONIAN GOLD WASHERS.

On the other hand, the galena in the veins is argentiferous and in one locality the silver-lead ore was exploited some years ago by English enterprise, but their mines are now abandoned. Antimony also exists, but in small quantity.

Conclusion.—Although these obscure and meagre gold placers have probably been important in the world's history, they seem to originate from deposits which are only accessorially auriferous. In the destruction of the vein outcrops by weathering and erosion the sparsely disseminated gold has passed into the gravels, and has been concentrated there to proportions greater than those known to exist in the present veins, while the other metals have passed into solution, and so have been lost. This gold-field is probably of the same type as others which are known to exist in Greece, and even in Asia Minor.

A COAL THIEVES' UNION.—The London *Colliery Guardian* of recent date says: "An extraordinary development of the trade union spirit was brought to light at Halesowen Police Court on December 31, when Matilda Whittall and Sarah Harris, married women, and William Rose were charged with stealing a quantity of coal from the White Heath Colliery, belonging to the Titford Colliery Company, on December 23. Mr. J. W. Growcott, manager, said it appeared to be a problem to know how to deal with coal stealers, for they had formed a kind of union, out of which all fines were paid. Mr. Garratt (presiding magistrate): 'You mean they have started a coal-stealers' association?' Witness: 'Yes.' Inspector Pitt said it was difficult to detect the offenders, and whenever they were caught the fines were paid by the people residing in the district."

A CONSIDERATION OF THE COPPER SITUATION FROM A STATISTICAL STANDPOINT

By WALTER RENTON INGALLS.

The copper producing industry has lately experienced a crisis analogous to that which followed the collapse of the French corner in 1889. The price of the metal fell between November 15, 1901, and January 15, 1902, from approximately 17 cents per pound to something like 11 cents for Lake brands at New York, with subsequent recovery to 13 cents toward the end of January. The cause of these movements and the probable course of the market in the near future have been the subjects of great speculation. Alarming prognostications and optimistic opinions have been expressed alternately, sometimes concurrently. It is important to determine what are the facts in the situation in copper, so far as they are visible to disinterested observers.

The record of the market conditions in 1901 is still fresh in mind. The Amalgamated Copper Company, which in various ways controlled a large proportion of the American production of copper, undertook to maintain the price of copper at 17 cents. That price, which had been practically the ruling rate throughout 1899 and 1900, does not appear to have stimulated production materially; nor does it appear to have *per se* checked consumption. In 1899 and 1900 there was a remarkable increase in commercial activity both in Europe and in the United States. Toward the end of 1900, however, many branches of business in Germany, where there had been a period of over-speculation, suffered a critical turn and fell into a deplorable condition; on the other hand, commerce in Great Britain was unfavorably affected by the continuance of the war in the Transvaal, involving a great expenditure of labor and money. For these reasons the consumption of copper in Germany and Great Britain, which are the principal buyers of the American surplus, diminished greatly in 1901. Consumption in the United States increased enormously, but not enough to absorb the entire surplus that had previously been going abroad. In this juncture, the independent American producers were doing finely, while the Amalgamated Copper Company was "holding the umbrella;" in other words, all of its competitors were shading the Amalgamated price and getting the business, and the Amalgamated was storing most of its copper in stock; at the end of 1901 it was estimated variously as having from 150,000,000 to 250,000,000 pounds in stock. This leading to an impossible position and the independent producers refusing to agree to any plan of limiting production, the Amalgamated Copper Company restricted further its own production and drastically cut the price of the metal in order to dispose of its stock on hand.

The question of maximum interest now is if the policies of conflicting interests in the production of copper has not led to a position which is not justified by the actual condition and prospects of the industry. In this connection it is useful to study the statistics of production and price from 1886 to 1900, which period covers the career of the French syndicate.

The production of copper in the world and the average price of G. M. B.'s at London as reported by Henry R. Merton & Co., and the average price of Lake copper at New York, as reported by the ENGINEERING AND MINING JOURNAL, all of which statistics are authoritative, are summarized in the following table, in which the production is stated in long tons:

Year.	Production Long Tons.	Price of Lake Copper at N. Y.			Av. Price of G. M. B.'s At London.	
		High. Cents.	Low. Cents.	Average. Cents.	£	s. d.
1886	217,086	12.00	10.00	11.00	40	1 8
1887	223,798	17.00	10.00	11.25	46	0 5
1888	258,026	17.25	16.12	16.67	81	11 3
1889	261,205	17.25	11.00	13.75	49	14 8
1890	269,455	17.00	14.33	15.75	54	5 3
1891	279,391	14.75	10.62	12.88	51	9 4
1892	310,472	12.38	10.38	11.55	45	13 2
1893	303,530	12.13	9.75	10.75	43	15 6
1894	324,595	10.13	8.94	9.50	40	7 4
1895	334,565	12.25	9.75	10.76	42	10 7
1896	373,363	11.67	9.87	10.88	46	18 1
1897	399,730	11.92	10.78	11.29	49	2 7
1898	429,626	12.93	10.99	12.03	51	16 7
1899	472,244	18.50	14.75	17.61	73	13 9
1900	486,084	16.94	16.00	16.52	73	12 6

M. Secretan's attempt to corner the copper supply of the world was inaugurated toward the end of

1887; the failure came early in 1899, when copper fell gradually from 17¼ cents to 16¼, then rapidly to 12, and finally to 11 cents. But such was the consumptive demand for copper at that time, that upon arrangements being effected whereby the marketing of the great stocks accumulated by the French syndicate was to be spread over a series of years, the price of copper rose naturally to 14¾ cents in December, 1889, and in September, 1890, averaged 17 cents, which was about equal to the highest realized under the syndicate's management. The low prices that ruled from 1891 to 1897 were due to generally unfavorable industrial conditions, the depression being lowest after the silver crisis in 1893, which manifested themselves in the prices of other metals as well as in copper, as is shown in the following table:

Year.	Copper.	Spelter.	Lead.
1891	12.88	5.02	4.35
1892	11.55	4.63	4.09
1893	10.75	4.08	3.73
1894	9.56	3.52	3.29
1895	10.76	3.63	3.23
1896	10.88	3.94	2.98
1897	11.29	4.12	3.58
1898	12.03	4.57	3.78
1899	17.61	5.75	4.47
1900	16.52	4.39	4.37
1901	16.56	4.08	4.33

M. Secretan undertook to corner the world's supply of copper upon the theory that the consumptive demand had outstripped the capacity for production. He appears to have been correct in his hypothesis. He miscalculated the volume of the invisible stocks in private hands and the quantity of scrap metal that would be collected and offered under the stimulus of a high price. M. Secretan practically confessed that it was the magnitude of this factor in the situation which was the chief source of embarrassment, baffling as it did all calculations. The increase in new production was rather large, but not alarmingly so. When the corner collapsed the syndicate was in possession of very large stocks of metal. It was officially reported January 1, 1889, that its American agents then held 59,000,000 pounds. According to the ENGINEERING AND MINING JOURNAL the total stock in the United States at that time was 75,000,000 pounds. The stocks in England and France and afloat from Chile and Australia, March 1, 1889, amounted to 118,140 long tons; on January 1 they had been 104,105 tons. It was estimated on good authority that the stock of copper throughout the world on March 1, 1889, was not less than 175,000 long tons, the syndicate having held back considerable quantities at the mines to avoid the payment of freight and charges, and having retained some copper at English smelting works. That stock of copper was equivalent to nearly 68 per cent of the world's production in 1888; in comparison with it, the recent accumulation of stock was small. The absorption of the stocks in England and France since 1889 is shown by the following statistics, reported by Henry R. Merton & Co.:

January 1.... 1888—35,001	January 1.... 1895—51,575
January 1.... 1889—96,194	January 1.... 1896—43,604
January 1.... 1890—94,942	January 1.... 1897—31,776
January 1.... 1891—62,449	January 1.... 1898—27,895
January 1.... 1892—53,486	January 1.... 1899—22,702
January 1.... 1893—51,556	January 1.... 1900—17,797
January 1.... 1894—43,428	January 1.... 1901—24,845

Unfortunately there are no complete statistics of stocks in the United States. According to Mr. Charles Kirchhoff, in the *Mineral Resources of the United States* for 1900, mines in Michigan, Montana, and Arizona, which in 1900 produced 420,596,269 pounds of fine copper out of the total of 533,517,751 pounds from those States, reported that they held 85,719,639 pounds on January 1, 1900, and 91,215,571 pounds on January 1, 1901. These figures represented about two-thirds of the American production in 1900. If the stocks of the remaining producers had been in the same proportion, the total in first hands in the United States would have been about 129,000,000 pounds January 1, 1900; and about 137,000,000 pounds January 1, 1901. According to the *Mineral Industry*, the stock in first hands, January 1, 1900, was 88,722,559 pounds; January 1, 1901, 93,050,230 pounds; but this statement also was admittedly incomplete. Assuming that the actual stock in the hands of producers in the United States on January

1, 1901, was 137,000,000 pounds, or in round numbers 61,000 long tons, the following statement expresses what is known definitely:

	Jan. 1 1889.	Jan. 1. 1901.
Stocks in England and France.....	95,194	24,845
Afloat thereto.....	7,911	4,015
Stocks in the United States.....	33,500	61,000
Total.....	137,605	89,860

It is certain that during the 12 years from January 1, 1889 to January 1, 1901, the world consumed at least 47,745 tons of copper more than it produced; in all probability the excess of consumption during that period was 75,000 tons, although the production increased from 261,000 tons in 1889 to 486,000 in 1900. The sources of the increase in production are shown in the following table:

	1889.	1900.
Australia.....	8,300	23,000
Canada.....	2,500	8,500
Chile.....	24,250	25,700
Cape.....	7,700	6,720
Germany.....	17,356	20,410
Japan.....	15,000	27,840
Mexico.....	3,780	22,050
Peru.....	275	8,220
Russia.....	4,070	8,000
Spain and Portugal.....	54,270	52,872
United States.....	105,774	268,787
Other Countries.....	17,930	13,985
Total.....	261,205	486,084

The situation in copper at the beginning of 1901 may be summarized as follows: A stock of copper amounting to approximately 175,000 tons in the early part of 1889 had been reduced to probably about 100,000 tons, while the increasing production of the world had been entirely absorbed, the arithmetical average of the price of Lake copper at New York having been a little more than 12 $\frac{3}{4}$ cents per pound. An extraordinary demand for consumption, beginning in the latter part of 1898, had forced the price up to 17 $\frac{5}{8}$ cents, and the Amalgamated Copper Company, organized early in 1899, controlling directly upward of one-third of the American production in 1900 and indirectly a much larger proportion, had undertaken to fix the price permanently at 17 cents. The great stock of copper known to exist in 1889 represented practically all there was in the world; the high price of that time had converted all the invisible stock into visible, and its quantity had proved to be greater than anyone had previously any idea of. Presumably the high prices of 1899 and 1900 had the same effect. It is well known that copper coins were collected in India and China and exported because their intrinsic value was greater than their coinage value; some lots of these were melted up by brass manufacturers in Connecticut. After the raking over that the world had for old metal in 1888 and again in 1899 it is improbable that there now exists any important available supply of the second-hand copper. Furthermore it is believed that the published policy of the Amalgamated management merely to steady the price of copper, not to enhance it unduly, caused manufacturing consumers to carry less copper at their works than business prudence necessitated under a fluctuating market. It is probable that the American Smelting and Refining Company experienced somewhat the same result in its policy of pegging the price of lead. This development may or may not have been anticipated by the organizers of the trusts, but at all events it transferred to them a burden which has had to come out of the proceeds of the metal.

In 1901 there was a great falling off in the consumptive demand in Great Britain and Germany, especially the latter, which began in the second half of 1900 and manifested itself by the increase in stocks that year. In 1901 the depression became more pronounced, the exports from America to Europe declining in a remarkable manner, and although the danger of the situation was reduced by an unprecedented consumption in the United States and comparatively little increase in production here, there was such an accumulation of stocks in first hands as created alarm. About November 1 it was rumored variously that the Amalgamated Copper Company, or its affiliated interest, the United Metals Selling Company, was carrying from 200,000,000 to 250,000,000 pounds of copper, which had been accumulated

while the independent producers had been supplying the reduced consumptive demand by cutting under the Amalgamated price. Inasmuch as it was declared that the independents were bare of stocks, or nearly so, it is probable that 110,000 tons, in round numbers, represented the entire stock of copper in the United States. The visible supply in England and France at that time was about 21,000 tons. It is likely that the world's stock was then as much as 150,000 tons—the estimated stock at the collapse of the French syndicate in 1889 was 175,000 tons. The stock in 1901, if it were 150,000 tons, was, however, only about 30 per cent of the production in 1900, while the stock in 1889 was 68 per cent of the production of the previous year. In other words, there was about eight months' supply on hand in 1889; only about four months' supply in 1901. This was not in itself extraordinarily alarming. The late R. P. Rothwell expressed the opinion, in various volumes of the *Mineral Industry*, that the market may be considered practically bare when stocks in all available forms do not exceed one-sixth of the year's output, and that they could not fall much below that without causing a famine and sudden rise in price. The great danger in the situation was that the stocks were concentrated in the hands of one holder and the consumption in Europe was still below the normal. However, the course that was pursued after the failure of the French syndicate in 1889, when a proportionately greater stock was concentrated in one interest, furnished a complete precedent and guide for action in the recent case. It does not seem that the action of the Amalgamated Copper Company in precipitately cutting the price to the extent it did was necessary, apart from such effect as it may have been desired to exert on the stock market.

The subsequent course of events is clear. The attempt to fix arbitrarily the price of copper having been abandoned, consumers were left to buy as best they could, just as formerly. They do not buy heavily on a falling market, and the Amalgamated's cuts did not stimulate absorption of its stocks until 11 cents was reached, which price it was felt was lower than was warranted by the real situation in the copper industry. Toward the end of January a heavy buying began, partly for speculative purposes, partly for immediate consumption, and partly for accumulation of stock at consumers' factories. It is said that the entire Amalgamated stock has been disposed of; it has not, of course, been consumed yet; it has been converted from visible to invisible stock, the price of 11 to 12 cents being sufficiently low to effect the change. Incidentally the price of copper recovered to 13 cents and upwards, with a subsequent relapse to about 12 cents.

The chief concern at present is as to what the near future will bring forth. How long will it be before the consumptive demand in Great Britain and Germany regains its strength and exports from the United States increase? Is there in sight an important increase in the world's production? Will the present large producers agree to regulate production in any way? At what price can the present demand for consumption be supplied at a reasonable profit to the producers? In connection with those questions it is important to consider the conditions under which the world's production of copper is made.

Although the ores of copper are widely distributed, it appears from experience that the deposits which are capable of making a large production are comparatively few. In general, the deposits of that class are of low grade and capable of profitable exploitation only by the expenditure of a large amount of money and several years of time. The development of a mine at Lake Superior, that is, bringing it to the productive stage, appears to require the outlay of upward of \$1,000,000 and approximately three years of time. The most successful of the new Lake Superior mines, which were first opened in the spring of 1898, are just beginning to produce a little copper, but it will be still a long time before their output is of any consequence. The chief feature of copper production recently has been the exploitation

of the great deposits of low grade pyrites, few of them new discoveries, which has become possible through improvements in metallurgical methods. Such, for example, are the mines in California, Utah, British Columbia and Tasmania. The development of those mines has required a great deal of money—that of the Mount Lyell is said to have cost \$2,000,000—and the investments in them have also, in most cases, been slow in materializing. The only new copper producer of importance developed quickly in recent years has been the Cananea property of the Greene Consolidated Copper Company, a phenomenal mine, which has apparently more than fulfilled the rosiest expectations of its not ultra-conservative promoters. This mine is at present producing at the rate of about 30,000,000 pounds per annum, and it is claimed that a larger output can soon be made, which is probably true. The discovery of such a mine is, however, one of those lucky accidents that make mining ventures so attractive and unfortunately for so many hopes are realized so infrequently. In a more sober, less startling, manner, recent importance copper developments have been Mr. Heinze's mines at Butte (1893); the Wolverine at Lake Superior (1893); the Mountain Mines in California (1895); the Mount Lyell in Tasmania (1896); the Baltic at Lake Superior (1898); the first exploitation of the copper resources of Cerro de Pasco in Peru (1898); the Moctezuma in Mexico (1899); and the Utah Consolidated in Utah (1899). Save in one or two instances the development was begun a long time before the years mentioned, which are those of the first production reported.

In 1901, the Bingham in Utah and the Tennessee and British Columbia companies became producers; in 1902 the Trimountain and Copper Range are just beginning to make a small output; in the near future, production is to be expected from the United States in Utah, and the Mohawk, Adventure and possibly some others of the new undertakings at Lake Superior. The increase in the production of copper in the United States during the ten years 1891-1900 is shown in the following table, in long tons:

Year.	Arizona.	Michigan.	Montana.	United States.
1891.....	17,723	51,505	50,536	128,179
1892.....	17,160	54,460	72,000	152,620
1893.....	19,600	50,510	69,500	147,210
1894.....	19,690	51,125	79,730	159,695
1895.....	21,420	58,036	82,589	172,300
1896.....	31,548	64,669	93,276	203,893
1897.....	35,979	64,653	103,528	216,060
1898.....	48,359	70,462	97,400	234,271
1899.....	54,793	69,363	106,650	262,206
1900.....	49,447	64,396	114,144	268,787

In 1901 there was probably a decrease in the American production, inasmuch as the mines which make returns to Mr. John Stanton, reported only 265,255 tons, against 268,887 in 1900. The decrease occurred in November and December, previous to which months the output was running about the same as in 1900, and was due to the partial suspension of operations by the Amalgamated Copper Company. As to what extent that company may have been limiting its production earlier in the year, and as to what extent its restriction was voluntary and not compelled by litigation over its mines and increasing poverty of its ores, only the managers of that company can answer definitely. It is well known, however, that the grade of the Anaconda ore has been diminishing seriously, which the Amalgamated management has hoped to offset by the metallurgical improvements in the new Washoe Smeltery; and that many of the best Amalgamated mines at Butte have been rendered temporarily unproductive by the apparently interminable litigation with Mr. Heinze.

Examination of the statistics of production show that the output of American mines has been for 10 years increasing steadily, with the exception of a single year, irrespective of the price of copper. The largest proportional increase, about 18 per cent, occurred in 1896, in which year the price of Lake copper averaged only 0.08 cent higher than in 1895, while the price had been low for the three years previous, so the increase could hardly be interpreted as the coming in of new mines of which the development had been due to a high price for the

metal. The large increase in 1892 occurred on a falling market. The high prices which have ruled since 1898 have been accompanied by a large increase in production in 1899, a small one in 1900 and none at all in 1901, although many of the new ventures inaugurated in 1898 have now become producers.

It appears from the statistics, therefore, that during the 12 years previous to 1901 there was a large increase in the world's production of copper, due partly to the discovery of new mines, partly to the ability to exploit profitably by means of improved mining and metallurgical methods mines that were previously known, and partly to the extension of the capacity of the older producing mines, which increase was effected without either material stimulus or check because of fluctuations in the price of copper and in the long run was not equal to the increase in consumption. At certain times during that period means were taken to restrict arbitrarily the production, especially in 1892, 1893 and 1894, but at the lowest prices touched by copper there was still an increase in production. During the 12 years, 1889 to 1900 both inclusive, there was marketed in the world, besides a surplus of accumulated stock, a new production of 4,244,000 tons in round figures. The arithmetical average of the price of Lake copper at New York during that period was about 12 3/4 cents per pound. The total value of the 12 years' product on the basis of Lake copper at New York, computed as the sum of the annual outputs multiplied by the average price of the same year, was \$1,233,500,000 in round figures, or an average of about 13 cents per pound. It appears therefore that on the whole the copper industry has maintained itself in a healthy and prosperous condition, consumption somewhat exceeding production, on a basis of 13 cents for Lake at New York. This result may be of course rather misleading, inasmuch as Lake copper really constitutes a comparatively small part of the world's production, the major part being inferior brands which fetch a relatively lower price, while the difference between the values of the brands and between the prices at New York and London have not always been the same. However, it is well known from the greatly increased consumption of electrolytic copper, which sells at only a small discount from the price of Lake, that the average cost of the entire consumption of copper in the world is now closer to the price of Lake than it used to be. The difference between the average price of Lake copper and G. M. B.s at London for a series of years is shown in the following table:

Year.	G. M. B.'s, London.	Lake, New York.	Difference.
1889	£49.73	£63.50	£13.77
1890	54.26	72.75	18.49
1891	51.47	59.50	8.03
1892	45.66	53.00	7.34
1893	43.78	49.50	5.72
1894	40.37	43.75	3.38
1895	42.98	49.50	6.52
1896	46.90	50.88	3.98
1897	49.13	52.25	3.12
1898	51.83	55.38	3.55
1899	73.69	82.00	8.31
1900	73.63	77.00	3.37

The arithmetical average price of G. M. B.s at London from 1889 to 1900 was £51.95 per ton, or 11.29 cents per pound; the average corresponding to the total production and means annual price was £53.47 per ton or 11.62 cents per pound.

This discussion of the copper situation is not designed to extend to an attempt to forecast the future, except in so far as the experience of the past is a guide. It is agreed that the recent demand for copper in the United States has been unparalleled and that there is no indication of a wane in the general industrial prosperity of this country; also that there have been, for a year and more, hard times in Europe, especially in Germany, from which there is now some evidence of recovery. The crisis in the copper market was clearly precipitated by the failure to recognize the existence of such a condition abroad, where the deliveries of copper for consumption dropped, according to Henry R. Merton & Co., 42-102 tons in 1901 as compared with the previous year. This condition must be only temporary. On the other hand there does not appear to be any alarming increase in production in sight. The discovery of an-

other bonanza like that of Le Cananea is hardly to be anticipated in the near future and the production of the new mines recently developed does not promise more than to meet the natural increase in the demand for consumption when industry in Europe regains its normal condition. Reports are published of the great copper resources of Peru and Transcaucasia, which have undoubtedly a foundation of fact, and there are vaguer reports of great copper deposits in Alaska and the Canadian Northwest, but it will be in all probability a long time before any of them assumes a highly important place in the world's copper supply and by then it is likely that some of the present big mines will have been exhausted.

IOWA'S IRON MINE.

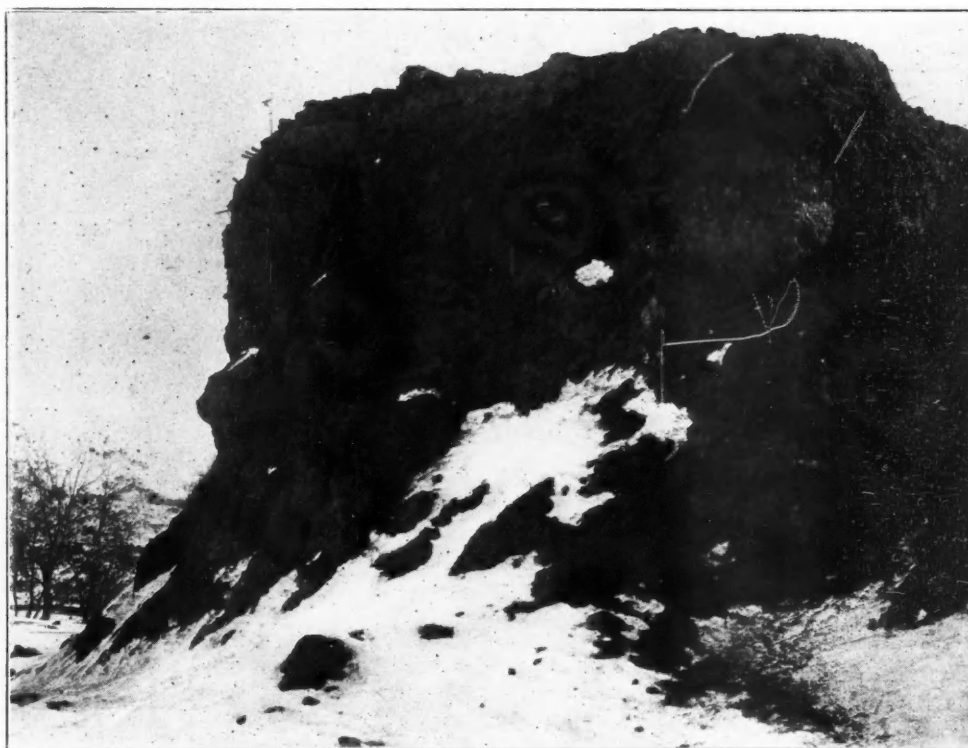
By S. W. BEYER.

It has long been known that certain facies of the Galena-Trenton formation as developed in Iowa contains a considerable percentage of iron. Hall in his "Geology of Iowa" mentioned the deep, red-brown color so often exhibited by this limestone when weathered. The ocherous pockets and seams have been mentioned by all who have written of the lead and zinc deposits of the Dubuque region. It was of more recent date that certain ferruginous deposits in the vicinity of Waukon in Allamakee County com-

produced. The two succeeding years show an increased output, the amount marketed for 1901 being 4,876 long tons. All of the ore thus far produced has been shipped to Milwaukee and used in furnace mixtures.

OCCURRENCE OF THE ORE.

The principal ore body and the only one up to this time which has been developed, is known as Iron Hill and is situated about three miles northeast of the town of Waukon, the county seat of Allamakee County. Iron Hill is the highest point in the county and forms the divide between Village Creek and the Oneota River. The summit of the ridge reaches some 200 feet above the water of the creek. The hill trends east and west, has an area of more than half a square mile and is crowned by the ore beds which extend farthest down the south slope. The lowest level ascertained, where the beds appear to be in place, is about 50 feet above Village Creek. Detached boulders and fragments of ore are encountered in prospect holes at much lower levels. The hill has been exploited thoroughly by sinking numerous test pits; and the ore body is reported to attain a maximum thickness of 135 feet. The test pit records show that the underlying limestone forms an almost level floor, slightly dipping toward Village Creek. The major portion of the ore body rests upon a Galena-Trenton base, though an inconsid-



ORE-PIT, IRON HILL, NEAR WAUKON, IOWA.

menced to attract the attention of the commercial world. Up to 1894 a few test pits had been dug, but those familiar with the deposits little realized their importance, believing them to be, in course of time, a possible source of mineral paint. During the year just mentioned Professor Samuel Calvin visited the field and made a thorough examination of the ore body as then known and embodied the results of his investigations in "The Geology of Allamakee County," which appeared in Volume VI of the Iowa Geological Survey and was issued the following year. In this memoir were included the results of chemical analyses of representative samples of the ore. Owing to an unfortunate typographical error in placing the decimal point the phosphorus constituent was multiplied ten-fold, thus making that element exceed the permissible limit in ore of economic importance. This report was the first authoritative account of the district given to the general public, and the misstatement in phosphorus content has been responsible in large measure for its tardy development. Prospecting and testing continued somewhat intermittently until 1899, when actual mining operations were begun. During that year 1,260 long tons of ore were

able portion appears to extend down to the Saint Peter sandstone, probably brought about through a "creep" produced by the undercutting of the creek.

The ore is concretionary, the concretions varying in size from a fraction of an inch to aggregations several feet in diameter, and are imbedded in an ocherous clay matrix. While some of the concretions contain stained clay cores, many are hollow and the beds when viewed *en masse* present a strikingly cavernous appearance. The caverns vary in size from one to a few inches and possess the spheroidal shapes usual to nodular structures. Irregular caverns of larger size are not uncommon. Scattered throughout the ore body are occasional chert or flint nodules, sometimes occurring singly, at other times in aggregated masses of considerable extent. In the latter the individual cherts are cemented together by the hydrated oxide of iron, which often includes a liberal admixture of water-worn quartz grains, varying from sand to pebbles of half an inch in diameter. The conglomeratic boulders are more frequent at certain levels than others but appear to have no definite limits. They are often closely associated with the richest ore bodies.

Fractures and joint planes are not prominent features and when they occur may be attributed usually to the present topography and are supposedly due to creep.

Nature of the Ore.—The principal ore present appears to be the hydrated sesquioxide of iron or limonite, somewhat siliceous as is shown by the analyses herewith appended.

	Sample No. 275 E. Patrick Analyst	Waukon Ore J. E. Weems Analyst	Waukon Ore Black, Fisher of Milwaukee Analyst	Waukon Ore Yellow, Fisher of Milwaukee Analyst	Waukon Ore J. E. Weems Analyst	Average
Metallic Iron.....	54.32	47.88	58.54	54.79	57.75	56.65
Silica and insoluble	9.08	4.00	5.12	3.26	5.38	5.38
Water	12.34	.....	11.92	10.92	11.53	11.53
Phosphoric acid.....	0.13	0.41	.....	0.13	0.72	0.32
Lime .....	.....	.....	.....	0.70	.....	.....
Magnesia .....	.....	.....	.....	Tr.	.....	.....
Alumina	6.08	.....	.....	Tr.	0.25	.....
Manganese oxide.....	.90	.....	.....	Tr.	0.20	.....
Sulphur	None.	1.07	.....	.....	.....	.....

Aside from the limonite, the ore appears to be in part hematitic. This is shown by the analyses of certain selected samples which gave nearly 67 per cent iron. Pure limonite contains only 59.8 per cent iron while hematite may reach 70 per cent when pure. The phosphorus percentage shows considerable variability, doubtless owing in part to the method of sampling. The samples showing the largest amount were taken from single concretions and cannot be considered to fairly represent the general ore body. Analyses made for the purpose of grading the ore placed on the market show the phosphorus content well within the danger limit rarely exceeding 0.09 for pure phosphorus. Similar variations may be noted in the sulphur content. The sulphur present is doubtless in the form of the pyrite and is not often detected.

Origin of the Ore.—Professor Calvin in his memoir, to which reference has been made, demonstrates conclusively that the ore beds cannot be accounted for through secular decay, and concentration in place, of the iron constituent contained by the rocks, but that some secondary process of concentration must be taken into account. A single argument put forward by him is sufficient to render impossible any *in situ* explanation. He states that a liberal estimate of the stratified rocks removed from the district would not exceed 1,000 feet, and granting the presence of one per cent of iron on the average, and no loss during the process of degradation, the maximum thickness of the ore residuum could not exceed 10 feet, an amount less than one-tenth of the actual thickness reported. His conclusion is, that the ore beds were accumulated through the well known processes of decaying organic matter and circulating water, generally known as the "bog iron ore" process. While the bog iron ore theory explains the greater portion of the deposit, the presence of the irregularly arranged siliceous concretions, and the water worn quartz pebbles, render obvious the complexity of the conditions which prevail during the time of accumulation.

Mining.—Some years since, the Waukon Iron Company was organized to exploit Iron Hill and if circumstances proved favorable, to mine and ship ore. The chief organizers and owners live in the county. The first serious attempt to develop the property was during the season of 1899. Early in 1901 a complete modern ore washing plant was installed and put into operation.

The beds are easily worked, and as there is almost no stripping the open pit method is adopted. The usual practice is to break up the ore by the use of heavy charges of black powder. The larger boulder concretions are further reduced by breaking with dynamite. The ore is loaded by hand into two-ton home-made wooden ore cars and hauled by horses to the washer. A double track leads from the pit to the washer, the grade favoring the loaded car.

The plant is conveniently located at the head of a ravine which leads down to Village Creek, and is equipped with a complete McClanahan-Stone outfit, manufactured by the McClanahan-Stone Machine Company of Hollidaysburg, Penn. The ore from the car is dumped into a hopper which leads to a single roll crusher. The crushed ore passes directly

into a single 25-foot log washer; consisting of steel shaft armed with steel blades rigidly bolted to the shaft. Here water is admitted at the rate of 300 gallons per minute when the plant is operated at its full capacity. The ore from the log enters a standard McClanahan-Stone double shell screen. Arrangements are made so that an additional 50 gallons of water per minute may be introduced here if desired. The screenings fall directly into an inclined trough leading to a sluice box which carries the waste down the gully. The washed ore is caught by a steel pan conveyor which carries the ore to the storage bins. The chert nodules and other impurities are removed by hand as the ore passes over this belt. An overflow bind has been provided some distance from the plant and is connected by an elevated cable conveyor. The capacity of the plant is 300 tons per 10-hour shift. Power is supplied by a Fairbanks-Morse 120 horse-power boiler and a Frost slide-valve engine of

fact a saving worthy of consideration. At present two horses and two drivers are required.

It is estimated that about 30 per cent of the material as it comes from the pit, of which the larger portion is ferruginous clay, passes through the screen. With the clay a considerable percentage of fine ore also escapes. No attempt is made to recover this ore, although such recovery might be effected readily by passing the screenings through a jig. The clay itself could be caught in settling basins, and used in the manufacture of brick, thus utilizing the products of Iron Hill to their fullest extent and adding no mean sum to the profits of the business.

Ore in Sight.—The visible ore body on Iron Hill has a superficial area approximating 300 acres, and a maximum thickness reported to be 135 feet. The average specific gravity of limonite as it ordinarily runs is 3.75, but owing to the cavernous character of the beds in question, 3 may be assumed as a safe



CLOSE VIEW OF ORE-BODY, IRON HILL, NEAR WAUKON, IOWA.

85 indicated horse-power. Water is obtained from a well 500 feet in depth on the premises. A constant supply is maintained by the use of an open storage reservoir of 12,000 barrels capacity. The machinery thus far installed is thoroughly modern, well housed, and well kept.

Future of the Industry.—Iron Hill can not take rank as an iron producer until better transportation facilities are provided. The Waukon branch of the Chicago, Milwaukee & St. Paul Railway ends some three miles distant as the crow flies, but according to recent surveys would require an actual extension of some five miles to bring the plant into connection with it. A water grade can be secured down Village Creek to the Mississippi River, but in this case a new line of railway from 15 to 18 miles in length would be required. At the present time it is difficult to say which would be the more practicable route. The consensus of opinion slightly favors Village Creek as it is the most direct to navigable water. The industry can scarcely be said to be more than initiated. The output of the past year represents the plant running at its full capacity for less than 20 days. This state of affairs was due almost wholly to bad shipping facilities. The cost of transferring the ore from the washer to the car is now 50 cents per ton, an amount greater than is paid for transporting Lake Superior ore from Duluth to Cleveland and other lake ports.

The ore would yield readily to the steam shovel, which would be more independent of weather and labor difficulties. Some form of haulage would ef-

factor, and if 70 per cent of the deposits is marketable, the ore would run about 3,000 tons per foot per acre. If the further assumption be made that the beds will average 40 feet in thickness, the tonnage would be 120,000 tons per acre or 36,000,000 tons for the entire deposit. Or to be still more conservative and assume the average thickness to be 20 feet and reduce the acreage to 200 acres, the other factories remaining the same, the available merchantable ore in sight would be 12,000,000 tons, an amount worthy of respectful consideration.

Several other ore bodies, similar in occurrence and association, but much less important are known to exist in Allamakee County, but as yet have not been thoroughly explored.

A BIG BLAST IN GRANITE.—The London *Engineer* says that a monster blast was fired at Bonawe granite quarries, Argyleshire, Scotland, recently. The mine was driven with compressed air as the motive power, into the center of the quarry face for 70 feet, with two arms 50 feet each, and a chamber at the end of both the arms, in which was placed 20,000 pounds of gunpowder. This is the first mine in any of the granite quarries which has been driven by rock drills actuated by compressed air, and the operation was carried through in the remarkably short time of 10 weeks from date of starting by Messrs. Murdock & Co., Camborne, Cornwall. Powder of the highest grade was used, and the blast was so successful that upwards of 250,000 tons of rock were displaced.

GEOLOGY OF THE MESABI IRON REGION.

At the meeting of the Geological Society of Washington, held in that city January 22, Mr. C. K. Leith described certain new features in the geology of the Mesabi iron-bearing district of Minnesota, which have appeared as a result of recent work by the United States Geological Survey.*

The Keewatin series of the Minnesota Survey has been subdivided by the Survey into a lower igneous basement, corresponding to the Archean or Basement complex of other parts of the Lake Superior region, and an upper well-defined sedimentary series resting unconformably upon the lower rocks and corresponding to the Lower Huronian of other parts of the Lake Superior country.

The upper of the two sedimentary series of the Mesabi District containing the iron ore (the Animię of the Minnesota Survey; the Upper Huronian of the United States Geological Survey) comprises three lithological units—a quartzite below, an iron formation in the middle horizon, and a slate above—all previously supposed to be conformable. It is now found that structurally the series is a dual one—a quartzite below (Pokegama) separated by a slight unconformity from an iron and slate formation above (Biwabik and Virginia formations). The Biwabik iron formation contains quartzite and conglomerate at its base and grades both upward and laterally into the Virginia slate. In the fullness of its succession and in the clear cut nature of the unconformities, the Mesabi District may stand as the type pre-Cambrian District of the Lake Superior region.

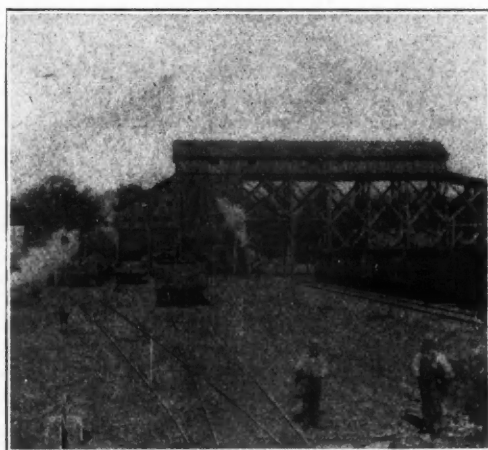
The most interesting of the late developments concern the origin of the iron ores. They have resulted from the alteration of certain rocks containing green granules, which, on analysis, prove to be essentially ferrous silicate. They lack potash, and therefore cannot be glauconite and of organic origin as supposed by Spurr.†

The iron-bearing formation bears clear evidence of sedimentary origin, and it is believed that the origin of the green granules making up the original rock is closely similar to that of the cherty iron carbonates which are the original rocks of the iron-bearing formations of other portions of the Lake Superior region. The iron, probably derived from the leaching of the Archean basic rocks, was carried in solution, mainly in the form of carbonate, though perhaps in part as sulphate, to the ocean, in which iron formation material was being deposited. There the carbonate of iron was thrown down by oxidation and hydration as limonite. The limonite settled and became mingled with organic material, the presence of which is shown by the association with carbonaceous slates, and was reduced to the protoxide form. The simultaneous decomposition of the organic material freed carbon dioxide. Silica also precipitated (chert is known to develop under such conditions) probably through the agency of organisms.‡ Both of these substances could combine readily with the iron protoxide, but in the case of the Mesabi rocks the main combination was the protoxide, and silica, giving the ferrous silicate which we now find. The ferrous silicate took the form of granules in the same way that oolites take their form.

When the iron formation was brought above the ocean, the ordinary weathering agencies began to alter the ferrous silicate of the iron formation. The iron was oxidized, or oxidized and hydrated, and was concentrated and separated from the silica, through the agency of underground waters. The deposits are now found in gently pitching troughs in the iron formation, bottomed by thin slaty layers, now largely altered to paint rock, which serve, and have in the past served, as channels for the circulation of under-

ground water. The channels have the irregularity and complexity of ordinary surface drainage channels. A conspicuous feature is their general flatness, as a consequence of which the areal extent of the ore bodies is very great as compared to their thickness. Seldom is the depth greater than 300 feet, while the horizontal dimension is usually many times that figure. In this the Mesabi differs from the old ranges, where the ore deposits have much greater vertical dimensions and correspondingly smaller horizontal dimensions. The difference in areal extent is shown by the fact that the ore deposits in the Mesabi District occupy perhaps 4 per cent of the total area of the iron-bearing formation, while in the old ranges the ore deposits occupy but a small fraction of 1 per cent of the area of the iron formation.

The Mesabi ore deposits never extend to the south under the overlying black slate, and moreover lie approximately in middle slopes of the Giant's Range, very largely between elevations of 1,450 and 1,650 feet above sea level. The explanation of this occurrence concerns the flowage of underground waters which have concentrated the deposits. It is thought that it can be shown that such waters have their most vigorous circulation on the middle slopes of the range, and that the circulation beneath the black slate to the south is not so vigorous. Water coming down the south slope of the Giant's Range enters the edges of the gently southward-dipping iron formation strata, and flows down the slope. Under the black



ANTHRACITE COAL BREAKER AT SPADRA, ARK.

slate the water backs up to a certain extent, as shown by the pressure with which water comes to the surface through drill holes which pierce the overlying slate. Much of it must come to the rock surface before passing under the Virginia slate. The iron ores are thus not only confined to the gently pitching troughs controlling the water circulation, but are confined to those parts of the troughs not covered by the Virginia slate where the circulation has been most vigorous.

The phosphorus in the ore deposits is a residual product and not a concentration. The original rock from which the ores have come contains a lower percentage of phosphorus than the ores.

ARKANSAS ANTHRACITE COAL.

SPECIALY REPORTED.

It is not generally known that an anthracite coal of excellent quality is found in Arkansas. The product is insignificant in comparison with the large operations in Pennsylvania, yet the coal is fast becoming a factor in the trans-Missouri country. It is not due to the want of a market that the shipments have not reached far greater proportions. So far, mining of this coal has only been carried on by very small operators of limited means and imperfect facilities. A company with substantial capital is now being formed to exploit the field.

Small mining camps where this coal is produced are to be found in the Arkansas Valley, in Johnson and Pope counties, about midway between Little Rock and Fort Smith, along the line of the Little

Rock & Fort Smith division of the St. Louis, Iron Mountain & Southern Railroad.

The town of Spadra in Johnson County is the centre of operations. Here upwards of 5,000 acres are believed to be underlain with hard coal, but thus far comparatively little of the field has been worked. The more pretentious mines are equipped with breakers patterned after the type used in the anthracite regions of Pennsylvania, though of course much smaller, as the accompanying illustration will show.

In appearance and structure this coal very closely resembles that of the Lykens Valley field in Pennsylvania, which from the market quotations exceeds in value the more familiar grades of anthracite from the Lackwanna, Scranton, and Schuylkill districts.

The Arkansas product is popularly known to the trade as Eureka and Ouita. The analysis as compared with Shamokin and Lykens Valley anthracite is as follows:

	Vol. Comb. Matter.	Fixed Carbon.	Ash.
Lykens Valley, Pa.	6.88	83.84	9.25
Zebra Run, Shamokin, Pa.	7.31	84.25	6.11
Eureka, Spadra, Ark.	7.90	85.60	6.00
Ouita, Russellville, Ark.	12.66	80.46	5.11

In addition to the operations at Spadra, Arkansas, small mines are worked in Pope County, near Russellville, producing the Ouita anthracite, in much the same manner. Here several local companies are realizing a good profit, with a small outlay. It is probable that a company with sufficient capital to open these veins of coal on a larger scale will acquire the lands and develop them properly at an early date.

The annual shipments now approximate 50,000 tons of sized coal; the demand will easily absorb 150,000 to 200,000 tons per annum. With proper development this Arkansas coal will have little difficulty in displacing the eastern anthracite in Missouri, Kansas and Nebraska.

The completion of projected improvements for the current year on the Little Rock & Fort Smith division of the Iron Mountain Railway, with added motive power and better shipping facilities, will give mining in this region a new impetus.

TORPEDOES FOR OIL WELLS IN COLORADO.

SPECIALY REPORTED.

An interesting fact associated with the Florence oil wells and brought to special attention in connection with like discoveries in the Boulder and De Beque districts in Colorado, is the recent failure of torpedoes to increase the flow. Instead of producing such a result, as has so often followed torpedo treatment in Pennsylvania, it appears that the explosives often not only retard the output, but in certain instances actually destroy the well. The theory of this negative effect in the Florence and other wells of Colorado, is that the oil stratum penetrated is composed of porous and loosely compacted shales, through the crevices and laminations of which the oil percolates freely toward any adjacent opening, such as the drill hole, and the violent explosion of dynamite, instead of opening these liquid highways, seems to crowd back the mass until it becomes so compacted against the sides of the opening as to form an impervious wall. When the oil exists in a brittle and homogenous sand rock, as in many of the Pennsylvania districts, the violent action of the explosion cracks and shatters the surrounding walls, thus opening seams and crevices, and in this manner multiplying the areas of least resistance, and opening new channels of exit through the saturated mass of rock that has acted as a matrix for the oil.

A NEW BRITISH COAL-FIELD.—Considerable interest attaches to the announcement that a new coal-field has been discovered in the district of South Worcestershire, lying between Chipping Campden and Moreton-in-the-Marsh. At the instance of the principal landowners, Lady Northwick, Sir P. Van Notten Pole, and Mr. Freeman Mitford, an expert has been employed, and he having reported that coal exists within workable distance of the surface, boring is now being vigorously proceeded with at various points.

*See "Iron Ore Deposits of the Lake Superior Region," part on Mesabi District, by C. R. Van Hise and C. K. Leith: In *Twenty-first Annual Report*, United States Geological Survey, Part III, 1901, pages 351-370. A monograph on the Mesabi District, by C. K. Leith, will be published shortly by the United States Geological Survey.

†This summary is published by permission of the Director of the United States Geological Survey.

‡Bulletin No. X, Minnesota Geological Survey, 1894.

§See *Monograph XXX*, United States Geological Survey, 1898, pages 17-21.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALY REPORTED.

DUTY ON PUMICE-STONE BRICKS.—Scouring bricks made of ground pumice stone and sand, mixed and pressed into different sizes, are dutiable at the rate of \$6 per ton, under paragraph 92, Act of July 24, 1897, by similitude to pumice stone wholly or partly manufactured.—Appeal of P. H. Petry & Co., from Collector of Customs at New York; Board of General Appraisers.

DUTY ON TIN WASTE AND CLIPPINGS.—The offal produced in cutting up sheet tin is dutiable as waste, under paragraph 463, act of July 24, 1897, at the rate of 10 per cent ad valorem. Such waste, having fallen from finished wrought tin, is not entitled to free entry under paragraph 683, not being tin in blocks, pigs, or bars, nor is it dutiable under paragraph 183, as metal unwrought.—Appeal of T. McGettrick from Collector of Customs at Burlington, Vt.; Board of General Appraisers.

DUTY ON FLEXIBLE TUBES AND PIPES.—Flexible copper pipes and iron tubes are properly dutiable under the act of July 24, 1897. We find from the evidence that the so-called copper pipes are made wholly of copper, as such material is commonly used in making pipes, and that the so-called iron pipes or tubes are made wholly of iron, as that material is commonly used in making iron pipes or tubes, and that the flexibility of such pipes or tubes is produced not by a composition of metals, but solely by reason of their peculiar patented construction. In view of this finding, we hold that the copper pipes are properly dutiable under paragraph 176 at the rate of 2½ cents per pound and the iron pipes under paragraph 152 at the rate of 35 per cent ad valorem.—Appeal of Lazelere & Co., from Collector of Customs at Philadelphia; Board of General Appraisers.

FORECLOSURE OF MECHANICS' LIEN ON MINING PROPERTY.—Where a mining corporation employed one under an agreement to pay him what his services were worth, and the rate of wages was afterwards fixed by the parties, it was proper to allege in suing on the contract that the company agreed to pay the wages fixed in the adjustment, and under such allegation proof of the original contract and subsequent adjust is admissible. In action to foreclose a mechanics' lien and to recover for services rendered as superintendent of the company's mine, evidence of conversations with the president of the company and of an agreement with him as to the rate of compensation is not incompetent because they occurred after the contract was alleged to have been made; as the time of making the contract is not of the essence. In such an action it is proper to allow interest on the amount found due.—Victor Gold and Silver Mining Company v. Sandberg (66 *Pacific Reporter*, 360); Supreme Court of Utah.

LIABILITY FOR NEGLIGENCE OF MINE SUPERINTENDENT IN INDIANA.—Under the laws of Indiana (Burns' Revised Statutes, 1894, Section 7,479) it is provided that the operator of a coal mine shall employ a competent mining boss to carefully watch over the airways; and section 6,472 of the same laws requires that such boss shall visit and examine every working place in the mine at least every alternate day, and to examine and see that such places are properly secured by props, and that safety is assured. A boss appointed by an operator failing to examine the mine in which one was employed as a miner, and unknown to this miner the walls between the places where the coal was mined became so thin that a charge of powder used in mining blew the wall out and the miner was injured. It was held that the proximate cause of the injury was the negligence of the boss in permitting the wall to become so thin that it could not withstand the force of an explosion, and in permitting a charge to be placed where he was bound to know that it

would blow through and injure one near that point.—Eureka Block Coal Company v. Wells (61 *Northeastern Reporter*, 236); Appellate Court of Indiana.

A SYSTEM OF DAMS INJURIOUS TO LOWER PROPRIETORS WILL BE ENJOINED.—Where certain parties conducted mining operations about two miles above the premises of another, on a gulch tributary to a creek flowing through the land of the latter, and which deposited silt injurious to his land. Specimens of the silt showed it to be similar to the deposit in the impounding dams of the mine owners, but there was evidence that the same formation was found along other contributories. Witnesses testified that they had traced the deposits back to the mine; that there was but little of it found in the creek above its juncture with the gulch; that sand came down every time that the miners turned off a reservoir head; that at one time when their dam broke, sand came down in such quantities as to fill up the creek for a space of 900 feet, and much of it was carried onto the land of complainant. The miners had two dams, both carrying all the tailings they would hold, and a slight freshet had recently caused a breach in the lower one, carrying away about one-fourth of the tailings. The court held that the evidence showed that the system of the mine operators was not secure or effective in preventing the debris from being carried onto the land of complainant, and that its use should be enjoined.—York v. Davidson (65 *Pacific Reporter*, 819); Supreme Court of Oregon.

WHEN CLAIMANTS WILL NOT HAVE RIGHT OF INSPECTION IN MINES.—Certain parties were the owners of the patented claims Anaconda, St. Lawrence, Smoke Stack, and Rob Roy, and subsequently another party located the Copper Trust Mine on a discovery near the eastern corners of Smoke Stack and St. Lawrence, alleging that the vein there discovered passed on its strike through the Smoke Stack, the St. Lawrence and into the Anaconda. This latter claim was so located as to include within its lines most of the space within Smoke Stack and St. Lawrence, and also a space to the southwest of these claims and to the east of the Anaconda not included in the surface rights of the three claims through which the vein passed, nor subject to their extralateral rights, but which was within the surface of the Rob Roy. Such locator did not claim any right to follow the vein to such space, but that it belonged to him by appropriation. The court held that the ores in such space belonged prima facie to the first parties, as owners of the Rob Roy, by virtue of common-law rights, though no part of the apex was within its bounds, and therefore such locator had no right to an order for an inspection of the mines of the others, under the law of Montana providing that such order may be made "for good cause shown" pending an action for the recovery of a mine.—State v. District Court of Second Judicial District of Silver Bow County (65 *Pacific Reporter*, 1020); Supreme Court of Montana.

LIABILITY ON STOCK CONTRACTS.—A mining corporation issued 500 shares of stock, which it distributed pro rata among its stockholders as a stock dividend. It afterwards desired to sell an issue of bonds, and offered the same at 6 per cent of their par value, but was unable to sell them. It received an offer, however, of 85 per cent for the bonds, provided it would also issue to the purchasers one-half the same amount of its capital stock, which would amount to 1,500 shares. It accepted such offer, making an agreement with its stockholders that they should furnish the stock pro rata, and receive 25 cents out of every 85 received for the bonds and stock, and at the same time it issued to such stockholders 1,000 shares additional stock, reciting as consideration for same the making of permanent betterments on its property from its net profits. This arrangement was not stated to the purchasers, and the indebtedness created by the bonds was as large as its assets, in-

cluding the proceeds of the bonds and stock, could pay. It was held that the portion of such proceeds received by the stockholders on account of the 500 shares of stock previously issued and owned by them could not be considered as paid for by the corporation, or as depleting its assets, but the transaction as to the 1,000 shares issued at the time the loan was made was the same in effect as though they had been issued directly to the purchasers, and their proceeds became assets of the corporation, and were wrongfully diverted by their payment to the stockholders as against the bondholders, who were entitled to recover them back on a deficiency of assets to pay the bonds.—Great Western Mining and Manufacturing Company v. Harris Estate (111 *Federal Reporter*, 38); United States Circuit Court.

ABSTRACTS OF OFFICIAL REPORTS.

Quincy Mining Company, Michigan.

This company's report covers the year ending December 31, 1901. During that period the total rock mined was 905,022 tons; rock hoisted, 924,173 tons; stamp rock treated in mill, 886,266 tons. The product was 21,457,285 pounds mined from stamp mill and 6,320,983 pounds from the rock-houses; a total of 27,778,268 pounds mineral, from which there was smelted 20,540,720 pounds refined copper. The yield of copper on the basis of rock stamped was 1.16 per cent; on the basis of rock hoisted, 1.11 per cent.

The average force employed was 1,602 men, of whom 533 were classed as miners. The average wages of miners on contract were \$62 per month.

The receipts and expenses with the averages per pound of fine copper, were as follows:

	Total.	Cents Per lb.
Copper sales.....	\$3,327,072	16.20
Interest and real estate.....	72,503	0.35
Total receipts.....	\$3,399,575	16.55
Mine expenses.....	\$1,539,313	7.49
Taxes in Michigan.....	62,222	0.30
Smelting, transportation, etc.....	206,304	1.01
New construction.....	167,193	0.81
Total expenses.....	\$1,975,032	9.61
Net balance.....	\$1,424,543	6.94

The balance carried over from 1900 was \$757,817, from which a dividend of \$300,000 was paid February 25, 1901, leaving \$457,817. Adding this to the surplus above gives a total of \$1,882,360. From this a dividend of \$6 per share, or \$600,000, was paid August 15, 1901, and the sum of \$200,000 was appropriated to meet machinery contracts; leaving a balance of \$1,082,360.

The statements of assets is as follows: Cash and copper, \$1,028,044; supplies, etc., at mine, \$251,228; accounts receivable, \$218,722; total, \$1,497,994. Bills and accounts payable were \$215,634; machinery contracts, \$200,000; total, \$415,634; leaving a balance of \$1,082,360, as above.

The president's report says: "A dividend of \$4 per share, or \$400,000, has been declared, payable February 15, 1902, which, with the \$6 per share paid August 15, 1901, makes a total of \$1,000,000 paid from the earnings of the year 1901. Owing to the present unsettled condition of the copper market, it was thought wise not to distribute a larger amount, reserving part of the year's earnings to increase the surplus, and also to provide for the payments to be made this year for erection of coal unloading and storage plant, new dock, railroad extension at Torch Lake and other contract work."

The report of Superintendent S. B. Harris shows a large amount of development work done, with variable results. In conclusion, he says: "At Number 8 the old boilers that were installed, temporarily, have been replaced by two new fire-box boilers of 100 horse power each. At Number 1 stamp mill the old slime tables are being replaced by Wilfley tables. At Number 2 stamp mill considerable construction work, by way of completion, was done during the year, and another Wickes vertical water tube boiler added to the plant. During October a contract was made with the American Bridge Company and the

John A. Mead Company, for the erection of a coal unloading and storage plant, at our stamp mills at Torch Lake. This plant consists of three steel towers, each having a guaranteed unloading capacity, under favorable conditions, of 135 tons per hour; and a steel shed, to be 385 feet long by 301 feet in width, having a storage capacity of about 70,000 tons. The equipment is to be ready for service by May 1, next. An extension of about 1 mile of railroad was made from the Quincy & Torch Lake Railroad to the new coal dock. The dock is 400 feet long and is now nearing completion. For transporting coal, to the mine and mill boiler plants, another locomotive and 32 cars have been added to the railroad equipment. Our smelting works has done its usual good service during the year and given the most satisfactory results."

Pittsburg Coal Company.

This company is the consolidation formed some three years ago to include the so-called railroad mines—that is, the mines shipping by railroad—in the Pittsburg District. The report is for the year ending December 31. The balance sheet at the close of the year is as follows:

Preferred stock.....	\$29,701,200
Common stock.....	30,268,200
Bonds and mortgages assumed.....	1,196,679
Liabilities for purchase of coal lands, etc.....	6,192,396
Reserve funds.....	2,407,147
Current accounts and bills payable.....	3,232,094
Undivided profits.....	3,188,053
Total liabilities.....	72,276,769
Coal lands, mines and buildings.....	\$62,709,976
Railroads owned and worked.....	1,498,878
Docks, lighters, etc.....	2,937,829
Coal on storage docks.....	651,196
Cars owned.....	1,899,170
Stocks of other companies owned.....	631,475
Accounts and bills receivable.....	4,932,267
Cash.....	1,015,978
Total assets.....	\$76,276,769

The gross earnings and expenses are not stated. The net earnings for the year were \$4,272,209. The royalty fund for purchase of new coal lands took \$576,847, and depreciation fund for plant and cars \$595,824; a total of \$1,172,671, leaving a balance of \$3,099,538. From this dividends of 7 per cent on preferred stock, amounting to \$2,078,865, were paid, leaving undivided profits amounting to \$1,020,673, which represent working capital. The report of President Francis L. Robbins says, in substance:

"The mining operations were concentrated during the year at the mines most favorably located for operation and transportation. At these mines additional miners' houses and modern mining equipments, operated by either electricity or compressed air, were installed at a cost of \$492,335 and many economies introduced. One result is an increased tonnage per mine operated with a decreased cost per ton of coal produced.

"During the past year there have been purchased 23,195 acres of coal and 1,620 acres of surface, all in the vicinity of the City of Pittsburg, at a cost of \$2,701,942. In addition the mines and property of the Shaw Coal Company, consisting of five opened and producing mines, 3,700 acres of coal and 500 acres of surface, situate within 15 miles of Pittsburg, were leased for a term of 40 years on advantageous terms without any investment whatever by this company. This property was among the best of the few outstanding coal properties in the Pittsburg District.

"The policy of charging royalty at the rate of \$400 per acre on the coal purchased at an average cost of about \$100 per acre has been continued and the fund thus created will within the next 10 years provide for and pay all indebtedness incurred for coal purchased since the company's organization. The total amount of coal owned by the company at this date is over 150,000 acres. All the coal purchases made since organization have been carried on the books at absolute cost; no revaluation of the same has been made.

"The statement submitted herewith shows liabilities incurred in the purchase of coal lands since the organization of the company at \$6,192,396. The intrinsic value to-day of the coal representing these

liabilities is more than double the total amount paid for the same. This is apparent in prices being paid for tracts adjacent to those purchased by our company.

"Following the policy of dealing as nearly as possible directly with the consumer, we have, during the past year, acquired docks and yards at various points on the Great Lakes, which have more than doubled our capacity for storing and marketing our product direct to the consumer in the Northwest—thus securing for our mines a permanent and steady market for an increased output. Among the docks thus secured and under contract are the following: Pioneer Fuel Company docks at Duluth, Minn., and Gladstone, Mich.; Ohio Coal Company docks at Duluth, Minn., and Milwaukee, Wis.; the C. Reiss Coal Company docks at Sheboygan, Ashland and Manitowoc, Wis., and Escanaba, Mich., and the docks of the Whitnall Coal Company at Milwaukee, Wis. The expenditures on this account thus far are \$632,915. The properties representing this investment show from their operation during the year ending 1901, net earnings of at least 15 per cent on the amount of our investment. In connection with these docks the company acquires a large anthracite and Hocking Valley coal business.

"The company is now in control and owns approximately 5,000 acres of coal lands in the Hocking Valley, formerly property of the New Pittsburg Coal Company and the Greendale Coal Mining Company. This property consists of eight mines, having a capacity of 2,000,000 tons per annum, and was taken over by the purchase of the capital stocks of the above-named companies with the property free and clear from debt. The properties thus purchased not only provide for the requirement of our Lake business as regards Hocking Valley coal, but by their last year's earnings have demonstrated that they will pay at least 20 per cent net upon the amount invested in them.

"New car shops have been equipped at Montour Junction in order to provide the means of repairing the company's railroad car equipment and also to construct and repair the mining cars and other equipment of the mines. In addition, these car shops are turning out at least one finished railroad car per day. During the year, 500 new 40-ton coal cars have been added to the railway car equipment, which, together with the cost of the new car shops, represents an additional investment of \$474,545.

"We were greatly hampered by reason of losing 30 days' transportation through strike of Lake engineers and by the unfortunate inability of the railroad companies, transporting its output, to effectively handle and carry the unprecedented amount of freight offered for transportation from this district. This resulted in the company being unable to make deliveries of coal sold upon very profitable contracts, of not less than 2,000,000 tons.

"The principal capital expenditures during the past year may be summarized as follows: Additional coal lands, \$2,701,942; new equipment at mines, including miners' houses, \$492,335; additional docks and yards on the Great Lakes, \$632,915; 500 new 40-ton railway cars, car shops and equipments, \$474,545; total, \$4,301,737. The purchases of the capital stocks of the C. Reiss Coal Company, the New Pittsburg Coal Company and the Greendale Coal Mining Company, referred to in the preceding paragraphs, having been made since January 1, 1902, are not included in the figures here shown.

"Beginning the business year of 1902, your officers believe the company is in position to do a larger and more profitable business than ever before. During the month of January, 1902, the company shipped 12 per cent more coal than during the month of January, 1901, and 19 per cent more than in December, 1901. We look forward to a highly successful and prosperous business year. On February 7, 1902, a contract was made in the joint convention at Indianapolis which fixed the mining rate and the terms and conditions under which our coal will be mined during the year ending April 1, 1903, on the same basis as that operative during the year ending April 1, 1902."

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.

La Bauxite. By Ing. Giovanni Aichino. Turin, Italy; reprinted from *Rassegna Mineraria*. Pages, 48.

Where to Build the Isthmian Canal. By Jacob Wm. Miller, late Lieutenant-Commander, U. S. N. New York; issued by the Nicaragua Company. Pamphlet, pages 16.

Traité de Cinématique Théorique. By Prof. H. Sicard. With Notes by Prof. A. Labrousse. Paris, France; Gauthier-Villars. Pages, 188; with diagrams. Price (in New York), \$1.50.

The Utility of an Academic Education for Young Men Who Have to Earn Their Own Living and Expect to Pursue a Commercial Life. An Investigation. By R. T. Crane. Chicago; published by the author. Pages, 70.

The Asphalt and Bituminous Rock Deposits of the United States. Being an extract from the *Twenty-fourth Annual Report of the United States Geological Survey.* By George H. Eldridge. Washington; Government Printing Office. Pages, 256; illustrated.

New York. Nineteenth Report of the State Geologist. Reprinted from the *Fifty-third Annual Report of the New York State Museum.* Frederick J. H. Merrill, Director. Albany; published by the University of the State of New York. Pages, 160; illustrated. Price, 40 cents.

NEW PUBLICATIONS.

Mysore Geological Department. Report of the Chief Inspector of Mines for the Year 1900. W. S. Smeeth, Chief Inspector. Published for the Department. Pages 24; with maps and tables.

The mines of the State of Mysore in India are chiefly known on account of the group of successful gold mines in the Kolar District. The State is one of those Indian districts which are nominally independent, but whose governments are under strict British control. The mines are all worked by British companies, and the mining department is managed by a British engineer. Outside of the gold the mineral production is not important, although there is some production of iron ore, corundum, mica, asbestos and salt, with considerable quarrying of building stone and a clay industry which produces a greater value than anything else, with the exception of gold, in the State. There are 12 operating companies in the Kolar field, of which four are of importance and pay large dividends, while there are two or three from which there is a fair prospect in the future. The report gives a number of interesting particulars about these mines and the machinery in use. The gold mines are generally free milling propositions, and the ores are treated very much like those of the Transvaal; that is, by stamp mills and amalgamation, the tailings from the mills being cyanided while a small quantity of pyritic concentrates is saved and treated. The returns from the latter, however, are not large; as a rule, about 70 per cent of the gold saved being obtained by amalgamation and about 30 per cent from the cyaniding vats. The machinery in these mines is generally good, but the mines can be considered in fair condition only, since the proportion of accidents is rather high; thus we find from the report that in 1900 the deaths from accident among the underground workers was 4.17 persons for each 1,000 employed, which is rather high for metal mines in which there is no risk from gas. Part of these, however, may be due to the character of the labor employed, the miners being chiefly natives of the country, who are proverbially careless of life and averse to adopting any precautions which may seem to involve additional labor. The larger part of the acci-

dents recorded are from falls of rock, and seem to be due to the defective timbering. A feature which is perhaps characteristic of the Indian labor is the large number of arrests for theft about the mines, gold quartz, amalgam, and quicksilver being the chief articles stolen. In 1900 no less than 332 persons were arrested for such thefts, and 302 were convicted.

The report also gives some particulars of the scheme for generating electricity at the Cauvery Falls and transmitting the power to the gold mines. The plans for this work have been completed, and a commencement has been made on the work. The distance for transmission to the center of the Kolar field is 91½ miles. The power plant will be owned by the State, the mining companies paying an annual rental at a fixed price per horse power per year. The electrical plant required is to be of American design and manufacture, and will be furnished by the General Electric Company.

The Anthracite Coal Industry. By Peter Roberts, Ph.D. New York; the Macmillan Company. London; Macmillan & Company, Limited. Pages, 276; with maps and diagrams. Price, \$3.50.

The anthracite coal industry has been an attractive subject to writers. The importance and the peculiar conditions under which it has existed and has been developed to its present dimensions have drawn the attention of students of mining and industrial conditions. The best existing monograph on the anthracite industry, considered as a trade, is probably that written by the late Richard P. Rothwell in 1895 on the "Evolution of the Anthracite Coal Trade." No writer has since attempted to controvert the statements there made, which were founded on a thorough knowledge, not only of the anthracite trade, but also of the region itself, and on a careful study of all the conditions affecting its history and conditions.

Dr. Roberts has taken up the anthracite coal industry from a different point of view, studying, not mining or trade conditions, but "economic conditions and relations of the co-operative forces in the development of the industry." He has sought to trace and describe the social and economic conditions of the region, their bearing upon its development, and in turn the effect which the nature of the industry and the methods of conducting it have had upon those conditions. In doing this he has had to touch to a considerable degree upon the trade itself, and to use much information drawn from the reports of coal companies and mine inspectors.

He has divided his subjects into twelve chapters, treating successively on the anthracite coal deposits; developing the coal beds; capitalization; transportation; mine management and inspection; employees and wages; incidental profits of operators; accidents; strikes; unionism; and reclaiming waste. The final chapter is a general summing up of the subject.

The general plan of the book is a good one, but Dr. Roberts has not gone deeply enough into the history of the region. The chapters on strikes and on unionism are especially deficient in this respect. No one can study completely the economic history of the anthracite country without considering fully the rise and fall of the different trades unions which have had their place there during the past 50 years. We think also that he has not given sufficient importance to the gradual change in the working force of the region, the substitution of immigrants from the eastern and southern portions of Europe for the Irish, Welsh and American miners and laborers who formerly constituted the working force. As another point of criticism, we think that the book underestimates the cost of mining, and consequently the direct profits of the operators. The anthracite industry is a great industry, occupying the peculiar position that, up to a very short time ago, furnished substantially no direct profit to those who conducted it. The only profit drawn from it was indirect, and chiefly from the transportation of the product.

Aside from these points the book contains much

that is interesting. The chapter on mine management and inspection, including mine legislation, deserves careful study. The question of wages has been well considered, with the causes which tend to keep down the miners' average earnings. The general conclusions drawn are also worth reading, whether one agrees with all Dr. Roberts' ideas or not. In short the book has some faults, but merits reading and discussion.

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.

The Tunner Memorial.

Sir: The ever-accelerated rate of progress in the science and the art of iron and steel metallurgy, which has now culminated in the universally recognized perfection and leadership of American practice, should not dazzle us so much as to cause us to forget the pioneers who blazed the path, and, against many obstacles, pressed forward toward the glory which they saw afar, and did not live to reach. Certainly no one acquainted with the history of this amazing process will need to be told of the service and merit of Peter Tunner, who, born in 1809, the son of a primitive Styrian forge-owner, died in 1897 as Ritter von Tunner, loaded with well-earned honors and decorations, conferred by many European states besides the Austro-Hungarian Empire, of which he was a citizen, and with such still more significant symbols of appreciation as the Bessemer gold medal, and honorary membership in the Iron and Steel Institute of Great Britain, the American Institute of Mining Engineers, the American Philosophical Society, etc. All these numerous rewards came to him unsought, in recognition of his lifelong devoted, enthusiastic, unselfish, intelligent, wise and effective labors in studying, testing, recording, judging and generously promoting the steps of progress in his special field achieved or proposed by others and in the training of observers and practitioners competent to execute and extend such improvements. Indeed, the debt we owe to famous and brilliant innovators, who have had the good fortune to flash out (perhaps among many impracticable prophetic suggestions) suggestive new ideas, to be reduced to useful forms by others, may often be smaller, when measured justly in the scales of history, than the credit due to those who have patiently studied, criticised, weighed, amended and utilized the discoveries of which they have not claimed the authorship. And, above all, those men who, at the sacrifice of possible fame and wealth to themselves, have patiently persevered in the thorough preparation of observers and discoverers for the next generation, deserve all the more, at the hands of that generation, enriched by their labors and sacrifices some recompense of gratitude and fame, at least, in lieu of that which, in their own life-time, they were (as Agassiz said of him self) "too busy" to serve.

Members of American Institute of Mining Engineers who desire to have more particularly recalled to them the life and work of Ritter von Tunner, are referred to my biographical notice of him, Volume xxvii, page 444 of the *Transactions*. A few pamphlet copies of this sketch are still on hand, and, while the supply holds out, I will, with pleasure, send a copy upon application to any suitable person who may seriously desire it, and to whom it is not otherwise conveniently accessible.

Upon the assumption, however (which I deem reasonably safe for most cases), that American iron and steel metallurgists need no new enlightenment concerning the work of Tunner, I proceed to the main purpose of this article: namely, the announcement that leading representatives of iron and steel

metallurgy in Europe and America have formed an international committee for the purpose of erecting in stone and bronze, at Leoben, in the Austrian province of Styria, the place made famous by his labors, and still the seat of the school he founded, a suitable monument in his honor. This committee, appropriately headed by the president of the Mining and Metallurgical Association of Styria and Carinthia, comprises, together with leading professors and mining officials of Leoben (among whom the names of Hofer and Kupelweiser will be specially familiar to Americans) such famous and representative persons as Sir Lowthian Bell, of England; Prof. Richard Akermann, of Sweden; Prof. Ledebur, of Freiburg, Saxony; Prof. Wedding, of Berlin; Prof. Habits, of Liege, and Greiner, of Seraing, Belgium; Massenez, of Weisbaden; Schrödter, of Düsseldorf, and others not less eminent. The American member is Prof. Henry M. Howe, of Columbia College, New York, who is unquestionably the man best qualified, both by personal knowledge of the technical history to which he has himself made numerous and important contributions, and by the more than national reputation which he has thus won, to represent American ironmasters, steelmakers and students of this branch of metallurgy, in their recognition of Tunner's work and fame.

Contributions for this purpose may be sent, or further inquiries may be addressed, either to Prof. Howe or to me.

R. W. RAYMOND.

New York, Feb. 11, 1902.

The Origin of the Fine Gold in Snake River, Idaho.

Sir: It was the good fortune of the writer to have been selected by an eastern syndicate, in the summer of 1899, to investigate a certain region in the north-west corner of Wyoming, bounded approximately on the north by the Yellowstone National Park, on the east by the summit of the Rocky Mountains, on the south by Green River, and on the west by the Idaho State line. This region embraces what is known as the Jackson Hole country, a portion of the Teton and Wind River Mountains, a greater portion of the grand cañon of the Snake River, and many large streams which form the magnificent proportions of the Snake and Green rivers, as they, with their crystalline contents debouch from the dome of the North American Continent. The investigation was specifically called for to determine the truth of certain stories brought to the ears of the syndicate by vendors of fabulous riches in fine placer gold—"Snake River Gold" supposed to be contained in the sand and gravel of the above described country. Sixty days were spent with pack and saddle horses, a good guide and helpers, in covering most fully all parts of this remarkable and comparatively unknown region. It was soon found that for enormous deposits of alluvial matter, consisting of sand, gravel and boulders up to 20 pounds in weight, the region was certainly worthy of notice. Gravel deposits so extensive as to crown and envelop mountains more than 11,000 feet high (Mount Leidy), veritable mountains of gravel on which from base to summit no evidence of outcrop of any rock formation in or out of place can be seen; forming bars or mesas of terrace shape, miles in length and breadth, and of unknown thickness, with not a square foot of the original strata in sight. Gold was found anywhere, no matter if the gravel came from a mountain top or from extreme low water mark in some great river bed, even the very leaves of the sage brush, chicos and bunch grass, would show in the pan the inevitable color of fine, brassy gold, so light that a fraction of a second exposure to the air would cause it, at the next touch of water, to mount and float away like an elusive spectre. Further research showed the bars that carried the most sand had the most gold; bed-rock where found was no richer than the top layer of gravel, and repeated holes sunk failed to find more compact conditions with depth. Where the streams had by their classifying action formed bars of limited extent, consisting exclusively of fine sand, the most gold was

found; either in the stream beds of to-day or in similar bars, at a higher level, formed in pre-historic times. These last facts are fully recognized by the prospector of the land, and he is far too wise to put in any of his time digging for gold in the larger, unclassified bars. Some of these fine sand bars were found that would have paid to work on a small scale, but no great wages would have resulted. About 200,000 colors of the average gold seen would weigh a dollar, the best of the fine sand bars would contain 2,000 colors to the pan, and the average pan taken from the great mass of the wash would contain perhaps 8 or 10 colors. It was observed in the higher portions of the region the colors often bore a more rough, angular appearance than those down in the lower levels, and in many of them the peculiar sulphuretted, submetallic glow, that gold exhibits when just released from its combinations with some form of iron, was plainly noticeable. Examination of the boulders revealed in many instances not only small particles of finely divided pyrite as yet unoxidized, but also many pre-existing pyrites fully reduced to oxide form. The boulders containing the pyrite were apparently of igneous origin, the nature of which was difficult to determine by the eye, but probably a lavitic rock of a semi-basic andesitic composition, in which the feldspar had been partially replaced by auriferous pyrites. A careful lookout was kept to discover this formation in place, and although several hundred miles were traversed, none similar to the auriferous boulders could be found. A lavitic rock capping the Continental divide, just north of the Wind River Range, was found in a great flow, but it was of a character known as basalt, and of an exceedingly basic vitreous type. All the wash bears indication of intense attrition, rounded and smoothed to a perfect finish. It seemed evident that an old shore line, probably to the north and east of considerable extent, but now obliterated in this region, had existed; a prominent rock of which was of volcanic origin and that during some period it had been impregnated by replacement action, with gold bearing pyrites, rendering it susceptible of rapid disintegration. There were also evidences of periods of mountain building, faults were seen showing thousands of feet displacement in strata, alternating with profound glacial activity, followed on the retreat of the latter by great floods of rushing, seething torrents, which formed no doubt numerous large inland seas of fresh water, a period of rest, and subsequently a gradual continental emergence as it exists to-day.

Hypothetical deductions from the foregoing premises as to the origin of Snake River gold are as follows:

1. The presence of volcanic boulders charged with auriferous pyrites accounts for the primary source of the gold, and the fine grained pyrite accounts for the minute size of the gold colors.
2. The sulphuretted, angular conditions of many of the extremely fine colors of gold indicates proximity to their original home, as seen up near the Continental divide; whereas the majority of those down in the Snake River plains show a more battered, nugget-like appearance, indicating they have travelled far, and the mountain masses of gravel indicate remnants of former immense glacial moraines.
3. The great glacial activity accounts for the enormous accumulations of wash.
4. Torrential action accounts for the smooth, elliptical form of the boulders near the mountain top, where the lake seas could not reach them. Plunging wave action accounts for the round smooth shape of the boulders where the seas could reach them. Eddying, swirling action accounts for the deposits of the fine, workable, auriferous sand bars.
5. The intensity of all this hydraulic activity, aided by great uplifts and subsidences, accounts for the widespread extent of the gold bearing gravel, found from the region specified, down Snake River for several hundred miles, to a lesser extent down the Green River, and to a still lesser extent down the Wind and Yellowstone rivers, all debouching from the same dome-like center.

6. Atmospheric action, subaerial decay and other agencies acting upon the gravel mass have oxidized the pyrite and hence released the gold, and as these processes are continually going on, the gravel supply inexhaustible, certain bars with every annual flood are enriched to some extent.

7. The great deposits of wash now to be seen in Jackson Hole, a country 3,000 miles in area, and on the head of Hoback River, which empties into the head of the Grand Cañon on the Snake just below Jackson Hole, have no doubt in the past been of much greater bulk, all of which were transferred by the action of water to its present location many miles down the Snake River. The gold bearing formation was more tributary to the Snake River watershed than to the other large rivers heading in the region, as evidenced by the richer gold contents of the Snake River gravel, although the other rivers carried more or less similar fine gold.

J. H. SHOCKLEY.

Telluride, Colo., February 8, 1902.

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, or 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.)

Wood as a Fuel for a Reverberatory Furnace.—We have copper pyrites in quartz carrying good values in gold and silver. We have abundance of pine and oak wood. Could a reverberatory furnace with hearth 10 feet long be operated on these ores with this class of wood for fuel? If so what would the probable consumption of wood be as compared with coal? Would it be best to mix the woods, and if so in what proportions?—M. A. C.

Answer.—We do not know that a reverberatory furnace has ever been operated successfully by wood firing. By building a special type of fire-box, so that a great thickness of wood could be maintained on the grates, it might be possible to smelt your ores by means of wood, but with an ordinary fire-box and a thin fire it would be impossible.

Realgar.—I have come across a large body of realgar in this State, but have been unable to come in contract with any one who uses the article commercially. It is only 2 miles from a railroad and freight to tidewater will not exceed \$2.50 per ton. Can you put me in communication with importers or consumers of the article? Much of the article is crystallized.—A. B.

Answer.—The consumption of realgar is not very large, and there are no accurate statistics of the quantity sold. It is used chiefly in coloring other substances, or as a pigment; small quantities are also used in preserving skins and hides and in making fireworks. The realgar used in the United States is imported. The chief dealers are the Roessler & Hasslacher Chemical Company, 100 William Street, New York; and Fuerst & Company, 2 Stone Street, New York.

Method of Leaching Cinnabar.—Can you tell me if there are, or have been, any methods of extracting cinnabar, or rather, quicksilver, from its ores by leaching? If so, what are the solvents used? Do you think it possible to get an economical scheme for its separation by wet processes? I notice in Comey's "Dictionary of Chemical Solubilities" several cheap reagents are mentioned, such as cupric chloride and sodium sulphide, if they could only be made to dissolve the cinnabar in sufficiently diluted solution. Where can I get some literature on the subject?—R. F. H.

Answer.—Up to the present time no successful method for the extraction of cinnabar by leaching has been developed. Some attempts have been made to do so; but, owing principally to the low percentage of quicksilver in the ore, the cost of the chemicals is too great to permit of its economical operation. You might possibly find scattered through the technical press some discussion of this subject; but so far as we know, there has been no other publication bearing on this subject.

Smelting with Oil.—Melting Copper Sow.—1. Could not coke and blast or atomized oil and blast be more economically used to heat a Faber-du-Faur or Tatham furnace than coke alone?

2. Could a copper sow (running about 100 ounces gold per ton, 80 per cent copper, 4 to 6 inches thick) with bottom of a water-jacketed blast furnace, below tuyere zone, be melted out, by filling the furnace from sow up from 3 to 5 feet with coke, and using the highest available blast?—H. H.

Answer.—1. We are not specially familiar with the Faber-du-Faur, or the Tatham furnaces, but presume they are modifications of the blast furnace. Generally speaking, atomized oil cannot be burned in any other way than by an ordinary oil burner and it cannot be mixed with the blast unless a special burner is provided for each tuyere.

2. The copper bottom below the tuyeres can only be cut out by means of raw sulphides added to the charge, to produce a low-grade matte. No amount of blast or coke would cut out the sow, or bottom; but, on the contrary, would add to it.

THE BADGER OIL-CUP.

The accompanying illustration shows the Badger oil-cup, a new device made by Charles H. Besly & Company, of Chicago. The cut shows the cup with a portion of the side broken away so that the construction can be plainly seen. It is very simple in form, and can be operated by hand or by wrench. It is made of cast iron with octagonal cap; the base is cast iron having a round thread, with a hexagonal steel stem which is threaded, screwed into the base and expanded. It is claimed that the stem will not break off and that the base, having a round thread, will not clog, strip nor cross.



THE BADGER OIL-CUP.

This cup is made in six sizes, the smallest being 1½ inches outside diameter, 1¾ inches height and ¼-in. threaded pipe thread, and a capacity of ½ ounce oil; while the largest is 3¾ inches diameter, 2¾ inches in height, ½-in. threaded pipe thread, and holds 5½ ounces oil.

THE PNEUMATIC CYANIDE PROCESS.

By OUR SPECIAL CORRESPONDENT.

The success which has attended the application of the chlorination process to the extraction of gold from the Cripple Creek ores has stimulated the efforts of the friends of cyanide as a solvent. Among the several new ideas or applications of well known principles in order to simplify and perfect the cyanide process, is that of the agitation of the solution,

and the oxidation of the contents of the leaching tank. Among these methods is that patented and applied by the Pneumatic Cyanide Process Company, with headquarters in Denver, Colo.

That all solutions are expedited by agitation is an axiom in all chemical and industrial processes. Accepting this fact, this company also claims that agitation by means of air currents not only hastens the action, but that the oxygen of the air is an important factor in supplementing the simple agitation or stirring of the mass.

To accomplish this latter result, currents of air are injected into ordinary tanks through perforated pipes that rest on the burlap or canvas filters at the bottom. The injection of the air current is continuous with the introduction of the solution and pulp. By this means it is claimed that a gentle agitation causes the heavier and coarser grains to seek the bottom, and thus the slimes which are the bane of all these percolation processes are kept in suspension until the latest moment. When the discharge valves are open the air currents are still operated, though under a decreased pressure, and by the gentle stirring of the lower layers of sand it is claimed that the solution can be drawn off in a much quicker time and in equally good shape as by the simple filtration. A new mill employing this method has lately been installed on the Gold Standard Mine at Idaho Springs.

DEMAND FOR GAS AND OIL ENGINES.

San Francisco manufacturers in 1901 supplied a considerable demand for gas and oil engines in New Zealand, Samoa, Tahiti, Mexico and Hawaii—a demand that has been created chiefly within the past four years; besides multiplying the trade on the Pacific Coast and at San Francisco. Some three years ago the Union Gas Engine Company, San Francisco, through its agents, W. A. Ryan & Co., Auckland, New Zealand, placed a 60-h.p. auxiliary oil engine in the schooner *Huia*, 450 tons burthen, Mitchelson Bros., owners. That was then the largest engine of its class ever put aboard a vessel in New Zealand waters. So satisfactory was its initial and subsequent operation that the ship owners and other employers of motor power in the colony have become large patrons of the San Francisco manufacturer.

In the Spring of 1900, the *Uta*, an oil launch, was built by Messrs. Ryan & Co., at Auckland for the Wellington Harbor Board. The length of this vessel was 65 feet using for power a 50-h.p. Union oil engine. The official trial trip at Auckland proved very satisfactory, while the run to Napier (400 miles) was made without any care except to keep the oil tanks supplied with oil. From Napier to Wellington, 300 miles, very rough weather was encountered but the engine was found to work so smoothly that upon the arrival of the launch at its destination it was accepted, and paid for by the board within 24 hours.

In April, 1901, the Auckland Harbor Board's launch *Kuaka*, length 75 feet, was fitted with one 85-h.p. Union oil engine, a 4-h.p. hoist and windlass and one 3½-h.p. stationary engine for electric lighting.

The *Wai-ito* tunnel boat, length 40 feet, beam 8 feet, draft 9 inches, at stern and 6 inches at bow, was subsequently fitted with one 12-h.p. Union engine, driving a 21-in. propeller. The *Wai-ito* was constructed especially for traffic on the upper Wanganui River, whose shallow waters demand extremely light draft vessels. The propulsion of this boat in 9 inches of water was made possible by the selection of a proper engine and the construction of the boat's bottom. The bottom of the craft was constructed with a longitudinal tunnel compartment through the center for the accommodation of the propeller, thus providing ample water space for the propeller and permitting the actual bottom of the boat to rest on a line even with the lower action of the propeller wings.

The Wanganui River Trust has put into successful operation a Union oil engine hoist and ship wind-

lass on a craft employed in widening and deepening the river channel.

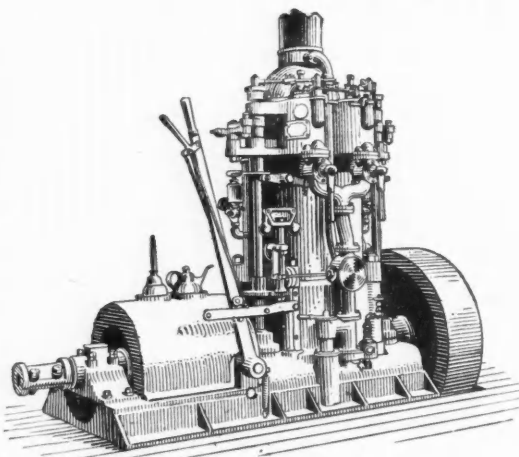
The Colonial Government ordered one 85-h.p. Union oil engine as auxiliary power for the new schooner *Countess of Ranfurly*. This vessel was constructed in the summer of 1901, for carrying the mails and Government supplies between Auckland and the recent English acquisitions in the Cook group of the Savage Islands.

The German Government in the past year put in operation in Samoan waters the twin screw schooner *El Frieda* supplied with two 27-h.p. Union oil engines, and another engine of the same make is to be placed in the Samoan Government launch *O-le-ae-to*.

The French Government on the Island of Tahiti was supplied within the year with a 40-h.p. Union oil engine for *La Perle*, employed in trading with neighboring islands.

At Guaymas, State of Sonora, Mexico, Iberri Hijos have purchased one 40-h.p. Union engine for a boat recently constructed.

There is a growing demand for oil engines for auxiliary power aboard schooners navigating the narrow and shallow waterways of the islands in New Zealand. These compact and economic motors enable the craft that ply the bays and rivers to make ports that could not be reached with canvas. There are innumerable landings on these and other islands of the Pacific, where profitable trade may be estab-



UNION MARINE GASOLINE ENGINE.

lished which are not accessible by vessels that depend upon the wind alone, but which can be put in communication with commercial centers by the adoption of gas engines for auxiliary power.

The Union gas engines have been built in San Francisco since 1885, and the following governments have adapted them: United States, Japan, Germany, France, New Zealand and New South Wales.

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 February 4, 1902.

692,240. FLUE CONNECTION FOR FURNACES.—Simon C. Collin, Philadelphia, Pa., assignor of one-half to William White, Jr., Pittsburg, Pa. The combination of a supply-pipe, a water-containing receptacle around the upper end of the supply-pipe, an elbow having a surrounding water-jacket and provided at its lower end with an annular flange depending into said water-containing receptacle to provide a water-sealed connection between the supply-pipe and elbow, means for supporting the elbow to permit lateral movement thereof to and from the furnace-opening, a water-supply pipe leading to the water-jacket, a drain-pipe connection between the water jacket and receptacle, and an overflow-pipe leading from the receptacle.

692,257. METHOD OF CALCINING LIME, ETC.—Byron E. Eldred, Brookline, Mass. The herein-described process which consists in conducting the combustion of fuel under an artificially-accelerated draft with air and a neutral gaseous diluent, the latter present in sufficient proportion to retard the combustion to a substantial extent, and sub-

jecting the resulting heating agent to an igniting temperature to an extent sufficient to substantially complete its combustion.

692,283. PROCESS OF REFINING OILS.—John N. Harris, South Norwood, England, assignor to the Globe Trading Company, Limited, London, England, a corporation of Great Britain. A process consisting in heating the oil to from 110° to 130°, mechanically mixing with the oil a powdered purifying material as carbon, allowing the mixture to stand while the powdered material with the impurities precipitates, the temperature being maintained at about 120° F., and then aerating in the presence of methylated alcohol.

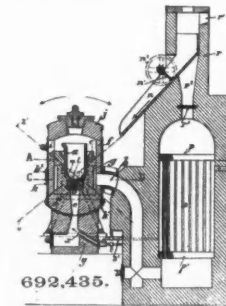
692,310. METHOD OF TREATING COPPER ORES.—William J. Knox, Edgewood Park, Pa., assignor to George Westinghouse, Pittsburg, Pa. The method of separating copper from copper matte in which the iron and other metals exist largely as sulphides, which consists in melting the matte, oxidizing iron and sulphur of the matte by forcing air into contact therewith while in a molten state, thereby generating heat sufficient to maintain the mass in a molten state and thereby causing the formation of iron oxysulphides under such conditions that substantially no silicate of iron is formed, and in separating the copper therefrom by causing it to remain quiescent a sufficient time to separate by gravity.

692,315. AMALGAMATOR.—John W. R. Laxton, Lynn, Mass. An amalgamator comprising a mercury vessel, a tank surmounting the same with its lower part opening thereinto, said tank enlarged in diameter at the middle and having a contracted outlet at the top, means for passing mixed pulverized ore and water through a body of mercury in the vessel and thence upwardly through the tank, and one or more centrally-located receptacles in the enlarged part of the tank for catching entrained mercury.

692,380. DIAMOND-CUTTING MACHINE.—John H. G. Stuurman, Brooklyn, N. Y., assignor of one-half to Herman A. Groen and Joseph Groen, New York, N. Y. The combination with a vertical rotating cutting-disk, of an overhanging arm arranged above the cutting-disk, a cutting-disk guide depending therefrom, stone-holding dops depending from said arm, and means for rotating the cutting-disk.

692,393. COMPRESSED-AIR DRILL.—Fred Weimar, Chicago, Ill., assignor of two-thirds to S. A. French, Chicago, Ill., and T. D. Hewitt, Freeport, Ill. The combination with a portable reciprocating-engine cylinder and its piston, of a flexible pipe for delivering motive fluid to the cylinder, a rigid frame extending from the cylinder alongside the path of the piston-rod, two gears mounted in said frame to rotate upon an axis perpendicular to the axis of the cylinder, two racks connected directly to the piston-rod, to reciprocate therewith, and engaging the two gears, respectively, but upon opposite sides, a tool-chuck mounted in the common axis of the gears, clutch devices arranged to transmit to the chuck like alternate movements of the gears, and a slide-valve operated directly by parts accompanying the piston in its reciprocation.

692,424. AIR-COMPRESSING APPARATUS.—Justin H. Burdick, Milton, Wis. An air-compressing apparatus, comprising an air-cylinder, having an air-inlet and air-outlet; a piston movable within said cylinder; a float, adapted to be raised and depressed by the rise and fall of waves; and means, connected to said piston and said float, for causing the piston to travel inward the full extent of its stroke with each elevation and depression of said float, the outward travel of said piston varying in extent with the height of the waves.

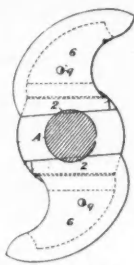


692,435.

692,435. MELTING FURNACE.—Jules Essner and Emile Laurans, Paris, France. The combination of a base, with a receiving-chamber, an inlet-pipe for combustible gas under pressure leading thereto, a furnace pivotally supported above the base, there being a chamber in the bottom of the furnace communicating with the receiving-chamber, said chambers forming the combustion-chamber, a crucible above said chamber, a refractory wall around the crucible and within the furnace, there being a passage for the products of combustion between the refractory wall and the crucible, there being also a reverse outlet-passage between the refractory wall and the furnace-wall, and a passage with which said outlet communicates when the furnace is in upright position.

692,483. STAMP BATTERY CAM.—Charles C. Rueger, Butte, Montana. A sectional-cam, consisting of a hub with wedge-shaped sockets or seats formed therein, independent cam-arms having a wedge-shaped base adapted to fit the seats in the hub, said seats intersecting the bore into which

the cam-shaft fits, said shaft having transverse notches registering with the seats of the cam-hub.



692,488.

692,495. CONCENTRATING-TABLE.—John A. B. Wesley, Gawler, South Australia. The combination with a concentrating-table, of a horizontally-disposed triangular lever connected at one angle to the table, a driven eccentric at the second angle thereof, a horizontally-disposed lever-arm pivoted at one end to a stationary element and at the other end to the third angle of the triangular lever.

692,496. CAR-HAUL.—Alfred M. Acklin, Pittsburg, Pa. A device for moving cars, consisting of a secondary traveling chain having hooks thereon for engaging with the car, and a main traveling chain having hooks thereon for engaging with the car and adapted to travel at a greater speed than the first-named chain.

692,531. ELECTROLYTIC CELL.—Ernest A. Le Sueur, Rumford Falls, Me., assignor to the Electro-Chemical Company, Rumford Falls, Me., a corporation of Maine. An electrolytic cell for the decomposition of the salts of the alkaline metals, having an anode, a cathode consisting of an amalgamated reticulated or foraminated metallic sheet, one side of which receives the alkaline metal, said cell constructed to contain in contact with that side of said sheet the solution to be decomposed and also to hold in contact with the other side of said sheet a body of water into which the said metal is discharged, and having means of supplying fresh mercury to said sheet to maintain the mercury held thereby free from impurities.

692,539. PROCESS OF REDUCING ORES.—Hermann Niewerth, Berlin, Germany. The process consists in heating the mass of ore to be reduced, heating two bodies of carbonaceous material, forcing a heated reducing-gas from one of said carbonaceous bodies into the ore for reducing the same, withdrawing the decomposed gas from the ore back into the first carbonaceous body for regeneration, forcing a quantity of reducing-gas from the second carbonaceous body into the ore for reducing the same, returning the decomposed gas into the second carbonaceous body for regeneration, and alternately continuing the movements of the heated reducing-gases through the ore until the reduction of the same is completed.

692,557. MINING-DREDGE.—John A. Swenson, San Francisco, Cal. The combination of a scow having a well or opening, a caisson open at both ends movable vertically therein, means for raising and lowering the caisson, a platform movable longitudinally on the scow over the top of the caisson, a dredging implement carried on the truck and means for lowering the dredging implement into and for raising it out of the caisson and for operating it to cut, excavate and elevate the material, the position of the dredging implement being controlled by the movements of the truck.

692,605. ARTIFICIAL-FUEL COMPRESSOR.—Marcus L. Bratton, Luray, Kan. A machine for compressing expansible material comprising three press-boxes with corresponding plungers and pitmen-rods, a crank-shaft having three cranks between its ends set at an angle of 120° to each other, and positive driving-gears at both ends of said crank-shaft.

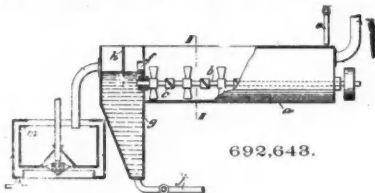
692,627. HYDROCARBON COMPOSITION.—B. B. Clawson, Oakland, Cal. A composition of matter consisting of asphaltum 100 pounds, bituminous rock 300 pounds, uinitate or gilsonite 100 pounds, sand or like material 50 pounds, and litharge 5 pounds.

692,634. PROCESS OF EXTRACTING PRECIOUS METALS FROM THEIR ORES.—Herman Davis, Dayton, Nev. A process for the extraction of the precious and other metals from ore, ore-pulp, sands, slimes, tailings, mineral-bearing earths or other substances containing these metals, which consists in applying chlorine gas or chlorine water to change the metals into chloride, then removing a portion of the free chlorine by the application of air, and lastly leaching out the chlorides with a solution of a cyanide of the alkali or alkali-earth metals.

692,637. MINER'S SAFETY LOADING-TOOL.—Alfred V. Des Moines, Silverplume, Colo. A miner's safety loading-tool, comprising a pair of twin jaws, free to shear past each other, and provided with operating edges for engaging a fuse and with idle indicating edges for showing the relative position of the operating edges.

692,643. APPARATUS FOR SEPARATING MINERALS BY SELECTIVE ACTION OF OILS.—Alexander S. Elmore, London, England. The combination in an apparatus for separating metallic from rocky constituents of ore, of a trough, a shaft adapted to revolve within said trough and provided with inclined blades, pipes for delivering oil and water to said trough, a subsidence-tank arranged at one end

of said trough, extending below the same and communicating therewith, said tank adapted to receive the liquid mineral pulp and oil from said trough, a vertically-extending partition arranged in said tank at the top thereof for the purpose set forth, a centrifugal drum arranged at one side of said tank, a pipe connected to said tank and communicating with said drum for discharging therein the metallic ingredients and the oil, and a pipe connected to the tank for discharging therefrom the earthy and rocky ingredients.

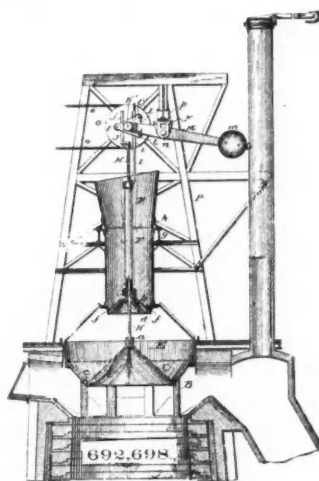


692,643.

692,644. ARTIFICIAL STONE AND PROCESS OF MANUFACTURING SAME.—Frederic M. Emerson, Brookline, Mass., assignor to Murdock Parlor Grate Co., Boston, Mass., a corporation of Massachusetts. The herein-described process of manufacturing artificial stone having a central core or body of one concrete material, and a surface facing or veneer of another concrete material, which consists in building up the core or body and the facing or veneer at the side thereof from uncompressed concrete materials, then compressing the material of one of these parts whereby it is caused to intimately unite with the material of the other part, then compressing the material of the other of these two parts, then continuing to build up the core and the veneer at the side thereof, both from uncompressed concrete materials, and, after they are so built up, compressing them alternately, and continuing these operations until the desired size of stone is formed.

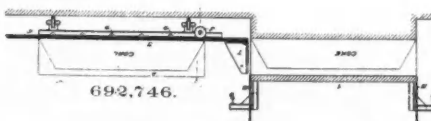
692,678. HOT-BLAST STOVE.—Carl W. A. Koelkebeck, Pittsburg, Pa. The combination, with a set or group of hot-blast stoves for furnaces, which are provided with air-jackets surrounding the stoves for heating air before its admission to the interior of a stove, of connecting means whereby air may be supplied from any of the jackets to the interior of any one or more of the stoves at will.

692,688. APPARATUS FOR PRODUCING FLUORINE.—Maurice Meslans, Paris, France. An apparatus for the manufacture of fluorine by electrolysis and provided with a partition wholly of metal separating the anode and cathode cells, and having openings through it only below the normal level of the electrolyte, said partition being electrically connected with the anode and being of a metal having the described property of forming on its surface a layer of insulating fluorine.



692,698.

692,698. MECHANISM FOR FEEDING BLAST FURNACES.—Albrecht B. Neumann, Joliet, Ill. The combination of a receiver or hopper, a receiving-chamber having communication with the receiver or hopper and with the furnace, an initial or upper bell for controlling the communication between the receiver or hopper and the receiving-chamber, a final or lower bell for controlling the communication between the receiving-chamber and the furnace, a rod for carrying the initial or upper bell, a rod for carrying the final or lower bell, and a common means for reciprocating both rods, oppositely acting on the rods simultaneously in manipulating the bells.



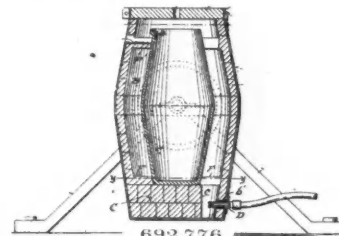
692,746.

692,746. COMBINED CHARGING AND DISCHARGING DEVICE FOR COKE-OVENS.—Samuel T. Wellman, Charles H. Wellman, and John W. Seaver, Cleveland, Ohio. A coke oven or retort charging machine having a movable carrier whereby the charge of coal is carried into the oven or retort, and a pusher combined with said coal-

carrier whereby the charge of coke may be pushed from the oven at the same time that the fresh charge of coal is being introduced into the same.

692,752. BLOWPIPE-TORCH.—Clay G. Woodmansee, Los Angeles, Cal., assignor of one-half to R. C. Hamlin, Los Angeles, Cal. A vapor-generating chamber having waste therein; air-passage connected to the rear end, and blowpipe-tube connected to the front of said chamber; reservoir attached to the front end of the generating-chamber; tube connecting said reservoir with a lamp having burner-tube terminating below the end of the blowpipe-tube; and a wick in said lamp.

692,760. PROCESS OF MAKING HYDROSULPHITES.—Max Bazlen, Ludwigshafen, Germany, assignor to the Badische Anilin & Soda Fabrik, Ludwigshafen, Germany, a corporation. The process consists in adding directly sulphurous acid as such to a commercially-pure bisulphite and reducing the mixture so obtained.



692,776.

692,776. SMELTING-FURNACE.—Harvey E. Auman, Reading, Pa., assignor to the Harvey Burner and Furnace Company, Reading, Pa. A rotatably-supported smelting-furnace, formed of a casing, a crucible-support in the bottom thereof and of a less diameter than the casing, a combustion-chamber formed by one side of the support, and the casing and a hydrocarbon-burner located therein, a crucible resting upon the support, a series of openly-spaced fire-bricks projecting inwardly from the casing, surrounding the crucible and engaging the same only near the top and bottom, to prevent displacement when the casing is tilted, a groove in the upper face of one of the fire-brick and extending through the casing, and a cover for closing the furnace.

GREAT BRITAIN.

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

Week Ending January 11, 1902.

23,320 of 1900. ZINC OXIDE PIGMENT.—W. S. Rock, Jersey. Making oxide of zinc suitable for pigment by alternately covering scrap iron and carbon with water and leaving it to the action of the air.

1,773 of 1901. BRIQUETTE BINDER.—T. Ingham, Liverpool. An agglutinating material for making briquettes, made from sea-weed, with a substance added to make it insoluble.

2,939 of 1901. POLING MOLTEN COPPER.—C. Haber and A. Savelsberg, Ramsbeck, Germany. A poling instrument for poling copper, lead, etc., consisting of a tube bringing steam in, heated and regulated by the molten material.

3,305 of 1901. NITRIC ACID MAKING.—Chemische Fabrik Rhenania, Aachen, Germany. In the manufacture of nitric acid, splitting the process into two stages, first producing strong nitric acid in the ordinary way by nitrate and sulphuric acid, and then treating the residue in a separate retort containing hot bisulphate to expel the remainder of the acid.

14,953 of 1901. ALUMINA AND ALUM MAKING.—K. Dementjeff and J. Ousikoff, Eleburga, Russia. A method of treating eololite to produce waterglass, alumina and alums.

18,891 of 1901. CLEARING BLAST FURNACE GASES.—J. A. Elsner, Dortmund, Germany. Apparatus for removing dust from blast furnace gases.

20,657 of 1901. WELDING AND PLATING.—H. Wachwitz, Nuremberg, Germany. In welding and plating, using aluminum surfaces to prevent oxidation and the alloying of the surfaces.

Week Ending January 18, 1902.

23,493 of 1900. CHLORINATING COPPER PYRITES.—U. Alvise, Rome. Using chlorine for chlorinating burnt copper pyrites instead of common salt.

4,403 of 1901. CYANIDE MAKING.—E. C. Rossiter, Birmingham. Making cyanides by heating cuprous sulphocyanide in a stream of hydrogen in the presence of copper.

5,122 of 1901. CONCENTRATOR.—Wilfley Ore Concentrating Syndicate, London. Detailed improvement in the Wilfley ore concentrator.

18,150 of 1901. LEAD SMELTER LADLE.—D. Laird, Forfar. Ladles and tipping frames for crucibles for receiving molten lead from smelting hearth.

24,032 of 1901. ASSAYER'S CRUSHER.—F. W. Braun, Los Angeles, Cal. Ore breaker and crusher for assayers.

PERSONAL.

Prof. John H. Furman, of Chihuahua, Mex., has gone to London.

Mr. W. R. Boggs, Jr., of Winston, N. C., has sailed for Europe on a business trip.

Mr. E. R. Abadie is now superintendent of the Champion Mine, at Nevada City, Cal.

Mr. Arthur Hendley is at Caborca, Sonora, Mexico, to test some placer properties there.

Mr. J. R. Morrison, of Nevada City, Cal., is on his way to Siberia to engage in mining.

Mr. A. M. Johnson has been appointed manager of the Ophir Mine and the mill at Stateline, Utah.

Mr. J. H. Henley, superintendent of the Ibez Mines Company of Leadville, Colo., has resigned.

Mr. Ben Stanley Revett will probably return from England to Breckenridge, Colo., by March 1.

Mr. C. K. McCornick, of Salt Lake City, Utah, recently went to Paris, France, on a short visit.

Mr. Jacob C. Haas, a mining engineer of Spokane, Wash., recently visited the Lake Superior copper district.

Mr. Vincent P. Tommins, secretary of the Manhattan Copper Company, is visiting the property at Troy, Ariz.

Mr. J. D. Graham, Gold Commissioner of Atlin, B. C., recently returned from a visit to England to his home at Revelstoke, B. C.

Mr. L. M. Cockerill is now manager of the United Mexican Mines Association, Limited, at Guanajuato, Mexico, succeeding Mr. R. H. Williams.

Mr. B. W. Dunn, of Houghton, Mich., representing Eastern men, has been in Parral, Mex., looking up mining properties.

Mr. Nathan F. Leopold, general manager of the Arcadian Copper Company, recently visited the mine near Hancock, Mich.

Mr. G. P. Goodier, manager of the Oro Verde Mining Company operating at Yankee, Colo., has returned from a visit to Utah.

Mr. F. Griffith, who resigned the management of the Red Dog Mill, Johannesburg, Cal., is succeeded by Superintendent Munn.

Mr. T. McCabe, foreman of the Salt Lake & Tonopah Mining Company, at Tonopah, Nev., has been appointed superintendent.

Mr. J. A. Van Leuven, late assistant engineer with the United States Corps of Engineers at Havana, Cuba, has located at Redding, Cal.

Mr. J. R. Flagg has accepted the superintendency of the Maple Creek Mines in Junction City, Cal., succeeding Mr. C. Scranton, resigned.

Mr. T. Worth Bowen recently returned to Salt Lake, Utah, after making an examination of the Beaumont oil field for Denver capital.

Mr. J. L. Mitchell, of Cozad, Neb., has been visiting Gilpin County, Colo., where he is interested in the Keystone Gold and Copper Company.

Mr. Walter Fitch, superintendent of the Champion iron mine, at Champion, Mich., recently visited the Calumet & Hecla copper mine, at Calumet.

Mr. William A. Akers has returned to his office in Salt Lake, after giving expert testimony in the Grand Central-Mammoth mining case at Nephi, Utah.

Col. T. G. Bush, president of the Alabama Consolidated Coal and Iron Company, is interested in some oil developments in the lower part of Alabama.

Mr. John Bindley, of Pittsburg, Pa., has been in the Birmingham, Ala., district for the past few days. He is interested in the Alabama Steel and Wire Company.

Mr. H. J. Parks has resigned his position with the Raritan Copper Works to take charge of the electrical department of the De Lamar Refining Works at Carteret, N. J.

Mr. A. J. Campbell has been appointed superintendent of the Isabella Gold Mining Company, of Cripple Creek, Colo., in the place of Mr. John Gafney, who has resigned.

Mr. Lew Humphrey, of Central City, Colo., recently returned from a trip of 2 months to Durango, Mexico, after examining mining properties in the interests of Eastern parties.

Mr. C. W. Butler, formerly head of the sampling department of the Puget Sound Reduction Company at Everett, Wash., is with the Pacific Coast Ore Sampling Works at Oakland, Cal.

Mr. W. Denby has resigned as superintendent of the Ebner Mines at Juneau, Alaska, and has accepted the same position with the Snettisham Gold Mining Company at Snettisham, Alaska.

Mr. S. E. Bretherton has the Rocky Mountain Smelting Company's furnaces at Florence, Colo., running, and has gone to Arizona to start up a hot blast copper matting furnace under contract.

Mr. Robert McF. Doble, of San Francisco, consulting engineer, is in British Columbia engaged in the

examination of hydro-electric transmission projects for the City of Vancouver and vicinity.

Mr. F. W. Blackford, of Butte, Mont., has gone to Peru in charge of a party of expert silver and copper miners from Michigan and Montana, to open in a modern way mines near Cerro de Pasco.

Mr. E. E. Abercrombie recently returned to Boston from Salt Lake, having while there visited the large copper mines in Beaver County and the Utah Consolidated properties at Bingham, in which he is a stockholder.

Mr. C. T. Durell, superintendent of the Spotted Horse Mine for the Central Montana Mines Company, has been appointed general manager of this company, which also owns the Whiskey Gulch cyanide property in Fergus County, Mont.

Mr. Jesse J. MacDonald, formerly with the Gold and Silver Extraction Company of America, Limited, has left San Francisco to take a position with the Inca Mining Company at Santo Domingo, near Tira-phola, Peru, S. A., and will remain two years.

Mr. H. A. Fillmore, former superintendent of the Pettebone Colliery at Forty Fort, Pa., has been made the general superintendent of the West End Coal Company at Mocanaqua and will have full charge of all the outside operations, Mr. Roberts continuing as inside superintendent.

Mr. William L. Honnold, who has represented the Consolidated Mines Selection Company, Limited, in this country for the past two years, will sail from New York on the *Kronprinz Wilhelm* March 8 for London. Later he will go to Johannesburg, South Africa, to act as consulting engineer for the same company.

OBITUARY.

Captain Robert A. Abbott, president of the Jefferson Coal Company, at Bethlehem, Pa., died at his home in that city on February 13. He was 70 years old. He was prominently connected before and after the war in anthracite coal mining, and was a relative of Asa Packer.

John W. Nelson, for 4 years superintendent of the Emma Gold Mining Company, at Dunton, Colo., died February 3 of cirrhosis of the liver. The deceased was born in 1841, at Lund, Sweden. He came to America about 30 years ago. He first lived in New Orleans, and later removed to Memphis, Tenn.

Mr. Nelson was engaged in business at Helena, Ark., in 1876, and came to Colorado in 1879, and after a short residence at Pueblo he was engaged as foreman of the Bassie Mine, at Querida, Custer County, and held that position for 5 years. Later he resided at Bulldomingo, Walsenburg and Silver Cliff, and finally settled at Canon City.

In 1885 he went to Ouray and became foreman of the famous Virginus Mine and the Revenue Tunnel. During the past 4 years he was engaged in superintending and developing the Emma Group of gold mines, at Dunton, which are owned by A. E. Reynolds and Richard Keller, and planned the new mill on the property.

SOCIETIES AND TECHNICAL SCHOOLS.

PRINCETON UNIVERSITY.—The catalogue for 1901-02 shows a total enrollment of 1,354 students. Of this number 760 are in the academic department, 477 in the scientific and 117 in the graduate school. The faculty numbers 101. The gifts received by the university during the year amount to \$227,477.

ENGINEERS' CLUB OF ST. LOUIS.—At the meeting on February 5 there were present 38 members and 12 visitors. Mr. Henry Rustin, mechanical and electrical engineer of the Louisiana Purchase Exposition Company, addressed the club on the subject, "Exposition Engineering Problems." Mr. Rustin outlined the power requirements of an exposition which includes 2-wire and 3-wire direct current circuits of several different voltages; single-phase, 2-phase and 3-phase alternating current of several different voltages and frequencies; water, compressed air, illuminating gas, and possibly natural gas and acetylene.

INDUSTRIAL NOTES.

The Acme Cement Company, which recently purchased the Laramie Plaster and Cement Company's works at Laramie, Wyo., has arranged to operate the plant on a large scale.

The Wm. C. Johnson & Sons Machinery Company, of St. Louis, Mo., has placed orders recently with the Hooker Steam Pump Company for numerous mine pumps of special design for Indian Territory.

The Robins Conveying Belt Company, of New York City, recently secured a contract from Fraser & Chalmers, Limited, of London, for a number of conveyers, which are to be shipped to Freemantle, Australia.

The Brown Hoisting Machinery Company, of Cleveland, O., has secured a contract from the Haarlemsche

Machine Fabrik, of Haarlem, Holland, for a bridge tramway gravity system. This machinery will serve as mechanical equipment for an extensive ore handling plant being erected by the Dutch firm.

The Mohawk Paint and Chemical Company of New York has been incorporated with a capital of \$200,000. The directors are Irwin F. Mathes, Augustus M. Clements and Joseph E. King, of Port Edward; Justin Batchelor, of Wallingford, Vt.; Howard S. Paine, of Glens Falls; John C. Avery, of New York, and Alfred R. Kittson, of Boston.

The American Bridge Company has secured the contract for extending the central power house of the Sydney City and Suburban Tramways, Sydney, Australia. The contract calls for 700 tons of structural material, to be delivered inside of 4 months. The Sydney power station is being equipped at an expenditure of some \$800,000, and \$500,000 more will be expended for additional machinery.

The National Tube Company's exports of pipe made through Eastern ports in January amounted to nearly 3,000 tons. The shipments to Continental Europe made a total of 1,805 tons, Antwerp taking 1,100 tons in 2 shipments. Shipments were made to Lisbon, Genoa, Amsterdam and Hamburg. South Africa was forwarded 539 tons of pipe, in 2 lots. Mexico was a purchaser to the extent of 216 tons. Consignments also went to Cuba, Singapore, China and Japan, Manila, Soerabaja and Buenos Ayres.

Messrs. Robert W. Hunt & Company, of Chicago, Ill., have been given the inspection of the rails, splice-bars, bolts, nuts and spikes, which the Mexican National Railway Company has purchased in England and Belgium. They have also been given the inspection of rails which the Louisville & Nashville Railroad Company has purchased in Germany. John J. Cone, of the firm, will have immediate personal charge of the inspection of this material, and will take with him to Europe a detail of men selected from his firm's American corps of inspectors.

It is reported that the Anglo-American Gypsum Company, recently incorporated under the laws of New Jersey, with a capital of \$2,000, will take over a number of gypsum plants in Canada and Nova Scotia. For this purpose, it is said, the capital stock will probably be increased to something like \$8,000,000 to \$10,000,000. The capital stock of the United States Gypsum Company, which was incorporated under the laws of New Jersey in December last, has been increased to \$7,500,000. It is said that the new company will be a rival of the United States Company.

The Crown Pottery Company, of Evansville, Ind., has been incorporated with a capital of \$400,000, to be increased to \$700,000. The company is the consolidation of all the potteries west of East Liverpool, O., including the plant at Evansville, and the plant at Peoria, Ill. A third factory will be built either at Indianapolis or at Terre Haute, at which will be employed 500 skilled laborers. A warehouse will be established in some Western or Southwestern city, the idea being to control the pottery business of the West and Southwest. Besides pottery, the company will manufacture glassware, firebrick and ornamental tiling.

It is announced that A. S. White, formerly president, and John Alvin Young, formerly secretary and treasurer of the National Salt Company, are no longer connected with the company as officers. The present officers are: President, N. S. Beardslee; vice-president, Joy Morton; secretary and treasurer, Mortimer B. Fuller; assistant treasurer, F. W. Relyea. The Board of Directors of the International Salt Company, known as the Salt Trust, as at present constituted, is as follows: E. L. Fuller, president; M. M. Belding, Jr., secretary and treasurer; M. M. Belding, Sr., W. B. Putney, Oakleigh Thorne, A. S. White, F. F. Culver and O. L. Gubelman.

A company called the Westinghouse Electrical Works has been organized under the Russian laws for the purpose of operating a plant at St. Petersburg, which will turn out electrical equipment, principally for the Government. A subsidy of \$1,500,000 has been granted by the Russian authorities. The capital of the enterprise is \$3,000,000, mostly subscribed by Moscow parties. The plant, which will cover 28 acres and employ some 1,500 men, will, it is said, be one of the most modern and complete works of its description in Continental Europe. Everything, other than the castings, which will be imported from the United States, will be manufactured at the St. Petersburg factory.

The Goodman Manufacturing Company of Chicago, Ill., manufacturer for 13 years of electrical mining machinery for use in bituminous mines, states that it has recently engaged as mining engineer S. W. Farnham, of St. Louis, for many years engineer of the Missouri Pacific Railroad coal properties in Missouri, Kansas, Arkansas and the Indian Territory. Mr. Farnham has had experience in the development, equipment, organization and management of bituminous mines, and is prepared to advise and assist the customers of the Goodman Company, not only in mat-

ters pertaining to electrical equipment, but as well in those relating to ventilation, drainage, tippie equipments, etc.

During the past few days the Colorado Iron Works, at Denver, Colo., has received a large number of orders. Among them was one for 6 vibratory screens for the Silver Lake Mines at Silverton, Colo., one for a set of riveted steel water jackets for the Hall Mining and Smelting Company, of Nelson, B. C., one for 4 Nesmith double bowl slag trucks for the Copperfield Mines, of Copperfield, Vt., 1 for 3 33 cu. ft. capacity slag trucks for the Compania Metallurgica Mexicana, 1 for a small concentrating plant for Idaho Springs, Colo.; 1 for a 50-ton pneumatic cyanide plant for the Ohio Gold Mining Company, of New Mexico, and 1 for 2 sets of 16 in. by 40 in. crushing rolls for the Woods Investment Company, of Victor, Colo.

The Pittsburg Consolidated Coal and Brick Company has been incorporated with \$150,000 capital stock by Pittsburg men to develop coal and fire-clay lands in Pennsylvania, West Virginia and Maryland. The company is composed of C. E. Pool, of Pittsburg; F. H. Gregg, Samuel Crosby and H. Barlow. The holdings of the company include 98 acres of fire clay and coal land at New Galilee, Beaver County, Pa.; 436 acres of coal and timber land at Bayard, W. Va., and 936 acres of coal and timber land at Stoyes Station, Md. At New Galilee, Pa., 2 mine openings have been made, and work will be started in the near future on the tipples. An output of 500 tons a day will be provided for. The company will also build a fire brick plant at New Galilee to have a daily capacity of 100,000 brick. The temporary offices of the company are in the Anchor Bank Building, Pittsburg.

The Lackawanna Iron and Steel Company has been incorporated under the laws of the State of New York with a capital stock of \$40,000,000. Its charter permits it to manufacture iron, steel and other metals, operate mines, lumber lands, furnaces, mills, elevators, water works, viaducts, aqueducts, canals, etc. The directors named are: H. McK. Twombly and D. O. Mills, of New York City; Henry A. C. Taylor, of Newport, R. I.; J. G. McCullough, of North Bennington, Vt.; H. Walters, of Baltimore, Md., and Samuel Matner, of Cleveland, O. The headquarters of the company is given as West Seneca, Erie County, N. Y. The Lackawanna Iron and Steel Company is an old organization and has been doing business in Pennsylvania until recently. The plants within the past year have been moved to Buffalo, where the concern will manufacture steel rails and structural work and other heavy material. The enlargement of the plant necessitated an increase in capitalization from \$25,000,000. Walter Scranton is president.

The American McKenna Process Company is erecting a plant at Warners, N. J., where old rails will be re-rolled for the export trade. The company at present operates plants at Kansas City and Joliet, Ill., each able to turn out about 100 tons of re-rolled rails daily. The New Jersey works will have a more modern equipment and a much larger capacity, being capable of re-rolling 200,000 tons of old rails annually. The company, of which Howard Morris is the president, and in which Chicago, Milwaukee, and Boston capital is principally interested, propose, in the first instance to re-roll 80-lb., 70-lb. and 60-lb. old rails into 70-lb., 60-lb. and 50-lb. weights, respectively. Eventually the plant will turn out rails as light as 16 lbs. The contract for the erection of the works has been undertaken by Milliken Brothers, of New York. The Lewis Foundry and Machine Company, of Pittsburg, has the contract for equipment. The water tube boilers will be manufactured by Hyde Brothers & Company, of Pittsburg, and the engines will be built by the Harrisburg Foundry and Machine Works, of Harrisburg, Pa. The plant is expected to be ready in a few months.

TRADE CATALOGUES.

The American School of Correspondence of Boston is sending out circulars calling attention to the free scholarships for 1902 it offers to deserving young men. The school offers courses of study in electrical, stationary, locomotive, marine and textile engineering, as well as in heating and ventilation, plumbing and mechanical drawing.

A great variety of electrical railway appliances and telegraph, telephone and electric light supplies are described in the 224-page pamphlet published by J. H. Bunnell & Co., of 20 Park Place, New York City. The list includes batteries, keys and sounders, insulators and insulated wires, construction tools, push buttons, bells, switches and switch-boards, incandescent lamps, etc.

The Crocker-Wheeler Company, of Ampere, N. J., has just issued a new Bulletin, No. 18, describing the electrical equipment of the Joseph Dixon Crucible Company, of Jersey City. This company which formerly operated 4 separate steam plants, has now combined them into 1 electric power plant. A 100 kw. generator and 24 motors, all of Crocker-Wheeler man-

ufacture, have already been installed, and future equipment is contemplated.

The Burt exhaust head to prevent the disfigurement of buildings and decay of roofs by oil and wet steam escaping from exhaust pipes is described in a little pamphlet published by the Burt Manufacturing Company, of Akron, O. This head is stated to have but one chamber and to employ no diaphragm nor baffle plates, thus avoiding back pressure and increasing the life of the apparatus. It is described as equipped with malleable iron bases and drips, increasing its durability. The manufacturers claim that it will not break nor rust, and will last a life time.

Morehead tank and return traps for steam plants are described in Circular No. 137 sent out by the American Blower Company, of Detroit, Mich. These traps are described as made of steel, the heads and longitudinal seam being closely riveted and calked to withstand any boiler pressure up to 125 lbs. The return trap, it is stated, has no rubber joints, and only one valve, this being on the outside; there is no ball or globe float inside the receiver. The tank trap is of similar construction, except that it has no live steam connection to the boiler. The pamphlet gives directions for setting up and operating the traps.

The J. W. Ruger Manufacturing Company, of Buffalo, N. Y., issues a little 16-page pamphlet on "Practical Power," pointing out the advantages of gas engines over steam plants and calling attention to the merits of the Ruger gas engine. Another pamphlet of 24 pages describes these engines and the method adopted for using gasoline. The main tank in this system is located outside the building, and by means of a small pump a reservoir near the engine, holding less than 2 qt., is kept constantly filled, feeding the engine, while any excess is returned to the main tank. This gasoline attachment is stated to take the place of the gas valve, and is controlled by the governor in the same manner as that valve. The company's single engines are built in various sizes, from 5 to 50 h. p. The twin engines are 15 to 100 h. p.

GENERAL MINING NEWS.

Kansas & Texas Coal Company.—The Central Coal and Coke Company of Kansas City has purchased all the properties and business of this company of St. Louis. The deal involves more than \$3,000,000. The company will own 45 coal mines in operation, employing 10,000 men; 23 company stores, doing a mercantile business of \$2,000,000 a year; 2,500 company houses used as homes for the miners and lumber workmen; 50,000 acres of coal lands in Missouri, Kansas Indian Territory, Arkansas, Louisiana, Texas and Wyoming; lumber mills that produce 180,000,000 ft. of lumber yearly, and offices and agencies in every large city in the United States. The capital stock of the company will be increased from \$750,000 to \$7,000,000. A large cash consideration changed hands in the deal, but the Kansas & Texas stockholders will receive part payment in stock and have one director in the company.

ALASKA.

Northern Belle Gold Mining Berner's Bay Company.—The Mine Securities Corporation of New York City has made a first payment for the control of 18 claims, comprising this company's property. The properties, it is stated, have been under the management and ownership of the Nowells, of Boston, for several years; during which time a large sum has been spent in plant and development work. The company, in addition to its mines and reduction works, also owns the local railway and docks and the steamer running between Seward and Juneau.

The Mine Securities Corporation has contracted to enlarge the present milling plant of 200-ton capacity to one having a 1,000-ton daily capacity. One vein on the Kensington Mine alone is said to be 100 ft. wide. It is expected to keep the ore supply opened up at the maximum milling capacity from 3 to 5 years ahead of mill requirements. Mill runs are reported to show average values of from \$6 to \$10, gold being the only product. On a 100-ton basis the corporation estimates the ores can be mined and milled for less than \$2 per ton. A nearby water-power, owned by the company, sufficient for 1,000 h. p., is to be utilized for power with which to run the mill and air compressor plant.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Company, Limited.—The directors have received a cable message from Clifton that the production for the month of January was equivalent to 1,253 short tons of copper.

The directors of this company have received the results for the year to September 30, 1901. After paying £0,000 to the redemption fund and £24,619 of preferential dividends the surplus, including £60,233 brought forward from September 30, 1900, is £325,963. After deducting the dividend on the deferred ordinary shares for the year to September 30, 1900,

amounting to £13,010, which was paid on July 29 last, a sum of £312,953 is left. The directors resolved to recommend to the annual meeting the payment out of this sum of a dividend for the year to September 30, 1901, of 16s. 6d. per share, free of tax, on the preferred ordinary and deferred ordinary shares of the company. To account of this dividend 9s. 6d. per share was paid on July 29 last, and it is proposed that the balance of 7s. per share be paid on February 28. This balance dividend will be paid on 316,530 preferred ordinary shares and on 63,444 deferred ordinary shares, which latter include the shares recently issued to the shareholders. The dividends for the year absorb £298,543 and a balance of £14,410 will be carried forward.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Grand Gulch.—The 40-ton shipment of ore from this property to the Salt Lake smelters gave reported results of 48 per cent copper and 5 oz. silver per ton. Reports given out at the company's recent meeting show that during 1901 \$42,000 was derived from ore that averaged near 40 per cent copper.

PINAL COUNTY.

The new town of Troy, located about 26 miles southwest of Globe, is growing steadily, and its population now numbers 400 men, women and children. The buildings include a post-office, a company store, schoolhouse, hotel, miners' union hall and other buildings.

Troy Copper Company.—This company is capitalized at \$1,000,000, and the Manhattan Company at \$1,500,000. The officers and directors of the Troy are: President, William W. Davis; vice-president, Charles H. Barney; treasurer, John B. Humphrey; assistant treasurer, Edward H. Clarkson, and secretary, Joseph B. Martin. The Manhattan officers and directors are: John W. Sisson, president; William J. La Roche, vice-president; George E. W. Stivers, treasurer; Vincent P. Tompkins, secretary; Henry T. Hobart, Walter J. Leavenworth, Robert C. Rathbone, Charles H. Barney and Joseph B. Martin. The mine manager for both companies is Charles H. Cutting, and the corporation counsel, James P. Prince. The consulting engineer of the Troy is George S. Andrus, and of the Manhattan, Joseph B. Henry. The office of the Troy Company is in Boston, and of the Manhattan in New York.

The Troy property consists of 30 claims, while the Manhattan has 15. Development has been done on both. On the Troy the deepest shaft is down 450 ft., and 3 levels have been run. The equipment on the Davis shaft consists of a 40-h. p. Fairbanks & Morse gasoline hoist and Leyner air compressor and drills and a 30-h. p. gasoline hoist on the Alice shaft. On the Manhattan the principal work is on the Rattler, which is down over 300 ft., and is equipped with a 40-h. p. gasoline hoist, an air compressor and drills. On both properties 125 men in all are working. Recently a 60-ton smelter was ordered. The ore has been sent to the El Paso Smelter.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Shenandoah.—At this mine, near Plymouth, S. K. Thornton, superintendent, the present 500-ft. shaft is sinking to the 1,000-ft. level. A new compressor has been installed.

Zeila.—At this mine, at Jackson, W. F. Detert, superintendent, the repairs to the shaft, which have caused 2 months shut down, are about finished.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Carley.—The Carley Bros. are working a pocket claim on French Gulch. The conditions are said to be like those of the Bonanza Mine, at Sonora, Tuolumne County, where many rich pockets have been taken out.

Whittle.—At this mine, near Angels, a new pump has been put in.

ELDORADO COUNTY.

(From Our Special Correspondent.)

Montezuma.—At this mine, near Nashville, a good ledge has been struck.

Union.—This mine, near Eldorado, is to start up again. It is to be worked from the adjoining Church Mine. Mr. Harpending is owner.

FRESNO COUNTY.

(From Our Special Correspondent.)

Copper King.—The county supervisors are still taking testimony concerning the use of traction engines for hauling ore from the Copper King Mines to the railroad. Most of the objections come from teamsters. It is contended that horses are frightened by the steam engines, and an attempt is being made to stop the use of such engines on the public roads.

INYO COUNTY.

(From Our Special Correspondent.)

Anthony.—Mr. French, manager of this mine at Ballarat, is to build a tram and overhaul the mill. The stamps will be dropping soon.

Poverty Hill.—James McCarthy and Charles Petersen, of Independence, have bonded to S. H. Husleton, of Parkersburg, W. Va., this group of claims at Fish Springs. The 5-stamp mill is to be put in order and the ground thoroughly prospected. Mr. Husleton has also bought a claim at the same place from Geo. Gilliam, and has begun to develop it.

Ratcliff.—Superintendent Godsmark has resumed operations on this mine at Ballarat, and the stamps will shortly be dropping.

KEIN COUNTY.

(From Our Special Correspondent.)

Butte Mining Company.—This company, at Randsburg, P. H. McMahon, superintendent, is working 22 men and taking out considerable ore.

Florence.—A Bakersfield company has been organized to re-open and work this gold mine near the Long Tom on Upper Poso Creek.

Old Keys.—It is understood that this mine, near Isabella, is to be sold.

MONO COUNTY.

(From Our Special Correspondent.)

Snowflake.—This mine (formerly the Booker), at Bodie, owned by John Kelly and E. Marks, is being worked under lease by J. B. Kennedy. Ore is now hauled to the Syndicate Mill at Bodie.

NEVADA COUNTY.

(From Our Special Correspondent.)

Blue Tent.—This and the Enterprise claim at Blue Tent, 6 miles from Nevada City, have been bonded by C. L. Canfield and others who will put up a 20-stamp gravel mill.

Cisco Consolidated Mining Company.—This company has bonded the Hartley Mine, at Cisco, and is doing considerable development. There is a 10-stamp mill on the property, and a larger mill is contemplated.

Empire.—The mill at Grass Valley, George W. Starr, manager, is to have 20 stamps added to its present 40 stamps. This is the oldest quartz mine in the State, and the largest producer in the Grass Valley District. A large Norwalk compressor has recently been added to the plant with a capacity for 30 drills.

Federal Loan.—High grade ore has been struck in an upraise from the 300-ft. level in this mine, at Nevada City. H. R. Ogden is superintendent.

Menlo Mining Company.—This company, at Grass Valley, which recently bought the Illinois and Wisconsin Plains, has elected the following directors: G. W. Starr, L. P. Larue, C. E. Clinch, C. B. Lakenan and J. M. Lakenan. Mr. Starr is superintendent.

Merrimac.—This mine, owned by Col. George Stone and others, of San Francisco, is to start up after an idleness of about 5 years. The mine is near Nevada City.

Mohawk.—Now hoisting works are to be put on this mine, owned by Charles Scheunert, of Sacramento, and William McLean, of Graniteville.

Niagara.—San Francisco men have bonded this mine at Nevada City, and will put up machinery. The mine is owned by Brown, Durbin & Co.

Old Home Consolidated Mining Company.—This company expects to resume operations in Blue Tent District, at Nevada City. This is a quartz proposition. The company's office is at 41 First street, San Francisco.

Remington Hill.—San Francisco men have bonded a large tract of land at Remington Hill, about 18 miles from Nevada City, and will begin drifting on the gravel in the spring. A great deal of gold was taken from that vicinity in early days.

Texas.—A 2-ft. ledge has been uncovered in this mine, near Nevada City.

Yuba-Monarch Gold Mining Company.—This company has been organized to work the Minnie Belle, Alice and Stenwinder mines at French Corral. A mill of large capacity is to be erected.

PLACER COUNTY.

(From Our Special Correspondent.)

Dryland.—This dredge, on the American River, 7 miles from Colfax, is to work the tailings from Indian and other canyons. H. J. Barton and A. La Bud own the dredge.

Prairie Flower.—This 10-stamp mill, at Canada Hill, has closed down for lack of water. The Sailor gravel claim is also short of water.

RIVERSIDE COUNTY.

(From Our Special Correspondent.)

Pinon.—W. F. Sherwood, of Los Angeles, has purchased from Dr. Mary S. Erth, of the same place, a 2-3 interest in this and the Golden Calla mines in the Pinon District.

Yorba District.—William Kroonen, of Corona, has taken up the following claims: Dutch Republic, Pacific, Lorenzo, Big Canyon, Boston, Great Western, Cheyenne, Sunlight and New York.

SAN LUIS OBISPO COUNTY.

(From Our Special Correspondent.)

California Copper Company.—This company has temporarily stopped work at Morro.

Occanic.—A large force is employed on this quick-silver mine at Cambria, and a furnace is under construction. The mine has been idle since the early 70's.

SANTA BARBARA COUNTY.

(From Our Special Correspondent.)

Waldorf & Crawford.—These asphalt mines are working a larger force of men.

SHASTA COUNTY.

(From Our Special Correspondent.)

Bully Hill.—H. A. Cohen, general manager of Capt. De La Mar's copper mines at Winthrop, says that the low price of copper will not affect work at the plant. The policy of some near-by property owners in demanding exorbitant damages on account of smelter fumes, is much more likely to cause the closing down of the plant.

Sunlight.—Thomas Greene, of Redding, and Wm. Murray, W. A. Pryor and H. Weitman, of Shasta, are opening a quartz claim on the site of the old county hospital at Shasta. After drifting from the 70-ft. shaft they have struck a ledge showing free gold. A steam hoist and pump have been put in.

SIERRA COUNTY.

(From Our Special Correspondent.)

Balsam Flat.—J. W. Morrell is to develop this mine, near Allegheny. A 1,200-ft. tunnel is to be run to the gravel channel.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

Red Bird.—Work continues in this quartz mine and mill, near Yreka, but cold, dry weather has made the water supply short.

Weideman & Williams.—This old mine, on the north fork of the Greenhorn, is being reopened by E. Northcutt under bond.

SAN BERNARDINO COUNTY.

(From Our Special Correspondent.)

American Borax Company.—This company has been organized in San Francisco to develop borax deposits in the desert country near Daggett.

Bagdad.—At this group, near Ludlow, 3 gasoline engines are used. Two Durkee electric drills are being put in. The company, when it finds enough water, will move the 60-stamp mill and plant from Barstow to the mine. The general manager is Mr. Stag and C. Grant is mine superintendent.

Dale District.—The miners of the old Virginia Dale Mining District have abandoned the name and formed the Dale District, with the same boundaries. The Capitol, a new mine recently located by C. B. Eaton, is attracting attention.

SONOMA COUNTY.

(From Our Special Correspondent.)

Skinner.—At this graphite mine tunnels are being run to open the claims which belong to Mr. R. M. Skinner, of Petaluma.

Yellow Jacket.—S. A. Nay, of Petaluma, has purchased this ranch, and will start work on the Yellow Jacket quicksilver mine on the property.

TRINITY COUNTY.

(From Our Special Correspondent.)

Dorleska.—Sixty men are at work on this mine, at Abrams, belonging to the Union Consolidated Mining Company, of which M. McIlwaine is superintendent and H. Z. Osborne, of Los Angeles, is general manager. The mine is making a good monthly output.

Fairview.—At these mines, near Minersville, development is being carried on by the Altoona Quick-silver Company, which has a bond.

Sykes.—The new ditch is completed on this hydraulic mine, at Trinity Center. Thos. Macdonald is superintendent.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

California & New Era.—These mines, near Big Oak Flat, are now owned by J. G. Thoma, and work has started.

Campo Seco.—This company is to sink a 2-compartment shaft on its properties near Jamestown.

De Lay.—At this mine, near Groveland, grading is being done for a prospecting mill.

Dutch.—The rock breaker and blower at this mine, at Quartz, are to be run by electric power.

Eagle-Shawmut.—At this mine, at Chinese Camp, C. E. Uren, superintendent, the 100-stamp addition to

the mill will not be ready before June. The mile-long tramway from the hoist to the new mill is about completed.

Golden Gate.—At this mine, near Sonora, grading is completed for the 20 stamps to be added to the present 20-stamp mill.

Hope.—This mine, at Sonora, is ready to start again, and will employ about 18 men in mine and mill.

Mack.—The men laid off recently at this mine, at Big Oak Flat, have been put on again; and Mr. Lang has withdrawn his resignation as superintendent.

Mt. Jefferson.—Twenty stamps continue to drop regularly at this mine, at Groveland. J. M. Meighan is superintendent.

Norwegian.—This mine, at Tuttle town, owned principally by Mr. Murdock, of the Western National Bank, at San Francisco, is being pumped out, and will be worked again.

Porto Fino.—At this mine, near Carters, Joseph White is getting out high-grade base shipping ore.

Star.—This mine, near Columbia, is owned by the Rose Creek Mining Company, which also owns the Christine, De Mill, Blue Blazes, Center, Prospect, Starine, Maud S., Admission, Probability and Native Son claims. It has resumed operations after some years' idleness. The properties have been bonded to E. A. and J. O. Hayes, of San Jose.

COLORADO.

BOULDER COUNTY.

(From Our Special Correspondent.)

Forest.—This is again a shipper under the leasers, C. Bolt, J. Howison and A. Shipley. The development includes a shaft 600 ft. deep, with drifts at 100 ft. intervals.

Nancy.—This tunnel, at Wall Street, has for its objective point the Gillard vein, and is now in about 1,100 ft. Samuel Knott, of Boulder, is superintendent.

CHAFFEE COUNTY.

Belle of Granite.—This mine, at Granite, is under bond to the Occidental Development Company of Boston, Mass., of which Mr. H. Redding is manager. The company has purchased at public sale the entire mill plant of the Troy Mining and Milling Company. The 60 h. p. boiler and No. 6 Cameron pump are being installed to sink 100 ft. in the main shaft. The remainder of the plant will form part of a reduction plant to be erected at La Veta to treat ore from the mine.

Columbine.—This property, at the head of Lost Canyon near Granite, is being developed by the Accidental Mining Company, of Buffalo, N. Y. Shipments will not start before June. B. Tryon is manager.

Hudson.—This mine, at Granite, is owned by Henshaw, Olivett & Co., who are sinking a new shaft. The mill erected last fall will start in the spring.

Ruby King Mining Company.—This company, owning several claims near Granite, has been reorganized and merged into the Pacific Gold Mining Company. Messrs. Blacknet and Swan, of Pittsburg, Kan., own 51 per cent of the stock of the new company; Frank Perkins, of Colorado Springs, will be its business head.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

Aliunde Consolidated Mining Company.—At the annual meeting the following officers were elected: Solomon Turk, president; Willard Teller, vice president; Harrison J. Teller, secretary, and Titus Turk, manager. It is claimed that more vigorous development will be undertaken.

Georgetown Deep Mining and Tunnel Company.—Mr. Kelley, representing this company, has purchased the Boston-Beecher property, on Democrat Mountain, for about \$50,000, with long-time payments. This gives the company 40 patented claims on the line of the Kelly tunnel.

Red Oak Company.—Since the burning of the mill this company, at Georgetown, has decided to lease all the workings of the mine because of the former expensive management.

Tropic Mining Company.—Manager R. B. Morton has put in a blower and will commence a raise on the Tropic vein. The distance is 900 ft. This vein shows from 8 to 10 ft. of good ore in the shaft at 400-ft. depth.

OURAY COUNTY.

(From Our Special Correspondent.)

Mining Transfers.—J. W. Jones to C. W. Wessler, Marsie lode; Carl J. Singfrid, to the Ouray Home Gold Mining Company, Gold McIntyre and War Cloud lodes; U. S. A. to Glacier Mining Company, patent on Slide lodes; J. P. Barrows to Charles F. Potter, 5-12 interest in Monument lode.

Bachelor.—Exceptionally high grade lead-silver ore is being mined in this property from No. 1 level, and the prospect is good for surpassing all previous

records of production. The Bachelor is operated by George R. Hurlburt, one of its three owners, and is a close corporation. The mill is running full time and saving a large percentage of values.

Camp Bird Extension Mining Company.—This company, under the management of Martin Thistle, of Ouray, will soon begin building a 500-ton mill, plans for which are about completed. The material, already ordered, will be conveyed to the ground as rapidly as received. The company claim to have 4 ft. of milling ore, averaging \$20 per ton.

El Mahdi.—This Ouray property, under the management of Thomas Sullivan, is producing first-class ore. A cross-cut is now being run to intersect the Dexter vein, which runs parallel with the El Mahdi.

Humboldt.—This property, idle for several years, is in the Sneffels District, close to the Revenue, and is now being developed with a large force of men under the management of John McMahon, formerly superintendent of the Wedge Mines Company. Sinking is in progress, and several drifts in ore are being driven on the vein. The Humboldt is a close corporation, and if the present increase in values holds a mill will be erected in the spring.

Red Mountain Mining and Milling Company.—This company, which recently took over a large group of claims in Red Mountain District, has 50 men cleaning out and repairing the old workings. The Hudson shaft has been unwatered, and the National Belle is worked by a large force.

Ruby Trust.—This property, in the Sneffels District, operated by Col. Meeks, of Lake City, is now a regular producer. Five stamps are dropping in the mill, and 5 more will soon be. Arrangements are being made to install 20 more stamps.

CUSTER COUNTY.

Bassick.—The new shaft at this mine, at Querida, is down about 1,200 ft.

Powhattan Company.—This company is driving a long tunnel to tap the lead in North Mountain, near Querida, at a depth of 1,200 ft.

(From Our Special Correspondent.)

Florence Mining, Milling, Smelting and Refining Company.—The stockholders at a recent meeting at Florence elected the following officers: President, L. Blaney; vice-president, M. E. Lewis; secretary, T. H. Newkirk; treasurer, C. W. Blaney. The claims are located near Querida, in the Silver Cliff District.

DOLORES COUNTY.

Mt. Goram Mining and Milling Company.—This company is a Milwaukee, Wis., concern. It controls 33 full claims on the Smuggler-Altamont veins adjoining the Emma properties, near Rico. The company has a 35-ton concentrating plant, consisting of a 9 by 15-in. Blake crusher, 10 850-lb. stamps, and 3 Wilfley tables. The company gets its coal from its own mines, 1¼ miles from the mill. A 700-ft. aerial tramway conveys the ore from the bins at the mine to the mill. The mill requires but 5 men to keep it running 24 hours. The mines are opened by tunnels.

GILPIN COUNTY.

(From Our Special Correspondent.)

Mining Transfers.—A. Ress to Argo Mining, Development Town and Tunnel Company, ¼ interest Elizbone and Trentina lodes, Russell District; J. E. Daniels to Clara Coltrin, the Blossom numbers 1, 2, 3, 4 and 5 lodes and Great Head lode, Pine District; J. P. Jones to J. Visintin, Grand Junction and Curran lodes, Illinois Central District; H. J. Hawley to E. Sears, 1-5 interest Success lode; J. M. Hardman et al. to the Missouri and Colorado Mining and Milling Company, 775-1,000 interest in Old Ann group of 7 lodes, Hawkeye District; J. C. Woodbury to E. M. Cranston, 1-24 interest Williams lode and 1-36 interest in Grace Darling lode, Lake District.

Kansas-Burroughs Consolidated Mines Company.—The shipments for January were 268 cars, or 2,412 tons, an average of 80 tons per day. P. McCann, Central City, is manager.

Ninety-four Company.—This company is going to increase its milling plant from 3 to 16 tables, after successfully using the Waugh dry process for several months. Indiana parties are interested, and G. W. Possell, Yankee, is manager.

Robert Emmet.—A shipment of iron gave returns of \$158 per ton and daily shipments of milling ores are made. W. Nicholls, Central City, is manager.

HINSDALE COUNTY.

Golden rivece.—A car-load of first-class ore was shipped last week from this mine at Lake City. The ore was taken from the bonanza recently opened, and the car-load was estimated to be worth \$25,000.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Carpenter Smelter.—This plant, at Golden, after a series of vexatious delays, is now running satisfactorily. The delays seem mainly due to defects in the

cast iron water jackets, which have since been replaced by wrought iron ones.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

A. Y. & Minnie Mining and Milling Company.—The capitalization is \$10,000. The incorporators are E. L. Newhouse, Julius Rodman and S. D. Nicholson. The company is arranging for extensive work on the A. Y. & Minnie Mine, which it has leased for the year.

Aimee.—This Fryer Hill property is producing steadily low-grade iron, but recently better values are obtained, some pockets of chlorides having been encountered.

Antelope Mining Company.—At a meeting of the directors the corporate life was extended. The company has just leased the Deer, Antelope and Ocean Wave claims, and the future of the company is much brighter.

Caribou Mining Company.—The capitalization is \$100,000. Incorporators are: Wm. Byrd Page, K. L. Fahnestock, S. W. Mudd. Directors for the first year include the above men and E. C. Simmons and Geo. F. Campion. The company is working the Bison, in Leadville Basin, where an enormous deposit is producing 200 tons daily of oxidized iron. The company has also a large manganese deposit.

Coronado Mining Company.—The company is opening up a low-grade iron body and is making regular shipments. It is in a legal tangle just now from a judgment of \$5,117 obtained by the Denver National Bank, which advertises to sell the machinery to satisfy judgment on February 19.

Diamond Gold Mining Company.—Sinking to 1,000 ft. is completed and drifting will begin at once. The workings show good contact.

Fortuna Mining Company.—The company has just obtained judgment for \$15,000 against the Resurrection Mining Company for ore alleged to have been taken from its territory. The company sued for \$150,000, and the case has been on several years.

Garbutt.—Sub-lessees are taking out some good gold-copper ore from a strong vein in the old workings.

Little Chief Mining Company.—The 20 years' time of incorporation having expired the company has filed a certificate of renewal. Its headquarters are in New York City. It has valuable holdings on Fryer Hill, which are operated under lease.

Midas Mining Company.—The company has overcome its water difficulty and is handling 200 tons a day of good grade oxidized iron ore from one of the largest shoots ever opened in the district.

Phoenix Mining Company.—The repair work on the Sixth Street is about done. Shipments of 100 tons a day of manganiferous iron are maintained through the Coronado shaft. The property will ship 200 tons a day to the Pueblo Steel Works as soon as repairs are completed.

Printer Boy Gold Mining Company.—The New York owners are pleased with the outlook. New machinery is in place and the old Littler shaft is being unwatered to the 700-ft. workings, whence the shaft will be sunk 150 to 300 ft. to the ore zone.

Silverthorn Mining Company.—This recent incorporation will work claims near Low Pass section. Illinois men are at the back of the enterprise.

Tarshish Mining Company.—Good mineral is being opened in the 270-ft. workings of the Seneca. The management is making occasional shipments.

Two Bit Mining Company.—This new incorporation has started a shaft and installed machinery and other surface improvements are being completed.

Valley Leasing and Mining Company.—Springfield, Mass., people are at the head of this combination, formed to work the Valley, Forest Rose and Dispute claims. The ground adjoins the Monarch.

Waswado Mining Company.—The new shaft on the Eclipse claim is 1,000 ft. deep. Some good streaks have been cut in sinking and some good ore is coming from the Nevada Tunnel.

SAGUACHE COUNTY.

(From Our Special Correspondent.)

There is much activity in the mines tributary to San Luis Park, especially in the Sangre de Christo Range. Messrs. Cramer & Smith are pushing their tunnel on Cat Creek. A new compressor has been installed at the Pass Me By tunnel at Carpenter, under the direction of U. G. Carpenter.

SAN MIGUEL COUNTY.

Ophir Consolidated Mining Company.—W. S. Buckley, manager of this company, and 44 stockholders from Milwaukee, Wis., recently visited the property at Telluride.

SUMMIT COUNTY.

Benzie Investment Company.—This company, of Denver, which owns the Bledsoe and Independence groups, at the foot of Jack Mountain, near Kokomo,

has let a contract to drive a cross-cut through from the lower tunnel to intersect a vein cut in the upper tunnel. This property produced high grade ore in former years. The ore carries copper.

Butler Investment Company.—This company, of Denver, promoters of the Gold Cord Mining and Smelting Company, has let a contract to drive the tunnel into Jack Mountain, near Kokomo.

Elk Mountain District.—The Kimberley and the Breene mines are producers. The Undine tunnel is going into the hill rapidly, with 3 shifts employed. The lower Breene tunnel is in over 1,100 ft.

Wilfley.—This mine, on Elk Mountain, shipped 10 cars of ore in January. The mill is working day and night.

(From Our Special Correspondent.)

Connor's Bonanza Mining and Reduction Company.—This Milwaukee, Wis., company is driving a tunnel into Elk Mountain to reach ore bodies owned by it. The tunnel is now in nearly 800 ft. It is expected to reach the main ore body in about 100 ft. further. The manager at Kokomo is John T. Keegan.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

New Mining Leases.—It is reported that W. S. Stratton, who controls a large amount of property on Globe, Gold and Bull hills, is to lease a considerable portion to competent mining men. This rumor cannot be verified, but there seems considerable foundation for it. A few weeks ago the Cripple Creek Chamber of Commerce appointed a committee to confer with Mr. Stratton about leasing his idle property, and it is understood that something was accomplished. It has been the general policy of Mr. Stratton not to lease any of his property. He has within the last 2 or 3 years obtained a large amount of territory, which before his getting control was opened to lease, and the change in ownership caused a marked falling off in leases. It is recognized here that leasing assists very materially the welfare of the district.

El Paso Gold Mining Company.—It is understood that development work on the 600-ft. level is temporarily suspended because considerable water has been encountered in drifting on the vein. The new station pump will arrive in a short time. Stopping goes along as usual. The property is the banner one on Beacon Hill. Mr. Bainbridge, of Cripple Creek, is in charge.

Isabella Gold Mining Company.—The new directors are slowly getting matters in shape. It is not known just what the plan of development will be, but it is understood that considerable of the surface ground will be leased. Messrs. Lennox, Giddings and others, who are now in control of the Isabella Company, are well known mining men from their connection with the Strong, Gold King, Elkton and others.

GEORGIA.

LUMPKIN COUNTY.

(From Our Special Correspondent.)

G. H. Breyman's dredge (formerly owned by Birch Bros.) is now at work again after a short stop for repairs.

Calhoun.—This is one of the oldest gold mines in the State. Under the direction of Superintendent Wharton Anderson it is paying good profits.

Crown Mountain Mining and Milling Company.—By the aid of arc lights 2 giants are kept working nights as well as days. While the company is handicapped by a partially disabled pump, the mill is going nearly full time.

Dahlonega Consolidated Gold Mining Company.—This company, under the direction of William Rex, superintendent, has made a successful mill run on low grade ore, saving \$1.42 free gold and 44 lbs. concentrates per ton. The concentrates are worth from \$70 to \$90 per ton. The cost of mining and milling is given as \$1 per ton. Two inclines are being sunk, one on the Knight vein and one on the Prewitt. Twenty stamps of the large mill are in use.

Standard Gold Mining Company.—Two new air drills have arrived, and work will be resumed on the Benning vein. The ore will be milled at the Consolidated Mill.

IDAHO.

LATAH COUNTY.

Jerico.—A 3-stamp mill is to be erected at this mine, on Elk Creek, 55 miles from Troy. The machinery is being hauled in over the snow. The shaft is down 125 ft., and considerable development has been done by levels and cross-cuts. The vein is said to be of good size and to run \$35 per ton. A 12-h. p. gasoline hoist is in place. A 16-h. p. gasoline engine will run the mill and a 4-h. p. engine the concentrator.

ILLINOIS.

SANGAMON COUNTY.

(From Our Special Correspondent.)

The last scheme for consolidating the coal interest of Illinois has fallen through and the options re-

turned to those operators who gave them, much to the disappointment of some who had hoped to unload at a good big price, though having little to give for that price.

Cantrell Co-operative Coal Company.—This company, at Cantrell, is not yet able to resume operations at its mine since the fire several weeks ago. The fire is probably out, but the mine is full of gas.

Republic Iron and Steel Company.—This company has its coal mine at Springfield working after being idle 10 days completing the installation of the tail-ropes haulage plant.

MARYLAND.

ALLEGHANY COUNTY.

Piedmont Georges Creek Coal Company.—This company has leased of Charles H. and Ruth Leathaw several tracts of coal land, paying a royalty of 10c. per ton on big vein coal and 5c. per ton on coal from all smaller veins.

GARRETT COUNTY.

Meadow Mountain Coal and Coke Company.—This company has opened a mine along the Jennings Railroad, a short distance south of Salisbury, which shows 4 ft. of coal. H. C. Yerger, of Patton, Pa., has erected coal tipples. Two side tracks, one on each side of the Casselman River, have been built. The above company will ship most of its coal to Trenton, N. J., to be used at the rubber and steel works of the owners.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

Atlantic.—The January output was 276 tons mineral, the same as in January, 1901.

Franklin.—The January output is given as 352 tons of mineral, which compares with 164 tons in January, 1901.

Quincy.—The January output was 1,121 tons of mineral, compared with 975 tons in January, 1901.

(From Our Special Correspondent.)

Arcadian.—Work is confined to the Douglass shaft, which is 700 ft. deep.

Atlantic.—Improvements under way for some time are about completed, and in a short time "F" shaft will be closed down and the product of the mine hoisted through "A," "B" and "D" shafts.

Baltic.—Operations at present are confined to 4 shafts with 25 drills in use. The depths of the various shafts are as follows: No. 2, 250 ft.; No. 3, 600 ft.; No. 4, 600 ft., and No. 5, 425 ft. Drifting on the 7th level is under way at Nos. 3 and 4. The mine is shipping about 2,500 tons of rock to the mill each week. It is expected that the second head in the mill will be in commission before many weeks.

Belt.—The machinery used in exploring this property, other than that belonging to the fee holders, has been shipped back to the Arcadian Mine. Several tons of mass and barrel copper will be shipped to the smelters.

Centennial.—Work continues with a reduced force, and operations underground are confined to the sinking of "A" shaft, now 1,750 ft. deep, and sinking at the rate of 80 ft. per month. The work of installing the new hoist at "A" shaft has been delayed by bad weather.

Champion.—The Wisconsin Bridge and Iron Company, of Milwaukee, Wis., has the steel work on the new mill completed up to the rock bins.

Franklin.—No. 1 shaft, on the Amygdaloid lode, at the Junior branch of the property, has been abandoned, and will be allowed to fill with water. The conglomerate lode continues to open up well, and is shipping 800 tons daily.

Isle Royale.—Sinking in Nos. 1 and 2 shafts will be resumed within a week. The shafts are now down to the 16th level. The showing in the bottom of the mine is reported good.

Mayflower.—Exploratory work at this property is confined mainly to the Amygdaloid lode. The shaft is down 100 ft., where drifting to the north is under way.

Oscola.—The new shaft at No. 2 shaft, on the Kearsarge lode, is nearly completed. No. 3 shaft is down to the 22d level. The output of the Kearsarge branch will be increased as soon as the new mill is in commission.

Penn.—Exploratory work continues. Sinking is under way in 2 old shafts, both of which are down about 80 ft.

Wyandot.—The report of a recent strike is without foundation. Work is confined to exploring on Section 28, where 2 diamond drills are at work 2,200 ft. apart.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Phoenix.—A number of men are employed on the railroad to connect the mine and stamp mill site. The greater part of the right-of-way is surveyed and cut, and the remainder of the grading will be done as soon

as the snow leaves the ground. Developments at the mine is reported as encouraging. Active work is confined to the Robbins, or "West" vein, and the St. Clair fissure. The Robbins yields considerable copper, but most of the output comes from the St. Clair in the form of small masses and barrel work, which goes to the smelters direct. The output of the property ranges between 15 and 20 tons per month.

IRON—MENOMINEE RANGE.

Menominee Exploration Company.—This company, of which Charles E. Lawton is superintendent, is working mines at Stambaugh, Iron River, Amasa and Vulcan. At the Baltic Mine at Stambaugh, W. E. Bengry, superintendent, a sand shaft is to be sunk under the supervision of Capt. James Reed.

MINNESOTA.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

There have been several important sales of mining properties recently. Youngstown blast furnace interests have bought 2 locations, the n. e. $\frac{1}{4}$ of the n. e. $\frac{1}{4}$ of section 7, T. 57, R. 17, and the w. $\frac{1}{2}$ of the s. w. $\frac{1}{4}$ of section 32, T. 58, R. 20, paying about \$125,000. They bought a 25c. lease in each case, and will open the properties shortly, it is understood. There is a small tonnage of ore in the first named piece, which adjoins the Fayal on the south. The other is partially developed and contains, so far as known, about 3,000,000 tons of reasonably high-grade ore.

Another sale was of 160 acres in section 32, T. 52, R. 22, where Kinney and associates have shown up a large tonnage of various grades of ore. This has been taken by the McCormick Harvester Works for a bonus of \$520,000 on a 20c. royalty.

One hundred and twenty acres in the n. e. $\frac{1}{4}$ of section 12, T. 57, R. 21 have been sold to P. L. Kimberley and associates for \$200,000. The land belongs to the State of Minnesota, which will get 25c. a ton royalty on ore mined. The bonus paid goes to the developers, who are Duluth men. There are shown up here about 5,000,000 tons of various grades of ore, with the development not completed.

The Eastern Railway of Minnesota has bought the n. $\frac{1}{2}$ of the n. w. $\frac{1}{4}$ of section 12, and the n. e. $\frac{1}{4}$ of the n. e. $\frac{1}{4}$ of section 11, T. 57, R. 21, for \$160,000. This has been developed to show about 4,500,000 tons, of which 2-3 are bessemer ore, and the development is incomplete. It carries a royalty of 25c. and an annual minimum of 100,000 tons after next year. The same company has bought the 60 acres adjoining to the west, the n. w. of the n. e. of section 11, and the s. $\frac{1}{2}$ of the s. w. of the s. w. of section 2, same town, from the Pitt Iron Company, a Duluth corporation. This carries part of the ore body of the tract to the east, and some of the ore is so near surface that it can be stripped.

Ore has been found on the n. $\frac{1}{2}$ of the n. e. $\frac{1}{4}$ of section 25, T. 58, R. 18, where drills have been working some time. As yet the ore is low grade. The Delta Iron Company has an option on the land, and is doing the work.

On the Pennsylvania 40 the n. e. $\frac{1}{4}$ of the s. w. $\frac{1}{4}$ of section 20, T. 58, R. 19, where drilling has been in progress some time, the ledge has been struck, but no ore is yet encountered. The hole is down about 100 ft.

Adjoining this 40 to the north the Interstate Mining Company (Jones & Laughlins) will drill for ore during the spring. The indications are good in both tracts.

Belliton Mountain Iron Company.—This company has taken a lease of the w. $\frac{1}{2}$ of the s. e. $\frac{1}{4}$ of section 14, T. 58, R. 20, and will explore it. This ground is north of any preceding finds in that township, but large ore bodies lie to the south. The royalty is 15c. a ton, and the minimum output is 75,000 tons after 3 years.

Elba Iron Company.—This company is hoisting faster than in any preceding year, and has 70,000 tons in stock now. The mine will be a heavier shipper than ever this year. Elba and Corsica are now employing about 325 men.

Pitt Iron Company.—This concern, owned by a Steubenville, O., interest, is being put into shape for shipment. The mine is on the east side of T. 58, R. 17. Tracks have been built to the property and a shaft is sunk.

IRON—VERMILION RANGE.

(From Our Special Correspondent.)

United States Steel Corporation.—Tracks are being put in at the Sibley location, and machinery will be installed at once for opening a mine independent of the Savoy.

MONTANA.

FILATHEAD COUNTY.

A post office will be established about March 1 at Cabinet, the new town that is springing up in the West Fisher District. This will be a great convenience for the mining companies, of which there are 10 now operating in this new gold camp.

American Kootenai Mining and Milling Company.—

The company has purchased an electric plant, and will work on a larger scale. Electric drills will be used. The ore is free milling quartz between a porphyry and a slate formation. The plant is equipped with modern machinery of Allis-Chalmers make, and has an aerial tramway of 25 tons per hour capacity. The mill is run by water power developed by a double nozzle Pelton water wheel under 105-ft. pressure.

Fisher Creek Company.—This company is adding 2 more stamps to its mill, making it a 20-stamp affair. The ore is free milling quartz. Manager Brannegan is increasing his force of miners daily.

Mother Lode Company.—Manager W. J. Beager states that the new mill will be completed early in the spring.

Snowshoe.—The new strike of 3½ ft. of rich ore in the lower workings has caused interest in adjoining property. The ore recently encountered is of clean shipping grade, carrying gold, silver and lead. Spokane parties own the mine.

LEWIS & CLARKE COUNTY.

Winscott.—A. C. Mason and associates have let a contract for a 60-stamp mill on this old property, a few miles south of Helena. The machinery is being built in Milwaukee, Wis., by the Allis-Chalmers Company, and will begin to arrive at the mine in April. It will be driven by electrical power from the Missouri River Power Company, and is expected to be running by July 1. The property is reported to show an ore body 480 ft. wide and 720 ft. long, which has been opened to a depth of 150 ft. The ore is thought to average over \$2.50 per ton, while the mine and mill expenses, it is thought, will be below \$1 per ton. The gold occurs free in a granite formation. Grading for the mill site is to start soon. A tunnel 7 by 8 ft. will run under the ore shoot and deliver the ore to the mill. A reservoir to hold 22,000,000 gal. is planned to store the flood waters of Big Indian Creek. Colin McIntosh is manager for Mr. Mason.

SILVER BOW COUNTY.

Colusa-Parrot Company vs. the Anaconda Company.—This suit has been set for trial in the Federal Court for March 7. Senator W. A. Clark's company wants \$700,000 damages for ore alleged to have been taken by the defendant from a vein which apexes in the Colusa-Parrot ground. Another suit of a similar character, involving the ownership of the vein in dispute, was tried in the same court about a year ago, and was decided in favor of the Anaconda Company.

NEVADA.

ELKO COUNTY.

Smuggler.—These mines, in Good Hope District, 60 miles north of Golconda, have been sold to Omaha men. The property is a large one, and the mines were once heavy producers. It is proposed to test the low-grade ores, to determine the proper kind of a concentrating plant to erect and to build a large plant as soon as possible.

(From Our Special Correspondent.)

Black Eagle Mining Company.—This property, near Toano, recently shipped to Salt Lake City 43,110 lbs. of ore.

Dexter Tuscarora Consolidated Mines Company.—The output of cyanide and gold bars from this property, at Tuscarora, in January amounted to \$11,200. Extreme cold weather during the last of the month made it difficult to keep pipes leading from the leaching tanks free.

LYON COUNTY.

Carson Valley.—A 100-ton cyanide plant is being built at this old mill site, 6 miles below Yerington, to work the large deposit of Douglass mill tailings. It is estimated that there are about 400,000 tons of these tailings. They are under bond to A. F. Rogers.

NEW MEXICO.

BERNALILLO COUNTY.

Cochiti Gold Mining Company.—William Stevens has been appointed receiver of this mine at Albemarle on the application of employees, who claimed that the company owes \$200,000 for salaries and supplies. It is stated that arrangements are being made by which employees will be paid in full. It is also said that the company will be reorganized.

NEW YORK.

ULSTER COUNTY.

Ellenville Zinc Company.—This company was recently incorporated at Newark, N. J., and the following directors elected: E. P. Backus, Joseph Fish, Philip Lowey, Thomas Provost, J. O. Poole, of Newark, and Thomas E. Benedict and Frank B. Hoornbeek, of Ellenville. The following officers were elected: E. P. Backus, president; T. E. Benedict, vice-president; F. B. Hoornbeek, treasurer; Thomas Provost, secretary. The Executive Committee consists of T. E. Benedict, who is the managing director; F. B. Hoornbeek, treasurer, and J. O. Poole, who will be superintendent.

Messrs. Backus, Fish and Poole, of the Newark members of the Board, are original owners of the mineral rights purchased on the Shawangunk Mountain, comprising the tract of several thousand acres known as the Mitchell tract, which land is owned by the Village of Ellenville.

OHIO.

Continental Coal Company.—This company, of Cleveland, incorporated under West Virginia laws, with a \$3,500,000 capital, has as officers: Geo. W. Cottrell, president; Gustav Von Den Steinen, secretary and treasurer; R. H. Crowell, W. B. Stewart and W. C. Herrick, directors. The mines are in Perry, Athens and Hocking counties.

OREGON.

JOSEPHINE COUNTY.

Lucky Queen.—This group of claims on Jump-Off-Joe Creek, has been sold by H. A. Corliss and Rush & Son to Arthur A. Dunphy, of Spokane. The property is one of the oldest about Grant's Pass. It is developed by over 1,000 ft. of shafts and tunnels, and at one time had a 10-stamp mill. The new owners will install machinery.

WALLOWA COUNTY.

Fargo Gold and Copper Company.—This company, in the Imnaha District, is reported to have 25 men at work opening its claims. The ore is said to carry gold, silver and copper. The country is rugged and broken, making transportation difficult. A matte smelter may be erected in the spring. Joseph is the nearest town.

PENNSYLVANIA.

ANTHRACITE COAL.

Delaware, Lackawanna & Western.—This company states that the newspaper reports of its new breaker at the Auchincloss Colliery are greatly exaggerated. The breaker is a small one, of wood, not iron, construction, and its only novelty is that the machinery is to be driven by individual electric motors instead of by shafting and belts.

Lackawanna.—This colliery, at Olyphant, now owned by the Temple Iron Company, has had the breaker considerably enlarged and improved. A washery is to handle the large culm pile, and the refuse from the washery will be flushed into old mine workings through a bore hole.

Lehigh Valley Coal Company.—This company is preparing to erect a large breaker at Mount Carmel, to prepare the coal from the Sioux and Columbus collieries.

Mount Carmel.—At this colliery, near Hazelton, operated by Thomas M. Righter & Co., a large stripping will shortly be opened. It is expected that fully 200,000 tons of coal will be reached in this way.

Royal Oak.—This colliery, at Shamokin, owned by Wilkes-Barre men, has closed indefinitely, throwing 300 boys and men out of employment.

BITUMINOUS COAL.

Apollo Coal Company.—The incorporators of this company are: Joseph R. Eisaman and Harry C. Burkett, of Greensburg, and John M. Gallagher, of Blairsville. The company recently purchased 100 acres of coal between Salina and Roaring Run, formerly owned by the Northwestern Coal Company. The company is said to be negotiating for the purchase of several thousand acres of coal in Armstrong and Indiana counties. New works will be established at Apollo and Salina.

Old Iron City.—This coal mine, near Belleverson, in Rostaver Township, that has been closed many years, is to be opened again by its present owners, the Flint Coal Company. The water has been pumped out and mining will soon start.

Keystone Coal and Coke Company.—At a recent meeting of stockholders of the Keystone Coal and Coke Company, Greensburg Coal Company, Hempfield Coal Company, Madison Gas Coal Company, Arona Gas Coal Company and Claridge Gas Coal Company it was decided to merge all these companies with the Sewickley Gas Coal Company and the Carbon Coal Company, with a capital of \$2,500,000, under the name of the Keystone Coal and Coke Company.

This company will own 7,000 acres of coal, 3,000 acres of surface land and 10 well-equipped mines in Westmoreland County. It will employ between 3,000 and 4,000 men and control in addition to the above, 6,000 acres of coal land and improvements on the Western New York & Pennsylvania Railroads, near Bethlehem, from which is being shipped daily a large amount of coal to Buffalo and other markets. The principal offices of the company will be in Greensburg, with branch offices in Philadelphia and Pittsburgh.

Logansport Coal Company.—This company is about to begin operations in the field recently purchased near Logansport on the Allegheny Valley Railroad. The output will be 1,200 tons daily. The work is under the supervision of Engineer William G. Wilkins. The company owns 500 acres of coal and 275 acres of surface. A contract for the erection of 50 miners' homes at a cost of \$20,000 will be awarded in

a few days. The officers of the company are: President, R. C. McLean, of Oakmont; vice-president, L. T. Darrall; secretary, Lloyd Darrall, and treasurer, Joseph West.

Pittsburg Coal Company.—This company has entered suit in the Allegheny County Courts against former stockholders of the New York & Cleveland Gas-Coal Company, the Fidelity Title and Trust Company, Moore & Schley, of New York, the Pennsylvania Mining Company and others. Nearly \$800,000 is in dispute, the coal combination claiming that this amount was illegally withheld from it. An injunction is asked for.

Mt. Pleasant Coke Company.—This company has purchased the coal lands under the R. S. Love farm of 90 acres in Mt. Pleasant Township. The company will erect 60 coke ovens and start a new town on the lands.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Gold Find at Pringle.—There has been considerable excitement over the discovery of some rich ore near Pringle, 12 miles south of Custer. Several veins have been found, and the entire country has been staked out. The veins are opened up by shallow pits, are narrow, and not enough work has been done to show their extent.

North Star Mining Company.—Experiments are being made to determine the practicability of adopting cyanide or other similar process to treat tailings from a 20-stamp mill being built. The ore is said to assay \$20 a ton, of which from \$3 to \$5 a ton can be saved by amalgamation.

University Gold Mining Company.—A large body of concentrating ore is reported struck and is being followed in a winze. It is said to assay \$4.50 gold and 1 oz. silver and concentrates 7 to 1. It is near the railroad.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Bear Gulch District.—Several hundred acres of mining ground have been bonded by California men. The deal involves \$750,000. John Treber, of Deadwood; Edward Grosfield, of Spearfish; E. St. John and others, of Bear Gulch, have ground in the deal. The bond runs until September 1, 1902.

Custer Peak Company.—A boarding house, blacksmith shop and other buildings have lately been completed, and a good-sized force of men is working. The company is developing a ledge of free milling and concentrating ore.

Deadwood-Standard and Spearfish Companies.—A Boston syndicate is having an examination made with a view to purchase. C. W. Merrill is one of the experts. The Deadwood-Standard has a 200-ton cyanide plant, and the Spearfish a 250-ton plant. The Potsdam group, belonging to D. A. McPherson, W. L. McLaughlin and others of Deadwood, is included in the deal.

Deadwood-Terra Mining Company.—A meeting of the stockholders has been called to consider a proposition to transfer the property and franchises of the company to the Homestake Mining Company. The Deadwood-Terra has been one of the Homestake associated companies for several years, and has been worked under Homestake management.

Hidden Fortune Gold Mining Company.—The company has paid Henry Frawley, of Deadwood, \$30,000 in cash for a 3/4 interest in the Iowa and Brunette lodes, included in the group on which a bond was taken last February. This completes the payments on the original group bonded.

Monarch.—George Bachman has increased his working force. Mr. Bachman has had the ground under lease several years, and has been working narrow seams of ore. He sacks his product for shipment, much of it assaying from \$90 to \$150 a ton. The ground belongs to the Golden Reward Company.

Richmond Hill.—A lease has been taken by C. B. Harris, and silver-lead ore is being mined for shipment to Omaha. The property is also producing a dry ore that will go to the Deadwood Smelter.

Tortette Group.—Henry Tortette, the owner, is hauling ore to the Highland Chief cyanide mill, in Spruce Gulch, a mile from Deadwood.

Trent Mining Company.—Rich silver ore is reported discovered on the property. J. H. R. Storey, of Philadelphia, is one of the heaviest owners.

Two Johns Mining Company.—Several holes have been run with a diamond drill from the face of a 1,200-ft. tunnel that have encountered some ore.

Wasp No. 2 Company.—The last clean-up was the largest ever made by the company. It gave in 607 oz. of bullion, worth a little over \$7,000, and was the result of 14 days' run in a 100-ton plant on quartzite assaying from \$3 to \$5 a ton.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Ajax Mining Company.—A large air compressor is

being put in the old Standby Mine, capable of operating 29 drills. It takes the place of the compressor that was disabled some months ago. The company is continuing the cross-cut on the main ore body.

Grantz Mining Company.—Articles of incorporation have been filed by Otto P. Th. Grantz, Mrs. R. H. Graves, George V. Ayres, D. M. Gillette and Asa Baldwin. The company is capitalized at \$1,000,000 and is the successor to the St. Elmo Mining Company, owner of the St. Elmo group of claims. A 500-ft. shaft is to be put down.

Ohio-Deadwood Gold Mining Company.—Much gold ore is reported encountered in the main working tunnel. The ledge is 100 ft. wide, and the rich streak is ft. across. It is white quartz, containing wires and globules of free gold. The company has ordered a stamp mill to be built in the spring.

UTAH.

(From Our Special Correspondent.)

Salt Lake Bullion Settlements.—The silver-lead bullion shipped to the Eastern refiners by the Salt Lake Valley smelters for the week ending February 8 was valued at \$49,300. During the same period the banks made settlement on copper bullion, \$110,000; gold bars, \$156,500; cyanides, \$1,200.

BEAVER COUNTY.

(From Our Special Correspondent.)

Cactus.—The old mill, near Frisco, is to be equipped for experimental treatment of Cactus copper ore and to verify smaller tests which were made in Salt Lake City. J. M. Callow will continue experiments before the company decides on the equipment of the new 1,000-ton mill, which Samuel Newhouse proposes to have built.

Horn Silver.—Shipments of silver-lead ore from Frisco during the week ending February 8 amounted to 414,640 lbs.

Majestic.—A. B. Lewis and associates have paid \$10,000 on this property, near Frisco. The final payment will be made soon.

BOX ELDER COUNTY.

(From Our Special Correspondent.)

Mount Royal Mining Company.—This property, adjoining the Eldorado at North Ogden, in the Willard District, has been taken in hand by W. H. Tibbals, of Salt Lake, for Eastern parties. The property embraces 631 acres patented ground, on which a working bond has been given till June 1 for examination and report, and 4 men will be kept employed until then. The ore carries gold, silver and copper.

Prince of India Gold and Copper Mining and Milling Company.—The capital stock is fixed at \$300,000, divided into \$1 shares. Headquarters are at Salt Lake. The officers are: J. W. Dalbey, president; E. D. Waterman, vice president; M. R. Waterman, secretary; Don Maguire, treasurer. The company owns the Prince of India, Ben Hur, Santiago, Seaman and Landslide claims in Willard District.

JUAB COUNTY.

Grand Central vs. Mammoth.—By a decision recently given the Grand Central Company has the ore bodies in the Silveropolis and Consort claims. The jury found from the evidence that the apex of the Mammoth lode left the west sideline of the Mammoth claim south of the southern limits of the Silveropolis, which deprives the Mammoth of its extralateral rights north of that point, and that the apex of the Grand Central vein is in Grand Central ground. This is the second trial. A year ago Judge Higgins found for the Grand Central, and C. S. Tingley was named to take evidence and award damages, but while he was preparing to act as referee Judge Marioneaux granted a new trial on the application of the Mammoth for an opportunity to offer testimony in rebuttal. Both trials have cost each company over \$100,000. In the present case the Grand Central has been represented by Brown & Henderson and A. C. Ellis, Jr.; the Mammoth by John S. Zane, Judge Zane and Col. H. L. Pickett, all of Salt Lake.

(From Our Special Correspondent.)

Tintie Shipments.—Shipments of ore and concentrates to the Salt Lake Valley smelters for the week ending February 7 are: Ajax, 3; Carisa, 5; Gemini, 6; Grand Central, 10; Lower Mammoth, 2; Mammoth, 4; Swansea, 6; Star Consolidated, 2; Sunday, 1; Tesora, 3; Yankee, 12; Mammoth Mill, concentrates, 4 cars; Tesora Mill, concentrates, 3 cars; May Day Mill, concentrates, 2 cars; total 66 cars. Mammoth Mill, 2 bars of bullion.

Grand Central vs. Mammoth.—Both of these companies at Mammoth have resumed work, and large shipments of ore are being sent to the Salt Lake smelters.

May Day.—The management of this property at Eureka report a strike of good ore at 35 ft. below the 300-ft. level. Another shipment of a car of slimes and a car of concentrates has been made to the Salt Lake smelter.

Swansca.—The ore accumulated in development work, amounting to 6 cars, was recently shipped from Silver City to Salt Lake.

Utah Mining Company.—At a recent directors' meeting in Salt Lake, the secretary of this company reported that the mine at Fish Springs shipped via Oasis to the Salt Lake smelters since October 1, 1901, 1,292,600 lbs. ore, which realized \$56,110; dividends paid, \$12,600. This property is on the edge of the American Desert, and the ore is hauled about 50 miles to the railroad.

PIUTE COUNTY.

(From Our Special Correspondent.)

Annie Laurie.—The management of this property, at Kimberley, reports that during 1901 the mill made a saving of 92 per cent, and the gross output amounted to \$420,000.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Ben Butler.—This property, at Bingham, under the temporary management of L. U. Colbath, reported 263,060 lbs. concentrates marketed at the Salt Lake smelters during the week ending February 8.

Bingham Consolidated.—This company shipped during the week ending February 8 copper matte as follows: Butte & Boston Smelter at Butte, Mont., 225 tons; Utah Consolidated Smelter, Salt Lake, 100 tons. The 2 furnaces are now treating 300 tons of ore daily.

Grizzly.—This property at Alta in the Little Cottonwood District, sent to the smelter 42,760 lbs. silver lead ore during the week ending February 8.

Miners' Dream.—This property, at Bingham, owned by the Bingham Consolidated and under the management of Duncan McVichie, is reported working in a fine body of ore at 680 ft. The shaft is said to be in 5 ft. of ore which assays 44 oz. silver and 11 per cent copper.

Utah Consolidated.—From the Highland Boy Mine, at Bingham, the average daily shipment of 480 tons of copper ore is treated at the furnaces in the Salt Lake Valley. Copper bullion at the rate of one car per day is shipped East.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—Following are the shipments of ore for the week ending February 8: California, 75,000 lbs.; Anchor, 348,150 lbs.; Quincy, 2,112,370 lbs.; Ontario, 1,052,300 lbs.; Daly West, 1,693,300 lbs.; Silver King, 1,570,220 lbs.

Ontario Mining Company.—The annual report of this company, at Park City, is being compiled by Manager Rood, and will be published in about 30 days. Ore shipments move along as usual.

TOOELE COUNTY.

(From Our Special Correspondent.)

Consolidated Mercur.—The development of the Lulu ground at Mercur is reported to show over 400,000 tons of ore blocked out, said to average about \$7 per ton gold. The cyanide plant continues to treat 800 tons of ore daily.

Stockton Shipments.—Shipments for the week ending February 8 are as follows: Hennefer, ore, 32,500 lbs.; Terminus, ore, 36,900 lbs.; Ophir, concentrates, 624,080 lbs.; Hidden Treasure, ore, 50,500 lbs.

Utah Queen.—A new strike is reported on the 250-ft. level of this property, at Dry Canyon, by Manager Morris R. Hunt, who says the new body of ore is 18 in. wide, with every indication that there is a body of it ahead. The samples show copper and silver glance.

WASHINGTON.

FERRY COUNTY—REPUBLIC.

(From Our Special Correspondent.)

The Washington & Great Northern is grading rapidly between Marcus and Republic, and Republic to the mines.

The Kettle Valley Lines Railway has finished laying rails between Grand Forks, B. C., Nelson, Wash., and the Kettle River, at Curlew. It has 20 miles more to lay to Republic. Grading is completed except for one or two rock cuts.

California.—Ore is being stoped on the first level. On the second level both drifts are in high grade ore. On the third level the west drift is producing ore assaying from \$227 to \$239 per ton. The values are principally gold, with some silver and copper. About 90 tons of ore have gone from Curlew to the Granby Smelter, at Grand Forks, B. C., and 150 tons are to be delivered at Curlew within a week. The Kettle Valley Lines Railroad is prepared to transport the ore to Grand Forks. Work will be resumed immediately on the 400-ft. level.

Curlew Mining Company.—This company has acquired the last outstanding interest in the water power of the San Poil River available in Republic. Owing to numerous claimants and previous litigation this water power has never been fully developed. The company intends developing it as fully as possible.

The company will develop power for the mines for lighting Republic and will furnish water for general use.

Gold Cord.—At this mine, on Bridge Creek, in the south half of Colville Reservation, a big strike is reported. The tunnel has intersected 24-ft. of ledge matter at 200 ft. About 18 ft. is said to be concentrating ore, assaying \$22 in gold, silver and copper, while 6 ft. is said to run about \$70.

Gold King Gold Mining Company.—The principal place of business is Republic. Recently the following trustees were elected: J. W. Palmer, president; Thos. Fortune, secretary; R. W. Hunner, treasurer; Wm. Bingham and M. Ediams.

Gold Ledge.—The tunnel is in 815 ft.

Hawkeye.—The drift on the 100-ft. lead has been driven 30 ft. on ore said to average \$19.60 per ton in silver and copper. Work has been resumed in the shaft. Eastern men are negotiating for ore from this and neighboring mines, with the view of establishing a smelter in the neighborhood.

Lucille Dreyfus.—This mine is working on a fine body of ore and shipping to the Granby Smelter.

Oregonian.—This claim has been sold to J. W. Palmer, who has 5 men busy on 2 shifts sinking a 100-ft. shaft. The claim adjoins the Morning Glory on the northeast.

Phil Sheridan.—This mine, at Sheridan, has five men started on a tunnel on the vein, which will give 200 ft. of depth. An upraise of 120 ft. will connect the tunnel with the shaft. Ore has been shipped from the shaft to the smelters which ran over \$100 per ton.

Reservation Mill and Mining Company.—This mine south of the International Boundary, reports a large and valuable body of ore struck by diamond drill.

Tom Thumb.—The machinery is being overhauled and work will be resumed February 20. A 4-h. p. engine and small dynamo are being installed for lighting the mine.

Trade Dollar.—The south drift on the 200-ft. level is in 92 ft. The drift—5 ft. wide—is all in ore. Work in the north drift has been temporarily suspended. The company will put in steam machinery and open lower levels as soon as railroad transportation is available.

Wauconda.—Work is resumed in the mine. The main tunnel is in 1,060 ft., and will be driven 1,000 ft. further, if necessary, to cross-cut all the known and blind veins within the limits of the company's ground.

WYOMING.

(From Our Special Correspondent.)

The following oil companies have been organized recently to operate in the new oil fields of the north part of the State: Colorado Oil, Gas and Coal Company, capital stock \$50,000; Central Oil Company, with a capital stock of \$150,000; National Oil and Gas Company, with capital stock \$150,000; Centennial Oil and Gas Company, capital \$15,000; Boulder Monarch Oil and Gas Company, capital \$150,000; Alamo Oil Company, with a capital stock of \$150,000.

FOREIGN MINING NEWS.

AFRICA.

TRANSVAAL.

Jumpers Deep, Limited.—This company reports that its mill on the Witwatersrand was started up again February 2; 25 stamps are running, which will be increased to 50 as soon as necessary labor is received.

ASIA.

INDIA—MYSORE.

Kolar Gold-field.—The total gold production reported for January was 41,612 oz. crude, against 42,829 oz. in January, 1901, showing a decrease of 1,217 oz., or 2.8 per cent. The production of the leading mines was: Mysore, 13,533 oz.; Champion Reef, 13,459 oz.; Ooregum, 7,001 oz.; Nundydroog, 4,729 oz.; Balaghat, 2,119 oz. The total output this year was equal to 37,451 oz. fine gold, or \$774,112.

AUSTRALIA.

WESTERN AUSTRALIA.

Gold production for the month of January is reported at 168,159 oz. crude, against 138,697 oz. in January, 1901, showing an increase of 29,462 oz., or 21.3 per cent, this year.

CANADA.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Output.—The output for the week ending February 1, according to the *Rossland Miner*, was as follows:

Mine.	Week.	Year.
Le Roi	4,000	20,400
Le Roi No. 2	1,050	5,450
Cascade	.....	120
Bonanza	30	60
Totals	5,080	26,030

Centre Star.—Operations are confined principally to development work on the various levels, particularly in the 600-ft. level east of the shaft. Shipments to the Trail Smelter are about to start.

Le Roi.—The contract for sinking below the 1,050-ft. level was let to men already employed in the mine. Work is to start at once.

War Eagle.—Shipments to the Trail Smelter are about to start. Development is under way at all levels, and a diamond drill is exploring the formation on the 800-ft.

ONTARIO—ALGOMA DISTRICT.

Breitung Iron Company.—At a recent meeting in Marquette this company elected these directors and officers: Directors, George Wagner, John F. Carey, E. N. Breitung, James Wallace and Charles C. Jones; president, George Wagner; vice-president, John F. Carey; secretary and treasurer, E. N. Breitung. The company's operations are 25 miles northeast of the Soo in the territory traversed by the Algoma Central Railroad. The railroad is running a line to the property. A tunnel has been driven 167 ft. through the footwall. All the ore struck so far has been bessemer grade.

ONTARIO—LAKE OF THE WOODS DISTRICT.

(From Our Special Correspondent.)

Black Eagle Mining Company.—This company, of London, England, took over the Regina Mine last spring. Since then it has done considerable development thereon, and erected a new mill with 30 stamps of 1,250 lbs. each, purchased from the Jenckes Company, of Montreal. Mr. Peterson, the new manager, says that he has plenty of ore in sight, and will clean up monthly. The first gold brick worth approximately \$9,000, was from a 22 days' run.

Golden Horn.—This mine, at Rush Bay, is being developed by a St. John, N. B., company. The shaft is now 100 ft. deep.

ONTARIO—MANITOU DISTRICT.

(From Our Special Correspondent.)

A find of magnetite carrying nickel, cobalt and copper is reported on the shore of Turtle Lake, 60 miles north of the Canadian Pacific road and about 100 miles west of Port Arthur. Explorations are under way.

Explorers are sinking testpits and drill holes on the shores of Steep Rock Lake, a part of the Seine River, and reports are that the ore, which is a hematite, is showing up well. Parties representing the Clorgue syndicate; Lee, Higginson & Company, of Boston; Prof. R. Pumpelly, United States Steel Corporation; and Mackenzie, Mann & Company, builders of the Canadian Northern road, are working there.

MEXICO.

CHIHUAHUA.

(From Our Special Correspondent.)

Candelaria Mining and Milling Company.—H. L. Brown, manager, recently returned from an extended trip East. He visited the principal mining camps of Colorado to ascertain the latest methods of treating different ores, and then went East and purchased machinery. The mine is at Parral.

Compania Metallurgica.—This company, of Torreón, will be in full operation in a few weeks. It will have an agency at Parral.

Compania Minera Fundadera y Afundadera.—This company, of Monterey, is to establish an ore-buying agency in Parral.

Hidalgo Mining Company.—Manager J. I. Long has returned from Pittsburg, where he attended a meeting of the directors of the company.

The company's mill No. 2 at Presena was burned to the ground recently. It was a 90-ton daily capacity lixiviation plant, of latest model. The same mill burned in a very similar manner last May, and at the last fire had been running full capacity 2 months. The mill will be immediately rebuilt.

JALISCO.

Castellana.—These mines, at Ixtlan, were recently sold to the Castellana Consolidated Mines, Limited, of London, Eng. R. J. Price, of London, is president; R. Donde and J. L. Requena are Mexican directors, while the general manager is J. F. Allan. The mines have been large producers, the higher grade ore being shipped to Aguascalientes smelters and the milling ore being treated at the reduction works of Lonergan & Stanhope. The present machinery—3 Chilean mills of 30 tons capacity per day—will be increased. Ixtlan is 30 miles from the San Marcos Station of the Mexican Central Railway.

SUMATRA.

Redjang Lebong Mining Company.—This company informs us that its production for December was 2,050 oz. of gold, and 10,029 oz. of silver. Some tests have been made with the new slimes plant, but it was not expected to begin operations before the end of January.

MINING STOCKS.

Complete quotations will be found on pages 296 and 297.

New York. Feb. 20.

The copper stocks have lost their strength, owing partly to professional trading, and incidentally to weak metal prices. The rumor of a consolidation of the Heinze properties with the Amalgamated Company again bobbed up this week, but it has had little effect on the stock market. In fact, there are holders who will readily sell at any upward turn in price, notwithstanding these incubated reports. On Monday Amalgamated was up to \$71 1/2, but on Wednesday it dropped to \$68 1/2, the lowest price in a month. Anaconda is quiet at \$33 1/2 @ \$32 3/4. On curb the coppers attract moderate attention, Greene Consolidated, of Mexico, selling at \$24 1/2 @ \$24, British Columbia at \$8 1/2 @ \$8 3/4, and Tennessee at \$14 1/2.

Horn Silver, of Utah, is lower at \$1.45 @ \$1.40.

In the Colorado list few Cripple Creek shares were traded in. Isabella brought 30c., and is firmer since the annual meeting, as new management has been installed, and the company has a treasury reserve of some \$47,000. Portland sold at \$2.45, which is lower than the Western market. Some business is noted in Small Hopes, of Leadville, at 35 @ 34c., a drop of several cents since last week.

A sale of Quicksilver common, of California, is reported at \$3 1/2, a fractional gain since the last transaction. Brunswick gold is feverish at 10 @ 11c.

The Comstock shares are slightly higher, Consolidated California and Virginia selling at \$1.40, Ophir at \$1 @ 92c. and Mexican at 40c.

Some large trading has been done in the coal railroad stocks, especially in Philadelphia & Reading, and prices have advanced, owing to the prosperous condition of the coal trade.

Auction sales were 721 shares Chrysolite Silver Mining Company at Colorado at \$30 for lot; 20 shares preferred National Lead Company at \$81 1/4; 1,200 shares sand Fork Extension Oil Company at \$50 for lot; 9 shares Laffin & Rand Powder Company at \$236; 24 shares Ohio & Indiana Consolidated Gas Company at \$19 1/4; \$1,000 6 per cent bonds Indiana Natural Gas and Oil Company at \$84; \$2,000 first mortgage 6 per cent gold bonds Nipper Consolidated Copper Company, of Montana, at 105.

Boston. Feb. 19.

(From Our Special Correspondent.)

If it was not for the inspiration drawn from the rapid advance, and it might truthfully be said, manipulation, in the price of Trimountain Mining stock, it is doubtful if there would be much animation in the copper share market. This stock touched \$98 to-day, an advance of \$13 for the day, and this, on top of an \$11.50 advance Tuesday. During the week an advance of \$23.50 has been recorded, making \$38 thus far this month, and \$64 thus far this year. The capital being 100,000 shares, an enhanced valuation of \$6,400,000 is hereby given the property within seven weeks, which is almost unprecedented, and especially when it is considered that the company has not yet completed its mill. For the present the company's rock is being treated at the Arcadian mill, and if rumor is correct it is running over 2 1/2 per cent ingot. Thomas W. Lawson is responsible for this pyrotechnic display, and if he can carry out his prognostication as well in the future as in the past, in this particular case, a much higher price will be reached. There are about 30,000 shares in the hands of the public, the balance being held by Lawson and Burrage.

Centennial mining took a start to-day, and rose \$4.25 to \$19.50. As the mine was closed down a short time ago the movement is looked upon with some suspicion. Early last week the price was \$11.75. There are unconfirmed rumors that the lower levels are increasing in value, and insiders have been aided in picking up cheap stock by closing down. Osceola and Tamarack have been under pressure on talk that dividends will have to be reduced, owing to the unfavorable price received for copper. The former fell \$2.50 to \$76.50, but recovered the loss to-day, and the latter has lost \$7 to \$249. The Osceola, especially, is weak in treasury funds. This company has put the new addition to its mill at work with three heads of stamps. The fourth head is expected to go into commission in the spring, which will make a total of 7. The output will be more than doubled, and will compare with the Quincy's.

A drop of over \$1 per share to \$16.37 1/2 was recorded in United States Mining, on heavy selling by a prominent house, but recovery was easily made to \$18.50. It is thought that a block of underwriters' stock was marketed which cost \$15. Isle Royale broke \$3 to \$19.50, but it recovered to \$21.25. It is said that holdings of the late Matthew Luce, a director of the company, were being liquidated.

Dominion Coal and Dominion Iron and Steel stocks have been favored, the former closing at \$75 to-night, its highest price, and an advance of \$4 in the week. Dominion Iron and Steel closed \$2.50 higher at \$33.50.

The retirement of Mr. Henry M. Whitney from the presidency of both companies is announced; the control and management have reverted to Canadian interests, represented by James Ross.

Guanajuato has recovered to \$4.50. The company is reported to have redeemed \$112,000 of the \$200,000 bonds recently sold. There are 13,000 shares of stock in the treasury. During January Guanajuato crushed 1,100 tons of ore, receiving \$21,000 (Mexican) in bullion and concentrates.

The increase in the capital of the Atlantic from 40,000 to 100,000 shares had the effect of weakening the stock to \$27, but recovery was sharp to \$32, with to-night's close \$30.50. This is merely the adoption of up-to-date methods.

The first annual report of the St. Mary's Mineral Land Company, successor to the St. Mary's Canal Mineral Land Company, of Michigan, shows 103,897 acres of land, and mineral rights in 7,276 additional acres. The company had \$273,735 cash on hand December 31 last. This company owns one-half of the Champion Mine, and has contributed one-half the expense, or \$387,000. Activity in the market is now looked for in the South Range group.

San Francisco. Feb. 15.

(From Our Special Correspondent.)

Business has been rather quiet this week, and quotations have been lower as a rule. Interest in the market seems to be lacking.

Consolidated California & Virginia sold at \$1.30; Ophir, 88 @ 90c.; Silver Hill, 73 @ 74c.; Hale & Norcross, 29c.; Best & Belcher, 27c. There was a sale of Standard Consolidated at \$3.

Annual meetings of Comstock mining companies will be held in March as follows: Yellow Jacket on the 3d, Potosi on the 12th and Chollar on the 19th.

The monthly sworn statements filed in the offices of the mining companies show cash on hand February 1 as below, with January expenses paid, unless otherwise noted: Alpha Consolidated, \$957; Best & Belcher, \$951, with a balance of \$14,000 due on assessment and unsold bullion estimated at \$3,600, but an indebtedness of \$3,500 at bank; Bullion, \$2,056; Crown Point, \$2,328, with January expenses unpaid; Consolidated Imperial, \$1,422; Challenge Consolidated, \$755; Consolidated California & Virginia, \$47,423, with one carload of concentrates unsettled for; Confidence, \$2,736, with January expenses unpaid; Caledonia, \$7,573, with January expenses unpaid; Chollar, \$2,437; Gould & Curry, \$3,110, with liabilities of \$13,911; Hale & Norcross, \$5,951; Justice, \$3,030, with liabilities of \$7,198; Mexican, \$2,089; Ophir, \$4,337; Overman, \$1,726, with January expenses unpaid; Potosi, \$2,699; Savage, \$2,585; Segregated Belcher, \$116; Silver Hill, \$10,391; Sierra Nevada, \$2,304; Standard Consolidated, \$48,073, with January expenses and bullion clean-up to be accounted for; Syndicate, \$3,408; Union Consolidated, \$8,643; Utah Consolidated, \$333, with \$1,500 due bank.

The Andes Mining Company reports no cash, but an indebtedness of \$97; Belcher reports liabilities of \$9,900.

The following companies in the above list have assessments in course of collection: Alpha Consolidated, Andes, Best & Belcher, Challenge Consolidated, Culler, Gould & Curry, Savage, Union Consolidated and Utah Consolidated.

On the Producers' Oil Exchange business showed up better than for two or three weeks past. There was more buying, and prices were firmer. Home sold at \$3.95; Caribou, 70c.; Four Oil, 53c.; Reed Crude, 35 @ 37c.; Oil City, 20c.; Junction, 17c. The heaviest dealings were in Home, Four Oil and Junction.

London. Feb. 7.

(From Our Special Correspondent.)

The South African market has been pretty busy again this week, though there have not been any conspicuous booms or advances. A great many new schemes of development are being brought forward, and the shares in the companies are having special attention given to them by the Stock Exchange firms responsible for them. Properties in the East and West Rand that have hitherto lain idle or undeveloped are being looked into, and though many of them are low grade, the backers are confident that with the present government they can be made to pay.

An important South African issue has been made this week. This is the Charter Trust and Agency Company, Limited, which has been formed for the purpose of assisting the British South African Company in opening up Rhodesia by taking over certain branches of its business. The Trust is to undertake the agency for local and railway loans, to help in debenture issues, and to provide capital in other ways for helping various business propositions. It will also undertake the sale of shares held by the British South Africa Company in subsidiary land and mining companies, and in this way will help to bring further funds to the parent company and relieve it of some part of its heavy holdings. The present issue is £1,250,000, and there is little doubt that the money will be easily found. The Board of Directors consists

of Earl Grey, Frank Rhodes and Mr. H. W. Fox, who are all intimately connected with the British South Africa Company, with Mr. Robert Benson and Mr. A. H. Grenfell, two leading city merchants, a board which could hardly be improved upon. The formation of the company is a practical proof of the intentions of the Chartered Company to go ahead at once in the development of Rhodesia.

Once more the mining market has been badly ruffled by the doings of the Westralian mines. Last week I mentioned that Mr. Govett, the recently appointed chairman of Lake View Consols, had on his arrival at the mine decided to change the management, and had put Messrs. Bewick, Moreing & Co. in charge. Since then cables have been received from Mr. Govett saying that the mismanagement has been serious, and that the new plant erected is too extensive for the developments effected. He has even recommended that the dividend recently declared of 2s. 6d. per share shall not be paid, but the money kept in hand. The whole episode mystifies the market, and the public want to know where all this is to end. The £1 shares now stand about £4, which compares somewhat badly with £28, at which figure they flourished two years ago, when dividends of £1 per quarter were promised for an indefinite time. There never was such a country as West Australia for ramifications of speculation. Not only has the London market for the shares been the happy hunting ground for a professional bear party, but the speculative mania has been diffused through the workmen at the mines. Alterations in the lodes have been used for speculation by the miners long before the mine managers have become aware of them. In the present case it is believed that Mr. Govett is not disposed to keep up this alternation of bull and bear tactics, but desires to put the mine on a more legitimate basis. It may, however, be urged, though without any disrespect to Mr. Govett, that he is a stock broker and not a mining engineer, and may not be a very good judge of management or mismanagement. No fault can be found with his present policy of commissioning Messrs. Bewick, Moreing & Co. to examine and manage the mine, as the opinions of the representatives of the firm out there, Mr. Feldtman and Mr. Hoover, are well worth having.

The controversy which rages in Colorado round the management of Stratton's Independence, Limited, is finding no echo here on the market or among shareholders, though in circles where American mining is discussed, the pros and cons are gone into very thoroughly. The shares in the company stand at about 10s. to 12s. 6d., and there do not appear to be many movements in them. Mr. Hammond's first and second reports were not entirely consistent, and in his first it is admitted that he took a too gloomy view. The shareholders and general public are not ready to believe that there was any ulterior motive in these reports, but consider that they represented exactly his views in his capacity as mining engineer.

A good deal of dissatisfaction is being shown by

DIVIDENDS.

Table with columns: Name of Company, Date, Latest Dividend (Per Share, Total), Total to Date.

ASSESSMENTS.

Table with columns: Name of Company, Location No., Delinq., Sale, Amt.

shareholders in the Lillie Cripple Creek Gold Mining Company, which was floated 3½ years ago in London by Messrs. Bonbright & Co. The share capital was all allotted to the vendors, and no working capital was required on flotation, as the mine was a going concern. Dividends were paid up to the middle of 1900, amounting in all to 20 per cent of the capital, but since then little or nothing has been heard of the mine by shareholders. I am informed that the cause of the collapse was the sudden alteration in the dip of the vein, which, instead of going down straight, as formerly, suddenly dipped out of the property. If this is so, there is no reason why shareholders should not be told, and the exact state of the case placed before them. The majority of the directors live in Colorado, and the English directors are either powerless or indifferent. It is a pity that this company should come to such an unfortunate ending, for at the time of flotation the proposition seemed a very reasonable and fair one.

Paris. Feb. 9.

(From Our Special Correspondent.)

The mining stock division of the Bourse remains quiet, with the exception of the South African gold stocks in which a considerable movement still exists. Not only are the old stocks active, but some new issues are announced. Most of these stocks seem to be already higher than the situation warrants; but people buy them because they expect an active market—in fact, what you on your side call a boom.

In other mining stocks there is but little movement just now, and the week past has not shown any incidents to be recorded.

The Chamber of Deputies has voted in favor of the bill to restrict the hours of labor in mines. The limit is fixed provisionally at 9 hours, to run from the time the last workmen descend the shaft to the moment when the first men are landed above ground. At the end of a first period of two years the limit will be reduced to 8½ hours, and after a second such period to 8 hours. The law will only take effect six months after its promulgation.

The foreign merchandise trade of France for the full year is reported by the Ministry of Commerce as below:

	1900.	1901.
Imports	Fr. 4,677,800,000	Fr. 4,714,548,000
Exports	4,108,693,000	4,166,165,000
Excess, imports.....	589,101,000	548,383,000

This shows an increase of 16,748,000 fr. in imports; an increase of 57,466,000 fr. in exports, and a consequent decrease of 40,718,000 fr. in the excess of exports. The commerce of France with the United States is valued as below:

	1900.	1901.
Imports from United States.....	Fr. 509,531,000	Fr. 481,877,000
Exports to United States.....	255,204,000	239,514,000
Excess, imports.....	254,327,000	242,363,000

This shows a decrease of 27,654,000 fr. in imports, and of 15,690,000 fr. in exports; leaving a decrease of 11,964,000 fr. in the excess of imports. The United States last year was second only to Great Britain in the value of our imports; but was fourth in the amount of the exports taken from us.

AZOTE.

COAL TRADE REVIEW.

New York. Feb. 21.

ANTHRACITE.

The market for anthracite is still strong. If the producing companies are not making money now, there is no hope for them. Prices are firmly maintained and practically the entire output of the collieries is being taken. With the possibility of labor troubles by April 1, and this possibility is much greater than certain newspapers seem willing to admit, the outlook is favorable for a good demand into March. Car supply at the collieries, which began to show some signs of improvement, has been reduced again as a result of the recent storm. The main line roads are all open, but sidings are snow bound in many places and coal is greatly delayed in transit.

According to newspaper reports, President Mitchell, of the Mine Workers, and the presidents of several of the anthracite districts have been in New York City this week trying to arrange for a conference with J. P. Morgan. While such a meeting may be arranged, officials of the companies concerned profess to know nothing about it. Mr. Mitchell made a similar visit to New York shortly before a meeting of the Mine Workers last year. His present visit is probably undertaken with a view to making a statement at the convention announced to be held at Shamokin on March 12. The operators are to be invited to be present at this convention; it remains to be seen whether or not the operators are any better represented than they were last year.

Trade in the Northwest continues to show a steady movement of coal from the docks, and a very fair winter market. In Chicago territory trade is good. Supplies on docks are thought to be large enough to last till navigation opens. Arrivals of all-rail coal,

however, have been light, owing to delays by snow along the railroads in Pennsylvania. As a result some dealers dependent on all-rail shipments have been short of coal. Along the lower lakes and in the all-rail trade farther east the heavy snow fall has cut down receipts severely and greatly hampered the forwarding of cars stalled on sidings. The shortage of bituminous coal in that territory has brought out a heavy demand for the steam sizes of anthracite. Along the Atlantic seaboard wintry weather has prevailed, and the consumption of coal has been heavy. The market is very active at Boston, New York and Philadelphia. At New York retail dealers have had great trouble in making deliveries through the snow for several days, and the movement by barges about the harbor has been badly hampered by ice. The steam sizes are in strong demand, as are stove and chestnut. We quote current prices for free-burning white ash coal f. o. b. New York Harbor points as follows: Broken, \$4; egg, \$4.25; stove and nut, \$4.50.

BITUMINOUS.

Atlantic seaboard bituminous trade is calling for considerable coal. The heavy snowstorm has hindered deliveries by land and water. New York Harbor was practically blocked for 2 days, and the lower ports were closed to a great extent. High winds following the storm have kept vessels in port and greatly delayed the coastwise movement of coal. Car supply at the collieries is still further reduced as a result of the storm, and this has cut down shipments still more.

There is to be a general meeting of the trade today in Philadelphia, at which a number of important matters will be discussed, including a continuance of last year's understanding regarding the control of prices, and any amendments that may be proposed. There is more or less struggling for position by one or two interests, and a great variety of opinions are expressed as to the results that will come from this or any subsequent meeting that may be held. Apparently a faction does not like the control exercised by the Pennsylvania Railroad nor the way that control is used. This faction is talking as though it might try to make trouble for some interests. It would seem as though the Pennsylvania had things in pretty good control so far as the railroad situation is concerned, but the outlook as yet is doubtful, and any prophecies as to the final outcome are to be taken with allowances.

Shipments to the far East, on account of the weather, have been limited during the week, and considerable coal is wanted in that territory. Along Long Island Sound the lower grades are in pretty good supply, but the demand for the higher grades is just as strong as ever. New York Harbor trade is taking a considerable tonnage. The stormy weather stiffened prices and brought out an increased demand. All-rail demand is still heavy, and is calling for more coal than producers can supply. Transportation from the mines to tidewater is variable, and will be affected by the storm. Car supply at the mines is around 30 to 40 per cent of the whole number of cars wanted, and the regions producing the lower grades seem to get best service. In the coastwise vessel market most craft were tied up the greater part of the week. The Chesapeake Bay is still closed at Baltimore, and Newport News is bothered by ice, as is also Norfolk. A shift of wind has opened a channel up the Delaware to Philadelphia. No vessels are offered for charter. We quote freight rates from Philadelphia as follows: Providence, New Bedford and Long Island Sound, 90c; Boston, Salem and Portland, \$1; Wareham and Newburyport, \$1.15; Portsmouth, \$1.05.

Birmingham. Feb. 17.

(From Our Special Correspondent.)

There is a demand for every ton of coal that is being mined, and some of the larger producers are behind in their orders. The railroads are again complaining that they are not able to get their full supply of fuel. The production has been enlarged considerably in the past year, but it seems the demand grows at a more rapid rate. Good prices obtain.

Announcement is made that a new corporation with \$250,000 capital is being organized to operate mines in the Blue Creek region, in Jefferson County. During the past week President M. H. Smith, of the Louisville & Nashville Railroad, was in this district and looked over the route of a new branch of the Birmingham Mineral Railroad, which will run to some virgin coal lands in Blount County, which are to be operated.

There is a steady demand for coke, but it has not been necessary to import any, as was the case last year. More coke is being manufactured in the State now than ever before.

Chicago. Feb. 18.

(From Our Special Correspondent.)

The outlook in the coal market is anything but roseate, so far as the consumer is concerned. Never before, the large dealers say, has the condition of affairs been worse, except in times of strikes, so far as the procuring of enough coal to meet the demand

is concerned. Those users of soft coal who have contracts made months ago are congratulating themselves, for all grades are 30 to 40c. above the normal price, with a prospect of further advance rather than a decline. Eastern grades are very scarce and there is such congestion of traffic on the railroads as to make the supply of Indiana and Illinois coal none too good. The railroads, it is claimed, are still absorbing the products of the mines and holding loaded coal cars in reserve, until they can secure additional motive power, everywhere west of the Alleghenies. In the anthracite field there is a better condition; the market is solid and there is no scarcity of any grade except nut, the demand for which continues; the price of anthracite remains at \$6. Soft coals are quoted as follows for delivery on cars at Chicago: Birdseye cannel, \$5.50; West Virginia splint, \$3.50; Hocking lump, \$3.50; Youghiogheny lump, \$3.45; West Virginia lump, \$3.35; lower vein Brazil block, \$2.70; Indiana semi-block, \$2.50; Clinton lump, \$2.25; Deep River lump, \$2.15; steam lump, \$2; smokeless lump, \$3.90; smokeless egg, \$4; smokeless mine run, \$3.50; blacksmith's coal, \$3.40; Indiana and Illinois mine run, \$2. For Milwaukee, Duluth and the Northwest there is reported to be a great scarcity, with practically no coal at present passing through Chicago in that direction.

Cleveland. Feb. 19.

(From Our Special Correspondent.)

Plans are now being made for a meeting in Cleveland the latter part of this week at which the prices which shall be charged this summer on the coal shipped to the Northwest will be fixed. It is known that there is a general disposition to make a slight advance in the price of the coal but what will be the outcome is very difficult to say. It is apparent this spring that the meeting will be no cut and dried affair. Any number of new companies which will ship coal by lake have come into existence during the last few weeks and these companies will be called into the conference in order that peace during the season may be assured. Many of them own such quantities of coal lands as make them a respected factor at once. What the attitude of these companies to the matter of prices will be is a question, yet most of them are backed by old coal men who are not inclined to be radical. The new companies will develop new fields in Jefferson County, Ohio, and in West Virginia, with one operating in the Hocking and Shawnee valleys.

The domestic trade is good and brisk and while the market is strong prices have not been changed by the recent cold snap. The quotations are: Run-of-mine, \$1.75; ¾-in., \$1.80; slack, \$1.30. For Pittsburgh coal \$2.25 is asked for ¾-in. and \$2.10 for run-of-mine.

Pittsburg. Feb. 19.

(From Our Special Correspondent.)

Coal.—The car shortage has seriously interfered with coal production. Many of the mines of the Pittsburg Coal Company were able to operate but two days in the week. While there has been no change in the circular prices premiums ranging from 10c. to 50c., and in one or two special cases as high as \$1 have been paid for prompt delivery. So far there has been no change in prices that ruled all of last year which are: 1¼-in. coal, \$1.45 a ton at the mines; ¾-in., \$1.35; run-of-mine, \$1.25. The Monongahela River Consolidated Coal and Coke Company is also affected. It is not dependent upon railroad cars, and has plenty of empty coal boats and barges to be loaded, but the frozen rivers prevent the moving of the craft to the tipples, and as a result but few of the river mines are in operation. Arrangements have been completed for the joint conference between committees of the coal miners' organization and the operators to prepare the dead work scale for the Pittsburg district. It will be held in the offices of the Pittsburg Coal Company next Monday. No trouble is anticipated in reaching an agreement.

Connellsville Coke.—While the contract price of coke remains at \$2.25 for furnace and \$2.75@\$3 for foundry, deliveries during the past two weeks were at much higher figures. Many furnaces are not getting one-third of the requirements, all of which is due to inadequate transportation facilities. The last issue of the *Courier* gives the production in the Connellsville Region for the previous week at 210,819 tons. The shipment for the week aggregated 9,387 cars, distributed as follows: To Pittsburg and river tipples, 3,594 cars; to points west of Pittsburg, 4,164 cars; to points east of Connellsville, 1,631 cars. This was a decrease of 1,394 cars compared with the shipments of the previous week.

Foreign Coal Trade. Feb. 20.

Export trade continues quiet. Shipments have been somewhat delayed by inclement weather, preventing deliveries of coal at the seaboard.

A charter is reported from Baltimore to Marseilles, France, at 7s. 6d. (\$1.80) per ton, February sailing. This is the lowest rate reported for a long time. Another charter is reported from Norfolk to Messina, Sicily, at 9s. (\$2.16) per ton, February sailing. This is also a low rate.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of February 7, that the tone of the Welsh coal market is weak, and prices for all descriptions of coal are lower. There is, however, considerable latitude in quotations for some sorts. Prices named are: Best Welch steam coal, \$3.72@3.78; seconds, \$3.60; thirds, \$3.42; dry coals, \$3.42; best Monmouthshire, \$3.42@3.54; seconds, \$3.30; best small steam coal, \$2.34; seconds, \$2.16; other sorts, \$1.86. 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 2½ per cent discount.

The general tone of the freight market is steadier, and rates in some directions show slight improvement. Some rates noted from Cardiff are: Algiers, \$1.30; Marseilles, \$1.35; Genoa, \$1.32; Naples, \$1.38; Port Said, \$1.32; Singapore, \$2.76; Las Palmas, \$1.38; St. Vincent, \$1.56; Rio Janeiro, \$2.58; Santos, \$2.88; Buenos Aires, \$2.34.

IRON MARKET REVIEW.

New York, Feb. 20.

The market continues to show extreme activity in all directions. Business is being freely placed for delivery in the third and fourth quarters of the year. Prices show but little change, although it is said that premiums are being freely offered in cases where early deliveries are necessary to buyers. This is especially the case with pig iron and steel billets. Structural material is in strong demand, and delay on building contracts during the coming season is feared.

London despatches report that an order for 5,000 tons of Cleveland pig iron for the United States has been placed, and that other orders of the same kind are expected. It is also reported that the Dominion Iron and Steel Company has been obliged to buy some pig iron in England, in order to meet its contracts in Canada and the United States.

Birmingham. Feb. 17.

(From Our Special Correspondent.)

The demand for pig iron in Alabama continues strong. Sales are being made now on which delivery will be made during the last months of the year, and no small part of the production for the first 8 months of the year has been sold ahead. Some purchasers are offering a premium of 25 to 50c. per ton for immediate delivery, but there is not much of iron to be had.

Two furnaces have been blown in this month already, one more goes in this week, and before the end of the month another will follow. The production will have been increased during the month about 400 tons daily, one furnace having been blown out for repairs. The Tennessee Coal, Iron and Railroad Company blows in one of its bessemer furnaces this week, and the Woodward Company will blow in one towards the end of the month.

There have been no changes in the quotations for the past week. The following figures are still given: No. 1 foundry, \$12.50; No. 2 foundry, \$12; No. 3 foundry, \$11.50; No. 4 foundry, \$10.50@11; gray forge, \$10.50; No. 1 soft, \$12.50; No. 2 soft, \$12.

The report of the Southern Iron Committee for the month of January shows that the shipments of pig iron from the southern field amounted to 173,916 tons, of which 90,834 tons went from the Birmingham District alone. Shipments of cast-iron pipe from Alabama and Tennessee amounted to 8,292 tons, of which the Birmingham District shipped 4,816 tons. The districts making up the southern field, according to this report, are Anniston, Birmingham and Sheffield, in Alabama; Nashville and Chattanooga, in Tennessee, and Middlesboro, in Kentucky. The shipments of steel billets from the Tennessee Coal, Iron and Railroad Company's mill at Ensley during last month amounted to 7,348 tons. The export shipments continue low. The export shipments last month from the southern field amounted to 398 tons pig iron and 213 tons of cast-iron pipe.

In finished iron and steel the various plants in the district are working well and the output is satisfactory. The mills and factories in this district have had about as much to do as they have been able to handle. Good prices obtain. At the steel plants in Ensley orders are plenty. At the steel rod, wire and nail mill litigation has not disturbed the operation of the plants. C. W. Robinson, the minority stockholder, who has been behind the litigation, has filed a petition asking for a receiver for the concern, and this writ will be heard February 20.

Buffalo. Feb. 20.

(Special Report of Rogers, Brown & Co.)

The conditions are identical with those noted last week. There is a slight improvement in transportation, but producers and consumers alike are still embarrassed by the poor service. The available tonnage tributary to this market for the last third or quarter of the year is being absorbed slowly but

surely. We quote below on the cash basis, f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, \$18.25; No. 2, \$17.75; southern soft No. 1, \$17.75; No. 2, \$17.25; Lake Superior charcoal iron, \$20.

Chicago. Feb. 18.

(From Our Special Correspondent.)

The pig iron market continues very active, with orders crowding every furnace. Sales in the last week have been very large. The demand for Northern iron has been so great as to cause an advance of \$1 per ton on Lake Superior coke iron, which is quoted at \$17.50@18 for No. 1 and \$17@17.50 for No. 2. For Southern grades prices are unchanged, to-day's quotations being \$16.15@16.50 for No. 1 and \$15.65@16.15 for No. 2.

Coke has advanced slightly, the present price being \$5.50@5.75 against \$5.25@5.75 a week ago. There is loud complaint about the inability of the railroads to haul coke. The general situation as regards congestion of traffic is perhaps worse than it was last week, on account of the delays and setbacks due to the heavy snow storms.

Cleveland. Feb. 19.

(From Our Special Correspondent.)

Iron Ore.—Shippers of iron ore have taken vessel tonnage on season contracts so far to the extent of 2,000,000 tons. This has covered the entire shipments of two companies, but three or four big shippers have taken nothing. The business done so far has been on the basis of 80c. between Duluth and Ohio ports; 70c. from Marquette; and 60c. from Escanaba. The marine interests have scattered greatly since the first work was done and there is hardly a possibility that any more contracts will be placed for a week or 10 days. It is quite apparent, however, that the chartering done so far has not relieved the market of the possibility of a contest on the season's rates, as the big shippers have so far held assiduously to the demand for a 75c. rate between Duluth and Ohio. The ore sales are slow but on the basis established before the market was opened of \$4.25 for bessemer old range; \$3.25 for non-bessemer old range and bessemer Mesabi; \$2.75 for Mesabi non-bessemer.

Pig Iron.—The furnaces in the Valleys are about all banked because of the lack of coke and many of the consumers are suffering, especially for foundry grades. There are no stock piles from which to draw and the cessation of production leaves the foundries without a supply. The material is scarce, yet contracts are steadily being taken for deliveries into the second half. No one is offering any material for quick shipment. The prices hold firm at \$16.50 and \$16 respectively on Nos. 1 and 2, Valley furnace. Basic and bessemer producers are about off of the market for the first half. Prices hold nominally at \$16 valley furnace.

Finished Material.—There is an incessant call for structural steel but the supply is limited. Some mills have ordered their agents here to take no more orders for the present, even for deliveries during the latter part of the year, professing to be sold up through the season. There is no steel to be had inside of five months and it is apparent that some building projects must wait. Mill quotations are still 1.70c., with frequent store sales ranging considerably higher. The quotations are 2¼@3c. out of stock. Bars are in big demand at the old prices, with bessemer steel bars selling more freely since the increase in bar iron prices. The market is represented by: Bessemer steel bars, 1.50c., Pittsburg; open-hearth steel bars and bar iron, 1.60c., Pittsburg; store prices 1.75c.@1.90c. Sheets are selling briskly out of store with a big demand on certain gauges and good business in sight on others. Store prices prevail ranging on 3.40c. to 3.60c. Wrought pipe is a little slow with some dealers trying to unload but with others holding off for the business which promises now to show up later in the spring. There is a big call for steel billets but no one has any material for sale and there is hardly enough business to warrant a quotation in this territory. One Cleveland concern is shut down because it cannot get steel.

Old Material.—The trade this week has been very brisk, especially in cast scrap. Dealers are experiencing some difficulty in finding material. Prices have not changed in six weeks.

Philadelphia. Feb. 20.

(From Our Special Correspondent.)

Pig Iron.—There is a pronounced feverish undertone to the pig iron market in middle and eastern Pennsylvania, due partly to unsettling outside rumors concerning advancing prices and huge orders for late summer delivery. Quotations are somewhere near \$18.50 for No. 1; \$18 for No. 2; \$17 for No. 2 plain; gray forge, \$17.50@18; basic, \$17.50; bessemer, \$20@21.

Billets.—Quotations are nominal, but some gilt-edged prices were paid yesterday for early deliveries. Foreign steel was quoted to-day \$29.50, and the home

product, \$32.50@33, but these figures need fumigating.

Bars.—Strong conditions are reported everywhere. Iron bars are 1.70@1.75c.; steel, 1.65@1.70c.; but special deliveries come higher.

Sheets.—The fluctuating tendency in raw material is manifesting itself in sheets when urgent requirements are to be met, and there are a good many of them. Card rates are 2.40@3.50.

Merchant Steel.—There is nothing to add except that the western consumers are pressing harder for what they want.

Pipes and Tubes.—The only report is that tube work is still straining capacity.

Skelp.—People who were half inclined to place orders six weeks ago are now trying to see what is the best they can do on spring deliveries.

Plates.—There is an unconfirmed rumor afloat that a shading is being quietly made on some steel plate mills. So far as can be learned, however, prices are firm. Prices range from 1.75@1.80.

Structural Material.—Business would boom if there were any room for new orders. Everybody knows that whatever business is squeezed through is at a much higher price than those usually quoted. There are contractors here now trying to get fixed for big local spring jobs, and they are making no headway.

Steel Rails.—Trolley rails and light rails are badly wanted. There are also pressing needs for 80 and 90-lb. for freight yards and sidings. Prices are \$28.

Scrap.—The upheaval in the scrap market continues. To buy scrap is not to get it. The beautiful snow is having things its own way. The most wanted kinds are choice heavy and heavy steel, which are worth, respectively, \$15 and \$19.50. Old steel rails would be taken in any quantity.

Pittsburg. Feb. 19.

(From Our Special Correspondent.)

The Bessemer Association met during the week and fixed the price of bessemer pig iron for the third quarter at \$16, Valley furnaces. Negotiations were at once opened by the United States Steel Corporation for at least 100,000 tons, and the deal will likely be closed this week. Although the big steel combine is a heavy producer of pig iron, it is necessary to buy from 40,000 to 50,000 tons a month from the merchant furnaces to meet the requirements of its steel mills. Bessemer pig iron for the first half delivery seems to have been sold, as some offers at large premiums were rejected during the week. But little iron was made, owing to the shortage of coke, the furnaces that are in blast being operated very irregularly. About 12 are still banked. The freight congestion is as acute as it was a week ago, and as a result many mills are unable to operate in full, while some have been closed entirely. This is due to a lack of raw material in some cases and also on account of a shortage of coal. A representative of the Otis Steel Company, of Cleveland, was in Pittsburg yesterday looking for coal. The plant was closed on Monday, but likely will be started to-morrow, as the Pittsburg & Buffalo Company was able to take care of an order for prompt shipment. The big steel works of the Carnegie Company are never handicapped on account of the fuel supply, as it receives its coal from the river mines, and invariably has about 1,000,000 bush. available at all times.

Gray forge and foundry iron are in greater demand, and prices this week are firmer and higher. Some large sales were made. There is a demand for basic iron, but the furnaces are sold up for the first half. The demand for structural material is particularly heavy, although many mills cannot guarantee deliveries before the last quarter. The Cambria Steel Company has withdrawn from the market for the balance of the year. Bessemer and open-hearth billets continue scarce, and none was sold. Wire rods are firmer than usual at \$35 a ton for delivery this side of July 1. Sheets are very firm, and a great deal of new business has been booked by the leading producer.

The time for receiving suggestions for the new wage scale of the Amalgamated Association of Iron, Steel and Tin Workers from the different lodges expired yesterday. These recommendations will be printed and considered by the lodges, and action on them will be taken at the annual convention which opens in Wheeling on April 15. The convention occurs a month earlier than in former years, as certain changes are to be made that will prevent the closing of the mill on June 30 pending a settlement of the scale. If an agreement is not reached by that time the mills will be operated as usual under a plan that will be determined by the convention.

Another meeting of independent sheet steel manufacturers was held here yesterday, which was attended by 17 concerns representing about 75 mills. A temporary organization was effected by the election of W. L. Glessner, of the Laughlin Nail Company, Martin's Ferry, O., chairman, and A. F. Baumgarten, vice-president of the Maryland Sheet and Steel Company, secretary. The main object of the organization is to arrange for a better supply of raw material. A number of plans were suggested, but noth-

ing definite had been accomplished when the meeting adjourned. Another session will be held to-morrow.

Pig Iron.—The Bessemer Association's action is referred to above. Foundry iron is in better demand and there is but little to be had for delivery during the balance of the first half. The price of No. 2 for the third quarter has been advanced to \$17, Pittsburg, and sales aggregating 10,000 tons were made this week. Gray forge is firm at \$16.50, Pittsburg, and about 4,000 tons were sold.

Steel.—No sales of bessemer steel billets are recorded, and \$31 is the nominal quotation. Open-hearth billets are quoted at \$32. Steel bars are still very active, and some large orders have been booked. There is no change in price, 1.50c. still being quoted. Tank plate remains at 1.60c.

Sheets.—The sheet steel market is very strong, and No. 28 gauge is firm at 3.10@3.15c. for large lots and 3.20c. for car-load lots. Galvanized sheets are 70 and 10 per cent off. The American Sheet Steel Company is taking orders at these prices, but is not guaranteeing shipments.

Ferro-manganese.—The demand is fair, with 80 per cent domestic quoted at \$52.50.

New York. Feb. 21.

Pig Iron.—The market is very firm, with prices for northern brands still advancing. Anything like prompt delivery cannot be had at current quotations. A local sales agent reports that one customer found it impossible this week to get a car-load for March delivery. We quote for tidewater delivery: No. 1X foundry, \$17.85@18.35; No. 2X, \$17.25@17.85; No. 2 plain, \$17@17.30; gray forge, \$16.50@16.85. For Southern iron on dock, New York, No. 1 foundry, \$16.25@16.50; No. 2, \$15.75@16; No. 3, \$15.25@15.50; No. 4, \$14.75@15; No. 1 soft, \$16.50; No. 2, \$15.75@16.

Bar Iron and Steel.—Demand continues good. We quote 1.58c. for common bars in large lots on dock; refined bars, 1.63@1.68c.; soft steel bars, 1.68c.

Plates.—The market is still good, with no changes in prices. We quote for tidewater delivery in car-loads: Tank, 1/2-in. and heavier, 1.78c.; flange, 1.88c.; marine, 1.98c.; universal, 1.78c.

Steel Rails and Rail Fastenings.—A considerable tonnage will be imported. Standard sections are still quoted at \$28 at Eastern mills; light rails at \$28@30, according to weight. Spikes are 1.80c.; splice bars, 1.60c.; bolts, 2.60@2.70c.

Structural Material.—There is little change in the market. Prices are as firm as ever. We quote for large lots at tidewater as follows: Beams, 1.80@1.95c.; tees, 1.85c.; angles, 1.80c.

CHEMICALS AND MINERALS.

(For further prices of chemicals, minerals and rare elements, see page 298.)

New York. Feb. 21.

Heavy Chemicals.—Domestic high test alkali is in moderate request for shipment at 75@80c. per 100 lbs., f. o. b. works, while foreign is quiet at 90@92 1/2 c. per 100 lbs. in New York. High test domestic caustic soda is firm, as makers report only medium stocks; sales on yearly contract are noted at \$1.90@1.92 1/2 per 100 lbs., f. o. b. works, and for immediate shipment at 5c. more. Bicarb soda for shipment is in good request at \$1 per 100 lbs. for ordinary and \$3 up for finer grades, both f. o. b. works. Sal soda is quiet at 55c. per 100 lbs., f. o. b. works. Bleaching powder is featureless at \$1.80@1.90 per 100 lbs. for early shipment, and \$1.65@1.80 for forward delivery, prices being fixed according to test and quantity. Chlorate of potash is in small demand at \$8 per 100 lbs., for crystals, and \$8.25 for powdered. Contracts for domestic chlorate of potash have been booked at \$7.75 per 100 lbs., f. o. b. works.

Acids.—Contract deliveries are moderate, as demand is only of a jobbing character. Exports of copper sulphate from New York in January were 1,564,294 lbs., against 3,424,685 lbs. in the same month last year, showing a decrease of 1,860,391 lbs., due chiefly to the smaller shipments to Italy. Of the 1902 exports Greece received 746,775 lbs.; Austria, 326,451 lbs.; Italy, 199,418 lbs., and Holland, 159,540 lbs., the latter quantity being intended for re-shipment to the interior of Germany.

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.

Table listing prices for various chemicals like Acetic, Blue vitriol, Muriatic, Sulphuric, Nitric, Oxalic, etc.

Brimstone.—Spote best unmixd seconds have sold at \$24.25@24.50 per ton, and early arrivals at \$24,

while shipments remain \$23@23.25. Best thirds are \$2.50 per ton less than seconds.

Pyrites.—Deliveries are moderate on contract, while prices remain firm. Quotations are f. o. b.: Mineral City, Va., lump ore, \$5 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 40 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Sulphate of Ammonia.—In January nearly 1,900 tons were shipped from Great Britain to the United States. Owing to speculative buying abroad the market here has strengthened to \$2.97 1/2 @3 per 100 lbs. for gas liquor for this and next month's shipment. Spot is \$2.95.

Nitrate of Soda.—From a statistical viewpoint the market is exceptionally strong, but consumption is endangered by the extraordinarily high prices. This week a retail parcel sold ex-store at \$2.35 per 100 lbs., the top notch in many months. Importers are asking \$2.25 for wholesale lots on spot, and \$2.20 to arrive, while for future shipments \$2.02 1/2 is quoted. The settlement of the labor troubles at Iquiqui, Chile, has eased prices on shipments, but the spot market continues firm. The new nitrate duties in Chile, which went into effect on February 18, are 90 per cent in bills and 10 per cent in gold, while the old rate was 65 per cent in bills and 35 per cent in gold.

Abroad the visible supply on February 1 was reported as 618,800 tons, or nearly 35 per cent smaller than at the same time last year. On the other hand, the European deliveries in January were 66,400 tons, or 11,811 tons greater than 1901. Consequently, the selling price has risen nearly £2 per ton.

Salt-peter.—Crude is in moderate request at \$3.45 per 100 lbs. for spot, while refined holds at \$4.37 1/2 @ \$4.62 1/2 per 100 lbs. Statistics show that stocks on hand in the United States on January 1 were 2,059 bags, or 142 bags less than a year ago. Arrivals in January were 1,773 bags (3,229 bags in 1901), and the consumption during the month 2,174 bags (3,276 bags in 1901), making the stocks on February 1, 1,658 bags, against 2,154 bags a year ago. Adding 9,821 bags on the way, we have an apparent visible supply of 11,479 bags, against 15,317 bags in 1901.

Phosphates.—Stormy weather has interfered with mining, but as the production at many properties is well contracted for, operators are not alarmed at this temporary reduction in output. The fact is miners hold many long-time contracts which can be filled during milder weather. Just now buying for immediate consumption is not large.

We quote phosphate prices as below.

Table listing phosphate prices from various regions like Fla. hard rock, Fla. land pb., Tenn., etc.

Liverpool. Feb. 4.

(Special Report of Joseph P. Brunner & Co.)

There is little change to note in the position of heavy chemicals, the export demand being still quiet. Soda ash is well maintained at usual prices as to market. For tierces the nearest spot range is 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 5s. @ £4 10s.; 58 per cent, £4 10s. @ £4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals are in good jobbing demand 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 in moderate request at steady prices. We quote: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Bleaching powder is rather slow of sale at the moment and £6 15s. @ £6 17s. 6d. per ton, net cash, is about the nearest value for hardwood packages, with special terms for Continental and a few other export markets. Chlorate of potash continues quiet at 3d. @ 3 1/2 d. per ton, net cash. Bicarb soda is selling to a fair extent at £6 15s. per ton, less 2 1/2 per cent for the finest quality in 1-cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets. Sulphate of ammonia is slightly dearer at £1 13s. 9d. @ £1 15s. per ton, less 2 1/2 per cent, for good gray 24@25 per cent in double bags f. o. b. here. Nitrate of soda is well held at £10 7s. 6d. @ £10 10s. per ton, less 2 1/2 per cent for double bags f. o. b. here, as to quantity and quality.

METAL MARKET.

New York. Feb. 20.

GOLD AND SILVER.

Gold and Silver Exports and Imports.

At all United States Ports in January and Year.

Table showing Gold and Silver Exports and Imports for January 1901 and 1902.

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 February 20, 1902, and for years from January 1, 1902, 1901 and 1900.

Table showing Gold and Silver Exports and Imports for New York for various periods.

Exports of gold this week were to the West Indies; silver, chiefly to London. Imports were from Central and South America and the West Indies.

Financial Notes of the Week.

Very little has occurred during the week to interrupt the general course of business. No further gold exports are reported.

Exports of merchandise from the United States in January were valued by the Bureau of Statistics of the Treasury Department at \$128,789,623; while imports amounted to \$79,426,146. For the seven months of the fiscal year, from July 1 to January 31, the statement is as follows:

Table showing Exports and Imports for 1900-01 and 1901-02.

The gold and silver movement in detail will be found in the usual place, at the head of this column.

Specie shipments by water from San Francisco in January are reported as follows:

Table showing specie shipments by water from San Francisco for 1901 and 1902.

The silver shipments this year included \$1,000 in Mexican dollars to the Fiji Islands and \$2,304 in Chilean pesos to the Society Islands; the balance—\$2,270 in Chilean pesos, \$11,484 in Mexican dollars and \$466,100 in silver bars—going to Hong Kong. The gold coin went to Hong Kong. The shipments to New York were not reported this year; in January, 1901, they were \$350,876 in gold coin and \$7,000 in silver coin.

The statement of the New York banks, including the 63 banks represented in the Clearing House, for the week ending February 15, gives the following totals, comparison being made with the corresponding weeks of 1901 and 1900:

Table showing financial statements for New York banks for 1900, 1901, and 1902.

Changes for the week this year were increases of \$13,498,700 in loans and discounts, \$14,597,100 in deposits and \$1,516,700 in specie; decreases of \$67,600 in circulation, \$2,200,800 in legal tenders, and \$4,335,375 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates cov-

ered 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, and sub-columns for 1901 and 1902. Rows list countries like N. Y. Ass'd., England, France, Germany, Spain, Netherlands, Belgium, Italy, and Russia.

The returns of the Associated Banks of New York are of date February 15, and the others February 13, as reported by the Commercial and Financial Chronicle cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has been dull and firm at 25 7-16d. without special feature. The recent improvement in silver was of a temporary character, as the Eastern rates did not respond to the London market.

Receipts of silver at the United States Assay Office in New York for the week ending February 20 were 101,000 oz.

Shipments of silver from London to the East for the year up to February 6, are reported by Messrs. Pixley & Abell's circular as follows:

Table showing silver shipments from London to the East for 1901 and 1902, with columns for India, China, and The Straits.

Arrivals for the week, this year, were £113,950 in bar silver from New York, £9,800 from Chile, and £13,250 from Australia; total, £137,000. Shipments were £132,500 in bar silver to Bombay, and £10,000 to Calcutta; total, £142,500.

Indian exchange has been firm, and though the demand for Council bills in London was not quite so active, all the bills offered were taken at 16.03d. per rupee.

Prices of Foreign Coins.

Table listing prices for Mexican dollars, Peruvian soles, Victoria sovereigns, Twenty francs, Twenty marks, and Spanish 25 pesetas.

OTHER METALS.

Daily Prices of Metals in New York.

Table showing daily prices for Silver, Copper, and Spelter in New York, with columns for February, Sterling Exchange, N.Y. Cts., London Pence, Lake Cts., Electrolytic per lb., London & per ton, Tin, cts., and St. L. cts.

London quotations are per long ton, (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars; the price of electrolytic cathodes, is usually 0.25c lower than these figures.

Copper.—The market has been very quiet and languid. A little business has been done for early delivery, buyers not yet being prepared to act in a larger way, although consumption continues good.

The foreign market, which closed last week at £54 12s. 6d., has been firm and throughout the week has ruled about £1 higher. The closing quotations on Thursday are cabled at £55 17s. 6d. for spot, £55 7s. 6d. for three months.

Statistics for the first half of February show a decrease in the visible supplies of 100 tons.

Refined and manufactured sorts we quote: English tough, £59@£60; best selected, £60@£60 10s.; strong sheets, £69@£70; India sheets, £68@£69; yellow metal, 6 1/4@6 3/4 d.

Exports of copper from New York and Baltimore for the week ending February 19 are reported by our special correspondents as follows: To Great Britain, 800 tons; Germany, 647; Holland, 1,857; France, 290; Belgium, 430; Austria, 110; Italy, 55; Australia, 14; total, 4,203 tons. Also 289 tons matte to Great

Britain. Imports were 657 tons, chiefly from England.

Copper production as reported by Mr. John Stanton, who acts as statistician for the companies, was as follows for the month of January, stated in long tons (2,240 lbs.) of fine copper:

Table showing copper production for 1900 and 1901, with sub-columns for U.S. reporting mines, U.S. outside sources, and Foreign reporting mines.

The falling off in the United States production, as compared with 1901, was 3,724 tons, or 16.4 per cent. The decrease was wholly in the reporting mines. The feature of the statement is the large quantity of copper exported, which shows a gain of 5,018 tons, or 50 per cent, over January, 1901, and of 986 tons, or 7.4 per cent, over 1900.

The approximate consumption of foreign copper in Germany for the full year is reported as below in metric tons:

Table showing German copper consumption for 1900 and 1901, with columns for Imports, United States, Great Britain, and Other Countries.

Exports of copper from Chile for the year 1901 are reported by Messrs. Jackson Brothers, of Valparaiso, as follows, in quintals:

Table showing Chilean copper exports for 1900 and 1901, with columns for Consumption, Total, and Copper.

The statement does not include the copper contents of pyrites imported. This copper, however, is relatively a small quantity.

The foreign market which closed last Friday at £112 15s., advanced on Monday to £117 10s. for spot, £110 for three months. On Wednesday it reacted to £115 10s. and the closing quotations on Thursday are cabled as £116 15s. for spot, £109 for three months.

Lead.—Has been in good demand. The quotations are unchanged at 3.97 1/2@4.05c. St. Louis, 4.05@4.10c. New York. The foreign market is unchanged, Spanish lead being quoted at £11 11s. 3d. @£11 12s. 6d., English lead at £11 13s. 9d. @£11 15s.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is firm and demand fairly active. Both Missouri soft lead and argentiferous lead, for a change, are selling at the same price, 4.05c.

Spelter.—The market has been quite active, and a good business has been done at somewhat higher prices. The consumption of this metal is very heavy, and the season is now approaching when the demands for galvanizing purposes are greatest. We quote the market at 4.05c. St. Louis, 4.20c. New York.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter continues dull and uninteresting. We quote the market nominally 3.90@3.95c. Buyers are very scarce, all having loaded up at the late decline for current and near future requirements.

Antimony.—Is dull and unchanged. We quote Cookson's at 10c.; Hallett's at 8@8 1/2c.; Hungarian, Italian, Japanese and U. S. Star at 7 1/4c.

Nickel.—The price continues firm at 50@60c. per lb., according to size and terms of order.

Platinum.—Consumption continues good. Ingot platinum in large lots brings \$19.50 per oz., in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 82c. per gram.

Quicksilver.—The New York price continues \$48 per flask for large lots, with a slightly higher figure for small orders. In San Francisco quotations are firm at \$47.50@48 for domestic orders, and \$44 for export. The London price is £8 15s. per flask, with the same figure quoted from second hands.

Quicksilver receipts at San Francisco in January were 1,725 flasks, against 1,827 flasks in January, 1901. These receipts do not include shipments from

mines direct to consumers. Exports by water from San Francisco for the month were: British Columbia, 3 flasks; Mexico, 330; Central America, 2; New York, 20; total, 355 flasks, against 442 flasks in January, 1901.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Table listing prices for various metals and alloys including Aluminum, Ferro-Tungsten, Magnesium, Manganese, Mangan'e Cop., Molybdenum (Best), Phosphorus, American, Sodium metal, and Tungsten (Best).

Variations in prices depend chiefly on the size of the order.

Average Prices of Metals per lb., New York

Table showing average prices for Tin, Lead, and Spelter from January to December for 1902, 1901, and 1900.

Average Prices of Copper.

Table showing average prices for Electrolytic and Lake copper from January to December for 1902, 1901, and 1900.

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Table showing average prices for London, N.Y., and New York from January to December for 1902 and 1901.

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

LATE NEWS.

JASPER COUNTY—MISSOURI.

(From Our Special Correspondent.)

Joplin Ore Market.—The ore market for the week ending February 15 was very active. High grade zinc ore advanced to \$33 per ton for ore from 3 mines near Joplin, while lead ore remained steady at the previous week's price. The greater part of the zinc ore output advanced, although much remained unchanged. The lead output is very small, owing to the severe weather, which prevents many of the lead mines from operating. Much of the zinc ore was purchased on a bid of \$28 per ton for 60 per cent. ore, and some was even purchased as low as \$26 per ton for 60 per cent zinc ore. The higher the grade the higher the price per assay. Lead ore brought \$21.75 per 1,000 lbs., delivered, and the local smelters took the greater part of the product.

Following is the turn-in by camps of the Joplin District for the week ending February 15:

Table showing zinc and lead output from various camps like Joplin, Carterville, Galena-Empire, Carthage, Aurora, Oronogo, Webb City, Cave Springs, Zincite, Duckwing, Neck City, Spurgeon, Carl Junction, Granby, Central City, and Stotts City.

Totals. 8,877,140 lbs. zinc, 828,220 lbs. lead, \$144,820 total corresponding week 1901 7,961,320 lbs. zinc, 1,680,070 lbs. lead, \$161,920 total since Jan. 1, 76,611,940 lbs. zinc, 8,086,690 lbs. lead, \$1,125,242 zinc value last week, \$127,021; lead, \$17,808 total zinc value 7 weeks, \$852,157; lead, \$173,085

STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing companies like Alamo, Alice, Amalgamated, Anaconda, and others with columns for par value, Feb. 13-19, and sales.

BOSTON, MASS.

Table of stock quotations for Boston, Mass., listing companies like Adventure, Aetna, Allouez, Amalgamated, and others with columns for par value, Feb. 13-19, and sales.

Coal and Industrial Stocks.

Table of coal and industrial stock quotations, listing companies like Am. Agr. Chem., Am. Car & Fdy., and others with columns for par value and Feb. 13-19 prices.

Official Quotations, Boston Stock Exchange. Total sales, 194,713 shares. †Ex-dividend. ‡Ex-ass't paid.

ST. LOUIS, MO.*

Feb. 17.

Table of stock quotations for St. Louis, Mo., listing companies like Am.-Nettie, Catherine Lead, and others with columns for shares, par value, bid, and ask prices.

*From our Special Correspondent.

SPOKANE, WASH.*

Feb. 15.

Table of stock quotations for Spokane, Wash., listing companies like Black Tail, Ben Hur, and others with columns for par value, bid, and ask prices.

Total sales 178,666 shares. *Reported by Hunner & Harris.

SALT LAKE CITY.*

Feb. 15.

Table of stock quotations for Salt Lake City, listing companies like Ajax, Ancho, and others with columns for location, shares, par value, and quotations.

*By our Special Correspondent. Total number of shares sold, 384,210

MEXICO.

Feb. 8.

Table of stock quotations for Mexico, listing companies like Durango, Ca. Min. de Penoles, and others with columns for shares, last dividend, and prices.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.

Table of stock quotations for Colorado Springs, Colo., listing companies like Acacia, Alamo, Am. Con., Anaconda, etc., with columns for par value, high/low prices for Feb. 10-15, and sales volume.

Colorado Springs (By Telegraph)

Table of stock quotations for Colorado Springs, Colo., listing companies like Acacia, Alamo, Am. Con., Anaconda, etc., with columns for par value, high/low prices for Feb. 13-19, and sales volume.

MONTREAL, CANADA.

Feb. 17.

Table of stock quotations for Montreal, Canada, listing companies like Big Three, California, Can. Gold Fields, etc., with columns for par value, high/low prices, and sales volume.

LONDON.

Feb. 5.

Table of stock quotations for London, listing companies like Alasks-Treadwell, Anaconda, etc., with columns for authorized capital, par value, last dividend, and quotations.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. *Ex-dividend.

PARIS.

Feb. 6.

Table of stock quotations for Paris, listing companies like Acieries de Creusot, Anzin, Boleo, etc., 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, Golden Star, British Columbia, etc., with columns for par value, high/low prices, and sales volume.

CHEMICALS, MINERALS, RARE EARTHS, ETC. CURRENT WHOLESALE PRICES.

Main table listing various chemical and mineral products such as Abrasives, Barium, Barytes, Bauxite, Bismuth, Bitumen, Bone Ash, Borax, Bromine, Cadmium, Calcium, Cement, Chlorine, Chromic Acid, Coal Tar Pitch, Cobalt, Copper, Cryolite, Explosives, Graphite, Gypsum, Infusorial Earth, Iron, Iodine, Lead, Lime, Magnesite, Manganese, Marble, Mercury, Mica, Mineral Wool, Nickel, Oils, Oxides, Potash, Potassium, Pyrites, Quartz, Salt, Silica, Silver, Sodium, Sulphur, Sulphate, Tar, Tin, Uranium, Zinc, and Zirconium, along with their respective prices and quantities.

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable. See also Market Reviews.