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TO ENGINEERS VISITING NEW YORK

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.



IT GIVES US pleasure to note that Mr. Richard Pearce, the distinguished metallurgist, has been presented, by the Royal Geographical Society of Cornwall, with a gold medal in recognition of his services to science. Mr. Pearce has been the recipient of many honors in the course of his eminently useful career, but none probably will have pleased him so much as this token of esteem from the old mining county in which he was born.



DISPATCHES received in London this week report that the Chinese Government has issued an edict forbidding the export of silver from the country. It is not probable, however, that this can be enforced, or that it will make any material difference in the situation. China is not in a position to default on its payments of indemnity to the Powers, and these cannot be made without selling silver. The Government must be the first to violate its own decree; and it will amount to no more in practice than some other Chinese edicts.



WE ARE INFORMED that there is a demand for arsenic ores in France and Germany, and that good ores would meet with a ready sale. The closing down of the Devon Great Consols Mine in England and the small supplies now afforded by some of the old German mines are the chief causes of this demand. The Canadian arsenical ores are now worked at Deloro, and are not shipped abroad for treatment. We may add, however, that French and German buyers now here are not willing to state the prices which they are prepared to pay, nor the quantities they can take; but these points will doubtless develop later.



AT THE RECENT meeting of the Nickel Corporation, in London, the chairman (Col. Millard Hunsiker) stated that the present stagnation in the nickel industry and the large stocks of ore held by the smelters and refiners made it impossible to market any more ore at reasonable prices. The nickel trade is comparatively a small one, and every now and then there are times when ore cannot be sold. Recently nickel has been under a cloud. Every one thought there was going to be a great demand for it, and therefore large stocks of ore were bought, which have not yet been consumed.

DIVIDEND payments in November were the largest since August, owing to the heavy quarterly disbursements by the combinations, notably the United States Steel Corporation. In all 35 American mining and metallurgical concerns paid \$12,661,035 in dividends in November, of which \$2,004,406, or 15.8 per cent, was contributed by 20 copper and gold, silver and lead mines, and the balance of \$10,556,629 by 15 industrial concerns, principally iron and steel. In addition to these dividends, 11 Mexican mines paid \$124,660, one Central American property, owned in New York, \$15,000, and 1 British Columbia mine, \$12,500; a total of \$152,160.

Since January 1 the American dividends amounted to the large total of \$117,446,284, and foreign reported to \$3,301,341.



IN SOME RECENT comment on the price of silver, we referred to a possible increase in the use of the metal in the arts. At present prices of the metal, what is known as solid silver ware, should sell at figures very little, if any, above the best grades of plated ware. We find, however, that the reduction in silver ware has not been at all in correspondence with that in the metal; in fact, that the selling prices now are very nearly the same as they were when silver was quoted at double its present price. This is said to be the result of the combination of silver ware manufacturers, which has maintained its prices at the old level, with corresponding profits. It seems to us that it would pay producers of silver to look into this matter, and possibly to enter into the business themselves. This is a suggestion only, but it may be worth consideration.



THE INQUIRIES noted elsewhere into the extent of the use of crude oil for fuel in Chicago show that a very small quantity is actually employed for that purpose; oil forming not more than 1 per cent of the consumption, in the opinion of competent judges. Some years ago there was a good deal of talk as to the probable use of Lima and other Ohio and Indiana petroleum, but it died down after a time, though talk was lately started again on the possibility of obtaining cheap supplies from Texas. The fact is that the use of petroleum for fuel is not increased, and the larger part of that consumed is for special purposes where the liquid fuel can be more conveniently applied than a coal fire. The reason is not found in any mechanical difficulties, for these were long ago overcome; but simply in the fact that under present conditions oil costs more than the coal which will produce an equivalent quantity of heat. Until these conditions change materially we cannot expect an increase in the consumption of oil in Chicago, or in other cities similarly located.



PROSPECTING for and locating iron ore deposits are reported as going on actively in many parts

of this country and Canada. In some cases they are carried on openly, in others in a quiet way, which would seem to imply a certain amount of secrecy and concealment. It is quite natural that iron ore deposits should attract attention at a time of unexampled activity in the iron and steel trades. It is hinted that a large part of these operations—especially the quietly conducted ones—are really intended for the benefit of some of the great corporations which now control so large a part of the iron and steel manufacture of the country. This is probable and also quite natural. Corporations which have an enormous amount of capital invested are quite likely—if they are properly managed—to look ahead for some time; and one of the first points they would wish to secure is their supply of raw material. There is a good deal of iron ore in this country, not now worked, which is sure to be needed after a time; and the company or companies which secure control of it now will have great advantages in the future.



WE NOTED recently the quantity of gold shipped from the Canadian Yukon for the season up to the end of September. The October shipments increased the total reported gold to \$11,555,000. The last steamer of the White Pass & Yukon line left Dawson on October 26, and no more large shipments were possible after that date, as navigation closed; but it is possible that \$100,000 more might be added.

The uncertain elements in the Yukon gold production are the amounts carried out by individuals, which escape record, and the amount retained in the country as circulating medium. Both are rather difficult to estimate; but it seems likely that the amount retained this year was considerable, as many men remained in the country, and a good deal of work is in progress. Moreover, a general system of cash payments was this year introduced by the trading companies, requiring more gold for circulating currency. It is probable that the total output was larger than was expected or estimated early in the season. A significant fact is that the trading companies report a substantial improvement in business, especially in the latter part of the season.



THE IMPORTATION of zinc ore by Kansas smelters from the Slocan District in British Columbia is being considered. The remoteness of that district is a drawback, and because thereof the high freight rate will not leave a large margin to the miners. It is said that a rate of \$11 per ton has been named. Even under that condition it may be possible for certain miners to realize something worth while on ore that is recovered as a by-product, just as the producers in Leadville have been able to ship to Belgium under a freight rate that is nearly as high. However, there appears to be a question as to the admissibility of zinc ore into the United States under the existing tariff law. At the time the latter was enacted no zinc ore had ever been imported into this country, and apparently no one foresaw that the domestic smelting industry would ever

acquire such a development as to look abroad for ore. Consequently the tariff schedule does not contain that item, and in default of a special provision it would appear that zinc ore would fall into the convenient omnibus clause of "all other ores not enumerated," which are dutiable at 20 per cent. A duty was levied on spelter at the rate of 1.5 cents per pound to protect the zinc industry in general, but as to the divergent interests of the miners and smelters there was apparently neither conception nor intention.



THE SLOCAN DISTRICT, BRITISH COLUMBIA.

The Slocan District embraces a ruggedly mountainous area west and north of Kootenay Lake and its west arm, east of Slocan Lake and south of a line extended east from the north end of the latter. Samuel S. Fowler describes the general geology of the district in a paper read at the Nelson meeting of the Canadian Mining Institute. In the northern part of the district there is about 100 square miles of slate formation, from which the major part of the silver-lead output has been derived. The veins which cut across the slates are from a few inches to many feet in width, and are probably related genetically to a series of dikes of felsite and other intrusive rocks. The larger veins contain many inclusions of the country rock. The gangue minerals are chiefly spathic iron and quartz. South of the slate formation there is a large area of coarse granite, in which there are many veins of value, though they are narrower than those in the slate. They are more sharply defined and contain fewer inclusions of country rock. The ores are harder and tougher, contain a larger proportion of spathic iron and quartz, besides a greater variety of other gangue minerals, and important quantities of the richer silver-bearing minerals, finely disseminated. As in the slates, an important part, frequently the chief part of the values is highly concentrated and is mined and shipped with but little sorting as clean ore. East of the slates and granite, along the west shore of Kootenay Lake, there is a narrow fringe of very old schists and slates, which in the vicinity of Ainsworth present valuable ore deposits of good size and appearance of considerable permanency, but the ores are of low grade in silver, and except some which lie near the granite area cannot be worked at much, if any, profit under present conditions.

The ores shipped from the district comprise: (1) Siliceous oxidized ore from near the surface of the veins occurring in the slates. This was formerly important in quantity, but is no longer, the superficial ore bodies having been worked out in most cases. It assayed 20 to 30 per cent in lead, and was often of high grade in silver. (2) Galena ore, which now forms the bulk of the output, either as lump ore (hand sorted) or fine concentrates. It averages about 40 per cent lead, 12 per cent zinc, and the remainder quartz and siderite (besides the sulphur combined with the lead and zinc), and carries 80 to 100 ounces silver per ton. (3) Siliceous lead ore, silver-bearing, but very low in lead; obtained chiefly from the granite area and not amenable to the ordinary process of mechanical concentration. (4) Blende, obtained as lump ore (hand sorted), or

as middling product from some mills. It is silver-bearing, and often is of high grade. It is shipped to European zinc smelters, or is mixed to some extent with the galena concentrate. The Slocan District is affording a gradually increasing quantity of this rich zinc ore and a satisfactory solution of the problem of realizing on all the values in it is at present one of the greatest troubles in the district.



THE ANTHRACITE STRIKE COMMISSION.

As we noted briefly last week the proposed settlement of the difficulties between the anthracite coal operators and the miners outside of the Commission fell through on account of the withdrawal of the companies from the negotiations. This action was taken somewhat suddenly, though we cannot say that it was altogether unexpected. The cause nominally assigned for the quick change of front was the complication introduced by the action of the independent operators in protesting against any settlement in which they should not be considered, and in demanding some equivalent for the increased cost of mining which would be imposed upon them by an increase in wages and allowances. This action had some influence, without doubt, but it does not altogether account for the change; though the other reasons do not seem to be altogether clear, at least on the surface. There is no doubt that Mr. Wayne MacVeagh was acting in good faith when he submitted his proposition for a settlement, and that he had reason to believe that his action would be approved by the companies. It is little use speculating as to the ulterior causes.

The failure of this attempt at negotiation throws the whole case back to the Commission. The members took up their work again at Scranton on December 3, when they met pursuant to adjournment. It is understood that a mass of evidence relating to colliery management, costs, wages and other details, is ready to be submitted; and the Commission has plenty of work before it. It may be that if the independent operators agree upon a presentation of their side of the case and call upon the Commission to hear it—as they have a right to do—the long-discussed question of railroad rates on anthracite, and some other similar matters, may be gone into. This would mean prolonged hearings and discussions.

While an early agreement would have been desirable, it seems best that the case should be returned to the Commission. A final and complete settlement is even more important than an early one, and this can only be reached, in the present condition of affairs, through the Commission. Moreover, adjustment made by the Commission is much more likely to satisfy public opinion; and that is certainly to be considered—in spite of Mr. Baer and his dogmatic assertions.



MARKET CONDITIONS.

Iron and Steel.—The situation so far as regards production is improving somewhat. The railroads have been able to clear some of the accumulation of traffic, and to make deliveries somewhat more

promptly than they have been for some time past. There is still room for better work, however, and the mills are not yet satisfied with what has been done. The question of the most importance at the present time is how closely manufacturers can approximate to the deliveries promised on their contracts. From all appearances a great deal of work which should have been delivered this year will go well over into the first half of next year and this will throw out many of the calculations which have been made.

Foreign material continues to be in demand. The extent of the imports up to the end of October is shown by the statements given in another page, and the probability is that during the closing months of the year these figures will be largely increased. The effect of this demand is very appreciable in foreign markets, especially in Great Britain, where the sales to this country have served to tide the trade over a rather difficult time. The present calculation abroad is that the demand from this side will continue for some time to come.

Copper.—The copper market continues somewhat quiet and depressed, although there are signs of improvement. There does not appear to be any cessation in the demand from consumers, but sales continue on a rather moderate scale and it is evident that until there is some decided indication of a higher price, buying will continue to be limited to immediate demands. The same influences that have apparently worked to depress the market whenever there was any indication of improvement are still manifested and a further depressed effect has followed the irregularity of the stock market. At the close we have to record a small advance.

Other Metals.—The somewhat lower range of values established for tin continues. The supplies at present are good and until there is some possible turn in the market, there will probably be very little buying for future requirements.

Lead continues quiet and unchanged. Demand and consumption is steady, but there is no inducement to manufacturers to lay in stock.

Spelter is quiet and again shows slightly lower quotations. The somewhat high range of values which has prevailed for several months past is apparently at an end and the metal is settling down to its normal price.

Silver continues very much depressed and a still lower record of price is noted this week. A report is noted elsewhere to the effect that the Chinese government has prohibited the export of silver, but this is not at all likely to affect values for the reason that it will be entirely impossible to enforce the edict, and the government will probably be the first to violate it. Until the Chinese difficulty is settled and until there is some improvement in the demand for India, which does not at the present time seem probable, little change can be looked for in this market.

Coal.—The Western coal markets are still disorganized. The last rush of coal to the lakes is now going on, although shippers have practically given up all hopes of filling their contracts. Nevertheless they will try their best to get the greatest quantity possible to the northwest before the lakes are closed for the season. For trade at local points, matters are a little better. Anthracite is beginning to find its way to Chicago and other large cities, though still in very limited quantities. Supplies of bitu-

inous coal are better, however, and the trade is generally quiet.

The seaboard bituminous coal trade shows no lessening in demand and consumers at many points and particularly in the Long Island Sound ports and in the all-rail trade, are in need of coal. Freight rates are advancing. The supply of cars at the mines shows little improvement, and except for the mild weather, which favors transportation, all conditions are against consumers.

All that can be said of the anthracite trade is that the companies are distributing the coal mined as widely and carefully as possible, but demands everywhere are still very urgent.



THE LATE DR. SELWYN.

We noted at the time the death of Dr. Selwyn, who was for a number of years Director of the Geological Survey of Canada, on October 24 in Vancouver, B. C., where he had lived since his retirement from active work. From an appreciative sketch of his work by B. T. A. Bell, editor of the *Canadian Mining Review*, we take the following:

"Alfred Richard Cecil Selwyn was born in Somersetshire, England, in 1824. He was the youngest son of the Rev. Townshend Selwyn, Canon of Gloucester Cathedral. His early education was received from a tutor at home, but later he was sent to Switzerland, where he completed his studies. After leaving school, some years were spent partly in travel in Belgium, France, Switzerland and the Tyrol, and partly in the position of a clerk in mercantile houses in London and Liverpool. This latter occupation, however, was distasteful, and having already acquired considerable knowledge of geology as an amateur, Mr. Selwyn gladly availed himself of an appointment as Assistant Geologist on the Geological Survey of Great Britain. The ability he displayed in this position soon attracted the notice of distinguished geologists, and in 1852, on the recommendation of Sir H. T. De la Beche, the Director of the Survey, Mr. Selwyn was appointed by the Secretary of State for the Colonies, to undertake the geological survey of the colony of Victoria, Australia. About this time much interest had been aroused respecting the gold fields and coal beds in Tasmania, and the government of that colony decided to obtain the services of a practical geologist to decide the question. Mr. Selwyn was asked to undertake the work, and consenting, at once began a thorough and systematic examination of Tasmania, his report on which was highly satisfactory. In 1859 he undertook with equal success a similar service for the government of South Australia. Previous to this, in 1856, he was appointed one of the commissioners of mines for Victoria; in 1858 he was made a member of the Science and Prospecting Board, and in 1861 appointed a commissioner for the Victoria International Exhibition. In 1869, Sir William Logan having resigned, the position of Director of the Geological Survey of Canada was offered to Dr. Selwyn, and he accepted. His work since then is well known; the lines laid down by his predecessor have been carried out to a large extent, but the field has so greatly enlarged that the present system may fairly be said to have originated with Dr. Selwyn. The responsibilities of such a position were very great, and his task had been rendered more arduous by the small sums appropriated by Parliament for the purposes of the survey. A regrettable dissension also at one time greatly added to the difficulties of his position; and this, together with certain ill-advised criticisms, made either in malice or ignorance, which had appeared, caused the appointment of a Royal Commission, in 1884, to enquire into the system and work of the Survey, the report of which silenced these complaints.

"While administering the details of the Survey and Museum, Dr. Selwyn took an active part in the

work of exploration. Amongst the most important of his expeditions were: In 1871 from Victoria, B. C., to the Rocky Mountains by the North Thompson and Fraser Rivers; in 1872 a canoe voyage from Port Arthur to Winnipeg; in 1873 from Winnipeg across the plains to the Rocky Mountains, returning by the Saskatchewan River and Lake Winnipeg; 1875 from Victoria, B. C., to Peace River and return; in 1882 a boat voyage from Port Arthur around the whole northern shores of Lake Superior to Sault Ste. Marie. Besides these long and arduous explorations, Dr. Selwyn made many journeys and geological observations over large portions of every province of the Dominion, and as the foregoing record shows he was actively and continuously engaged in geological work for forty-seven years.

"Dr. Selwyn, as Director of Geological Surveys, on behalf of the government of Victoria, Australia, and later of the Dominion, took a prominent and active part in the collection and preparation of the mineral exhibits at six International Exhibitions: Melbourne-Dublin, 1854-55; Melbourne-London, 1861-2; Melbourne-Paris, 1878; London, 1886. From all these exhibitions he was awarded gold, silver and bronze medals and diplomas. At the Paris Exhibition in 1878 he was elected chairman of the jury on Cartography, and was awarded the Cross of the Legion of Honor, and in London in 1886 that of the Order of St. Michael and St. George.

"Since 1869 he edited and contributed to sixteen volumes of reports with numerous maps and illustrations relating to the structural geology and to the mineral, vegetable and animal resources of the Dominion. He is also the author of the Canadian part of Stamford's "Compendium of Geology and Travel—North America," London, 1883. In 1881-2 he superintended the removal of the Geological Museum from Montreal, and its re-organization on a broader basis in Ottawa, where it now embraces natural history, as well as mineralogy and geology, and has become the most complete existing collection illustrating the natural resources of Canada."

IMPORTS OF PRECIOUS STONES.—Imports of precious stones into the United States for the 10 months ending October 31 are valued by the Treasury Department as follows: Diamonds, uncut, \$5,379,567; diamonds, cut but not set, \$11,592,916; other precious stones, \$3,751,333; total, \$20,723,816. For the corresponding period in 1901 the total value was \$19,895,418; showing an increase this year of \$828,398, or 4.2 per cent.

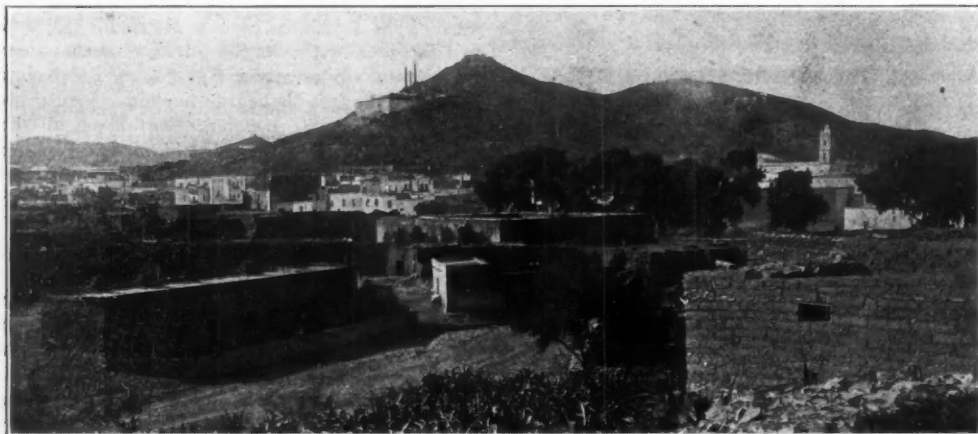
THE MOND NICKEL PROCESS.—In the application of this process to the Sudbury pyrrhotite, the ore is roasted and melted to a matte containing about 20 per cent Cu and 20 per cent Ni, which is then bessemerized to a product containing 48.62 per cent Cu, 31.37 Ni and 0.7 Fe. The matte thus concentrated is dead roasted, and treated with dilute sulphuric acid, whereby about two-thirds of the copper and 1 to 2 per cent of the nickel are extracted. The residue after drying assays 45 to 60 per cent Ni. It is treated in charges of 500 kilograms with water gas in a reduction tower at a temperature of not to exceed 300° C. The tower is 7.5 meters high, and contains 14 hollow shelves, which are heated with water gas to 250° C. The ore is moved from shelf to shelf by means of rakes operated by a vertical axle. The lowest shelves are cooled. The reduced charge is transferred to a similar tower, called the volatilizer, in which the metal is treated with carbon monoxide at a temperature not exceeding 100° C. The residue from the volatilizing tower goes back to the reducing tower. The charge goes back and forth between the two towers for 8 to 15 days. When 60 per cent of the nickel has been volatilized as carbonyl the residue is returned to the roasting furnace. The nickel carbonyl is treated in the decomposing apparatus, wherein the nickel is recovered as granules, which are 99.4 to 99.8 per cent pure. (*Stahl und Eisen*, 1902, XXII, 1082.)

THE PRIETA MINE OF PARRAL, MEXICO.

By L. M. TERRY.

This famous property consists of two mines, the Prieta and Apodoquena, and two fractional claims known as Demasia No. 1 and No. 2, forming a solid claim some 1,140 feet on the vein by 330 feet wide, being situated on the Cerro de la Cruz (or Hill of the Cross), with the main working shaft only about 900 feet to the north of the mayor's office in Parral.

As will be seen from the general view of Parral, which accompanies this article, the Prieta occupies a very commanding position; in fact, dominating the town from all points of view. The altitude of Parral is 6,000 feet above sea level,



PARRAL, LOOKING NORTH. PRIETA MINE ON THE HILL.

while the mine towers some 200 feet above the city itself.

The definite history of this mine extends as far back as 1828, there being in existence deeds to the Prieta executed in that year. And from the general condition of the property above the water level, it seems probable that the mine was worked even before this date. In the years of the mine's greatest activity, there was undoubtedly a large production of silver, the ore being oxidized in the upper workings and therefore easily treated by the patio process, for the records of the Chihuahua Mint (to which all Parral product was then shipped) show that in the years 1850 and 1851 the Prieta shipped over \$175,000 value in silver bars.

At about this time in the history of the mine it seems evident that the miners had practically gutted the workings to and doubtless considerably below the present water level, when, finding the rebellious ore encountered at that point unsuited to their methods of treatment, they stopped work and allowed the mine to flood.

It is stated that the mine lay idle for some 30 years until in 1879 an American company, which had secured control of it, attempted to unwater the property. After some six months' pumping they succeeded in clearing out the water. It seems, however, that nothing of moment was accomplished, for the mine soon flooded again, this probably being due to an insufficient pumping capacity.

In 1887 a native firm made the same attempt, and, with the aid of American mechanics, succeeded in unwatering the property, and holding the water out for a few weeks. Some small amount of cleaning at the bottom of the mine, and entire timbering of the shaft, were about the only results of their labors when they in turn were run out by the water.

In 1898 the present company was organized, and after putting up necessary machinery, succeeded in unwatering the mine to the 327-foot level. Being unable to take out the water below this point (some 50 feet) they operated the mine above the 300-foot level only, shipping altogether about \$60,000 (Mexican currency) worth of ore,

the mine flooding only once during their operations. From a variety of causes, however, all work was stopped on July 8, 1901, and the mine again filled, this time to a point 243 feet below the collar of the shaft.

Matters stood thus until the latter part of the same year, when the company was reorganized, the well-known banking firm of Sperry, Jones & Co., of Baltimore, Md., becoming its fiscal agents, and the present local management went into effect in February of the present year. The writer was placed in charge of local operations as general manager.

At that time the mine was found to be flooded to the 243-foot level, and was reported to have an inflow of 450 gallons per minute. From the

of the old workings were very large, and a great mass of water was contained in the reservoir thus formed, while the steady inflow which was found to amount to 450 gallons per minute, caused the water to rise very rapidly when there occurred any "bucking" of our pumps.

In unwatering this property we used one No. 11 suction condensing Cameron sinker down to the 327-foot level, pumping the water to the tunnel (or 140-foot level), while for the last 50 feet both our No. 11 Camerons were used, throwing the water to the sump at the 327-foot level, and from thence by means of a 16 by 8½ by 12 Snow "Duplex" to the tunnel, from which point the water is conducted through the city by means of a covered drain leading to the Parral River.

The water is now easily controlled by the before-mentioned Snow duplex at the fourth level, being protected by a No. 11 Cameron, and station pump at the 327-foot level. The latter pump is a 20½ and 12½ by 7 by 24 Knowles compound condensing, badly worn, and having been under water since 1888, yet still having plenty of life for the work required of it. The above arrangement is merely temporary, pending the arrival of our new Knowles pumps.

Regarding the Prieta vein, its general strike is N. E. and S. W., being practically vertical to the 300-foot level, and thence dipping to the S. E. at about 80° to the horizontal. The vein matter consists of quartz, calcite, argentiferous galena, argentine, ruby and wire silver, with zinc blende and pyrites, having a general analysis of Zn. 11 per cent, Fe. 9 per cent, SiO₂ 50 per cent, CaO 8 per cent and S 13 per cent, while the country rock, both foot and hanging, is rhyolite. The release between vein matter and the walls is fairly well pronounced, and we experienced no difficulty in determining the extent of the ledge. The average width can be taken at about 9 feet, though in many places it reaches to 15.

Since August 16 we have cleaned out the bottom of the mine, removing a large amount of filling material, etc., and are now driving the drifts in both directions on the vein, having at



PARRAL, LOOKING SOUTHEAST, SHOWING PRIETA MINE IN THE BACKGROUND.

erally overhauling the entire equipment while awaiting the arrival of the new machinery. After rather more than the usual delay one must expect when ordering machinery for this country the necessary changes were completed, and the mine was unwatered without incident, the draining being entirely accomplished by August 16.

The water, which has always in the past seemed to be the unsurmountable obstacle to development of this mine, gave no particular trouble, though from the 327-foot level to the bottom there was necessary much cleaning-out of old timbers, pipe, etc. It is true that the flooded stopes

the present writing (November 15) opened up 115 feet of new drifts. In addition to the above we have sunk our 3-compartment shaft to the bottom (377-foot level) a distance of 50 feet, connecting the same with the fourth level. This work has all been carried on simultaneously, necessitating the hoisting of the ore taken out of the drifts by means of an auxiliary underground hoist to the 300-foot level, and thence to the top by way of the cage. This temporary arrangement for the hoisting of the ore of necessity taken out in the development work, has naturally not allowed the shipment of a very

large amount of ore. However, up to November 15 there was sold over \$31,000 (Mexican) worth of ore.

The opening up of the bottom of the mine has developed, in addition to some 5,000 tons of ore ready to stope down, and lying between the fourth and third levels the top of a solid body of ore some 250 feet long and of a much better grade even than that above.

Possibly the above statement regarding dimensions will not be understood until it is pointed out that the cleaning out of the bottom disclosed a length of old workings 135 feet on the vein, and in bringing the floor down to grade for the track, several railway car-loads of ore of about 60-ounce grade were taken out. The new development brings the length opened up on the vein to 250 feet.

As yet practically no stoping has been done, it being the intention to develop as much ore as possible, while awaiting the conclusion of the shaft timbering, when the mine will produce from 50 to 75 tons per day. This result it is expected to accomplish by the latter part of next month. The shaft sinking is to be continued as rapidly



END OF DRIFT ON FOURTH LEVEL, PRIETA MINE.

as possible, with the intention of cross-cutting to the vein and opening up the block of ground below the fourth level, without loss of time.

In conclusion, the managers feel that the future of the mine is exceedingly bright, for the vein at the fourth level is, as before pointed out, a solid body of good paying grade ore, requiring very little, if any, sorting; the mine's lowest workings are but 377 feet from the collar of the shaft; the water is no longer a necessary factor, other than the pumping cost, and the sinking of the shaft for another 100 feet will doubtless swell the output to 150 tons per day.

A DEEP COAL MINE IN BELGIUM.—The deepest coal pit in the Hainaut Province of Belgium is the Sainte-Henriette, in the Mons District, coal being now raised from a depth of 1,251 meters.

ZINC ORE IN RUSSIA.—Important discoveries of zinc ore are said to have been made in the Government of Vladikavkas, Caucasus, south of the railway station Tarkoch. The veins occur in granite and gneiss, and some of them show a width of 1.5 to 3 meters at the outcrop. The vein filling is quartz, and to a less extent calcite, in which blende together with galena and chalcopryrite are interspersed through the entire width.

IRON AND STEEL EXPORTS AND IMPORTS.

Exports of iron and steel—including machinery—from the United States for the ten months ending October 31 are valued by the Bureau of Statistics of the Treasury Department at \$81,977,545, against \$85,911,774 for the corresponding period in 1901, and \$109,492,127 in 1900. The decrease this year in actual quantities is greater than that indicated by the values given, owing to the generally higher range of prices now prevailing. The chief items of the exports for two years are given in the table below, in long tons:

| | 1901. | 1902. | Changes. |
|--------------------------------|---------|--------|------------|
| Pig iron | 57,804 | 24,574 | D. 33,230 |
| Steel billets and blooms | 27,196 | 2,189 | D. 25,007 |
| Iron and steel bars | 39,115 | 27,204 | D. 11,911 |
| Rails | 285,380 | 65,266 | D. 220,114 |
| Plates and sheets | 28,093 | 15,422 | D. 12,671 |
| Structural steel | 44,267 | 49,783 | I. 5,516 |
| Wire | 70,364 | 83,992 | I. 13,628 |
| Nails | 26,471 | 30,899 | I. 4,428 |

Decreases are shown in this table, except in a few items, in which there is an old and well established trade.

Exports of iron ore for the two months were 86,806 tons, against 60,534 tons last year, showing an increase of 26,272 tons. Most of this ore went to Canada.

The iron and steel exports were 23.6 per cent of the total exports of manufactures for this year.

Imports of iron and steel show a very notable increase this year. For the ten months ending October 31 they were valued by the Bureau of Statistics of the Treasury Department at \$31,987,056, against \$16,349,427 for the corresponding period in 1901; showing an increase of \$15,637,629, or 95.6 per cent. Some leading items of these imports were as follows for the two years:

| | 1901. | 1902. | Changes. |
|----------------------------|--------|---------|------------|
| Pig iron | 39,336 | 406,610 | I. 367,274 |
| Scrap iron and steel | 16,454 | 86,859 | I. 70,405 |
| Ingots and billets | 6,603 | 222,011 | I. 215,408 |
| Bar iron and steel | 17,070 | 23,030 | I. 5,960 |
| Steel rails | 1,085 | 49,388 | I. 48,303 |

The increases shown are due to the enormous demand for materials here, which our own mills and furnaces have been unable to meet for the time. It is, however, temporary in its character.

Imports of iron ore for the ten months were 997,531 tons, against 807,547 tons for the corresponding period last year; an increase of 189,984 tons, or 23.5 per cent. The greater part of the ore imported was from Cuba.

LOSS OF LEAD IN ROASTING PLUMBIFEROUS BLENDE

It is well known that in roasting galena there is a large loss of lead by volatilization, which is the larger the higher the temperature in the furnace. In roasting galena the sulphide of lead goes largely into the form of sulphate which can be completely decomposed only by means of silica, but this involves a high temperature and the loss of lead is so large that the practice of slag-roasting has now been generally abandoned, at least in the United States. The temperature required for the desulphurization of zinc blende is also high and when the ore contains lead, as is the case with most of the ore treated nowadays by European smelters, the loss of that metal by volatilization is also high. What such loss may amount to has recently been investigated by K. Sander (*Berg. und Huttenmannische Zeitung*, LXI, xlv., 561, November 7, 1902.) He has reported the following results:

| Sample | I | II | III | IV | V |
|-------------------------------|------|-------|-------|-------|-------|
| | % | % | % | % | % |
| Loss in weight | 9.90 | 8.60 | 9.65 | 9.70 | 9.80 |
| Lead assay, raw ore | 9.84 | 11.38 | 6.60 | 7.73 | 6.00 |
| Lead assay, roasted ore | 9.88 | 11.47 | 6.10 | 6.93 | 5.20 |
| Lead volatilized, % | 9.53 | 7.88 | 16.44 | 19.05 | 21.80 |

The determinations of lead were made gravimetrically.

The lead in zinc blende exists almost always as sulphide, in the roasting of which oxide and sulphate are formed. The latter compounds react with the still undecomposed sulphide, forming sulphur dioxide and metallic lead, which volatilizes. Lead sulphide and oxide are also directly volatile, though at a higher temperature than the metal.

The volatilized lead is partially recovered in the dust chambers of the furnace (probably to a very small extent, in view of the great difficulty of condensing and settling lead fume), partially by the acid dripping down in the Glover tower, and partially as slime in the acid chambers. Sander considers that the presence of silver in the chamber slime indicates that it must come to some extent from the furnaces, through the Glover tower, and not wholly from the chamber lead, which is usually almost free from silver.

PRODUCTION OF QUICKSILVER IN ITALY.

According to a paper by V. Spirek, presented at the national congress for applied chemistry at Turin recently, there are now at the Monte Amiata five quicksilver works, which have the following equipment: 1. Siele, three Cermak-Spirek furnaces, of 2 $\frac{1}{2}$, 12 and 2 metric tons capacity per day, and three shaft furnaces of 4 to 6 tons capacity per day. 2. Cornacchino, two Cermak-Spirek furnaces (24 tons and 2 tons) and one shaft furnace (4 to 6 tons). 3. Abbadia San Salvatore, two Cermak-Spirek furnaces of 24 tons, two of 2 tons, and two shaft furnaces of 6 tons each. 4. Montebuono, one Cermak-Spirek furnace of 12 tons. 5. Cortivecchie, two Cermak-Spirek furnaces building, one of 24 tons, one of 12 tons. The record of all the works from 1893 to 1901, both years inclusive is as follows:

| Year | Ore tons | Production Average yield % | Mercury tons |
|------------|----------|----------------------------|--------------|
| 1893 | 14,950 | 1.9 | 273 |
| 1894 | 15,022 | 1.7 | 258 |
| 1895 | 10,504 | 1.9 | 199 |
| 1896 | 13,701 | 1.8 | 188 |
| 1897 | 20,659 | 0.99 | 192 |
| 1898 | 19,201 | 0.80 | 173 |
| 1899 | 29,322 | 0.7 | 205 |
| 1900 | 33,930 | 0.75 | 260 |
| 1901 | 35,000 | 0.77 | 271 |

The average value of the quicksilver produced was 4.85 lire per kilogram in 1893, and 4.40 in 1894. Since then it has risen gradually but steadily, to 6.50 lire per kilogram—\$43.50 per flask—the price reported last year.

EXPANSION COEFFICIENT OF CONCRETE.—William D. Pence has determined that the coefficient of linear expansion of concrete is 0.000099 per 1° C. (*Thonindustrie Zeitung*, 1902, XXVI, 1273.)

FUSING POINTS OF REFRACTORY MATERIAL.—W. C. Hereaus has determined the following melting points: Seger cone, No. 36, 1785° C.; Seger cone, No. 37, 1800° C.; corundum, 1865° C. (*Sprechsaal*, 1902, XXXV, 1570; *Chemiker Zeitung Report*, XXVI, xxix, 303.)

IRON AND STEEL EXPORTS OF GREAT BRITAIN.—Exports of iron and steel, and their manufactures, from Great Britain for the 10 months ending October 31 are valued by the Board of Trade returns as follows:

| | 1901. | 1902. | Changes. |
|--------------------|-------------|-------------|---------------|
| Iron and steel ... | £21,186,548 | £23,875,376 | I. £2,688,828 |
| Machinery | 15,019,429 | 15,506,681 | I. 487,252 |
| New ships | 6,983,737 | 5,322,086 | D. 1,661,651 |
| Totals | £43,189,714 | £44,704,143 | I. £1,514,429 |

A considerable part of the large gain in iron and steel was due to the demand from the United States.

MINING MACHINERY EXPORTS OF GREAT BRITAIN.—Exports of mining machinery from Great Britain for the 10 months ending October 31 are valued as follows:

| To: | 1901. | 1902. | Changes. |
|--------------------------|----------|----------|------------|
| European countries | £60,281 | £39,977 | D. £20,304 |
| United States | 915 | 1,228 | I. 313 |
| South America | 31,537 | 31,656 | I. 119 |
| South Africa | 88,462 | 168,144 | I. 79,682 |
| East Indies | 57,148 | 54,887 | D. 2,261 |
| Australia | 113,124 | 75,571 | D. 37,553 |
| Other countries | 63,324 | 73,885 | I. 10,561 |
| Totals | £414,791 | £445,348 | I. £30,557 |

The most notable gain was in exports to South Africa; the heaviest decrease was in those to Australia.

HOISTING FROM GREAT DEPTHS—II.*

BY HENNER JENNINGS.

The problem can be divided into three sections:

1. Sinking the shafts.
2. Winding men and ore from a maximum depth of 5,500 feet, in a vertical shaft, from one fixed permanent station to the surface.
3. Hoisting men and rock through an incline shaft, with a declination of 20° to 30°, the hoisting appliances being placed underground and the power generated on the surface.

In deciding on the type of winding engine required, the main conditions demanded for it are as follows:

1. Maximum safety to life.
2. Minimum running cost.
3. Minimum initial expenditure.
4. Flexibility.

The practicability and safety of using parallel ropes to a depth of 5,500 feet has been shown. To the writer it appears that the analysis of Mr. Behr's paper has proved on theoretical grounds that the best system to adopt for hoisting between two given points is the one where the starting moments, and moments of inertia are the smallest, and the speed most uniform and free from great demands of brake regulation. Certainly these points have been shown to be best met by the Whiting system with tailrope and also from the size of cylinders and drums as used in practice.

The safety of life in winding depends primarily on the strength of the rope and the maintenance of its condition. The breaking of a rope is brought about, as shown by Prof. Undeutsch, by the joint action of static and dynamic strains. The static strains can be taken as constant for any winding system with established factors of safety. The dynamic strains can be brought about by jerky and irregular winding, sudden starting and stopping, and imperfect condition of the hoisting ways in connection with maximum speeds. The smaller the drums and cylinders of a winding engine, and the more uniform the speed, other things being equal, the less liability there is of excessive shocks from imperfect handling by engine attendants. Where an average speed, say, of 2,500 feet per minute is required, the maximum speed is required to be much higher in the system demanding the greatest time for acceleration and retardation. Therefore, on these lines the system giving the greatest security is also the Whiting system.

On the other hand, Mr. Behr has shown theoretically the danger of having negative moments, and, in connection with sinking, the advantages of the conical drum in this regard. Mr. Leggett has also shown the practical danger that exists in connection with the Whiting system when used with drums of smaller diameter. The fact that he was able to sink to the depth of 2,190 feet with drums of only 8 feet diameter, and with 3 wraps of rope around the driving drums is very satisfactory and encouraging for the Whiting system.

In a consideration of that system, the point that presents the most trouble to the writer is the sinking of shafts with safety and speed. The following, however, appears to be a complete solution for our particular requirements for a vertical depth of 5,500 feet.

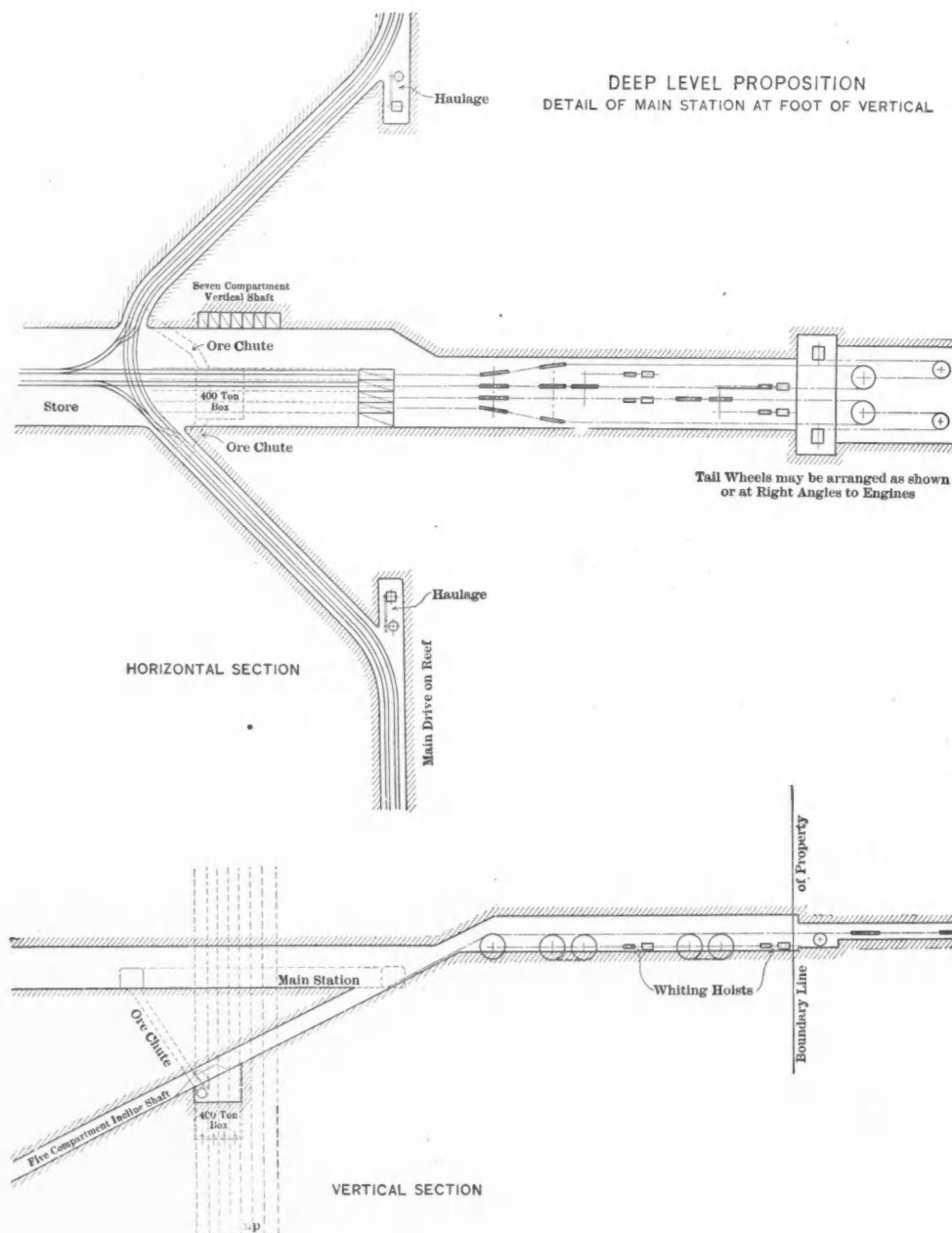
1. Adopt the system suggested by Messrs. Sederholm and Seymour (now being put into effect by the Rand Mines, Limited,) of providing temporary cylindrical drums to go down to a depth, say, of 2,000 or 3,000 feet. Sinking to this depth by this means is one of acknowledged safety, as is seen in the Catlin shaft—3,700 feet. It has been shown that when the reef is intersected, two sets of Whiting engines would be required,

one for men and the other for ore, using the same diameter of rope. Between 2,000 and 3,000 feet, take the cylindrical drums off the engine, use the sheave system with tailrope, and establish a station at a depth of, say, 2,500 feet. At this point start the system with the second Whiting hoist on the surface, and use it simply to hoist a kibble to this established station. By this means we practically adopt a stage-winding system recommended by Mr. Behr, with the difference, however, that we use Whiting hoists instead of conical drum engines, and, when the shaft is sunk, each engine commands the total depth of the shaft without a stage.

It is shown that the quicker the mine is made interest-producing the more valuable become

stages, and to have engines with smaller cylinders than those used with conical drums, and whose work is more uniform, and whose piston speed can with safety be greater. Tandem compound engines, suggested by Mr. Behr, are in use in the Whiting system, and to better advantage than large diameter conical drums, which only use high-pressure cylinders, evidently to secure safety and smoothness of running.

3. As to minimum initial expenditure the Whiting system has advantages in both size of drum, size of cylinders and weight of running parts. The price of the hoist constructed for the Rand Mines is estimated at \$65,475. The writer will leave Mr. Behr to figure out the cost on these fields of an engine similar to that de-



mining claims. By this system of hoisting the reef can be reached more quickly than by any other way, and will justify the difference of cost of double attendants for shaft sinking after, say, 3,000 feet. The danger of serious negative moments will be overcome by the constant length of rope always in the shaft of, say, 2,500 feet, and the latter part of the sinking can, if desired, be done by making the rope taper in parallel rope sections, as recommended by Mr. Behr, from 2,500 feet to the bottom of shaft.

2. Regarding minimum running cost, it is obvious that, for a depth of 5,500 feet, it will be cheaper to keep one set of winding engines running rather than two to do the same work in two

signed by E. P. Allis or Nordberg at Lake Superior, and would like to see estimates for those he would recommend.

4. As to flexibility, for moderate depths, double drum cylindrical and double drum conical engines with hydraulic clutches, etc., might show to advantage when compared with the Whiting system; but for great depths it is seen that all the main winding engines of the world on these systems are made practically inflexible, the moving masses evidently being considered too great to be dealt with by clutches, and the Whiting system is the only one which it seems possible to render flexible for its maximum depth capacity. But it is not a very vital point in this discus-

* In discussion of Mr. Hans Behr's paper on "Winding Plants at Great Depths." Abstracted from paper read before the South African Association of Engineers. Part I appeared in the issue of November 29.

TABULATED STATEMENT OF MR. BEHR'S PRINCIPAL DATA.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|--|-------|-------------------------|-------------|-------------|-------------|-----------------|----------------|-----------|----------------|----------------|-----------------|----------------|----------------|-------------------------------------|-----------------------|----------------|------------------|
| Case | Type | Depth | Output | Wt. of load | Wt. of rope | Wt. of skip | Starting moment | Maximum moment | I of drum | I of accel | Time to accel | Time full speed | Time to retard | Running time | Total time including stop and start | Max. velocity | Stress in rope | Factor of safety |
| | | s | q | w | P | F | M ₁ | I | I | t _a | t _s | t _r | T | V ₁ | | | | |
| I | Plain cylindrical drums, no tail rope, 10 ft. dia. par'l rope. | 2,000 | 120x24 = 2880 | 6,000 | 3,600 | 4,000 | 80,400 | 121,562 | 2x10,000 | 40,132 | 7.7 | 46.3 | 9 | 63 | 90 | 36 f.p.s. 2160 f.p.m. | 30,000 | 7 |
| II | Plain cylin. 12 ft. dia. drums no tail rope as in case I. | 3,000 | 120x24 = 2880 | 8,100 | 9,000 | 5,400 | 165,000 | 249,475 | 2x20,000 | 86,655 | 7.6 | 72.3 | 12.37 | 92.27 | 119.27 | 36 | 30,000 | 7 |
| III | Cylindrical drums 12 feet diameter taper rope. | 3,000 | 120x24 = 2880 | 8,100 | 7,160 | 5,400 | 152,780 | 230,960 | 2x20,000 | 82,515 | 7.4 | 73.5 | 10.46 | 91.36 | 118.36 | 36 | 30,000 | 7 |
| IV | Cylindrical drums 12 feet diameter parallel rope tail rope. | 3,000 | 120x24 = 2880 | 8,100 | 9,000 | 5,400 | 98,370 | 148,750 | 2x20,000 | 96,780 | 12 | 72 | 7.33 | 91.33 | 118.33 | 36 | 30,000 | 7 |
| V | Conical r = 4, R = 7.8 taper rope. | 3,000 | 100x24 = 2400 | 6,000 | 6,600 | 4,000 | 76,900 | 116,270 | 2x40,000 | 110,600 | 23.21 | 40.56 | 16.58 | 80.35 | 107.35 | 68.2 | 30,000 | 7 |
| VI | Same as V, but only one drum in use. | 3,000 | 52x24 = 1248 | 6,000 | 6,600 | 4,000 | 89,200 | 116,270 | 45,000 | 57,200 | 23.72 | 45.39 | 6.19 | 75.3 | 102.3 | 60.8 | 30,000 | 7 |
| The available starting moment with valves set as in case V is less than that required 3648 in this case, but if valves were set to give full crank leverage the available moment would be 96,125. | | | | | | | | | | | | | | | | | | |
| VII | Conical r = 5, R = 8 taper rope. | 3,000 | | 6,000 | 4,392 | 4,000 | | | 2x40,000 | | | | | | | | 35,000 | 7 |
| VIII | Conical flat end r = 4, R = 7, parallel rope. | 3,000 | | 6,000 | 6,634 | 4,000 | | | 2x40,000 | 106,000 | | | | | | | 30,000 | 7 |
| IX | Conical r = 5, R = 13, taper rope 4 sections. | 6,000 | 100x24 = 2400 | 10,000 | 18,676 | 6,600 | 202,000 | 305,420 | 800,000 | 940,000 | 52.39 | 59.87 | 38.57 | 150.83 | 177.83 | 69.6 | 35,000 | 7 |
| If the max. shaft velocity were reduced to case V the load would be double ca se V and the engines would be three times case V for unbalanced load must use high pressure in all four cylinders. | | | | | | | | | | | | | | | | | | |
| X | Conical two engines, r = 5, R = 8, taper rope. | 6,000 | 99.3x24 = 2383 & 2,820 | 6,000 | 5,280 | 4,000 | 86,000 | 130,030 | 2x40,000 | 123,000 | 24.53 | 39.06 | 18 | 81.59 | 108.59 | 60.6 | 35,000 | 7 |
| Cannot start full unbalanced skip in up per stage nor empty unbalanced in lower. | | | | | | | | | | | | | | | | | | |
| XI | Cook's system, r = 5, R = 8, taper rope. | 6,000 | 106.8x24 = 2563 & 3,000 | 6,000 | 10,354 | 4,000 | 156,250 | 236,245 | 2x60,000 | 197,000 | 21.52 | 38.3 | 14.16 | 73.98 | 100.98 | 61.12 | 35,000 | 7 |
| If this capacity were reduced to equal case X engines would only be 70% larger than X instead of 80% as now, for raising full unbalanced load conditions are better than X. | | | | | | | | | | | | | | | | | | |

TABULATED STATEMENT OF MR. ROBESON'S PRINCIPAL DATA.

| | | | | | | | | | | | | | | | | | | |
|-------------------------|--|-------|-------------------|-------|--------|-------|---------|---------|--------|---------|-------|-------|-------|--------|--------|----|--------|---|
| Whiting A Rand mines | Whiting r = 6 parallel rope, tail rope | 5,000 | 109.6x24 = 2630.4 | 8,000 | 17,916 | 4,000 | 98,186 | 148,450 | 33,334 | 109,098 | 21.3 | 70.6 | 12.2 | 104.1 | 131.1 | 56 | 35,000 | 7 |
| Whiting B V | Whiting r = 6 tail rope | 3,000 | 107.7x24 = 2584 | 6,000 | 7,250 | 4,000 | 73,187 | 110,656 | 33,334 | 81,273 | 17.36 | 44.24 | 11.44 | 73.04 | 100.04 | 50 | 30,000 | 7 |
| Whiting C IX | Whiting r = 6 tail rope | 6,000 | 104x24 = 2496 | 8,000 | 21,500 | 4,000 | 100,875 | 152,520 | 33,334 | 117,120 | 25.24 | 73.20 | 14.32 | 112.76 | 139.76 | 63 | 39,000 | 6 |
| Whiting D Kimberley | Whiting r = 5 tail rope | 1,500 | 254x24 = 6096 | 9,600 | 5,250 | 7,280 | 82,431 | 124,633 | 30,759 | 71,787 | 20.36 | 7.85 | 11.77 | 39.98 | 66.98 | 60 | 25,760 | 8 |

sion, for in vertical shafts, as it is seen, there is no necessity for flexibility after sinking is done, beyond taking up the strength of the rope. . .

It may be urged that the Whiting hoist is not as advantageous in sinking as the conical drum hoist; that in sinking it is less flexible, as the Whiting would always require the use of two skips, and, if one got out of order, work could not be continued in one compartment. This is true, of the conical system if simply for moderate depths, but for great depths the designs of the hoists show that only one skip could be used, and that it would always have to run unbalanced, for, without clutching arrangements, how is it possible to run unbalanced skips to advantage? There would be no provision in the one fixed drum for varying the lengths of the rope as depth was attained, and consequently, it would take twice the running time of the engine to clear out the rock at the bottom of the shaft, than would be the case in the balanced load with two skips and the Whiting engine. This would also apply when dealing with large quantities of water. Again, the Whiting system, by its take-up arrangements, composed of a sheave on a movable carriage, running on a track, and adjusted by means of a small steam winch, can use balanced skips with ease and advantage for sinking to a depth of 5,500 feet, and an accident necessitates no greater stoppage than with the large conical drum system:

The disadvantages that have been noted in connection with the Koepe system have induced the writer to prefer the Whiting system. He also agrees with Mr. Behr that the flat rope system is "out of the running" on account of the great difficulty in the manufacture and upkeep of the

ropes, and it is probable that higher factors of safety will be required with such ropes, even if they are made tapering.

Regarding the tandem stage winding, known by some as the Cook system, Mr. Behr's criticism of this seems very just. The necessity of cutting expensive underground stations, equality of lift for rock and trans-shipment of men and material, in connection with its unsuitability for sinking and handling water, render its consideration for a depth of 5,500 feet out of the question. If used at all, it can be operated by the Whiting system as advantageously as by conical drum hoist down to a depth of, say, 6,000 feet.

The next problem to deal with is the hoisting of ore, men, etc., through the incline to the vertical shaft. An arrangement of the station near the bottom of the vertical shaft is shown in the diagram given herewith. Here it is assumed that the Whiting hoist system will be used in the incline as well as in the vertical, though in the former case it will be necessary to drive it either electrically or by compressed air. The sinking of the incline shaft would be preferably accomplished by a small sinking engine, with a capacity of winding from a depth equal only to the distance apart of the established levels. The distance between these levels might be left to the discretion of the manager in accordance with the mining conditions met with, but probably will not be closer than 200 or 300 feet. By this system the Whiting hoist could always run with tailropes and the take-up gear at the back could be made to deal with simply two or three levels, and thus a cross-cut into the barren footwall would only be required to be some 300 or 400 feet long.

Regarding the relative advantages of using electric or compressed air power, it can be stated in favor of electric power that it can be supplied in connection with the generating plant which will probably deal with the pumping problem for the mine, and, further, the electric power might cost less for installation and give higher efficiency, than the power generated on the surface by air-compressors and sent underground to the same point.

In connection with compressed air, it can also be said that it would be supplied by the installation required for running rock drills, and that the tendency in using it will be to lower the temperature in the vicinity of the engine driven by it, whereas the use of electric power would be to raise the temperature of the mine in the vicinity of the motor.

Hoisting engines with compressed air motive power will be in principle and design similar to steam hoisting engines, and therefore their efficient operation is better understood and more certain than that of an electric plant.

Regarding the probable cost of winding from great depths, Mr. Behr gives us no light, and admits his inability to even compare the steam consumption of different winding engines. He says: "Considerable uncertainty prevails, however, as to the actual steam consumption of steam-winding engines. The writer is not aware of any published reports of reliable tests."

The costs of hoisting vary greatly in different districts, and in different mines of the same district, and are dependent upon so many factors that it is difficult to arrive at reliable definite estimates for hypothetical cases. Regarding the cost of hoisting at some of the mines on the

Witwatersrand the accompanying table gives details.

This table gives rather a heterogeneous mass of data for guidance. However, it can be seen that for depths down to about 1,000 feet, the average cost can be taken at about 14 cents per ton mined, and 26 cents per ton milled. The hoisting costs at the De Beers Consolidated Mines will be a further guide; in July, 1899, the total expenditure for hoisting about 227,000 tons from an average depth of 1,350 feet from two shafts, the De Beers and the Kimberley, averaged 14 cents per ton. For great depths it is obvious that the cost connected with the use of so many and such large engines as would be required would be serious.

The hoists for men should all be constructed with great reserve engine power, and, for practical reasons, the same sized ropes and drums should be used as in hoists for ore, though they would run at a lower speed. For the winding between 5,500 and 8,000 feet, at least 13—and possibly 15—engines would be required, and these would certainly develop a maximum of 10,000 horse-power, and if all were running at once would demand very extensive boiler capacity.

If it is assumed that the cost will increase in direct proportion to the depth, we should have the average depth of 6,500 feet, which compared to 1,000 would equal \$1.10 per ton milled. This, however, is not a fair estimate, as the cost of attendance on engines, and some general expenses, would be constant, the class of engine used more economical, and the output per engine larger. But, even with these considerations, the writer doubts the wisdom—when all ropes, repairs and renewals are taken into account, of estimating on a less cost than 60 cents per ton milled.

The most interesting and insistent recommendation of Mr. Behr is the claimed necessity for the use of taper ropes. The theoretical advantages of taper ropes in hoisting are fascinating, especially in combination with conical drums, but before they are accepted there are some very practical facts to be faced. In the first place, taper ropes have not been used in hoisting from such depths as would crucially test their efficiency. From the whole history of hoisting plants, Mr. Behr can give but two illustrations of their use, one at the Comstock, the other at Przibram. He admits that they were unnecessary in the first case named, and the depth at which the taper ropes were used at Przibram was only 3,900 feet. It will be seen from the "Hauling Statistics," which have been given in Part I, that the smallest diameter of rope used, even at depths less than 1,000 feet, and with live loads of 2½ to 3 tons, is 1½ inches. With huge drums, and consequently big engines, the shocks and vibrations are intensified, so that to withstand the latter safely, a rope should, to commence with, be not less than, say, 1¾ inches diameter for a load of 4 tons. Grant this and refer to the tables, where it will be seen that the static strength of such a rope, even if made parallel, will hoist a live load of 4 tons and skip of 5,000 pounds from a depth of 4,000 feet with a safety factor of 6. Now at such a depth as last named, what are the advantages of taper ropes? Parallel ropes have been used to 5,000 feet, whereas taper ropes have never been used beyond 4,000 feet depth.

The final result of the writer's investigation of Mr. Behr's paper has strengthened his convictions that the best system of hoisting for the exploitation of the ore of the Witwatersrand mines to the maximum depth at which it can be made to pay, will be as safely, more economically, and with smaller first cost, accomplished in connection with the Whiting system than with any other; while admitting certain defects in that system, they are more apparent for shallow and moderate depths than for great, and it is beyond 2,000 feet and down to 5,500 feet that the chief advantages of this system have, it is trusted, been demonstrated.

THE CERRO DE PASCO COPPER MINES

We have heretofore noted the sharp and generally very correct estimates of mining properties made by the Special Commissioner of the London *Economist*. His latest article is on the Cerro de Pasco Mines in Peru, and the paper contains so much that is new on the famous deposit, that we reproduce it below in full:

The value of the golden treasure of the Incas of Peru, which Pizarro and his merry men appropriated for themselves and for their royal master, the King of Spain, was, I believe, greatly exaggerated. The average value of their bullion, from relics I inspected, could not have been more than 700 fine, equal to, say \$14 an ounce, and I should be surprised if the whole of the gold taken from the country amounted to \$50,000,000. As the Incas' Kingdom embraced not only modern Peru, but Ecuador and Northern Chile as well, this relatively small quantity of gold might easily have been collected together from alluvial areas within its boundaries. Peru, for all its mineral wealth, is a country in which gold-bearing deposits are few and far between. The Spaniards soon found this, and without more ado proceeded to work the many rich silver mines which abounded in the higher regions of the Andes.

In the year 1630, an Indian, prospecting in the mountains at a height of 15,000 feet, discovered a new silver mine—the mine of Cerro de Pasco—which ever since then has been a great silver producer, and is still unexhausted. But not only was this a silver mine; underneath its deep layer of silver ore lay almost equally vast areas of copper ore, and quantities of lead, bismuth, manganese, gold, and almost every known metal. In fact, it is no exaggeration to say that to this Indian we owe the discovery of one of the greatest and most valuable ore deposits the world has known.

We pass an interval of over 250 years. Slowly over that period was being excavated, by Indian labor, the present great quarries of the Cerro. Millions of tons of ore had been taken away. The poorest was treated by crude processes on the spot, the richer was carried on the backs of llamas to lower altitudes, where probably a higher extraction was secured. But only silver was mined. Then, a few years ago only, the deeper workings in the silver ore penetrated down into an area of copper ore, which was found to be of unusually rich value, and apparently of great size. And to-day Cerro de Pasco is a copper mine—perhaps the greatest there is. One forgets that it has been a great silver mine for 270 years, and the huge quarries from which the silver ore has been taken seem only a natural preparation for reaching the wealth underneath. This is not the day of silver. I suppose there are many hundreds of thousands of tons of silver ore still left in the Cerro quarries. The best is gone, but that remaining will, at a guess, average 9 ounces a ton. This is too poor to treat alone, but as a flux for the copper ore may yet be an asset of great value.

The ore deposits at Cerro de Pasco cover an area equal to probably one square mile. This, when the copper zone was discovered, was split up among hundreds of different owners, and the mining work was done on contract for these owners by Indians. Before long, a hundred tortuous spiral stairways had been sunk into the copper, and the natives, having gouged out the richest patches of the ore, were carrying it on their backs to a hundred dumps on the surface. These dumps represented such a big underground area of copper ore, that the interests of the few mining men who visited the field were deeply roused; the more so, when it was found that their average value was fully 25 per cent in copper, to say nothing of gold and silver as well. Inspection of the mines, or rather caverns, which the natives had made, showed that not only was the supply of 25 per cent ore very great, but the average of

the whole bulk of the ore was so high as to be practically unheard-of hitherto in a big copper deposit.

A few years ago, after the great value of this copper mine had been demonstrated, and when the many small owners of the area were sending away their picked ore on the backs of thousands of llamas, there came a certain one to the authorities of the Peruvian Corporation—which is a London concern, bound up in the development and furtherance of Peru—and this is what he said: "Gentlemen, your company has not prospered of late. Your railways pay indifferently, and your sugar estates not at all. Peru is falling into disrepute, and your Corporation along with it. But there has lately been brought to notice on the Andean Plateau the most wonderful mine in South America. Its area is split up among many small owners, but it is quite certain that the whole of it, or, at least, nine-tenths, can be bought for a mere fraction of its intrinsic value. Your railway to Oroya taps this country. By extending the railway 80 miles over the Plateau, you can reach the mine itself, tapping a flourishing agricultural and mining district; and this great property and its traffic will become yours for a mere song. I beg of you to have this scheme examined, for assuredly it will make your fortune." But to him answered the mouthpiece of the Peruvian Corporation: "Young man, do not raise your voice within these portals. Our directors are at present enjoying their afternoon sleep. They are not so young as they were; nor so eager to go into new ventures. Where could we raise so much money to build a new railway? Moreover, we do not share your belief in the value of Cerro de Pasco. Good afternoon." And so, once more, the lethargic, self-satisfied Englishman threw away a great opportunity, and, in due course, a syndicate of Americans, having at its head the greatest metal mining capitalist in the United States, appeared on the scene, and promptly bought the whole thing up. Its first purchase consisted of about 85 per cent of the Cerro area, for which it paid, I am informed, about \$3,000,000. Since then, it has acquired still more of the ground, paying proportionally a higher price. The American Syndicate expects to spend a total of \$7,500,000 over the next three or four years before producing a ton of copper.

From that we may infer what the shrewdest copper experts in the States think of the Cerro—also what the Peruvian Corporation has missed. At present the Syndicate has only the mine—which is more like a rabbit warren underground than a copper mine; they have to develop this, to import a staff from the States, to build a railway, and finally to erect a huge smelter capable of dealing with such a vast deposit. As regards the railway, this will probably run from the terminus of the Lima-Oroya line, and will have to be over 80 miles in length. The Cerro de Pasco Syndicate will no doubt insist on leasing the Lima-Oroya line from the Peruvian Corporation at its own price; failing this, it would build a new line to Cerro from the coast, and take all the traffic from the inert London company. This railway should be built in two years, and after that, the erection of smelters and the completion of the mine's development should be rushed ahead rapidly.

My impressions of Cerro de Pasco are fresh. I inspected the mine in August, and though able to go through only a fraction of the caverns, which the last few years' work has seen made in the copper ore, I gained the clear opinion that here is certainly the richest and perhaps even the greatest copper mine in the world. The depth of silver-bearing ore found on the surface probably averages 200 feet. Below this comes the copper zone, its depth is, I believe, not yet determined, but it is probably almost as much as this. Heaven only knows what may lie beneath that again. The remarkable fact about these huge patches of copper ore is their richness. The

Indians mined only the best ore. What they have sent away hitherto has averaged 25 per cent. Most of what they reject as too poor appeared to me to average 12 to 15 per cent, and of this there seemed to be millions of tons. Of course, it is too soon yet, pending extensive development and blocking out of ore, to say what there actually is in the mine—the square mile or so over which the patches of ore are found; but I do not see why, in a few years' time, the Cerro de Pasco Mine should not be producing something like 4,000 tons of copper a month. Compared to Cerro, the best mines at Butte are poverty-stricken, and in five years or so, when such great present producers as Anaconda are nearing their end, this big yield from Peru will more than make good any deficiency that may happen to the States' output. Geologically, much will be written in the future about Cerro. Here and there patches in the copper zone, carrying, instead of or in addition to copper, manganese, bismuth, of high grade, lead, and other unusual compounds. In all the ore there is an appreciable quantity of silver, and in certain areas gold values are found running to several ounces to the ton. Altogether, from a mining point of view, it is simply a marvelous spot.

The town of Cerro de Pasco is the highest in the world. The altitude is very severe on a white man, and in going through the mine I had to rest every few steps to recover breath. This matter of altitude is, of course, a severe drawback to the place. It would ruin a smaller mine altogether. Out of every hundred picked men sent to Cerro one-third will not be able to stand the climate, and most of the rest will never be at their best, mentally or physically. For this reason, working costs will be high. Mining will be dear, because of the expense of taking out big flat bodies lying under the friable zone of silver ore. But then, again, what does that matter?—the ore will average 12 per cent copper, and can be treated on a vast scale. The mere brute force of value is enough to override far worse difficulties than this.

GOLD PLACERS IN WESTERN ONTARIO.*

Fine gold was discovered in 1896 in gravel along the banks and in the valley of the Vermilion River, and an examination of the deposits was made in the spring of the following year by Mr. Arthur H. Gracey, whose report was published in the annual volume of the Bureau of Mines for 1897. Mr. Gracey found the auriferous gravel widely disseminated in the basin, both of the Vermilion and Wahnapiatae rivers, and also on the banks of Lake Onaping, but the gold was mostly in fine colors and the average value of the gravel low, not more than a few cents per cubic yard. Richer deposits were found carrying as much as 50 cents or \$1 per cubic yard, but, on the whole, the beds appeared to be too low in gold contents to admit of profitable working, at any rate by hand, and ordinary hydraulic methods were precluded, a sufficient head of water not being obtainable on the rivers. A closer investigation was made of these placer gravels by Dr. Coleman, whose account was printed in the Bureau Report for 1900, and who found them to extend much farther north than the area examined by Mr. Gracey. More or less work had been done by prospectors during the intervening years, and it was therefore possible for Dr. Coleman to form some opinion as to the value of the field as a whole. The conclusion at which he arrived was that the gold being very fine and apparently nowhere concentrated in deposits which could be worked by hand, the scope for profitable operations was limited. It would probably be found, Dr. Coleman thought, that only the gravels from Meteor Lake, on the height of land, southwest to

Dawson City on the Vermilion were deserving of attention, the beds over this stretch extending along the river for 40 miles and having a breadth of 1 mile and sometimes of 2 or 3 miles. He agreed with the suggestion made by Mr. Gracey and others that the most promising method of treating the gravels was by dredging, for which the conditions were eminently suitable, provided the gold contents proved to be sufficient. As to the origin of the gold, Dr. Coleman regarded the quartz veins or stringers in the Huronian rocks to the northeast and north as the most probable source, and deemed it likely that the auriferous gravels had been brought a considerable distance, probably by glacial action.

During the past year Mr. Robert H. Ahn, of Toronto, has been experimenting with these gravels with the view of recovering the gold by a combined amalgamation and cyaniding process. A small plant was erected on the banks in Hamner township, which, according to Mr. Ahn's statements has proven the practicability of his method. The gravel is first screened down to about one-fourteenth of the original bulk, this residue containing all the gold obtainable without crushing. The treatment was described by Mr. Ahn in the ENGINEERING AND MINING JOURNAL, March 1, 1902, page 319.

Deposits of gold-bearing gravel, apparently somewhat similar in character to those of the Vermilion River, were discovered last year on a large body of water known as Savant Lake, north or northeast of Sturgeon Lake, where gold exists in quartz veins and in dikes, and about 120 miles north of Ignace station on the Canadian Pacific. Ignace is about 150 miles west of Port Arthur. The gravel beds are described by Mr. Alan Sullivan, who made a hasty examination of them in the summer of 1901, as extending over a length of at least 6 miles and a breadth of 1 mile; the average value of the gravel within this area, as shown by numerous pannings from the surface, being about 8 to 10 cents per cubic yard. A number of islands which run in a range down the middle of the lake are entirely of gravel, and vary in height from 25 to 100 feet. Mr. Sullivan did not reach bed-rock at any place, and was therefore unable to say whether there is any concentration of values at that point. The gold is not light and flaky, but in small rounded particles, and large boulders are conspicuously absent. It is possible that some further investigations of this region may be made shortly.

A NEW METHOD OF COPPER MATTE CONCENTRATION.

Thofehrn and St. Seine propose to blow a mixture of air, superheated steam and silica upon a bath of molten matte or crude metal in a reverberatory furnace. The result is a rapid oxidation and scorification of the metals to be removed in the zone of action of the tuyeres without any mingling of the slag with the bath, the action of the blast being to drive the slag toward the skimming doors and keep the bath of metal in the blast zone quite uncovered. Nor does the scorification take place at the expense of the walls and the hearth of the furnace. The method is applicable to furnaces of large size, it being possible to refine charges of 100 tons or more in a comparatively short time.

In the concentration of matte containing 33 per cent Cu a rather large proportion of silica is used at first in the blast. The oxidation and scorification proceeds very rapidly. The fusible slag collects on the surface of the bath outside of the blast zone, protecting the walls of the furnace, and drifts toward the skimming doors. In a properly designed furnace the most of the iron is slagged and the sulphur driven off as dioxide from a charge of 50 tons in about 6 hours. The product being then a regulus with about 80 per cent Cu, the proportion of sand in

the blast is reduced, or it is used intermittently, to slag the remainder of the iron and burn off the last of the sulphur, while antimony, arsenic, phosphorus and similar impurities are converted by the hydrogen of the steam into volatile compounds and are thus eliminated. There is obtained finally a copper bath with about 99 per cent Cu, which can be cast into anodes, or if it be free from gold and silver can be further refined in the usual manner. If the mattes be auriferous, its gold contents collect in the copper first precipitated, which takes place shortly after the bath has been brought to the stage of white metal. By tapping off the first tenth or eighth of the copper almost all of the gold will be found therein.

Black copper and nickel matte can be refined in a similar manner. It is claimed that metallic nickel sufficiently pure for the trade can thus be obtained. This process is described in the *Oesterreiches Zeitschrift* for November 1 last.

COST OF QUICKSILVER FLASKS IN SPAIN.—The contract for the supply of quicksilver flasks required by the Almaden mines during the next eight years has been awarded to a Spanish concern at the price of 6.10 pesetas per flask.

ZINC OXIDE EXPORTS.—Exports of zinc oxide from the United States for the ten months ending October 31 were 9,065,747 pounds, which compares with 7,614,400 pounds in the corresponding period of 1901; showing an increase of 1,451,347 pounds, or 19.1 per cent. The average value of the oxide exported this year was 4.07 cents per pound.

IRON ORE IMPORTS OF GREAT BRITAIN.—Imports of iron ore into Great Britain for the 10 months ending October 31 were as follows, in long tons:

| | 1901. | 1902. | Changes. |
|-----------------------|-----------|-----------|------------|
| Spain | 3,944,405 | 4,362,741 | I. 418,336 |
| Other countries | 661,229 | 952,444 | I. 291,215 |
| Totals | 4,605,634 | 5,315,185 | I. 709,551 |

The other countries include Greece, Algeria, Sweden, Norway and Newfoundland.

COST OF ELECTRICAL POWER PLANT.

—According to the *Electrochemical Industry*, I, iii, 84, the complete investment of the Michigan Lake Superior Power Company at Sault Ste. Marie, Mich., is \$4,000,000, which is about \$135 per kilowatt of capacity. The plant is described by Prof. Joseph W. Richards in the same journal, pages 85 to 88. The St. Mary River furnishes a head of 20 feet and a minimum discharge of 3,600,000 cubic feet per minute, representing a total of 135,000 horse-power. Since only 18 feet of head can be utilized and there are losses in the mechanical and electrical conversion the available electric power is about 110,000 horse-power. The present utilization comprises the 20,000 horse-power plant on the Canadian side and the new 40,000 horse-power plant on the American side. The American power canal is over 2 miles long, 200 feet wide and 25 to 27 feet deep, cut partly through red sandstone and partly through red clay. It is capable of delivering about 20,000 cubic feet of water per second. It cost \$3,000,000. The power house is 1,340 feet long, 87 feet wide and 107 feet high. It is divided into 80 sections, for each of which there is a set of four 125 horse-power turbines driving a 500 horse-power dynamo. The power house, with docks and equipment, cost \$1,000,000. Estimating interest on the investment at 10 per cent, cost of maintenance and labor at 2½ per cent, and depreciation at 2½ per cent, the power should be furnished at \$15 per electrical horse-power per year. It is stated officially that industries which contract for power at \$20 per electrical horse-power per year will be furnished with sites free, and will be exempted from borough taxation for five years.

* From Report of the Bureau of Mines of Ontario, 1902; Thomas W. Gibson, Director of Bureau.

THE CANANEA COPPER DEPOSITS, MEXICO.

By WALTER HARVEY WEED.

The Cananea deposits are situated in the range of that name 30 miles south of the International boundary and about 45 miles southwest of Bisbee, Ariz. The locality is now accessible by rail from the main line of the Southern Pacific at Deming or Benson, over the El Paso & Southwestern to Naco on the International boundary, where connection is made with the Cananea Railroad. This railroad traverses an open, well-watered prairie land, the average elevation of which is 5,000 feet above sea level. The mountain range rises abruptly from the broad mesa levels, which have a nearly uniform 2 per cent grade. They are trenched by the streams, whose diverging branches have cut broad and shallow valleys in the basal mountain slopes, and concentrate in trunk channels which are 100 feet or less below the level of the plain. Nearing Cananea the broad and gently sloping plain shows a scattered growth of yuccas in a stony or gravelly soil, replaced as the town is reached by scrub oak trees.

My observations on the Cananea Range were made while riding over the trails to Puertecitos and returning by wagon road, so that no pretension is made to accuracy in the accompanying cross sections (Figs. 1 and 2), which are given as diagrammatic representation of hasty observations.

The mines are situated on the northern slopes and watershed of the Cananea Range, a group of mountains 6 to 10 miles wide and about 25 miles long, running in a general northwest and southeast direction. The mines are located in the southern half of the range upon a great mineral belt or zone running with and along the range, from its southern extremity to Puertecitos Pass, the deep gap that divides the mountains into two distinct portions. This range consists of the denuded and dissected remains of an old volcano. Near the central dividing gap there is a

massive igneous rock, forming the mountains, presents few good natural exposures of the rocks, though there are many outcropping ledges of the metal-bearing vein-stuffs. The wagon roads and the narrow-gauge railroad almost encircle the range, and give excellent exposures of the rocks, which are supplemented by the sections in the mine openings. It is evident, from the character of these rocks and their relation one to the other, that a volcano broke out in a mountainous mass of Carboniferous limestones and shales, which were covered up by volcanic ashes and lava flows, and later sufficiently eroded to expose the deeper rocks in the mountain area.

Between the Elenita Mine and the Puertecitos group, the most northerly property of the company, a wagon road has been blasted out of the

are probably the largest contact deposits yet discovered. The contact ores are not, however, confined to the immediate proximity of the eruptive mass, but also occur in upturned beds between altered limestone strata.

There is a belt of contact metamorphic rocks extending from the Cobre Grande on the southeast, to the Puertecitos on the north, a distance of about 8 miles. These rocks do not all contain ore, but it occurs localized along favorable beds. This mineralization is especially great at the southeast end of the range. As the outcrops have been weathered and leached they now form great ridges of gossan. The Democrata is the most easterly, and between this and the Capote vein there is the Veta Grande, a big iron vein, and a large number of small veins in the lime-

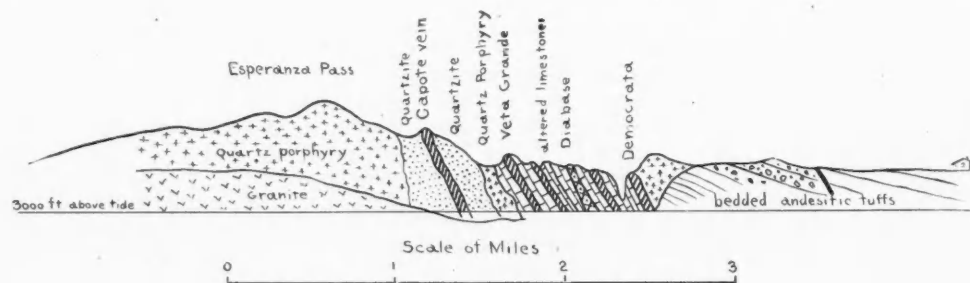


FIG. 2.—IDEAL DIAGRAMATIC CROSS-SECTION THROUGH RONQUITTS GROUP OF MINES, CANANEA.

side hill, exposing fine sections of hornstone, adinoles, impure marbles and other rocks of original sedimentary origin altered by contact metamorphism. These rocks show distinct bedding planes, adjacent beds often being of strongly contrasting color and composition. They are cut by dikes of white aplitic granite. This series prevails along the road to the Puertecitos mines, the strata dipping north. The outcrops and road cuttings show much copper, mostly as green stains.

stone series, while in the porphyry and quartzite to the west the Oversight and Capote mines are found.

The Capote ore-body consists of a mass of quartzite and crushed porphyry altered to a white clayey material and carrying scarf-like masses, strings and bunches of soft black copper glance, with some residual pyrite. The southwest and southeast part of the ore-body consist of a shattered mass of quartzite, whose joints, fissures and

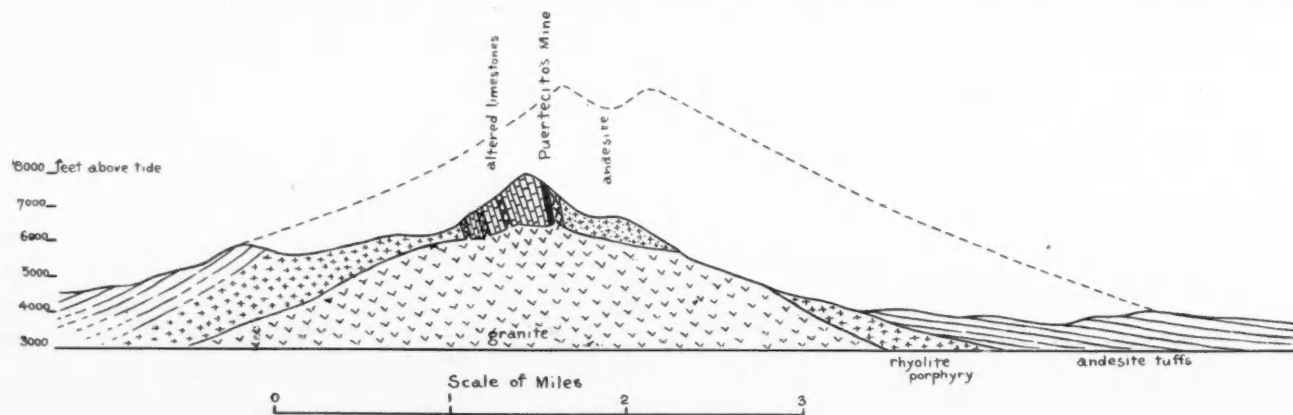


FIG. 1.—HYPOTHETICAL DIAGRAMATIC CROSS-SECTION THROUGH CANANEA RANGE.

great mass of hornblende granite occupying the center of the old volcano, forming its core, and encircled by andesitic porphyries of various kinds, and by massive crystalline rocks of similar composition.

The granite core is seen near Puertecitos, surrounded by massive andesitic and dioritic rocks. The main crest and summits of the range consist of quartzites, hornfels, marble, adinoles, etc., formed from sandstones, shales and limestones, and cut by andesites and quartz porphyries. The character of these rocks and their relation one to the other show the region to have been one of intense volcanic activity. The bedded andesitic tuffs and breccias, forming the lower foothills and mesas to the east of the range, are the ejected rocks and andesitic ash of the old volcano, whose core is now dissected and carved into a mountain range without a suggestion of its old form. The outlying fragmental rocks are well exposed but the complex of altered sediments and

The Puertecitos mines show great outcrops of garnetiferous rock carrying copper carbonates, oxide and the native metal. That this is derived from veins of chalcopryite ore is shown by the working tunnel of the Cananea Mine, where a vein 30 feet wide consists of an upward stratum of altered impure limestone heavily charged with chalcopryite and zinc-blende. This bed occurs beneath a layer of white marble. The entire section seen along the road is one typical of contact metamorphism in which the pure limestones have changed to marble, and the impure argillaceous limestones and the shales to mixtures of garnet, epidote-calcite and other contact minerals.

The ore bodies of the Cananea consist of great masses of chalcopryite (and its secondary products, glance, malachite, cuprite, native copper, etc.) occurring in the altered sedimentary rocks, and in veins or shear fractures in which secondary concentration has occurred. These

interstices are filled by ore. This crushed material has all the characters of an interfault mass, but no boundary fault slips were observed, and where the boundary of the ore was seen the transition to solid and lean quartzite or pyritized porphyry was very abrupt. The evidences that the glance is of secondary origin are clear and conclusive, both in the faces seen in the mine and in their sections of the ore, where the disseminated pyrite grains (of an altered porphyry, forming a dike in the quartzite of the ore body) are partly replaced by glance. The ore-body is very large, measuring 275 feet by 135 feet on the 100-foot level, and 165 feet by 100 feet on the 200-foot level. The ore is soft, as much of the porphyry is rotted, and heavy timbers in square sets are used and the space filled with waste as in the Butte practice. Much of the ore will run 15 per cent as mined. In the rock cuts along the narrow-gauge railroad the true nature of several of the lesser veins is recognizable as al-

tered strata impregnated with chalcopryrite, with small amounts of galena and blende.

The garnetiferous ores will be readily smelted, but cannot be concentrated. The Elisa ore, which is siliceous, is valuable for the precious metal contents as well as the copper.

In the Cananea District the vein outcrops are the most prominent features of the landscape in the vicinity of the mines now being worked. The enormous masses of iron ore, the gossan caps of

from surface springs in the heart of the mountains to the city which has sprung up about the smelter, or the newer city on the lower Mesa. With depth the mines will undoubtedly yield water, as the Capote now yields a supply large enough for concentrator and smelter.

The smelting plant embraces six Mitchell economic hot-blast furnaces, treating over 1,000 tons of raw ore per day, and the resulting matte is bessemerized on the spot. The production for

work has been planned on broad lines, and it has cost, according to the company's report, \$3,682,073 for the mining division, and \$1,671,247 for the reduction division. As a result of this great expenditure five or six years' work has been done in a little over a year, and the property is now fully equipped. Although operating so short a time the eight-mine shafts are now deep enough to form a correct estimate of the value and future of the property, the Capote and Oversight shafts being 750 feet below the outcrop, and the No. 5 shaft of the Veta Grande 700 feet below the croppings. The Elisa is 540 feet and the Ventura 700 feet below the surface.



SAPOTE, INDIANA AND ELISE MINES, CANANEA.

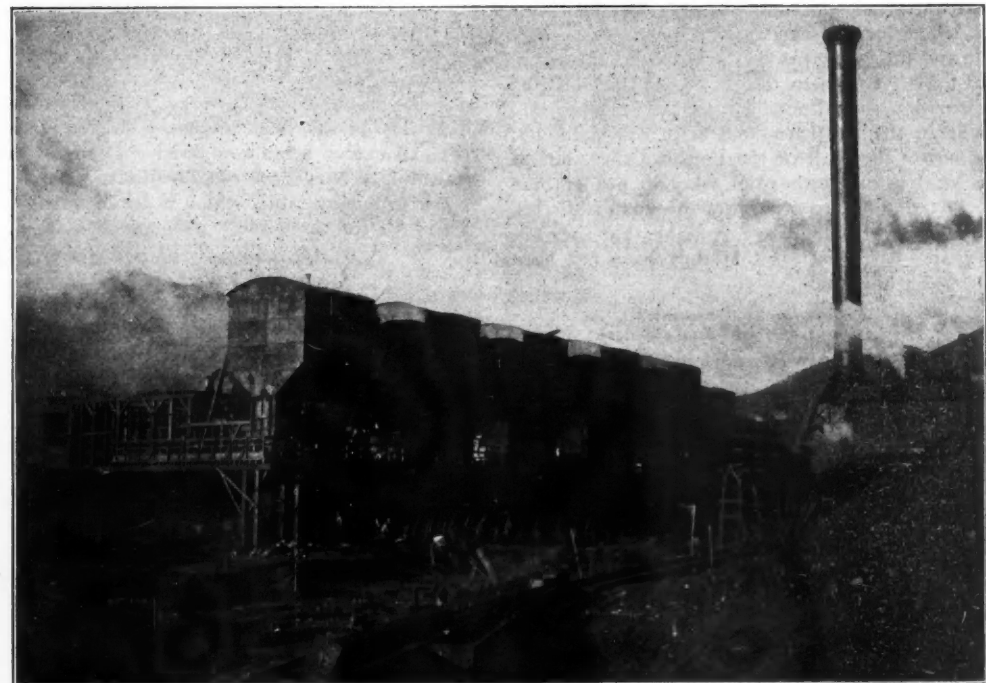
the veins, form high ridges of rough brown rock traceable for long distances across relatively smooth slopes. Where the streams have cut across these vein outcrops, the deep and narrow gorges show excellent sections of the veins and the enclosing rocks. It is in such places that the earliest mining was done. The drifts and tunnels driven in the veins disclosed large masses of native copper, carbonates and oxide ores, the existence of which made the region well known throughout Sonora for the last half century. As the gossan cap is penetrated the ore beneath is found to consist of pyrite and chalcopryrite mixed with much earthy and soft black copper glance.

The ores of the different mines vary considerably in character and value. In general it may be stated that the ore from the group of mines nearest the smelter, embracing all the bonanza mines of to-day, is quite siliceous, occurring largely in a quartzite gangue or an altered quartz porphyry. The ore from the Puerfecitos group is less siliceous, the gangue consisting largely of calcite and garnet. The intermediate mine, the Elisa, has a chalcopryrite ore that is siliceous, but carries, I was told, good values in gold and silver. In the Veta Grande vein large bodies of low-grade ore were encountered carrying native copper in a very siliceous gangue. This ore will average about 2.15 per cent copper, but also carries about 0.38 oz. gold per ton. It is this ore which can be so easily and advantageously concentrated; tests showing, I was told by the mill superintendent, a saving of nearly 92 per cent, and the concentrates having 22 per cent copper and 3.6 oz. gold per ton.

The company now working these mines owns almost the entire district, and, as a consequence, the development work has been planned and carried out on a broad scale in order to develop the whole tract to the best advantage. In addition to a 42-mile standard gauge railroad line, built to connect the camp with the El Paso & Southwestern Railroad, the company has built 11 miles of narrow-gauge track, which runs to the mouth of the cross-cut working tunnels driven to tap each ore-body. Well-graded roads, cut out of the solid rock, extend to the sawmill and to the remoter prospects. Pipe lines convey the water

1901 was 34,437,131 pounds, and for the first four months of 1902 was 11,758,072 pounds copper and 114,426 ounces of silver.

The company is now prepared to maintain a monthly production of 5,000,000 pounds of copper, which will place it fourth in the list of the copper-producing mines of the world, and will



SMELTING PLANT AT CANANEA.

raise Mexico to the same relative rank among copper-producing countries. The extent of the mineral area owned by the company, with its developed mines and undeveloped prospects, is so great that reliable estimates are difficult to make. So far as my brief examination warrants an opinion, I should say it is one of the very largest copper deposits of the world. The development of the district from a wild mountain area to a great industrial center has been rapid. This

blende used in the charge for distillation and the increase in the zinc content of the charge because thereof.

VALUE OF OZOKERITE.—Since the beginning of this year, according to the *Chemiker Zeitung*, the price for ozokerite in Galicia has risen 40 to 50 per cent on account of decrease in the production. The value of ceresin has risen correspondingly.

PROBLEMS OF LABOR AND LIFE IN ANTHRACITE MINING

By **FREDERICK L. HOFFMAN.**

PART III.—HEALTH AND MORTALITY.

The health and mortality of anthracite coal miners are subjects which have received practically no serious consideration, and medical literature is silent regarding all essential facts which would aid us in forming an intelligent opinion and final conclusion as to whether this occupation is really more unhealthful than employment in industries such as the manufacture of pottery-ware, glassware, matches, white-lead, etc. The annual reports of the State and local boards of health of Pennsylvania contain no information of determining value, although the reports for Scranton, Shenandoah and a few other towns indicate in a measure more or less satisfactory health conditions. In only one instance has the subject of sanitation in mining towns been brought officially before the public, and that was in 1888, in a paper by S. M. Free, M. D., read at the State Sanitary Convention at Lewisburg. The paper, however, deals rather with general principles than with the necessary statistical evidence. It, however, forms a most useful contribution to the very limited literature of the subject. The local health reports deal only with general conditions and health problems, and no distinction is made in the vital statistics as to the mortality of the general population, and that of miners in particular. The only indications as to the probable health conditions of the industry are to be found in the death rates from consumption, respiratory diseases and accidents. The United States Census of 1900 gives no consideration to the subject of coal miners' mortality in the section on diseases of occupations, the facts being considered in the aggregate for miners and quarrymen, leading to conclusions which have no practical value. Data of limited usefulness are given in the vital statistics of cities by divisional periods of life, and the following table will show the death rates per thousand living at specified periods of age for the registration cities in the aggregate and for four cities of the northern anthracite coal fields. It is a matter of regret that detailed information should not be available for cities and towns in the Southern anthracite coal-field, but this is not the fault of the Census Office, but of the local health authorities who do not enforce the law as to the registration of vital statistics. The data for Hazleton are available, but they are so apparently defective that they have not been included in this table:

Comparative Vital Statistics.
U. S. Census of 1900—Rate per 1,000.
Ages at death.

| | Under 5 | 5-14 | 15-24 | 25-34 | 35-44 | 45-64 | 65 and Over |
|-----------------------------------|---------|------|-------|-------|-------|-------|-------------|
| Carbondale | 58.4 | 10.3 | 6.5 | 9.5 | 14.8 | 30.5 | 113.3 |
| Scranton | 66.1 | 10.4 | 6.4 | 9.3 | 12.4 | 27.0 | 92.3 |
| Pittston | 69.4 | 7.0 | 5.2 | 11.4 | 12.3 | 29.6 | 104.2 |
| Wilkes-Barre | 49.9 | 3.3 | 5.9 | 7.7 | 9.6 | 24.6 | 105.1 |
| Average for American cities | 57.6 | 4.7 | 6.7 | 9.6 | 12.6 | 24.8 | 93.3 |

It is shown by this table that the mortality of cities in the anthracite region is generally higher at ages under 15, below the average at ages 15-44, and above the average at ages over 45, when comparison is made with the general average for American cities. This table is very suggestive, and it is quite apparent, that the health of miners is not sufficiently impaired (if at all) to cause an excessive mortality until after the age of 45. It is assumed here that the general vital statistics are a fair indication of the special mortality experience of miners. This, however, is only true in a measure, and the data must be considered with caution.

As to the diseases most prevalent in the cities and towns of the anthracite region we have only information of value for two cities, Scranton and Wilkes-Barre. The following table has been derived from the annual report on the Statistics of Cities compiled under the direction of the

United States Commissioner of Labor showing per 10,000 of population the mortality from important causes. For the purpose of comparison the corresponding death rates for Pittsburg have been included:

Comparative Vital Statistics—1901.
From the Statistics of Cities—Rate per 10,000.

| Cause of Death. | Pittsburg | Scranton | Wilkes-Barre. |
|----------------------------------|-----------|----------|---------------|
| Typhoid Fever | 12.5 | 3.0 | 3.5 |
| Measles | 2.0 | 0.8 | 0.6 |
| Scarlet Fever | 3.5 | 0.5 | 1.7 |
| Diphtheria and Croup | 5.0 | 4.1 | 3.7 |
| Tuberculosis | 16.1 | 11.1 | 9.9 |
| Cancer | 4.3 | 3.9 | 4.0 |
| Apoplexy and Paralysis | 6.0 | 8.3 | 9.2 |
| Bronchitis | 5.0 | 7.2 | 2.5 |
| Pneumonia | 23.2 | 22.1 | 16.9 |
| Other Respiratory Dis. | 2.5 | 6.1 | 2.9 |
| Heart Disease | 6.1 | 5.7 | 8.3 |
| Diarrhoeal Dis. of Child'n. | 15.1 | 5.1 | 8.9 |
| Bright's Disease | 6.3 | 5.7 | 6.9 |
| Suicide | 1.4 | 1.3 | 1.2 |
| Accidents | 19.1 | 16.6 | 12.9 |

It is shown by this table that the mortality from most of the important diseases has been higher in Pittsburg than in either Scranton or Wilkes-Barre. It is of importance to note the relatively higher mortality from tuberculosis and pneumonia in Pittsburg. Deaths from other respiratory diseases, especially bronchitis, have been higher in Scranton than in either Pittsburg or Wilkes-Barre. The mortality from accidents is shown to have been considerably higher in Pittsburg than in either Scranton or Wilkes-Barre, although the rates for the latter two cities are above the average. Thus, for the purpose of comparison, it may be stated that the accident death rate for Philadelphia is 9.6, for Cleveland 7.2, for Buffalo 8.4, and for Cincinnati 8.7 per 10,000 of population. The rates for Scranton and Wilkes-Barre are higher than those for the ten largest cities in this country, but below the average for Pittsburg. This would indicate that the accident factor in anthracite mining is a more important element in determining the mortality rate than the disease factor.

While we have only fragmentary information of very limited value regarding the diseases of coal miners in this country, we have quite satisfactory data for England and Wales, where health conditions resemble quite closely those which prevail in the anthracite region. The factor of nationality enters into the subject, but we have at present no data which would enable us to pass upon this point. The mortality of coal miners from all causes when compared with men in unhealthful or dangerous employments, is set forth in the following table, which is for England and Wales for the three years 1890-1892:

Comparative Mortality From all Causes
Males in Dangerous and Unhealthful Occupations.
England and Wales, 1890-1892—Rate per 1,000.

| Occupations. | Ages: 20-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65 and Over |
|-----------------------|-------------|-------|-------|-------|-------|-------------|
| Coal Mining | 5.6 | 6.3 | 9.6 | 19.4 | 43.8 | 146.4 |
| Lead Mining | 6.5 | 9.5 | 13.5 | 23.9 | 66.6 | 245.2 |
| Seamen | 10.5 | 13.0 | 18.9 | 27.7 | 44.8 | 143.8 |
| Potters | 5.4 | 8.2 | 19.6 | 43.0 | 75.1 | 143.4 |
| Liquor Dealers | 8.7 | 15.2 | 23.3 | 34.0 | 53.2 | 105.7 |
| All Occupations | 5.1 | 7.3 | 12.4 | 20.7 | 36.7 | 102.3 |

This table shows that with unimportant exceptions the mortality of coal miners has been below the average for men in all occupations, and of men employed in especially dangerous or unhealthful trades, at ages under 65, and that at the earlier ages the differences in the mortality rate are very marked. Making all due allowance for possible inaccuracies the facts are very definite and warrant the conclusion that coal mining, in England at least, cannot be considered a particularly unhealthful occupation. On this point the Registrar-General, from whose report the table has been calculated, remarks that "miners are a picked class in a more special sense than are men in most other industries. The labor is so arduous that only those who possess more than the average physical strength are able to continue it; consequently, miners whose powers have become seriously impaired are compelled to seek less exacting employment. The mortality of men having formerly worked as miners, and who are now oth-

erwise employed, is probably much higher," but we do not possess accurate information on this point.

With reference to the special disease liability of coal miners, in particular to consumption and respiratory diseases, the following table shows the rates only for ages 25-34. Consideration of all age groups would require more space than is available:

Comparative Mortality From
Consumption, Respiratory Diseases and Accidents,
Ages 25-34.
England and Wales, 1890-1892—Rate per 1,000.

| | Consumption | Respiratory Diseases | Accidents |
|-----------------------|-------------|----------------------|-----------|
| Coal Mining | 1.2 | 0.9 | 1.8 |
| Lead Mining | 4.3 | 0.8 | 1.1 |
| Seamen | 3.8 | 1.9 | 2.7 |
| Potters | 3.2 | 1.6 | 0.1 |
| Liquor Dealers | 4.1 | 2.2 | 0.5 |
| All Occupations | 2.6 | 1.1 | 0.6 |

*According to this table the mortality of coal miners from consumption was very much below the average, while the mortality from respiratory diseases was lower than for men in all occupations for seamen, potters and liquor dealers. The accident rate was higher for coal miners than for men in all occupations, but 50 per cent below the average mortality of seamen at this particular age period. This table, if fairly representative of the conditions in this country, does not warrant the general assumption that coal mining, as such, must be classed as an exceedingly unhealthful occupation. It is but proper, however, to state the further observations of the Registrar-General, that "while coal miners as a class do not suffer excessively from pulmonary consumption, their mortality being scarcely more than half the standard among occupied males, they nevertheless succumb to this disease very unequally in different parts of the country"; but, he adds, that "in none of the counties does the mortality of colliers from phthisis even approach the standard figure for occupied males."

These statistics, which must be considered the most accurate which have yet been brought together, confirm the more fragmentary data for the anthracite counties of Pennsylvania and prove that miners, as a class, or mining communities as a whole, do not give evidence of an exceptionally high mortality rate from all causes in general or from pulmonary and respiratory diseases in particular. This conclusion regarding the comparative healthfulness of coal mining has the support of numerous investigations made in England, Scotland and on the Continent. A recent writer on the maladies of coal miners in Oliver's "Dangerous Trades" (page 534) states his conclusions as follows:

"There are no doubt several circumstances that contribute to the general healthiness of the (coal) miner's occupation; in the first place, mining is hard work, and men whose constitution is not tolerably sound, and whose physique is not fully up to the average, will either select some less arduous occupation at the outset, or will find themselves, if they began life as miners, unable to continue at the work. On the other hand, the work, though arduous, requires steady though only moderate exertion, and does not expose the worker to the abnormally violent strains, exerted through brief periods, that characterize some other occupations. Again, the hygienic conditions are, as far as the coal mine at least is concerned, far more favorable than in most other occupations. The miner works in a good atmosphere, ample ventilation being a prime necessity for ensuring the safety of the coal miner, in an equable temperature, free from the extremes alike of heat and cold, he is not exposed to the inclemencies of the weather, and his working place is usually dry. The same cannot always be said of the miner in metalliferous mines, where the conditions of work are far less favorable in every respect, and his mortality is therefore higher."

According to this writer metal miners are sub-

ject to a greater disease liability than coal miners, and this view is confirmed by impartial investigations made at different times in different countries. The opinion, therefore, that the work in silver and gold or in iron ore and copper mines is freer from liability to disease is not supported by the facts. Such data as are available regarding the diseases of metal miners in this country, although very limited as to the number of observations, confirm the view of writers on the diseases of metal miners in foreign countries that coal miners are less subject to diseases on account of their occupation than miners of iron ore or precious metals.

The conflicting views on this subject imperatively demand a thorough and strictly scientific inquiry along the lines adopted by the Royal Commission of 1864. A collective medical investigation should be made through practicing physicians in the anthracite counties, and the following factors considered by the Royal Commission might be taken into consideration: The health and diseases of miners with special reference to

should be according to the normal standard of health and longevity, the anthracite miners are apparently less subject to an excessive mortality than metal miners in the Lake Superior region, the Western States, or in foreign countries.

THE NEW BULLY HILL SMELTER.

We recently noted in our news columns the blowing in of the new smelter at Capt. J. R. De La Mar's Bully Hill Mines. It is now in successful operation under the management of Mr. Austin H. Brown, formerly of Butte.

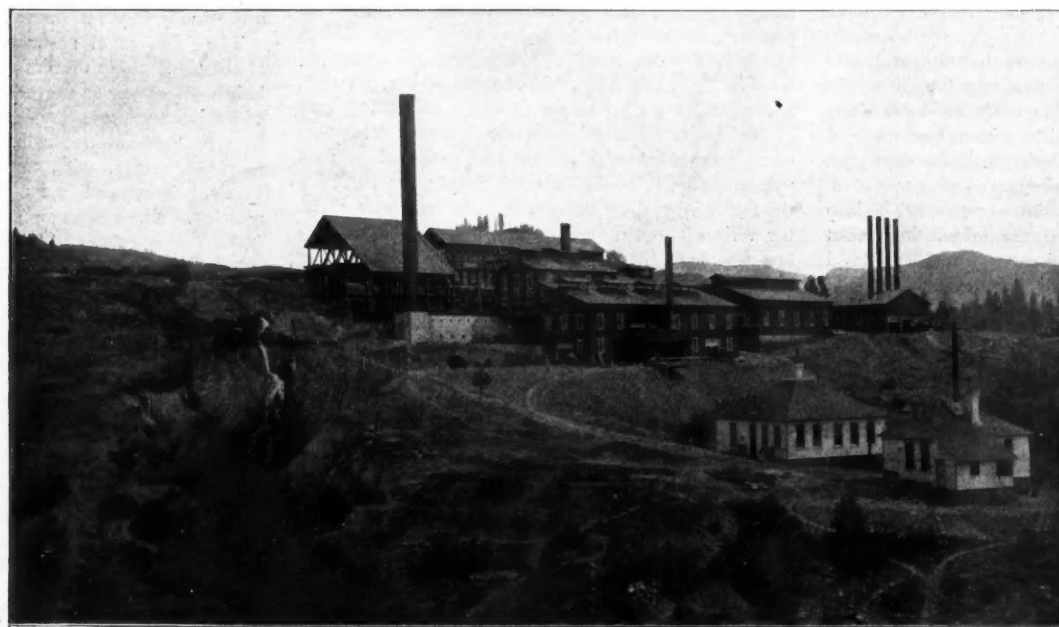
The Bully Hill group of mines is located in Shasta County, California, at a distance of about 25 miles northeast of Redding, on the Southern Pacific. The district is reached by a daily stage line and good road from Redding, and also for freight by the standard-gauge railroad of the Terry Lumber Company, which runs to a terminal at Bella Vista, within 16 miles of the Bully Hill mines. This property was worked 30 or 35 years ago, originally as a placer

rainfall in Shasta County is up to the maximum for the Pacific Coast.

The smelter being located about half a mile from and 160 feet below No. 3 tunnel, the connection has been made by a 30-inch gauge railroad 4,000 feet long, with an average grade of 4 per cent. Its equipment consists of a 10-ton Shay patent locomotive and 24 two-ton side dumping steel ore cars of special design. This railroad brings the cars over the top of the smelter bins, where the ore is dumped into various bins according to its grade and character.

The design and general arrangement of the plant were the work of Messrs. H. A. Cohen and A. H. Brown, the making of plans and detailed working drawings being entrusted to S. V. Trent, of the Trent Engineering and Machinery Company, of Salt Lake City, Utah, who received the contract for the entire equipment and erection of the works, as well as for the railroad equipment.

The works comprise the following departments: Roasting stalls for coarse ores, two 6-hearth 16-foot lucifer roasters for fine ores, smelter bins, briquetting section, blast furnace section, converter depart-



COPPER SMELTING AND CONVERTING PLANT AT BULLY HILL, CALIFORNIA.

physical condition and appearance, food, habits, etc.; ventilation of mines with special consideration of the air in mines, dust, powder smoke and improvements in ventilation; accidents in mines with special consideration of the principal causes and some regard to coroners' inquiries, and methods and means for ascertaining the true responsibility for casualties; the dwellings of miners and sanitary condition of mining towns with special consideration of sanitary regulations, lodging-houses, etc.; children working in mines with special consideration of their physical well-being, physical proportions of weight in its relation to stature, their relative growth in comparison with established standards for healthy and well-nourished children, etc. Such an inquiry should be supplemented by a thorough analysis of the vital statistics of the principal mining towns, large and small, and a statement should be published in detail as to the ages, occupations and causes of death of persons employed in different occupations in or about anthracite mines. This method was followed by the Royal Commission, and the statement will be found on page 348 et seq., Appendix B, of the Report. Only by means of such an inquiry will it be possible to arrive at an intelligent and accurate conclusion regarding the health and diseases of miners and mine laborers in the anthracite region. On the basis of the facts at present available it is impossible to form an accurate conclusion, but it is safe to state that while conditions are far from being what they

when a large amount of coarse gold was washed from its gravels. In the early stages the ledges were also worked to a limited extent and yielded well in gold and silver. The operators, however, were evidently perplexed by the liberal percentage of copper allied with the gold and silver, the relics of two unsuitable plants and a diminutive smelter surviving to tell the tale.

The mines are deposits or replacements in a broad porphyry zone having much the appearance of fissures, but with a very generous mineralization. The formation is part of the same zone that comprises the mines of the Mountain Copper Company, also in Shasta County; the chief difference as compared with the ore of the Mountain mines being a higher average grade in copper, somewhat less iron and sulphur contents and a little more silica and alumina. A large number of claims are comprised in the property, which includes also two groups located at Copper City, about 3 miles below and to the west. On these groups, in addition to the copper veins, are quartz fissures carrying good values in gold and silver, and making very desirable material for furnace charges, converter linings, etc. The main group at Bully Hill is opened to a depth of 350 feet by three tunnels with very extensive drifts and cross-cuts.

The country is rough and precipitous, and is completely covered with undergrowth, brush and pines, the most conspicuous growth being the hardy manzanita. There is an abundant water supply from the springs and mountain streams, while the average

ment, engine room, boiler room, machine shop and water system. Of these various departments a separate description, in metallurgical sequence, is given below.

The roasting stalls are located 300 feet back of and above the main works. They comprise a double row of stalls 300 feet long and each 6 by 6 feet by 10 feet long. Being set back to back with 4 feet intervening, a main flue is thus formed, connecting all stalls with the brick stack, which is located opposite the center of the line of stalls. The ore is brought in cars along a car track running over the top of the stalls. For its removal other tracks set slightly below the stalls are conveniently located for receiving the calcined material. The stalls are built of hard porphyry rock, set in mortar with suitable brick openings connecting them with the flues. The stalls are reserved for the roasting of coarse unbroken ore.

As the mines produce an unusually large proportion of fines the roasting of such material has turned out to be of much greater importance than at first expected. For this work the Trent Engineering and Machinery Company specially designed the "lucifer" roaster, an improved form of multiple-hearth furnace of the McDougall type, with steel plate casing, brick arches and walls, mechanical stirring gear of the revolving type, having detachable plows, removable arms and large hollow spindle of the most substantial proportions. In these lucifer roasters the water circulation through columns and arms used in some recent variations of this style of roaster is entirely unnecessary, and therefore dispensed with.

In designing these roasters the objects aimed at were extreme durability, simplicity and accessibility, first cost being entirely subordinated to economy in operation.

Above each roaster and on opposite sides are located two charging hoppers each of 8 tons capacity, from which the ore is delivered to the roaster by means of an improved rotary and positive feeder. The ore thus delivered to the uppermost of the six hearths is rabbled from the circumference to the center, where it falls to the second hearth to be rabbled towards the circumference of this hearth and so on until the bottom hearth is reached, where the calcines are discharged into the hopper controlled by gates.

In these roasters the revolving speed is uniform, the capacity being varied by changes in the speed of feeders. The present requirements of the smelter call for 50 tons of calcined ore daily, hence the lucifer roasters are operated at that capacity. The mechanical details of these roasters have some novel features, and are very thoroughly worked out, ample provision being made for adjustment, ready dismantling, rapid removal of plows, protection of arms from heat, slippage of driving gear in the event of accidental obstructions.

The calcine furnaces being located 6 feet below feed-floor level, the calcines are raised to a height of 28 feet by means of double chain elevators (one for each roaster) fitted with 8-inch buckets and housed with steel plate. These elevators discharge directly into the cooling conveyor.

The discharge from the above conveyor is into a 50-ton hopper adjacent to the briquetting room which is located in the furnace room and on a level with the furnace floor. For briquetting a White press is used, the bricks being elevated to feed-floor level and stacked for hardening. For bond and to avoid the use of slacked lime, talc or gouge from the mine is employed. Before briquetting the calcines are drawn from the storage hopper into the mixing machine, the framework and box of which are made of wood and the stirring gear of iron and steel. In this mixing machine the talc is fed with the calcine and a slight spray of water is added to facilitate mixing.

Parallel with and 30 feet back of the blast furnace building are located the storage or charging bins, which measure inside 16 feet wide, 16 feet high and 100 feet long, with partitions at varying intervals. Separate compartments are allotted for calcines, various classes of mine ores, lime rock, iron ores, etc. These bins are loaded from two-ton railroad cars, the trains of which run in over the top of bins.

Underneath the bins there is a clearance of 6 feet 3 inches in height, with passages from back to front. About 5 feet apart are located the chutes controlled by gates and set to discharge into charging barrows of light pattern. The coke storage is immediately back of the bins and is also reached by the coke barrows from under the main bins. In this way the general storage is well concentrated, and thoroughly accessible, with a minimum of distance for the charge wheelers. The charging scales are located close to the furnace and right in the course of charge wheelers from bins to furnaces.

The blast furnace section is 48 feet long, 28 feet wide from front to back, with a height of 15 feet from furnace room floor to feed floor. The blast furnace is 42 inches wide by 120 inches long at the tuyeres. It is of the dumping bottom pattern. The main jackets are of steel plate 8 feet high with two 5-foot wide jackets on each side and one jacket at each end, both ends having a large top opening and each side a small top opening, all being provided with bronze water jackets. On each side are 8 tuyeres 5 inches in diameter, fitted with removable bushings. They are grouped by twos with one blast box and 7½-inch tuyere pipe for each pair. Immediately above the main jackets is a course of cast iron water jackets 4 feet in height and arranged by twos on each side and one on each end.

Above the feed floor the shaft of the furnace extends with brick wall arranged with two feed doors on each side and a door on each end for convenience

in barring. These doors are counterweighted and made double with air space, thereby greatly reducing radiation of heat at feed floor. At the front end of furnace is located the stationary forehearth, 10 feet in diameter, with a refractory lining of crushed chromic ore, mixed with a small proportion of talc and solidly tamped into place. From the forehearth the slag overflows into the granulating launder. For the tapping of matte there is provided a large cast iron jacketed breast, bolted to the shell of forehearth, and in front of that an adjustable bronze jacketed spout.

The converter section is 30 feet wide by 144 feet long, made entirely of steel with corrugated covering. It abuts on the furnace building, and is set 9 feet lower. The converters are located so that the matte can either be spouted direct into the converters from the forehearth, be conveyed to them by a ladle and electric crane, or the converter shells can be brought immediately below the forehearth, charged and returned to their stands. Usually the practice is to charge the converters by means of ladles.

The converters are of the Trent horizontal or cylindrical pattern with shells measuring 68 inches in diameter by 96 inches long, and of the same design as the larger ones used at the United Verde copper works. They are tilted by hydraulic power, 3 stands and 5 shells giving ample capacity for taking care of the output of matte from the furnace. This section is provided with an electric crane of 20 tons lifting capacity, which is used chiefly for handling the ladles with their charges and the converter shells for relining and repairing. At the same time they are capable of lifting entire a converter shell with its lining and charge from its place.

The copper room is 36 feet wide, and parallels the converter section, being 144 feet long. The tracks from beneath the converter stands extend into the copper room, and each track has a transfer table, permitting the mould carriages to be shifted readily from one stand to another and to any part of the copper room.

The motive power comprises a boiler house 32 by 60 feet, containing 4 boilers of 100 horse-power each, of the return tubular pattern, arranged to run independently or all together. These boilers are provided with an improved and special form of fire-box, giving unusually good economy in the burning of cord wood, which is used for generating the steam.

The engine room is a substantial frame building, with heavy trusses, and is 50 by 60 feet. It includes the following machinery: One Nordberg duplex blowing engine 36 by 36 inches, with Corliss steam cylinder 18 by 36 inches; one Nordberg horizontal Corliss engine, 14 by 32, and one 16 by 36 inches. These two engines are belted to the main line shaft with friction clutch arrangement, permitting either or both to be thrown into or out of connection at any time.

The air for the furnace is provided by a No. 7 cycloidal blower. The hydraulic power is provided by an improved pressure tank system having steam hydraulic pump, pressure and open tanks, etc., etc. The electrical power is generated by means of a multipolar direct-current generator, 110 volts, 60 kilowatts capacity. From this generator are operated the electric crane, the lighting for the entire works and the offices.

ZINC SMELTING IN BELGIUM.—According to the report of Ad. Firket, inspector general of mines, the 10 zinc smelting works of the Province of Liege, Belgium, in 1901 produced 114,624 metric tons of spelter, which was 7,714 tons more than in the previous year. The average value of the product was 420.11 francs, against 499.25 in 1900. The total quantity of ore smelted in 1901 was 292,027 tons, of which 78,903 came from Italy, 50,514 from Spain and Portugal, 29,653 from Algeria and Tunis, 28,458 from America, 23,178 from Scandinavia, 22,556 from France, 17,348 from Germany, 15,098 from Australia, 14,015 from Great Britain, and 6,870 from Belgium. The

smelting works employed 5,268 men and used 618,298 tons of coal.

THE HYDRAULIC INSTALLATION AT THE PANUCO MINES IN MEXICO.*

By HORACE L. SHORT.

The gold and silver mining properties of the Compania Minera de Panuco are situated on the western slope of the Sierra-Madre Mountains, about 70 miles inland from the port of Mazatlan. Their mill is almost centrally situated amongst the various mines, several of the winding shafts being close to the mill, probably within 400 meters.

In exceptionally dry seasons the whole of the milling and mining machinery is run by water power, assisted at times by steam power; in average seasons, however, the whole plant is run by water power alone.

The water-power system comprises two reservoirs of different altitudes above the power station, which are respectively termed the high level and the low level dams or reservoirs.

The high level reservoir comprises a dam of about 9,500 cubic meters of masonry, with a mean height of about 12 meters and a maximum height of 20 meters above the bed of the reservoir, which forms a natural watershed of about 800,000 cubic meter capacity, with an approximate maximum vertical height of 2,250 feet above the turbine nozzles. The reservoir is tapped a little distance from the masonry dam by a steel pipe line of varying diameter, from 16 inches downwards. This pipe line, which is about 8 kilometers in length, is laid above ground, the underside of the pipe being about 12 inches above the ground. It is supported by the flanges resting loosely on cast-iron plates, which in turn rest on a block of stone sunk not more than 6 inches into the ground. This tube line conveys the vertical head of water of 2,250 feet direct to the high-level turbines.

The low-level reservoir consists of a masonry dam of about 2,200 cubic meters of masonry work between two cliffs, that form the sides of a small mountain creek, by which means a reservoir is formed of about 200,000 cubic meters capacity. From one side of the dam the water is tapped by an 18-inch steel pipe line, which conveys a vertical head of water of 240 feet for a distance of about 3 kilometers, to the power station.

The water-power plant above ground comprises six Pelton wheels, so arranged as to drive the entire milling plant and machinery, either by the high-level supply alone or the low-level supply alone, or the two running together. All the turbines are belted direct, where possible, on to the main countershafts of the various departments of the mill and engineering shops, and to air-compressors, for the distribution of energy to the distant parts of the premises, not exceeding 2 kilometers. Electrical energy is only being used for lighting purposes.

In unusually dry seasons the turbine nozzles are changed to a smaller size, sufficient to run about 75 per cent of the whole machinery, while the remaining 25 per cent is run by steam power.

The spent water from all turbines is collected in a small reservoir, and is conducted by means of a steel pipe line, 18 inches diameter, down the shaft of one of the mines near the power house, on to a Pelton wheel driving a pair of horizontal air compressors, situated at a depth of about 130 meters below the water level in the above-ground power house reservoir; these compressors, 24 by 24 inches, being belted from the turbine to run at 120 revolutions per minute.

A tunnel, about 600 meters in length, with a slight fall from the turbine well, carries off the spent waters from the turbine to the outside of

* Abstract of paper read before the Institution of Mining and Metallurgy, London.

the mine (see illustration). This tunnel is driven mainly for this purpose, but at the same time it drains the upper workings, and also cuts off 130 meters head of water, pumped from the lower workings; it also aids in the ventilation of the mines, and serves as a prospect drive, several payable veins being encountered. In this position the compressors are centrally situated for the distribution of compressed air to the various winding and hauling engines, pump, and rock drills, in the mine.

It may be of interest to mention a few small details which materially add to the successful running of the installations.

By using buckets with the dividing edge and lower lip filed to a knife edge, and the water surface of the bucket truly filed and polished, the brake horse power is increased fully 10 per cent over that obtained with buckets not filed and polished; this refers to the high-level turbines, where the greatest diameter of nozzle used does not exceed $\frac{7}{8}$ inch diameter. In the low-level Pelton wheels, however, where nozzles from $2\frac{1}{2}$ to $3\frac{1}{2}$ inches diameter are used, the effect is not so great, not being more than 1 to 2 per cent, according to size of nozzle used.

water pipes inside the mine, this treatment gives much better results than either tar or paint.

All belt pulleys in connection with both the milling and mining machinery throughout are of unusually large diameter, and all belts are run at an unusually high speed. The following is an instance in point: A 12-inch wide six-ply canvas-rubber belt running at the unusual speed of 7,500 feet per minute, over pulleys 36 inches and 120 inches diameter, respectively. This was examined after running continuously at this speed night and day for two years, and was found to be practically in as good condition as when first put on; and an 18-inch wide six-ply belt running at 5,000 feet per minute, under similar conditions to the above, gave equally satisfactory results. In all cases diagonally riveted joints in the belts were found to be preferable and more reliable than laced joints.

All pulleys from 36 inches diameter upwards are built with hardwood belt faces, wrought-iron spokes (disks in the smaller sizes), and cast-iron bosses. The chief advantages of these pulleys are that they can be quickly and cheaply built; are very light and strong; and that a carpenter can turn the belt face of a 10-foot diameter by 24-inch

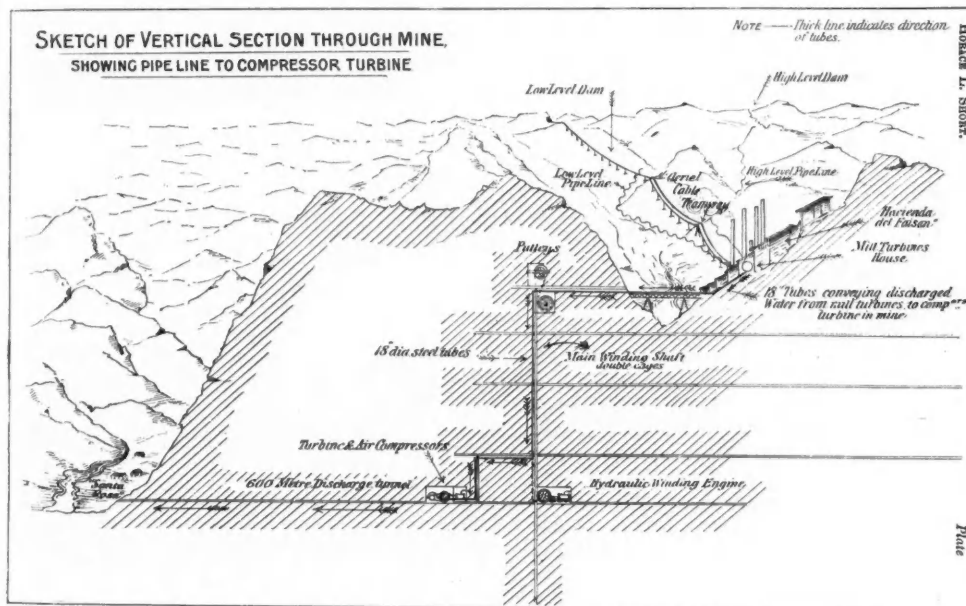
to insufficient mass in the flywheel rim, which was increased 50 per cent by the addition of cast-iron segments, bolted on to the underside of the rim; this addition enabled a pressure of 75 to 80 pounds per square inch to be attained, without undue injury to the belts, and no trouble was afterwards experienced from this cause. These air compressors have a water cooling jacket round the cylinder and cylinder covers, and indicator diagrams were frequently taken to ascertain the efficiency of the water cooling system. From the diagrams taken with and without the cooling water in operation, a difference of from 5 to 7 per cent was shown in favor of the cooling system, the air pressures being 45 and 75 pounds per square inch receiver pressure.

All air and water pipe flanges are made extra heavy and of special form, to employ the least possible number of bolts. Generally two bolts are used in pipes up to 4 inches diameter, and three in the larger sizes.

All air mains are of light steel tube from 10 inches diameter downwards. The oil that escapes by the oil collectors near the air cylinders is carried, by the compressed air, along the air pipes and the greater part is deposited on the inner surface of the pipe line; therefore, although this oil is lost at the collectors, it serves to prevent oxidization of the inner surface of the pipes, and serves the two-fold purpose of enabling a thin tube line to be used, and of preventing rust from being carried along, by the air in the pipes, to the various engine cylinders, which, of course, would be highly detrimental to the inner surface of the cylinders, valves, etc. It was found that the oil collected from the compressor cylinders (heavy cylinder oil) could be advantageously used over again three times, each time being thoroughly strained before using. It should not be mixed with new oil, but used by itself, and fed into the cylinder with a sight feed lubricator.

Thin sheet asbestos near, and brown paper at a distance from, the compressor cylinders, was used for making all air pipe flange joints, the ordinary rubber packing, besides being more expensive than the above, being entirely unsuited for the purpose, as the oil, carried along the pipes by the air, rapidly decomposes the rubber; innumerable and constant leakages result, and frequent stoppages are necessary in order to replace the packing.

The following system was adopted in a flywheel pumping engine, running on compressed air, used expansively in a 10 by 20-inch cylinder, with expansion valve. A super-heated jet of steam is admitted at either end of the cylinder during the admission of air, through fine perforations directly opposite to the air admission ports; the steam is generated in a small vertical boiler close to the engine, the steam pressure being a little above the air pressure, and both air and steam can be cut off independently of each other at any part of the stroke. Many tests went to show that the system was very economical and well worth adopting. To use air expansively, it is absolutely necessary either to heat the air sufficiently to prevent freezing up the exhaust port, or some means must be adopted to prevent the exhaust port being stopped up with ice; otherwise excessive back pressure has to be overcome by the piston. Heating the air is the simplest and best method of overcoming this difficulty, as it not only clears away the ice, but it also conduces to economy. The above system can easily be applied to existing engines at small cost, and will soon pay for itself several times over. The reason that the electrical transmission system was not adopted in any of the above installations, was chiefly due to the fact that in the milling and engineering department the conditions were such as to allow the turbines to be belted directly to all the main countershafts; secondly, as a large number of rock drills are used in the mines, and as, up to the time of the commencement of the installations,



HYDRAULIC INSTALLATION AT PANUCO, MEXICO.

The starting and stopping valves, which were close to the turbines, consist of one massive 6-inch gate valve, together with a small by-pass gate valve to each turbine, whose area was about double that of the average nozzle used with the turbines. This by-pass is, of course, to relieve the main valve from the excessive one-sided pressure, so that it may be opened without undue exertion, and without running the risk of scoring or damaging the valve face.

The pipe line is fitted with several specially constructed spring relief valves; these are mainly for the purpose of relieving the almost instantaneous rise of the pressure, and consequent shock that arises, owing to the ram action that takes place when the water issuing from the nozzles is suddenly arrested either entirely or partly. On several occasions accidents of this class have happened, but they were chiefly caused by unlooked-for intruders; on one occasion the nozzle was found blocked by a small fresh-water fish; on another occasion by a fresh-water lobster, and a large eel, although every precaution was taken to guard against such intruders.

Refuse oil and "swarf" from the milling and mining machinery is found to form a very good protective surface against oxidization, when smeared over the exterior surfaces of the air and

face belt pulley in its working position, in two hours. If the shaft runs a little eccentrically, the belt face runs perfectly truly, which would not be the case if the pulley had been turned up in the table. Again it is often found that large, broad belts stretch more on one side than the other, with the result that the belt tends to run off the pulley; the remedy for this is to turn the crown a little nearer to one side of the pulley than the other. With a wood rim pulley this can be done while the belt is running, no stoppage being necessary; in fact, the operation can be performed in a few minutes, whilst with the iron pulley it is sometimes a very serious and difficult matter. If the belt face of the pulley is made properly, and of hard and well-seasoned wood, the face will last for six or eight years, and it is only a question of an hour, perhaps, to skim up the face again, and the pulley will be as new.

In the belt-driven air compressors (24 by 24 inches), which are of American manufacture, great trouble was at first experienced with the flywheel driving belts, and it was impossible to run the compressors up to more than 40 pounds to the square inch air pressure, owing to the excessive vertical flapping of the belts, which were very soon destroyed. This, of course, was due

no satisfactory electric rock-drilling system was upon the market, it was deemed advisable to use compressed air for this purpose, as its use also enables the rock drill to be used in headings where there is poor ventilation and oppressive temperature. The exhaust air from the drills not only materially aids in the ventilation, but also considerably lowers the temperature of the surrounding air in the immediate vicinity, thereby enabling the operators to perform their work under better conditions than would be the case if an electric rock drill were used.

In the machine shops many pneumatic tools are in use; the steam hammers in the smiths' shops are run by compressed air in place of steam; the largest hoisting plant is run direct by a water-power motor, and the general existing circumstances seem to point in favor of compressed air being used for general underground purposes; and this, after the fullest consideration, has been finally adopted, and the general results obtained after its installation fully justify its adoption.

The total available power of the above-ground turbines together, is between 750 and 800 horse-power for three months in the year, while an average output of about 400 horse-power can be obtained by judiciously manipulating the high and low-level water supplies throughout the year, the requirements of the mill and engineers' shops being about 450 horse-power.

The underground power capacity is about 250 horse-power, which, in the wet season, can be raised to 350 horse-power, if desired.

The whole plant has given entire satisfaction, and has enabled the company to open up additional low-grade veins, which they can now work at a profit.

In case the metal in the mines should give out, the plant can be very cheaply turned into an electrical power station, for the transmission of energy to the various other mining properties which surround the mines of this company.

IRON ORES OF BRAZIL.*

By HERBERT KILBURN SCOTT.

In this paper the author says that the Brazilian deposits exceed, in a very appreciable degree, any he knows, both as regards the quantity and quality of the ores, as well as the facility of mining. They in fact constitute, very probably, the most important known iron ore deposits in the world. The purity of the ores is especially remarkable, phosphorus only existing in a small quantity in the superficial rubble or conglomerate ore, being to all intents and purposes absent from the original ore deposits.

The ore field is situated within a zone of about 3,200 square miles, 3,280 to 5,000 feet above the level of the sea, and about 310 miles from Rio de Janeiro, which is the nearest port. The principal ore outcrops commence at Congonhas do Campo, extending towards Ouro Preto and on through Antonio Pereira, Infencionado, Agua Quente, and Caraca. From this latter place there is a break to Itabira do Matto Dentro, where the ores again outcrop very strongly, and so continue to the Gaspar Soares mountain, where iron was first made in the State by the direct process in 1815. Another series of mountains through which the iron ore stratum runs, extends from the Pic d'Itabira do Campo, through Taquaral, Piedade, and Cocaes. The zone is crossed by the Central Railway, the most important line in Brazil, built with a wide gauge of 1.80 meters, to a place named Lafayette, on the borders of the ore field, where it is broken to 1 meter, owing to the mountainous character of the country. This railway carries all the manganese ore exported from the State, and is very well managed by the Government. Other important deposits of iron ores also occur in different parts of the State, at Barbacena on the Central Railway, and Vicosa on the Leopoldina Railway, as well as in the neighboring State of Sao Paulo, where, at a place

named Ipanema, a deposit of magnetite has been worked more or less intermittently from the year 1590, when the first ironworks were built in Brazil. In the States of Parana and Santa Catharina, iron ore deposits are found near the coast which are considered by Dr. Derby, the distinguished geologist, as of the same character and probably a continuation of the deposits of Barbacena. These ores carry varying quantities of manganese, in fact, in some cases to such an extent as to be considered manganese rather than iron ores.

The principal ore deposits form part of the Serra do Espinhaco, the others being found in the Serras do Mar e Mantiquiera. The rocks of the first range of mountains are constituted of schistose quartzites, micaceous schists, and limestones, being known as the Itacolumite series. These rocks appear to run successively into micaceous schists and schistose quartzites, which in turn pass into an almost pure hematite named Itabirite. The base of the rock series is gneiss or granite, and on them the principal iron formation rests, interstratified between the schists and limestones. Owing to the faulted character of the country, the precise order in which the rocks occur is not known, nor can their age be determined, though Dr. Derby is inclined to think that they may be assigned as Archean, Pre-Cambrian, or Lower Silurian. His study of the genesis of these deposits is not yet complete, but as manganese is so intimately associated with the iron formations, he is of opinion that they may be residual metamorphosed deposits of limestones which originally contained carbonate of iron.

The second series of mountains consist of gneiss, with injected diorites and granites, and the deposits in them are, so far as known, exclusively magnetite, and of less importance than those already mentioned.

The ores found in the principal deposits may be divided into three classes, as follows: 1. Massive hematite ores. 2. Micaceous iron schists. 3. Rubble or conglomerate ores.

The massive hematite constitutes the most important ore from the economic point of view, and has often associated with it a small quantity of magnetic oxide of iron. It occurs in enormous beds 30 to 50 meters in thickness, generally very much tilted up and outcropping on the summits or along the sides of the mountains, where, owing to its excessive hardness, it has resisted erosion better than the enclosing rock. In composition it generally contains from 66 to 70 per cent metallic iron with a small quantity of silica and traces of phosphorus.

The micaceous iron schist, or Itabirite, consists of alternating bands of varying thickness of micaceous iron ore and quartz, both these minerals, and especially the quartz, being often in a very friable condition, which accounts for its facility of weathering. The constituents of the schist exhibit a folded structure, and it has a special interest because it sometimes encloses thin lines of an ochreous mineral known as "jacutinga," which often carries gold values. The micaceous schist is preferred to the massive hematite ore by the native ironworkers, because the micaceous character of the ore facilitates reduction in the small furnaces worked on the direct process.

The rubble or conglomerate ore, the result of the weathering of the two other classes and more especially of the micaceous iron schist, is found in one or the other state, according as it is anhydrous and pure or hydrated and mixed with argillaceous matter. The rubble ore is always found on the surface, and varies between 3 and 30 feet in thickness. Owing to natural concentration, this rubble constitutes a very rich ore, averaging 66 to 70 per cent metallic iron, while the conglomerate portion, which from its very nature is hydrated and mixed with argillaceous matter, contains a very much lower percentage of iron, varying according to the intermixture of binding material. Where possible the native ironworkers use the pure rubble ore, and so dispense with the concentrating process necessary when the micaceous iron schist is used. The conglomerate is often found to be auriferous, the gold no doubt being derived from the "jacutinga" in the original micaceous iron schist.

The outcrops of the principal deposits have so much in common, both as regards their position and the quality of the ore, that a detailed description of each of them would be of little interest. The Pic d'Itabira do Campo is perhaps the most favorably situated body of ore. It is about 2½ miles from the Central Railway, and some 1,640 feet above it. The thickness of the deposit, which is tilted almost to the vertical, is somewhat difficult to determine, but it is probably more than 150 feet in width where the Pic (peak) proper rises 480 feet above the mountain summit. All around this mass huge boulders of ore exist in great profusion, and for some distance along the slope of the mountain there is the usual surface deposit of rubble or conglomerate ore. The natural facilities for economical working on a large scale are very great, and in view of the enormous dimensions of the outcrop and purity of the ore, it is probable that large quantities of mineral could be excavated without the removal of any overburden to speak of, or appreciable rejection on the dump.

Along the Caraca Mountain, which is one of the largest in the district, the iron ore deposit is more imposing and certainly more extensive than that above considered. The railway at the present time is 22 miles from the Caraca Mountain, but a line is projected that will pass near the deposits. The outcrop is nearly vertical, and the deposit, which extends almost without a break along the mountain for about 25 miles, is, as far as the author after careful examination can see, about 150 feet in thickness. Prof. Gorceix, the first director of the Ouro Preto School of Mines, always considered this the largest iron ore deposit in the district, and he estimated the quantity of easily workable ore at some hundreds of millions of tons.

The Tapanhoacanga Mountain, which runs parallel to that of the Caraca, is covered for some miles with the rubble and conglomerate ore, no doubt being the result of the erosion of the Caraca deposit, and especially those parts of it that are essentially a micaceous iron schist.

The Pic d'Itabira do Matto Dentro is 75 miles from the Sabara station of the Central Railway. It has very much in common with the Pic d'Itabira do Campo already considered, and consists of an immense body of the purest ore, which outcrops very strongly at an altitude of about 4,250 feet above sea level. Unlike the other pic, where the stratum is vertical, this ore body has an inclination of about 30°. The distance from the railway renders it of little present economic importance, but with the projected extension of the Leopoldina Railway to this place, it will have an importance equal to any of the other deposits.

The deposits of Congonhas do Campo, Taquaral, Cocaes, Conco, Soco Sao, Miguel de Piracicaba, Gandarella, etc., have all much in common with those already noticed, and consequently do not need more than mention.

Even with the present low prices of iron ores and Brazilian exchange higher than it has been for some years past, the author is of opinion that these ores could be exported to England or the United States at a profit, providing mining was done on a large scale and the handling of the ore carried out in the economical way which obtains in the Lake Superior region. The cost of placing the ore on board ship in the harbor of Rio Janeiro is estimated at about \$2.25 per ton.

MINING REGULATIONS IN CHINA.—Article IX of the Commercial Treaty just concluded between China and Great Britain reads as follows: "The Chinese Government, recognizing that it is advantageous for the country to develop its mineral resources, and that it is desirable to attract foreign as well as Chinese capital to embark in mining enterprises, agrees within one year from the signing of this treaty to initiate and conclude the revision of the existing Mining Regulations. China will, with all expedition and earnestness, go into the whole question of mining rules."

* Abstract of paper read before the Institute of Mining and Metallurgy, London.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALY REPORTED.

SALES OF PROPERTY TO MINING COMPANY DURING EXISTENCE OF TRUST RELATIONS.—One who sells property to a company toward which he stands in a fiduciary relation at the time of the sale is not liable to account in the winding up of the company for any undisclosed profit made by him on the transaction, unless either—First, his conduct has been tainted with fraud; or, secondly, he stood toward the company in a fiduciary relation, not only at the time of sale, but also at the time of his original acquisition of the property in question.—In re Lady Forest Gold Mine (84 *Law Times*, 559); English Court of Chancery.

LIABILITY FOR DAMAGE TO CROPS CAUSED BY FUMES FROM SMELTER.—A smelter was lawfully erected and in operation within a mile of an orchard and farm in 1898, and was operated in the usual manner. The fumes were necessarily poisonous and destructive to vegetation, and there is no known method of preventing such effect. During the summer of 1899 the orchard and crops were first injured by such fumes and in 1900 were practically destroyed by the same. Under the laws of Washington (*Ballinger's Annotated Code and Statutes*, section 4805) an action to recover for such damage must be brought within two years after the cause of action accrues. Action was commenced in this instance in February, 1901. It was held that the cause of action did not accrue until the damage actually occurred and the action was not brought too late. Where such orchard and crops were injured during successive years by poisonous fumes from the smelter the owner of the orchard may recover for damages accruing within two years of the time when the action was brought, on account of the continuing nuisance; and although he may have alleged total damage in his bill of complaint he may recover for partial destruction under the laws of Washington regulating pleading and practice.—*Sterrett v. Northwestern Mining and Smelting Company* (70 *Pacific Reporter* 266); Supreme Court of Washington.

ABSTRACTS OF OFFICIAL REPORTS.

Grand Central Mining Company, Mexico.

The directors submit a report covering the period from September 1, 1901, to August 31, 1902, as follows:

"There was carried forward from the previous year a sum of £34,122, and after providing all working expenses and expenditure on plant and development, and after deducting £2,777 for income tax, the year's working, including £451 realized from sale of old plant, shows a new profit of £7,276, making a balance of £41,399 to be carried forward. The principal source of income during the year has been this company's proportion of the proceeds of the tailings treated by Messrs. Charles Butters & Co., Limited, which amount to £26,462. Of the original quantity of 250,000 tons, for which the contract was made, there have been treated, to August 31 last, 240,536 tons, which have returned to this company \$280,621. However, by purchase from other sources there still remain to be treated under the contract about 52,955 tons, so that a further income may be expected from this source. As mentioned in the last report, the mill was started to treat all the existing ore reserves of the Grand Central Mine on November 18, and ran until February 10, 1902, treating during that time 11,728 tons, from which bullion was recovered amounting to £19,828.

"The general policy of active development work on the whole of the company's property has been followed during the year at an expenditure, including the cost of treating the above-mentioned ore reserves, of £37,123. Options were secured

by Mr. Peterson, the manager, on various claims adjoining the Verde and South Verde properties, and a thorough development of these properties, namely, the Verde, South Verde, Bastilla and Gran Consolidacion claims, has been carried on, but on July 10 he advised absolutely that all further work in this direction should be abandoned. A diamond drill was also sunk upon the extreme edge of the South Verde property on evidence, which the manager considered sufficient, that a new rich ore-body discovered by a neighboring company would run into our ground.

"Simultaneously with the disappointing advices as to the Verde and Bastilla group, Mr. Peterson had to report that, owing to striking very soft ground at low depths, the drill hole had failed, and in order to test to the 900 feet or 1,000 feet which he had originally advised, a completely new hole would be necessary. Although he did not recommend this work, the directors have felt that they ought not to entirely abandon the property before taking this last measure, and accordingly, by their instructions, drilling was recommenced with a new plant, under a contract with thoroughly competent people."

Smelting and Refining Company of Australia (1901), Limited.

The report recently issued by this company says: "Owing to technical legal difficulties the company did not come into formal possession of the works and property until the month of May of the present year. Under the advice of Mr. A. A. Blow, the company's consulting engineer, it was decided to secure the services in Australia of the following gentlemen: Mr. W. L. Hoyt as general manager, Mr. F. Palmer as local secretary and ore buyer, and Mr. E. J. Rogers as superintendent of works. These gentlemen have been working together since May last, Mr. Hoyt having assumed control during that month.

"One of the difficulties with which the old company had to contend was the want of a regular supply of ores. Your directors, as well as the staff in Australia, have been successful in making arrangements which will ensure constant and regular supplies to the works for some considerable time.

"The monthly returns from Australia have since May shown steadily increasing profits, and the figures show that there has been a marked development in the quantities of ore purchased and treated. During the first month of the company's operations tonnage dealt with was as follows: Ore, 2,649 tons; total material smelted, 4,984 tons. And during the following six months, ending May 31, the monthly average was: Ore, 3,785 tons; total material smelted, 6,718 tons. The first three months of Mr. Hoyt's management showed a very substantial increase in the quantity dealt with. The monthly average for that period (June, July and August) being: Ore, 4,617 tons; total material smelted, 7,222 tons.

"The works having been taken over as a going concern as from June 30 last year, the directors feel that it would be of interest to the shareholders to note the increase of business that has taken place, as the following figures of the shipments will show:

| | Gold. ozs. | Silver. ozs. | Lead. tons. | Cop. tons. |
|---------------------------------|---------------|-----------------|----------------|---------------|
| July to Dec, 1901, per month. | 3,501 | 52,883 | 564 | 26 |
| Jan. to June, 1902, per month. | 5,240 | 68,442 | 472 | 63 |
| July to Sept., 1902, per month. | 7,534 | 87,001 | 799 | 2 |

"Cable returns for the months of September and October show that the rapid development of the business continues, especially so far as gold ores are concerned, the shipments for these two months containing 25,046 ounces gold, 226,895 ounces silver, and 94 tons copper. As there is a large and increasing demand in the colonies and also in Japan for the company's brand of soft lead, and the refinery is now in a position to refine all the silver-lead bullion produced, the soft lead is thus being disposed of at good prices, and the shipments now being made to London for

realization merely consist of dore bullion and copper matte.

"As shareholders were informed at the statutory meeting, the company succeeded in obtaining important reductions in rates from the Railway Commissioners; also in charges for wharfage. This consideration, for an industry which has had much to struggle against in the past, will, doubtless, tend to a large development of business, and the board is making every effort to meet the increase by enlarging the capacity of its works, which a year ago were only sufficient to treat about 150 tons of ore per day (say, 4,500 tons per month); but improvements and additions to smelting plant now approaching completion, will increase the capacity to 400 tons of ore per day, or, say, 12,000 tons per month, and according to the estimate of Mr. Blow this output should yield a profit of over £100,000 per annum. Apart from contracts now in hand, further supplies, extending to about 70,000 tons per annum, are now being negotiated, and will necessitate an enlargement of the present refining plant, which should take about six months to complete. The developments impending in connection with new contracts are so important, and the advantages of having personal relations with the new staff are so great that one of your directors and the consulting engineer contemplate an early visit to the works."

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*.

Proceedings of the Colorado Scientific Society. Volume VI. Denver, Colo.; published by the Society. Pages, 296; illustrated.

Report of the Chief of Engineers, United States Army. 1902. Washington; Government Printing Office. Pages, 660.

New South Wales Statistical Register. Part X. 1901. By T. A. Coghlan, Government Statistician. Sydney, N. S. W.; Government Printer. Pages, 32.

New Zealand Official Year-Book. 1902. Compiled by E. J. von Dadelszen, Registrar-General. Wellington, N. Z.; Government Printer. Pages, 692.

Transactions of the American Electrochemical Society. Volume II. Edited by C. J. Reed, Secretary. Philadelphia; published by the Society. Pages, 274; illustrated.

Report on the Ore Deposits of Mount Heemskirk. By George A. Waller, Assistant Government Geologist of Tasmania. Hobart, Tasmania; Government Printer. Pages, 48; with maps.

A Course in Qualitative Chemical Analysis. By Dr. F. P. Venable. Fourth Edition. Revised by Dr. Alvin P. Wheeler. New York; the University Publishing Company. Pages, 54.

Syllabus of a Course of Lectures on Elementary Geology. By Dr. John C. Branner. Second Edition. Stanford University, Cal.; published for the Author. Pages, 368; illustrated. Price, \$2.75.

BOOKS REVIEWED.

Report on a Geological Reconnaissance of Cuba, Made Under the Direction of Gen. Leonard Wood, Military Governor. By C. Willard Hayes, T. Wayland Vaughan and Arthur C. Spencer. Washington; printed for the War Department. Pages, 124; with maps and illustrations.

The work, of which the results are given in this volume was performed by members of the United States Geological Survey, who were temporarily transferred to the War Department for this purpose. Necessarily it was confined to a preliminary reconnaissance of the country, special attention being paid to the economic geology of the Island. It was the first approach to a systematic survey of Cuba that has

ever been made, and the results are correspondingly valuable. We have heretofore published some notes and summaries from this report, and it will be found of such value that one regrets that the survey work could not have been continued and completed.

Geological History of the Hematite Iron Ores of the Antwerp and Fowler Belt in New York. By W. O. Crosby. Boston; Reprinted from the *Technology Quarterly*. Pamphlet, 10 pages; illustrated.

This is a reprint of an interesting geological study on the probable geological origin and history of the massive hematites opened in the old Sterling Mine in Jefferson County, New York; and also of other ore occurrences in the same belt. The author has studied the district carefully and compares its geology with that of some other districts, especially the Michipicoton iron district in Ontario.

Handy Electrical Dictionary. Compiled and Edited by W. L. Weber. Chicago; Frederick J. Drake & Co. Pages, 224, pocket size. Price, 50 cents.

This work is a handy little manual, containing condensed definitions of terms used in electrical engineering of all kinds. The extent of this branch of engineering is indicated by the size of the book and the number of terms included. The definitions, though brief, are generally clear, and the book seems very well adapted for use as a pocket manual by electricians; and also by the many others who are more or less concerned in electric work.

Annual Bulletin on the Mineral Resources of Kansas, 1900 and 1901. By Erasmus Haworth. Lawrence, Kan.; published by the University Geological Survey. Pages, 80; illustrated.

This bulletin shows that the mineral industries of Kansas made substantial progress during the two years covered, although there were no new developments of any importance. In gold and silver the agitation over the so-called gold-bearing shales of the western part of the State has mainly subsided. In other departments—coal, lead and zinc, oil and gas, clay products, gypsum, cement, building stone, and salt—gains are shown in output and value. The different subjects just enumerated are treated fully in separate chapters of the report.

Report on the Yalwal Gold-field, New South Wales. By E. C. Andrews. Sydney, N. S. W.; Government Printer. Pages, 48; illustrated.

This is one of the series of valuable reports on different districts prepared and issued by the New South Wales Geological Survey. Gold-mining operations have been carried on at Yalwal for about 30 years, and although some extremely rich patches of stone have been extracted from such mines as the Pinnacle, the Caledonia, the Pioneer and the Homeward Bound, it is chiefly upon the low grade ores of the field that the gold-mining industry has had to depend. The Yalwal field is of interest, owing to the fact that the mining and treatment of auriferous ores has been effected here at a lower cost than in any other part of the State; one of the principal reasons for this is that the ore can be extracted in open cuts or quarries at a very low rate. The gold occurs chiefly as impregnations in indurated slates, quartzites, and conglomerates of Devonian age, and although minute quartz veins are occasionally visible in these, it is found to be more economical to extract and treat the whole of the material rather than to attempt to pick out the richer portions. The Homeward Bound and Pioneer mines have been able to pay their way for some years by treating ore of exceptionally low value; and in view of this fact it seems probable that good profits could be obtained if these mines were worked on a much larger scale.

The Design of Simple Roof Trusses in Wood and Steel. By Prof. Malverd A. Howe. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 140; illustrated. Price, \$2.

The purpose and scope of this book are well expressed by the author, who says in his preface that

very little, if anything, new will be found in its pages. The object in writing them has been to bring together in a small compass all the essentials required in properly designing ordinary roof-trusses in wood and steel. At present this matter is widely scattered in the various comprehensive treatises on designing and in manufacturers' pocket-books. The student who desires to master the elements of designing simple structures is thus compelled to procure and refer to several more or less expensive books. Students in mechanical and electrical engineering, as a rule, learn but little of the methods of designing employed by students in civil engineering. For this reason the writer has been called upon for several years to give a short course in roof-truss design to students, and in order to do so he has been compelled to collect the data he has given in this book. The tables giving the properties of standard shapes are based upon sections rolled by the Cambria Steel Company. Standard sections rolled by other manufacturers have practically the same dimensions.

In collecting and presenting the material given in his usual clear style, Prof. Howe has done a service not only to students, but to engineers who may be frequently called on to design roofs for mills and other buildings in the course of their work.

Poor's Manual of the Railroads of the United States. Thirty-fifth Annual Number. 1902. H. W. Poor. New York; H. V. & H. W. Poor. Pages, 1,638; with maps. Price, \$10.

In our last issue we gave some figures from the Introduction to this book, which gives the most complete summary attainable of the work done by the railroads of the country. *Poor's Manual* does for the railroad the work which *The Mineral Industry* performs for the mining and metallurgical industries, and it is a notable instance of success achieved by a private enterprise in the collection and compilation of statistics of public interest. The yearly statistical volume published by the Interstate Commerce Commission gives general figures of considerable use to students, but the information about individual railroad companies is very little. *Poor's Manual* gives an abstract of the history, financial situation, results of working, organization, etc., of each railroad in the United States. Within a few years an important addition has been made of like statistics for street railroads, which department now fills 240 pages. Another department deals with miscellaneous industrial corporations, and this fills 110 pages. Still another department has to do with State and municipal debts. Finally, there are tables of dividends paid by the railroad companies and by the street railroad companies, bond lists of leading railroads, lists of dates of annual meetings and transfer agencies, and lists of railroad officers.

No criticism of such a work can be made. We can only say that the book long ago became indispensable to investors, and there is nothing which can take its place.

Handbook to the Mining and Geological Museum, Sydney, New South Wales. By George W. Card, Curator and Mineralogist. Sydney, N. S. W.; Government Printer. Pages, 202; illustrated.

This handbook contains a catalogue of the valuable collection made by the Geological Survey of New South Wales and preserved in the Museum of the Survey at Sydney. The collection of rocks, fossils and minerals for the Geological Survey Museum was started in the year 1875 by the late Mr. C. S. Wilkinson, and rapidly increased in magnitude after the appointment of the Geological Survey Staff in the year 1878. In 1879 the collection contained 14,720 specimens, and towards the latter end of the same year it was largely increased by the addition of the late Rev. W. B. Clarke's private collection, which, together with his library, was purchased by the Government. On the closing of the Sydney Exhibition in 1880, the Geological Survey Museum was installed in the Garden Palace, or Exhibition Building, a large wooden structure, but unfortunately on September 22, 1882, this edifice was totally destroyed by fire, and thus an exceed-

ingly valuable collection, numbering upwards of 50,000 specimens, was lost. The work of renewing the collection was at once proceeded with by the late Mr. Wilkinson, and has been zealously continued ever since. The Museum now contains a valuable and representative collection of the rocks, minerals, and fossils of New South Wales, and is of considerable use to students of geology and others who take an interest in the mineral resources of the State. The chief requirement at present is a good Museum building, the one now in use being of a temporary character, not suitable for the purpose and far from fireproof.

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.

Retaining Ink on Glass.

Sir: Your issue of November 8 contains a question by "A" regarding ink on glass. There are several glass section models of mines in the California State Mining Bureau, and all, I think, are colored with oil paints. Glycerine mixed with India ink has been suggested.

R. P. M.

San Francisco, Nov. 12, 1902.

Secondary Enrichment at Cripple Creek.

The opening up of deposits of gray-copper in the lower levels of some Cripple Creek mines opens a field of mental speculation which may be of profit to the future of the camp. Gray-copper is almost always a product of secondary enrichment. The gray-copper of Cripple Creek is very rich in gold, in most, if not all, of the places where it has been found. In the few places where it has been developed it shows very fair dimensions. The theory of the secondary enrichment of ore deposits has been well substantiated in the last few years by the very able efforts of members of our Geological Survey, and other eminent geologists. Secondary enrichment with its necessary attendant secondary impoverishment is so noticeable a feature of many copper-silver ores that the impoverished zone is absolutely worthless, and the enriched zone is the only part of the deposit having commercial value. The great Copper Queen Mine at Bisbee, Ariz., and the mines of Eureka, Nev., are conspicuous examples of secondary enrichment. That this same natural process has had much to do with the formation of gold deposits is well known, but gold being so very inert in all chemical reactions the influence of the forces which produce secondary enrichment are not, as a rule, so marked as to force themselves upon the attention. Moreover, in gold veins we generally have two forces of secondary enrichment at work, namely, mechanical and chemical, and the mechanical enrichment is often more noticeable than the chemical. The mechanical enrichment takes place very close to the surface, and the degree of intensity of the enrichment depends entirely upon the fineness of the gold and the porosity of the vein. As erosion takes place there is a tendency for the gold of the vein to be carried by the surface waters down into the underground water channels and there lodged. If the gold is very fine and the vein very "loose," this action will accomplish a very considerable secondary enrichment near the surface. The other source of secondary enrichment, chemical conveyance of the gold, depends on so many different conditions that it would be a difficult matter to foretell with certainty where it would be an important factor and where it would not.

In the Cripple Creek District it would seem as though conditions were ideal for both means of secondary enrichment. The veins in the upper levels are generally loose and porous. The gold

resulting from the decomposition of the tellurides is in an amorphous form, which is an ideal form for mechanical conveyance. The early attempts at milling these ores proved this fact so conclusively that it was disastrous to the mill owners. A rich zone of oxidized ore bodies has followed the inequalities of the mountain surface with such persistence that there can be but little doubt that secondary enrichment by mechanical means has played a very important part in the formation of Cripple Creek's superficial bonanzas. Now, in the last few months several bodies of gray-copper have been struck at depths of 1,200 to 1,400 feet from the surface, and these bodies are of fair size and immensely rich. Can it be that we are only just now approaching the true zone of secondary enrichment? The suggestion opens up a fertile field for the imagination. May it not be that the bonanzas which attracted the attention of the civilized world, in the early days of the

QUESTIONS AND ANSWERS.

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

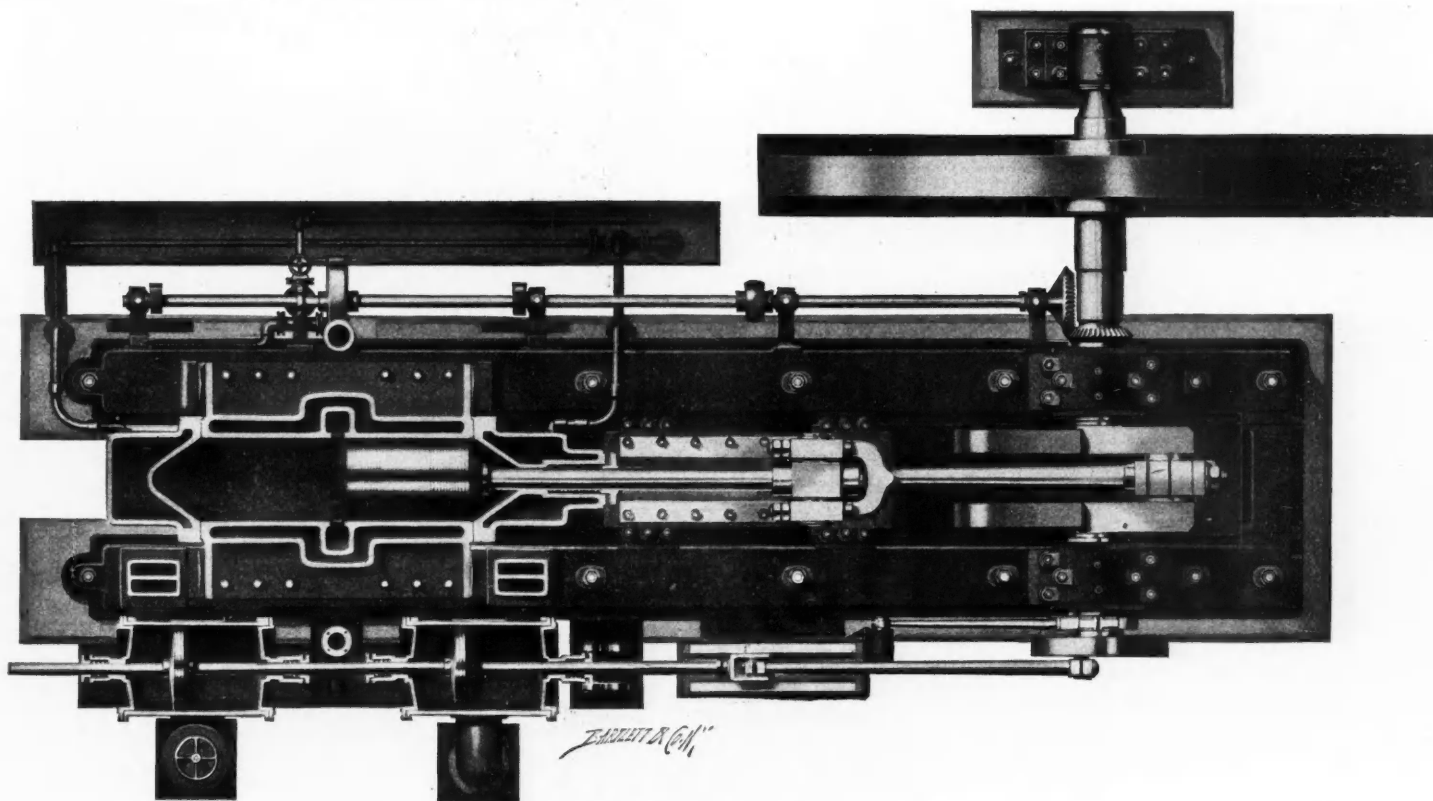
Sulphur.—Kindly give me names of some book on refining of sulphur or brimstone. There is an extensive deposit of sulphur in this district consisting of sulphur 20 to 24 per cent. and calciferous rock 76 to 80 per cent. Do you think it would pay for working, fuel being very plentiful? Are there any large consumers and also large producers of sulphur on the Pacific Coast?—E. L.

Answer.—Probably the best paper on refining sulphur or treating sulphur ores was the monograph on

THE KOERTING GAS ENGINE.

The discovery of the fact that gas of low heating capacity, such as the waste gases from blast furnaces, could be used effectively, gave a great impetus to the construction of such engines, especially of large capacity. One type of engine which is now extensively used in the Koerting, which is manufactured in this country by the De La Vergne Refrigerating Machine Company, of New York. The makers claim substantial advantages for the two-cycle type, of which the Koerting engine is a representative, in comparative simplicity of construction.

This engine is the result of five years of tests and experiments on the part of Mr. Ernst Koerting, a well-known expert on all subjects relating to the gas engine. After a number of models had been constructed a 400-horse-power gas engine was built in the Koerting shops, and when it was found that this complied with all the requirements



SECTIONAL PLAN OF KOERTING GAS ENGINE.

camp, are to be surpassed, possibly many times over, in the gray-copper zone?

The fact that copper is almost entirely lacking in the upper levels, and that it is found in a "secondary" form on the lowest levels associated with gold would indicate that it had been leached out above and precipitated below, and the further fact that in its present state it is rich in gold suggests that it had a companion in its migrations, and the companion is, of course, the main end of all Cripple Creek mining.

If there is a zone of secondary enrichment associated with the zone of concentration of the copper, then there is perforce a zone of impoverishment, and that is where most of the mining is being done to-day.

The evidence at hand to-day warrants nothing more than the suggestion of a zone of secondary enrichment. There have been but three or four of these bodies of gray-copper encountered, but it is well to bear the fact in mind. Just as in crossing a desert, if two or three trails are encountered leading in one direction it is well to notice the fact, and if four or five more are found heading in the same direction it is pretty safe conclusion that they lead to water.

GEO. J. BANCROFT.

Cripple Creek, Colo., Nov. 24, 1902.

the Sulphur Industry of Sicily, by Dr. Giovanni Aichino, published in *The Mineral Industry*, Volume VIII.

If your deposit is as claimed, it ought to be worth working. At the present time there is hardly any sulphur produced in the United States. A considerable quantity of pyrites is used, however, by manufacturers of sulphuric acid in the East. There are no deposits worked on the Pacific Coast; manufacturers of acid there using chiefly sulphur imported from Japan, with an occasional lot from Mexico. The larger users of sulphur are all in the East, and an important question with regard to your deposit would be the freight rates that you could secure. The sulphur from Sicily, which now forms our main supply, comes by water on a low freight rate.

Vanadium.—Could you give me any information about the actual value of vanadium compounds found in the ashes of coal?—A. R. P.

Answer.—Unfortunately, the demand for vanadium compounds is so limited that it is impossible to obtain quotations at all reliable. The supply now obtained from the Creusot Works in France furnishes the market entirely, and there does not seem to be any opening for new material of this kind.

the new engines were immediately placed upon the market, and proved very successful. The makers have already sold in the United States engines of this type, representing 41,800 horse-power.

The engine is of the two-cycle type, and is double-acting, like a steam engine, hence the crank end and head end of the lower cylinder are similar, the admission valves being located in the valve boxes, which are bolted to the cylinder heads. There are no exhaust valves required, the products of combustion escaping through slots in the middle of the cylinder from which the exhaust pipe leads. These slots are covered by the long motor piston.

The combustion mixture is admitted through two double-acting pumps, the one for gas, the other for air. The crank ends of the air pump and gas pump discharge into the crank end of the power cylinder, and the head ends of the pumps discharge into the head end of the power cylinder. The gas and air are compressed to about 9 pounds per square inch by the pumps.

The combustible mixture of gas and air is produced only at the inlet of the cylinder. There is no storing of it. The mingling of the air first introduced with the burnt residue gases, or with the succeeding charge of combustible mixture, is

avoided by the construction of the admission device. For the same reason there is no loss of mixture through the exhaust ports.

The pump is provided with piston valves, with the valve gear so arranged that its maximum capacity cannot exceed 50 or 60 per cent of its total displacement. For after the pump has completed the suction stroke, the gas suction port is left open during a portion of the succeeding (compression) stroke, so that the gas can return without increase in pressure until the suction port is closed, when the gas is compressed and passed out through the compression port. The amount of gas thus furnished corresponds to the maximum power of the engine.

The engine is started with compressed air. Engines to which blowing cylinders are attached are

to take place in the case when the apparatus is not in use, the carbon and fuse arrester being permanently connected to outgoing lines.

That part of the equipment shown in Fig. 3 is shown as the cut-in station, and is intended for use in connection with the instruments already described and shown in Figs. 1 and 2. This box is weather-proof, provided with hinges and lock and made of heavy cast iron. It is so constructed that it may be used without unlocking. In the lower end of the box an opening is provided with a self-closing trap door, which may be opened by pressing upwards. This equipment consists of a bridging jack with heavy German silver reinforced springs and mounted on a heavy hard rubber base, and with heavy sleeve for plug guide, the tension of the springs being sufficiently strong

There is probably no concern in Chicago that uses more than 500 barrels a day, or indeed so much. One of the heaviest users is the Chicago Union Traction Company, which operates street cars on the West and North sides of the city. In some of the power houses of this company oil is found advantageous because of its convenience in getting up steam quickly for intermittent power. At most of the power houses, however, coal is used and the oil burners will probably be superseded with coal fire boxes in the near future.

Oil was used in a number of Chicago apartment houses five to ten years ago, but has been generally abandoned. Probably not more than 1 per cent of the heating plants of the city use oil, and there is no prospect that the number will



FIG. 1.—STROMBERG-CARLSON TELEPHONE.

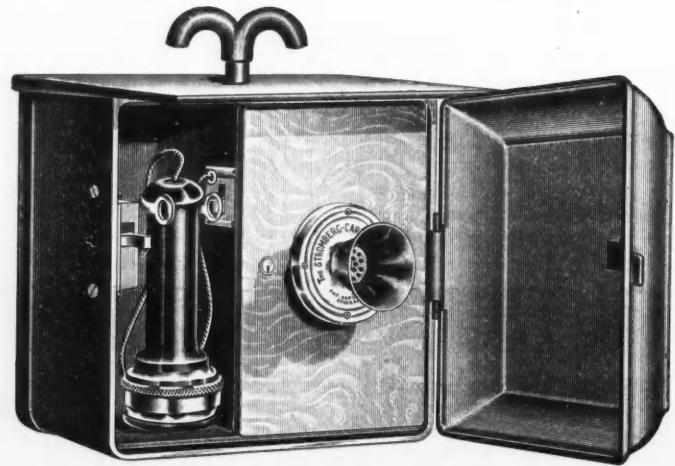


FIG. 2.—STROMBERG-CARLSON TELEPHONE.

easily started with air under 150 pounds pressure. For those without such cylinders 90 to 120 pounds pressure is sufficient.

These engines are built in sizes ranging from 400 to 2,000 horse-power. The accompanying illustration shows a plan view in section of a Koerting engine, complete and mounted on bed-plate.

CENTRAL ENERGY TELEPHONE FOR MINES.

A new "central energy" mine and railway telephone set which is especially designed to meet the conditions of bad weather, hard usage and places where high-potential currents abound, is shown in Figs. 1 and 2. This outfit is made by the Stromberg-Carlson Telephone Manufacturing Company, Chicago, Ill., and Rochester, N. Y. The iron box which protects the telephone proper is claimed to be weather-proof and absolutely water-tight. The line connections are brought into the box through a double elbow, at the top, as shown, thus eliminating any chance of water coming in contact with any connections in the box. The mechanism is completely protected by the inner case, which is locked and only accessible to the person having charge of the maintenance of the system. The various parts of the apparatus are mounted on the inside of the inner case door, and when it is open, reveals all parts in a manner that is convenient for inspection, test or repairs. The equipment of a single telephone consists of one S-C long-distance transmitter, one S-C bi-polar receiver, platinum contact hook switch, metallic carbon and fuse lightning arrester connectors, and all necessary parts, for the complete operated central energy system. All metal parts are non-corrosive; all circuits are wired with the best grade of rubber insulation wire, and all parts are interchangeable.

The line cut-off device is provided when specified and is intended as an absolute line disconnect, when the receiver is hung on the switch-hook and the outer case door closed; this makes it impossible for any high potential current arcing

to retain the plug firmly in position and assuring perfect electrical contact. On the bottom of the box there is a Y-shaped guide or groove which forms a path for plug, to the opening in spring jack, sleeve, thus making it convenient for the user to insert plug into the jack. The mere insertion of the plug calls headquarters.

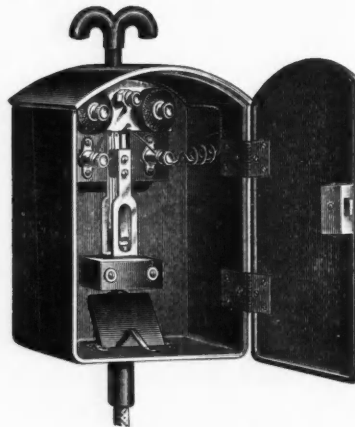


FIG. 3.—CUT-IN BOX.

This instrument could very conveniently be applied in mines, and seems especially adapted for that purpose.

THE USE OF FUEL OIL IN CHICAGO.

BY OUR SPECIAL CORRESPONDENT.

A recent careful investigation made to determine the truth of some rather vague statements made as to the growing use of oil fuel shows that there is very little oil used in Chicago. Ten years ago the Illinois Steel Company used it extensively, consuming 7,000 to 10,000 barrels a day. At present this concern does not use more than 500 barrels a day, in its Joliet plant. Oil was found too expensive, as compared with the gas manufactured by the company for its own use. At Joliet they do not use any gas.

be increased. Until about two years ago the University of Chicago fed the products of Mr. Rockefeller's wells to its furnaces, but since the completion of the new heat and power plant coal has been used exclusively.

For most consumers of fuel oil the price is about 3 cents a gallon, and 125 gallons are considered equivalent to a ton of Illinois coal, worth at present about \$2.75 on cars. Manifestly oil is more expensive than coal; too expensive for most purposes. It finds its principal use in 50 to 100 manufacturing establishments where bending and certain kinds of forging are done. The McCormick and Deering agricultural implement factories use it, for instance. Natural gas has been substituted for oil in a number of the apartment houses.

"The price of oil has been advanced, and the price of coal declining, of late years." That seems to express the situation briefly. All of the fuel oil sold in Chicago is furnished by the Standard Oil Company.

There has been an increase in the consumption of refined oil in Chicago City, due to the high prices of coal lately, but this is not great, probably not amounting to more than 10 to 15 per cent increase, and is largely temporary in its nature. It will pass as the coal market resumes its normal condition.

Aside from this temporary demand, parties who are in a position to know the facts estimate that not more than 1 per cent of the fuel consumed in Chicago is oil, and the proportion is not increasing.

DISTILLATION OF BARIUM-HOLDING ZINC ORE.—It is commonly stated in the metallurgical hand-books that barytes is an objectionable impurity in zinc ore, being reduced in the retort to sulphide which reacts with zinc, forming sulphide of the latter, although this has been disproved by the careful experiments of Prof. Prost and others. K. Sander now presents further confirmatory evidence as to the harmless-

ness of barytes (*Berg und Huttenmannischer Zeitung*, 1902, LXI, 465). He charged 10 retorts with 400 kilograms of roasted blende from Southern France, which contained lead and 9.2 per cent of barytes, and another 10 retorts with roasted blende free from barium. The residues from the former assayed 2.70 per cent Zn; from the latter 3.54 per cent. A repetition of the experiment gave 2.08 per cent and 2.92 per cent, respectively.

A NEW AIR COMPRESSOR.

A new type of air compressor, built at the Franklin, Pa., Air Compressor Works of the Chicago Pneumatic Tool Company, is here shown. This machine represents the latest product in this field and is designed to meet the growing demand for high efficiency in air compression, that naturally attends the steadily increasing adoption

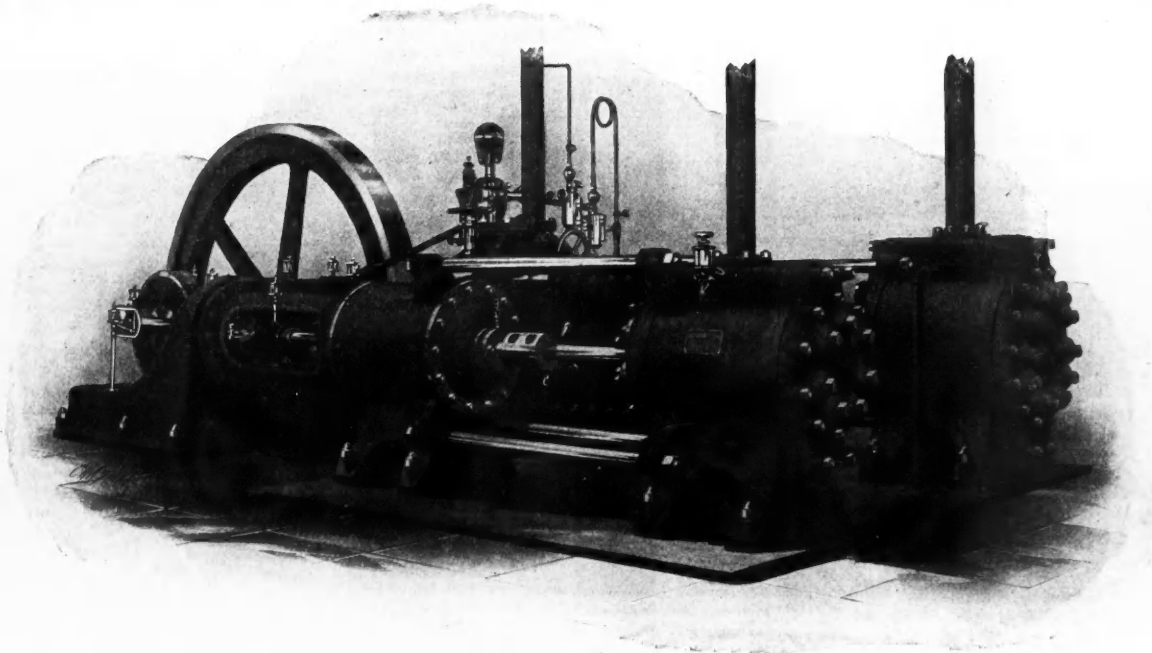
cylinder, the water passing also through the heads, its cooling effect being especially concentrated around the discharge valves, which naturally sustain all of the heat due to compression and friction that has not been eliminated by the water-jacket during the actual process of compression.

A novel feature, the value of which as a safeguard cannot be over-estimated, is an outside water connection for conducting the circulation of water between air cylinder and cylinder head, excluding the possibility of serious accident through water entering the interior of cylinder should the gasket between cylinder and head become ineffective.

The bearings are exceptionally large and well proportioned. The main bearings are provided with removable shell boxes, and only the best phosphor-bronze and babbitt metal are used. All

The cylinder flanges are recessed to effectually prevent the valves from falling into the cylinders, avoiding the necessity of a guard plate and the consequent clearance loss resulting from its use.

The cranks are of disk pattern, made from best quality charcoal iron. Shafts and crank pins are forced to their places, the former being keyed and the latter riveted, especial care being exerted to have the shaft and pins absolutely parallel. Crank pins are of special ground steel. Crank shafts are of unusual strength, made from best hammered machinery steel, accurately turned and finished. Connecting rods are made from best forged steel, carefully finished. Boxes are adjustable for wear, and accord with the most approved practice in all classes of compressors. The guides are bored and cross-heads are provided with babbitted shoes at the top and bottom with wedge adjustment for taking up wear.



CHICAGO PNEUMATIC TOOL COMPANY'S CLASS C. S. C. AIR COMPRESSOR.

of pneumatic machinery in all branches of industry. It is known as the Class C. S. C. pattern, designed for a delivery air pressure of 100 pounds per square inch, with a steam pressure of 100 to 150 pounds. The compressor illustrated has low pressure steam cylinder 31 inches diameter, high-pressure steam cylinder 20 inches diameter, low-pressure air cylinder 28 inches diameter and high-pressure air cylinder 16½ inches diameter, all cylinders being 24-inch stroke. The capacity of the compressor is 1,710 cubic feet of free air per minute when operated at 100 revolutions, or 2,052 cubic feet at 120 revolutions.

In design, the frames follow the most approved Corliss construction, and are of exceptional strength, to withstand extreme strains without producing mechanical distress. The steam and air cylinders are tied tandem to each other with heavy tie-rods, and are rigidly supported by a sole-plate, which extends beneath all four cylinders. The pillow blocks have extra broad pedestals, and all frames are planned perfectly true on the bottom, assuring a perfect alignment. All cylinders are of extra close grain iron, with appropriate thickness for reboring, and are bored absolutely true and parallel.

Steam and air pistons are of solid type, cored hollow to avoid unnecessary weight, and are provided with snap rings of special iron carefully fitted to place. They have no followers nor bolts, thus avoiding liability of accident. Stuffing boxes are of ample depth. Piston rods are of steel, turned true and polished.

The air cylinders and cylinder heads are thoroughly water-jacketed. Provision is made for a circulation of cold water the entire length of the

bearings are adjustable for wear, with ample provision for oiling. Steam valves are balanced slide valves, adjusted to realize the highest attainable economy in the consumption of steam, and are provided with Meyer independent adjustable cut-off. All valves have provision for readjustment when required by wear.

The air inlet and discharge valves are of the poppet type, placed in the cylinder heads from the outside and immediately accessible for adjustment or repair without removing the cylinder heads. The valve, valve steam and head are forged in one piece, entirely avoiding the use of flange nuts, jam nuts, split pins or other contrivances intended to serve as a head for the steam, needing constant supervision, with continual liability to work loose. A feature of more than ordinary importance embodied in this valve is the fact that the valve seat is a part entirely separate from the cylinder proper, and may be removed, replaced or renewed whenever occasion requires. In most forms of air compressors employing poppet valves, the valve seat forms an integral part of the cylinder head, affording no opportunity for renewal when it becomes worn. The valve and seat form a complete piece of mechanism which may be examined, reground and adjusted separate from the compressor.

The valve seats are of bronze and the springs of steel, light enough to minimize resistance in opening, yet strong enough to promptly seat the valve in closing. The proportion of valve area to cylinder area is exceptionally liberal, enabling the cylinder to fill freely at each stroke, without volumetric loss or impaired efficiency due to the wire-drawing effect of insufficient valve area.

A combined speed and pressure regulating governor is provided, having a connection to the air receiver; it regulates the steam supply to the compressor to suit the air consumption, maintaining a constant unvaried air pressure, even though the demand be intermittent. Working in combination with this governor is a speed governor for regulating the speed of the engine.

The inter-cooler furnished with this type of compressor consists of a set of tubes encircled by a steel shell, into the heads of which the tubes are fitted, suitable provision being made for expansion and contraction. A constant circulation of cold water is maintained through the tubes, and the compressed air from the initial compressing cylinder enters the inter-cooler on one side and after thorough distribution and contact with the tubes discharges from the other side, passing to the next compressing stage. Adequate provision is made for readily cleaning the interior of the inter-cooler, and the tubes, being of composition metal, do not rust or become foul.

In many forms of compound compressors the advantages to be derived from two-stage compression are not realized because of inadequate cooling surface in the inter-cooler, or because the air comes in contact with the cooling surfaces, but once in passing through the inter-cooler.

Complete provision is made for automatic oiling, sight feed lubricators of ample capacity being furnished for steam and air cylinders, centrifugal oilers for crank pin bearings, and oil cups of approved pattern for all wearing parts. Steam and air cylinders have indicator connections, and indicator diagrams are taken under the exact working conditions.

This type of compressor is built in three sizes, ranging in capacity from 500 to 2,000 cubic feet of free air per minute, and is also built with simple steam cylinders, for plants where the available steam pressure does not warrant compounding. Single and duplex compressors in a variety of sizes are also manufactured.

Compressors of this type are in operation at a number of important shops, and have given very satisfactory results.

A NEW BY-PRODUCT COKE OVEN PLANT.

The Cleveland, Ohio, *Iron Trade Review* states that a contract just entered into between the Retort Coke Oven Company, of Cleveland, John W. Wilcox, general manager, and the Cleveland Furnace Company, provides for the erection in Cleveland at once of 66 retort coke ovens of the Otto-Hoffman type. The new plant is to be located on ground adjoining the blast furnace which the Cleveland Furnace Company now has under construction, the land being leased from the furnace company. Work on tracks and piling for foundations for the coking plant is already in progress. The plans contemplate a complete system, including apparatus for the recovery of by-products. The compression system of ramming the coal and introducing it into the ovens will be employed, making it possible to charge 8 tons of coal instead of 6 as in ordinary charging without ramming.

The new method is in use at the Sydney, Cape Breton, plant, and is being installed at Lebanon and Buffalo by the Lackawanna Steel Company. Electricity will be the motive power for filling, pushing and other operations. Three gas engines will be installed of 160 horse-power each, and will be supplied with gas from the ovens. It is expected that the plant will be completed by the fall of 1903. Its output will be 350 tons a day, all of which will be taken by the Cleveland Furnace Company. Coal will come from a Monongahela River property owned by interests identified with the furnace company. In case a second blast furnace is added there is ample room for the doubling of the coke plant.

NEW ELECTRIC POWER TRANSMISSION DEVELOPMENTS IN CALIFORNIA.

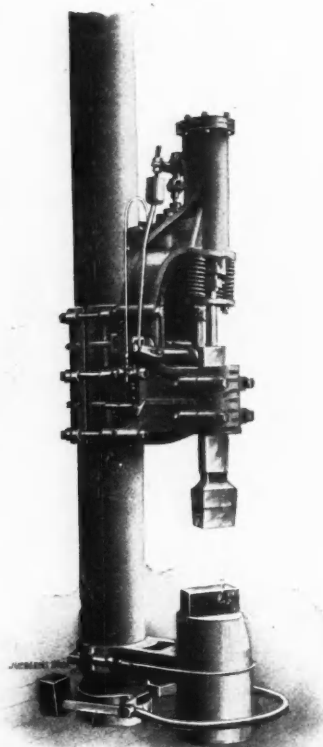
The Northern California Power Company, which furnishes power to a great variety of industries in one of the most prosperous sections of California, has recently installed a 4,000 horse-power generating plant at the Cow Creek station, which is situated in the high Sierras and is typical of the many transmission plants which have recently been installed in California. The ultimate capacity of the station will be 8,000 horse-power when the demand for power reaches this amount. The company has already installed 3,000 horse-power at another generating station, known as the Battle Creek station, thus making the present total capacity of the company's electrical installation 7,000 horse-power. Among the industries supplied with power by this company are ore-smelters, the city water works at Red Bluff and Redding, and the operation of large air compressors at the Mountain Copper Company's mine at Iron Mountain. For lighting current is also furnished to the cities of Redding, Red Bluff and Willows, and the towns of Keswick, Cottonwood, Anderson, Corning and Vina. These towns lie along the Sacramento River, and are located in one of the most fertile valleys in California. Irrigation is necessary on most of the land in this valley, and electrically driven centrifugal pumps are employed to raise the water to the irrigating ditches. Many thousands of motors are already in operation in California driving pumps for irrigation work.

The apparatus which the Northern California Power Company has recently installed in its Cow Creek station consists of two 1,500-kilowatt, 3-

phase, Westinghouse alternators, which will be driven by impact waterwheels supplied with water under a head of approximately 900 feet. They have also purchased from the Westinghouse Electric & Manufacturing Company the exciters, switchboard and raising transformers for this station. The transmission will be at 34,000 volts. The Battle Creek station is likewise equipped with Westinghouse apparatus.

A SMALL POWER HAMMER.

There is a considerable demand for a power hammer of small size to be actuated by steam or compressed air. To meet this the American Engineering Works, of Chicago, have designed what they term a post hammer. They are building this design in two sizes, 100 and 250 pounds falling weight. The accompanying illustration shows a 250-pound post hammer mounted on a 12-inch wrought steel column. These hammers are also



AMERICAN ENGINEERING WORKS POST HAMMER.

arranged for mounting on wooden posts. The cost of the hammer is considerably less than the cost of other forms of steam hammers with the same capacity. The 100-pound size is capable of handling any work up to 2¼-inch square or round, while the 250-pound hammer will handle anything up to 3½-inch square or round.

A special valve movement and treadle for handling these hammers has been designed and patented. It is so arranged that a slight movement of the treadle causes the ram to rise to the top of its stroke, and remain there for any length of time desired, thus enabling the operator to adjust any work or tools on the lower die. If the treadle is then pressed down to the limit, the ram will give a hard, full blow, the same as a drop hammer, or if desired, the treadle can be pressed down part way, when the hammer will give repeated light or hard blows as may be required. The special valve gear permits one man to handle the hammer easily for drawing or regular forge work, or for die work, similar to drop forging. The change from one kind of blow to the other is made instantly and smoothly.

These hammers are already in successful operation in a large number of railroad, forge and machine shops. They would be very convenient tools for the repair shop at a large mine or mill.

PATENTS RELATING TO MINING AND METALLURGY

UNITED STATES.

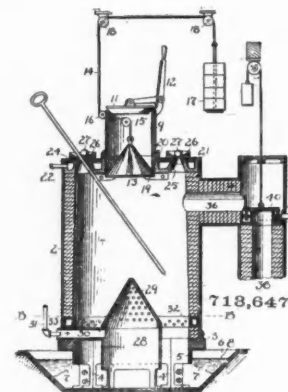
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the *ENGINEERING AND MINING JOURNAL* upon receipt of 25 cents.

Week Ending November 18, 1902.

713,602. METHOD OF PRODUCING PURE OXYGEN.—Charles Charlopin, Paris, France. A continuous process of manufacturing pure oxygen in quantities, which consists in dissolving hydrochloric acid under pressure to separate it from other agents; introducing the hydrochloric acid in gaseous form together with an excess of compressed air, into a chamber containing copper chloride, both the gas and the air being superheated whereby chlorine and other gases are produced; separating the chlorine from the other gases by subjecting it to liquefying pressure; mixing the chlorine so obtained with superheated steam to obtain oxygen, and finally separating the oxygen from the hydrochloric acid by dissolving the latter.

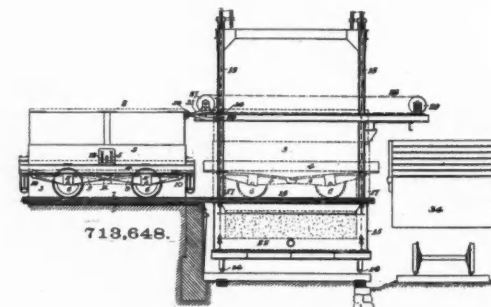
713,631. DISCHARGE-VALVE FOR COMPRESSORS.—Frederick W. Gordon, Hartford Conn. In discharge-valves for compressors, the combination, with a compressor-cylinder, compressor-piston, discharge-chamber, and discharge-valve opening to the discharge-chamber, of a piston and cylinder disposed at the back of the discharge-valve and arranged to detract from the area thereof subject to discharge-pressure, a tappet projecting into the compressor-cylinder and adapted to be engaged by the compressor-piston as it nears the end of its compressive stroke.

713,647. GAS-PRODUCER.—William T. Kelly, Bellaire, Ohio. A producer and a cover therefor having holes through



the same and removable cup-shaped caps in said holes having flaring walls, and balls to seal said caps.

713,648. COKE OVEN.—Hugh Kennedy, Sharpsburg, Pa. In combination with a coking-hearth, a platform movable up-



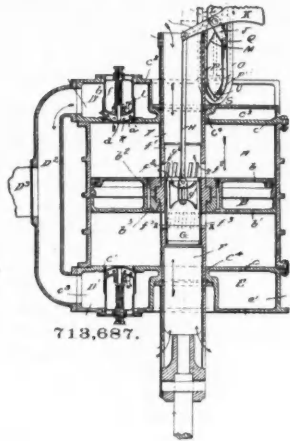
wardly and downwardly below the level of said hearth, and a coke-oven movable transversely to and from the hearth and platform.

713,661. AIR-COMPRESSOR VALVE.—Foster M. Metcalf, Battle Creek, Mich., assignor to American Steam Pump Company, Battle Creek, Mich. An air-compressor valve having a cylindrical extension or sleeve, a cushion-cap freely fitted therein and forming therewith a cushion-chamber and having radial openings in its stem, and a spring located between the valve and cap.

713,680. COMBINED COUPLING AND BUMPER FOR MINE CARS.—John M. Phillips, Carrick, Pa. A combined coupling and bumper composed of a casting having a cavity for the reception of a coupling-link, a hole for the reception of a coupling-pin and a metal plate extending around the front of said casting and projecting to the rear of the same and adapted to embrace and be secured to the bottom plank of a car-body.

713,687. BLOWING-ENGINE.—Cyrus Robinson, Pittsburg, Pa., assignor to the Westinghouse Machine Company, Pittsburg, Pa. In an air-compressor, the combination of a stationary cylinder, outlet-valves for controlling the escape of compressed air and adapted to yield to the air, springs for holding said valves closed against the pressure of the air, a

piston adapted to reciprocate in said stationary cylinder, a piston-rod connected to said piston, power mechanism connected to the said piston-rod to drive it, said rod being pro-



vided with an air-duct, a valve in said air-duct, a lever for moving the said valve carried by and movable with the piston-rod, and means for moving said lever independently of the movement of the piston-rod.

713,694. ORE-MIXING MACHINE.—John P. Schuch, Jr., Cripple Creek, Colo. In an ore-mixing machine, the combination with a mixing-tank and an agitator shaft of agitating mechanism mounted for free sliding movement on the shaft, and rotary supporting means for holding the agitating mechanism out of contact with the bottom of the tank.

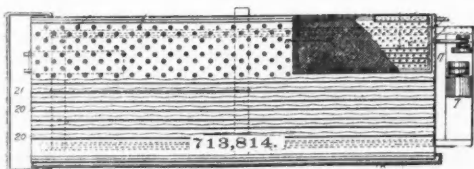
713,747. ORE-CONCENTRATING TABLE.—Ira A. Cammett, Denver, Colo., assignor to the Denver Engineering Works Company, Denver, Colo. An improved concentrating-table having a table-surface embodying a series of raised ribs or riffles which diminish in height as they extend toward the tail end of the table and which sink into the adjacent surface of the table on one side of each while continuing farther upon the other side.

713,750. EXCAVATING-MACHINE.—Walter Cole, San Francisco, Cal. In an excavating-machine for the cutting of narrow ditches or trenches, the combination with a roller-supported carrier frame which rests on each side of the line of cut, of a carrier-wheel mounted to work within the frame, a series of adjustable spokes for said wheel, a series of excavating-buckets adjustably attached to the periphery of the wheel, and means for imparting longitudinal travel to the carrier-frame and rotary motion to the carrier-wheel.

713,800. PROCESS OF REMOVING SULPHURIC ACID FROM WATER.—Hans Reiser, Cologne, Germany. A process consisting in continually passing the water through a pulpy mass of pulverized barium carbonate.

713,802. PROCESS OF COMBINING TITANIUM WITH IRON.—Auguste J. Rossi, New York, N. Y., assignor of one-half to James MacNaughton, Tahawus, N. Y. A process of combining homogeneously with iron a certain predetermined percentage of titanium which consists first in bringing together a mixture of titanic acid and iron, with carbon sufficient to deoxidize the titanic oxide, the proportion of titanic acid to the entire mixture being regulated so as to secure in the product derived from the next step not less than 2 per cent nor as much as 5 per cent of titanium, next supporting the said ingredients, and while so supported subjecting them to an intense heat, say not less than 3,500° F. until the iron and the titanium resulting from the deoxidization of the titanic acid, are thoroughly molten and homogeneously commingled, next withdrawing the said molten mixture, from the said temperature, and allowing it to solidify; next, reducing to molten state, while suitably supported and by application of the temperatures usually required to melt the iron, both the iron to be titanized and the quantity of said solidified mixture required to impart to the resulting final product the required percentage of titanium, and continuing the said support subject to said last-mentioned temperature until the constituent titanium has been melted and homogeneously distributed throughout the mass and finally withdrawing the said product from the said temperature and allowing it to solidify.

713,814. CONCENTRATOR.—August Ten Winkel, Denver, Colo., assignor, by direct and mesne assignments, of one-half to Stanley H. Bissell, Denver, Colo., Dwight Bissell, Redwood Falls, Minn., and Florence M. Cotton, Minneapolis,



Minn. The combination with a transversely-inclined concentrating-table having a movement whose tendency is to carry the material longitudinally from the head toward the tail of the table, and means located at one of the upper corners of the table for feeding pulp thereto, of a water-receptacle

mounted on the table and covering a suitable area at the ore-feed corner, a screen located above the water-receptacle, and an intermediate plate provided with projections having openings in their upper extremities forming nozzles, and means for introducing water to the water-receptacle and forcing it up through the said nozzles and thence through the screen which is arranged to receive the pulp as it is fed to the table.

713,823. STONE-CUTTING MACHINE.—Henry H. Wetmore, St. Paul, Minn., assignor of one-half to Walter Arnold, St. Cloud, Minn. A stone cutting and dressing machine, consisting of two uprights, a vertical frame slidably secured to said uprights, a cylinder and its shaft carried by said frame and adapted to receive a rotary and a longitudinal reciprocating motion, an inclined tray and braces therefor secured to said frame with its front edge close to the cylinder, and abrading material upon said tray.

713,872. MOLD FOR CASTING ROLLED-IRON FINISHING ROLLERS.—Walther Gontermann, Siegen, Germany. A mold for casting rolled-iron finishing-rollers, said mold having a grooved body, iron bricks within the grooves, and a coating of iron filings and a binding agent covering the bricks.

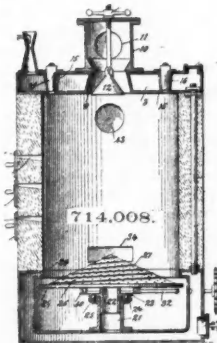
713,878. BLASTING-FUSE.—Edward H. Heath and Elmer E. Taylor, Cripple Creek, Colo. A body portion having a flared open end, and a fuse with its end inserted in said body portion, combined with a protecting waterproof covering having its inner end frictionally held and compressed between the outer surface of the fuse and the inner surface of the flared portion with its outer end extended beyond the outer end of said flared portion and bent back over the end thereof and embracing its outer surface.

713,909. HOISTING AND CONVEYING MECHANISM.—William McIntosh, Clinton, Mass. In a hoisting or conveying apparatus, suspension means, a carriage traveling thereon, an operating rope or ropes extending to the carriage, a series of supporting-carriers for the operating rope or ropes, a horn carried by the carriage for supporting said carriers, a horizontal pusher arranged to engage only the outermost carrier on the horn, and means actuated by the travel of the carriage for operating said pusher.

713,923. ELECTRIC FURNACE.—Albert A. Shade, Chicago, Ill., assignor of one-half to Eugene Howard Moore, Chicago, Ill. In an electric furnace, means for feeding the material thereto, means for withdrawing the molten material therefrom, electrodes arranged to form an arc through which the material is passed, an oblique ledge or wall located in the path of the material below said arc against which the material impinges after passing through said arc, and a magnet for deflecting the arc toward said ledge or wall.

713,932. AUTOMATIC BUCKET-DUMPING MECHANISM.—Tury E. Anderson, Denver, Colo., assignor to David P. McDonald, Denver, Colo., and Fairbanks, Morse & Co., Chicago, Ill. The combination with a bucket, a cable, a framework and a track thereon, of a carriage mounted on the track, a sheave or pulley mounted on the carriage, and engaged by the cable, the arrangement being such that the bucket is raised vertically to the desired height by applying power to the cable while passing over the sheave, a stop on the cable to engage the carriage and limit the independent movement of the bucket, whereby the carriage is caused to travel up the inclined track, a pendant attached to the bucket, a pivoted platform provided with a slot adapted to receive the pendant of the bucket, the lower extremity of the pendant being enlarged to prevent it from passing through the slot, vertical guides located beneath the track and beneath its ends in which said platform is vertically movable and capable of rotation at either end and means for holding the carriage against downward movement on the track when the cable is slackened to allow the bucket to rest on the platform which is arranged to tip and dump the bucket, the latter being suspended by its pendant when in the inverted position.

714,008. GAS PRODUCER.—Joseph A. Mitchell, Brooklyn, N. Y. A gas-producer, comprising side walls, a base formed of inner and outer walls producing a chamber extending



along the sides and bottom of the base, a hollow column mounted in the base and communicating with said chamber at the bottom of the base, a grate sustained on the column, a hollow head having means for receiving the air-blast, and means establishing communication between the hollow head and base.

714,009. APPARATUS FOR MAKING WHITE LEAD.—John H. Montgomery, St. Louis, Mo., assignor of one-half to Robert T. Brown, St. Louis, Mo., and Charles E. Neeley, Little Rock, Ark. The combination in an apparatus for

making white lead, of an atomizer for molten lead, a closed chamber in which said atomizer is located, means within said chamber for producing water-jets, and a conveyer at the bottom of said chamber.

714,038. PROCESS OF BURNING WOOD OR CHARCOAL FUELS, ETC.—Jas. A. Russel, Tacoma, Wash. A method of producing a high temperature from wood or charcoal fuel for heating an object to be operated upon, consisting in impelling air upward through a heat-storage chamber and from thence up through the wood or charcoal fuel, thence directing the gases laterally across the object to be heated, thence downward through an absorbing chamber.

714,040. PROCESS OF PRODUCING METALLIC ANTIMONY.—Thomas C. Sanderson, Chelsea, N. Y.—A process which consists in providing a molten bath of sulphide of iron; immersing in the bath antimony sulphide; adding a suitable reducing agent for reducing the antimony ore; and running off the metallic antimony from the bath, whereby the process may be carried on continuously for the reduction of repeated charges of antimony ore.

714,082. COAL-TIPPLE.—Franklin W. Willis, Pratt, W. Va. In a coal-tipple, depressed and elevated tracks inclined in opposite directions, a pivoted platform carrying a switch-rail and capable of vertical movement to register with either of the said tracks, and a dumping-platform mounted to rock on the rail-carrying platform.

714,099. APPARATUS FOR ROASTING ORES.—William F. Collins, Boston, Mass., assignor to New Process Reduction Company, Northampton, Mass. In an apparatus for roasting ores, a rotatable combustion-chamber, a disseminating device extending through said chamber, and a rotatable retort communicating with said chamber.

714,111. WELL-DRILLING MACHINE.—Robert B. Moore, Yarralton, Tex.; T. F. Moore, administrator of said Robert B. Moore, deceased. A drilling machine, comprising a rope-drum mounted to turn and slide, a revoluble member operatively engaging the drum, means for sliding the drum to prevent it from being revolved by said member, means for locking the drum to prevent it from revolving after it has been disengaged from the revoluble member, a rope-actuating device to alternately raise and drop the tool, and means for operating the rope-actuating device from the revoluble member.

714,117. GAS-MAKING APPARATUS.—Wilbur F. Steele, New York, N. Y., assignor to Acme Gas Company, New York, N. Y. In apparatus for making gas, a plurality of series of carbureters connected up to an initial air-heater at one end of each series and at the other end to a scrubber, one or more of the carbureters having means for heating the same.

714,120. AUTOMATIC STOP MECHANISM FOR WIRE-MILLS.—Harry H. White, Reading, Pa., assignor to the Carpenter Steel Company, Incorporated, Reading, Pa. The combination with a wire-rolling mechanism, a stop-lever therefor and a feed-reel mounted on a movable stand, of a shifting device for said lever and a rigid connection between said device and the stand whereby the movement of the latter under undue strain upon the feeding-wire directly and automatically operates said stop-lever.

GREAT BRITAIN.

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

Week Ending October 30, 1902.

19,902 of 1901. SULPHURIC ACID PLANT.—E. Wem-mackers, Paris, France. Improved plant for making sulphuric acid, by the contact process.

20,077 of 1901. LEACHING SULPHIDE ORES.—A. M. Scbillot, Paris, France. Process for leaching sulphide ores, without roasting, with strong sulphuric acid and recovering the acid used.

22,387 of 1901. REFINING SULPHUR.—C. Wessell, New York, U. S. A. Refining Joplin spelter by adding a small portion of phosphorus to the molten metal.

22,554 of 1901. COPPER MANGANESE ALLOY.—G. Thomson, Elizabeth, N. J., U. S. A. An improved process for making copper-manganese alloy free from iron.

25,841 of 1901. PULVERIZER. T. Parker, London. A pulverizer, consisting of a number of rotary pivoted hammers.

5,209 of 1902. MAGNETIC SEPARATOR. F. J. King, London. A magnetic separator on which the magnetic field of the electromagnets is split up into several subsidiary fields.

14,386 of 1902. CHLORATE MANUFACTURE.—P. L. E. Lederlin, Chedde, France. In the manufacture of chlorates by the electrolysis of salt, adding hydrochloric acid continuously so as to prevent the formation of free alkali.

14,412 of 1902. REMOVING MINE TIMBERS.—D. Jones, Wrexham. An apparatus for removing pit props.

15,261 of 1902. CHLORIDE OF LIME MANUFACTURE.—L. M. Bullier and G. Maguene, Paris, France. Mixing chloride of lime and sulphate of soda and compressing the mixture, thus forming hydrochlorite of soda and sulphate of lime.

16,274 of 1902. SMELTING WITH OIL FUEL.—J. T. Shadforth, Newcastle-on-Tyne. A smelting furnace using vaporized petroleum and superheated steam as the reducing agent.

PERSONAL.

Dr. R. O. Hall left Denver, Colo., for California on a business trip last week.

Dr. M. Zucker, a metallurgist, of Oakland, Cal., was in Denver, Colo., last week.

Mr. Paul S. Coudrey is the new manager of the Le Roi No. 2 Mine at Rossland, B. C.

Mr. Forbes Rickard has returned to Denver, Colo., from inspecting mines in northern Idaho.

Mr. Alexander Hill, of London, Eng., representing the directors of the Le Roi No. 2, is at Rossland, B. C.

Mr. Samuel Newhouse was in Denver, Colo., recently on business connected with his mining enterprises.

Mr. W. Neil Smith, professor of mining at the University of Tasmania, passed through New York City last week.

Mr. F. E. Carringer, president of the Progressive Mining Company, of Leadville, Colo., is East on a business trip.

Mr. Phillip Argall, of Denver, Colo., has been looking at mining property in Gilpin County, Colo., during the past week.

Mr. D. H. Allen, of the Miner's Sampling Works, at Black Hawk, Colo., is making a business trip to Rapid City, S. Dak.

Mr. George Kingdon, formerly of Hanover, N. M., is now at Bacoachi, Sonora, Mex., in charge of mines for Phelps, Dodge & Co.

Mr. E. D. McDermott, son of Mr. Walter McDermott, has been in New York City en route for the Michigan copper district.

Mr. Seymour H. Bell, manager of the North Pole Extension Company's property, has been in Salt Lake, Utah, from Sumpter, Ore.

Mr. George E. Collins, of the Sunnyside property near Silverton, Colo., was a visitor to Central City, Colo., last week on business.

Mr. C. T. Carnahan, one of the heavy mine operators and owners of Leadville, Colorado, has just returned from a trip to the Orient.

Mr. W. A. Tucker, formerly assayer at the Union copper mine, has been appointed manager at the Sea Board copper mines, Virgilina, N. C.

Mr. G. P. Goodier, manager of the Oro Verde Company interests at Yankee, Colo., has been on a trip to Oswego, N. Y., and Eastern points.

Mr. D. T. Kissell, former superintendent of the Anchor Mill at Park City, Utah, is now superintendent at the Sheba Mine, Mill City, Nev.

Dr. F. G. King, late of the Montana School of Mines, has been called to the chair of metallurgy in the Colorado School of Mines at Golden.

Col. Nicholas Treweek, president of the Wabash Company, recently left Salt Lake, Utah, for Boston, Mass., and will not return until Christmas.

Mr. H. Salmon, who has been superintendent of a stamp mill in Corea for 4 years, will spend the winter in Michigan, returning to Corea next spring.

Mr. Frank M. Langford, manager of the Melcher Company's property in the Connor Creek District, Cassia County, Idaho, has been in Salt Lake, Utah.

Mr. P. J. Donohue, chief of the Western Exploration Company's staff of experts, returned recently to Salt Lake, Utah, from a 2 months' trip into Mexico.

Mr. W. Nicholls, former foreman of the Morning Mill, has returned to the Coeur d'Alenes as superintendent of the Empire State Mill at Wardner, Idaho.

Mr. J. Beyers Holbrook has been admitted to partnership in the firm of C. H. Davis & Partners, New York City, as the firm's heating and ventilating engineer.

Dr. C. H. Gordon, superintendent of the city schools of Lincoln, Neb., has been appointed instructor in geology and geography in the University of Nebraska.

Mr. W. H. Boughton, assistant professor of civil engineering in Denison University, has accepted the position of professor of civil engineering in the University of West Virginia.

Mr. William C. Ralston, manager of the Melones Mining Company, of Calaveras County, Cal., and ex-president of the California Miners' Association, has been elected State Senator.

Mr. Ernest L. Vogel on November 18 resigned his position with the Charles Munson Belting Company, and is now connected with the sales department of the Allis-Chalmers Company.

Mr. C. E. Bunker, who has been superintendent of the Keystone Mine at Amador City, Cal., for some time, has resigned. The Keystone is one of the oldest and most profitable quartz mines in California.

Major A. Hoover has resigned his position with the Santa Rita Consolidated Mining Company to ac-

cept the position of general mine superintendent of the Cumaral Mines in the State of Sonora, Mex.

Mr. J. M. Micklewait, of the El Paso Novelty Works, El Paso, Tex., has been in Ohio and Chicago contracting for the agency of gasoline hoists, to fill several good orders from the Mexican mining trade, taken by his firm.

Mr. A. G. Wilkes, formerly with the San Pedro Gold and Copper Company at Santa Fe, N. M., has gone to Aguacalientes, Mex., as foreman for the American Smelting and Refining Company. The works of the San Pedro Company have closed down.

Mr. Eduardo J. Chibas, who has had extensive experience as mining engineer in this country and in Central and South America, has established an office in Santiago de Cuba, Cuba. He will give particular attention to examining mining properties in the island.

Dr. Charles Palmer, the new president of the Colorado School of Mines at Golden, is arranging a course of lectures by eminent mining and metallurgical men for the benefit of the senior class. Dr. Austin gave the first of the series on applied metallurgy.

Mr. Franz Meyer has opened an office as metallurgical and chemical engineer at 68 Broad Street, New York City. He was formerly technical managing director of the Actien-Gesellschaft fur Zink-Industrie, vormals Wilhelm Grillo in Oberhausen, Germany.

Mr. John L. Harris has been appointed superintendent of the Quincy Copper Mine in Upper Michigan. Mr. Harris has been acting superintendent since the resignation of his father, Capt. S. B. Harris, last spring. Previous to that time he was assistant superintendent.

Mr. J. W. Mercer, general manager of the South American Development Company, with headquarters in New York City, and Guayaquil, Ecuador, was in Denver, Colo., a few days since on a business trip. He was manager of the Liberty Bell Mine at Telluride for some time.

Mr. J. Allison Holmes, formerly connected with the metallurgical departments of the Montana Ore Purchasing Company, with headquarters at Butte, has accepted a similar position with the United States Mining Company, and has taken up his residence in Salt Lake, Utah.

Mr. J. A. Cronkrite, of Chihuahua, Mex., has been appointed the representative of the Mines Securities Corporation in Mexico, with headquarters at Chihuahua. Mr. C. M. Weld, an engineer of the Mines Securities Corporation, is to assist in opening iron deposits in India for Tata & Co.

Mr. P. W. McCaffrey left Denver, Colo., for Sonora, Mex., on November 26, to examine and report on a prospect involving the erection of a large smelter and the construction of 128 miles of railway. The International Trust Company, of Denver, is understood to be financing the deal.

Mr. F. W. Rudler, curator to the Museum of Practical Geology, London, Eng., retires this month after a service extending over 40 years. A testimonial is to be presented to him, and old students of the Royal School of Mines can send contributions to Mr. D. A. Louis, 77 Shirland Gardens, London, W.

Mr. Bernard MacDonald has resigned the position of general manager and consulting engineer, which he occupied with the Le Roi No. 2 and other mines at Rossland, B. C. He will open an office in Spokane, Wash., on January 1, 1903, from which as headquarters he will carry on the business of consulting mining engineer.

Mr. T. J. Hurley has been appointed general manager of the Occidental Mining Company, the Natalie Mining and Milling Company, and the Ruby Basin Mining and Tunnel Company, with headquarters at Silverton, Colo. The Mines Securities Corporation, of New York City, owns the controlling interest in all these companies.

Mr. Charles Parsons, who has been engaged in railroad mechanical work and in the sale of engineering and railroad supplies, is now connected with the Chicago Pneumatic Tool Company, and will travel in the interests of that corporation. Mr. Parsons was for about 13 years with the lines now comprising the Erie Railroad.

Mr. J. O. Heimberger has purchased the stock of the Leadville Printing and Publishing Company, of Leadville, Colo., and is now the sole owner of the Leadville *Herald Democrat*, a newspaper that has always given much attention to mineral developments in the Leadville District. Under Mr. Heimberger's control it promises to increase its usefulness to Leadville and the mining interests of Colorado.

Mr. Ralph R. Knowles, an alumnus of Worcester Polytechnic Institute, class of 1890, now in charge of the mill and smelter of the Fraser Mountain Copper Company at Twining, N. M., was in Denver last week buying machinery. The company has a 150-ton matte furnace, and 150-ton concentrator, which have been running successfully for the past 6 months,

but is at present shut down on account of freezing up of water. Some additional equipment and needed repairs will be made preparatory to a resumption early next season.

Mr. Armin W. Brand, president of the United States Vanadium Company, of Colorado, of which Mr. A. B. Frenzel is general manager, left for Chicago last week on his return from a trip to the property. Mr. Frenzel lately returned from a trip abroad, where it is said he made a contract with a large German iron firm to export several thousand tons of vanadium ore to be used in the manufacture of steel. It is also said arrangements are about perfected for a 100-ton smelter near the mouth of Bear Creek, Dolores County, for treating the crude ore on the ground.

OBITUARY.

William T. Jones, an old Californian, and one of the best-known mining superintendents on the Mother Lode, who for 25 years was superintendent of the Plymouth gold mine, at Plymouth, Amador County, owned by Messrs. Hayward & Hobart, died at his home in Oakland, Cal., on November 20, after a short illness.

Charles B. Houston, president of the Houston Coal and Coke Company, of Philadelphia, Pa., was struck by a mine locomotive while inspecting the company's mines at Elkhorn, W. Va., on November 26, and died in Philadelphia on November 28 from his injuries. Mr. Houston was 70 years of age, and a wealthy man. With John Roach, the shipbuilder, he built the Chester, Pa., rolling mills, and was once a partner of J. Donald Cameron in the iron business. His holdings of iron and coal lands in Virginia and West Virginia were extensive. He left a widow and 2 sons.

Thomas J. Edwards was killed on November 26, by a break in the Williamson Iron Company's little furnace in Birmingham, Ala., which also caused the death of James McAnnally, a stove man about the furnace. Mr. Edwards was 51 years of age and left a wife and 3 children. He was the eldest son of Giles Edwards, who built blast furnaces in Tennessee and Alabama 20 and 30 years ago. Mr. Edwards, previous to coming to the Williamson Furnace, was in charge of the Jenifer Furnace at Jenifer, Ala., and before that was master mechanic with the Sloss-Sheffield Steel and Iron Company.

SOCIETIES AND TECHNICAL SCHOOLS.

COLORADO MINE OPERATORS' ASSOCIATION.—This association will hold its annual banquet at the Adams Hotel, Denver, Colo., on December 13.

COLLEGE OF THE CITY OF NEW YORK.—Prof. Alfred G. Compton has been formally installed president pro tem. Prof. Compton is an old alumnus of the college, having been a student in the first graduating class in 1857. Since that time he has filled various positions on the teaching corps, and is head of the department of Physics.

Prof. Robert Ogden Doremus, the Government expert and Professor of Chemistry, has decided to withdraw his resignation and remain at the college 2 years more, though without remuneration. His son, Assistant Prof. Charles A. Doremus, will probably succeed him as full professor.

ENGINEERS' CLUB OF PHILADELPHIA.—At the meeting on November 15 there were 65 members and visitors present.

The secretary announced that the twenty-fifth anniversary of the organization of the club will be celebrated by a banquet at the Union League on December 6.

Mr. John E. Codman presented the paper of the evening, in which he gave a very complete description, with engineering data, of the proposed and adopted plans for the installation of special mains to supply water under high pressure for extinguishing fires in the central business portion of the city of Philadelphia. The paper was illustrated by drawings and photographs. It was discussed by Messrs. John C. Trautwine, Jr., James Christie, Edwin F. Smith, Henry Quimby and others.

Messrs. S. Cameron Corson, Paul W. England, W. Herman Greul, Carl Horix and Henry Szpland were elected to active membership, and Mr. Wallace R. Lee to junior membership.

ENGINEERS' CLUB OF ST. LOUIS.—At the meeting on November 19, 37 members and 9 visitors were present. Mr. J. C. Robinson presented a paper entitled "A Brief Review of the Manufacture of Hydraulic Cement, Its Chemistry, History and Recent Development." A number of figures were given of the growth of the cement business, showing that the use of Portland cement was increasing at a more rapid rate than all others. The chemical composition of hydraulic cement in some detail was given, as well as the effect of the various constituents upon the properties of the cement. The early methods of manufacture, as practiced several centuries ago, where described, and the various improvements that have been made in the

manufacture and their effect on the cost and time of manufacture. The most modern methods of manufacture, including the rotary-kiln, were described in some detail. A description was given of the method of testing employed by the manufacturers and a statement of the accuracy required in mixing materials.

In the discussion which followed the paper, Messrs. Colby, Wheeler, S. B. Russell, Affleck and A. L. Johnson participated.

INDUSTRIAL NOTES.

The Allis-Chalmers Company is about to ship from its Chicago plant considerable equipment for the Yaqui Smelting and Reduction Company, San Antonio de la Huerta, Sonora, Mex.

The Hokkaido Colliery and Railway Company, of Hokkaido, Japan, is to be furnished with two 400 h.p. horizontal cross-compound engines, built by McIntosh, Seymour & Co., of Auburn, N. Y.

The Adamite Abrasive Company, North Tonawanda, N. Y., is placing its machinery in the plant being erected, and will soon have the plant in operation. The company will use emery from Austria.

A recent fire at the refining works of the Hercules Oil Refining Works, Los Angeles, Cal., destroyed several warehouses, 2,500 bbls. of distillate and 500 tons of asphaltum. The main portion of the distilling plant was saved.

The Marion Machine and Tool Company is now the National Steam Pump Company, the change of name having been recently made. The company was formerly located in Marion, Ind., but now has a fine new plant at Upper Sandusky.

The San Joaquin division of the Southern Pacific Company, at Bakersfield, Cal., now has 108 locomotives equipped for burning oil, only 4 coal burning engines remaining on the division. The company used 64,831 bbls. of fuel oil on that division of the road in October.

According to current reports a syndicate has practically completed arrangements in behalf of New York City men to control the output of mining machinery in Ohio and Pennsylvania for the Connellsville Manufacturing and Mine Supply Company. The combine will be capitalized, it is claimed, at \$30,000,000.

The gasoline schooner *Bernardo Reyes*, property of Messrs. W. Iberri y Hijos, Guaymas, Sonora, Mex., has recently been equipped with a pair of double-cylinder, twin-screw engines, of 60 h.p., by the Union Gas Engine Company, of San Francisco, Cal., and developed on her trial trip a speed of 8½ miles per hour.

The Quantuck Water Works Company, incorporated at Albany November 7, proposes to build a water plant at Quoque, L. I., to supply that village and also the villages of East Quogue and Westhampton, N. Y. The officers are: President, J. Post Howell; vice-president, Erastus F. Post; secretary, Ernest H. Bishop; treasurer, Henry Gardiner.

Charles H. Besly & Co., of Chicago, Ill., state that they have put on the market a new Gardner grinder, No. 10, in response to many inquiries for a machine with 18-in. disks, somewhat cheaper in price than the regular No. 4 Gardner grinder. It has 2 18-in. spiral grooved steel disks, 2 tilting tables, large spindle bearings and improved countershaft.

The Robinson Machine Company, of Pittsburg, Pa., states that its new shops in Monongahela, Pa., are completed, and that it is better prepared than ever to turn out good work promptly. In addition to building hoisting, haulage and ventilating machinery for coal and metal mines the company has facilities for making mill and glass works castings.

The J. H. Montgomery Machinery Company, of Denver, Colo., has booked an order through its Mexican agents at Monterey, Mex., for a surface gravity tramway complete, and a complete concentrating plant to be used in connection. It has sold 25 Common Sense steel whims in various parts of Colorado and Wyoming, and 10,000 ft. of double riveted steel hydraulic pipe to the Highland Valley Power Company, of Idaho.

The Vancouver Power Company, of Vancouver, British Columbia, has let a contract to the E. F. Phillips Electrical Works Company, of Montreal, Quebec, for 170 miles of copper wire for the transmission of power from the North Arm power house to the cities of Vancouver and New Westminster and other centers. Delivery is to be in 3 installments—in March, May and June, 1903. The weight of the wire will be, approximately, 150 tons, and the contract price is about \$35,000.

The National Liquid Gas Company, of Pittsburg, Pa., has been organized and granted a New Jersey charter with \$15,000 capital stock to manufacture liquid carbonic acid gas from coke. The company has secured ground at Zelionople, Pa., and has started construction. The plant will be 200 by 150 ft., 2 stories high. The output of the plant will be from 2,000,000 to 3,000,000 lbs. per year. The officers are J. A. Fraunheim, Zelionople, president; Emil Swenson, Pittsburg, vice-president; W. C. Lynne,

secretary and treasurer, and J. Burnser, general manager.

The Chicago Pneumatic Tool Company says trade prospects are first class, both at home and abroad. There have been some changes recently in its representation in different cities. George A. Barden, who has been representing the company at Buffalo, has been transferred to the Philadelphia field and C. R. Green, who has been connected with the Cleveland office of the company, has succeeded Mr. Barden in Buffalo. Charles Parsons, who recently became connected with the company, is now traveling in the Northwest. J. W. Duntley, president, who has been spending some time in Europe, is returning to America.

The Nitro Powder Company, of Kingston, N. Y., has just issued \$60,000 worth of bonds to furnish capital to handle its great increase of business. The company is a New York corporation, incorporated in 1896. Its products are made under patented formulas, owned exclusively by the company. The company's business in 1901 increased 23 per cent, and to December 1, this year, its business has increased 85 per cent. Some of the largest mining companies in the United States use its powder exclusively. The company's property consists of 40 acres of land, upon which it has 24 buildings, situated in Mingo Hollow at Esopus, where it has 200 ft. of water front on the Rondout Creek, which connects with the Hudson River a mile below. The company has also installed a new plant for the manufacture of electric fuses, and is seeking foreign connections.

The Superior Portland Cement Company, of Toronto, Ont., was recently organized by the election of Judge Morgan, president; James McCullough, first vice-president; C. C. Van Norman, second vice-president; W. H. Jackson, manager; R. J. Daley, secretary; J. J. Follett, treasurer; E. Uley, auditor; J. W. McCullough, solicitor. The directors of the new company are: Judge Morgan, W. H. Jackson, J. J. Follett, R. J. Daley, E. J. Jackson, C. C. Van Norman, Dr. B. E. McKenzie, C. J. W. Neale, J. Muldoon, Toronto; James McCullough, D. Stouffer, Stouffville; George McIntyre, D. B. Brown, Orangeville; Sheriff J. W. Bettes, Bracebridge; Dr. W. Chambers, Oakwood; J. Moore, Mt. Albert; S. A. Flumerfelt, Goodwood; Thomas McCarty, Sault Ste. Marie. The company owns deposits of marl and cement clay at the Caledon Lakes near Orangeville. A modern plant with a capacity of 600 bbls. daily is to be erected at the earliest possible date, at Orangeville, Ont.

The consolidated Industries Company's plant at Batavia, N. Y., will supply 3 products—metallurgical coke, fuel gas and electricity—by a special process. The electricity for lighting and power purposes will be generated at a central station employing 250-h.p. Westinghouse gas engines of the new horizontal double-acting type, direct connected to Westinghouse alternating-current generators, operating in parallel and supplying current at 1,100 volts to the distributing network. A smaller generating unit will also be used for light loads. Another gas power enterprise, capable of certain ultimate developments is the Rocland Electric Company at Hillburn, N. Y., which together with the Ramapo Iron Works and the Ramapo Foundry Company, is comprised in the Snow interests. The installation will consist of an independent gas manufacturing plant employing the Loomis-Pettibone process, and a power plant containing Westinghouse direct-connected gas engine generator units. The producer plant will supply water gas to the iron plants for heating and metallurgical purposes, electric power to industrial plants in the vicinity, and current for lighting throughout the Ramapo Valley for some 14 miles between the towns of Ridgewood, N. J., and Hillburn, N. Y. The gas engines installed are also of the new Westinghouse horizontal double-acting type of 350 h.p., each equipment aggregating 1,200 boiler-h.p., or 1,240 boiler-h.p. maximum. The engines are direct connected to Westinghouse polyphase generators, and constructed to operate in parallel. A 128-h.p. vertical gas engine unit will carry light loads, and assist at peak loads. A small amount of direct-current power will be furnished for a short time from one of the main units, which will be temporarily a direct-current unit, but will be replaced by an alternating-current generator, thus converting the entire plant into a polyphase gas engine central station. The machinery will be furnished and erected by Westinghouse, Church, Kerr & Co., of New York City.

TRADE CATALOGUES.

Dixon's graphite facings for coating molds to prevent adhesion of the metal to the sand are described in a little 10-page pamphlet issued by the Joseph Dixon Crucible Company, of Jersey City, N. J.

The Ideal Stamp Mill Company, of San Francisco, Cal., for which E. C. Griffith, of Los Angeles, Cal., is agent, issues an illustrated pamphlet of 16 pages, describing the Ideal stamp mill. This mill is of novel design, and some important advantages are claimed for it by the manufacturer.

"The Story of Sterling White Lead" is the title of a little 24-page pamphlet issued by the Sterling White Lead Company, of Pittsburg, Pa. The pamphlet describes various substances used as paints, the process of manufacturing white lead by the old Dutch method and the particular merits of Sterling white lead.

The Massachusetts Fan Company, of Waltham, Mass., publishes an illustrated catalogue describing its Davidson propeller fan, which is stated to be well adapted to nearly all operations of ventilation, heating and drying. The company claims that for such operations as the fan is well adapted a saving of from 25 to 40 per cent for the power required to drive the apparatus may be effected as compared with fans of the blower or centrifugal type.

No. 38 of the Record of Recent Construction, published by the Baldwin Locomotive Works, of Philadelphia, Pa., entitled "Motor and Trailer Trucks," describes the Gibbs cradle-suspension for electric cars, motors by which the motors retain always practically the same relative position with the track, besides permitting a lighter truck frame and a shorter wheel base. Specifications of electric motor and trailer track trucks furnished the Boston Elevated, the Manhattan Elevated and the Mersey, Eng., Railway Company, are given, also details of trucks, furnished to electric traction companies in Illinois, Indiana, Pennsylvania and Michigan.

The Smooth-On Manufacturing Company, of Jersey City, N. J., makes Smooth-On iron cements. These are described in several pamphlets, which the company sends on application. Smooth-On Cement is a cement for repairing blemishes, blow-holes or defects in castings. Smooth-On Compound is for repairing leaks of steam water or oil, or making connections in steam or hydraulic work. Smooth-On Elastic Cement is for all inside seams of marine and stationary boilers. Smooth-On is stated to be a dry metallic composition that on being mixed with water, becomes a hard metallic cement insoluble in water, petroleum or oils, capable of withstanding a high heat, and having the same expansion as iron.

GENERAL MINING NEWS.

Petroleum Developments.—November is ahead of October in completed wells and dry holes, but shows a slight falling off in new production. The new operations at the close of the month were the heaviest during the past year. The districts of the Southwest made a heavy decline. The Big Knot and Wolf Pen districts in West Virginia have failed to come up to expectations; the latest strikes have been small and unimportant. In spite of a highly encouraging market and a general desire on the part of producers to increase the production, the drilling of 24 new wells every day of the past month failed utterly to check the waning output of the old fields. The virgin territory of West Virginia and Southeastern Ohio appears to be nearly exhausted and operators are turning with anxious eyes to Kentucky, which, to some extent, is still an unknown quantity, as a factor in the world's supply of crude petroleum, says the *Oil City Derrick*. The prospects of a pipe line have revived operations in that State, and developments are being prosecuted with a fair degree of success. Little will be known of the staying qualities of the wells until the oil bearing rocks have been more fully tested. While the consumption of Pennsylvania oil, as shown by the pipe line shipments, will be short of October, it promises to exceed the production nearly 10,000 bbls. a day. The new work under way at the close of November should make December the liveliest month of the year in the oil fields. Greatly increased activity is notable in the districts of West Virginia and Southeastern Ohio.

In the Trenton rock oil fields there was a decrease in nearly every department of field work. Indiana alone showing a gain in completed wells. The territory now being developed is small, and no possible increase in production can be looked for, notwithstanding the fact that the higher market has proved a great incentive towards new operations.

While 37 more wells were completed in the Eastern and Western oil fields in November than in October the new production showed a decline of 767 bbls., and there was an increase of 13 in the number of dry holes. This increase was confined to Pennsylvania and Indiana. The work under way at the close of November consisted of 597 rigs and 1,201 drilling wells, which was a loss of 2 rigs and 15 wells drilling as compared with the October figures. There was a gain in the new work in Pennsylvania and a loss in Ohio and Indiana.

ALASKA.

COOK'S INLET.

(From Our Special Correspondent.)

Sunrise District.—On Canyon Creek S. W. Weible has cleaned up \$7,000 in preliminary work, and is building a larger ditch. The Polly Mining Company finished its 5-mile ditch rather late in the season. A hydraulic plant will be sledged in this winter. John Renner and Robert Michelson, owners of the Polly,

state that the ground will pay \$200 per day with 4 men. At the Vest Pocket Mine, on Bertha Creek, P. M. Ogle will put in 2 more giants. The Silver Tip has been bought by Eastern men. On Crow Creek W. C. Jack and F. Fenstermacher, with 8 men, took out \$1,200 per week during the season. A great many small claims on various creeks have been worked during the summer.

ARIZONA.

COCHISE COUNTY.

(From Our Special Correspondent.)

Calumet & Arizona.—The smelter was blown in on November 20.

Darwin.—A new pump is being installed at the 200-ft. level, and cross-cutting and drifting stopped by the influx of water will soon be resumed.

Old Peabody.—This property, now known as the Dragoon Mining Company, about 6 miles north of Dragoon station, on the Southern Pacific, is making regular shipments of copper ore, about 3 car-loads a week to the Federal Smelting Company at El Paso, and employs about 80 men.

Old Terrible.—This gold mine, about 5 miles from Dragoon, formerly known as the Golden Rule, has resumed work under the superintendence of C. T. Bricker. The incline shaft following the lode upon a contact is about 260 ft. deep. A new vertical shaft to cut the lode at 400 ft. is being sunk. The mill has 21 stamps and Wilfley tables. Some free gold is collected on the plates, but the ore contains a large amount of galena and pyrite, and is concentrated, the concentrates being shipped to smelters. Crude oil from California is used for fuel. Water is pumped from a 240-ft. well near the railroad.

Sulero.—The recent strike of high-grade galena ore, mixed with argentiferous gray copper, in the Eureka-Mabel claims, is being followed up by a drift, which has followed the ore for over 40 ft.

Tombstone Consolidated Mines Company, Limited.—Nearly 20 years have passed since the water-level in the mines of Tombstone was sufficiently lowered by pumping to show the existence of valuable ore bodies below the 600-ft. on the Contention lode. The destruction of the pumping works caused work to be suspended until the sinking of the new 4-compartment shaft and the installation of powerful pumps by this company. The pumps have just started, and are rapidly lowering the water. The 6-in. sinking pump is found to be sufficient to control it. The railway extension from Fairbank to Tombstone is nearing completion, and it is expected that trains will be running by January 1.

Tucumacacori.—The ancient Tucumacacori Mission Mine, it is claimed, has been rediscovered by Mark Lulley after a search lasting 27 years in the Tyndall District, Santa Rita Mountains, on the claim known as the "Wandering Jew." High-grade fine-grained galena was found at the bottom of an old trench.

Wolframite.—No shipments of consequence have been made for months, owing to the low price and light demand, but the annual assessment work is in progress upon most of the claims.

GILA COUNTY.

(From Our Special Correspondent.)

Gray Eagle.—At this mine in the Bradshaw Mountains, George V. Harrington is running the Oro Bella 10-stamp mill steadily on ore from this mine.

Little Vulcan Smelter.—The material for this new plant is on the ground. The process is a new one.

GRAHAM COUNTY.

(From Our Special Correspondent.)

African Copper Company.—This company at Clifton is installing 6 new converters in its smelting plant.

Horseshoe.—This and other copper properties at Safford has been transferred to the Federal Mining Company, of Boston.

Kin-ehy Group.—J. D. McEnery has sold this group of gold and copper claims, 18 miles from Pima, to Detroit, Mich., men, who are organizing a company.

MARICOPA COUNTY.

(From Our Special Correspondent.)

Sultan.—S. Markes has a contract to haul a 20-stamp mill from Hillside to this mine in Santa Marie District.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Altata.—This mine, at Chloride, has a shaft 250 ft. deep, and a cross-cut of 100 ft. each way. The 5-in. vein is worked under lease and bond by A. H. Dryden and John Schemmelpfing.

Gold Creek Mining Company.—This company claims to have cut a rich body of ore on the west side of the mountains at Hardyville.

Gold Nugget.—At this mine, at Cerbat, Superintendent John Barry is getting ready for sinking.

Gold Road.—Three car-loads of piping for this mine in San Francisco District are side tracked at Kingman waiting for wagons. The new line for taking water to the mine has been surveyed.

Mocking Bird.—O. D. M. Geddis, C. W. French and A. J. Doran, of Kingman, have men at work on this gold mine in Minnesota District, and will install a cyaniding plant designed by Oscar Ellis.

Mother Lode.—Work has started on this mine at Chloride by the Philadelphia & Arizona Mining Company.

Queen Bee.—The old Mineral Park Mill is being converted into a concentrating plant, new concentration machines being put in.

Ramrod.—A mill will soon be installed on this mine at Virginia Camp in Weaver District.

Rough Rider.—This mine, at Layne Springs, belonging to R. F. Harris, of Chloride, has been temporarily closed, pending a change of ownership.

Tennessee.—From the 500 level of this mine at Chloride very rich ore is taken.

Vulcan Smelter.—This plant, at Chloride, is receiving iron ore for fluxing from Cerrillos, N. M.

PINAL COUNTY.

(From Our Special Correspondent.)

Alice.—A heavy flow of water has been encountered in this gold and copper mine at Troy.

Arizona Copper Mountain Mining Company.—This company, with property situated near Kelvin and the Gilan River, is to erect a reduction plant for the copper ore developed in the Copper Butte and adjacent claims.

Buckeye.—The electric hoist at this mine near Troy is in operation.

SANTA CRUZ COUNTY.

(From Our Special Correspondent.)

Old Glory.—Brand & Ish, who have recently bonded this and other properties, and have the 20-stamp mill in operation.

YAVAPAI COUNTY.

(From Our Special Correspondent.)

United Verde.—The company is still trying to put out the fire in the stopes on the 5th level by forcing in carbonic acid gas. No definite information is given out as to the success obtained. It is rumored that the smelter and mines at Jerome may resume work in January.

CALIFORNIA.

ALAMEDA COUNTY.

(From Our Special Correspondent.)

Near Tesla several quartz claims have been taken up by W. C. Doack. These are near the coal and manganese mines, where some quartz mining has been done, but with no success.

AMADOR COUNTY.

(From Our Special Correspondent.)

Bay State.—This company, at Plymouth, W. W. Worthing, of Stockton, general manager, has made final payment on the bond for the Rhetta Claim adjoining the Bay State. There are 20 men employed, and the mill is running steadily.

Bunker Hill Mining Company.—In this mine at Amador City, C. K. Downs superintendent, a 25-ft. ore-body is cut on the 1,400 level, supposed to run \$6 per ton. This is a distinct body from that found on the 800 level.

Horn.—The tunnel has tapped the ore-body in this mine at Defender, George W. Horn superintendent. The ledge is 2 ft. wide.

BUTTE COUNTY.

(From Our Special Correspondent.)

Beattie Mining Company.—This company, near Georgetown, has applied to the California Debris Commission for a permit to mine by hydraulic process and dump the debris into Canyon Creek.

Big Butte.—The owners of this mine at Beredns have applied to the California Debris Commission for permission to run their property by the hydraulic process, dumping the debris into Butte Creek.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Black Cat.—This new company, W. T. Robinson superintendent, is opening an extension of the Esperanza at Mokelumne Hill. The old 100-ft. tunnel is being cleaned out.

Emma Gold Mining Company.—This company, operating near Mokelumne Hill, H. H. McIntyre president, is soon to install a 10-stamp mill.

Lancell.—This gravel mine at Buckeye, P. L. Shuman superintendent, has started again. The mine was closed owing to shortage of water.

Royal Consolidated Mines Company.—On this property at Hodson, J. C. Kemp Van Ee manager, graders are at work on the site of the contemplated stamp mill. A 40-stamp mill is in operation at the mine.

Sultana Mining Company.—A new 10-stamp mill has been completed for this mine at Angels. The main shaft on the south end of the Bovee Claim, 700 ft. deep, is well timbered, and an east drift is being

driven. A new gallows frame is being put over the Bovee main shaft, and sinking has begun on the Fritz shaft No. 2.

Wilbur-Womble Mining Company.—This property, adjoining the Royal at Hodson, is having new works put up under the direction of Superintendent Orr.

ELDORADO COUNTY.

(From Our Special Correspondent.)

Montauk Gold Mining Company.—This company, owning the Zantgraf Mine, near Placerville, Edwin Goodwin, of Loomis, superintendent, has been declared insolvent by the Superior Court. Creditors of the company filed the petition, urging claims amounting to some \$7,000. The corporation declared it had no assets, the mine having been transferred to Mr. Goodwin to satisfy a debt of \$55,000. It is understood that the creditors will endeavor to have the sale nullified on the ground that the company was insolvent when the sale was made. Mr. Goodwin has since sold the Zantgraf to a bank in Auburn.

HUMBOLDT COUNTY.

(From Our Special Correspondent.)

Big Lagoon.—At this beach sand mine on the Big Lagoon many improvements are being made, including buildings for the men. There are large deposits of black sand. Dredging is being tried.

INYO COUNTY.

(From Our Special Correspondent.)

Golden Argus.—In this mine, 22 miles from Ballarat, J. J. Crees superintendent, there are 15 men at work and the 5-stamp mill is running.

Inyo Gold Company.—At this mine in Tuba Canyon, J. P. Flint is putting in a cyanide plant.

King Consolidated.—These mines at Ballarat, near the Redlands Mill, has been bonded to New York men through W. W. Godsmark, of the Radcliff.

Panamint Cyanide Plant.—At Ballarat, T. N. Stebbins is putting in a cyanide plant to work over the many old dumps.

Radcliffe Consolidated.—At this mine at Ballarat, W. W. Goosmark manager, 30 stamps are dropping regularly. There are 6 levels on the vein, and all the ore is handled by a gravity wire tram. There are 30 men employed.

Reward Mining Company.—This company, at Reward, H. C. Steele superintendent, is examining different watercourses with a view of establishing a station for electric power. It is reported that Philadelphia, Pa., men are negotiating for the mine.

Tuba.—At this mine at Ballarat contract has been let for a 50-ton cyanide plant to work the tailings.

KERN COUNTY.

(From Our Special Correspondent.)

Lady Butte.—In the shaft of this mine at Kernville good ore is reported. The drifts are now being cleaned out.

Mammoth Coal Company.—This company at Garlock has, at a depth of 145 ft., a 12-ft. vein of coal. The quality is said to be improving.

Pacific Smelting Company.—This company has been organized to build custom smelting works at Bakersfield to use oil fuel. The incorporators are A. W. McCrae, B. L. Brundage, A. Weill, H. P. Bender, G. W. Lupton, J. W. Scott, C. I. Claffin, G. T. Nugbert, C. Bickeroyke and C. W. Wickersham, all residents of Bakersfield. Mr. McCrae is the chief promoter. The plant is to start with a capacity of 100 tons per day.

Woody District.—A number of mines are being opened up near Woody. The claims around Rag Gulch paid high in early days.

NEVADA COUNTY.

(From Our Special Correspondent.)

Gold Canyon Mines Company.—This new company has purchased the Majenta Consolidated group of quartz claims, in Moore's Flat District, and has a bond upon the Santa Monica in Snow Point District. William Gregory is superintendent. The office is in San Francisco. Development is in progress on both properties, the upper tunnel will be run 1,000 ft. on the Majenta to block out a large body of ore, and a new tunnel is being driven on the Santa Monica. A stamp mill will be erected.

W. Y. O. D.—The water in this mine at Grass Valley, now owned by the Pennsylvania Mining Company, has been all removed by the pumps. Repairs are being made preparatory to hoisting, and some timbering is to be done. The company is now employing about 60 men.

PLACER COUNTY.

(From Our Special Correspondent.)

Hinman.—This property on Bear River has been bonded by San Francisco men, who will begin development at once. The ore carries both gold and copper.

PLUMAS COUNTY.

(From Our Special Correspondent.)

Forest Reserve.—The county supervisors have passed resolutions against the proposed forest reserve and miners throughout the country are signing peti-

tions against it, thinking that the establishment of a reserve in that section would greatly check mining development.

RIVERSIDE COUNTY.

(From Our Special Correspondent.)

Wright-Lawrence Mining Company.—This company intends erecting a smelter on its property 70 miles south of Needles, near the Colorado River.

SAN BERNARDINO COUNTY.

(From Our Special Correspondent.)

Federal Mining Company.—This company, near Manvel, now employs 24 men opening and developing the old Brick Consolidated mines. The mines have been idle several years. C. H. Thompson is manager.

Mountain Jewel Mining Company.—This company, at Danby, is planning a 10-stamp mill. The company's headquarters are at Long Beach, and J. P. Hays is president.

Orange Blossom.—Work has been resumed on these mines near Bagdad, Peter Klinefelter, superintendent. The property is owned by Denair, Eagman & Rich, of Needles.

Silver Wave.—This company at Danby is running its 10-stamp mill steadily.

SANTA BARBARA COUNTY.

(From Our Special Correspondent.)

Santa Inex.—An attempt is to be made to work the bed of the Santa Inex River by wing-dams such as are used on the Klamath River, but instead of using bags of sand, gravel, etc., piles will be driven, and the space to be mined enclosed by planks. The ocean beach in the vicinity around Lompoc has been mined many years, the miners getting the gold from the black sands.

SANTA CLARA COUNTY.

(From Our Special Correspondent.)

Ella Copper Mining Company.—This company has been organized to open and work the copper claim opened near the New Almaden Mine at New Almaden. The directors are Joseph Ketcher, Henry T. Welch, E. Knickerbocker and Thomas Booley, of San Jose. This deposit was worked years ago, but did not pay. It is expected to pay under new conditions. Absurd stories as to values come from the local papers.

SHASTA COUNTY.

(From Our Special Correspondent.)

E. P. Connor Company.—The latest smelter to be "planned" is to be on Middle Creek, about 4 miles from Redding. E. P. Connor, D. N. Honn, Frank Honn and others are interested in the mine where the custom smelter is "to be built."

Huron Submarine Gold Mining and Construction Company.—This company has been for some months working on the Sacramento River a short distance above Redding. A. S. Martin is president. The past season has been spent in experimenting. The main feature of the dredger is its large V-shaped "anchors," 10 ft. long and 7 ft. wide, which are lowered through the center of the boat and break the current so that the gravel behind can be worked. In this way the rough bedrock may be reached. A suction pipe is inserted in the crevices, while a powerful jet of water loosens the gravel, sand and gold.

Mountain Copper Company.—The Smeltermen's Union has declared a strike at this company's smelters at Keswick, of which Lewis T. Wright is general manager. About 200 men walked out to enforce recognition of the union. The company announces that unless the men volunteer to keep at least one furnace running the plant will be closed down for a year at least. A sympathetic strike of the miners at Iron Mountain, where the mines are located, has resulted in about 1,200 men being out of work. The mine is the heaviest copper producer and the largest silver producer in California, and also produces much gold from the quartz obtained from other mines for flux. Should it close indefinitely a number of small quartz mines must also close for lack of a market. It is mainly to the operations of this company that the county is credited with almost one-fifth of the entire mineral product of the State. The Iron Mountain Mine has been on fire some time, and strenuous efforts are being made to put out the fire. In view of this and the low price of copper the miners have chosen a bad time for a strike. There seems to be no dispute about wages; recognition of the Smeltermen's Union being the only point of dispute.

The company has discharged all of the machine men, molders and railroad hands, and several clerks in the store. Some of the hotels at Keswick have closed. The Texas Mine, which has been furnishing quartz for flux, has closed down, as have the Holt & Gregg line quarries near Kennett. A number of small mines have also been compelled to discharge their men and quit mining. The directors of the company say they will not compromise, but will stop all work.

SIERRA COUNTY.

(From Our Special Correspondent.)

Belleview Mining Company.—At this drift mine at Gibsonville, C. B. Wingate general manager, Aug Holtz,

superintendent, the long tunnel is expected to be finished by March 1. The mine was formerly known as the Thistle Shaft, or Feather Fork, and was worked through a shaft.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

Callahan's Dredge.—The company operating near Callahan's on Scott River, has been delayed by the washing out of the dam intended to turn the river into a new channel. The dam is being rebuilt.

Siskiyou Development Company.—This company, opening the coal mine near Ager, reports the coal at the 500-level freer from slate and sulphur than in the upper levels.

Yreka Mining and Milling Company.—This company, near Rollin, L. D. Ball superintendent, owns the Gold Ball, Mountain Laurel, Golden Eagle, Flora Blanche and Aida claims. An aerial tramway is being built to take ore from the mines to mill. The 20-stamp mill is running, and contracts have been let for about 1,000 ft. of tunneling. The new tunnel on the Mountain Laurel will tap the ledge at 500 ft. It is intended to have 40 stamps in the mill.

SONOMA COUNTY.

(From Our Special Correspondent.)

Oakland Quicksilver Mining Company.—J. T. Melton, C. M. Hooley, Mrs. M. J. Thompson have begun suit against this company at Pine Flat, and against certain individuals to quiet title to lands on which the mines are situated, averring that defendants have no right or title to 1,884 acres in dispute.

Socrates.—This quicksilver mine at Pine Flat has again started work with a full force of men. Frank A. Huntington, who had much to do with reopening the mine, has sold out his interests.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

Big Creek Gold Mining Company.—This new company, organized at Bangor, Me., has 15 claims on the Peri Ranch near Groveland. A tunnel is being run on the Justice. E. H. Wiley is local manager and J. B. Watson superintendent.

Cosmopolite.—A new compressor has been shipped to this mine at Groveland, Harry Argall superintendent.

Mazepa Mining Company.—In this mine at Stent, Henry Moore superintendent, the shaft is now 820 ft. deep and 7 levels have been run. A 20-ft. body of ore has been found below the 500-level.

Star.—This mine, near Columbia, E. J. Ohlsen superintendent, is to start again shortly.

McAlpine.—This mine, just across the Mariposa County line, is under the management of S. E. Rigg, of Coulterville. A road has been built from the Moccasin Creek road to the mine, and several buildings have been erected. A hoist is nearly completed.

Meighan Gold Mining Company.—New men have taken an interest in this company, owning the Longfellow Mine at Groveland. There is a 20-stamp mill on the property and 40 stamps will be added in the spring.

Sierra Gold Mining Company.—This new company, owning the Nona F. Alethian and Even Chance mines near Groveland, is sinking a new double compartment shaft. A lot of new machinery has been purchased. John F. Giles is president.

YUBA COUNTY.

(From Our Special Correspondent.)

Honeycomb Mining Company.—This company has elected the following officers: W. H. Martin, president; W. B. Meek, treasurer; E. L. Cleveland, secretary, and C. L. Crane, of Reno, Nev., superintendent and general manager. The company proposes to work the ledges underlying the old Honeycomb Hill at Camptonville. A mill and other machinery have been shipped from San Francisco.

COLORADO.

(From Our Special Correspondent.)

Mining men generally have been shocked at the assassination of Arthur Collins. It is a blow at legitimate mining in the San Juan section that every good citizen resents. There is a stern determination to root out the lawlessness that has been fostered by the Molly Maguire type of union miner who, driven out of the Couer d'Alene section of Idaho, has taken up his anarchistic methods in Colorado. All classes of taxpayers are interested in exterminating this vicious element.

The cruel murder came as a surprise, because of the utter absence of any friction at the mine since that of '90. Until the mine owners and good citizens generally combine to stamp out the lawless sentiment with which Telluride and contiguous camps has been inoculated, it is a perfectly safe prediction that the mining industry therein will suffer a serious check to its normal prosperity.

The reported sale of the Sunnyside Mine, near Eureka, has an air of mystery, and some suggestive features. While two mills have been kept busy with the product of the mines, and the price is vaguely

stated at \$1,000,000, it is whispered that there is a salty flavor, so far as ore values are concerned, which has made a hitch in the negotiations. There is also a hint that some difficulty may crop out in giving a good title.

The Livingston strike at Boulder continues to hold, so far as the size of the shoot is concerned, and general average values at a depth of 50 ft. Its effect has been to stimulate interest in Boulder County mines.

Ores and Metals has been sold by its former publisher, P. A. Leonard, to Mr. S. Z. Silversparre, late of Chicago.

A new Gates deal, as it is called, has been initiated in the organization of the Southwestern Fuel and Iron Company, to operate in the San Juan section on much the same lines as the Colorado Fuel and Iron Company, with the added feature of smelting and mining precious metals. The capitalization, \$50,000,000, suggests an important operation with which rumor connects the names of Gates, Paul Morton and the Santa Fe management, T. P. Shonts, E. G. Wilson and others. C. H. Gage, the inventor of a leaching process, who has been operating a plant near Silverton, is said to be in charge of the metallurgical end of the scheme.

The striking of new pumping oil wells in the Boulder field, though not heralded with brass band accompaniments as heretofore, is stimulating a good deal of development, and the construction of a refinery is under way.

BOULDER COUNTY.

Village Belle.—This mine, at Eldora, was sold at sheriff's sale recently to W. S. Bellman, of Boulder, for \$2,150. The mine was a few years ago used to float a company capitalized at \$1,500,000.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

Clear Creek Ore Production.—The Chamberlain Sampling Works in this county which buys practically all of the smelting ores reports the output for the year at \$2,000,000.

Clear Creek Mining and Reduction Company.—At a meeting in Idaho Springs the following officers were elected: President, D. P. McDonald, manager of Fairbanks-Morse Company, of Denver; vice-president, S. R. Strasser, of Cincinnati, O.; secretary and treasurer, B. F. Strasser, Cincinnati, O.; manager, J. N. Isgrig, of Colorado Springs; B. F. Lowell and Bruce Meyers, of Black Hawk, directors. The company will spend \$25,000 completing the mill begun several months ago, on which about \$35,000 has already been spent. It will be a steam driven concentrator. The same parties have taken the Hall ranch in Gilpin County and will open some of the lodes in that section. A gasoline hoist is to be installed at the mines, and a 250-h.p. Corliss engine at the mill.

Consolidated Stanley Mining and Milling Company.—The pumps have been drawn and the mines will probably be sold for an indebtedness of close to \$80,000. Disagreement among the stockholders, litigation and the appointment of a receiver are the causes. The property is one of the most valuable in the county.

Elkins Mining and Milling Company.—This company has 50 men grading for the new plant of machinery to be installed at the Terrible group at Silver Plume. A dam has been constructed across Clear Creek. B. C. Catren, of Georgetown, is manager.

Kaverne Mining Company.—Otto Hausing, formerly manager, was recently removed, and later arrested on the charge of embezzlement. After a preliminary hearing he was bound over to the December term of the district court. It was claimed that the pay-rolls had been tampered with. A civil suit is also on against him in the sum of \$10,000. The mine and mill at Dumont are closed. W. S. Mason, of Lasalle, Ill., president of the company, made the first complaint.

Newhouse Tunnel.—Samuel Newhouse says that work on the tunnel will not be resumed until agreements can be made with owners of mines laying ahead of the bore which is now in 13,300 ft. The Saratoga vein is 850 ft. ahead, and Mr. Newhouse has made a proposition to its owners which to this time has not been accepted, though the recent strike of wide bodies of \$7 and \$10 ore at a depth of 1,000 ft. may cause the owners of the Saratoga to close the contract. The Saratoga is also making more water. The Newhouse people offer to drive the tunnel ahead provided the Saratoga will advance about \$35,000 for the work, taking it out in hauling and mining. Such a contract is deemed imperative, since many mines which have been drained refuse either to work their lodes or allow the tunnel company to work under a satisfactory royalty. The Newhouse people are drifting on lodes owned by the tunnel and also furnishing power for 3 8-hour shifts to both the Sun & Moon and Gem Consolidated companies.

Pelican-Dives Mining Company.—At the annual meeting in Georgetown all of the old directors were re-elected. The company will continue to operate un-

der the leasing system, about 150 men now working the claims.

Pittsburg Consolidated Mining, Milling and Tunnel Company.—Manager W. L. Shaffer, of Idaho Springs, reports sinking the shafts on both the Dover and Brighton mines.

GILPIN COUNTY.

(From Our Special Correspondent.)

Mining Deeds and Transfers.—E. H. Rider to Belle Connor, one-fifth interest Hillside placer, South Boulder District; L. Olson to L. Larson, Notice and Augustin lodes, Illinois-Central District; P. McFarland to F. G. Nagle, portion of Bates lode, Gregory District; A. Ingram to F. Ingram, the Tonboy and Saratoga lodes, Pine District; S. B. Pierce to E. G. Otis Andrews, one-quarter interest in Organ and Center lodes, Russell District; A. Rohling to P. Rohling, Deadwood placer, South Boulder District; C. E. Phillips to Frank Ingram et al., the Sarah Jane lode, Pine District.

Cashier Gold Mining and Reduction Company.—Shipments from 2 different sets of leasers from the Golden Wedge workings gave values of 11.30 and 13.50 oz. gold per ton, respectively, and copper values of 12 and 14 per cent net values of \$246, and nearly \$300 per ton. B. L. Campbell, Central City, is in charge.

Clear Creek Mining and Reduction Company.—A circular letter sent out by the Golden Smelter announces that starting December 1 there will be an advance of \$1 per ton, making the total charges \$5.50 per ton, but the values of the ores has been advanced to \$20 instead of the former, \$15 per ton, there being an understanding with the American Smelting and Refining Company not to handle ores above those values. The new arrangement will not hurt this section, but ought to increase shipments of medium grade ores.

Hall Ranch.—Eastern and Colorado parties have purchased the Hall Ranch and 17 lode claims in the Pleasant Valley District for \$250,000, and made a substantial payment. The ranch property consists of 87 acres of patented ground taken up under the early agricultural grants. The property was owned by the Gilpin County Mining and Leasing Company, a London, Eng., concern, while the 17 lodes on the property were owned by Hazard Brothers of Central City. The new owners will operate as the Fostoria Gold Mining and Milling Company, with the following officers: B. M. Myers, Central City, president and manager; D. P. McDonald, Denver, vice-president; W. R. Strasser, Washington, Ind., secretary and treasurer, the main office to be in Central City. At the Summit shaft new machinery is to be installed, consisting of 34-h.p., Fairbanks, Morse & Co.'s gasoline hoister, an electric pump and drilling outfit, with shaft building 40 by 60 ft., with other additions. The shaft is to be sunk 500 ft. at once.

Pewabic Group.—The Iron and Richardson shafts have been unwatered to 600 and 400 ft., respectively, in a little over 6 weeks, since Berry Brothers took hold. The work was done with water buckets reflecting credit upon Superintendent Nelson and assistants. As soon as the shafts can be retimbered the levels will be cleaned out. The Golden Smelter will get the greater proportion of the product. E. R. Nelson, Russell Gulch, is in charge.

Stewart Gold Mining Company.—The ore shoot has been struck in the 170 level east of the shaft, shows as well as above, and in the west level indications are improving. Shipments will be resumed as soon as the roads are free of snow blockade. J. A. Gilmour, Central City, is manager.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

The heavy fall in the price of silver is viewed with alarm by the mining men of this district, as many properties have been barely able to make a small margin with the price above 50c. As yet no mines have been compelled to shut down.

Arrangements are under way to sink several prospecting shafts on the west rim of the Leadville Basin in placer territory. It is the intention to prospect a 30-acre tract through the Laura and Daisy lodes.

Leadville Zinc Ores.—The market is steady; 160 tons of concentrates come from the A. Y. & Minnie and A. M. W. mills; 100 tons of A. M. W. ore produce 80 tons of concentrates, while it takes 115 tons of the A. Y. & Minnie ore for a similar product. The Moyer dump material is being shipped at the rate of 200 tons a day to the United States Zinc Works at Canon City. The new concentrating mill at the Resurrection is fast approaching completion.

Bartlett Leasing Company.—A 1,200-ft. tunnel about half completed is being run. It will save heavy pumping expenses and is cutting some new veins at greater depth.

Cloud City Mining Company.—After several months' idleness this downtown property is arranging to ship from its manganese body at 500 ft. The ore goes to Pueblo. The Cloud City has a fine grade

material worth about \$3, f. o. b. Leadville, while it can be mined for about \$1.25 a ton.

Forest City Mining Company.—The sulphide orebody in the Chataquan shaft on Little Ellen Hill at 160 ft. is holding out, and the oxidized material is widening. The management states that average assays show \$50 to the ton.

Gold Basin Mining Company.—At 390 ft. in this shaft on old Big Four territory the company is following a small vein rich in gold and copper, but not large enough to more than pay expenses.

New Leadville Home Mining Company.—A number of stockholders have stated their willingness to loan the company money to conduct development work, about \$17,000. It will be secured by mortgage on machinery and leasehold.

Peerless Maud.—A large ore body has been opened up by Hugh Dyatt, who has been operating this Horseshoe territory for several years; \$30 to \$50 ore is shipped, while the lower-grade material is to be milled.

Penn Mining and Leasing Company.—Sixty tons daily of low-grade siliceous ore are mined. Occasional streaks of high-grade ores are encountered.

Valley Leasing Company.—Manager J. W. Deane has returned from Boston and after examining the new strike made at 280 ft. states that it is holding out and will average \$30 net. New drifts have been started and work is to be pushed on the new shaft.

OURAY COUNTY.

Caroline Mining Company.—This company has started up its new power plant at Ouray. It is of 500 h.p., and with the other 3 power houses will furnish power enough to work the deep shaft of the Revenue. Another boiler has been ordered for use in case of emergency.

Home Pyritic Smelter.—The company has been reorganized with A. P. Wyman, A. A. Shifter, H. L. Crain, A. J. and J. Walter Desmond as incorporators under the laws of Maine, and the plant will soon be in running order under the management of James C. Hill. The plant is located 2 miles below Ouray.

Ouray Chief.—A new road is built to this mine 2 miles from Ouray, by the local manager, David Wood, and shipments are expected to average a car a day. The tunnel is now in 800 ft. A shaft being sunk at its terminus is down 75 ft. The property laid idle for many years. The owners are Youngstown, O., men. Its output is a carbonate, and runs in silver and gold, with a good percentage of copper.

SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

Smuggler Union.—This Telluride company stopped nearly all work at its mines, owing to the assassination of Arthur L. Collins, the manager. Rewards for the detection of the assassin have been offered by the county and the State, but so far no clues are reported found. The miners' union has denounced the crime, but done nothing, apparently, to aid in its punishment. The mine may be closed some time, as the horses and mules used by the company have been taken to Montrose. An attempt will be made to have the death of Mr. Collins and the mysterious disappearance of two mine officials within the year investigated by the authorities.

TELLER COUNTY.—CRIPPLE CREEK.

(From Our Special Correspondent.)

Delinquent Tax Sale.—A number of mining claims were recently bought at tax sale. The taxes on non-producing property in this county are very high, and a number of weak companies had no cash in the treasury. In some instances the properties of stronger companies were advertised, and in some cases injunctions were got out to restrain the sales. Undoubtedly a number of properties will be redeemed before the tax deed is given. There is much dissatisfaction over the way mining property is taxed.

C. K. & N. Gold Mining Company.—The lessees are now able to work in the third level, owing to the starting of the El Paso pumps. The property is worked under lease by Horace Granfield, who has made considerable money out of it.

Golden Cycle Mining Company.—There appears to be considerable feeling between some of the directors. The minority stockholders, principally Messrs. Campbell, Carlton, Shepherd and Ballard, accuse President Milliken of borrowing \$50,000 to purchase a controlling interest in the Theresa and adjoining property, and leasing the Theresa to Secretary Hill, with the privilege to work through the Golden Cycle workings, for which privilege the company received nothing. A number of other accusations were also made. In return the majority stockholders consisting of Messrs. Milliken and Hill make counter accusations, and deny the minority accusations. Among other allegations, Messrs. Hill and Milliken claim that an excess amount for sampling was paid to the Rio Grande Sampler, in which Messrs. Carlton and Campbell were interested. The property is situated on the south slope of Bull Hill, near the Vindicator Mine.

Mobile Gold Mining Company.—A circular has been issued by President F. H. Pettingell to the stockholders, asking that the remaining stock in the treasury, amounting to 65,000 shares, be subscribed for at the rate of 1 per cent per share. At present there is no money in the treasury, and as considerable money is due for back taxes this step is taken to save the property. The company owns the Last Chance on Gold Hill.

Sunshine vs. Sedan.—This suit is again before the District Court of Teller County. It involves the question of Apex rights on property situated on Galena Hill in Grassy Gulch. A previous trial resulted in a hung jury. A number of prominent mining men have been giving expert testimony.

IDAHO.

SHOSHONE COUNTY.

Reports from the Coeur d'Alenes that mine owners there are planning to cut wages have been denied by the operators. John A. Finch, of Finch & Campbell, said recently: "A reduction in wages has not been considered. We are looking forward to a successful winter at the present wage scale, and hope that the tonnage of the camp may be somewhat increased. We are shipping now all allotted to us under the recent settlement with the American Smelting and Refining Company. In some cases we are shipping even more than the allotment, with the consent of the smelting company, as it is expected that the season's production may be cut down somewhat during the cold weather."

Wages in the Coeur d'Alenes are a minimum of \$3.50 for all men underground, except at Wardner, where the pay is \$3.50 and \$3. The day shift is 10 hours and the night shift 9 hours.

It is said that from 350 to 500 more men are busy now than at this time last year. It is estimated that 3,000 men have employment in the Coeur d'Alene mines, as follows: At Wardner mines, 1,000; up Canyon Creek—Tiger-Poorman, 50; Mammoth, 140; Hecla, 100; Standard, 245, and Frisco, 250; at Mulan—Morning, 250; and Hunter, 50; at the California, up Nine Mile, 45; at the sampler below Wallace, 35; at the mines at Murray and prospects, 400 (estimated); at Hercules, 50; besides prospectors working their own claims throughout the district.

Monarch.—A deal is reported pending for the consolidation of this and the California Consolidated properties, about 2 miles north of Wallace. J. D. Logan, of West Virginia, who, with A. F. Mathews, of the same State, owns the Monarch, has been in Wallace.

Skookum.—Judge Beattie in the Federal Court recently gave judgment in the Skookum case for \$175,867 to Kennedy Hanley, of Kellogg. The judgment is against Charles Sweeney, F. Lewis Clark and the Empire State-Idaho Mining Company, and is based on the report of the master in chancery, Warren Truitt, who found damages to Hanley amounting to \$265,242. He gave Hanley the gross value of one-eighth of the ore taken from the Skookum Mine, in which Hanley holds an eighth interest, and refused to allow the defendants anything for the cost of mining the ore which they took without Hanley's consent. Judge Beattie did not allow the defendants anything for mining up to the date that Hanley brought suit, on March 18, 1899, but allowed them to deduct for mining after that date.

INDIANA.

(From Our Special Correspondent.)

Coal Miners' Wages.—Coal operators admit that the price for mining, to be fixed at the joint conference after the first of the year will be 10c. a ton higher than at present, but the miners say they will insist on a larger increase. The fact that the miners throughout the winter, will not keep them from asking working full time, and are likely to be employed

Company Stores.—The Indiana Supreme Court has decided the law against company stores passed by the last Legislature unconstitutional. The act prohibited the issuing of tokens payable otherwise than in lawful money upon an assignment of wages earned or unearned by any employee in any coal mine in this State, and making any such token or order issued in violation of the act, immediately due and payable in lawful money. It is pronounced class legislation, discriminating against the merchant. "The mechanic, the farmer, banker or broker may lawfully take an assignment of the wages of the coal miner, and in consideration may issue the miner a check payable only in merchandise, work, produce, professional service or depreciated notes or currency, while the merchant must redeem his check in lawful money. This act confers privileges upon the former class and denies them to the merchant."

Mine Workers' Convention.—The call for the convention of the United Mine Workers of North America has been sent out from the national headquarters in this city, to meet in Indianapolis January 19. The convention will be composed of 800 delegates. President Mitchell and other officers will submit annual reports, and officers will be chosen.

ing higher pay. Some of the camps now need more men. At many places the miners are making new records for earnings. George Case, of Clinton, recently drew \$92.40 for 2 weeks' work, after deduction for oil, powder and blacksmithing. Pay envelopes at many mines contain \$50 or more for 2 weeks' pay.

Weekly Wage Law.—The Indiana Supreme Court has held that the act of 1899, by which employers are required to pay wages every week, and all assignments of future wages are declared void is constitutional.

PARK COUNTY.

(From Our Special Correspondent.)

Raccoon Valley Mining Company.—This company, with a capital stock of \$20,000, will develop and operate coal mines near Coxville, W. W. Ray, Silas Jones and William Williams are the incorporators. The home office will be at Coxville.

PIKE COUNTY.

(From Our Special Correspondent.)

A new mine has been opened at Winslow. W. L. Little, of Evansville, has recently leased a large tract of coal land in this county, and will sink new shafts at once. Jabez Wooley, of Evansville, is improving new mines at Petersburg and Boonville. F. B. Pusey is improving his mine on the Illinois Central, several miles below Evansville. By the first of the year more mines will be in operation in Southern Indiana than ever before. The price remains at 8c. per bu.

SULLIVAN COUNTY.

(From Our Special Correspondent.)

J. Smith Tally, of Terre Haute, has bought the coal rights on 593 acres of land in this county for \$22,500.

VANDERBURG COUNTY.

(From Our Special Correspondent.)

Shortage of Cars.—There is such a shortage of cars at the coal mines of this county that some mines are likely to close.

VIGO COUNTY.

(From Our Special Correspondent.)

Coal Mine Combination.—Word comes from Terre Haute that the bottom has dropped out of the proposed coal mine combine. It is said that Moore Brothers and others wanted to pay for the mines with 60 per cent in stock, and the rest in cash, and the operators who gave options refused the terms.

Latta Creek.—The employees of this coal mine at Jasonville, southeast of Terre Haute, are on a strike. They say the shift boss has been disloyal to the Union.

LOUISIANA.

CALCASIEU PARISH.

(From Our Special Correspondent.)

Welch Oil and Development Company.—This company's well at Welch, which showed so much gas pressure that it could not be capped, is under control, though the valve is kept partly open to ease the pressure. The well is about 1,250 ft. deep, and was drilled at comparatively small expense in 15 days, only one line of 6-in. casing being used. Storage tanks will be built at once, and a pipe line laid to the Southern Pacific Railway, which is only half a mile distant.

The Southern Pacific Railway and the Denver-Beaumont Oil Company have made arrangements for wells to be drilled at once.

MICHIGAN.

IRON—MENOMINEE RANGE.

Eleanor.—This mine at Loretto will be worked more vigorously than in the past, and the management is advertising for a large number of men. Miners are reported in demand at all properties along the range.

IRON—MARQUETTE RANGE.

Breitung Hematite Company.—This company has ordered a plant of machinery for its new mine, and will have it installed as soon as possible. The mine has a 3-compartment shaft 70 ft. deep, and some hoisting is under way.

MINNESOTA.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

A mine will be opened another year by the Minnesota Iron Company, in section 4, T. 58, R. 17, where recent explorations have found ore in some quantity. It is possible also that a large mine to the south of the Auburn will be opened for the coming year, but this project may be delayed on account of other work.

Biwabik.—This mine is working steam shovels, and will do a large amount of work this winter, employing possibly more men than in the summer. A through cut will be made on a new level, enabling easier mining and handling of loaded cars. Three shovels will work most of the winter.

Duluth.—This mine, of the Minnesota Iron Company, at Biwabik, will be stripped for a larger area and the underground workings will be extended. The mine will employ more men than in any preceding winter.

Stephens.—Tracks have been laid into the property

by the Duluth & Iron Range Road, and shipments could be made now, but the mine will be arranged for very extensive work another season. A part of the stripping outfit of the Drake and Stratton Company has been moved to Eveleth, where the company has a large amount of work to do at the Fayal.

Stevenson.—This mine may ship this year 1,400,000 tons, a tremendous total, considering the conditions. The mine is owned in fee by the Great Northern road. A large amount of additional stripping will be done in preparation for another year, probably at least 500,000 yd. will be let or carried on by the company during the winter. Stripping has been going on all summer under a contract with the Drake Stratton Company, mostly in widening the pit near the east end. The mine is still shipping heavily. In its equipment are 3 105-ton steam shovels and a number of locomotives. The same owners have this year operated the Jordan, a milling proposition, from which they have made a good output. They have also the Commodore, from which they have shipped an old stockpile, and which they will reopen the coming winter, the contest with the owner as to royalties being ended.

MISSOURI.

ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

Central Lead Company.—This company has declared its usual dividend of 50c. per share.

Doe Run Company.—This company is going to also give its stockholders a 50 per cent stock dividend, which has been expected for some time, to represent the large increase in plant and average in lead lands. This will increase the present capital of \$1,000,000 to \$1,500,000.

Irontale Shaft.—Wild rumors have been circulated that the Irontale Shaft was to be abandoned, and the machinery moved to Flat River. While the shaft has been shut down pending the scarcity and high price of labor, this property has been only slightly prospected, and some excellent ore has been found, but the present small mill cannot meet present conditions.

St. Joe Lead Company.—This company is going to give its stockholders 50 per cent stock dividend, to represent the very large re-investment of profits that the company has made in the acquirement of additional lead properties, and in greatly enlarging the plant. The capital stock is now \$3,000,000, of which \$2,500,000 is issued; the capital will be increased to \$6,000,000, which will leave \$2,250,000 in the treasury, and \$3,750,000 outstanding or issued after this scrip dividend.

MONTANA.

CARBON COUNTY.

Bridger Coal Mines.—The mines at Bridger, which have been long idle, started work again November 15, owing to the general shortage of fuel in the Northwest. The output is now about 200 tons daily.

FERGUS COUNTY.

Gold Reef Mining Company.—The ditch $3\frac{1}{2}$ miles long to convey water from the head of Whiskey Gulch to the Gold Reef Mill, near Gilt Edge, is nearly completed.

LEWIS & CLARKE COUNTY.

Big Indian.—The 60-stamp mill at the property on Big Indian Gulch, 5 miles south of Helena, was built by the Allis-Chalmers Company. The building is 50 by 150 ft. and 85 ft. high. From the top of the mill a covered ore tramway extends to a tunnel. The ore which has been worked by an open cut 150 ft. wide by 300 ft. long and 100 ft. deep. From the tunnel and branches, chutes have been raised to the floor of the open pit. The ore is simply broken down the sides of the pit to the ore chutes, from which it is discharged into 4-ton self-dumping cars, 4 of which a single mule hauls to the Gates crusher within the mill. The ore runs over grizzlies, through the crusher and into ore bins of 1,500 tons' capacity. From these bins the ore is delivered by belt conveyors to the shelf feeders, and thence into the batteries. The stamps weigh 850 lbs. The mortars are set on solid blocks of cast iron, weighing 6 tons, and these rest on beds of concrete laid in bed rock. The stamps have a 5-in. drop gauged to 100 drops to the minute, and it has been found that the stamps have an average capacity of over $4\frac{1}{2}$ tons each 24 hours.

The mill is operated by electricity conveyed from the electric power plant on Missouri River, 18 miles distant. The electricity is delivered to transformers situated in a corrugated iron building detached from the main mill building as are also the assay office, oil storage house, blacksmith shop, pump house and heating plant. From the transformers the power passes into the mill to 2 dynamos of 60-h.p. capacity, which operate the stamps and self-feeders and to a dynamo which operates the Gates crusher which has a capacity of 1,000 tons each 24 hours.

The silver plated amalgamating tables are set on tracks, and may be rolled out of the way for a clean-up. A clean-up barrel is in the center of the batteries, and a trolley line conveys a bucket from the

batteries to the barrel. Near this barrel is located the retort furnace and the necessary appliances for handling amalgam and bullion. The entire interior of the mill is kalsomined in white. The flooring is of matched lumber.

MADISON COUNTY.

Red Bluff Mining Company.—The new concentrator at Red Bluff in Madison County has started work.

SILVER BOW COUNTY.

The first lot of mining suits between Heinze and the Boston & Montana Company to reach the United States Supreme Court at Washington is now up for argument on an appeal. The Boston & Montana Company is plaintiff in all 3 suits, which were about the first brought in the now famous litigation.

The Montana Ore Purchasing Company is defendant in 2 cases and the Chile Gold Mining Company, another Heinze corporation, is defendant in the other. The actions involve the Pennsylvania and Rarus mines, Judge Knowles of the United States Circuit Court granted injunctions in 2 of the cases, and the defendants took an appeal to the United States Circuit Court of Appeals at San Francisco, where the injunctions were set aside, the court ruling that Judge Knowles had no jurisdiction.

The third case, in which the Montana Ore Purchasing Company was defendant, was still pending in Judge Knowles' court on a demurrer to the complaint, and after the Circuit Court of Appeals had reversed the other 2 cases, Judge Knowles, guided by the decision, sustained the demurrer of the Montana Ore Purchasing Company. The attorneys for the Boston & Montana Company then took an appeal to the United States Supreme Court in the 3 cases.

Alice.—Work at this mine at Walkerville has been resumed, the hoisting works, which were recently destroyed by fire, having been rebuilt. The mine employs about 200 men on the tribute plan. The property is owned by Utah men.

Hecla Consolidated.—Henry Knippenberg, of Melrose, president and general manager, has issued a circular calling the attention of stockholders to the fact that on November 1 the company's surplus has been reduced to \$8,000, and that the November operations may show a loss of \$5,000. He again points out that the grade of ore extracted has been steadily declining for some years, the price of silver and lead is falling, and the expenses are increasing on account of depth and water. Car lots of ore in October netted \$600, against \$1,500 in 1901, and \$3,000 in 1900. The general manager and other officers are serving without salary. Mr. Knippenberg suggests that the workings be leased to individuals on 15 per cent to 25 per cent royalties, or that the company raise \$30,000 to be spent at the rate of \$5,000 monthly in development, the mine to close at the end of 6 months if no ore of importance is found.

Minnie Healey.—In order to make good the \$25,000 in the way of a bond which the Supreme Court recently ordered must be furnished by the plaintiff in the case of Miles Finlen against F. A. Heinze, the Johnstown Mining Company, and others, the Minnie Healy injunction case, because the court had found that A. F. Brayn and D. J. Hennessy could not be accepted as sureties, the plaintiff has deposited with the clerk of the court a certificate of deposit for \$125,000. This will be held as a surety pending the furnishing of an additional bond by a surety company.

C. F. Kelly, of Butte, one of the attorneys for Finlen, asked the court that permission be granted to file a cash bond instead of a bond signed by sureties, and the court ordered its acceptance. The check is on the Daly Bank and Trust Company, of Butte, and is furnished by the Amalgamated Copper Company.

NEVADA.

ELKO COUNTY.

Dexter-Tuscarora Gold Mining Company.—At the meeting in Salt Lake the old board of directors and officers were re-elected as follows: Ed. H. Airis, president; S. B. Milner, vice-president; the other members of the board being E. O. Lee, John Dern and Charles J. Devereaux, of Boston; George E. Airis was again named as secretary-treasurer.

Because the meeting last year was delayed for several weeks, the reports this time cover a period of only a little more than 11 months, from December 10, 1901, to November 15. During that time the total receipts amounted to \$130,713, while the total operating expenses were \$125,021, leaving an apparent net earning of \$5,691. To this should be added, however, \$18,000 that was expended in new development work in the property, which would make the real earnings of the company \$23,691.

The company's stamp mill treated 30,093 tons of crude ore, at a cost of a little less than 72c. per ton. An extraction of \$2.88 per ton was obtained on the plates. In the agitation and percolation departments of the cyanide plant 22,930 tons of ore were handled after leaving the stamp mill at a cost of \$1.10 per ton, while the extraction amounted to \$1.89 per ton. The difference between the total tonnage and the amount treated in the cyanide mill—8,163 tons—went as

slimes to the outside reservoirs, and the values it contains will be recovered.

The result of the year's run is satisfactory to the management. The indebtedness is now \$19,307, or \$2,024 less than it was at the beginning of the year.

NEW YORK.

HERKIMER COUNTY.

Salisbury Steel and Iron Company.—This company has been incorporated, with an authorized capital stock of \$1,000,000. The following are officers: George M. Bard, of Wilmington, Del., president; Victor Adams, Little Falls, N. Y., vice-president; H. L. Wilkins, secretary, and W. H. Switzer, treasurer. The company has acquired 320 acres of iron ore land on Oak Mountains, 5 miles from the terminal of the Dolgeville Railroad and 16 miles from the New York Central Road at Little Falls, N. Y. Surveys have already been made for the construction of a railroad from the terminal of the Dolgeville Road to the mines.

NORTH CAROLINA.

MONTGOMERY COUNTY.

(From Our Special Correspondent.)

Russell.—The 10-stamp mill on the Palmer lot is working day and night with paying results. O. M. Allen, who has a lease on the property, is at the mine from Kalamazoo, Mich.

Tota.—The gold mine that produced \$16,000 in October on a 10-stamp mill is still pounding away on ore that is yielding rich returns.

STANLY COUNTY.

(From Our Special Correspondent.)

Parker.—This gold mine, which is about to be operated on a large scale, continues to produce fine nuggets. The largest found last week weighed 10 dwt.

OREGON.

JACKSON COUNTY.

Roaring Gimlet.—Considerable machinery has arrived for this mine in Gold Hill District that is being developed by Capt. Mendenhall. As a pocket proposition, the Roaring Gimlet is credited with producing nearly \$20,000, over half that amount being taken out by 2 men last year.

PENNSYLVANIA.

Pennsylvania Railroad Company.—Coal and coke shipments originating on this company's lines east of Pittsburgh and Erie were as below, in short tons:

| | W'k Nov. 22. | Jan. 1 to Nov. 22. | 1902. | 1901. |
|------------------|--------------|--------------------|------------|-------|
| Anthracite | 79,039 | 1,893,770 | 4,186,698 | |
| Bituminous | 567,739 | 23,612,088 | 17,644,565 | |
| Total coal | 646,778 | 25,505,858 | 21,831,263 | |
| Coke | 166,897 | 8,707,889 | 7,314,921 | |
| Total | 813,675 | 34,213,747 | 29,146,184 | |

Coal shipments this year have increased 3,674,595 tons, all bituminous, and coke 1,392,968 tons; showing a total increase of 5,067,563 tons, or nearly 20 per cent. The anthracite coal shipments, owing to the miners' strike, fell off 2,292,928 tons, or about 55 per cent.

BITUMINOUS COAL.

Keystone Coal and Coke Company.—This company has begun operations at the coal plant, near Seward, where it owns 1,000 acres of coal land. A tippie has been completed and the coal is mined from a slope. The coal goes to the Eastern markets. It is the intention of the company to build at once 50 coke ovens.

Pittsburg & Buffalo Company.—This company has closed a deal by which it becomes owner of 3,500 acres of coal lands in Washington, Green and Armstrong counties. The consideration was \$500,000. A large sum of money will be expended in development. It is proposed to sink a shaft and mine 150 tons a day from the new seam recently discovered.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Central Black Hills Copper Company.—The 100-ton leaching plant on Spring Creek is nearly finished. The mill is equipped with Gates crusher and rolls. There will be 6 leaching tanks. Precipitation will be effected with scrap iron. Electrolytic precipitation may be adopted later. The company has a horizontal shoot of copper carbonate 40 ft. wide, 4 ft. thick and several hundred ft. in length, blocked out that carries over 2 per cent.

Mayflower Group.—Wisconsin men have purchased this property, 4 miles west of Custer, and A. T. Feay, of Custer, is in charge. The shaft is being unwatered, and will be straightened. A 10-ton cyanide experimental mill is to be built. The ore averages nearly \$10 a ton gold.

Ruberta Mining Company.—Incorporators are W. W. Olds, L. N. Lewis and Frank R. Olds. The capitalization is \$750,000. A group of gold-bearing claims near Custer will be developed.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Big Four Mining Company.—A deep shaft has been started on the contact of a large porphyry dyke. A steam hoist plant is in place. Charles Hoxie, of Deadwood, is to superintendent work.

Gladiator Consolidated Gold Mines and Milling Company.—Lumber is being delivered for a 200-ton cyanide plant to be built on Deadwood Gulch in the spring. C. H. Crabtree, Des Moines, Ia., is manager.

Homestake Mining Company.—An Ingersoll-Sergeant air compressor capable of running 100 drills is being installed at the new Ellison hoist. New boilers of 1,000 h.p. capacity are being erected. An addition to the shaft house is being erected for the new machinery.

Imperial Gold Mining and Milling Company.—A special stockholders' meeting has been called to vote on the proposition to increase the capitalization from \$1,000,000 to \$2,500,000.

Oro Hondo Mining Company.—The new hoist is nearly ready, and sinking will be resumed December 10. The shaft house is 46 by 140 ft., and the equipment consists of double-drum hoist and boilers capable of sinking 2,000 ft. A Norwalk air compressor of 14-drill capacity is in position.

Penobscot Mining Company.—The 40-stamp wet crushing cyanide plant at Garden City is handling 4,000 tons a month. It will be at full capacity by December 15.

Pluma Mining Company.—Excavations have started for the addition to the Hawkeye 40-stamp mill, which is to be enlarged to 80 stamps, and to have a cyanide annex. The Pluma shaft is 325 ft. deep. A test run is being made at the Pluma 20-stamp mill on cement ore. A test will also be made on the siliceous ore from the surface of the ground, crushing with stamps and cyaniding. Alfred Filion, of Lead, is superintendent.

Wauconda Gold Mining Company.—A 300-acre tract 4 miles south of Lead is under development. Frank Ames is in charge, with office in Lead, S. D.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Columbia Gold Mining Company.—The hoisting plant is in use, and sinking has been resumed with 3 shifts. At 200 ft. a cross-cut will be driven. L. M. Coulson, of Rochford, is superintendent.

Golden West Mining Company.—A steam hoist has been installed on the Yellow Bird group, and a deep shaft will be sunk. The company owns over 300 acres. Experiments are being conducted with the 5-ton Chilean mill on the Benedict group.

Redfern Mining and Milling Company.—A 15-ton mill is to be erected on the property near Redfern, where there is a 14-ft. vein of free milling ore opened by test pits and shallow shafts for over 2,000 ft. A number of Burlington Railroad men are interested. H. McMillan, of Alliance, Neb., effected the organization. A. G. Stephens, of Redfern, S. D., is in charge.

TEXAS.

GALVESTON COUNTY.

(From Our Special Correspondent.)

Oil has been struck 6 miles north of Alvin and 25 miles from Houston. The well is owned by B. W. Camp, of Houston, executor of the Charles S. House estate, is 244 ft. deep, and will be drilled deeper in hopes of getting a gusher.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Beaumont Oil Wells.—The shipments recently have shown a decrease—bad weather, strikes of machinists and scarcity of spot oil causing the decline. Spot crude is very scarce, and oil in tanks has brought 35c., with the certainty that it will bring 40c. before the end of the year. Oil, f. o. b. cars, sells at 40c. to 50c.

Though the number of wells equipped for pumping has been doubled since August, the production is less. About one well out of 10 equipped in Blocks 36, 37 and 38. H. S., is pumping, the water has spread to nearly all parts of the field, and all wells over 925 ft. deep are affected. The water is steadily rising 6 in. a day. My figures on production and prices predicted 4 or 5 months ago have been verified in every essential particular. The empty completed storage totals over 3,000,000 bbls., and where the tanks building are to get oil is hard to see, with production falling off so rapidly and present demand so hard to fill. The business on the Oil Exchange is so small that local papers no longer give quotations or sales. Legitimate trading has slumped so much that there is no necessity for the exchange at Galveston or Houston, and Beaumont is not much better.

Heywood Oil Company.—This company's well, No. 1, on Block 34, and the Ohio Oil Company's No. 1, on Block 23, National tract, were brought in recently.

Lone Star & Crescent Oil Company.—This company has 10 50,000-bbl. steel tanks building at Lucas.

Silver Dime Oil Company.—This company and the Moore-Skinner Syndicate have completed 2 wood-lined earthen reservoirs 384 ft. in diameter, and 24 ft. deep. The estimated capacity is 500,000 bbls. each.

Texas Company.—This company has a refinery under construction at Port Arthur. The company has no well, but confines itself to buying and storing crude. It has over 1,000,000 bbl. in tanks.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—The Salt Lake banks report for the week ending November 28 as follows: Bullion, \$114,100; gold, silver, lead and copper ores, \$131,550; gold bars, \$11,600; making a total for the week of \$257,250.

The settlements reported for the week ending November 21 were: American bullion, \$168,800; gold, silver, lead and copper ores, \$174,800; gold bars, \$16,300; total, \$359,900.

BEAVER COUNTY.

(From Our Special Correspondent.)

Cactus.—The strike in the extreme west of the ground has shown over 35 ft. of ore. The average of the ore is reported very satisfactory.

Germania Smelter.—This plant is being improved. For nearly 25 years the plant has never been idle.

Majestic.—Colonel Farish is reported preparing to select the site of the new main shaft for the O. K. group. Work on the smelter is proceeding fast.

Montreal.—Developments at this property continue.

Wasatch.—This company's holdings, located about 10 miles southwest of the Majestic, have passed into the hands of R. J. Evans and Frank H. Lathrop, of Salt Lake City. The price is given as \$25,000.

BOX ELDER COUNTY.

(From Our Special Correspondent.)

Prince of India.—The latest find reported by Don Maguire is copper sulphides carrying gold and silver.

Eldorado.—Work at this property on the new zone north of Ogden is progressing.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—For the week ending November 28 the output as reported by samplers is: Eagle & Blue Bell, 5 cars; Bullion-Beck, 9 cars; Mammoth, 16 cars; Gemini, 8 cars; Lower Mammoth, 10 cars; Yankee Consolidated, 13 cars; Ajax, 2 cars.

During the week ending November 21 the following consignment reached the Salt Lake samplers: Eureka Hill, 4 cars ore; Gemini, 8 cars ore; Grand Central, 3 cars ore; Mammoth, 22 cars ore; Eagle & Blue Bell, 11 cars ore; May Day, 2 cars ore; Bullion Beck, 6 cars ore; Yankee Consolidated, 7 cars ore; Uncle Sam, 3 cars ore; Lower Mammoth, 3 cars ore; Star Consolidated, 1 car ore.

Eagle & Blue Bell.—Manager J. W. McChrystal is reported as saying the percentage of copper has increased at 1,250 ft.

Emerald.—Richer ground is reported below a small streak of mineralized quartz. The fissure is 8 ft. wide, giving assays as high as 13 gold and 27 oz. silver. A small hoist will probably be installed at the collar of the winze to expedite the work.

Grand Central.—The new tram is in service, delivering 175 tons of ore daily.

May Day.—Negotiations are on to secure a contract with the American Smelting and Refining Company for the reduction of the company's ores. The dry concentrator will soon start and will be supplied with ore until January 1 for test.

Southern Eureka.—It is said this long idle property is to be at work soon, and the Leadville, Colo., owners will sink to 1,000 ft., and from that level explore the ground.

Swansea.—This company is again shipping ore, about 2,000 tons monthly to the Bingham Consolidated Smelter at Salt Lake.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Shipments.—For the week ending November 28 the Ben Butler sends 4 cars; Storey, 1 car; Bingham Copper and Gold, 1 car lead ore; Red Wing, 3 cars; United States Company, 4 cars.

The reported receipts at the samplers for the week ending November 21 were: Columbia, 2 cars ore; Bingham Copper and Gold, 1 car; Storey, 1 car; Ben Butler, 6 cars; United States, 5 cars.

Bingham Consolidated.—The ore body lately opened is 45 ft. wide. Two car-loads of lead ore are sent weekly to the Murray plant.

Dalton & Lark.—The long drain tunnel is steadily removing water from workings long submerged, and has made accessible many tons of ore.

Dewey Mill.—The mill is treating the second class ores of the Sampson Mining Company. This custom mill has done a fine business this year.

Yampa.—A strike at 1,700 ft. is reported in this Bingham property owned by the Tintic Mining and Development Company.

Utah Consolidated Smelter.—Five cars of copper bullion were sent to Eastern refineries in the week ending November 28.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—For the week ending November 28 the Mackintosh Sampler reports the following receipts: Daly West, 2,854,110 lbs. ore; Ontario, 1,041,270 lbs. ore; Anchor, 209,160 lbs. ore.

The receipts at the Mackintosh Sampler for the week ending November 21 were: Daly West, 3,497,480 lbs. ore; Anchor, 208,440 lbs.; Ontario, 688,270.

California.—The new directors are: W. F. Snyder, Clarence McCormick, Charles I. Rader, D. H. Peery, B. F. Bauer, W. I. Snyder and C. W. Hartley.

Comstock.—The directors have sold 50,000 shares at \$1.25, or \$62,500 for the block, to A. Hanauer, already a large owner. It is said the company can clean the slate with the proceeds and begin work unincumbered.

Crocker.—The 6-h.p. engine and boiler and the new gasoline pump are in position. With the hoist the company will be able to sink 1,000 ft. at least. The ore streak has widened to 18 in.

TOOELE COUNTY.

(From Our Special Correspondent.)

Stockton Shipments.—The Galena King sent out 1 car and the Utah of Fish Springs 2 cars for the week ending November 28.

The Cygnet and Galena King each shipped a car of ore for the week ending November 21.

Black Diamond.—Manager Dedericks reports a satisfactory showing of ore in a drift to the north off the 180-ft. level. Work south from same station also shows ore.

Cyclone.—Development work has reached a crossing of a fissure with the vein, and samples brought to the local office by Superintendent H. Luce show values in lead and silver.

Stockton Company.—About 400 ft. east of the 500-ft. level of the double-compartment shaft at the intersection of the Katherine ledge and blue lime a fine body of shipping and milling ore is reported. The gangue is soft and easily worked. Assays show from 11 to 26 oz. silver and 22 to 54 per cent lead along the 20 ft. of openings into the shoot.

Sunshine Company.—The slimes plant has closed down for further changes. About 60 days will be needed to make the changes.

WASHINGTON.

FERRY COUNTY—REPUBLIC.

(From Our Special Correspondent.)

Black Tail.—Four men are breaking ore for shipment.

Lone Pine-Surprise.—This company is shipping ore that was broken down in the upper and lower Lone Pine stopes to the Granby Smelter, at Grand Forks, B. C.

Mountain Lion.—John Thomas, the foreman, has arrived at Republic from Skie, Ore., where he has been in the interest of the Johnathan Bourne syndicate.

Trade Dollar.—A new strike of ore is reported in the north drift on the 300-ft. level. The ore runs \$37 per ton.

FOREIGN MINING NEWS.

AFRICA.

NATAL.

The Mines Department reports that 50,083 tons of coal were mined in the colony in September, an increase of 636 tons over September, 1901. There were employed in the mines 225 whites, 1,966 negroes and 1,733 East Indians; 3,924 persons in all. There was 30 tons coal exported and 16,740 tons sold to steamers in the port of Durban.

RHODESIA.

The gold output in October is reported at 16,849 oz. crude. For the 10 months ending October 31 the total was 162,135 oz. crude, against 140,399 oz. for the corresponding period in 1901; an increase of 21,736 oz., or 15.2 per cent. The bullion reported this year was equal to 144,300 oz. fine gold, or \$2,982,681.

ASIA.

INDIA—MYSORE.

Kolar Gold-field.—The total output of gold in October is reported at 47,858 oz., an increase of 6,188 oz. over October, 1901. For the 10 months ending October 31 the total was 417,881 oz. crude, against

419,610 oz. in the corresponding period of 1901; showing a decrease of 1,729 oz., or 0.4 per cent. The total this year was equal to 376,093 oz. fine gold, or \$7,773,842.

AUSTRALIA.

QUEENSLAND.

Mount Morgan Gold Mining Company.—This company reports for October 20,769 tons of ore chlorinated, the yield being 13,292 oz. gold, an average of 0.64 oz. per ton. Short supply of water still interferes with operations at the mills.

CANADA.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending November 22 and for the year to date are as follows, according to the Rossland Miner:

| | | |
|--------------------------|-------|--------------|
| Le Roi | 3300 | 192,298 |
| Le Roi No. 2 | ..... | 52,670 |
| Centre Star | 1890 | 29,011 |
| War Eagle | 1140 | 15,006 |
| Rossland G. W. | ..... | 2,400 |
| Giant | 85 | 2,840 |
| Cascade | ..... | 300 |
| Columbia-Kootenay | ..... | 30 |
| Bonanza | ..... | 90 |
| Velvet | 50 | 1,220 |
| Spitzee | ..... | 20 |
| White Bear | ..... | 5 |
| Totals | 6405 | 303,300 |
| Total shipments for 1901 | ..... | Tons 279,133 |

NOVA SCOTIA—CAPE BRETON.

Dominion Coal Company.—This company and the New England Gas and Coke Company, have agreed upon a new coal contract to run 5 years. The coal company will supply the gas company with washed coal at \$1.95 per ton, the minimum to be 45,000 tons and the maximum 65,000 tons monthly. The gas company will bring no damage suits against the Coal Company for alleged breach of a 25-year contract made in 1897.

On November 21 the Dominion Coal Company carried out a plan previously announced and stopped the shipment of coal to the New England Gas and Coke Company, claiming that the appointment of a receiver for the Gas Company last summer terminated the contract. The Gas Company, holding that the contract still was in force, prepared at once to take necessary legal steps.

The new contract price is an advance of 7c. a ton over that named in the old contract. The new contract provides that the Coal Company will create a surplus of 50,000 tons of coal at Everett and maintain such a surplus at all times, also that any time within 2 years the New England Gas and Coke Company may call upon the Coal Company for an additional supply of coal sufficient to supply 250 new ovens, which it is estimated would call for an additional 30,000 tons per month. This would make the prospective requirements of the Coke Company about 1,000,000 tons per annum.

There is a provision in the new contract that the agreement between the 2 companies can be terminated upon a 6 months' notice by the New England Gas and Coke Company, but cannot be terminated by the Dominion Coal Company.

ONTARIO—LAKE OF THE WOODS DISTRICT.

Big Master.—The new stamp mill is treating about 30 tons per day of 10 hours. The mill has a grizzly, 10 by 7 Blake crusher, a set of 24 by 10 belt rolls, with manganese steel shells, improved challenge feeders, 2 5-stamp batteries with 1,000-lb. Alaska pattern stamps, 12-ft. copper plates, retort and bullion furnace, clean-up pan and amalgam safe, hydraulic classifier, a 6-ft. Frue vanner, with belt and corrugated Frue vanners, with plain belts.

The principal feature of the mill is the introduction of improved crushing rolls to re-crush the ore from the 10 by 7 Blake crusher. The plates are 12 ft. long. After passing the plates the ore goes into the sizer, the product of the first cone, or largest size, passing to the vanner with corrugated belt, the pulp from the other cones going to the plain belt vanners. The mill is on the shore of the Manitou Lake, where there is a fine supply of water.

MEXICO.

DURANGO.

Weepah Mining Company.—This company has commenced work on some of its mining property in the Mapimi District. The superintendent hopes to strike ore in paying quantities, in which event the company will begin work on a large scale.

San Buenaventura.—The El Paso Novelty works has installed a new gasoline engine of 10 h.p., and introduced other up-to-date mining improvements in this mine at San Buenaventura, Mapimi.

NEW ZEALAND.

The Mines department reports the exports of gold and silver for September and the nine months ending September 30 as below, in crude or bullion ounces:

| | Gold. | | Silver. | |
|-------------|---------|---------|---------|---------|
| | 1901. | 1902. | 1901. | 1902. |
| September | 51,678 | 57,783 | 49,042 | 61,037 |
| Nine months | 330,664 | 372,846 | 369,304 | 452,444 |

The gold this year shows an increase of 42,182 oz., or 12.7 per cent; the silver an increase of 83,140 oz., or 9 per cent. The gold reported this year was equal to 337,641 oz. fine gold, or \$6,978,640.

SOUTH AMERICA.

BRITISH GUIANA.

Exports from the colony for the 10 months to the end of October included 78,746 oz. of gold bullion, against 78,105 oz. for the corresponding period in 1901; an increase of 641 oz., or 0.8 per cent. The export this year was equal to 66,564 oz. fine gold, or \$1,375,874.

Exports of diamonds for the 10 months were 10,186 carats, valued at \$100,940. This compares with 2,617 carats last year.

Exports of kaolin have reached a total of 900 tons this year.

CHILE.

Concerning the Chilean nitrate market, Jackson Brothers, of Valparaiso, write us under date of October 18 as follows: Owing to favorable advices from Europe regarding consumption, prices have advanced, and sales of 95 per cent have been effected at 6s. 6d. @ 6s. 7d. alongside for November—December, with little offering at the latter figure, owing to the small quantity of nitrate disposable this year. For January delivery there has been an inquiry at 6s. 5d. @ 6s. 5½d. alongside, with little interest for February—March, sellers being more disposed to operate for the three months, January—March combined. The refined quality has been sold at 6s. 8d. for November, and 6s. 6d. alongside for January—March deliveries with a demand at these figures. Production for the first nine months has been 21,485,000 qtls., against 20,859,000 qtls. last year; and the consumption 24,308,000 qtls., against 27,151,000 qtls. We quote 95 per cent. November—December, 6s. 6½d.; January, 6s. 5½d.; February, 6s. 4d. @ 6s. 4½d.; and 96 per cent, November—December, 6s. 7½d.; January—March, 6s. 6d.; all ordinary terms sellers. The price of 6s. 6½d., with an all-round freight of 17s. 6d., stands in 8s. 1¾d. per cwt. net cost and freight without purchasing commission. Reported sales for the fortnight ending October 18 are 449,000 qtls., and re-sales, 364,000 qtls.

ECUADOR.

Playa de Oro Mining Company.—Under this head, in our issue of November 1, an item appeared in relation to the suits between this company and Mr. Otis S. Gage. We are informed by competent authority familiar with the case that the wording of that article was somewhat misleading. The facts are that "the charges brought against Mr. Gage, to which that item referred, were decided to be absolutely erroneous, and all the case claims against him in that suit held to be without foundation. In addition to this Mr. Gage recovered at the trial a verdict in his favor against the company for 1,250 shares of its stock wrongfully withheld from him by the company, and the judgment of the trial court in all respects was unanimously affirmed both by the Appellate Division and the Court of Appeals."

MINING STOCKS.

(Complete quotations will be found on pages 771 and 772.)

New York.

Dec. 3.

The professional element is again playing the copy shares. This week Amalgamated rose to \$59, and Anaconda, of which little is being sold, brought 87¾ @ 88 per cent (\$21.93¾ @ \$22). On curb brokers are doing a small business. Greene Consolidated changes hands at \$26 @ \$25½, Tennessee at \$17¼, and White Knob, of Idaho, at \$12¼ @ \$12.

The depression in the silver market has forced Ontario, of Utah, down to \$6, the lowest price in a long time.

In the Colorado list the Cripple Creeks are unsteady, Portland selling down to \$1.95, and Isabella at 29c. Mollie Gibson took another tumble to 6½c.

Alice, of Montana, came forward at 25c., a falling off from the last sale some time ago.

The Comstock stocks display another battery of assessments, which has weakened prices. Ophir sells around \$1, Best & Belcher at 70c., and Mexican at 63c.

On November 28 the New York Stock Exchange made the first call in the Allis-Chalmers preferred (mining machinery combination), selling 330 shares at \$82 @ \$82½, and on November 29 the common stock appeared with sales of 100 shares at \$21. There are \$16,250,000 preferred shares, upon which dividends already paid amount to 10½ per cent, or \$1,706,250. No dividends have yet been paid on the \$20,000,000 common stock. The company's assets amount to over \$38,000,000, and the profits in the six months ending October 1 were \$695,783. The

total surplus on October 1, after allowing for the preferred dividend, was \$526,584. Another combination to be listed on 'change recently was the American Foundries Company, having \$15,500,000 6 per cent preferred and \$15,000,000 common stock. One quarterly dividend has been declared on the preferred stock, but nothing on the common. The company's assets on September 30 were \$32,860,856, of which \$1,228,424 was in cash.

Boston. Dec. 2.

(From Our Special Correspondent.)

The continued decline in Calumet & Hecla stock is encouraging all sorts of gossip, but the consensus of opinion is that it is being engineered for the purpose of bringing the management to terms in a copper agreement. Up to date Calumet people have stood aloof from making any sort of terms relative to the selling price of copper and whether this method of depressing the market value of the stock will succeed is a question that only time can answer. In general, the market is better, the undertone being strong, but the continued decline in Calumet is causing some uneasiness. This stock is off \$30 for the week, selling at \$420 to-day. True, the sales are small and far between, but they have as much effect as if they were large. To-day's price is a loss of over 53 per cent from the high price of 1898, when it was \$805.

United States Mining took a spurt with large trading in it Monday and Tuesday. What was reported as good buying put it up \$3 to \$22.75, with fractional reaction. This stock has really been the feature of the week's trading. This proposition has ceased to be a problem, and is now a demonstrated fact. Five furnaces are now erected, and by January 1 three of them are expected to be in operation. The capacity of the smelter is almost 50 per cent greater than early expectations.

Copper Range has acted queerly, having varied \$3.25 in extreme fluctuations, and closed within a fraction of a week ago. This stock, however, is dominated by Lawson. Utah Consolidated has shown good resistance, having advanced \$1.25 to \$23.25, with reaction to \$22.75. Dividend action is looked for shortly in this stock. The buying is said to have emanated from New York sources. The break of \$9.50 in the price of Daly-West to \$32, was said to be due to liquidation on account of the declining price of silver. The stock has recovered to \$38. United States Coal and Oil has been benefited by reports that a vein of cannel coal has been struck on the company's property. The stock sold up almost \$1 to \$14.75. Sales of United Copper were made to-day at \$30@ \$30.50.

Osceola has receded \$1.50 to \$50, but Tamarack has held firm at \$148@ \$145. No dividend action is looked for by either of these companies. The curtailing of the Osceola's product is highly censured, particularly at the Lake, where there are large holdings. A slight improvement is reported in Tamarack's No. 5 shaft, but conditions there are disappointing. Adventure has fallen \$1.87½ to \$14 on unfounded reports regarding the mill.

The agreement whereby American Zinc, Lead and Smelting stockholders were to get \$20 a share for their stock expires January 1. This was in connection with negotiations for turning the company over to the American Smelting and Refining Company, but terms could not be agreed upon. The American Zinc, Lead and Smelting Company will now erect its own smelter.

Colorado Springs. Nov. 28.

(From Our Special Correspondent.)

With Thanksgiving out as a holiday, the market closed to-day in dismal form. The volume of business was fairly large, but trading was done for the most part at a sacrifice of prices. The outlook for next week is not reassuring. Nothing new has developed during the past seven days relative to the Cripple Creek water situation more than the committee is making fair progress in the matter of financing the drainage tunnel scheme. There is, however, a hitch in this connection, as some of the mining companies are disposed to let the burden fall almost entirely on the shoulders of three or four big mines located on the western rim of the district.

The Golden Cycle fight developed several disagreeable aspects this week, the leaders of the two factions indulging in acrimonious personalities. The case has been advanced to the Federal Court, and from now on will be fought out on strict law points. The stock remained stationary at 59½c., and some 30,000 shares have been bought up at this figure during the past two weeks by the Carlton faction. The control, however, rests with John T. Milliken, the president of the company.

Elkton opened the week selling at 35½@35c., but lost a cent in keeping with the general weakness of the market. El Paso declined a cent during the week in keeping with the flabby condition of the market, and sold from 68 to 67c., recovering to 67½c. Isabella was the only leader showing an advance, going from 32 to 33c., closing at the latter figure to-day. Portland declined from \$1.95 to \$1.90 during the

week. Vindicator was listless this week, selling at \$1. Work showed some activity, selling at 7¼@7c., due to reported strikes this week.

Salt Lake City. Nov. 28.

(From Our Special Correspondent.)

The week has been one of sudden changes and surprises, yet the general level of the market has been maintained. The heavy weight of the board is having some bad times just now, Daly-West has fallen from \$45 at opening to \$39. Creole made a gain of several cents, selling 1,700 shares at 51½@49½c. Daly-Judge also climbs up the limits for the week, being \$10.50 and \$8.50, with 5,195 shares closed out. Consolidated Mercur fell to \$1.80@ \$1.78½, with 3,500 coming out. Ingot sold 31,600 shares at 12½@11c. Lower Mammoth fell from \$1.34 to 98c., with 11,000 shares changing hands. Mammoth rose to \$1.71, with sales of 1,100 shares. May Day fluctuated widely, with the unloading of 37,600 shares at 23@17c. With the resumption of output Swansea sold 700 at \$1.06 @82½c. Uncle Sam reported 5,900 at 30¼@25c. California was quite active at 29½@22c., a gain of 7 or 8c., with sales of 40,000 shares.

San Francisco. Nov. 29.

(From Our Special Correspondent.)

For a week with a holiday in it the mining stock market was fairly active. Ophir developed a little weakness, but other stocks were fairly maintained, and there were considerable gains in some of the list—especially in Best & Belcher and Mexican. A greater variety of business was done than for some time past, and the market was more interesting.

Some quotations noted are: Consolidated California & Virginia—which is once more at the head of the list—\$1.05@ \$1.10; Caledonia, \$1@ \$1.05; Ophir, 93@ 95c.; Mexican, 66@68c.; Best & Belcher, 49@53c.; Hale & Norcross, 18c.; Potosi, 17c.; Gould & Curry, 13c.

The Comstock assessment announced this week was 5c. a share on Utah Consolidated. Other assessments are 14c. on Rusby Gold Mining, of Siskiyou County, and 2c. on Shenandoah Consolidated, of Amador County.

Business in oil stocks is improving. The market has been more active and prices better. It really looks as if a wider market is in sight. Among sales reported are: Hanford, \$90; Peerless, \$12; Kern Oil, \$3.75; Sterling, \$1.65@ \$1.70; Twenty-eight, \$1.40@ \$1.45; Monte Cristo, \$1.10@ \$1.15; Sovereign, 27c.; Occidental, 14c. The heaviest buying was in Occidental, Sterling and Monte Cristo.

London. Nov. 19.

(From Our Special Correspondent.)

The depression in the South African mining market continues to be the chief topic of conversation in speculative circles. The market has been disturbed this week by the speech of Mr. J. B. Robinson at the meeting of the Robinson South African Banking Company, in which he announced that the bank was to be reconstructed with smaller capital. This was taken by the market to mean that Mr. Robinson saw little chance of expanding the bank's business. The bank has large funds in hand, and part of this is to be returned to the shareholders. The capital of the bank at present is £3,000,000 in 744,000 shares of £4 each, and 6,000 founder's shares entitled to a large share in the profits after 6 per cent has been paid on the ordinary shares. When reconstruction takes place the new shares are to be £1 each, and the founder's shares are to be made ordinary ones. The return of capital to shareholders and the reduction of the nominal capital of the bank certainly looks as if the money could not be profitably employed, and hence the market became very depressed. Mr. Robinson, however, states that this is not the case, but that the profits of the bank can be maintained without so much floating capital. Last year the bank paid a 5 per cent dividend, distributing £148,800 to the ordinary shares, and nothing on the founder's. In his speech Mr. Robinson spoke hopefully of the future of South Africa generally, and predicted that the supply of native labor would be ample for all purposes before long.

I have mentioned several times lately that rumors are being circulated with regard to the transfer of Rhodesia from the Chartered Company to the Imperial Government. Recently the rumors have been revived, and some of the sensation mongers among the daily press have published circumstantial accounts of the plans for the future. All this stuff is the imagination of the journalist, and is the very best guesswork. One rumor was that Mr. Chamberlain's visit to South Africa is for the special object of discussing terms for the transfer, and not for the reason publicly announced. This, of course, is far from the point. The question of handing over Rhodesia to the Imperial Government cannot be gone into until the Cape, Natal, the Transvaal and the Orange River Colony are settled, and the country restored to its former prosperity. It may not be for years that South Africa can be federated into a Dominion, and it will not be until then that the Chartered Company is superseded. I observe that Mr. Hawksley, the

company's solicitor, in making a speech the other day, pointed out the desirability of federating the five States at no distant date. This assumes naturally that Rhodesia will come under the same government as the other States. In the meantime, however, the company will be under the direction of Wernher, Beit & Co., for the offices of the company are to be removed shortly to the new building in Finsbury Circus, that is being built by that firm.

The British Aluminum Company, Limited, continues in a state of serious financial embarrassment, and the present condition is indeed critical, as the profits made are not sufficient to pay debenture interest. During the seven years existence of the company many new issues of capital have been made. There are three different classes of shares, amounting in all to £400,000, and besides £300,000 in 5 per cent debentures. Large sums have been spent on plant and properties, and it cannot be said that the management has always been conspicuous for its display of wisdom. The demand for aluminum and its alloys has not been equal to expectation, and the metal has so far only a few special uses in England. It is now proposed by the directors to suspend payment on the debentures for two years, which practically makes the debentures into cumulative preference shares, and to issue more debentures in front of the existing ones. The assets of the company have also been re-valued. The directors, who were apparently responsible for past troubles, have resigned, and with new management it is possible that the company may be put onto satisfactory lines. But the difficulties to be surmounted will be considerable.

COAL TRADE REVIEW

New York, Dec. 4.

ANTHRACITE.

Both producers and consumers have reason to bless the weather. The cold wave late last week proved of short duration, and unseasonably mild weather has prevailed this week. For the first time in years operators are glad to see really warm days at this season. Sales agents all over the country are beset by consumers and dealers, and are, so to speak, under the harrow. What their position would be if such weather prevailed as at this date in 1898 they can imagine, but do not care to. Consumption must be much below the winter normal, but demand is so widespread that no coal is going into storage, except so far as individual consumers here and there manage to lay in a few tons.

The season of lake navigation nominally closed this week, but as the Sault is still open a considerable tonnage of coal will doubtless go forward yet. Lake freight rates have ruled low, 30c. from Buffalo to Duluth and 40@50c. to Chicago. Arrivals at the head of the lakes are fairly heavy, but only the smaller Lake Superior ports can hope to get anything like a normal supply before shipments cease. In Chicago territory the situation is easier than a week ago, and vessels have been arriving more rapidly. It is believed that the tonnage that will arrive will be sufficient, though far below normal, to remove the prospect of a famine in water coal. The coal that arrives is promptly transferred to cars, and goes to the interior or to nearby points. Milwaukee is now getting attention, and is receiving a considerable tonnage by lake. Coal sells at wholesale at a small premium, and \$8 is about the retail price for prepared sizes. The lower lake ports and Canadian points are somewhat neglected by the operators in efforts to get as much coal as possible to upper lake points. Several Canadian cities have good supplies of bituminous.

Along the Atlantic seaboard anthracite is in a little better supply. All the mining regions are busy, mild weather removes urgent demands, but the market is very strong, particularly at points beyond Cape Cod. The shortage in anthracite receipts at Boston for 11 months is 1,105,663 tons, as compared with 1901, though this is partly offset by an increase of 440,156 tons in bituminous receipts. Dealers report great difficulty in meeting the demands of the retail trade. Present indications are that some points beyond Cape Cod will have trouble in getting anthracite all winter. Retail prices at Boston remain at \$9 per ton, delivered. A little coal has arrived at some of the smaller ports along Long Island Sound, and relieved demand somewhat. At New York Harbor points the market is easier, and is showing the effect of increased shipments from the mines, particularly of steam sizes. Some of the washery buckwheat offered at low prices, \$2.25 f. o. b. shipping port, is very poor stuff, which in a normal year the producer would not dare to ship. Part of the demand for prepared sizes at New York as elsewhere, is no doubt fictitious, owing to dealers and consumers duplicating orders in order to get some coal in storage. Present receipts are quite equal to actual needs. Coal is selling at retail for \$6.50@ \$9. The regular price for prepared sizes of free burning white ash is \$5, f. o. b. New York Harbor shipping port. At Philadelphia receipts are more plentiful. Retail prices are \$6.75@ \$8.

BITUMINOUS.

The Atlantic seaboard bituminous trade shows a slightly easier speculative market than last week, and speculative prices have dropped from \$5.75 to \$5.50, f. o. b. New York Harbor shipping ports for Clearfield grades. This drop has been due to heavier arrivals at tidewater. With heavier arrivals the demand for coastwise tonnage has increased, and coastwise freight rates are slightly higher. The railroads seem to have done something to improve car supply at the mines, and all producers hope the improvement may last, though all fear that it may not. The car shortage has been acute for two months.

There is considerable speculation in the trade over a probable advance in through freight rates next year, but a general lack of information as to what may be done by the railroads. An advance of 10c. per ton has been mentioned. This is generally regarded as conservative.

Demand at points beyond Cape Cod is still strong, though arrivals of foreign coal have permitted some coal to go in storage and relieved the situation a little. Some demurrage is still accruing on tonnage in excess of what the railroads could handle, and in excess of the specified demurrage clauses in the charter of vessels arriving. Along Long Island Sound coal is in short supply. The heavy winds last week kept vessels in port, and the coal that should have arrived at Sound ports went elsewhere. New York Harbor trade shows a heavy demand, but has received coal that would have gone to Sound ports but for unfavorable weather. In the all-rail trade coal is yet in short supply and some manufacturing plants are obliged to curtail production in consequence.

Transportation from the mines to tidewater is about up to normal, coal running through in a week. Car supply at the mines has improved, and is now thought to reach 50 to 60 per cent of the demand. In the coastwise vessel market vessels are in short supply, especially smaller craft. Freight rates are strong, and, if anything, are advancing. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island Sound, 95c. @ \$1.10; Boston, Salem and Portland, \$1.15 @ \$1.25; Wareham, \$1 @ \$1.10; Lynn, \$1.25 @ \$1.30; Newburyport, \$1.50. From the further lower ports rates are 15 @ 20c. higher.

Birmingham. Dec. 1.

(From Our Special Correspondent.)

The coal production in Alabama is only interfered with by the shortage of cars. The State has yet to decide on leasing out its convicts for coal digging. Governor Jelks and the Convict Board were in Birmingham during the past week conferring with the operators and receiving the reports from the State mine inspectors as to the mines belonging to such companies as have bid for the labor of the convicts.

The Louisville & Nashville Railroad Company announces that it is handling 150 cars daily from mines in Bibb County for out-of-State points, mostly to Pensacola and Louisiana and Mississippi ports. The Southern Railway is short a couple of thousand cars at least in handling the coal trade along their lines in this State. The Central of Georgia and the Frisco System are doing better, in comparison to the amount of coal on their lines, than perhaps any of the rest.

The manufacture of coke is about the same. The demand is increasing right along and the work on new ovens is being rushed as quickly as men can do it. Up to this past week the weather has been most favorable for outside work on ovens, and the contractors expect to be able to turn the ovens over to the companies in the stipulated time. The Sloss-Sheffield Steel and Iron Company will have 150 new ovens ready for operation by January 15, and before April 1 will have 50 to 100 more.

Chicago. Dec. 1.

(From Our Special Correspondent.)

A sharp cold snap has caused an increase of most satisfactory nature to wholesalers of coal, in the sales of the week ending to-day. For both out-of-town and city trade there has been a large volume of business, and if the weather does not relapse into the abnormally warm temperatures that characterized most of November, the satisfactory condition will continue. Undoubtedly the freezing weather helped to keep up prices of bituminous grades, which otherwise would have fallen on account of the steady, if small, supply of anthracite coming in by lake and by rail, and which will doubtless advance if the cold continues. Then, too, the supply has been generally better this week than heretofore, though smokeless grades and Hocking are still somewhat scarce. Quotations today are: Pocahontas and New River smokeless, \$5 @ \$5.50; Hocking, \$5; Youghiogheny, \$3.90 @ \$4; cannel, \$6; Brazil block, \$3.80 @ \$4; Indiana lump and egg, \$2.90 @ \$3; Illinois lump and egg, \$2.50 @ \$3; smithing coal, \$5 @ \$6. An illustration of the scarcity of smithing coal is found in the fact that to-day a prominent local house filled an order, not very large, for smithing coal that had been on its books since December 1 last, or practically a year. The coal could not be got, that was the whole explanation.

Anthracite is reported to sell for \$7 or cars, and the demand, not more than a tenth of which can be supplied, has increased from both city and country. Comparatively much of the anthracite is being sold at retail by consignees of cargoes from Buffalo and Erie; very little of it goes out of town. At retail anthracite is still \$7.50 @ \$8. It now appears probable that lake boats carrying anthracite will be run for two weeks or more after the closing of lake insurance, or until December 20 to 25, if the weather permits, the demand being so great and the rates so high as to justify the risk.

Cleveland. Dec. 2.

(From Our Special Correspondent.)

The coal trade has displayed the most activity of any of the commodities on the lakes this fall. The last week of coal shipment has been a veritable spurt, which has been rather refreshing in this season when everything has been dull and monotonous. The shippers had been cut short of their material for the last few months, and began to despair. They implored the railroads to give them more cars with which to move their product, and the request was acceded to. The shipment this week has been very active, and the rates under the influence of the livelier trade have revived. The shippers did not feel disposed to waste any time dickering with the vessel owners over rates. The latter made rapid advances, and whereas Duluth coal had been carried for 30c. previously the rate is now 75, without a contest. Rates to Lake Michigan jumped first from 40 to 45c., and then in a single day went to 75c. Shippers of hard coal out of Buffalo have paid \$1 to the head of the lakes and \$1.25 to Fort Williams. It seems now possible that the movement may be prolonged until after the expiration of the insurance of vessel hulls, especially as some of the owners do not insure their craft. The possibility of continuing the hull insurance until December 10 may make a larger movement later on. The shippers are rapidly getting ready to wind up their business, however, and the movement of the last few days has inspired the hope that the season will show some little gain over last year.

Pittsburg. Dec. 2.

(From Our Special Correspondent.)

Coal.—High prices for coal not under contract continues. The demand is heavy, but it is impossible to get full production, owing to the inability of the railroads to supply the cars needed. All the mines are in full operation at the opening of the week, but the car supply falls off before the end, and many mines are forced to close. The river mines continue to operate steadily. There was a satisfactory rise in the rivers last week, and the Monongahela River Consolidated Coal and Coke Company and independent shippers were enabled to send from 10,000,000 to 12,000,000 bush. to Southern ports.

Connellsville Coke.—The production was greater, but shipments fell off last week. There is still a heavy demand for coke and fancy prices are paid. Contracts for furnace coke for delivery next year are at prices ranging from \$3 to \$4.25 a ton, and for spot shipment from \$5 to \$6 is being paid. Contracts are made for foundry coke for next year at from \$4.50 to \$5, and for prompt delivery as high as \$9.50 a ton is paid. The Courier, in its last report, gives the production for the previous week at 240,058 tons, a gain of 1,423 tons. The shipments aggregated 9,879 cars, distributed as follows: To Pittsburg and river tipples, 3,684 cars; to points west of Pittsburg, 4,653 cars; to points east of Connellsville, 1,542 cars. This was a decrease of 215 cars, compared with the previous week.

San Francisco. Nov. 29.

(From Our Special Correspondent.)

The market continues quiet. Arrivals have been about as usual, and most descriptions are in good supply. Fuel oil continues to be a prominent factor, and most dealers are inclined to look for lower rather higher prices.

Prices.—Current prices for Coast coals to dealers are as follows: Wellington, \$8.50; Southfield, \$8; Roslyn, \$7; Seattle and Bryant, \$6.50; Coos Bay, \$5.50; white ash, \$5. For Rocky Mountain coals, large lots, quotations are: Castle Gate, Clear Creek, Rock Springs or Sunnyside, \$8.50; Colorado anthracite, \$14. For Eastern and foreign coals, cargo lots, prices are: Pennsylvania anthracite, \$14; Cumberland, \$12; Welsh anthracite, \$13; cannel, \$9; Brymbo, \$7.50; Wallsend, \$6.50.

Foreign Coal Trade. Dec. 3.

Export trade continues very quiet, and no new contracts are reported. Some foreign coal, chiefly from Wales, continues to arrive at New York and Philadelphia.

Exports of coal and coke from the United States for the 10 months ending October 31 are reported by the Bureau of Statistics of the Treasury Department as below, in tons:

| | 1901. | 1902. | Changes. |
|------------------|-----------|-----------|--------------|
| Anthracite | 1,768,684 | 638,137 | D. 1,130,547 |
| Bituminous | 4,634,324 | 4,526,880 | D. 107,444 |
| Total coal | 6,403,008 | 5,165,017 | D. 1,237,991 |
| Coke | 322,636 | 317,888 | D. 4,748 |
| Totals | 6,725,644 | 5,482,905 | D. 1,242,739 |

The coke exported went chiefly to Mexico. The distribution of the coal exports is shown in the following table:

| | 1901. | 1902. | Changes. |
|-----------------------|-----------|-----------|--------------|
| Canada | 4,448,828 | 3,722,516 | D. 726,312 |
| Mexico | 484,572 | 457,095 | D. 27,477 |
| Cuba | 301,831 | 316,036 | I. 14,205 |
| West Indies | 299,986 | 260,708 | D. 39,278 |
| Belgium | 11,948 | 4,116 | D. 7,832 |
| France | 196,889 | 29,766 | D. 167,123 |
| Germany | 17,053 | 16,352 | D. 701 |
| Italy | 108,175 | 86,530 | D. 21,645 |
| Holland | 3,812 | 305 | D. 3,507 |
| Other Europe | 158,943 | 46,523 | D. 112,420 |
| Other countries | 370,971 | 225,070 | D. 145,901 |
| Totals | 6,403,008 | 5,165,017 | D. 1,237,991 |

The decrease in exports to Canada was chiefly in anthracite, and was due to the deficiency in that kind of coal. The falling off in exports to Europe is chiefly the result of greater demand and higher prices at home. The trade to France, which assumed considerable proportions last year, was largely of a temporary character, and a decrease was to be expected with the decline in business and fall in prices there.

Imports of coal into the United States for the 10 months ending October 31 are reported as below:

| | 1901. | 1902. | Changes. |
|------------------|-----------|-----------|------------|
| Anthracite | 18,769 | 18,769 | I. 18,769 |
| Bituminous | 1,571,848 | 1,766,990 | I. 195,142 |
| Totals | 1,571,848 | 1,785,759 | I. 213,911 |

The increase this year was due to imports at Atlantic ports, in consequence of the coal shortage in the East. The imports from Great Britain rose from 44,675 tons in 1901 to 137,546 tons this year.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of November 21 that in consequence of large production and an easy demand the Welsh coal. Prices for forward shipment, however, are coal market still remains weak for all descriptions of slightly firmer. Quotations are: Best Welsh steam coal, \$3.78 @ \$3.84; seconds, \$3.66; thirds, \$3.60; dry coals, \$3.66; best Monmouthshire, \$3.36 @ \$3.42; seconds, \$3.30; best small steam coal, \$2.16; seconds, \$2.04; other sorts, \$1.92.

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

The outward freight market remains quiet and unchanged. Some rates quoted from Cardiff are: Marseilles, \$1.30; Genoa, \$1.26; Naples, \$1.20; Singapore, \$2.64; Las Palmas, \$1.44; St. Vincent, \$1.62; Rio Janeiro, \$2.28; Santos, \$2.52; Buenos Aires, \$2.04.

IRON TRADE REVIEW.

New York, Dec. 3.

There has been some improvement in the production of pig iron, as the furnaces in Western Pennsylvania and Ohio are now getting better supplies of coke. Complaints of delay are still numerous, however.

The figures given on another page show the extent of the importations of iron and steel into the United States up to the end of October, and there is no doubt that November and December will increase the aggregate for the year very considerably. German and British material is being offered quite freely, and finds many takers, not only among those manufacturers whose requirements have outrun their anticipations, but also among those who find that they cannot rely upon deliveries up to time on contracts made here a year or six months ago. The foreign pig iron and steel billets have undoubtedly helped to tide us over a tight place.

It is said that the steel rail contracts already placed will carry the mills well over into 1904. There is a shortage of girder rails, and several trolley enterprises are held up because they cannot get the material.

The liquidation now going on in the stock markets has not affected the iron trade so far, however much it may have depressed shares in iron and steel companies. There is no doubt that many of these stocks have been too high, and that they are getting down to a sounder basis of values.

Birmingham. Dec. 1.

(From Our Special Correspondent.)

There is little more accumulation of pig iron reported this week because of the scarcity of railroad cars, the Sloss-Sheffield Steel and Iron Company alone reporting 10,000 tons in the yards in the vicinity of Sheffield and Florence.

It is stated authoritatively that some iron has been sold for delivery the last half of the coming year at \$19.50 per ton. The Sloss-Sheffield Company declares that it has sold none under \$20 per ton for delivery during that period. The agreed price for

iron for the last half of next year is \$18.50 per ton, but indications point to a better price. There have not been many sales made as yet for delivery the last half of the year, but for the first half almost the entire production has been sold.

Williamson Furnace met with an accident this week, and will be out of blast for a couple of weeks, and perhaps longer. This furnace has been making from 75 to 85 tons of iron daily, and has been selling on the open market. The furnace will be repaired at once and started up again. The accident cost the lives of two men, including that of the general manager and superintendent of the furnace, T. J. Edwards.

The Tennessee Coal, Iron and Railroad Company manufactured an extraordinary amount of iron at its furnaces during the month of November. The repairing of No. 2 Alice Furnace in the city will hardly be completed before the middle of January, when it will be lighted up at once. The company has five furnaces in operation at Ensley and four at Bessemer. Oxmoor and No. 1 furnaces are also doing well.

The spot iron to be had still commands \$25 per ton. The following quotations are given: No. 1 foundry, \$21@22; No. 2 foundry, \$20@21; No. 3 foundry, \$18.50@19; No. 4 foundry, \$17@18; gray forge, \$16.50@17; No. 1 soft, \$21@22; No. 2 soft, \$20@21.

In railroad circles it is announced that better accommodations will be given the iron manufacturers from now on in handling their commodities. More cars are to be brought to the district and other lines which get traffic from this territory will be called upon to furnish some of the cars with which to move the product.

In finished iron and steel there is much doing in this district. The rolling mills are busily engaged. The plant of the Alabama Steel and Iron Company at Ensley, manufacturing steel rod, wire and nails, shut down last Wednesday for Thanksgiving Day and to allow petty repairs to be made. The plant resumed operations to-day.

The Southern Nut and Bolt Works in this city will move its plant to North Birmingham, and will double its capacity. Within the next two weeks the Southern Soil Pipe Company now in the course of construction at North Birmingham will be ready to start up. President S. L. Russell announces that the plant will handle in and out of the plant something like 240 cars of raw and finished product daily.

Chicago. Dec. 1.

(From Our Special Correspondent.)

There are indications that the price of Southern pig iron, in which most of the scant business now is being done, will be lower by the end of this week; the present quotations of \$20@22, Birmingham, or \$24.16@26.15, Chicago, are being cut quietly, at least 50c. a ton. The lower price applies mostly to orders for delivery in the first half of 1903, and the higher to deliveries within two months. For late deliveries, lapping over into the second half of 1903, as low a price as \$18, Birmingham, is said to be probable within a week from to-day, though now the price is ruling about \$1 higher. On spot iron as high a price as \$28, Chicago, is said to be obtainable, the eagerness of buyers continuing to get pig iron immediately. Apart from the spot lots, comparatively little business is being done; foundrymen preferring to wait until the imaginary boundary line of the first of the year has been passed before placing contracts. Then, too, the feeling continues that prices of iron are too high, and must soon drop. So there is dulness of business and diffidence on the part of buyers, except such as need immediate iron.

Northern quotations are unchanged from last week; \$23.50@24 for No. 1; \$23@23.50 for No. 2, and \$22.50@23 for No. 3. These quotations are, however, but nominal, as there is practically no Northern iron in the market, except for late deliveries in the first half of next year, and few contracts are being made. Malleable has some sale at \$23.

The intent of furnacemen controlling sales of Southern, is said on good authority to be to ease the high prices gradually, so as to get them down to a point where both buyers and sellers of iron can make something. It is generally recognized that it is bad policy to kill the goose that lays the golden egg, in the iron business as well as out of it.

Coke is still scarce and holds up to \$10@11. This price, however, is too high for foundrymen who have contracts made on the expectation of not more than two-thirds of this price. No prospect appears that coke will be lower for several months; the coming of winter, it is generally anticipated, will so increase transportation difficulties as to send the price up again rather than lower it.

Cleveland. Dec. 2.

(From Our Special Correspondent.)

Iron Ore.—By the end of this week the shipment of iron ore will have come to an end. It will perhaps be the middle of the last of next week before the unloading is completed. The estimates made of the movement during November show that it amounted to about 2,500,000 tons, which will bring the grand

total for the year up to about 27,000,000 tons, the all-rail movement being included. The rates of carriage have advanced this week, until \$1 is being paid from Duluth, but as far as known the Escanaba rate closed as it has been at 70c.

Pig Iron.—The market has been stronger during the week, as applies to business for the first half of next year. The consumers are easing up on their demands for this year, and have not done anything of importance for the second half. This confines all of the activity to the first six months of the season. The lack of interest in the present market is attributable alike to the impossibility of getting material and to the desire to have the stocks pretty well cleaned out before invoice time. The coke supply is still an annoying feature of the trade, and the furnaces are running intermittently at best. The shortage of material through this cause means much to the trade during the first half of next year, as promising as great if not greater shortage of material than now. The Valley furnaces are tied up in such a manner as to promise no relief to the consumers, and the offers of the furnaces from the Birmingham District are no more encouraging. The prices for first half delivery do not change from \$23, Valley furnace, for No. 2, and \$21 Birmingham for No. 2 Southern iron. The Bessemer furnaces, not included in the association, have been selling that material at \$23 for first half delivery, and the same class of furnaces have been selling basic at \$21. There is further talk of a necessity to import more iron, but nothing has been done as yet.

Finished Material.—The market in general is much stronger, giving evidence that the failure to buy last week and prior to that time was occasioned by the belief that a general reduction of prices was to follow certain cuts of which all wanted to take advantage. The structural steel trade is illustrative. Buyers had been holding back, and are still buying as they need the material. The orders, however, on this basis are as heavy as the mills care to handle. The smaller mills before that a greater part of their premium business has been done, and are selling a portion of their capacity for first half delivery at Association prices, reserving a portion of their capacity for quick shipment at high prices. The larger mills get 1.60c., Pittsburg, and the smaller mills for quick shipment from 2c. to 2.50c.; while the jobbers get 2.50c. to 3c. The case is almost identical in the plate trade where buying well into the second half continues. The prices hold at 1.60c. from the larger mills; 2c. from the smaller mills and 2.25c. to 2.50c. out of stock. Sheets have shown a tendency to decline again in price as the buyers are evidently waiting for it. The mills are firm, however, and have resisted any further decline vigorously. The prices are still based on 3.10c. to 3.25c. for No. 27 out of stock, and 2.75c. to 2.95c. at the smaller mills. The bar iron market is weak, and seems inclined to slump. There is a diversity of prices with some of the mills claiming to have obtained 1.80c. without difficulty, while some of the smaller mills make no claim to have quoted a better price than 1.70c. Some of the mills need business. The bar steel mills are getting 1.60c., Pittsburg, for Bessemer, and 1.70c., Pittsburg, for open-hearth. Bessemer billets are active, with the price ranging close to \$30.

Old Material.—The inclination toward a reduction of prices is now irresistible, and while none has been made it is inevitable, and is soon expected. No. 1 wrought this week dropped to \$19 gross from \$21 gross. Otherwise the prices remain unchanged.

Philadelphia. Dec. 4.

(From Our Special Correspondent.)

Buyers of foundry iron have practically disappeared from the market. They might as well stay away, for there is no iron for them. They understand the situation thoroughly; at the same time there are not a few users of foundry who expressed regrets this week that they were unable to place orders for material. The two obstacles in the way are the absence of capacity and the prices named, for conditional deliveries.

Quotations are: No. IX foundry, \$25@26; No. 2X, \$24; No. 2 plain, \$23; gray forge, \$21.50; Scotch, \$24; Middlesboro, \$22. Our importers are very confident that things are going their way, because of the upward tendency of prices at home.

Billets.—Eastern markets are quiet as to billets, but quotations have been effected by large transactions, especially for open-hearth billets, in Western markets. Bessemer is occasionally asked for, but our people are in no present need. Quotations are more or less nominal, and may be safely given at \$26 for foreign and \$30 for American.

Merchant Bar.—Merchant bar iron is likely to develop considerable activity after the new year, but for the present month our mill men are not looking for any particular movement. Refined bars are quoted at 1.95; steel at 1.75 in a large way. Small orders for steel bars have brought 1/2c. above this.

Tubes.—Buyers who have quietly placed large orders state they have been favored with slight concessions.

Muck Bars.—The only business in muck bars this week was done at a trifle under the sales last reported.

Merchant Steel.—A number of large concerns throughout the eastern territory, it is understood, are making out their estimates for the kinds of steel they use, but they will be in no hurry to place orders.

Plate.—The past week's business in plates has been very much like other weeks. Manufacturers are doing their best to arrange to accommodate orders which have been before them for some time past. The large buyers understand the situation thoroughly, and are glad to be able to get material as fast as their requirements call for it. There is a good deal of trouble in regard to fuel, and some large buyers are now waiting for deliveries that should have been made some time ago.

Structural Material.—Premiums are still paid for deliveries early in the year. Some manufacturers have quoted premium rates on deliveries later on. This desire to get the outside figure is making the way for importations much easier, and both German and Belgian agents are much encouraged at the present outlook.

Old Rails.—Old iron rails are quoted at \$30, and steel at \$21.

Scrap.—The holders of heavy scrap are utterly indifferent as to selling, and no business has been heard of. Those who get scrap have to pay the outside cent. Heavy steel is quoted at \$21.

Pittsburg.

Dec. 2.

(From Our Special Correspondent.)

There is practically nothing doing in pig iron and steel, but prices continue firm. No sales of any consequence are noted this week, buyers evidently waiting until the end of the year in anticipation of a decline. But few sales of any importance, as a rule, are made in December, and furnaces are not endeavoring to secure new business. Not more than half of the merchant furnaces are in operation, and they are not running regularly, owing to the unsatisfactory coke deliveries. It is now estimated that the Valley furnaces will be fully 30 per cent short on deliveries at the close of the year, and no business for the first quarter will be accepted at the present time, except at a heavy premium over current prices. The United States Steel Corporation is not getting satisfactory deliveries on the outside pig iron contracted for, and plans are under consideration that when carried out will make it entirely independent in the matter of raw material. It is proposed to erect nine great modern blast furnaces at a cost of \$5,500,000 that will produce annually 1,575,000 tons. Three furnaces are now under construction, and with the nine additional furnaces to be built will make the big corporation's pig iron production equal to its steel converting requirements. At present the combine is forced to buy about 2,000,000 tons of pig iron annually from the merchant furnaces. Three of the projected furnaces will be built in the Pittsburg District, four in the Youngstown District and two in Chicago. Two of the furnaces now being erected are at Braddock, which will increase the group there to eleven. One of them will be ready to blow in next week, and the other in about two months. A large furnace is being added to the Carrie group at Rankin, increasing the number to five.

The freight congestion is almost as bad as ever, despite the great efforts of the railroads. President A. J. Cassatt and other officers of the Pennsylvania Railroad arrived in Pittsburg unexpectedly yesterday. A long conference was held during the day, and it is understood arrangements are being perfected for hastening the proposed improvements. An official announcement of the result of the conference here is expected to be made from Philadelphia within a few days. It is reported that the tracks of the West Penn Division and the yards are to be greatly increased in order to relieve the main line east. In order to take care of the heavy business the Pennsylvania lines west are borrowing locomotives. At the close of lake navigation the United States Steel Corporation will loan the motive power of the Duluth & Iron Range Railroad to the Pennsylvania for use on its lines west during the winter. No announcement has yet been made by the railroads of the amount of advance in freight rates of iron and steel that will become effective on January 1. It is understood the rate for pig iron from the valleys to Pittsburg will be increased from 75c. to 85 or 90c., the latter figure being the rate that was in force in 1900. The rate of 85c. on billets from the Valleys and the Wheeling District will likely be advanced to \$1. The general advance on domestic iron and steel will not be less than 10 per cent.

The finished material market is unusually strong, and a large business in nearly all lines is in sight. Wire products, tin-plate and sheets are the weakest, but orders are steadily being booked for future delivery, due to the reduction in prices by the leading interests. The entire production of steel rails up to September has been contracted for, and Western roads are negotiating for a heavy tonnage for second half

delivery. Some roads have placed orders aggregating 50,000 tons in Belgium, so as to secure better delivery. It is certain the American mills cannot supply the demand.

Pig Iron.—The market is remarkably quiet, and no sales of any consequence are being made. Not more than half of the merchant furnaces in the valleys are in operation, but all of the steel corporation furnaces are running and turning out almost the normal capacity. Prompt bessemer is still quoted at \$24, Valley, and for the first quarter as high as \$23, Valley, has been quoted. For delivery after April 1, \$21, Valley, can be done. Gray forge is down to \$21, Pittsburg, for any delivery, and foundry No. 2 is quoted at \$22.50@23, Pittsburg, for delivery next year.

Steel.—There is a fair demand for bessemer steel billets, and prices are firm at \$30, Pittsburg. Open hearth billets range from \$1 to \$2 higher. The heavy demand for finer lines of merchant steel continues. Sales of structural material amounting to 10,000 tons were made during the week. About 12,000 tons of steel plates and fully 6,000 tons of steel bars were contracted for all for delivery next year, and sales were at the base price. Steel bars and tank plates for next year are quoted at 1.60c.

Sheets.—The market is active and prices are firm. A number of idle mills have been started, and an advance in prices is expected. The leading producer continues to quote 2.75c. for black sheets and galvanized is still quoted at 75 and 10 per cent off.

Ferro-manganese.—There is but little change in the market. The price of the foreign product continues to range from \$50 to \$51.50.

New York. Dec. 4.

Pig Iron.—Buying continues on a hand-to-hand basis, with prices unchanged. We quote for 1903 delivery, Northern irons at tidewater: No. 1X foundry, \$23@25.50; No. 2X, \$22@23; No. 2 plain, \$21@22. For Southern iron on dock, New York, No. 1 foundry, \$24.75; No. 2, \$24.25; No. 3, \$23.75. Middlesboro pig is quoted at \$19.50, in large lots, but for small lots and spot delivery, \$22 is obtained.

Bar Iron and Steel.—No change in the market is reported. We quote for large lots on dock: Refined bars, 2@2.05c.; common, 1.90@1.95c.; soft steel bars, 2@2.10c.

Plates.—Demand is active. We quote for tide-water delivery in car-loads: Tank, 1/4-in. and heavier, 2.05@2.20c.; flange, 2.15@2.25c.; marine, 2.25@2.50c.; universal, 2@2.20c.

Steel Rails.—Standard sections are still quoted at \$28, f. o. b. mills for 1903 delivery; light rails, \$30@36, according to weight. Relaying rails are \$28@30 for heavy sections and \$33@35 for light sections.

Structural Material.—Buying continues good. We quote for large lots at tidewater: Beams, angles, channels and tees, 2@2.20c. For small lots and prompt delivery good premiums are paid.

CHEMICALS AND MINERALS.

(See also wholesale price-list on page 774.)

New York, Dec. 3.

December opens with prices among the lowest this year, while business for future account indicates that a somewhat lower market may be expected in 1903, especially for manufactures. The raw material market, being controlled by the larger interests, promises to adhere to high prices, though in one or two lines the schedule may be slightly cut. There is talk of an advance in freight rates to be made in the near future. Certainly importers will have to face higher rates, as the past year has witnessed a demoralized ocean freight market. Should such an advance be realized, it will strengthen market prices for chemicals, but the effect will be only temporary, as the American production promises to show a larger increase next year.

Heavy Chemicals.—Demand is good, and prices are firm, though further 1903 contracts for domestic caustic soda have been taken at \$1.65 up per 100 lbs., f. o. b. works. Consumers expect a further cut in caustic soda prices, and so have bid \$1.50, but makers apparently refuse to accept. Bleaching powder for 1903 delivery continues to be booked at \$1.25 for Liverpool and domestic.

We quote domestic chemicals, per 100 lbs., f. o. b. works, as follows: High test alkali, in bags, 80@85c., for prompt shipment, and 77 1/2@82 1/2c. for forward; caustic soda, high-test, \$1.90@1.95 for early delivery, and \$1.65@1.75 for futures; bicarb. soda, ordinary, \$1.25, and extra, \$3; sal soda, 55@60c.; chlorate of potash, \$7.37 1/2@7.87 1/2; for immediate shipment, and \$7@7.12 1/2 for contracts; bleaching powder, next year's delivery, \$1.25. For foreign goods, we quote per 100 lbs. in New York: Alkali, high-test, 90 @92 1/2c.; caustic soda, high-test, \$2.25; sal soda, 67 1/2c.; bicarb. soda, \$1.50@1.60; chlorate of potash, \$7.50@8 for prompt, and \$7@7.25 for forward; bleaching powder, prompt, prime brands, Liverpool, \$1.75, and contracts, \$1.25; Continental, \$1.62 1/2@1.65.

Acids.—Attention is being turned to 1903 contracts, which are being booked on basis of quotations below. Blue vitriol continues weak, as foreign makes are pressed for sale at somewhat lower prices than the American. On the other hand, our exports of blue vitriol have fallen off considerably. In the 10 months ending October 31 they were only 30,027,816 lbs., as against 47,295,925 lbs. in the same period last year; showing a decrease of 17,268,109 lbs., or 36.5 per cent. The average invoice value of this year's exports was \$3.99 per 100 lbs., as against \$4.72 last year, showing a falling off of 73c.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars) delivered in New York and vicinity:

| | |
|-----------------------------|--------------------------------|
| Blue vitriol... \$4.45@4.50 | Oxalic com'l... \$5.25@5.50 |
| Muriatic, 18" ... 1.50 | Sulphuric, 50" ... 13.50@15.50 |
| Muriatic, 20" ... 1.62 1/2 | ... 1.05 |
| Muriatic, 22" ... 1.76 | Sulphuric, 60" ... 18.00@20.00 |
| Nitric, 36" ... 4.00 | ... 1.20 |
| Nitric, 38" ... 4.25 | Sulphuric, 66" ... 21.00@23.00 |
| Nitric, 40" ... 4.50 | ... 21.00@23.00 |
| Nitric, 42" ... 4.87 1/2 | |

Brimstone.—Imports this year are considerably larger than the two previous years, owing to the enormous consumption of paper. In the 10 months ending October 31 the United States imported 146,643 long tons of brimstone, which compares with 129,071 tons in 1901, and 130,403 tons in 1900. Prices continue high, and sales of best unmixed seconds, exteamer, are noted at \$23.25@23.50, while shipments bring \$22.75@23, according to position.

Exports of brimstone from Sicily in October were 31,801 tons, showing a small improvement over last year. Of this quantity the United States received 6,000 tons best unmixed seconds, and 300 tons best thirds; total, 6,300 tons, against 8,800 tons in the same month last year. The total exports from Sicily in the 10 months ending October 31 amounted to 388,936 tons, against 397,427 tons, showing a decrease of 8,491 tons. Stocks on October 31, this year, were 265,129 tons, which are 22,591 tons less than at the same time in 1901.

Pyrites.—Like brimstone imports show a material increase this year, but the demand has come principally from sulphuric acid manufacturers who supply the fertilizer industry. Imports of pyrites into the United States in the 10 months ending October 31 were 369,885 long tons, against 331,820 tons in 1901 and 284,373 tons in 1900. Business at present is seasonably good, and prices are 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, 13@13 1/2c. per unit, New York and other Atlantic ports. Spanish pyrites contain from 46 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Nitrate of Soda.—The spot market has advanced to \$2.10, owing to the scarcity of supplies both here and on the coast. Arrivals in January, February and March are quoted \$2 per 100 lbs., while the last half of the year is held at \$1.82 1/2. There appears to be very little nitrate unsold for the next two or three months' arrival, and it looks therefore as if higher prices may rule. Ocean freights are firmer.

Sulphate of Ammonia.—A firmer market abroad has advanced prices here, and for arrivals \$3@3.05 per 100 lbs. is quoted for good gas liquor. Shipments are obtainable at \$2.95@2.97 1/2.

Phosphates.—The market is quiet, though shipments show an improvement, as consumers are anxious to lay in supplies before heavy weather interferes with transportation.

Shipments of Florida high-grade rock in October amounted to 66,743 tons, being the second largest quantity this year, and showing an increase of 21,538 tons over last year. All of this year's shipments have gone abroad, while only 1,050 tons of last year's total were for domestic consumption.

In mining centers there is much activity. The Land Pebble Phosphate Company's plant at Bartow, Fla., was completely burned on November 21, the loss being heavy, as the plant cost nearly \$250,000 about 12 years ago. In Tennessee the Virginia-Carolina Chemical Company, the Southern fertilizer combination, has purchased the Arrow property, near Mt. Pleasant, for \$450,000, it is reported.

The Anderson (S. C.) Phosphate and Oil Company has declared a semi-annual dividend of 4 per cent on both its common and preferred stock, payable January 1, 1903.

| Phosphates. | Per ton F. o. b. | United Kingdom or European Ports. | |
|------------------------------|------------------|-----------------------------------|--------------|
| | | Unit. | Long ton. |
| *Fla. hard rock (75@80%).. | \$6.50@7.00 | 6@6 3/4d. | \$9.48@10.07 |
| *Fla. land neb. (68@73%).. | 3.00@3.25 | 4@4 1/2d. | 6.65@7.00 |
| *Tenn. (78@82%) export... | 3.25@3.50 | 5 1/2@6d. | 8.58@9.36 |
| *Tenn., 78% domestic..... | 3.00 | ..... | ..... |
| *Tenn., 75% domestic..... | 2.75@3.00 | ..... | ..... |
| *Tenn., 73@74% domestic..... | 2.30@2.40 | ..... | ..... |
| *Tenn., 70@72% domestic..... | 2.10@2.25 | ..... | ..... |
| *So. Car. land rock..... | 3.25 1/4@4 1/4d. | ..... | 5.07@5.08 |
| *So. Car. river rock..... | 2.75@3.00 | ..... | ..... |
| Algerian (63@68%)..... | ..... | 5 1/4@8 1/4d. | 7.15@ 9 13 |
| Algerian (58@63%)..... | ..... | 4 1/2@5 1/4d. | 5.70@6.20 |
| Algerian (53@58%)..... | ..... | 4 1/2@4 1/2d. | 4.95@5.23 |

*Fernandina, Brunswick or Savannah.
†Mt. Pleasant. †On vessels, Ashley River.

Liverpool. Nov. 18.

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

The market for heavy chemicals is quiet, but quotations are practically unchanged.

Soda ash is firm, and nearest range for tierces is 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 in barrels, £3 7s. 6d. per ton, less 5 per cent, or 7s. less for bags, with special quotations for certain export quarters. Caustic soda is very steady. 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 dull, but in the absence of resellers quotations are maintained at nominally £6 10s.@£6 12s. 6d. per ton for hardwood, with special terms for certain export markets.

Chlorate of potash is very idle, and 2 3/4d. per lb. net cash is nominal spot quotation.

Bicarb. soda is in fair request 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 quarters.

Sulphate of ammonia continues dull and £11 12s. 6d.@£11 15s. per ton, less 2 1/2 per cent, is about nominal spot value for good gray 24@25 per cent in double bags, f. o. b. here.

Nitrate of soda is still held on spot for £9 2s. 6d.@£9 5s. per ton, less 2 1/2 per cent for double bags, f. o. b. here, as to quality.

METAL MARKET.

New York, Dec. 3.

Gold and Silver Exports and Imports.

At all United States Ports in October and Year.

| Metal | October. | | Year. | |
|-------------|-------------|----------------|-----------------|-----------------|
| | 1901. | 1902. | 1901. | 1902. |
| Gold: | | | | |
| Exports.... | \$4,066,747 | \$1,446,514 | \$36,747,316 | \$32,442,833 |
| Imports.... | 9,138,638 | 9,113,041 | 44,638,680 | 34,019,533 |
| Excess. I. | \$5,071,891 | I. \$7,666,527 | I. \$7,791,364 | I. \$1,576,700 |
| Silver: | | | | |
| Exports.... | \$4,737,680 | \$4,382,545 | \$46,225,608 | \$39,963,064 |
| Imports.... | 3,070,516 | 2,789,734 | 25,561,680 | 21,470,573 |
| Excess. E. | \$1,667,173 | E. \$1,615,811 | E. \$20,663,948 | E. \$18,492,506 |

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 December 4, and for the years from January 1:

| Period. | Gold. | | Silver. | | Total Excess, Exports or Imports. |
|-----------|------------|------------|------------|-----------|-----------------------------------|
| | Exports. | Imports. | Exports. | Imports. | |
| Week ... | \$1,500 | \$52,808 | \$82,308 | \$48,944 | E. \$723,056 |
| 1902..... | 25,025,292 | 2,620,622 | 24,487,811 | 1,143,828 | E. 45,748,646 |
| 1901..... | 44,160,739 | 4,611,093 | 24,164,481 | 2,432,092 | E. 66,282,035 |
| 1900..... | 36,695,368 | 10,157,586 | 37,122,206 | 4,562,661 | E. 59,087,352 |

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

Financial Notes of the Week.

General business is rather quieter, and the stock markets continue uncertain. There is again talk of gold exports, but it is quite probable that they may be postponed to the end of the year.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending November 29, gives the following totals, comparison being made with the corresponding weeks of 1901 and 1900:

| | 1900. | 1901. | 1902. |
|------------------------|---------------|---------------|---------------|
| Loans and discounts.. | \$804,498,100 | \$876,169,200 | \$879,826,000 |
| Deposits | 864,410,000 | 940,668,500 | 883,836,800 |
| Circulation | 30,670,000 | 31,975,000 | 45,432,800 |
| Specie | 166,895,000 | 176,186,500 | 168,840,200 |
| Legal tenders | 60,073,400 | 72,395,200 | 67,905,300 |
| Total reserve | \$226,968,400 | \$248,581,700 | \$236,745,500 |
| Legal requirements ... | 216,102,725 | 235,167,125 | 220,959,200 |
| Balance surplus .. | \$10,865,675 | \$13,414,575 | \$15,786,300 |

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

| | Gold. | | Silver. | |
|-----------------|---------------|---------------|---------------|---------------|
| | 1901. | 1902. | 1901. | 1902. |
| N. Y. Ass'd | \$176,186,500 | ..... | \$166,895,000 | ..... |
| England | 176,851,385 | ..... | 164,774,355 | ..... |
| France | 491,873,550 | \$220,418,600 | 508,670,470 | \$221,488,935 |
| Germany | 165,785,000 | 64,475,000 | 166,270,000 | 61,500,000 |
| Spain | 70,040,000 | 85,125,000 | 71,650,000 | 98,500,000 |
| Neth'l'ds | 28,711,000 | 30,139,000 | 23,480,500 | 32,472,000 |
| Belgium | 15,573,335 | 7,786,665 | 15,483,335 | 7,731,665 |
| Italy | 79,670,000 | 10,234,500 | 83,785,000 | 10,416,000 |
| Russia | 339,595,000 | 29,825,000 | 374,165,000 | 32,605,000 |

The returns of the Associated Banks of New York are of date November 29, and the others November 27, 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.

Under heavy sales—in a measure speculative—silver had last week a heavy fall. Covering operations have advanced the price, but the market is unsettled, with a tendency apparently to lower prices as the normal result of the continued large output.

The United States Assay Office in New York reports receipts of 46,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to November 20 are reported by Messrs. Pixley & Abell's circular as follows:

| | 1901. | 1902. | Changes. |
|-------------------|------------|------------|---------------|
| India | £6,710,410 | £5,098,730 | D. £1,611,680 |
| China | 600,212 | 162,500 | D. 437,712 |
| The Straits | 592,412 | 756,470 | I. 164,058 |

Totals

Receipts for the week were £40,000 in bar silver from New York, £6,000 from Chile, £3,000 from the West Indies, and £21,000 from Australia; total, £70,000. Shipments were £75,000 in bar silver to Bombay, and £5,000 to Colombo; total, £80,900.

The Treasury Department's estimate of money in the United States on December 1 is as follows:

| | Total. | In Treas. | In Circ't'n. |
|--|-----------------|---------------|-----------------|
| Gold coin (inc. bullion in Treasury) | \$1,242,330,766 | \$264,967,774 | \$631,410,968 |
| Gold Certificates ..... | ..... | ..... | 345,952,024 |
| Silver Dollars | 547,127,022 | 5,121,270 | 78,700,912 |
| Silver Certificates ..... | ..... | ..... | 463,804,840 |
| Subsid. Silver | 99,511,076 | 6,428,213 | 93,082,863 |
| Treas. Notes of 1890 | 25,054,000 | 131,485 | 24,922,515 |
| U. S. Notes | 346,681,016 | 2,897,475 | 343,783,541 |
| Nat. Bank Notes | 384,854,514 | 13,302,019 | 371,552,495 |
| Total | \$2,645,558,394 | \$292,848,236 | \$2,352,710,158 |

Population of the United States December 1, 1902, estimated at 79,686,000; circulation per capita, \$29.52. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the Treasury as assets of the Government does not include deposits of public money in National bank depositaries, to the credit of the Treasurer of the United States, and amounting to \$141,569,403. The total amount in circulation shows an increase of \$16,598,166, as compared with November 1; and an increase of \$102,453,928, as compared with December 1, 1901.

Prices of Foreign Coins.

| | Bid. | Asked |
|--|--------|------------|
| Mexican dollars | \$.37 | \$.39 1/2 |
| Peruvian soles and Chilean pesos | .36 | .39 |
| Victoria sovereigns | 4.85 | 4.88 |
| Twenty francs | 3.85 | 3.88 |
| Twenty marks | 4.74 | 4.80 |
| Spanish 25 pesetas | 4.78 | 4.82 |

OTHER METALS.

Daily Prices of Metals in New York.

| Nov-Dec. | Silver | | Copper | | Spelter | | Lead | N. Y. | Cts. | L. Cts. |
|----------|----------|--------|--------|--------|--------------|--------|--------|-------|----------|---------|
| | Exchange | N. Y. | London | Lake | Electrolytic | London |  |  |  |  | Tin |
| 25 | ..... | 21 1/2 | ..... | 11 3/4 | 11 3/4 | 4 3/4 | ..... | ..... | ..... | ..... |
| 28 | 4.87 | 46 3/4 | 21 1/2 | 11 3/4 | 11 3/4 | 4 3/4 | 24 1/2 | 4.05 | 5.00 | 4.85 |
| 29 | 4.87 | 47 1/2 | 21 1/2 | 11 3/4 | 11 3/4 | 4 3/4 | 25 | 4.05 | 4.95 | 4.85 |
| 1 | 4.87 | 48 3/4 | 22 3/4 | 11 3/4 | 11 3/4 | 4 3/4 | 25 1/2 | 4.05 | 4.95 | 4.80 |
| 2 | 4.87 1/2 | 48 1/2 | 22 1/2 | 11 3/4 | 11 3/4 | 4 3/4 | 25 1/2 | 4.05 | 4.92 1/2 | 4.75 |
| 3 | 4.87 | 47 1/2 | 21 1/2 | 11 3/4 | 11 3/4 | 4 3/4 | 25 | 4.10 | 4.90 | 4.75 |

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 wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper.—The weakness which characterized the market last week has given way to a somewhat better feeling. While the main support apparently comes from Europe, consumers in this country also show considerably more interest. Producers are not meeting the market very freely, and quotations close rather firm at 11 1/2c. for Lake; 11 1/4c. for electrolytic in cakes, ingots and wirebars; 11c. in cathodes; 11 1/2 @ 11 1/4c. for casting copper.

The foreign market, which closed last week at £49

12s. 6d., opened on Monday at £49 15s., and the closing quotations are cabled on Wednesday as £50 12s. 6d. @ £50 15s. for spot, £50 17s. 6d. @ £51 for three months.

Statistics for the second half of November show an increase in the visible supply of 1,100 tons.

Refined and manufactured sorts we quote; English tough, £53 @ 53 5s.; best selected, £54 10s. @ 54 15s.; strong sheets, £66 10s. @ 67 10s.; India sheets, £65 10s. @ 66 10s.; yellow metal, 6 @ 6 3/4d.

Exports of copper from Atlantic ports in the week ending December 2 were: Great Britain, 578 tons; Germany, 315; Holland, 1,200; France, 1,251; Italy, 90; Austria, 40; Russia, 250; Argentine Republic, 11; Panama, 24; total, 3,759 tons. Imports were 106 tons copper from Mexico, and 2,457 tons ore from Tilt Cove.

Imports of copper in all forms into the United States, with exports of foreign copper, for the 10 months ending October 31, are reported by the Bureau of Statistics of the Treasury Department as below, in long tons of 2,240 lbs.:

| | 1901. | 1902. | Changes. |
|-------------------|--------|---------|-----------|
| Fine copper: | | | |
| Imports | 27,870 | 33,066 | I. 5,226 |
| Re-exports | 5,036 | 4,520 | D. 516 |
| Net imports | 22,834 | 28,576 | I. 5,742 |
| Ores and matte: | | | |
| Imports | 77,308 | 144,130 | I. 66,822 |
| Re-exports | 8,475 | 12,789 | I. 4,314 |
| Net imports | 68,833 | 131,341 | I. 62,508 |

Of the ores and matte imported this year, 118,775 tons, or 82.5 per cent of the total, were from Canada. Of the fine copper, 20,233 tons, or 61.3 per cent, came from Mexico, and 11,076 tons, or 33.6 per cent, from Great Britain. As the report does not give ores and matte separately, it is impossible to give the copper contents exactly. Making a close approximation, however, we find that the net imports of copper in all forms this year amounted to about 59,286 long tons.

Exports of domestic copper in all forms for the 10 months are reported by the Bureau as follows, in long tons:

| | 1901. | 1902. | Changes. |
|----------------------|--------|---------|-----------|
| Fine copper | 72,647 | 139,517 | I. 66,870 |
| Ores and matte | 13,138 | 16,207 | I. 3,069 |

Mr. John Stanton's estimate, heretofore published, gives the exports in fine copper this year at 147,826 tons, against 74,126 tons last year.

Chilean Copper Market.—Messrs. Jackson Brothers report from Valparaiso, Chile, under date of October 18, that sales of bar copper have been light, only 13,277 quintals being reported, at an average price of \$32.50, Chilean, per quintal. Sales of regulus have been only 300 tons at \$13.87 1/2 Chilean, per quintal, on a basis of 50 per cent copper. No sales of ore are reported.

Tin.—The heavy decline in silver, which influenced prices adversely last week, again played havoc with the market, and was the cause of considerable irregularity. Under the circumstances consumers, generally, seem to have made up their minds to proceed conservatively; and while quite some business has been transacted, the amount is not out of the ordinary. At the close we quote spot 25c., December 24 1/2c., January 24 1/2c.

The foreign market, which closed last week at £112 10s., opened on Monday at £113, advanced on Tuesday to £114 10s., but declined heavily on Wednesday, the closing quotations being cabled as £112 12s. 6d. @ £112 15s. for spot, £111 12s. @ £111 15s. for three months.

Statistics for the month of November show an increase in the visible supply of 1,600 tons.

Imports of tin into the United States for the 10 months ending October 31 are reported as below, in long tons of 2,240 lbs.:

| | 1901. | 1902. | Changes. |
|-----------------------|--------|--------|----------|
| Straits | 15,727 | 17,253 | I. 1,526 |
| Australia | 332 | 262 | D. 70 |
| Great Britain | 10,953 | 12,785 | I. 1,832 |
| Holland | 1,044 | 1,176 | I. 132 |
| Other countries | 142 | 401 | I. 259 |
| Totals | 28,198 | 31,877 | I. 3,679 |

The total increase in imports this year, as shown above, was 13.1 per cent.

Visible supplies of tin on December 1 are reported as below, in long tons of 2,240 lbs.:

| | Store. | Afloat. | Totals. |
|------------------------------|--------|---------|---------|
| U. S., exc. Pac. ports | 3,710 | 2,755 | 6,465 |
| London | 4,739 | 4,091 | 8,830 |
| Holland | 2,593 | 458 | 3,051 |
| Totals | 11,042 | 7,304 | 18,346 |

The total shows a decrease of 418 tons, as compared with December 1, 1901.

Lead is without change. The ruling quotations are 3.97 1/2 @ 4.05c., St. Louis, 4.05 @ 4.10c., New York.

From Europe, somewhat more satisfactory reports are being received, but prices remain rather depressed at £10 12s. 6d. @ £10 13s. 9d. for Spanish lead, 2s. 6d. higher for English lead.

Imports of lead in all forms into the United States, with re-exports of foreign lead, for the 10 months ending October 31, are reported by the Bureau of Sta-

tics of the Treasury Department as below, in short tons:

| | 1901. | 1902. | Changes. |
|----------------------------------|--------|--------|-----------|
| Lead, metallic | 257 | 2,233 | I. 1,976 |
| Lead in ores and base bullion .. | 94,516 | 85,002 | D. 9,514 |
| Total imports | 94,773 | 87,235 | D. 7,538 |
| Re-exports | 85,453 | 66,789 | D. 18,664 |
| Balance | 9,320 | 20,446 | I. 11,126 |

Of the imports this year 75,752 tons, or 86.8 per cent of the total, were from Mexico, and 8,044 tons, or 9.2 per cent, from Canada. In addition to the re-exports of foreign lead given above, there were 3,238 tons of domestic lead exported this year, against 2,364 tons in 1901, showing an increase of 874 tons.

Spelter continues on its downward course, and considerably lower prices have again been accepted. Consumption shows some signs of falling off, as is usual at this season of the year. We quote at the close 4.75c., St. Louis, 4.90c., New York.

The foreign market is very firm, good ordinaries being quoted at £19 7s. 6d., specials 5s. higher.

Exports of spelter, or metallic zinc, from the United States for the 10 months ending October 31 were 3,160 short tons, against 2,799 tons for the corresponding period in 1901; an increase of 361 tons, or 1.3 per cent. Exports of zinc ores were 43,168 tons, against 32,017 tons last year; an increase of 11,151 tons, or 34.8 per cent.

Antimony is quiet, but steady. The ruling quotations are 9 @ 9 1/2c. for Cookson's, 7 1/4 @ 7 3/4c. for Hallett's, 7 @ 7 1/4c. for Hungarian, Italian, Japanese and U. S. Star.

Imports of antimony into the United States for the 10 months ending October 31 were as follows, in pounds:

| | 1901. | 1902. | Changes. |
|-------------------------|-----------|-----------|--------------|
| Metal and regulus | 3,112,366 | 4,903,097 | I. 1,790,731 |
| Antimony ore | 1,633,496 | 1,328,283 | D. 305,213 |

The increase in metal and regulus was 57.5 per cent; but there was a decrease of 18.7 per cent in ore imported.

Nickel.—The price is now quoted by leading producers at 40 @ 47c. per lb., for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quality, runs as high as 60c. per lb.

Exports of nickel, nickel oxide and nickel matte from the United States for the 10 months ending October 31 were 2,672,835 lbs., against 5,046,214 lbs. for the corresponding period in 1901; a decrease of 2,373,374 lbs., or 47 per cent this year.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings \$19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72 1/2c. per gram.

Imports of platinum into the United States for the 10 months ending October 31 were 6,136 lbs., against 5,372 lbs. in the corresponding period in 1901; an increase of 764 lbs., or 14.2 per cent.

Quicksilver.—The New York price continues \$48 per flask for large orders, with a slightly higher figure for small lots. In San Francisco prices are steady, and the quotations are \$45.50 @ \$46.50 per flask for domestic orders. For export orders \$44 per flask is quoted. The London price remains £8 15s. per flask, with the same figure quoted from second hands.

Exports of quicksilver from all United States ports for the 10 months ending October 31 were 811,387 lbs., against 710,317 lbs. in the corresponding period in 1901; an increase of 101,070 lbs., or 12.5 per cent, this year.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

| | Per lb. | Per lb. | |
|--|-----------|------------------------------|--------|
| Aluminum ..... | ..... | ..... |  |
| No. 1, 99% ingots | 33 @ 37c. | Ferro-Tungsten (37%) | 28c. |
| No. 2, 90% ingots | 31 @ 34c. | Magnesium | \$2.75 |
| Rolled Sheets | 4c. up | Manganese, pure (N.Y.) | 60c. |
| Alum-bronze | 20 @ 23c. | Mangan'g Cop. (20% Mn) | 32c. |
| Nickel-alum | 33 @ 39c. | Mangan'g Cop. (80% Mn) | 88c. |
| Bismuth | \$1.50 | Molybdenum (Best) | \$1.82 |
| Chromium, pure (N.Y.) | 80c. | Phosphorus | 45c. |
| Copper, red oxide | 50c. | American | 70c. |
| Ferro-Molyb'dum (50%) | \$1.25 | Sodium metal | 50c. |
| Ferro-Titanium (10%) | 90c. | Tungsten (Best) | 62c. |
| Ferro-Titanium (20 @ 25%, N. Y.) | 55c. | | |

Variations in price depend chiefly on the size of the order.

| Month. | Tin. | | Lead. | | Spelter. | |
|-----------------|-------|-------|-------|-------|----------|-------|
| | 1902. | 1901. | 1902. | 1901. | 1902. | 1901. |
| January | 23.54 | 26.51 | 4.000 | 4.350 | 4.27 | 4.13 |
| February | 24.07 | 26.68 | 4.075 | 4.350 | 4.15 | 4.01 |
| March | 28.22 | 26.03 | 4.075 | 4.350 | 4.28 | 3.91 |
| April | 27.77 | 25.93 | 4.075 | 4.350 | 4.27 | 3.99 |
| May | 29.85 | 27.12 | 4.075 | 4.350 | 4.47 | 4.04 |
| June | 29.86 | 26.60 | 4.075 | 4.350 | 4.46 | 3.99 |
| July | 28.38 | 27.85 | 4.075 | 4.350 | 5.27 | 3.98 |
| August | 28.23 | 26.78 | 4.075 | 4.350 | 5.44 | 3.90 |
| September | 26.60 | 25.31 | 4.075 | 4.350 | 5.49 | 4.08 |
| October | 26.07 | 26.62 | 4.075 | 4.350 | 5.38 | 4.23 |
| November | 25.68 | 26.67 | 4.075 | 4.350 | 5.18 | 4.29 |
| December ..... | ..... | 24.36 | ..... | 4.103 | ..... | 4.31 |
| Year ..... | ..... | 26.54 | ..... | 4.334 | ..... | 4.09 |

Average Prices of Copper.

Table with columns: Month, Electrolytic, New York (1902, 1901), Lake (1902, 1901), London Standard (1902, 1901). Rows: January to December, Year.

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 with columns: Month, 1902, 1901, 1900. Sub-columns: London, N.Y., Pence, Cents. Rows: January to December, Year.

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Table with columns: Name of Company, Date, Per Share, Total, to Date. Rows: Ala. Con. C. & Iron, Am. Steel Foundries, Calumet & Hecla, etc.

*Monthly. †Quarterly. §Semi-annual.

ASSESSMENTS.

Table with columns: Name of Company, Location, No., Delinq., Sale, Amt. Rows: Alaska, Annandale, Aurora, Best & Belcher, Bingham Placer, Bullion, California, Canton Placer, Carbonate & Rattler, Chicago & Bingham, Christmas, Con. Cal. & Va., Crown Point, Elise, Emerald, Gold Hill, Hale & Norcross, Homestake, Justice, Little Chief, Madeline, Mexican, New Red Wing, Northern Light, Occidental, Ophir, Purje-Surprise, Reamer Con., Savage, Showers Con., Silver Bell, Sonora Quartz, South Lily, Star, Vulcan Sm. & Ref., Wilson & Barrett.

STOCK QUOTATIONS.

NEW YORK.

Table with columns: Company and Location, par val, Nov. 26, *Nov. 27, Nov. 28, Nov. 29, Dec. 1, Dec. 2. Rows: Acacia, Alice, Amalgamated c., Anaconda c., Argentinum, Best & Belcher, Breese, Brunswick, Chrysolite, Comstock T. S., Comst T. Bonds, Con. Cal. & Va., Creede & C. C., Cripple Creek c., Dunkin, Elkton, Golden fleece, Greene Con. c., Isabella, Jack Pot, Leadville, Mexican, Mollie Gibson, Occidental, Ontario, Ophir, Pharmacist, Phoenix, Portland, Potosi, Quicksilver, Sierra Nevada, Tenn. c., Union Cop., White Knob.

*Holiday.

Coal, Iron and Industrial Stocks.

Table with columns: Company, par val, Nov. 26, *Nov. 27, Nov. 28, Nov. 29, Dec. 1, Dec. 2. Rows: Am. Agr. Chem., Am. Agr. Chem. pf., Am. Sm. & Ref., Am. Sm. & Ref. pf., Col. Fuel, Col. H. C. & L., Crucible Steel, Crucible Steel pf., Int'l S. Pump, Int'l S. Pump pf., Mong. R. Coal, Mong. R. Coal pf., National Lead, National Lead pf., Phila Nat. Gas, Phila Nat. Gas pf., Pittsburgh Coal, Pittsburgh Coal pf., Republic I & S, Republic I & S pf., Sloss-Shef S. & L., Sloss-Shef S. & L. pf., Standard Oil, Tenn. C. I. & R., U. S. Cast I. Pipe, U. S. C. I. Pipe pf., U. S. Red & Ref., U. S. Red & Ref. pf., U. S. Steel Corp., U. S. Steel Corp. pf., Va.-Car Chem., Va.-Car Chem. pf., W'house Elect., W'house Elect. pf.

† Holiday.

Total sales, 337,938 shares.

BOSTON, MASS.*

Table with columns: Name of Company, par val, Shares listed, Nov. 26, *Nov. 27, Nov. 28, Nov. 29, Dec. 1, Dec. 2. Rows: Adventure Con., Allouez, Amalgamated, Am. Gold Dreg, Am. Z. L. & Sm., Anaconda, Arcadian, Arnold, Ashbed, Atlantic, Bingham Con. & S., Bonanza, British Columbia, Cal. & Hecla, Centennial, Central Oil, Con. Mercur, Cochiti, Continental Zinc, Copper Range Con., Daly-West, Dominion Coal, Dominion Coal pf., Dominion I & S, Elm River, Franklin, Guanajuato Con., Isle Royale Con., Mass Con., Mayflower, Michigan, Mohawk, Mont. Coal & Coke, Mont' & Boston, New Idria, Old Colony, Old Dominion, Osceola, Parrot, Phoenix Con., Quincy, Rhode Island, Santa Fe, Shannon, Tamarack, Tecumseh, Triniton, United Copper, United States, U. S. Coal & Oil, Utah Con., Victoria, Winona, Wolverine, Wyandotte.

* Holiday.

Total sales, 65,726 shares.

PHILADELPHIA, PA. §

Table with columns: Name and Location of Company, par val, Nov. 26, *Nov. 27, Nov. 28, Nov. 29, Dec. 1, Dec. 2. Rows: Am. Alkali, Am. Cement, Cambria Iron, Cambria Steel, Penn. Steel, Susq. I. & S., United Gas, Warwick I. & Steel.

§ Reported by Townsend, Whelen & Co., 300 Walnut St., Philadelphia, Pa. Total sales 2,972 shares.

* Holiday.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.*

Table of stock quotations for Colorado Springs, Colo. listing companies like Acacia, Alamo, Am. Con., Anaconda, Ben Hur, Black Bell, Blue Bell, C. K. & N., C. C. Con., Dante, Dr. Jack Pot, Elkton Con., El Paso, Fanny Rawlings, Findley, Gold Bond, Gold Dollar Con., Golden Cycle, Golden Fleece, Gold Sov'n., Hart, Iron Glad, Isabella, Jack Pot, Last Dollar, Lexington, Little Puck, Mol. Gibson, Moon Anchor, Morning Star, National, Nellie V., New Haven, Pappoose, Pharmacist, Pinnacle, Pointer, Portland, Prince Albert, Republic, Rose Maud, Sunset Eclipse, Uncle Sam, Vindicator Con., and Work.

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 163,500 shares.

COLORADO SPRINGS (By Telegraph.)

Table of stock quotations for Colorado Springs (By Telegraph) listing companies like Acacia, Alamo, Anaconda, Cripple Creek Con., Doctor Jack Pot, Elkton Con., El Paso, Fanny Rawlings, Gold Dollar Con., Golden Fleece, Isabella, Jack Pot, Last Dollar, Mollie Gibson, Moon Anchor, Pharmacist, Portland, and Work.

PARIS.

Nov. 13.

Table of stock quotations for Paris listing companies like Acleries de Creusot, Firminy, Huta-Bank, Anzin, Boleco, Brianca, Champ d'Or, Courrieres, Dombrows, Dynamite Centrale, Escobren-Beyberg, Fraser River, Huanchaca, Laurium, Mafidano, Metaux, Cle. Fran. de, Mokta-el-Hadid, Napthe Baku, Napthe Nobel, Nickel, Penarroya, Rebecca, Salines de l'Est, Salines du Midi, and Vielle Montagne.

LONDON.

Nov. 19.

Table of stock quotations for London listing companies like Anaconda, c. s., Arizona, c. s., Arizona, pref., Arizona, Cum., Camp Bird, c. Colo., Copiapo, c., De Lamar, g. s., Idaho, Enterprise, g., British Col., El Oro, g. Mexico, Frontino & Bolivia, g., Colombia, Hall Mg. & Sm., c. s., British Col., Le Roi, g., British Col., Le Roi No. 2, g., British Col., Montana, g. s., Montana, Rio Tinto, c., Spain, St. John del Rey, g., Brazil, Utah Con., g., (High Boy), Utah, Ymir, g., British Col., European: Linares, l., Spain, Mason & Barry, c., sul., Port'g'l., Rio Tinto, pref., Spain, Tharsis, c., Spain, Australia and New Zealand: Assoc. Gold Mines, W. Australia, Broken Hill Pr.p., s., N. S. Wales, Great B'd'r Pr.p., W. Australia, Hannan's Brownhill, g., W. Australia, Ivanhoe Gold Corp., W. Australia, Kalgurlie, g., W. Australia, Lake View Cons., g., W. Africa, Mt. Lyell M. & R. l., c., Tasmania, Mt. Morgan, g., Queensland, Waihi, g., New Zealand, Indian: Champion Reef, g., Colar Fields, Mysore Gold, Colar Fields, Nundydroog, g., Colar Fields, Ooregum, g., Colar Fields, Ooregum, pref., g., Colar Fields, African: British S. Africa, chartered S. Africa, Cape Copper, S. Africa, City and Sub'n (New), g., Transvaal, Crown Reef, g., Transvaal, De Beers Cons., d., pref., Cape Colony, De Beers Cons., def., Cape Colony, Ferreira, g., Transvaal, Geldenhuis Est., g., Transvaal, Henry Nourse, g., Transvaal, Jagersfontein, d., Orange F. S., Jubilee, g., Transvaal, Langlaagte Est., g., Transvaal, May Con. g., Transvaal, Meyer & Charlton, g., Transvaal, Namaqua, c., Cape Colony, Primrose (New), g., Transvaal, Rand Mines, g., S. Africa, Robinson, g., Transvaal, Wemacur, Transvaal.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

MEXICO.

Nov. 21.

Table of stock quotations for Mexico listing companies like Durango: Ca. Min. de Penoles, Guanajuato: Angustias, Pozos, Cinco Senores y An., aviadora, San Juan de la Luz, Providencia, San Juan de la Luz, Guerrero: Garduno y Anexas, Hidalgo: Amistad y Concordia, Carmen, aviada, Ca. Real del Monte, El Encino, aviadora, Guadalupe Fresnillo La Blanca, aviada, Maravillas y An., aviadora, Maravillas el Lobo, Palma y An., aviadora, Sta. Gertrudis y An., aviadas, Sta. Gertrudis y An., aviador, Santo Tomas Apostol aviador, San Rafael y An., Trompillo, San Rafael y An., aviada, Soledad, aviada, Sorpresa, aviada.

SALT LAKE CITY.*

Nov. 28.

Table of stock quotations for Salt Lake City listing companies like Ajax, Ben Butler, California, Carissa, Century, Con. Mercur., Daly, Daly-Judge, Daly-Wesck, Eagle & B. Bell, Grand Central, L. Mammoth, Mammoth, May Day, Ontario, Sacramento, Silver King, Star Con, Swanssea, So. Swanssea, Sunshine, Uncle Sam, Con, Victor, West Mg. Glory, and Yankee Con.

All mines are in Utah. *By our Special Correspondent. Total sales, 125,700 shares.

ST. LOUIS, MO.*

Nov. 29.

TORONTO, ONT.

Dec. 1.

Table of stock quotations for St. Louis, Mo. and Toronto, Ont. listing companies like Am.-Nette, Colo., Cathrine Lead, Mo., Central Coal & C., Central C. & C., pf., Central Lead, Mo., Columbia Lead, Mo., Con. Coal, Ill., Doe Run Lead Co., Granite Bimet. Mt., St. Joe Lead, Mo., Center Star, Fairview, Lone Pine, Mt. Lion, North Star, Payne, Rambler-Cariboo, Republic, War Eagle Con., White Bear, Winnipeg, Develop. Co., and Can. G. F. S.

*From our Special Correspondent.

Total sales, 10,500 shares.

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.

Table listing dividends for Gold, Silver, Copper, Lead, Quicksilver and Zinc companies. Columns include Name and Location of Company, Authorized Capital Stock, Shares (Issued, Par Val), Dividends (Paid 1902, Total to Date, Latest Date), and Amt.

COAL, IRON AND INDUSTRIALS.

Table listing dividends for Coal, Iron and Industrial companies. Columns include Name and Location of Company, Authorized Capital Stock, Shares (Issued, Par Val), Dividends (Paid 1902, Total to Date, Latest Date), and Amt.

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Table listing dividends for Canadian, Central and South American, and Mexican companies. Columns include Name and Location of Company, Authorized Capital Stock, Shares (Issued, Par Val), Dividends (Paid 1902, Total to Date, Latest Date), and Amt.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.
(See also Market Reviews.)

| ABRASIVES— | | CUST. MEAS. PRICE. | | BARIUM | | CUST. MEAS. PRICE. | | GRAPHITE—Am. f.o.b. Prov. | | CUST. MEAS. PRICE. | | PAINTS AND COLORS— | | CUST. MEAS. PRICE. | |
|---|----------|--------------------|-------------------|---|------------|--------------------|-------------------|---------------------------------|----------|--------------------|-------------------|-----------------------------|----------|--------------------|-------------------|
| Carborundum, f.o.b. Niagara Falls, F.F.F.F.F. | lb. | | \$0.08 | Oxide, Am. hyd. cryst. | lb. | | \$0.02 | Idence, R. I., lump | sh. ton | | \$8.00 | Metallic, brown | sh. ton | | \$19.00 |
| Grains | " | | .10 | Sulphate (Blanc Fixe) | " | | .02 | Pulverized | " | | 30.00 | Red | " | | 16.00 |
| Corundum, N. C. | " | | .07@.10 | BARYTES— | | | | German, com. pulv. | lb. | | .01 1/2 @ .01 1/2 | Ocher, Am. common | " | | 9.25@10.00 |
| Chester, Mass. | " | | .04 1/2 @ .05 | Am. Crude, No. 1 | sh. ton | | 9.00 | Best pulverized | " | | .01 1/2 @ .02 | Best | " | | 21.25@25.00 |
| Barry's Bay, Ont. | " | | .07 1/2 @ .09 1/2 | Crude, No. 2 | " | | 8.00 | Ceylon, common pulv. | " | | .02 1/2 @ .03 1/2 | Dutch, washed | lb. | | .04 1/2 |
| Mont., f.o.b., Chicago | " | | .07 @ .07 1/2 | Crude, No. 3 | " | | 7.75 | Best pulverized | " | | .04 @ .08 | French, washed | " | | .01 1/2 @ .01 1/2 |
| Crushed Steel, f.o.b. Pittsburg | " | | .05 1/2 | German, gray | " | | 14.50 | Italian, pulv. | " | | .01 1/2 | Orange mineral, Am. | " | | .07 1/2 @ .09 |
| Emery, Turkish flour in kegs | " | | .03 1/2 | Snow white | " | | 17.00 | GYPSPUM—Ground | sh. ton | | 8.00@8.50 | Foreign, as to make | " | | .08 1/2 @ .11 1/2 |
| Grains, in kegs | " | | .05 @ .05 1/2 | BAUXITE—Ga. or Ala. Mines: | | | | Fertilizer | " | | 7.00 | Paris green, pure, bulk | " | | .12 |
| Naxos flour, in kegs | " | | .03 1/2 | First Grade | lg. ton | | 5.50 | Rock | lg. ton | | 4.00 | Red lead, American | " | | .05 1/2 @ .06 |
| Grains, in kegs | " | | .05 @ .05 1/2 | Second grade | " | | 4.75 | English and French | " | | 14.00@16.00 | Foreign | " | | .06 1/2 @ .08 |
| Chester flour, in kegs | " | | .03 1/2 | BISMUTH—Subnitrate | | | | INFUSORIAL EARTH—Gr'd. | | | | Turpentine, spirits | gal. | | .53 1/2 @ .53 1/2 |
| Grains, in kegs | " | | .05 @ .05 1/2 | lb. | | | 1.40 | American best | " | | 20.00 | White lead, Am., dry | lb. | | .04 1/2 @ .04 1/2 |
| Peekskill, f.o.b. Easton, Pa., flour, in kegs | " | | .01 1/2 | Subcarbonate | lb. | | 1.65 | French | " | | 37.50 | American, in oil | " | | .05 1/2 @ .05 1/2 |
| Grains, in kegs | " | | .02 1/2 | "A" | " | | .03 1/2 | German | " | | 40.00 | Foreign, in oil | " | | .06 1/2 @ .06 1/2 |
| Crude, ex-ship N. Y.: Abbott (Turkey) | lg. ton | | 26.50@30.00 | BITUMEN—"B" | " | | .05 | IODINE—Crude | 100 lbs. | | 2.45 | Zinc, white, Am., ex dry | " | | .04 1/2 @ .04 1/2 |
| Kuluk (Turkey) | " | | 22.00@24.00 | "A" | " | | .02 1/2 @ .02 1/2 | IRON—Muriate | lb. | | .05 | American, red seal | " | | .06 1/2 |
| Naxos (Greek) h. gr. | " | | 26.00 | BONE ASH | " | | .07 1/2 @ .07 1/2 | Nitrate, com'l | " | | .01 1/2 | Green seal | " | | .07 |
| Garnet, as per quality | sh. ton | | 25.00@35.00 | BORAX | " | | .40 | True | " | | .04 | Foreign, red seal, dry | " | | .05 1/2 @ .05 1/2 |
| Pumice Stone, Am. powd. | lb. | | .01 1/2 @ .02 | BROMINE | " | | 1.40 | Oxide, pure cupperas color | " | | .05 @ .10 | Green seal, dry | " | | .08 1/2 @ .09 1/2 |
| Italian, powdered | " | | .01 1/2 | CADMIUM—Metallic | " | | 2.00@2.50 | Purple-brown | " | | .02 | POTASH | | | |
| Lump, per quality | " | | .04 @ .40 | CALCIUM—Acetate, gray | " | | 1.30 | Venetian red | " | | .01 @ .01 1/2 | Caustic, ordinary | " | | .04 1/2 @ .05 |
| Rottenstone, ground | " | | .02 1/2 @ .04 1/2 | " brown | " | | .90 | Scale | " | | .01 @ .03 | Elect. (90%) | " | | .06 1/2 |
| Lump, per quality | " | | .06 @ .20 | Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J. | sh. ton | | 70.00 | KAOLIN—(See China Clay.) | | | | POTASSIUM— | | | |
| Ronge, per quality | " | | .10 @ .30 | Chloride | 100 lbs. | | .70 @ .90 | KRYOLITE—(See Cryolite.) | | | | Bicarbonate cryst | " | | .08 1/2 |
| Steel Emery, f.o.b. Pittsburg | " | | .07 | CEMENT— | | | | LEAD—Acetate, white | | | | Powdered or gran. | " | | .14 |
| ACIDS— | | | | Portland, Am., 400 lbs. | bb'l. | | 1.70@1.90 | Brown | " | | .06 @ .06 1/2 | Bichromate, Am. | " | | .08 1/2 @ .08 1/2 |
| Boracic, crystals | " | | .10 1/2 @ .11 | Foreign | " | | 1.65@2.25 | Nitrate, com'l | " | | .06 1/2 | Scotch | " | | .08 1/2 @ .09 |
| Powdered | " | | .11 1/2 @ .11 1/2 | "Rosendale," 300 lbs. | " | | .75 | " gran. | " | | .08 1/2 | Carbonate (80@85%) | " | | .02 1/2 @ .03 |
| Carbonic, liquid gas | " | | .12 1/2 | Slag cement, imported | " | | 1.65 | Am. Bricks, f.o.b. Pittsburg | " | | 175.00 | Chromate | " | | .35 |
| Chromic, crude | " | | .20 | CERESINE— | | | | Calcined | sh. ton | | 17.50@18.00 | Cyanide (98@99%) | " | | .23 |
| Hydrofluoric, 30% | " | | .03 | Orange and Yellow | lb. | | .12 | Bricks | M | | 170.00 | Kainit | lg. ton | | 6.05 |
| 48% | " | | .05 | White | " | | .13 1/2 | Am. Bricks, f.o.b. Pittsburg | " | | 175.00 | Manure salt, 20% | 100 lbs. | | .66 |
| 60% | " | | .11 | CHALK—Lump, bulk | | | | Crude (95%) | lg. ton | | 6.00@6.50 | D'le Manure Salt, 48@53% | " | | 1.12 |
| Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J. | " | | .06 | Ppt. per quality | lb. | | .03 1/2 @ .06 | Calcined | sh. ton | | 17.50@18.00 | Muriate, 80@85% | " | | 1.83 |
| ALCOHOL—Grain | | | | CHROME ORE— | | | | Crude powd. | sh. ton | | 17.50@18.00 | 95% | " | | 1.86 |
| Refined wood 95@97% | gal. | | .60 @ .65 | (50% ch.) ex-ship N. Y. | lg. ton | | 24.75 | MAGNESIUM— | " | | 175.00 | Permanganate | lb. | | .00 1/2 @ .10 |
| Purified | " | | 1.20@1.50 | Bricks f.o.b. Pittsburg | M | | 175.00 | Carbonate, light, fine pd. | lb. | | .05 | Prussiate, yellow | " | | .13 @ .13 1/2 |
| ALUM—Lump | | | | CLAY, CHINA—Am. com. ex-dock, N. Y. | | | | Carbonate, com'l | " | | .01 1/2 @ .01 1/2 | Red | " | | .36 |
| Ground | 100 lbs. | | 1.75 | Am. best, ex-dock, N. Y. | lg. ton | | 8.00 | Blocks | " | | .07 @ .09 | Sulphate, 90% | 100 lbs. | | 2.11 |
| Powdered | " | | 1.80 | English, common | " | | 9.00 | Chloride, com'l | " | | .01 1/2 | 96% | " | | 2.14 |
| Chrome, com'l | " | | 2.75@3.00 | Best grade | " | | 17.00 | Fused | " | | .20 | Sylvinit | unit | | .39 1/2 |
| ALUMINUM— | | | | Fire Clay, ordinary | sh. ton | | 4.25 | Nitrate | " | | .60 | QUARTZ—(See Silica.) | | | |
| Nitrate | lb. | | 1.50 | Best | " | | 6.00 | Sulphate | 100 lbs. | | .75 @ .95 | SALT—N. Y. com. fine | sh. ton | | 2.00 |
| Oxide, com'l, common | " | | .06 1/2 | Slip Clay | " | | 5.00 | 70@75% binoxide | lb. | | .01 1/2 @ .01 1/2 | N. Y. agricultural | " | | 1.50 |
| Best | " | | .20 | COAL TAR PITCH | | | | 75@85% binoxide | " | | .01 1/2 @ .02 1/2 | SALTPETRE—Crude | 100 lbs. | | 3.75 |
| Pure | " | | .80 | gal. | | | .08 | 85@90% binoxide | " | | .02 1/2 @ .03 1/2 | Refined | " | | 4.25@4.62 1/2 |
| Hydrated | 100 lbs. | | 2.60 | Nitrate | lb. | | 1.75 | 90@95% binoxide | " | | .03 1/2 @ .05 1/2 | SILICA—Best foreign | lg. ton | | 10.00@11.00 |
| Sulphate, pure | " | | 1.50@2.00 | Oxide—Black | " | | 2.25@2.30 | Carbonate | " | | .16 @ .20 | Ground quartz, ord. | sh. ton | | 6.00@8.00 |
| Com'l | " | | 1.15@2.00 | Gray | " | | 2.25@2.40 | Chloride | " | | .04 | Best | " | | 12.00@13.00 |
| AMMONIA— | | | | Small, blue ordinary | " | | .06 | Ore, 50%, Foreign | unit | | .18 @ .19 | Lump quartz | " | | 2.50@4.00 |
| Aqua, 16" | lb. | | .03 | Best | " | | .20 | Domestic | " | | .30 | Glass sand | " | | 2.75 |
| 18" | " | | .03 1/2 | Slip Clay | " | | 5.00 | MARBLE—Flour | sh. ton | | 6.00@7.00 | SILVER—Chloride | oz. | | .65 |
| 20" | " | | .03 1/2 | COBALT—Carbonate | | | | MERCURY—Bichloride | lb. | | .77 | Nitrate | " | | .35 |
| 26" | " | | .05 1/2 | Nitrate | lb. | | 1.50 | MICA—N. Y. gr'nd, coarse | sh. ton | | 83.00@88.00 | Oxide | " | | .85@1.14 |
| AMMONIUM— | | | | Oxide—Black | " | | 2.25@2.30 | Fine | lb. | | .00 1/2 @ .02 | SODIUM— | | | |
| Carbonate, lump | " | | .08 1/2 | Gray | " | | 2.25@2.40 | Sheets, N. C., 2x4 in. | " | | .80 | Bichromate | lb. | | .06 1/2 |
| Powdered | " | | .09 | Small, blue ordinary | " | | .06 | 3x3 in. | " | | 1.50 | Chlorate, com'l | " | | .07 @ .08 |
| Muriatic, grain | " | | .05 1/2 | Best | " | | .20 | 4x4 in. | " | | 2.00 | Hyposulphite, Am. | 100 lbs. | | 1.60@1.65 |
| Lump | " | | .08 1/2 | COPPERAS—in bulk | 100 lbs. | | .37 1/2 | 6x6 in. | " | | 3.00 | German | " | | 1.70@1.90 |
| Nitrate, white, pure (90%) | " | | .12 | In bbis. | " | | .42 1/2 | MINERAL WOOL— | | | | Peroxide | lb. | | .45 |
| Phosphate, com'l | " | | .09 | COPPER—Carbonate | lb. | | .18 @ .19 | Slag, ordinary | sh. ton | | 19.00 | Phosphate | " | | .02 1/2 |
| Pure | " | | .12 | Powdered | " | | .25 | Selected | " | | 25.00 | Prussiate | " | | .11 @ 1 1/2 |
| ANTIMONY—Glass | | | | Nitrate, crystals | " | | .35 | Rock, ordinary | " | | 32.00 | Silicate, conc. | " | | .05 |
| Needle, lump | " | | .30 @ .40 | Oxide, com'l | " | | .19 | Selected | " | | 40.00 | Com'l | " | | .01 |
| Powdered, ordinary | " | | .05 1/2 @ .07 1/2 | CRYOLITE | " | | .06 1/2 | NICKEL Oxide, No. 1 | lb. | | 1.00 | Sulphate, com'l | 100 lb. | | .75 @ .82 1/2 |
| Oxide, com'l white, 95% | " | | .09 1/2 | EXPLOSIVES— | | | | No. 2 | " | | .60 | Sulphide | lb. | | .01 1/2 |
| Com'l white, 95% | " | | .12 | Blasting powder, A. | 25 lb. keg | | .65 | Sulphite crystals | " | | 1.90 | Sulphite crystals | " | | .02 1/2 |
| Com'l gray | " | | .07 | Blasting powder, B. | " | | 1.40 | Rock, ordinary | " | | 32.00 | SULPHUR—Roll | 100 lbs. | | 1.85 |
| Sulphuret, com'l | " | | .16 | "Rackarock," A. | lb. | | .25 | Selected | " | | 40.00 | Flour | " | | 1.90 |
| ARSENIC—White powd. | | | | "Rackarock," B. | " | | .18 | NICKEL Oxide, No. 1 | lb. | | 1.00 | Flowers, sublimed | " | | 2.15 |
| Red | " | | .04 1/2 @ .07 | Judson R.B. powder | " | | .10 | No. 2 | " | | .60 | TALC—N. C., 1st grade | sh. ton | | 13.75 |
| ASPHALTUM— | | | | Dynamite (20% nitro-glycerine) | " | | .13 | OilS—Black, reduced 29 gr. | gal. | | .09 1/2 @ .10 1/2 | N. Y., Fibrous, best | 100 lbs. | | 10.20 |
| Ventura, Cal. | sh. ton | | \$2.00 | (30% nitro-glycerine) | " | | .14 | 25@30, cold test | " | | .09 1/2 @ .10 1/2 | French, best | " | | 1.25 |
| Cuban | lb. | | .01 1/2 @ .03 1/2 | (40% nitro-glycerine) | " | | .15 | 15, cold test | " | | .10 1/2 @ .11 1/2 | Italian, best | " | | 1.62 1/2 |
| Egyptian, crude | " | | .05 1/2 @ .06 | (50% nitro-glycerine) | " | | .16 1/2 | Zero | " | | .11 1/2 @ .12 1/2 | TAR—Regular | bb'l. | | 2.20 |
| Trinidad, refined | sh. ton | | 35.00 | (60% nitro-glycerine) | " | | .18 | Summer | " | | .09 1/2 @ .09 1/2 | Oil barrels | " | | 4.20 |
| San Valentino (Italian) | lg. ton | | 16.00 | (75% nitro-glycerine) | " | | .21 | Cylinder, dark steam ref. | " | | .08 1/2 @ .10 1/2 | TIN—Crystals | lb. | | .23 |
| Seyssel (French), mastic | sh. ton | | 21.00 | Glycerine for nitro, (82-2-10" Be.) | " | | .13 1/2 @ .13 1/2 | Dark, filtered | " | | .11 1/2 @ .15 1/2 | Oxide | " | | .45 |
| Gilsonite, Utah, ordinary | lb. | | .03 | FELDSPAR—Ground | sh. ton | | 8.00@9.00 | Light, filtered | " | | .14 1/2 @ .17 1/2 | URANIUM—Oxide | " | | 2.25@3.00 |
| Select | " | | .03 1/2 | FLINT PEBBLES—Dan. Best | lg. ton | | 14.75 | Extra cold test | " | | .21 1/2 @ .26 1/2 | ZINC—Metallic, ch. pure | " | | .07 @ .09 1/2 |
| BARIUM | | | | French, Best | " | | 11.75 | Gasoline, 86" @ 90" | " | | .15 @ .20 | Carbonate, ppt. | " | | .09 |
| Carb. Lump, 80@90% | sh. ton | | 25.00@27.50 | FLUORSPAR— | " | | 14.40 | Naphtha, crude, 68" @ 72" | bb'l. | | 9.05 | Chloride solution, com'l | " | | .02 1/2 |
| 82@98% | " | | 26.00@29.00 | Am. lump, 1st grade | sh. ton | | 14.40 | "Stove" | gal. | | .12 | Chloride granular | " | | .04 1/2 @ .04 1/2 |
| Powdered, 80@90% | lb. | | .01 1/2 @ .02 | 2d grade | " | | 13.40 | Linseed, domestic raw | " | | .44 @ .46 | Dust | " | | .04 1/2 @ .04 1/2 |
| Chloride, com'l | 100 lbs. | | 1.67 1/2 @ 1.76 | Gravel and crushed, 1st gr | | | | | | | | | | | |