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No. 5

The Smelting Reports

The directors of the American Smelting and Refining Company have bowed to the spirit of the times by making a fuller report of its last fiscal year than it has done for many years. It has answered some inquiries, e.g., as to the basis of valuation of its ore and metal accounts, and has given some data about its mining interests, but it still fails by a good deal of communicating all of the information to which its stockholders are entitled, and which may be published without jeopardizing their interests in any way.

We conceive that this company ought to report the production and earnings of its mines, and give information about their condition just as it is expected of any mining company. It ought to state the tonnage of ore smelted and refined and the net earnings therefrom; and the tonnage of outside bullion refined, and the profit therefrom. It should, moreover, state separately its income from investments, its commissions from the sale of outside metals, interest received on loans, and the profit or loss of the United States Zinc Company and other subsidiary companies. Such a statement would enable the stockholders to form a fairly accurate idea of the operations and prospects of the company, and would not injure their interests in any way that we can see.

The last report of the company is, in the above respects, an improvement upon its predecessor, inasmuch as for the first time it states separately the income from the smelteries and refineries, from the mines, from investments, from interest and commissions and from miscellaneous sources. The income from investments is insignificant, having been only \$2500 per annum during the last two years, wherefore, it is to be inferred that the United States Zinc Company, National Metallurgical Company, etc., have not paid dividends. The item of "interest and commission" evidently covers interest on cash surplus loaned out and commission on the

sale of copper for the Utah Copper Company and Nevada Consolidated.

There are several statements in the last report that are not clear. It is said that depreciation on plants is estimated at \$750,000, and that capital expenditures amounting to \$803,710 were made during the year. We suppose that the latter covers the purchase of the outstanding stock of the United States Zinc Company and National Metallurgical Company. In the section on mines it is said that the profits therefrom have been credited to original purchase and development expenditures until such expenditures have been liquidated. The inference from this is that the annual balances carried to profit and loss account are real profits, the original purchase price having been liquidated, and all equipment and development expenditures having been paid as operations have gone along, but this is not made quite clear. If our assumption be correct, however, the bookkeeping of the mining department is certainly conducted in a conservative and proper way.

It appears also that the metal account is inventoried conservatively, silver being reckoned at 50c. per oz., copper at 12c. per lb. and domestic lead at 3.8c. per lb. The leeway on silver and copper is smaller than on lead. During the last four years we have twice seen copper dip under 12c., though not for long. However, we are inclined to think that the prices assumed are sufficiently conservative.

The most confusing part of the last report of this company pertains to its property account. For a long series of years this has been carried at \$86,845,670.51. It is stated now that the total cost of the properties has been \$97,845,774.62. This is evidently arrived at by adding to the previous figure the amount of \$7,600,410, expended on new construction, \$803,710.08 expended on capital account during the fiscal year ended April 30, 1911, and \$2,595,984.03 transferred from the investment account. In addition to the above expenditure for new

construction, \$7,600,410, the directors have now debited surplus account and credited property account with the further sum of \$15,245,364.62, thus reducing the property account to \$75,000,000, whereby it is claimed that \$22,845,774.62 have now been written off to profit and loss.

The above is chiefly an affair of the bookkeepers who must balance in their accounts the water originally injected into the capitalization. What interests the stockholders especially is the value of the real property carried in the property account.

The American Smelting and Refining Company has never carried a depreciation or amortization account. It has expended annually out of its earnings sums for new property or the extension of old property that have amounted to \$7,600,410. This was in effect an amortization account. We have frequently criticized it as being probably insufficient, but have considered that not to matter greatly so long as the company transferred so large a part of its earnings to surplus, and maintained the latter. To some extent the expenditures on new construction have actually increased useful capacity, as for example in the case of the Perth Amboy refinery, but in other cases while total capacity has been increased, insofar as useful capacity is concerned the additions have simply taken the place of old works no longer capable of profitable employment. It is idle to refer to the capacity for smelting 4,465,000 tons of ore per annum at the beginning of 1909, increased to 5,000,000 tons at the beginning of 1910, and to 5,500,000 tons in 1911 as evidence of increase in the real assets of the company. We believe that the company has never had an actual use for more than 3,500,000 tons, and that at the present time at least 1,000,000 tons of its nominal capacity, and probably more, is unlikely to find further employment. The expenditure on new construction, consequently, has never been wholly added to property account, but to a large extent has been merely a replacement of property become worthless. In beginning now to reckon an estimated depreciation of \$750,000 per annum, the directors apparently figure the physical value of the works of the company at about \$15,000,000. We do not imagine that they would reckon anything less than 5 per cent. on this ac-

count. In fact the company appears to have just about held its own during recent years in the matter of live smelting capacity, making additions in some districts where ore supply has increased to take the place of plant rendered idle by decreased supply in other districts. The annual appropriation of about \$750,000 for this purpose has so far proved sufficient, but whether that will continue to be so during the next 10 years remains to be seen.

The real reserve fund of the company has been the large cash surplus that it wisely accumulated. Of that, the sum of \$7,349,400 has now been invested in the common stock of the American Smelters Securities Company. In explaining that transaction we do not think that the directors have been quite frank. The outstanding stock has always been supposed to be chiefly in the hands of the Guggenheim Exploration Company, in whose reports 112,490 shares figured as late as Dec. 31, 1909, leaving only 10,000 shares for other persons, and we fancy that among the 15 interests now referred to the exploration company had the lion's share. This transaction is not prepossessing. We can conceive that the relations between the A. S. and R. Co. and the A. S. S. Co., two concerns engaged in the same business, under the same management, but with different sets of stockholders and to a certain extent competitive, often became highly awkward; and that it was desirable to relieve that situation. We assume that to be a motive behind the transaction, but there ought to have been some other way of effecting it. As consummated it does not impress us as conservative, which we remarked when it was first broached. Boiled down, the Smelting Company has invested \$7,349,400 of its cash surplus in the common stock of an affiliated company which has not yet paid any dividend, but has prospects.

In other respects the showing of the Smelting Company is favorable. Its net earnings have been well maintained in spite of the dullness in the mining business of the West and the figures bear out the assertion of the management that the business and profits of the company are extraordinarily stable. The Securities Company continued to make a large gain, its gross earnings having been more than a million dollars in excess of the previous year and the net earnings nearly

a million in excess. The surplus of this company exhibited a small decrease, however, owing to an enormous writing down in the investment account, the occasion for which is not explained.

Copper Export Figures

In referring to the discrepancy between the export statistics of the Government and those of the Copper Producers' Association for 1910, on March 18 last the JOURNAL said: "The items have been checked for the total exportation in 1910, with the exception of some amounting to a trifle over 9,000,000 lb." We took this then to mean that some officials in some custom-houses had made blunders, which the Government was investigating. It now appears that in the custom-house reports to the Bureau of Statistics omissions in copper exports had been made amounting to 3,640,000 lb. at the port of New York, and 9,569,500 lb. at the port of Baltimore; a total of 13,209,500 lb., which is 3,843,212 lb. more than the difference between the Government statement and the Copper Producers' figures. This difference, however, is easily accounted for by exports of scrap and by smaller lots sent abroad by buyers, after they had been accounted as domestic deliveries. The correctness of the association figures is thus fully vindicated.

Some discrepancy may always be expected in the monthly figures, owing to time difference. The Copper Producers' Association counts copper as exported as soon as it is delivered from the refinery, but the Government does not count it until the vessel carrying it is cleared. This may mean a difference of several days, which might carry large shipments over into the accounts of another month. This difference, however, would be corrected over a series of months, and was, in fact, adjusted when the comparison of the two statements was made last March.

Lake Superior Iron Ore

The shipments of Lake Superior iron ore for the season to July 1 were only 8,843,000 tons, a decrease of 6,075,000 tons from last year. This, however, is a greater apparent loss than was really the case, since the stocks of ore on Lake Erie docks on May 1 were greater by 1,406,000 tons than they were in 1910. It is well known also that stocks in furnace yards this spring were larger than last year, as a rule, though the amount cannot be

exactly ascertained. Making allowance for both the facts mentioned, it appears that the consumption of Lake ore so far this year has been about 25 per cent. below that of 1910. This is in line with other information as to the activity of the blast furnaces, and it points to a very considerable decrease this year in the production of pig iron. Even with the revival in trade, which some people expect, it will be hardly possible to make up in the second half of the year the decrease of the first half. No such sharp increase in production is, indeed, to be expected.

A noteworthy point in the Lake ore shipments is that while there were heavy losses at all the other ports, the tonnage at Superior shows an increase. It is evident from that that the Steel Corporation is working its Hill leases much more actively than its other mines on the Mesabi range. The minimum tonnage under those leases for 1911 is 3,750,000 tons and the royalty 98.6c. The Steel Corporation would, therefore, find it more profitable—perhaps we should say less unprofitable—to work up to the minimum in a quiet year like the present, and to curtail the output at its other Mesabi mines. Heavy royalty and a high minimum are not a desirable combination in a slack year.

Coal Resources of the World

The International Geological Congress decided to hold its next triennial meeting in Canada; and further decided that its main topic at that meeting should be the "Coal Resources of the World," as the iron-ore reserves were the chief subject at the Stockholm meeting in 1910. Although it is nearly two years before the meeting, Canadian geologists have already begun to prepare for it. The Canadian Mining Institute has appointed a committee to supervise the preparation of a volume, or volumes, on coal resources which shall compare well with the monumental work on iron ores which was the result of the last meeting. This committee includes G. G. S. Lindsay, the head of the Crow's Nest Pass Coal Company; D. P. Dowling, the coal expert of the Geological Survey of Canada, and the first explorer of the great coal deposits of Alberta; J. Bonsall Porter, of McGill University; with other well known geologists. It is hoped to secure the cooperation of leading geologists of other

coal-producing countries, and to make the work worthy of the importance of the subject and a fitting memorial of the Congress.

Anti-Trust Proceedings

The law offices of the Government seem to be paying particular attention to the metal trades just now. We have already referred to the sweeping indictments found under the Sherman law against participants in the alleged wire pools. The peculiarity of these proceedings is that suits are not brought against corporations as in previous proceedings, but indictments are found against individual managers and others. Some of them have appeared in court and pleaded not guilty, while others have pleaded *nolo contendere*; which means that they acknowledge the facts charged, and leave it to the court to decide whether they have violated the law.

It is stated that proceedings are to be begun also against the members of the steel-plate pool or combination, which was in existence for several years. The legal position of some other combinations or agreements is also under consideration at Washington. It is reported, however, that the American Smelting and Refining Company has been given a clean bill of health under the law.

These suits, with the anthracite-coal proceedings now pending, will surely keep the law officers of the Government busy—to say nothing of the courts. The anti-trust and interstate commerce laws should be thoroughly expounded and passed upon before the suits are finally decided.

Automobile Ore Trucks

One of the largest items of expense in the production of ore from small, isolated mines is the cost of transportation by wagon to the railway shipping point. A charge of \$3 to \$5 per ton for such service is not extraordinary and \$1 per ton is common. Of course, the cost depends primarily upon the length of the haul and the nature of the road. At the best, however, wagon-transportation eats seriously into the profit of many mines.

We expect to see economy in this respect through the introduction of motor trucks. Automobile coal wagons are in regular service in Eastern suburban districts, and if coal wagons, why not ore

wagons? We understand in fact that automobile ore wagons are already in use in some mining districts with noteworthy success and remarkable economy. Naturally this has been in regions where the roads are relatively good and the grades not excessive. Undoubtedly there are many mining districts in mountainous regions where the automobile cannot be introduced, just as there are many that are still dependent upon the mule-train, but also without doubt there are many favored regions in which the automobile truck can and will be employed.

The potash salts controversy some time ago passed out of international politics, our Government apparently having found no argument to controvert the German contention that the matter at issue was entirely one to be regulated by its own laws. In this case the Germans had decidedly the best of it, whatever opinion might be entertained of their fairness. They had the potash, and they were perfectly well aware that the United States Government would not adopt any aggressive measures for the benefit of the fertilizer trust. The question has now settled down into a controversy before the German courts on the point whether the German miners or the American contractors are liable for the amount of the so called surtax levied by the German government.

In the early days of gold milling in the Cripple Creek district the cyanide mills were worsted in the competition with the chlorination works and, for many years, the latter held the field. Improvements in cyanidation, however, altered the conditions, and the cyanide mills are now undoubtedly ahead. Emphasis is given to this conclusion by the fact that the Portland company recently decided to change its mill at Colorado City, having a capacity for the treatment of 10,000 tons of ore per month, from the chlorination to the cyanide process. This will leave the United States Reduction and Refining Company with the only chlorination mill in the field, and three of its chlorination mills are idle.

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Metallics

The specific gravity of granite ranges from 2.593 to 2.731, with an average of 2.663. A cubic foot of such granite weighs 166.4 lb. It will ordinarily withstand a pressure of 18,000 to 34,000 lb. per sq.in. Certain Wisconsin granites have withstood crushing up to a pressure of 43,973 lb. per square inch.

At the Oroya Brownhill cyanide plant filter frames are kept porous and free from lime by standing once a month for 24 hours in 5 per cent. hydrochloric acid. The average life of the cloths is 5.3 months, and they are usually discarded through becoming hard with calcium sulphate, which the hydrochloric acid will not remove. If some means could be found for removing this salt, the life of the cloths would extend over several years.

To distinguish alternating- from direct-current wires, if an incandescent lamp be burning in the circuit, hold a magnet near the filament. If it is direct current, the filament will be deflected either from or toward the magnet; if alternating, it will either vibrate quickly or remain motionless. Another way is to hold a wire carrying the current immediately over a compass needle. If the needle takes a steady deflection, the current is direct; if it vibrates quickly, or remains at rest, the current is alternating.

When a wire rope wears from abrasion the broken ends of the individual wires usually project outward in all directions, presenting a ragged appearance. When the wires break from undue bending, the broken ends do not immediately project, nor does the rope present an uneven surface. Upon close inspection it will be found that the wires look as if they had been cracked at right angles to their length. A long-lay wire rope shows good wear when the surface of the wires shows a flatness at all such points where it comes in contact with the sheave, while an ordinary-lay rope will be worn flat only at the outermost surface of the wire.

At the Waihi Grand Junction mill, the total weight of each stamp is 1100 lb. The dies are in two pieces—die block (145 lb.) and half-shoe die (112 lb.). When a shoe is partially worn, it is used as a die, and replaced by a full-weight shoe. The weight of the stamp is thus kept up to its full crushing power. The mortar box is bolted to a cast-iron anvil block, weighing 3.5 tons, placed on a bed of concrete. This gives a good, firm crushing base, and tends toward high stamp duty. The stamps are worked with 7 in. drop, 105 per min., and the height of discharge is kept as near as possible to 1½ in. The order of drop is 1, 4, 2, 5, 3. The screens used are woven wire of 5, 7 and 10 mesh. The duty is 7.6 tons per stamp per day.

By the Way

In his Cantor lecture at the Royal Society of Arts, Dr. A. E. Tutton said that workmen in the Kimberley mines knew that diamonds often exploded soon after being dug from the earth, for many accidents had occurred by Kafirs hiding newly found diamonds in their mouths.

In the Australian action of the Elmore company against the Sulphide Corporation and the Minerals Separation, Ltd., a cablegram announces that a decision has been rendered in favor of the defendants on the same lines as laid down in the British House of Lords judgment of November, 1909, in favor of Minerals Separation.

Mr. Wickersham has joined forces with Judge Gary and Mr. Guggenheim, but from a different angle. He believes that the law of supply and demand no longer prevails, that competition has broken down, and that we ought to have governmental regulation of prices. "It is highly probable," said Mr. Wickersham, "that in almost every one of the great staple industries, prices have been for years fixed by agreement among the principal producers, and not by the normal play of free competition, even among the domestic producers, nor by the unfettered operation of the law of supply and demand." Now, what the producers of copper, lead and spelter would like to know is who has fixed the prices of those commodities during recent years. If their identity can be learned, they will be discharged from the job, because they have certainly failed to fix prices high enough to satisfy any producer, or to put in any pegs that would stick.

Among the concerns recently under investigation by the Department of Justice have been the Aluminum Company of America, the American Smelting and Refining Company, and the Copper Producers' Association. Who would have guessed that it would have occurred even to a bureaucratic luminary to investigate a simple statistical organization like the Copper Producers' Association? Ought not the American Iron and Steel Association now prepare itself for inspection? In the meanwhile the Federal Grand Jury in New York has decided that the evidence presented against the American Smelting and Refining Company is insufficient to sustain the charges of violating the Sherman law, or the Interstate Commerce act, and that concern has been given a clean bill of health. Perhaps this will put Mr. Guggenheim in a better humor than when he sailed away to Europe, and he will realize that virtue has its own rewards.

The Sugar Trust joins the Steel Trust in testifying that there is an excellent cure for dropsy. Neither corporation has the slightest objection to admitting, under oath, that when it first began doing business a decade ago there may

have been a good deal of water in its system; ahem, yes, it recalls now that there was a good deal of water. But it is equally confident that the water has all been squeezed out and that the bondholders and stockholders nowadays revel in a delightful state of desiccation. It may be academic to speculate on what has been, but one cannot help trying to picture just what this anti-dropsy process could have been. The Steel Trust tapped itself into health by investing accumulated profits. The Sugar Trust probably pursued similar drainage methods, supplemented by such secret transfusion from the United States Treasury as the Custom House people have laid bare. In any case the squeezing-out process must have been carried on at the expense of the ultimate consumer and the original stockholder. This fact may well be kept in mind for reference whenever the trusts are tempted to expatiate upon their new-born virtue. Thus says the *Evening Post*, and we commend its remarks to those trusts that have failed to reinvest their surplus in good, solid, productive capacity, but like spendthrifts have distributed it all in dividends or have put it into new enterprises that have blown up.

In the last few days Nipissing has declined from around 10½ to 7, which is the lowest price touched since its ecstatic flotation, says the *Evening Post*. The worst that seems to be expected is that the "extra" dividend will be omitted while the 1000-ft. levels are being explored for more ore. That will take money, and the management thinks to find it out of earnings. The company has been paying 20 per cent. regular and 10 per cent. "extra," making 30 per cent. a year. It is supposed that the stockholders are now so dismayed at the prospect of having to get along with 20 per cent. instead of 30 per cent., that they have been selling their shares down to 7, though in 1906 the same stock, receiving 20 per cent., sold at 33¾. The par value of the stock is \$5 per share. A dividend of 20 per cent. is \$1 per share. A quotation in 1906 of \$33¾ per share was about 680 per cent., and dividends at the rate of 20 per cent. on par value meant an investment (?) yield of less than 3 per cent. Now, at quotation of \$7 per share, which is 140 per cent., dividends at the rate of 20 per cent. on par value mean a yield of 14 per cent. That is to say, on a 3 per cent. basis of yield speculators were mad about Nipissing five years ago; now, on a 14 per cent. basis of yield, they despise it. In five years the dividends have amounted to approximately 100 per cent., which is a good enough showing, but the stock had been distributed in the first place at from 500 to nearly 700 per cent. Neither speculators nor investors have ever learned in this country that a mine pays dividends out of assets; that big dividends mean a rapid dissipation of assets.

Correspondence and Discussion

The Use of Sectionalized Machinery

In an article in the JOURNAL of July 15, T. Lane Carter suggests some of the difficulties of transporting machinery to the difficultly accessible mines of Mexico, Central and South America. To facilitate transportation the manufacturers of mining machinery make some form of nearly every machine needed at a mine sectionalized so that no piece shall exceed a predetermined weight. It is assumed that such machinery will be taken to the mine upon the backs of mules and 300 lb. is usually recognized as the practical limit that such animals can carry.

There are many remote mines that are accessible by other means than mules; by river transportation or carts. When such is the case heavy machinery can usually be conveniently handled provided proper loading and unloading devices are at hand. I have known several instances where heavier loads could be taken long distances up rivers than could be loaded into or removed from the large bateaus or canoes merely because hoisting derricks had not been provided.

UNDERSIZED PACK ANIMALS

In Central America mules, horses and oxen are used to pack machinery over the trails to the mines. These animals are poorly nourished, undersized and not usually properly saddled so that the limit of load is not 300 but 150 and sometimes only 100 lb. The American "army mule" is considered quite capable of carrying 350 lb. but that animal is a far different creature than his Central American brother. Furthermore much depends upon the shape and size of the load; it must be well balanced if heavy.

Mules are superior to horses or oxen but the problem of mule transportation is not usually well understood. It is a science in itself, when done economically and efficiently and cannot, as is often the case, be left to a native *arriero*. The secret of success is preparation. Where a mine is dependent upon mules for bringing in machinery and supplies and will continue to be so dependent, it should be recognized at the start that much of the future of the mine depends upon its transportation system.

PREPARATIONS THAT SHOULD BE MADE

One of the first provisions to be made is a proper shipping terminal at the railroad or other point receiving supplies, where provisions should be made for properly storing and for repacking all supplies in bales and boxes so as many

Views. Suggestions and Experiences of Readers



loads as possible can be divided into two parts that exactly balance, made to do so by actual weighing on scales. Next, the average daily haul should be carefully determined and depots established where upon being reached at night ample food and fodder can be obtained for man and beast, and ample facilities for effective rest be found. Along the road between depots water stations should be established. The distance between depots should be governed by the grade and condition of the road and should not be so long as to tire an animal too much. Better have short hauls and a good beast.

The road, of course, should be made as fit as possible for easy traveling. It should be drained or corduroyed in wet places, and cut out smooth where rocky. The hoofs make the beast, and bad roads ruin hoofs, then animals are laid up. It may be expensive at first to make a good trail but it is better to spend the money in that way than in replacing dead animals.

SELECTION OF ANIMALS AND EQUIPMENT

Last and most important comes the selection of the men and animals. Mules should be carefully chosen, sound animals with good hoofs. Usually they will require a few weeks' easy work and good feeding before they are fit to begin packing. The first loads should be light and the haul short, gradually increasing both until the mules are hardened to their work. A proper pack-saddle should be provided for each animal. It is better in the end to buy American-made saddles unless an exceptionally skilful maker of native *aparejos* can be found. Each animal should have its own saddle, well padded, accurately fitted to him, and numbered; it should thereafter be used on no other animal.

The men must be drilled in properly placing the saddle on the mule so no chafing shall result and so it will not come too far forward over the withers. The cinch, placed just a palm's width back of the fore shoulder, should be drawn tight so no slipping shall occur and the crupper fit beneath the tail comfortably. Sheeps' wool pads under the cinch will prevent chafing. Finally men must be instructed in how to strap the

load tightly and evenly to the saddle, to keep the load as low as possible so no slipping or rolling occurs. Native drivers can easily be encouraged to do this part of the work properly with the exercise of a little patience on the part of the instructor. Above all else a mule's feet and hoofs must be cared for. Shoeing is not absolutely necessary but if done at all should be done by a skilful farrier.

ADVISABILITY OF IMPORTING MULES

When many heavy pieces of machinery have to be packed, pieces weighing more than the native mules can carry, it is occasionally advisable to import large American mules. The importation of American animals into tropical countries is often disappointing; if taken to torrid climates they usually die but if the climate is temperate, they rapidly become acclimated and give excellent service. At one mine in Mexico some splendid specimens were purchased and by proper mounting, pieces of machinery weighing 700 lb. were hauled up a steep trail to the mine.

It is surprising what can be done in the way of packing heavy weights over rough and steep trails, but to do it properly requires as careful management and as much experience as any other of the mining engineers' many duties.

M. T. TAYLOR.

New Orleans, La., July 20, 1911.

Leaching Copper Ores in Place

Much has recently appeared in the JOURNAL and other papers on the subject of leaching copper ores in place; I might refer to my letter which appeared in the issue of April 8 last.

An interesting example of the solubility of copper in its ores has recently been seen in some of the lower workings of the Transvaal Copper Mining Company, at Cumpas, Sonora. In September, 1910, after five years or more of submergence, the lower workings in question were pumped out and resampled by Arthur Houle. The result of his work showed that there is apparently no commercial ore left in this particular part of the mine. Previous sampling by two independent engineers, including Doctor Sandberg, at different times showed ore averaging over 2 per cent. copper. There is little question that the copper was leached out, for it is an interesting fact that the silver contents, which are in the form of insoluble compounds, appeared the same after as before submergence.

MORTON WEBBER.

New York, July 19, 1911.

Aiding Prospectors

The Grubstake fund being raised by the Denver *Republican* to aid prospectors to search for new orebodies in Colorado, the offer of the Denver *Post* to have assays made of ore samples brought in by prospectors without cost to them, and the frequent complaints about the tardiness of investigating and publishing reports on new mineral districts by the Geological Survey, signify that there is, in those parts of the country where the mineral industry is important, a general desire on the part of the public, to secure Government aid in the discovery and exploration of new mineral regions.

The United States seems a little backward about affording such aid. Ranking first as a producer of many metals, this country does less for the mining industry than perhaps any other where the working of mines is an important industry of the country. The publication of statistics is of value to a few people; the reports on districts where mining has been done for many years are not usually more than interesting historical records; the Survey reports are records of what is already known by the miners in the districts that they cover and their value is largely limited to a means of disseminating the facts of ore occurrence to others than those most interested.

The Canadian government has recognized the value of an early and prompt report on a newly discovered district, and when new mineral territory is discovered in Canada, we may expect as prompt attention from the Mines Department as was given in the case of the discovery of Porcupine.

South Africa, Australia and New Zealand have done much more than other countries ranking high as mineral producers, in the way of promoting the mining industry within their boundaries. Recently the Mines Department of New Zealand purchased a number of diamond drills, to lease to prospectors, as stated in the *JOURNAL* of July 8. This action on the part of the New Zealand government entitles it to first place in rendering practical aid to searchers for new orebodies.

Such a system of leasing drills could well be adopted by the State governments here at home. There are many difficulties in the way, but they are not insurmountable. To my mind one of the greatest difficulties would be in allotting a limited number of drills to the many prospectors who would apply for the leases. Furthermore, the operation of such drills cannot be left to men inexperienced in their use. To secure the maximum advantages the State would not only have to supply a skilled crew to operate each drill, but would also have to support a committee to investigate the possibilities of drilling in the ground for which the leases were petitioned.

The operation of small mines is another phase of the mining industry, the value of which is too lowly estimated in this country. There is an inclination to support and boast of our great mining corporations, their capitalization, enormous production and magnitude of their operations—they need no aid, and as they produce the bulk of the mineral wealth of the country, why should any one require aid from the Government?

The operator of a small mine does, however, contribute to the welfare of his community by employing men and distributing a part of his earnings in the neighborhood of the mine. To increase the number of small mine operators more prospecting is needed, and to secure that some sort of aid or encouragement for prospectors is necessary.

JOHN HORNE.

Colorado Springs, Colo., July 19, 1911.

Aeration of Sand Charges

In the *JOURNAL* of July 22, John H. G. Banks, in commenting upon H. T. Durrant's article, "Upward Leaching of Sand," that was published in the *JOURNAL* of Feb. 25, writes: "It is the oxygen in the solution which we have to look to, and not rely too much on the oxygen which we calculate is present in the depths of a drained-sand charge, the moisture in which probably averages 25 per cent."

Cyanide solutions, in order to dissolve gold, must contain a certain amount of oxygen, but the fact that gold is not dissolved by solutions containing no oxygen is not the only reason why aeration of both the charge and the solutions is necessary. The reactions that take place in a sand vat containing a charge being leached are far more complex, as a rule, than those by which solution of the gold is effected. These reactions, often obscure and little understood, take place by reason of the comminution of the ore, the presence of water, and of air. They take place between the decomposition products of the minerals in the charge which may be present only in small amounts, but complex in chemical constitution, such as the arsenic-sulphur minerals, and their presence, though only in small amount, may indirectly influence the dissolving of the gold to a large extent.

Under the influence of air and moisture these minerals break up to form salts, which consume oxygen; some of the salts thus formed may be dissolved by the solutions. Many such reactions require oxygen, which they derive from the air drawn into the interstices of the charge when it is drained or from the oxygen or air in the solution itself. When the source of oxygen is solely the solution, the amount of solution required to cover the charge in the vat may be rapidly deprived of its oxygen, so that it becomes

incapable of dissolving the gold with anything like normal rapidity.

Again, when certain soluble salts are dissolved by the solutions, they may be capable of rapid oxidation, when they will exhaust the relatively small amount of oxygen that the solutions contain, and then there will still remain a large amount of these salts, oxidizable and ready to take up that element when the opportunity is afforded. To provide the oxygen for such reactions it must be supplied in the first instance, preferably by aeration of the sand in the vat by draining; sometimes also by pumping air into the drained sand. In case the oxygen-requiring salts are soluble, then the solution will require aeration; in some instances aeration of the drained charge and of the solutions will be necessary.

An example of the first instance is the leaching of the Homestake sand. This sand contains pyrrhotite that is rapidly oxidized and draws oxygen from the air in the interstices of the sand particles and from the solutions. It is the practice at these Black Hills cyanide plants to blow air through the drained vats at intervals during treatment to supply the oxygen required by the decomposition of the pyrrhotite. The solutions themselves do not require aeration. An example of the second instance is afforded by the practice at the cyanide plant of the Consolidated Mercur company, in Utah. There the ore contains sulpharsenides and sulphantimonides which, upon decomposition, are dissolved by the solutions, and, being further oxidizable, draw oxygen from the solution, reducing its gold-dissolving power. At that plant it is the practice to aerate the solutions after they have been drawn from the charge. Of course, the charge is also aerated to a certain extent by the drawing off of the solutions, but such aeration is regarded as of less moment than aeration of the solutions before being used again.

The point I wish to emphasize is that an attempt should be made to determine where the excess oxygen is required, then to supply it in the most direct manner, either to the charge or solutions, as may be indicated.

A. JOHN DEANE.

New York, July 25, 1911.

The Utah Solar Salt Industry

In the *JOURNAL* of July 8, in the article under this title, the third sentence under the heading, "Harvesting the Crop," reads: "Great care is exercised to prevent this soda from being thrown down, as it is much easier to remove it from the finished salt." This should read: Great care is exercised to prevent this soda from being thrown down, as it is much easier to remove it in the mother liquor than to remove it from the finished salt.

PERCY E. BARBOUR.

Tecoma, Nev., July 12, 1911.

Quite a number of pipe derricks of a much improved type have been made under the patents of C. A. Neill, field superintendent for the South Penn. Oil Company, and while this company has by far the larger number of such derricks, they have been extensively used by others. The Neill patent derrick is made in different heights and with different thicknesses of pipe to suit different conditions. The design is flexible because the strength can be increased to cover requirements by using heavier pipe for leg sections, and this without any other change. There are no screwed joints, and it is assembled with clamps and bolts. It can be erected or taken down, so the manufacturer claims, in one day, by three men.

Clamps which were formerly made of malleable iron are now made of steel drop forgings of quite an ingenious type. The leg sections are plain, while the girts and diagonal braces, which are also of pipe, are swedged down at the ends so as to provide a flat bearing surface against the clamps and proper width of material for punching holes through which they are connected to the clamps themselves. The U-bolts connect the derricks and the diagonal braces at their intersections. Crown blocks may be made either of wood or of structural steel, and the design of the structural-steel bases for connection to the pipe derrick is quite a simple problem. The ladder in this improved type of derrick is made of 1½ x 1½-in. steel angles with ¾-in. steel rungs, and is connected to the derrick by U-bolts.

It is obvious that in this type of construction the overturning of the derrick under wind or its pulling in by eccentric distribution of loads is resisted entirely by the friction of the clamp on the pipe, and in consequence there is need that the bolts should be well tightened. Nine bolts are used at each joint.

It is obvious that the use of steel pipe provides an efficient leg section, and that where second-hand pipe can be cheaply obtained and the blacksmith work, including punching, done in the shops of the user, this form of construction would result in a considerable economy, as compared with wooden types. The derrick proper, however, is the only part of the rig in which pipe can be satisfactorily used, and in the case of derricks made of new pipe under ordinary methods of manufacture, with proper allowances of shop profit, etc., the cost would be rather more than that of derricks made of structural steel. The use of pipe for building towers of this character, while it still persists to some extent in other lines of industry, has been definitely abandoned long since by manufacturing shops generally, for the reason that experience indicates that the use of structural shapes is more economical.

Boiler Tests at Tennessee Copper Smeltery

By PERCY E. BARBOUR*

The following results of boiler tests were obtained at the copper smeltery of the Tennessee Copper Company, and are interesting as records of results obtained under actual working conditions. The superiority of automatic over hand firing, under the plant conditions, is shown, also the difference between the stokers when run by the stoker expert and the local plant-fireman.

Test No. 1 was made with the regular flat grate-bars. The firing was done by

The equivalent evaporation from and at 212 deg. F. per pound of combustible was 10.8 and 11.5 lb. of water respectively.

In all of these three tests the working conditions were practically the same. There was developed 82.4, 82.3 and 86.3 per cent, respectively of the rated capacity of the boilers in the battery. The demands for power at a smeltery are always variable and on the date of the fourth test were unexpectedly large for the battery of three boilers then under steam, so that they required pushing.

Test No. 4 was made with a special man in charge of the furnaces to give instruction to the regular attendants in the

DATA AND RESULTS OF EVAPORATIVE BOILER TEST

	1 2 3 4 5				
	Flat Grates	Murphy Furnaces			
Height of stack, ft.	90	90	90	90	117
Grate surface, sq. ft.	53.5	192	192	144	144
Water heating surface, sq. ft.	2,564	10,256	10,256	7,692	7,692
Superheating surface.	none	none	none	none	none
TOTAL QUANTITIES					
Duration of trial, hr.	22	7½	7	7	7
Weight of coal as fired, lb.	25,800	24,879	22,644	26,030	25,962
Percentage of moisture in coal.	3.0	4.7	7.4	5.4	5.4
Total weight of dry coal consumed, lb.	25,460	24,133	21,580	24,104	24,560
Total ash and refuse, lb.	5,090	4,871	3,587	4,500	5,302
Percentage of ash and refuse in dry coal.	20.0	20.1	16.6	18.6	21.5
Total weight of water fed to the boiler, lb.	133,100	199,609	198,152	190,103	179,768
Water actually evaporated, corrected for moisture in steam, lb.	196,615	195,180	185,160	185,160	175,112
Factor of evaporation.	1.172	1.0594	1.068	1.071	1.0655
Equivalent water evaporated into dry steam from and at 212 deg. F.	156,000	208,294	208,452	198,306	186,582
HOURLY QUANTITIES					
Dry coal consumed per hour, lb.	1,160	3,291	3,083	3,443.4	3,508.5
Dry coal per sq. ft. of grate surface per hour.	21.7	17.1	16.0	23.9	24.3
Water evaporated per hour corrected for quality of steam.	5,960	26,811	27,882	26,451.4	25,016
Equivalent evaporation per hour from and at 212 deg. F.	7,090	28,404	29,778	28,329	26,654
Equivalent evaporation per hour from and at 212 deg. per sq. ft. of water heating surface.	2.76	2.77	2.9	3.68	3.46
AVERAGE PRESSURES AND TEMPERATURES					
Steam pressure by gage.	155.0	140.3	156.6	162.60	157.8
Barometric pressure.	13.95	13.95	13.95	13.95	13.9
Absolute pressure.	154.25	170.55	170.55	176.55	171.7
Temperature of feed water entering boiler.	81	200	194	191.50	196.76
Temperature of gases escaping from boiler.	440.8	433.4	462.90	462.90	526.9
Temperature of fire room.	76	80	79.4	88.5	95.0
Force of draft, in. of water.	0.39	0.4375	0.425	0.333	0.47
Percentage of moisture in steam.	1.5	1.5	1.5	2.6	2.59
HORSEPOWER					
Horsepower developed.	206	823.3	863.1	821.1	772.5
Builders' rated horsepower.	250	1,000	1,000	750	750
Percentage of builders' rated horsepower developed.	82.4	82.3	86.3	109.4	103
ECONOMIC RESULTS					
Water apparently evaporated under actual conditions per pound of coal as fired.	5.16	8.02	8.75	7.3	6.92
Equivalent evaporation from and at 212 deg. per pound of coal as fired.	8.37	9.20	7.6	7.18	7.18
Equivalent evaporation from and at 212 deg. per pound of dry coal.	6.12	8.63	9.60	8.22	7.59
Equivalent evaporation from and at 212 deg. per pound of combustible.	7.65	10.8	11.50	10.10	9.68

native unskilled Tennessee labor which was ignorant, careless and nearly worthless. The equivalent evaporation from and at 212 deg. F. per pound of combustible was 7.65 lb. of water. The coal burned during this test was not quite as good as in the following tests.

Test No. 2. was made after Murphy automatic stokers, were installed, to ascertain the advantages of the new over the old style of firing. The equivalent evaporation was so high, considering the conditions, that test No. 3. was run as a check, and the good results were verified.

*Mining engineer, Tecoma, Nev.

manipulation of the stokers, the proper method of cleaning fires, etc. Expert handling of the stokers enabled us to develop 109.4 per cent. of the rated capacity of the battery, although at a slight decrease in efficiency. The equivalent evaporation from and at 212 deg. F. per pound of combustible was 10.10 lb. of water.

Test No. 5 was made to determine the advantage of having increased the height of the stack 27 ft. The draft was increased only 0.0325 in. of water over the highest previous average. The equivalent evaporation from and at 212 deg. F.

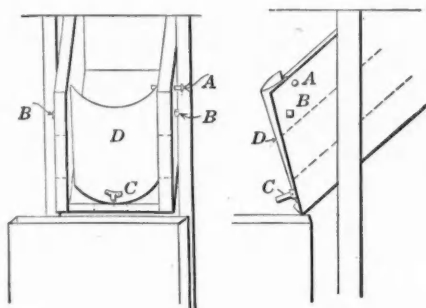
per pound of combustible was 9.68 lb. of water. The original stack was steel, five feet in diameter, and its top was 94 ft. above the grate bars. When the 27 ft. were added the total height above the grate bars was 121 feet.

Special Form of Chute Door

BY A. O. CHRISTENSEN*

The accompanying illustration is of a special form of chute door, which is easily and cheaply made, lasts longer than most mine chutes, requires a minimum of repairs and gives a minimum of trouble, while it is exceedingly handy to manipulate.

The door consists of a piece of heavy sheet iron *D*, bent into a half circle. The height of this sheet equals the height and its diameter the width of the chute mouth. The sheet iron has two $\frac{3}{8}$ - or $\frac{7}{8}$ -in. holes, each bored about one-third the way from the top, close to the edge. It also has a handle attached to its center, near the bottom. To place the door



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A STEEL CHUTE DOOR

two bolts, $\frac{1}{2}$ or $\frac{3}{4}$ in. diameter, and long enough to penetrate the planks which form the sides of the chute mouth, with about $1\frac{1}{2}$ in. to spare, are placed and locked, as shown at *B*. In order to hold the chute door from flying open from the weight of the ore in the chute, a bolt *A* is inserted, thus holding the door closed.

To fill a car from the chute, the bolt *A* is removed and the door lifted by means of handle *C* until sufficient ore has run from the chute. The door is then closed and bolt *A* inserted. It might be supposed that trouble would be experienced in closing the door, but such has not been found to be the case.

Extinguishing Oil Fires

For extinguishing oil fires where water is both ineffective and dangerous, frothy liquids have been recommended. (*Chem. Trade Review*, June 10, 1911). In a late test, near Hamburg, a mixture of one quart each of caustic soda and alum so-

lutions yielded 15 quarts of a yellowish-white foam, having a density of 0.14, and this could be sucked up and distributed like water by a hose. Spreading over the surface, the foaming liquid kept on water and benzine 20 minutes, with little change. A basement of 30 sq. ft. with benzine to 20 in., was fired, and was extinguished in 78 sec., with 18 gal. of the frothy mixture, and a burning benzine tank, 6 ft. in diameter and 9 ft. high, was extinguished in 13 sec. The benzine was little affected, burning as usual after removal of the froth.

Waterproofing Concrete Roofs

BY J. R. BAYLISS

In a hydroelectric water and light plant, erected for the city of Lawrenceburg, Tenn., several years ago, reinforced concrete was used for the construction of the roof of the power house and the pumping station. These buildings have been in use nearly three years without any leaks through the roofs. The plant consists of a concrete dam, tunnel through rock, power house with electric generators and turbines, two reinforced-concrete pipes from the tunnels to the turbines, and an electric pumping station half way between the power house and the town.

Both buildings are of the ordinary type of concrete construction with roofs and floors of reinforced concrete. The roof on the pumping station is 6 in. thick; $5\frac{1}{2}$ in. of 1:2:4 concrete and $\frac{3}{8}$ in. of 1:2 mortar finish. The concrete was placed plastic and tamped lightly into place, to insure no voids being left. The mortar finish was applied immediately after the concrete and finished smooth like a sidewalk as soon as possible, which was about the time it began to take its initial set. A lye-and-alum solution was used in the mortar finish. One pound of concentrated lye and 5 lb. of alum were mixed in 2 gal. of water. One part of this solution to about 30 parts of water was used. When the mortar finish was beginning to take its permanent set it was painted with two coats of the solution mixed with neat cement in about the proportion of one pint of solution to 2 lb. of cement.

These roofs have been in use nearly three years and show no hair cracks or leaks. There are two pipes 4 ft. diameter and 6 in. thick, leading from the tunnel to the turbine that are of reinforced concrete. One of them was waterproofed on the inside in the same manner as the roofs, except the mortar finish was applied after the forms were removed. The other one was plastered on the inside with $\frac{1}{2}$ in. of 1:2 cement mortar without

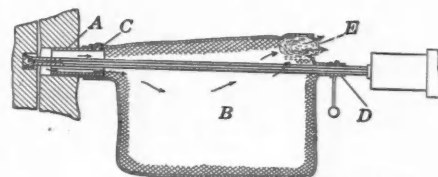
using any of the waterproofing compound. Both types are under a head of about 12 ft. of water, and neither has shown any sign of leakage.

The Dwyer Dust Arrester

The Dwyer dust arrester is intended for use with rock-drilling machines that can be so operated that the exhaust air will pass down the tubular steel bit to the bottom of the hole being drilled, to blow the dust and cuttings made by the bit through the annular space between the bit and walls of the hole. The device is a receptacle that permits escape of the air, but retains the cuttings.

In the accompanying illustration of the device, *A* is a sheet of metal rolled into a cylinder, the edges of which are free to overlap as much as may be necessary to introduce it into the mouth of the hole cut to sufficient depth by a starting bit, to permit introduction of the collar far enough into the hole to obtain a tight fit.

To the collar is tied a bag *B*, which has an opening at *C* for slipping over the collar. The bag is attached to the collar by an elastic band. At *D* there is an opening in the bag through which the drill passes. To the neck of the bag at the point *D* is attached a cord carrying



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DWYER DUST-COLLECTING DEVICE

a weight at the end. This cord is wrapped about the neck of the bag to hold it to the drill; the weight making tying unnecessary.

The bag *B* may be made of some light open fabric through which the air will pass, but which will filter the dust, or heavy material, such as leather, may be used, in which case a large opening *E* is made in the bag in which a sponge is held, through which the air escapes while the dust is retained. The device was invented by William E. Dwyer, of Leadville, Colo., and is patented.

Cooling Hot Bearings

A satisfactory mixture for cooling hot bearings is recommended by T. L. Darling, in *Power*, and it is said that it seldom fails and that the action is rapid. The recipe follows:

Mix half and half by volume No. 6 Keystone grease and ammonia and feed through the oiler as fast as possible by drops. If No. 6 grease is not available, common engine oil will do, but it will have to be stirred almost continuously.

*Mining engineer, Sombretete, Zacatecas, Mex.

*Abstracted from an article entitled "Waterproofing Concrete Roofs with Lye and Alum," *Cement Age*, May, 1911.

The Smelting Company Reports

In the twelfth annual report of the American Smelting and Refining Company it is announced that this company has purchased, at \$60 per share, 122,490 shares of the common stock of the American Smelters Securities Company, acquiring it from 15 individuals, corporations and estates. The valuation was appraised by the four vice-presidents of the A. S. and R. Co. The entire issue of the common stock of the A. S. S. Co. is now owned by the A. S. and R. Co., and is to be carried on the books of the latter at \$60 per share.

During the year the A. S. and R. Co. also purchased the outstanding preferred stock of the U. S. Zinc Company and is now the sole owner of that concern. The directors believe that this will yield in course of time a substantial addition to the profits of the A. S. and R. Co. Acquisition was also made of outstanding stock and bonds of the National Metallurgical Company, operating a smeltery at Matehuala, Mex. The last payment of bonds of the Omaha & Grant Smelting Company was made on April 1, 1911, and the A. S. and R. Co. now has no bonds

The Smelting Company shows about the same earnings as in 1910; the Securities Company shows a largely increased business and profits.

\$2,740,537.51. Since April 30, 1903, all capital expenditures at the smelting and refining plants have been charged each year to profit and loss, in lieu of depreciation. These expenditures, which were made entirely for new property or for the extension, with increased capacity or efficiency, of plants in operation, have, together with other amounts written off for depreciation, amounted to \$7,600,410. The directors have felt that this was

DETAILED STATEMENT OF A. S. AND R. CO.'S MINING OPERATIONS

		Net Earnings	Equipment and Development Expenditures	Balance to Profit and Loss Account
Prior to April 30, 1901	1901	\$99,085.89	\$215,249.22	.....
Year ended April 30, 1902	1902	*22,306.27	96,505.70	.....
1903	1903	*26,608.24	103,901.88	.....
1904	1904	156,904.82	95,173.50	.....
1905	1905	172,325.99	124,626.49	.....
1906	1906	256,829.23	65,121.14	.....
1907	1907	436,812.51	111,017.30	.....
Total to April 30 1907	1907	\$1,073,043.83	\$811,595.23	\$261,448.60
1908	1908	481,328.77	116,560.21	364,768.56
1909	1909	694,092.65	89,533.14	604,559.51
1910	1910	397,507.08	66,172.99	331,334.09
1911	1911	109,151.24	3,532.49	105,618.75
		\$2,755,123.57	\$1,087,394.06	\$1,667,729.51

*Loss.

ANALYTICAL STATEMENT OF THE PROFIT AND LOSS ACCOUNT, A. S. AND R. CO., APRIL 30, 1911

Year	Earnings After Deducting General Expense	Ordinary Repairs and Replacements	Depreciation or New Construction	P. and L. Adjustments	Dividends	Surplus
1900	\$4,140,050.35	\$615,089.50	\$.....	\$.....	\$1,545,053.00	\$1,979,907.85
1901	4,716,851.00	888,409.73	1,000,000.00	.....	1,918,000.00	910,441.27
1902	5,652,924.79	791,305.78	773,792.78	526,207.22	3,500,000.00	61,619.01
1903	8,347,639.70	770,854.13	655,682.67	1,500,000.00	3,500,000.00	1,921,102.90
1904	8,632,460.00	818,141.05	597,581.75	500,000.00	4,750,000.00	1,966,737.20
1905	9,560,643.80	878,648.20	425,288.55	637,795.25	6,000,000.00	1,618,911.80
1906	10,540,736.83	828,582.43	938,099.55	.....	6,750,000.00	2,024,054.85
1907	11,945,784.21	976,534.65	1,054,996.32	.....	7,000,000.00	2,914,253.24
1908	8,566,416.17	933,129.53	622,096.09	.....	7,000,000.00	11,190.55
1909	8,461,357.14	797,072.94	321,234.10	.....	5,500,000.00	1,843,050.10
1910	8,370,627.14	862,710.75	461,638.19	.....	5,500,000.00	1,546,278.20
1911	8,371,374.81	954,909.35	750,000.00	321,494.65	5,500,000.00	844,970.81
Total 12 years.....	\$97,306,865.94	\$10,115,388.04	\$7,600,410.00	\$3,485,497.12	\$58,463,053.00	\$17,642,517.78

outstanding against any of its property. The directors present their financial statements in a different form than heretofore. The new tabulation is a little more detailed than the old, but is still short of what is ought to be. These statements are given in the accompanying tables. The directors proceed as follows:

The surplus earnings of the company—after deducting expenditures for ordinary repairs and replacements, depreciation, new construction and dividends on the stock of the company—aggregated on April 30, 1911, \$17,642,517.78. To this amount has been added \$10,650,600 arising from the valuation at \$60 per share of the 177,510 shares of the common stock of the American Smelters' Securities Company heretofore not given any valuation in the assets of the company; and there has been written off to property account \$15,245,364.62, leaving a net balance in the profit and loss account at the end of the year, \$13,047,753.16.

PROFIT AND LOSS ACCOUNT, A. S. AND R. CO., YEAR ENDED APRIL 30, 1911

	This Year.	Last Year	Increase
Balance, first of fiscal year.....	\$16,797,546.97	\$15,251,268.77	\$1,546,278.20
Surplus income per statement of income account.....	1,166,115.46	1,546,278.20	380,162.74*
Appraised value of 177,510 shares of A. S. S. Co. common stock at \$60 per share not heretofore carried as an asset.....	10,650,600.00	.....	10,650,600.00
Total.....	\$28,614,262.43	\$16,797,546.97	\$11,816,715.46
Deduct:			
Depreciation in value of investments.....	\$300,572.43	.....	\$300,572.43
Profit and loss adjustments.....	20,572.22	.....	20,572.22
Transferred to property account.....	15,245,364.62	.....	15,245,364.62
Total deduction.....	\$15,566,509.27	.....	\$15,566,509.27
Balance end of year.....	\$13,047,753.16	\$16,797,546.97	\$3,749,793.81*

*Decrease.

DEPRECIATION AND CAPITAL EXPENDITURES

The total amount of capital expenditure which was added to the property account of this company during the first three years of its existence amounted to

quite as conservative as to yearly reduce the property account of the company through credit of earnings to depreciation. Beginning with this year, however, the directors have decided to follow the more usual custom of considering all

expenditure for property or new construction as a capital expenditure, and a charge will be made against the yearly earnings representing depreciation of plants. For the fiscal year ended April 30, 1911, the capital expenditures have amounted to \$803,710.08 and estimated depreciation to \$750,000.

There has also been added to property account the property of various subsidiary companies of which your company owns substantially the entire capital stock, but which has not previously been included in property account. The investment account, in which the cost of the securities of these companies has

heretofore been carried, has, as a result of this change, been largely decreased.

In addition to the above allowance for depreciation, the directors have thought it wise to debit surplus account and credit to property account the further sum of \$15,245,354.62, thus reducing the property account to \$75,000,000.

The total cost of the company's properties has been \$97,845,774.62, of which \$22,845,774.62, or 23 1/3 per cent., has now been written off to profit and loss.

A. S. AND R. CO.'S INCOME ACCOUNT, FISCAL YEAR ENDED APRIL 30, 1911

	This Year	Last Year	Increase
<i>Net earnings from operations:</i>			
Smelting and refining plants:			
Total before deducting repairs . . .	\$7,763,254.69	\$7,600,931.42	\$162,323.27
Less ordinary repairs and replacements	954,909.35	862,710.75	92,198.60
	\$6,808,345.34	\$6,738,220.67	\$70,124.67
Mines	105,618.75	331,334.09	225,715.34*
Miscellaneous	318,667.58	243,218.90	75,448.68
Total	\$7,232,631.67	\$7,312,773.66	\$80,141.99*
Deduct:			
Corporate and excise taxes	\$102,231.45	\$9,977.44	\$92,254.01
Administrative expense	368,357.60	375,076.84	6,719.24*
Total deduction	\$470,589.05	\$385,054.28	\$85,534.77
Net earnings	\$6,762,042.62	\$6,927,719.38	\$165,676.76*
<i>Income from investments</i>	<i>2,500.00</i>	<i>2,500.00</i>	<i>0.00</i>
<i>Interest and commission</i>	<i>651,572.84</i>	<i>577,697.01</i>	<i>73,875.83</i>
Total income	\$7,416,115.46	\$7,507,916.39	\$91,800.93*
Deduct:			
Depreciation credited property account	750,000.00	461,638.19	288,361.81
Balance net income	\$6,666,115.46	\$7,046,278.20	\$380,162.74*
<i>Dividends paid</i>	<i>5,500,000.00</i>	<i>5,500,000.00</i>	<i>0.00</i>
Surplus income to profit and loss account	\$1,166,115.46	\$1,546,278.20	\$380,162.74*

*Decrease.

CONSOLIDATED BALANCE SHEET A. S. AND R. CO., APRIL 30, 1911

ASSETS

<i>Property Account</i>		
Cost of the property of all companies owned by the A. S. and R. Co.	\$97,845,774.62	
Less amounts written off for depreciation or new construction	22,845,774.62	\$75,000,000.00
<i>Investments.</i>		
Book value of the securities of companies which the A. S. and R. Co. does not control	86,080.63	
300,000 shares of the common stock of the A. S. S. Co. at \$60.00 per share	18,000,000.00	18,086,080.63
<i>Working Assets</i>		
Material and supplies	1,341,497.50	
Prepaid expenses	98,632.65	1,440,130.15
<i>Current Assets</i>		
Metals when refined and ready for delivery	20,267,725.56	
Less unearned treatment charges	3,265,941.27	
	17,001,784.29	
Current accounts collectible	1,447,276.25	
Cash on hand and in banks	3,915,275.78	22,364,336.32
		116,890,547.10

LIABILITIES

<i>Capital Stock</i>		
Common	\$65,000,000.00	
Less held by trustee for conversion of A. S. S. Co. 6 per cent. deb. bonds	15,000,000.00	
	50,000,000.00	
Preferred	50,000,000.00	\$100,000,000.00
<i>Current Liabilities</i>		
Drafts in transit	830,425.76	
Employees' savings deposits	103,134.51	
Current accounts payable	2,125,326.34	
Accrued taxes	155,249.48	
Unpaid dividend checks	81,754.75	3,295,890.84
<i>Reserve Funds</i>		
Employees' benefit funds	329,913.63	
Insurance fund	321,466.21	
Less amount invested	208,229.84	113,236.37
Operating suspense items	103,753.10	546,903.10
<i>Profit and Loss Account per detailed statement</i>		13,047,753.16
Total		\$116,890,547.10

MINE EARNINGS LESS

Due to causes explained later in this report, the profit from mines has been for the past year about \$225,000 less than the preceding year. Notwithstanding this fact, the total earnings of the company are slightly in excess of the preceding year. The various charges under the heads of taxes, ordinary repairs and betterments and depreciation have each been in excess of the preceding year, resulting in a decrease in net earnings of \$380,162.74. Since more than half of this, however, is due simply to the fact that a portion of the mines of the company were not operated to their full capacity, on account of the ore not being needed by the smelting works, it will be seen that the ordinary net income of the company has been approximately the same as during the preceding year.

The operating mining properties of the Smelting Company are all situated in Mexico and are operated particularly to assure a supply at all times of ore necessary to the successful operation of the smelters of the company. The ores of the mines of the company are sold to its smelters at substantially the same prices paid to independent mines for similar ores. When, however, a full supply of ore can be obtained by purchase, the ores in the mines of the company are not mined, but remain as a reserve for time of need.

The profits which have accrued to the mines of the company have been credited to original purchase and development expenditures until such expenditures have been liquidated. Only after such liquidation has been applied have any profits from the mines been credited to surplus. Such credit to surplus during the past year has amounted to \$105,618.75.

On account of the fact that the mines of the company are not carried as an asset, there is no necessity of any charge for depreciation or the creation of a reserve for ore extinguishment.

In addition to capital expenditures at the smelting and refining plants heretofore mentioned in this report, which were charged to profit and loss in lieu of depreciation, there have been made similar charges in connection with the mining operations of the company amounting to \$1,087,394.06 as per accompanying statement of mining operations.

Since 1906 the company has inventoried the metals in process and on hand undelivered to customers at fixed prices, without regard to changes in market values. By this method the company never takes up as a profit the enhanced value of its large stock of metals constantly on hand in process of smelting and refining or in transit for delivery. On the other hand, in case of a decline, the company suffers no loss in its inventory valuation.

Silver is inventoried at 50c. per oz.; copper is inventoried at 12c. per lb.; do-

estic lead is inventoried at 3.8c. per pound.

tire product. These contracts are made for periods running as long as 20 years. Since the contracts require the Smelting Company to pay daily to the mines the market price of the various metals, the only fixed factor in such contracts is the working charge. This working charge is made sufficient to cover the smelting, refining, transportation, selling and profit. No profit other than a commission, therefore, is expected to be made by the company in connection with the buying and selling of metals. In this regard the Smelting Company virtually acts as an

have been in existence and in operation for 25 years or more, their present efficiency is such, the report states, that no fear need arise as to the ability of the plants of the company to meet competition successfully. In this connection, it will be interesting to note that the capacity of the various smelting plants has been increased from 5,000,000 tons per annum to 5,500,000 tons per annum, and the refining capacity has been increased from 350,000 tons to 460,000 per annum. Through the interest of the Smelting Company in the operations of the American

ASSETS AND LIABILITIES, AM. SM. SEC. CO., MAY 31, 1911

ASSETS		
Property account.		\$76,261,106.51
Investments.....		2,399,799.72
<i>Deferred Charges:</i>		
Balance of discount on debenture bonds		733,333.32
<i>Working Assets:</i>		
Material on hand.....	\$1,129,111.59	
Prepaid expenses	62,086.97	1,191,198.56
<i>Current Assets:</i>		
Metal stocks	\$8,977,605.31	
Less unearned treatment charges....	1,512,598.29	
	\$7,465,007.02	
Accounts collectible.....	3,432,247.96	
Loans to affiliated companies.....	299,081.24	
Demand loans.....	801,948.15	
Cash on hand and in banks.	3,514,709.31	15,512,993.68
		\$96,098,431.79
LIABILITIES		
Capital stock—		
preferred A.....	\$17,000,000.00	
preferred B.....	30,000,000.00	
common.....	30,000,000.00	\$77,000,000.00
Debenture bonds (6%).....		15,000,000.00
<i>Current Liabilities:</i>		
Drafts in transit	\$369,259.34	
Accrued taxes..	50,380.55	
Unpaid dividends (\$630,000.00, payable June 1st)	631,893.75	
Accrued bond interest.....	300,000.00	
Current accounts payable.....	1,032,581.74	2,384,115.38
<i>Reserve Funds:</i>		
Employees' benefit funds.....	\$42,015.96	
Operating suspense.....	48,877.27	90,893.23
Profit and loss account.....		1,623,423.18
		\$96,098,431.79

mestic lead is inventoried at 3.8c. per pound.

METALS SOLD AS SOON AS PURCHASED

The established policy of the company as to sales of metals is to be constantly in the market, except at short periods of temporary depression, and to strive to deliver regularly to customers the refined metal as it is produced. A large proportion of the gold, silver, lead, copper and zinc smelted, refined and sold by the company is the product of mines with which the Smelting Company has contracts to smelt and refine the miners' en-

STATEMENT OF INCOME ACCOUNT, AM. SM. SEC. CO.

	This Year	Last Year	Increase
<i>Earnings from Operations:</i>			
Smelting and refining plants.....	\$6,110,477.02	\$5,073,565.60	\$1,036,911.42
Less ordinary repairs and replacements.....	944,408.80	799,609.25	144,799.55
	\$5,166,068.22	\$4,273,956.35	\$892,111.87
Mines.....	1,850,799.85	1,841,609.15	9,190.70
Miscellaneous.....	234,544.16	158,861.61	75,682.55
Total.....	\$7,251,412.23	\$6,274,427.11	\$976,985.12
<i>Deduct:</i>			
Corporate and excise taxes.....	\$42,261.29	\$7,555.33	\$34,705.96
Administrative expense.....	365,399.77	370,215.39	*4,815.62
Total deduction.....	\$407,661.06	\$377,770.72	\$29,890.34
Net earnings.....	\$6,843,751.17	\$5,896,656.39	\$947,094.78
<i>Income from Investments:</i>			
	77,174.43	51,449.62	25,724.81
Total.....	\$6,920,925.60	\$5,948,106.01	\$972,819.59
<i>Deduct:</i>			
Interest.....	\$662,176.14	\$745,795.49	*\$83,619.35
Discount on bonds (proportion).....	16,666.68		16,666.68
Depreciation.....	650,000.00	532,039.38	117,960.62
	\$1,328,842.82	\$1,277,834.87	\$51,007.95
Balance available for dividends.....	\$5,592,082.78	\$4,670,271.14	\$921,811.64
Dividends: Preferred A.....	\$1,020,000.00	\$1,020,000.00	
Preferred B.....	1,500,000.00	1,500,000.00	
Total.....	\$2,520,000.00	\$2,520,000.00	
Surplus earnings carried to profit and loss account.....	\$3,072,082.78	\$2,150,271.14	\$921,811.64

*Decrease.

PROFIT AND LOSS ACCOUNT, AM. SM. SEC. CO.

	This Year	Last Year	Increase
Balance first of year.....	\$1,688,197.52	\$554,751.97	\$1,133,445.55
Net income.....	3,072,082.78	2,150,271.14	921,811.64
	\$4,760,280.30	\$2,705,023.11	\$2,055,257.19
<i>Deduct:</i>			
Miscellaneous adjustments.....	\$381,962.05	\$516,125.59	*\$134,163.54
Depreciation in investments.....	2,754,895.07	500,700.00	2,254,195.07
	\$3,136,857.12	\$1,016,825.59	\$2,120,031.53
Balance end of year.....	\$1,623,423.18	\$1,688,197.52	*\$64,774.34

*Decrease.

agent of the miner, paying to the miner the market price for whatever it may buy, and in order to insure the company against loss it is the policy of the company to sell as regularly as the market will warrant. Such sales and deliveries average in value \$15,000,000 to \$16,000,000 per month.

The various plants operated by the company have been kept in a condition of efficiency by the constant introduction of economical processes and the replacement of uneconomical furnaces or machinery. While many of these plants

Smelters' Securities Company, however, it has an additional interest at the present time in a smelting capacity of 2,650,000 tons and a refining capacity of 190,000 tons.

THE SECURITIES REPORT

The Securities company issues its sixth annual report for the year ended May 31, 1911. During the year the company decided to fund its indebtedness, and to pay the balance on its purchase of the Baltimore Copper Smelting and Rolling Company. For this purpose

\$15,000,000 in 6 per cent. bonds was sold to the A. S. and R. Co., which in turn, offered them to its stockholders. These bonds, under certain conditions, are convertible into A. S. and R. common stock.

The expenditures for new construction and betterments, \$594,724, have been added to property account, and there has been deducted from property account \$6,500,000 depreciation. Heavy construction expenses have been necessitated by increased receipts of ores and bullion under contracts requiring the Securities company to smelt and refine the entire output of certain mines and smelteries.

Like the Smelting company, silver has been inventoried at 50c. per oz., and copper at 12c. per lb., but lead at 4c. per lb. Six per cent. has been paid on the preferred "A" stock and 5 per cent. on the "B."

stocks, would indicate a normal consumption for the period. The imports of zinc ore were 38,414 tons, containing 15,079 tons of zinc, as compared with 43,703 tons of zinc ore, containing 21,178 tons of zinc, one-half of the imports in 1910. These figures are exclusive of lead ores from South America containing less than 12 per cent. of zinc. The exports of domestic zinc ore were 9625 short tons.

of good ground were found on the foot wall side of the lode.

Two locomotives were remodeled and 30 rock cars purchased. Additions to the foundry were also made. At the stamp mills it was found necessary to discontinue the stamping of Osceola rock at the Tamarack mill, owing to increase in product from the Osceola lode and a decrease from the Tamarack mines.

RECRUSHING PLANT

During the year ended Dec. 31, the re-crushing plant treated only coarse conglomerate tailings from the Calumet mill and produced 1,951,378 lb. of copper at a cost of 5.08c. exclusive of smelting and selling charges. Experiments covering a period of two years have demonstrated that the conical pebble mill has a greater capacity and secures a higher extraction

Calumet & Hecla

The report of the Calumet & Hecla Mining Company for the fiscal year ended April 30, 1911, has been issued and shows a production of 71,476,661 lb. of refined copper, the smallest output for over 10 years. For the calendar year ended Dec. 31, 1910, the production of refined cop-

ANALYSIS OF PROFIT AND LOSS ACCOUNT, AM. SM. SEC. CO.

	Net Earnings Before Deducting Repairs and Replacements	Repairs and Replacements	Net Earnings	APPROPRIATIONS				Surplus
				Depreciation or New Construction	Miscellaneous Profit and Loss Adjustments	Interest	Dividends	
1906	\$3,209,935.51	\$215,064.07	\$2,994,841.44			*\$179,242.12	\$2,690,000.00	\$484,083.56
1907	3,570,134.00	285,712.89	3,284,421.11			231,760.66	2,520,000.00	532,660.45
1908	2,870,899.32	556,547.14	2,314,352.18			777,386.87	2,520,000.00	†983,034.69
1909	5,076,033.40	691,378.56	4,384,654.84	585,383.64		758,228.55	2,520,000.00	521,042.65
1910	6,747,715.26	799,609.25	5,948,106.01	532,039.38	1,016,825.59	745,795.49	2,520,000.00	1,133,445.55
1911	7,865,334.40	944,408.80	6,920,925.60	650,000.00	3,136,857.12	678,842.82	2,520,000.00	†64,774.34
Total, 6 years	\$29,340,021.89	\$3,492,720.71	\$25,847,301.18	\$1,767,423.02	\$4,153,682.71	\$3,012,772.27	\$15,290,000.00	\$1,623,423.18

*Interest earned and added. †Deficit.

Accompanying tables show an analysis of the profit and loss account *ab initio*, and give a condensed balance sheet and income account.

Midyear Spelter Statistics, 1911

Figures compiled by C. E. Siebenthal, of the U. S. Geological Survey, from reports by all zinc smelters operating during the first six months of 1911 and from the records of the Bureau of Statistics show that the production of spelter from domestic ore in that period was 135,061 short tons, and from foreign ore, 5135 tons, a total production of 140,196 tons of primary spelter, compared with 134,592 short tons, one-half the production for the year 1910, and 127,880 short tons, one-half the production for 1909. The stock of spelter held at smelters on June 30, 1911, was 17,788 short tons, as against 23,232 short tons at the close of 1910. The imports of spelter for the six months were 1175 tons, as compared with 980 tons, one-half the imports in 1910, and the exports were approximately 11,318 tons, as against 6617 tons, one-half the 1910 exports.

The apparent consumption is thus indicated at about 135,497 short tons, as against 122,942 tons, one-half the consumption in 1910, and 135,365 tons, one-half that of 1909, which, taking into consideration the depletion of

per amounted to 72,059,545 lb. This compares with 80,096,995 lb. in 1909, and 82,549,979 lb. in 1908. The copper content of the rock was 25.77 lb. per ton in 1910, 28.18 in 1909 and 31.22 in 1908. The total cost per pound of producing this copper was 8.96c. in 1910, 8.28 in 1909 and 9.00 in 1908. The mine cost per ton of rock, excluding construction, was \$1.92 in 1910, \$1.93 in 1909 and \$2.15 in 1908. Comparison of these figures for 1909 and 1910, shows that in the latter year the total cost of production per lb. of copper increased about seven-tenths of a cent, whereas the total production decreased over 8,000,000 lb., and the copper content of the rock decreased 2.41 lb. per ton of rock.

PRODUCTION FROM DIFFERENT LODES

The conglomerate lode with a yield of 30.12 lb. per ton of rock contributed 58,739,509 lb. of the total amount produced and the output from the Osceola lode was 13,150,427 lb. The yield from the latter was 15.82 lb. per ton of rock. The production from the Kearsarge lode was 169,609 lb. but the yield was only 11.87 lb. per ton of rock. Development work on the conglomerate lode indicated rock of average quality at the north end of the mine and an improvement in the territory south of South Hecla No. 9 and 10 shafts. On the Osceola lode average ground was opened and large areas

than the Chilean mills with which the plant is at present equipped. The new plant will be equipped with the conical mills and when completed will have a capacity of 3000 tons per day. Experiments have also shown that the sands lying in Torch lake can be treated at a substantial profit.

The company now owns 43,202 shares of common and 2391 shares of preferred stock of the White Pine Copper Company. During the year timber lands were sold for \$837,500. Total assets are given at \$9,159,754, and liabilities as \$582,897 leaving a surplus of \$8,576,857. This compares with a surplus of \$7,667,298 for the previous year.

Slow Speed Exhaust Fan

A slow-speed multiblade exhaust fan, perfected by the Buffalo Forge Company, Buffalo, N. Y., shows high efficiency and economical power consumption. The design of the multiblade fan wheel gives maximum efficiency at comparatively low speed, with a consequent reduction in power consumption, in wear and in cost of upkeep. The fans, with reversible housing, are made single or double in sizes from 30 to 80 in. in diameter for pressures from one to six ounces. Some of the applications of the fan are in the handling of dust, smoke, gases, sawdust, shavings and refuse from abrasive operations.

Statistics of Copper Production

In the JOURNAL of May 6 we reported our revised statistics of copper production in North America in 1910, with comparison to 1909. Most of the copper producers in North America make public reports of their production; indeed, the majority of them report monthly. It is interesting to tabulate the individual figures insofar as is permissible from the fact that the respective companies state them publicly. This has been done in the accompanying tables:

LAKE SUPERIOR COPPER PRODUCTION

Company	(In Pounds)	
	1909	1910
Ahmeek.....	9,198,110	11,716,226
Allouez.....	4,031,532	4,655,702
Arnold.....	.....	10,000
Atlantic.....	43,483	19,018
Baltic.....	17,817,836	17,549,762
Calumet & Hecla.....	74,593,553	72,672,469
Centennial.....	2,853,793	1,572,566
Champion.....	18,005,071	19,224,124
Franklin.....	1,615,556	966,353
Isle Royale.....	5,719,015	6,888,043
Lake.....	.....	318,050
Mass.....	1,723,436	1,321,885
Michigan.....	1,979,305	36,682
Mohawk.....	11,248,474	11,412,066
Osceola.....	25,296,657	19,346,566
Quincy.....	22,511,984	22,517,014
Superior.....	.....	2,456,132
Tamarack.....	13,533,207	11,311,470
Trimountain.....	5,282,404	5,694,868
Wolverine.....	9,971,482	10,469,253
Victoria.....	1,062,218	1,164,564
Others.....	1,030,882	.....
Totals.....	227,517,998	221,322,813

PRODUCTION OF BLISTER COPPER

Company	(In Pounds)	
	1909	1910
Anaconda.....	291,902,352	266,608,461
Arizona.....	31,018,000	33,533,491
Balaklala.....	11,569,314	9,911,451
Boleo.....	29,878,944	28,659,800
British Columbia.....	6,327,769	7,438,748
Calumet & Arizona.....	52,188,263	54,677,970
Cananea.....	44,734,700	45,491,500
Copper Queen.....	108,542,964	116,061,102
Detroit.....	24,591,021	22,812,395
East Butte.....	6,071,727	10,023,568
Granby.....	22,063,651	20,018,048
Nevada Consolidated.....	49,990,000	65,474,176
Old Dominion.....	34,519,301	27,742,332
Shannon.....	17,642,026	17,031,770
Tennessee Copper Co.....	16,576,683	16,571,861
United States.....	36,672,606	28,430,425
United Verde.....	36,694,063	38,663,880
Utah Consolidated.....	10,043,900	7,489,471
Utah Copper.....	451,749,233	685,644,511
Totals.....	882,776,517	902,284,960

(a) Does not include Boston Consolidated.
(b) Includes Boston Consolidated for 11 months.

SUMMARY

Division	1909	1910
Lake Superior.....	227,517,998	221,322,813
Blister, reported.....	882,776,517	902,284,960
Blister, non-rep'd.....	175,516,162	160,731,473
Totals.....	1,285,810,677	1,284,339,246

PRODUCTION OF CERTAIN FOREIGN COMPANIES

Company	(In Pounds)	
	1909	1910
Cape Copper Co.....	10,404,800	9,867,200
Cerro de Pasco.....	32,343,687	40,758,645
Great Cobar.....	10,875,200	13,995,520
Mansfeld.....	41,931,492	44,779,835
Mason & Barry.....	5,297,600	6,619,200
Mt. Morgan.....	13,921,600	15,276,000
Namaqua.....	5,302,080	5,900,160
Rio Tinto.....	79,233,280	75,212,480
Spassky.....	.....	5,340,160
Sulitelma.....	9,620,800	11,032,000
Tharsis.....	7,826,560	9,761,080
Wallaroo & Moonta.....	11,864,800	10,838,200

The statistics of the above tables do not in all cases represent the production of individual mines. Many of the com-

panies, such as the Copper Queen, Tennessee Copper Company and others treat not only their own ore but also ore purchased from other producers, and in their cases the figures represent the total smelter production.

The Porcupine Fire

SPECIAL CORRESPONDENCE

A week's review of the results of the fire shows, as expected, that first reports regarding life and property loss were exaggerated; otherwise first accounts were noticeably correct. The following properties have been completely burned and lost all camp equipment: The Dome, West Dome, Vipond, Crown Chartered, Standard, Imperial and numerous smaller camps. The only properties in the Pearl Lake section that miraculously escaped from the conflagration were the Bewick-Moreing and the Porcupine Success. At the Dome, the entire plant, including the half-erected mill and offices, was completely burned out. It is the intention of the Dome directorate to reconstruct the entire equipment, using steel structure throughout and they anticipate having a 40-stamp mill running by the first of November of this year.

The money loss, as far as townsites and real-estate property is concerned and excluding losses at mining properties, is expected to total \$300,000.

LOSS OF LIFE

At South Porcupine, although the entire town was wiped out, but five lives were lost by burning and eight by drowning in Porcupine lake. Drownings were caused by the fact that at the height of the fire, the lake was unusually rough, due to the severe gale, and that the smoke was so thick that it was impossible for a man to see his own hand. This led to a panic at the south end of the lake, especially among the foreign element, but the women were landed successfully at Golden City.

In addition to the above fatalities, Manager Robert Weiss, wife and child and 21 others were suffocated in the main shaft of the West Dome mine. There were also 17 lives lost at the Dome mine. It is now estimated that the total death roll will not exceed 70, although there are about 80 missing, some of whom it will never be possible to trace. As the population of this section of the country is a moving one, there is no reason to think that those not heard from have all lost their lives. There is no doubt, however, that several lives were lost in the bush that will never be known of. As it is, some bodies have been found within the last few days that are absolutely beyond recognition, and in individual cases all that remain are charred bones. The total area covered by the fire is approximately 40 miles long and 25 miles wide.

RELIEF MEASURES

Relief has been prompt and efficient, and the calls for aid have met with a general response. Free transportation was granted by the Temiskaming & Northern Ontario railway, and during the first four days approximately 1500 people were sent out. The railway commission took charge of the outside relief funds, and in addition to the government, several firms in Toronto donated carloads of eatables, tents, etc. The militia, from headquarters in Ottawa, supplied the fire sufferers with 500 tents and 1000 pairs of blankets.

The city of Toronto, through the board of trade, likewise the city of Montreal, has announced that funds are forthcoming. Authorization has been received through the minister of finance, Hon. W. S. Fielding, that the American Red Cross Society donated \$1000, and that it is to be distributed according to the discretion of the relief committee.

The latter is doing admirable work under the chairmanship of Cyril T. Young, and has been working day and night for the last week, devoting all its time to alleviating the sufferings of the injured and destitute, of which there are many, especially the latter, owing to the fact that hundreds of prospectors who have had all their belongings burned, are gradually trekking into town. It has been decided that the South Porcupine townsite will be rebuilt without further delay and an elaborate hotel will be erected soon.

There is no doubt that the camp will suffer temporarily from this disaster, but owing to the fact that the railway is in, matters will be greatly facilitated and it is expected that at the end of three months all mines will be in full swing again. There is such confidence that this is a gold camp in the real sense of the word, that every mine, without exception, has decided to reëquip and continue operations at once.

Spain's Mineral Exports for 1909-1910

The principal exports of Spain¹ are iron and copper ore, iron pyrites, argentiferous lead (consumed in large quantities by France), quicksilver and blende, fol-

MINERAL EXPORTS FROM SPAIN

	1909	1910
Bullion, silver.....	\$2,482,911	\$2,653,712
Copper, bar, etc.....	5,134,008	5,139,918
Copper matte.....	3,486,492	2,894,531
Minerals:		
Lead.....	13,480,367	13,957,032
Pyrites, iron.....	4,353,170	3,433,587
Quicksilver.....	1,487,547	1,297,815
Zinc.....	202,307	265,323
Ores:		
Copper.....	5,487,678	4,717,329
Iron.....	18,404,723	18,553,587
Salt.....	1,005,698	907,591

lowered by agricultural products. The value of the mineral exports for 1909 and 1910 is shown in the accompanying table.

¹Daily Consular and Trade Reports, July 5, 1911.

The History of the Kimberley Mines

By E. M. Weston *

Diamonds discovered in 1867. River gravel first worked. Present method to spread blue ground, obtained by underground mining, on floors to decompose, then concentrate. Direct method of immediate crushing gaining favor.

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The story of the rise and development of the diamond-mining industry in South Africa as represented today in the deep mines and huge treatment plants of Kimberley, and the immense open workings of the Premier mine in the Transvaal, recently described in the JOURNAL, is as full of romance and interest as that of the discovery of gold in California or Australia. The art of diamond mining, including treatment of diamondiferous ground has followed along parallel lines to that of metallic minerals. The first diamond miner was the brother of the alluvial gold miner and worked with similar appliances.

DISCOVERY OF DIAMONDS

The discovery of diamonds in South Africa came much later than that of gold in California. It was in 1867 that the children of Daniel Jacobs, a Boer farmer living near Hopetown on the Vaal river in Cape Colony, brought in a bright pebble which they had picked up at play. This was noticed by S. Van Neikerk and

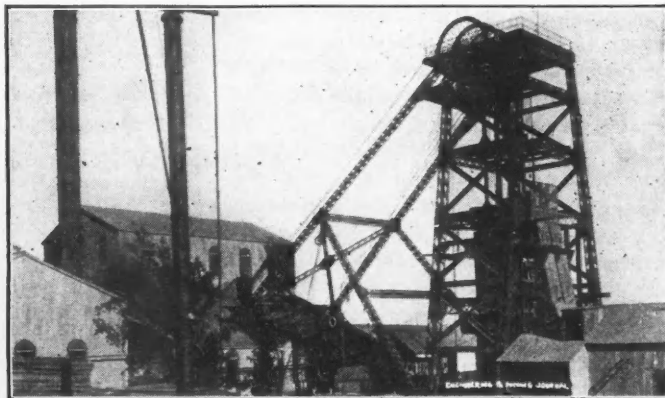
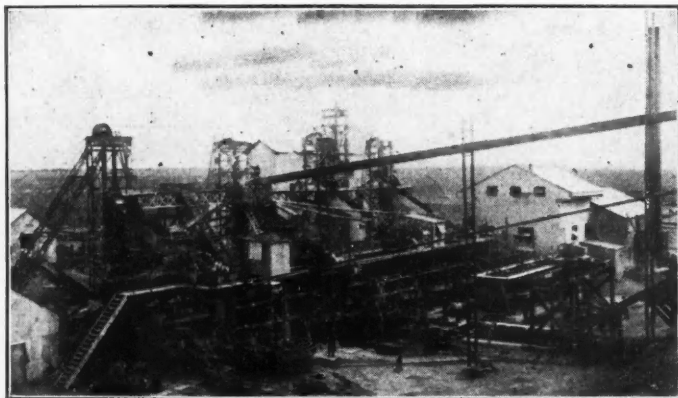
outcrops to be detrital deposits of no permanent value.

WORKING THE RIVER GRAVEL

Systematic search for diamonds by washing the extensive gravels of the Orange river was started by a party of prospectors from Natal in 1870 and at

The river diggers flocked to these new discoveries and as no one had any idea that the yellow sand and the calcareous tufa that was found underneath it lying on a decomposed yellow rock went to any depth, or was in its origin or nature different from the river diggings, claims were allotted 31x31 ft., and no one was allowed to hold more than two claims. The Kimberley mine was the richest and contained on the surface between 400 and 500 such claims.

These claims were often split up so that there were at one time 1500 proprietors, some holding only five square yards. Roads were left 15 ft. wide, 47 ft. apart, across the pipes, which were roughly oval or circular, and each digger hauled his ground to the road and carted it away for treatment. There is an enriched zone, corresponding to the gossan of a mineral lode, in most diamond pipes caused by mechanical concentration. The lighter decomposition products of the pipe-filling rock being washed away, leaves a concentrate. The effect of this can be seen



WASHING GEAR AND DIAMOND-MINE HEADFRAME, KIMBERLEY

J. O'Reiley, who showed it to the civil commission of Colesberg, M. L. Boyes, and Doctor Atherstone, of Capetown. They pronounced it a diamond worth £500. A little interest was excited, but for over a year no other finds were made and it was not until 1869 that a magnificent stone weighing 83.5 carats was found in possession of a witch doctor. This was named the Star of South Africa and was sold for \$125,000 to Earl Dudley. This of course started a rush.

A so called expert, J. R. Gregory, was sent from England to investigate the country. He declared the prospects hopeless, stating that the formation of the country was such that no large discoveries need be expected and that any diamond found had been brought by ostriches from the desert. Curiously enough, it is related that a few years later one of the general managers of the De Beers, when taken to see the Rand in its early stages, pronounced the banket

Barkly West rich diamond-bearing wash was found. Then started a rush like that to California, many gold diggers from California and Australia taking part. Thousands of them lined the river banks. Gravel was washed in rockers having two to three sieves in the feed box, arranged to classify the material, and the concentrate examined on tables or flat stones. The diggers who still work these gravel deposits use a trommel or shaking screen; also a sieve as a hand jig, inverting the contents on a table for the easy examination of the bottom layers.

In September, 1870, some children of a farmer named Van Wyk, residing near the present town of Kimberley, found diamonds in the mud with which their house was plastered. Digging was started on Dutoitspan pipe. In 1871 the Bultfontein-De Beers pipe was discovered and in the same year the Kimberley mine by a party headed by F. Rawstone and T. B. Kisch.

by looking over the yields of such a mine as the Premier, which at first produced about one carat per load and now gives between one-third and one-fifth of a carat.

TREATMENT METHODS AT KIMBERLEY

The first diggers treated the ground by pulverizing it with shovels, screening it on a coarse sieve to eliminate lumps and rocks and screening a second time on a fine sieve about 2x3 ft., hung on hide ropes and rocked by hand. In July, 1871, two Americans started the first steam-driven trommel which could treat 30 loads per day.

The subdivision into single claims and the arrangement of roads soon led to an extraordinary state of affairs. In about one year's time the roads became unsafe as the workings went down into the yellow ground of the pipes, which experiment had shown to be rich in diamonds. The mine was strangely picturesque at this

period; hundreds of carts and wheelbarrows, bearing ground to be sorted, were seen on the hazardous narrow roads, while down below, at all distances from the surface, a succession of rectangular ledges, represented the various working levels of different claims. Between 10,000 and 12,000 white and native laborers were in one mine busy picking and shoveling ground and piling it into original tubs and buckets, some of these being hauled up by ropes and tackle, others carried by hand up inclined planks and ladders or up staircases cut out in the perpendicular walls. Each man worked on his own device without regard to his neighbor, the only rule being that the roadways must be left intact.

As the claims deepened a system of rope haulage was adopted. Two grooved wheels were fixed, one on the surface and the other in the pit, while to the rope passing around them a bucket was fixed, making a sort of aerial main and tail haulage. In 1874 long lines of timber staging, in three decks, were erected around the walls of the pipe. Aerial rope haulage worked by horsewhims was employed, and in 1875 the first steam winding gear arrived, having cost £30 per ton for freight alone from Capetown. In 1874 100 claims were allowed under one ownership, and in 1878 large combines took place, as the ground around the rim of the pipe now began to fall in on the claims 300 to 400 ft. below.

Reef falls became more serious as the workings got deeper and many workers were ruined. In 1883 about 25 per cent. of the claims were covered with reef, as the wall of the pipes was called, and 10 loads of wash were raised for every three of blue ground. A method was devised by E. Jones for sinking through the fallen rubbish by timber coffer dams. Underground mining was started from shafts sunk at the bottom of the open cut. The last working of this kind was in 1889. The De Beers and Kimberley pipes were the richest, Kimberley being richer than De Beers. The late Cecil Rhodes and I. Rudd had obtained control of De Beers pipe and finally with the help of Alfred Beit, Rothschild and others got control of the Kimberley pipe from Barney Barnato. In 1888 the De Beers Consolidated Mines was formed, which acquired control of the four known pipes. Between 1883 and 1888 underground mining had been started from shafts sunk in the rim rock away from the pipe and the present caving system was gradually evolved. Wessleton mine was not discovered until 1890.

CHARACTER OF BLUE GROUND

At the time new treatment methods were evolved, the yellow or oxidized portion of the pipe changed in about 50 ft. to blue ground, which corresponded to the sulphide zone of metalliferous lodes. The blue ground has been variously de-

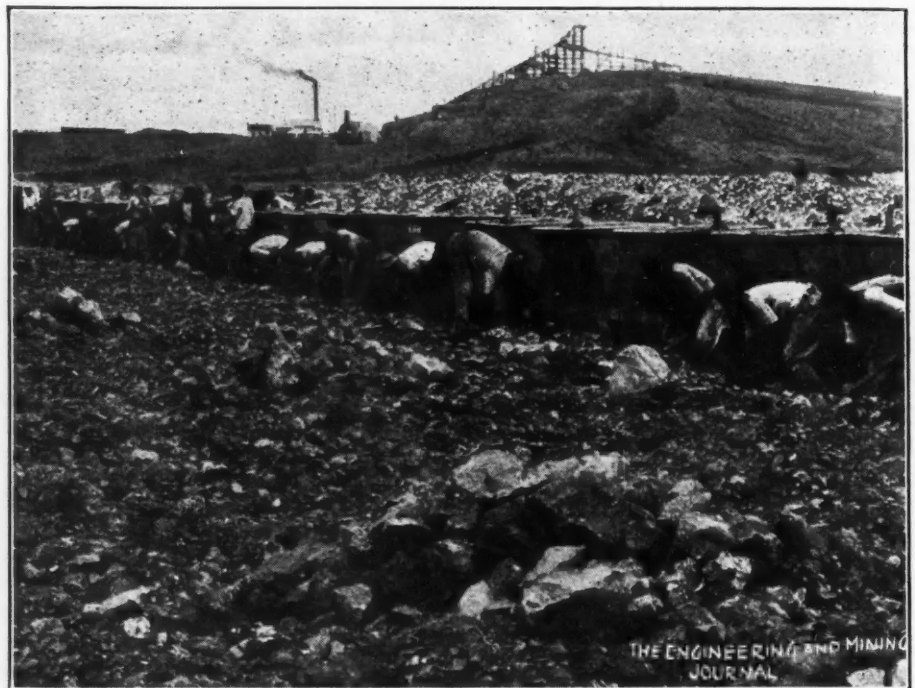
scribed as a porphyritic peridotite; or better as a serpentinized breccia having olivine for its main constituent; or as a clastic mass of serpentinized rounded and angular olivine, with ilmenite, augite, bronzite, calcite, chlorite, chromite, cyanite, zircon, garnet, mica and hornblende.

Treatment methods were improved to deal with this new material. In 1874 washing machines worked by horsepower were in evidence and elevators were employed to stack tailings. Rockers were used as water was found in wells and finally it was found that a machine almost identical with the puddler of the alluvial gold miner was most efficient, for floating away the lighter material, and producing a rough concentrate. This developed later into the centrifugal pan, up to 18 ft. in diameter, driven by steam

IMPROVED TREATMENT METHODS

The cost of underground mining and depositing in Dutoitspan mine was in 1907 only 2s. 7d. per load. There are 150 miles of endless-rope haulage. Caving methods are employed underground. It was early discovered that blue ground crumbled and decomposed if exposed to the air for some time and this method of rendering treatment easy was adopted in Kimberley. The rock is taken to floors of several square miles in extent, spread out, raked over by harrows driven by steam haulage, guarded night and day for several months and then sent to the treatment plants.

Direct treatment is, however, coming into favor to save the time and expense of working these floors, and at newer mines like the Premier, also at Kim-



LOADING WEATHERED BLUE GROUND, KIMBERLEY

power. It has a central shaft carrying revolving arms with stirrers and scrapers tending to throw the heavier material toward the circumference while the lighter material and slime flows away at the center. Steam power was late in its introduction on the field owing to scarcity of water and fuel.

De Beers Consolidated controls five pipes around Kimberley: Dutoitspan, with an area of 1440 claims; Wessleton, 1162; Bultfontein, 1067; De Beers, 622; Kimberley, 470 claims. (45.3 claims = 1 acre). The Premier mine in the Transvaal consists of one pipe of about 3570 claims. All the mines except Wessleton are worked by underground methods and the equipment is up to date. Electric traction, by 5-ton Baldwin-Westinghouse electric locomotives, is employed underground.

berley, the ore is gradually reduced in size to avoid fracturing diamonds more than is necessary. Crushers and rolls are employed and the method is based on the same principle that is employed to treat a brittle, easily slimed ore such as galena, by a method of gradual reduction to avoid slime losses. Jigs known as pulsators are used to reconcentrate the concentrates from the centrifugal pans which form about 1 per cent. of the bulk of ore treated. The concentrates are finally treated on grease-coated vanners which correspond to the oil separation plants used with lead, zinc and copper ores in metal mining. Diamonds adhere to grease almost as gold does to mercury, while all the other minerals in the concentrate pass off. It does not, however, work well with concentrates from yellow ground.

The Alamos District of Sonora

BY W. D. PEARCE*

Since the establishment of peace, mining operations in the Alamos district of Sonora and the adjoining territory in the states of Chihuahua and Sinaloa have again become active. The indications are that the mineral output for the year will be almost up to par, notwithstanding the fact that some of the mines were shut down for several months, while others were operated on a small scale while the revolution was in progress. Practically every mine in the district was short of supplies at the close of the revolution, and none of them had a sufficient supply of explosives. The near approach of the rainy season made it imperative that stores should be rushed in with all possible haste. Orders were telegraphed to the different bases of supplies and every available pack animal in the country was put on the trails to the mines. Now that the rainy season is on, but little packing can be done during the next 60 days, and a few of the mines will again be short of supplies within that time.

REVOLUTION HAS MADE THE LABORERS DISCONTENTED

Nearly all of the mining camps are short of laborers at present. In this country nearly every man who works in the mines has a little patch of ground somewhere in the mountains on which he grows corn, and hundreds of the miners are now engaged in this corn planting; but these will return to the mines in a short time. There are others, however, who, having had a taste of the more or less romantic life of the undisciplined revolutionist, will not be content to return to the mines at once, and this will tend to keep many of the mines short-handed for a few months.

The Zambona Mining Company, at Minas Nuevas, continues to operate its cyanide plant on mill tailings, which have accumulated for many years, and from which it realizes a good profit. It is increasing the daily capacity of its mill from 50 to 100 tons by the addition of 10 stamps and a tube mill to the crushing plant. New concentrators, classifiers, etc., will be put in, and the whole plant brought up to the highest state of efficiency. The company is making regular monthly shipments of precipitates and bullion.

Wilson & Obermuller have recently installed a 40-ton cyanide plant at Sobia, and are now treating the valuable tailings of the La Junta mine. They are also operating their new mill on their own property, the Prieta, in the same camp. The La Junta people have purchased the mill of J. J. Smith and are treating their

low-grade ores by amalgamation, while shipping the high-grade gold ore to the smeltery at El Paso. This high-grade ore averages more than $7\frac{1}{2}$ oz. gold per ton, while the total output of the mine at present averages over 3 oz. gold per ton. Fred C. Tatum resumed work on the Black Fox in the same camp, and it is reported that he opened up an orebody carrying several ounces of gold per ton.

The Muchacho Grande, a new property that is being developed at Matapaco, 40 miles north of Alamos, is attracting attention at present. The orebodies in this property are of rather unique occurrence and characteristics. The veins, which are numerous and of unusual width, occur in igneous formations. The principal veins are nearly parallel and have a general north-south strike, but are intimately connected by numerous smaller veins and branches running in different directions. The gangue is principally calcite and barite, in which the silver occurs, mostly, it is believed, as sulphides.

Development is being pushed as rapidly on this property as the supply of labor will permit. General Manager W. R. Layne reports that shaft No. 1 is down 65 ft. and all timbered. A crosscut at the 50-ft. level shows a width of vein of 50 ft., several feet of which assays over 40 oz. silver per ton. Shaft No. 2 is down 35 ft., and is in 12 ft. of 50-oz. ore. Shaft No. 4 is down 40 ft. and is in 20- to 30-oz. ore. North of these shafts the vein system is cut by a deep *arroyo*, from which a tunnel is being driven to connect with the shafts at a depth of about 225 ft. A crosscut from this tunnel shows the vein to have a width of 50 ft., the silver content being about the same as at the surface. North of the *arroyo* is a round hill, known as San José mountain, from which most of the veins radiate. Surface trenching on this hill indicates a width of vein of over 100 ft., with streaks 2 to 6 ft. wide of ore as good as that shown in the shafts. A tunnel is now being driven into this hill from the south. It is believed that the ores of this property are well adapted to cyanidation. There are streaks carrying from a trace up to 10 or 12 per cent. lead, but upon the whole it is practically free from lead or other base sulphides, or cyanicides, of any kind.

PALMAREJO COMPANY EXTENDING

At Chinipas, Chihuahua, the Palmarejo Gold Fields, Ltd., an English company, is pushing both development and construction vigorously, having a force of over 500 men employed. The new hydroelectric power plant to furnish power to the mine is completed, and the aerial tram from the mine to the mill is almost ready to operate. The main canal, carrying water for the mill power plant, had just been repaired at a large outlay of money, when it was cut by the revolutionists dur-

ing the siege of Chinipas. It is again being repaired.

Foundations for the new 300-ton mill are being laid, and the mill machinery will be brought in as soon as the condition of the trails permits. It is reported that this company sustained heavy material losses during the siege of Chinipas by the revolutionary forces, and that a claim for \$50,000 damages was filed. Some government officials, who arrived in Alamos a few days ago, stated that they were on the way to Chinipas to adjust this claim.

According to reports, the property of the White Chief Mining Company, near Chinipas, has been bonded to a French company, and engineers will arrive in a short time to make an examination of the mines. This property has a large tonnage of ore blocked out and it is considered a valuable one. During the revolution, the Rio Plata Mining Company handled all shipments of supplies and bullion through Alamos, but now that the railroads are all in operation, their shipments are again being handled through Chihuahua.

Oil in California

The production of crude petroleum in all California fields in May aggregated 6,630,133 bbl., a decline of 95,126 bbl. from the April output, and a decline in daily average from 218,138 bbl. in April to 213,875 in May, of 4263 bbl. The total output for the first five months of 1911 was 31,029,040 bbl., an average of 6,205,808 per month. Continuance of this average for the remaining months of the year would make a total production of 74,467,272 bbl. for 1911, approximately equal to the production for 1910.

The present year began with a small decline in January from the last month of 1910, and a greater decline in February, but March advanced more than 1,000,000 bbl. over February and the April increase was more than 400,000 over March. So after all the May decline does not cut a large figure since the annual rate of production is constant. The rate of market absorption equals 65,000,000 to 70,000,000 bbl. The minimum price at the well, marked by Independent Agency sales, is around 35c. per bbl., due in part to the steady increase in the surplus, and in part to competition. The normal minimum price should not go below 50 cents.

DECLINE AT THE SANTA MARIA FIELD

The interesting features of the field operations in California petroleum for May were the decline at Santa Maria and the increase at Coalinga. The total production of the Santa Maria field was 624,778 bbl., a decrease from the April production of 75,138. At Coalinga the

*Alamos, Sonora, Mexico.

production for May was 1,542,292 bbl., an increase over April of 91,802, and this in face of the necessary suspension of 248 producing wells, owing to lack of storage for the oil, particularly Agency oil; the Associated storage had been filled to the limit and no oil was taken in the last week of the month. There was, however, a gain of 278,780 bbl. in the Coalinga shipments for May over April, decreasing storage on the east side by 45,899 and on the west side by 155,110 bbl. There were 674 producing wells active at Coalinga and 215 at Santa Maria.

The Standard's appropriations for improvements in California in 1911 include about \$4,000,000 for pipe lines, storage tanks and reservoirs, \$1,100,000 for the El Segundo refinery, and \$750,000 for an asphalt plant at Point Richmond. The total storage capacity contemplated will approximate 55,000,000 bbl., a considerable proportion of which will apply to the new refinery, though not all of it will be built during the current year. The asphalt plant will compete with the Barber Asphalt Company, and should materially increase production, but there is a tendency of the smaller refineries engaged in the production of asphalt to diminish rather than increase in number. There were 46 oil refineries that produced approximately 160,000 tons of asphalt, in addition to other products, in the State in 1910. The number is not likely to increase in face of Standard competition, though the demand for solid and liquid asphalt is increasing.

THE INDEPENDENT'S STORAGE PLANS

The storage plan of the Independent Agency, which contemplated the construction of concrete reservoirs to hold 10,000,000 bbl., is held in abeyance, apparently awaiting a readjustment of the transportation *pro rata*, the smaller producers complaining that they are not fairly represented. The total daily average of oil moved for all members in May was 47,000 bbl., including all the oil handled by the Agency in all fields of California, embracing San Joaquin valley, Santa Maria and the district south of Tehachapi. The Union's *pro rata* was 39,000 bbl., leaving only 8000 bbl. for transportation to market, distributed among all other members of the Agency. The Producers pipe-line capacity is 25,000 bbl. per day, and some of the Agency oil was moved through the Associated pipe line, and some in tank cars. The Union has run approximately 18,000 bbl. from the Lakeview wells. There is a strong probability that the Agency membership will be reduced on this account.

FUEL OIL FOR ALASKA

It is reported in San Francisco that the locomotives of the Copper River & Northwestern railroad will be fitted with

oil-burning furnaces, and that negotiations are in progress with the Standard for furnishing fuel oil. This report is apparently confirmed by an order said to have been given to the Llewellyn Iron Works at Los Angeles for the construction of three steel tanks of 20,000, 30,000 and 55,000 bbl. capacities to be erected at or near Cordova, Alaska, upon the completion of the tanks being erected for the Amalgamated Development Company at Katalla. It is reported also that oil fuel is to be installed at the Beatson mines on the Alaska coast. The Alaska Steamship Company is burning both oil and coal. The railroad has been burning British Columbia coal at a reported price of \$15 per ton. The price at which California fuel oil may be delivered at Cordova is not made known, but should approximate \$1.10 per bbl., which would represent a saving of 60 per cent., estimating that 3½ bbl. of oil will equal in fuel value one ton of coal in locomotive service.

Exports and off-coast shipments of California crude petroleum from the San Francisco district for May totaled 272,686 bbl., distributed as follows: Guatemala, 26,000; Panama, 85,000; Chile, 43,000; Peru, 19,448; Hawaii, 99,238. The total value of shipments was \$163,300. The total residuum was 104,685 gal., valued at \$6273; asphalt, 287 tons, value \$3588. The refined products of petroleum were: Naphthas, 83,061 gal.; lubricants, 110,060 gal.; illuminants, 5,140,534 gal.; total refined products, exports and off-coast, 1,323,655 gal.; total value, \$215,786. These distributions included South American states, Canada, Germany, China, Alaska, Australia and others, besides Panama and Hawaii. The largest shipment of residuum went to Hawaii, 60,376 gal. Canada received the largest tonnage of asphalt, 250 tons. Of the refined products, the shipments were: Naphthas, Hawaii, 50,246 gal.; Alaska, 21,421 gal.; lubricants, Canada, 43,286 gal.; Hawaii, 18,187 gal.; illuminants, China, 5,045,162 gal.; Nicaragua, 32,000 gal.; Hawaii, 41,000 gallons.

Government Mining of Coal

SPECIAL CORRESPONDENCE

A movement started at Portland, Ore., is now under way, looking to the mining and marketing of Alaskan coal deposits by the Government. It is reported that petitions headed by Governor West, of Oregon, and addressed to the President and Congress are being circulated and rapidly signed. These petitions urge the enactment of a law providing for the creation of an Alaskan mining commission, this commission to have supervision of the coal-mining lands of the Government and the building of a railway to tidewater at Controller bay.

The plan is said to comprehend the purchase of steamships to transport the

coal from Alaska to the United States Government bunkers at Astoria, Coos bay and Portland, where the fuel will be sold direct to the people of the country at cost, plus the necessary sum to cover the expense of operation and the payment of interest and principal on the bonds which are to be issued to carry out the enterprise. It is estimated that the total cost of the project will be about \$6,000,000. Due to the immense supplies of coal in Alaska, it is believed that the opening of these fields to commerce would greatly reduce the price of fuel elsewhere. When 50,000 signatures have been secured to the petition, it is planned to forward them to the Oregon delegation in Congress for presentation to both houses.

Gas Lighter than Hydrogen

The studies of Dr. A. Wegener, on the outer layers of the earth's atmosphere, lead him to the conclusion that in these outer layers there exists a hitherto unknown element (*Chem. Zeit.*, May 25, 1911). This element must be a gas lighter than hydrogen and possessed of but trifling inertia, as meteorites rush through it with scarcely diminished velocities of about 30 miles per second, and are only brought to incandescence by the friction of the denser hydrogen, which, according to Hann and others, is the principal constituent of the atmosphere at altitudes of 40 miles above the earth's surface. From its analogy to coronium of the solar atmosphere, it is suggested the new element be named geocoronium. The claim for the existence of the element is really only a working hypothesis to explain certain spectroscopic observations of the polar lights and similar phenomena. But if it be the monatomic gas of atomic weight, about 0.4 indicated as probable by Mendelejeff, and if Wegener is right in assuming that, at altitudes of 120 miles or thereabouts, the atmosphere consists roughly of half hydrogen, half geocoronium, then the new gas should be present at sea level in the proportion of 1:2,000,000 or less of air. Its isolation, therefore, though a matter of great difficulty, cannot be said to be impossible with existing apparatus. The alleged analogy of geocoronium to coronium depends mainly on the low inertia of the two gases, its having been repeatedly observed that comets passing through the solar corona suffer no appreciable retardation. That the gases are identical is said to be probable, although it is admitted that their spectra appear to differ. However, only one line of these spectra has been fixed with any exactness.

Fluorspar is used in making glass, enameled and sanitary ware, in the production of aluminum, as a flux in the iron and steel industry, and for the manufacture of hydrofluoric acid.

The Problem of Mixed Sulphide Ores

By W. R. Ingalls

A review of the attempts to treat impure zinc-sulphide ores, a summary of the basic conditions, and the probable trend of experimentation.

NOTE—A paper presented to the Canadian Mining Institute, at Quebec, March, 1911.

In considering the treatment of difficult zinc ores, it will help to clarify ideas if the history of this metal be briefly reviewed. The commercial production of zinc is scarcely more than 100 years old, at least insofar as European and American industry is concerned. There is some reason to believe that long before it was done in Europe, the Chinese knew how to smelt zinc ores, but zinc has been an article of common commercial production in Europe for only a little more than 100 years. The production was scarcely 50 years old before attention began to be directed to the low-grade, mixed sulphide ores, deposits of that kind occurring in Europe as well as in this country. The first proposal for the treatment of such ore, other than by distillation, was made by Rochel, about 1857. He proposed to roast sulphide ore so as to obtain zinc sulphate, leach out the zinc sulphate, and ultimately obtain zinc oxide. The process did not prove to be easy, and no record of its practical application is to be found, but the method of making zinc sulphate that has long been practised in the Harz is similar. For the next 40 years attention was directed especially to the hydrometallurgical treatment of zinc ores. During that time, the number of proposals has run into the hundreds.

The majority have begun with the prescription to obtain a solution of zinc sulphate; then they go on to tell how they are going to precipitate the zinc, etc. In fact, the obtaining of a solution of zinc sulphate is a difficult thing at the outset. The great majority of proposals of this character apparently have never been tried in the laboratory, much less in the works. It seems to be impossible—I shall not say that it is impossible, because in these days of invention what seems impossible today may be possible tomorrow—but it seems to be impossible to convert zinc sulphide into the soluble sulphate by a roasting process without leaving so large a proportion of the sulphide undecomposed as to make the process uncommercial.

Baffled in that direction, the inventor naturally says: "Well, then, let us roast the ore to oxide, make sulphuric acid, and leach the oxide with the acid." This also looks simple on paper, but without going into any of the troubles accompanying the roasting of such ore, the extraction of zinc by such a lixiviation is in general far too low for commercial purposes. The reason for this used to be a good deal of a mystery, but we know now that in the roasting of a zinc ore containing iron there is formed a ferrite of zinc that is insoluble in acids. There is no difficulty about roasting a high-grade blende and dissolving the zinc with dilute sulphuric acid, but in the case of a highly ferrugi-

nous ore (which is one of the kinds of ore that bother us) the extraction is likely to be as low as 60 per cent.

From the simple hydrometallurgical methods, inventors naturally turned to the subject of precipitation by electrolysis. It was found difficult, however, to obtain the right kind of a precipitation of zinc, but this difficulty might have been surmounted; in fact, was surmounted in some cases. Far more serious, however, was the condition which generally was left quite out of consideration, although, it ought to have been the first subject of thought, viz., that all of the zinc salts absorb a large amount of energy in their formation, requiring the exertion of the same amount of energy for their decomposition, wherefore a little work with pencil and paper should have shown that the amount of power necessary for the electrolytic precipitation of zinc would preclude the possibility of any useful development in that direction, except, perhaps, under extraordinary conditions. Those conditions may be generalized as the availability of unusually cheap power and the ability to make use of the anode reaction, as, for example, in the decomposition of a solution of zinc chloride, whereby zinc is precipitated at the cathode, while chlorine is liberated at the anode, which chlorine may be utilized for the manufacture of bleaching powder. That, in fact, is done at the works of Brunner, Mond & Co., at Winnington, England, where electrolytic zinc has been produced, upon a relatively small scale, for a good many years. However, it must be recognized that the conditions at those works are exceptional.

Besides the difficulties in the hydrometallurgical and electrometallurgical methods that I have mentioned, there are others. I shall not say that the hydrometallurgy of zinc has no future. It has, in fact, a certain commercial history, and it may have a future for the treatment of some ores under special conditions, but I feel safe in predicting that it will not become a branch of metallurgy of general application, and proposals in this direction are decidedly to be regarded askance.

It is a source of wonderment that so much attention and so much money have been wasted upon this subject in the past. Heaps of money have been frittered away in taking out patents alone.

Along with the vast amount of experimentation in the field of hydrometallurgy, many attempts, dating back to an early time, have been made to smelt zinc ore in the blast furnace. This also has been a fruitless line of investigation. It is, indeed, possible to reduce and distil zinc in a blast furnace. That is essentially what is done in the Wetherill furnace, which has been used for a great many years for the manufacture of zinc oxide. From the Wetherill furnace, it is true, the residue of the ore remaining after expulsion of the zinc is not drawn off as a molten slag, which in the common conception of blast-furnace smelting ought to be a result, but it is possible to drive off a large percentage of zinc from the top of a blast furnace and draw off molten matte and slag from the bottom, as, for example, in the Bartlett process formerly used at Cañon City, Colo., while the new Pape process, now successfully employed in Germany, is substantially another step in this direction. The fundamental difficulty in the blast-furnace treatment of zinc ore is not in the smelting, but is rather in the condensation of the zinc as molten metal. Experience has shown the product invariably to be blue powder, zinc oxide, or a mixture of the two. Without attempting to go far into the reasons for this, I believe that they connect themselves primarily with the practical inability in a blast furnace to avoid the oxidizing effect of carbon dioxide.

Boudouard has shown that zinc oxide can be reduced by carbon monoxide only so long as the presence of carbon dioxide is very small, the permissible amount of the latter rising with the temperature. Thus at 1000 deg. C. it must be not more than 0.1 per cent.; at 1125 deg. not more than 0.2 per cent.; and at 1500 deg. not more than 0.76 per cent. With higher percentages at the respective temperatures, zinc is oxidized. It is difficult to see how in a blast furnace the percentage of carbon dioxide can be kept within those low limits. Even in the gasification of coal in the producer the percentage of unreduced carbon dioxide exceeds the figures above stated. In the ordinary retort the gas discharged, after the distillation is fairly in progress, is substantially pure carbon monoxide. It is possible to maintain that condition in smelting in retorts; other conditions imply relatively small retorts. These are the reasons why in the history of the art no one has been able to increase the size of the unit for zinc smelting. The number

of retorts per furnace has been increased, but not the size of the retort itself. The classic cases of the production of molten zinc in the blast furnace, the so called *Zinkstuhl* of the Harz are undoubtedly to be ascribed to locally favorable conditions in the furnace, purely accidental.

Now, while all of this experimentation, interesting, but more or less chimerical, was going on, some of it on a large scale, practical men were making progress in more simple ways. The zinc smelters, by improvements in their art, gradually became able to handle successfully ores of considerable impurity. High percentages of lead and iron ceased to have terrors. Silver and lead contents could be recovered either by smelting the entire residue from zinc distillation, or by subjecting it to mechanical concentration and smelting the concentrate. The choice between these alternatives depends simply upon commercial conditions. On the other hand, mill men made important improvements in their processes, enabling them to deliver to the smelter products that could readily be smelted. The experience in the United States is illustrative of this progress.

At Leadville, Colo., as far back as 25 years ago, we were treating mixed sulphide ores by jigging and tabling. We were able to treat profitably only those ores that were fairly high in lead, say 8 to 10 per cent. We had no market for our blende tailings, but foresaw that some day there would be a market, and saved them in a special dump instead of throwing them away, an early example of conservation. After we had exhausted the supply of ore of the above grade in lead we were no longer able to operate at a profit, and had to abandon the mill. The real beginning of the successful commercial treatment of these ores was a few years later, specifically in 1896, when the Wilfley table was introduced, inaugurating an era of concentration by fine grinding and tabling. Operators were then able to go back to the same deposits of ore that had been left five or six years previously, and were able to work profitably the low-grade material that had then been abandoned.

Soon after the introduction of the Wilfley table came the invention of the Wetherill magnetic machine, introduced first at Franklin, N. J., and later applied to the sulphide ores of the West. This machine was based upon a new principle in magnetic separation, viz., the use of magnets of condensed lines of force, giving magnetic fields of extraordinarily high intensity. Its success redirected attention to the older method of giving certain ores a magnetic roast, rendering them susceptible to magnetic machines of low intensity, which, previously, had not amounted to much for any purpose except the concentration of some kinds of iron ore. It was discovered that the

chief previous difficulty was a failure to roast the ores in just the right way. The proper procedure having been learned, it became possible to separate the mixed ores of the Wisconsin field. A few years later we had also the invention of the Blake electrostatic separator, and a little later the flotation system was introduced at Broken Hill, New South Wales, at which place it has now displaced all other methods.

At the present time we have a rather wide range of special processes for the mechanical separation of minerals, processes that are not dependent upon specific gravity, which enable us to treat a great variety of ores. Thus from the mixture of blende and siderite, the latter may be rendered magnetic by a light calcination and then may be picked out by means of magnetic machines. Blende and marcasite may be separated by magnetic machines and by electrostatic machines. In Wisconsin both are working side by side. At Broken Hill, for the separation of blende and rhodonite, magnetic machines and flotation processes have both been used, the latter having proved the more profitable. Flotation has been applied to the separation of blende and fluorite in Kentucky, and experimentally for the separation of blende and barite. All of the minerals that I have mentioned are nearly alike in specific gravity and cannot readily be separated by methods depending upon difference in specific gravity.

While we can, however, treat in one way or another almost all kinds of mixed ores at the present time, there are some that are still particularly difficult. Such, for example, is the case of blende high in ferrous sulphide as a constituent of the blende itself. Blende sometimes contains as much as 20 per cent. iron. Given such a case it might be possible to effect an excellent concentration of the mineral, but the latter might still be too low in zinc to be a good marketable product. Obviously, in such a case, any kind of mechanical separation may be a failure. Another difficult ore is a cryptocrystalline mixture of sulphides, a mixture so intimate that no single mineral can be discerned by the naked eye. In such a case the primary difficulty is that no practicable degree of crushing liberates the constituent minerals. Another difficult ore is the excessively fine dissemination of blende in dolomite or limestone.

However, all of these difficult ores may be treated by a furnace method. Whether such will pay, or not, is dependent upon the grade of the ore and the economic conditions under which it occurs. The mixed ores of the Harz have long been smelted at Lautenthal in ordinary blast furnaces for the production of lead, the zinc being chiefly worked off in the slag, which is caused to run high in zinc. Very zinky slags have similarly been

made in lead smelting at Broken Hill, at Marysville, British Columbia, and elsewhere. Recently, a company has been working the zinky slags of the Harz by the Pape process, obtaining zinc oxide by a modification of the Wetherill process, and subsequently distilling the zinc oxide for the production of spelter. A large tonnage of spelter has already been produced in that way. But while such a process may be conducted profitably under the conditions existing in Germany, it is hardly to be expected that a similar economic result could be obtained in a country where labor is relatively dear and where the mines are remote from the markets for the products. I have attempted to show that in one way or another practically all kinds of mixed sulphide ores can be treated metallurgically, but whether under given conditions it will pay to do so is a matter of an entirely different kind.

The question will naturally be asked: Why, with this wide range of new processes for the treatment of mixed sulphide ores, has there not been a more extensive application in North America? The answer is: That although our mines have enormous quantities of zinc, that metal is chiefly scattered among mines that are relatively small, and after all we do not possess many big deposits of these ores. In fact, there does not seem to be in the Rocky Mountain region many really big zinc mines except at Magdalena, Leadville and Butte. The biggest that we know of at the present time are apparently those at Butte. Their ores are of such a character as not to require any method of concentration other than simple gravity separation. In other cases the development of the mines is rarely sufficient to warrant the installation of the kind of plant that is necessary for the application of the special methods. So far as we know, we have nowhere in North America any remaining deposits of mixed ores of such magnitude as those at Broken Hill. The mechanical methods of separation that I have mentioned are not very flexible; i.e., they are best adjusted to the conditions of a particular kind of ore, and do not lend themselves well to the treatment of miscellaneous ores, varying widely in character from day to day. In other words, such processes are unsuitable for a custom works.

For those cases where it is desired to develop a market for miscellaneous ores, a place to which any miner can send and sell small outputs, or even an occasional lot of ore, it seems to be necessary to develop some system of pyrometallurgical concentration, or what may be roughly characterized as smelting. This idea is under consideration in some experimental work that is now being done by the Department of Mines of the Dominion of Canada. Along with that work, attention is also being directed to the subject of electrothermic smelting.

The possible treatment of zinc ores in the electric furnace is not a new idea. Attempts to smelt zinc ore in such a furnace have been made from time to time during the last 25 years. In fact, the Cowles brothers, who achieved distinction in connection with the aluminum industry, were engaged in an attempt to smelt zinc electrically before they directed their attention to aluminum. The list of proposals for the electrothermic smelting of zinc is almost as long as those for the blast-furnace smelting of this metal, and those in the field of hydrometallurgy. At least two ambitious attempts at electric smelting upon a commercial scale have been made. Both were failures, not only commercially, but also metallurgically. I am disposed to think that such metallurgical difficulties as have been experienced in the electric smelting of zinc ores can be surmounted, but even with that assumption I am by no means prepared to say, at the present time, that electric smelting would have any advantage over smelting in the standard way. My present view of electric smelting, insofar as zinc is concerned, is simply that it is an unexplored field of metallurgy. In plowing in this field we may find something of value, but as to whether we shall or shall not, we cannot at present say.

Soda Fields in Oregon

SPECIAL CORRESPONDENCE

Development work in the soda fields of Lake county, Ore., is interesting in that the product which was eventually found to be of value is not that for which the field was at first prospected. About six years ago, Joseph Gaston came to Lake county from Portland, and after much work, became convinced that he had found a borax lake of value. The analyses of the water and deposits apparently showed borax and that they seemed destined to prove commercially valuable. Soon after this, applications and mineral notices were filed, covering several thousand acres of this land. A company was subsequently organized in Portland to work this deposit and to get the material in shape for the market. Development work was commenced under the direction of Professor Willis, formerly of the Nevada School of Mines, who, as superintendent and supervising chemist, had done some work on the property. Instead of developing borax, however, the product has turned out to be soda in large quantities and of high purity.

Alkali lake, so called, is a small body of land of a few hundred acres in area and fed in the spring time by running water from the melting snows of the higher altitudes, and at other seasons by a good-sized spring that prevents it from becoming entirely dry, except in unusually dry years. It is located in a valley of the same name, about 25 miles in length,

and is practically a barren waste, not being inhabited except at times when stock men are using it as a part of the free range. Recently one of the Geological Survey experts went over the ground and made a thorough examination of a part of the lake and some of its outlying deposits. As a result of this examination, 2802 potholes were found, containing soda, but these were found to be distributed over only 150 acres of the total area which had been obtained by the company. As a rule these potholes were found to contain from 10 to 14 cu.ft. each, but some exceeded this. There is evidence that if all these potholes were exhausted, it would be only a short time before they would be refilled with a soda deposit, as it has been noted that in a single night a deposit of an inch in thickness has occurred. Development work has reached such a stage the company is taking orders for the product.

Filling Stopes with Sand in the Transvaal*

BY FREDERICK H. HATCH

An important problem which has recently forced itself on those responsible for mining on the Rand is the support of the hanging wall. The removal of the gold-bearing conglomerate bed which, except for its somewhat steeper dip, may be compared to a coal seam, leaves an open space, which is not allowed to cave, as in a coal mine worked on the longwall retreating system, but is supported over enormous areas by pillars of unworked conglomerate in the stopes; by ribs left above and below drives; and by pillars left to insure the safety of the shafts, supplemented in some cases by the stowing of waste rock. These methods have sufficed in the past to keep open the stopes and drives and to protect the shafts; but, owing to the robbing of the stope pillars in the outcrop mines, and more especially to the increased pressure of the superincumbent rock mass in the deep levels, serious movements of the hanging wall have lately been making themselves felt, crushing the pillars in the stopes, destroying the ribs above and below the drives, and in some cases even affecting the shaft pillars.

To arrest this untoward movement, which at one time threatened the loss of the main thoroughfares of some of the mines, a system of sand filling has been adopted. By this system the abandoned stopes and other working places in the mines are filled with sand, taken from the residue dumps or run in direct from the mill. This method has been borrowed from the Silesian coalfield, where it has for many years been in

*Extract from "James Forrest" lecture, 1911, before the Institution of Civil Engineers, entitled "The Past, Present and Future of the Gold Mining Industry of the Witwatersrand, Transvaal."

successful operation, enabling a thick seam of coal to be safely mined under towns, villages, rivers and main lines of railway.

METHOD OF OPERATION

The method employed, in the case of the old residue dumps, is to mix the sand with sufficient water to cause it to flow down pipes in the shafts and to be discharged in the stopes prepared for its reception. Where mill tailings are used, these are pumped as a pulp from the sand-treatment vats, and are thickened in cone classifiers, before delivery underground. Underground, the pulp is conducted by wooden launders to the stope to be filled. Barricades are used to keep the sand in place; but it drains well, and soon packs solid enough to bear the weight of a man. The effluent water is pumped back to the surface, and this is one of the chief items of expense. Another is the renewal of the pipes used to convey the sand down the shafts. The sand is extraordinarily abrasive, and the life of the pipes is short. The cost of the process is, however, balanced to some extent by the increased ore reserves, due to the advantage of not having to leave pillars in the stopes, coupled with the saving of the cost of cutting them.

At first it was feared that the cyanide remaining in the sands would be dangerous to the mine workers, but a little research has eliminated this source of danger. The moisture in the pulp, as it comes from the thickening cones, is 12 per cent. It consists of water, containing up to 0.02 per cent. of cyanide. By adding a 5 per cent. solution of permanganate of potash, or of chloride of lime, it is found that the cyanide in the moisture of the sands can be reduced to less than 0.0025 per cent. The water discharging from the sand packs underground shows no trace of cyanide, and no hydrocyanic acid has been found in the air of the stopes being filled.¹

The filling of the worked-out stopes will also assist ventilation, since it will prevent the dissipation of the fresh-air current. The system is already in use at the Village Deep, Village Main Reef, Ferreira Deep, Robinson, and Simmer and Jack mines, and there is little doubt that it will be universally adopted.

Algerian and Tunis Phosphate

Phosphate to the amount of 319,690 tons was shipped from Algeria during 1910 (*American Fertilizer*, June 17, 1911), making the total shipments of that product 4,575,515 tons from 1894 to 1910, inclusive. The shipments from Tunis for 1910 were 1,286,262 tons, making a total of 7,512,723 tons.

¹E. Pam. "Sand Filling on the Witwatersrand," *Journ. Chem., Met. and Min. Soc. S. A.*, Vol. XI, 1910, p. 76.

Wasp No. 2 Mine, South Dakota

By Jesse Simmons*

The accomplishment of total costs for mining, milling, cyaniding and general charges, amounting to \$1.016 per ton of ore, is the record set by the Wasp No. 2 mine, in the Black Hills of South Dakota, and it is probably not duplicated or closely approached elsewhere.

In the first place, all of the Wasp No. 2 ore is mined in opencuts, which is a system that could not be followed at every mine. Again, we find that milling is comparatively cheap, owing to the porous character of the ore, and the fact that it gives up 75 to 80 per cent. of its value by a simple leaching method after a coarse crushing.

MINING METHOD

The ore is a hard, close-grained Cambrian quartzite, 20 to 20 ft. thick, lying nearly horizontal, and covered by 2 to 5 ft. of soil and loose sandstone. Mill feed assays \$2.20 to \$3.60 per ton, with the average for a number of months approximately \$2.50 per ton.

After stripping the alluvium and sandstone from the top of the orebody, holes are drilled with an Ingersoll-Rand machine, 3¼-in. model, to the bottom of the quartzite. After chambering with dynamite and black powder, the hole is loaded with 50 kegs of black powder. This breaks and shatters 4000 to 6000 tons of ore. Small air-hammer drills, of Ingersoll-Rand and Shaw makes, are used in blockholing.

About 30 shovelers are employed, divided into two shifts, loading four-ton skips. These skips are hauled from the working face direct to the crusher bin, where they dump automatically, and are immediately returned. From the crusher, for a distance of 1200 ft., the skipway is double track, and from that point four track, as will be noted in the adjoining illustration of the opencut. The track, which is 4-ft. gage, is laid with 40-lb. rails and 6-in. pine ties. The grade has a maximum rise of 10 ft. in 100 over the space where it is double-tracked, and for the remainder of the distance is approximately level. A double-drum, 52-h.p., electric-driven hoist is used to haul the skips. Stripping is accomplished both by shoveling into one-ton ore cars and tramping, and by plow and scraper.

MILLING PROCESS

At the mill, the ore dumps into a bin of 250-ton capacity, is drawn by gravity into a No. 6 Gates crusher, is reduced to 1½-in. and elevated 38 ft. Dropping onto the point of a wedge-shaped grizzly, the product is divided between two No. 4 K Gates crushers, and further reduced to ½-in. particles, combining with the

This mine, in a famous low-grade district, is making a world's record for cheap mining and milling. Pays substantial dividends on a bullion recovery of less than \$2 per ton.

*Deadwood, S. D.

portion passing the grizzly and dropping to a 500-ton crushed-ore bin.

Shaking feeders direct the ore from this bin to four 16x36-in. McFarlane rolls, two of which are used as cracking rolls and the other two for finishing rolls. By an ingenious spouting arrangement, the oversize from the screens is returned at will to any of the rolls; in this way it is possible to secure maximum service from roll shells, without moving them from one machine to another, by using a roll as a finisher when the shells are newly put on, and when they are too heavily worn for this duty by switching the feed and using them for cracking.

The roll product is elevated 40 ft., to two screens, 2x9-ft., set at an angle of 45 deg. The screen opening is ¼ in. square. That portion of the product passing these screens drops into a finished-ore bin of 700 tons capacity, and the oversize is returned to the rolls as described.

CYANIDE PROCESS

Six individual, self-oiling trough conveyers are used to fill as many tanks in the leaching room. These individual conveyers are fed by a conveyer carriage which travels parallel to the finished-ore bin. The leaching tanks are 32 ft. diameter by 12 ft. depth, holding 400 tons each. They are provided with four discharge gates in the bottom through which the ore is shoveled into cars to be trammed to the dump. The tailings dump is partially upon the right-of-way of the C. B. & Q. Railroad, and is being hauled away for use as ballast.

Zinc-shaving precipitation is used, the precipitates being gathered three times per month, treated with acid, thoroughly washed, and dried in a vacuum tank. They are then roasted, fluxed and melted in a gasolene furnace, the resulting bullion running 300 to 325 gold and 650 to 625 silver, a total of 950 fine.

The illustration of the mill shows in the foreground the skipway for handling supplies. This extends from the crest of the hill, at the top of the mill, to the C. B. & Q. tracks in the gulch. A 42-h.p. electric-driven hoist handles a specially constructed car, and convenient sidetracks deliver

material to any desired point about the mill; mine and camp supplies are unloaded on a platform at the top of the mill. The top of this skipway is vertically 400 ft. above the lower end.

Circular tanks are used throughout the plant, and are as follows: Two water storage, 12x18 ft.; two solution storage, 20x13 ft.; six leaching, 32x12 ft.; two gold, 14x9 ft.; two solution sumps, 20x13 ft.

Electric power, purchased from the Consolidated Power and Light Company, of Deadwood, is used for operating the mill, the motors being as follows: Crushers, 50 h.p. and two 30 h.p.; rolls, two 50 h.p.; air compressor, 50 h.p.; hoists, 52 h.p. and 42 h.p.; elevator, 15 h.p.; pumps, 10 h.p.; conveyers, 2 h.p. and 5 h.p. The current is delivered at 24,000 volts, three-phase, 60 cycles and is stepped down to 440 volts in three 75-kva. Westinghouse oil-cooled transformers.

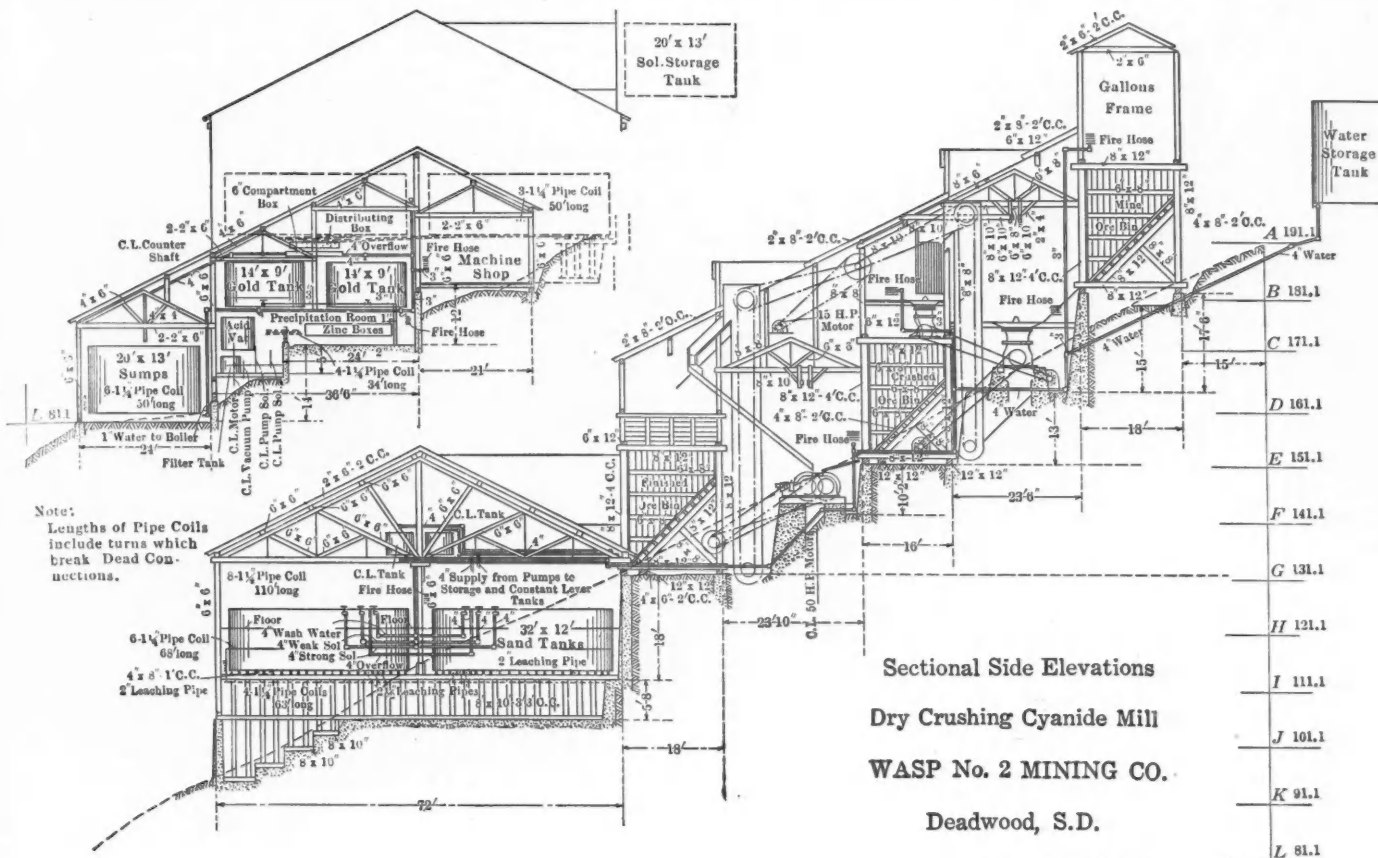
COST OF OPERATION

Following are detailed figures on the month of May, 1911, during which 14,800 tons were treated:

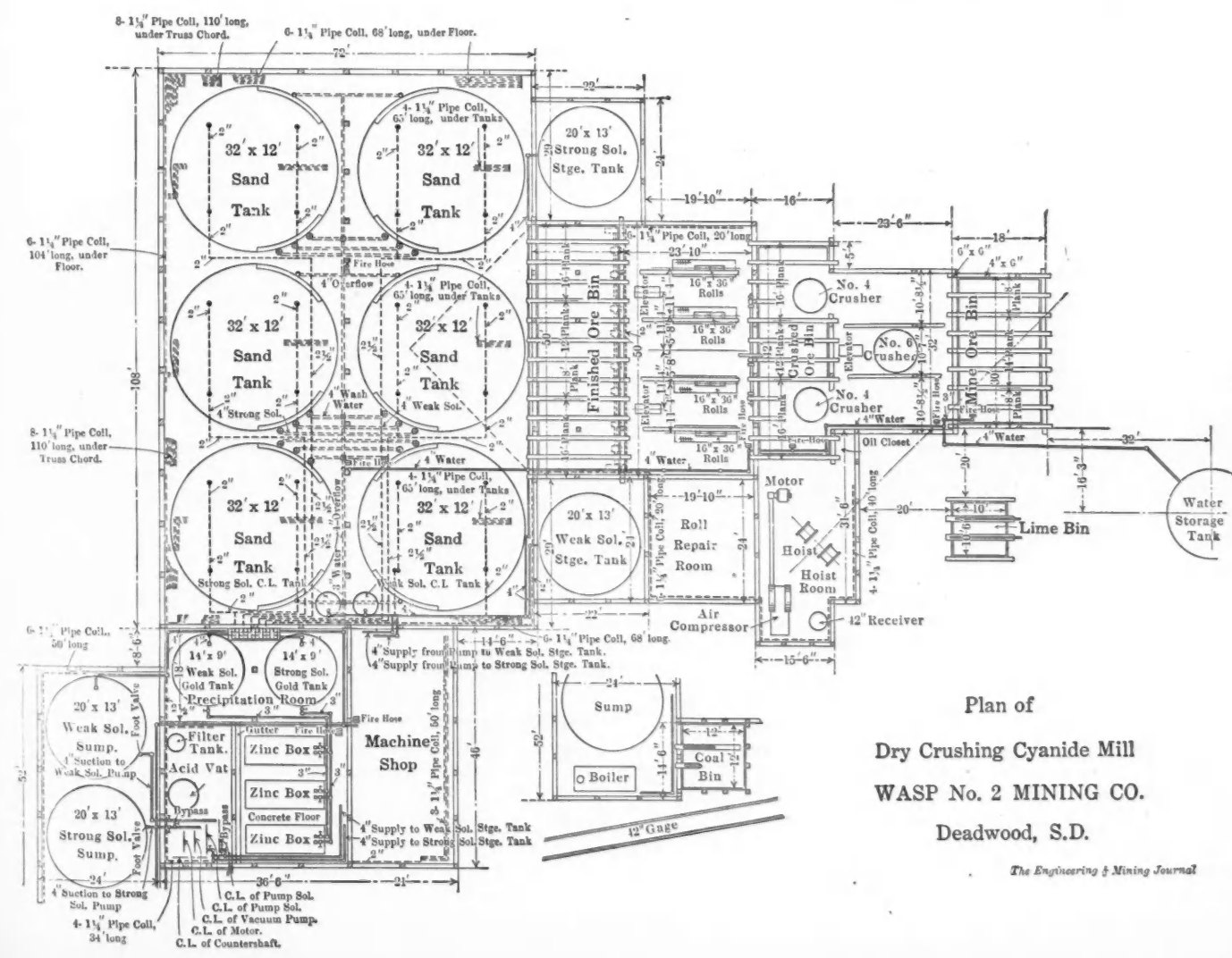
WASP MINE AND MILL COSTS		
MINE—	Total	Per Ton
Labor.....	\$3,847.25	\$0.2600
Stripping.....	720.00	0.0486
Supplies.....	251.91	0.0170
Explosives.....	233.30	0.0158
Stable.....	136.15	0.0092
Assay office.....	93.99	0.0063
Superintendent.....	208.33	0.0141
Power.....	236.20	0.0160
Expense.....	114.56	0.0077
Tools.....	66.85	0.0045
Equipment.....	192.91	0.0130
Tramway.....	900.06	0.0609
	<hr/>	
	\$7,001.51	\$0.4731
MILL—		
Labor.....	\$2,836.99	\$0.1917
Supplies.....	185.87	0.0126
Repairs.....	1,515.10	0.1023
Cyanide.....	869.89	0.0588
Expense.....	114.56	0.0077
Stable.....	136.15	0.0092
Assay office.....	94.00	0.0063
Superintendent.....	208.33	0.0141
Lime.....	112.50	0.0076
Cleanup.....	108.38	0.0073
Zinc.....	427.70	0.0290
Power.....	1,125.82	0.0761
Tools.....	15.74	0.0010
Tailings dump.....	108.43	0.0073
	<hr/>	
	\$7,859.46	\$0.5310
GENERAL—		
Bullion expense.....	\$132.41	\$0.0089
Interest and exchange.....	1.95	0.0001
Construction.....	44.76	0.0030
	<hr/>	
	\$179.12	\$0.0120
Total.....	<hr/>	<hr/>
	\$15,040.09	\$1.0161
RECEIPTS—		
Bullion.....	\$29,249.13	\$1.9763
Insurance refund.....	1.30	0.0001
Rents.....	91.00	0.0063
	<hr/>	
Total.....	\$29,341.43	\$1.9827
Profit.....	14,301.34	0.9663
Dividend No. 33.....	5,000.00	
	<hr/>	
To surplus.....	\$9,301.34	

In arriving at these costs the following prices were taken into consideration:

Labor—Shovelers, \$3 per day; miners, \$3.50; blacksmith, \$4; engineers, \$4; solution men, roll men and electricians, \$3.50; millwright, \$4.50; machinist and carpenter, \$4; crusher men and common



Sectional Side Elevations
 Dry Crushing Cyanide Mill
 WASP No. 2 MINING CO.
 Deadwood, S.D.



Plan of
 Dry Crushing Cyanide Mill
 WASP No. 2 MINING CO.
 Deadwood, S.D.

labor (including dumping tanks, roustabout, teamsters, etc.), \$3.

Supplies—Black powder, \$6.09 cwt.; dynamite, 40 per cent., \$14.75 cwt.; power, \$1 per horsepower per month and meter charge of 2c. per kw., less discount of 20 per cent. for quantity used; coal, \$3.25 per ton; cyanide, carloads, \$20.49 cwt.; lime, 30c. bu.; roll shells, \$5.71 cwt.; zinc, \$8.55 cwt.; steel rails, 40 lb., \$24 per long ton; ties, 6 in., green-cut timber, \$4.50 per 100 linear feet; hay, \$16 ton; oats, \$2 cwt.; shovels, \$8.50 doz. These prices are for material delivered either at the mine or on the railroad spur at the lower end of the skipway.

First National Bank, Deadwood, is treasurer; W. L. McLaughlin, general manager Mogul Mining Company, is secretary and John Gray is general manager. S. C. Williams is mine superintendent, and E. C. Brenner mill superintendent.

South Crofty, Limited

LONDON CORRESPONDENCE

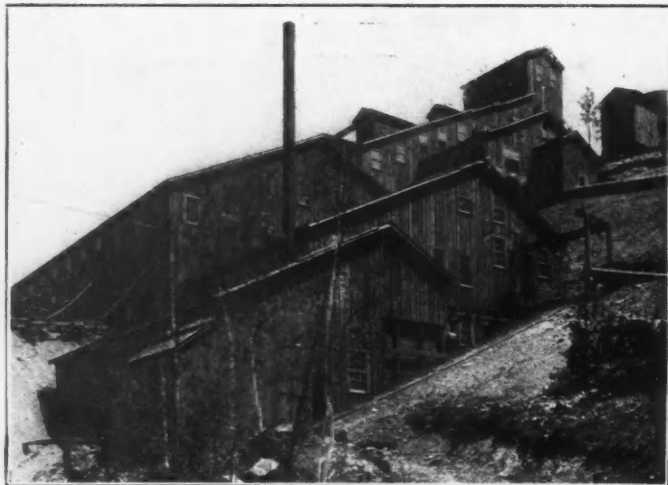
The company, which was organized in 1906 as a reconstruction of the South Wheel Crofty Mining Company, has just declared a dividend of 25c. per share, and announces a profit during the half year of nearly \$100,000. The profit amounts to

time, refines its own arsenic. At one time arsenic was considered a serious drawback to mining in this district, and it is known that there were large quantities of arsenical ores thrown into dis-used shafts, as there was no sale for it at that time.

Alaskan Gold Shipments

SPECIAL CORRESPONDENCE

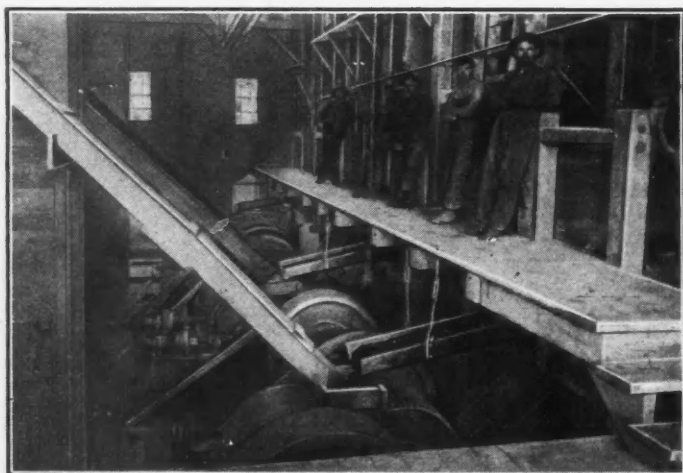
Indications are that the season's gold output of the Tanana district will be at least \$5,000,000 and may reach \$6,000,000, exceeding by \$1,500,000 the esti-



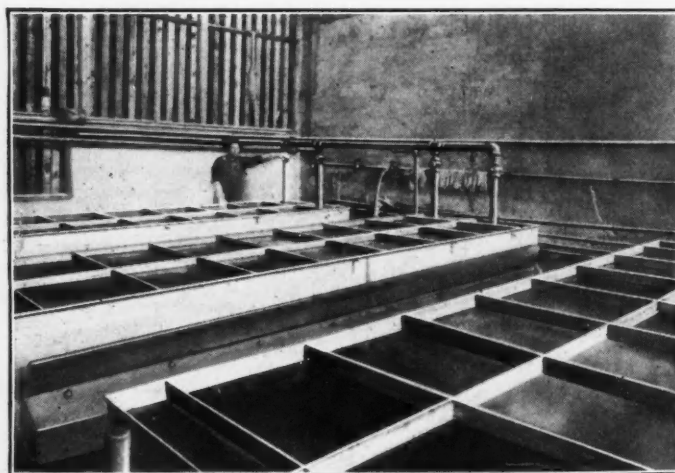
WASP NO. 2 MILL, BLACK HILLS, S. D.



WASP NO. 2 OPEN CUT



ROLL FLOOR, WASP NO. 2 MILL



PRECIPITATION ROOM, WASP NO. 2 MILL

A mill supply for eight years at present capacity is in sight in the ground, with values proved by drill holes from the surface to the bottom of the quartzite. Over a large part of the area these holes have been drilled 25 ft. apart.

The Wasp No. 2 Mining Company is a South Dakota corporation, capitalized at \$500,000. All of the shares are issued. Dividends to date, including two disbursements of 1c. each in June, 1911, have been \$255,595. T. J. Grier, superintendent of the Homestake Mining Company, is president; D. A. McPherson, cashier

about \$3 per ton on the total of 31,205 tons which were crushed, and on this total tonnage the cost was \$5.15 per ton, including nearly a half mile of development work. The output included 341 tons of tin concentrates, which sold for \$188,966; 71½ tons of wolfram, which realized \$36,513, and 410 tons of refined arsenic, which netted \$19,000. This mine, situated at Illogan, Cornwall, is well equipped with magnetic separators, by means of which the wolfram is separated from the tin ore, and this is the only mine in Cornwall which, at the present

mates made two months ago. Late reports state that the spring cleanups show that records will be broken on Fairbanks, Dome and Pedro creeks. With plenty of water and enough men to enable operators to work unhampered, \$1,000,000 worth of gold had been cleaned up from winter dumps by June 1. The recently opened quartz mines are expected to add about \$50,000 to the gold output of the camp during the season. The Iditarod is doing its digging and washing both, since the advent of spring, and has sent \$71,000 to Seattle within the last week.

The Health of British Guiana Miners

The mining industry of British Guiana affords some interesting opportunities for a study of mining operations under conditions typical of tropical or semi-tropical countries. The ever increasing sphere of American mining methods in foreign countries makes it a matter of considerable practical interest to study the health conditions under which mining is carried on in the tropics, since in its final analysis the cost in health and life must constitute an important consideration, although a much neglected one at the present time. While the mining industry of British Guiana has been rather depressed and somewhat on the decline during recent years, it is a safe conclusion that the territory, on account of its immense extent, has been only imperfectly explored, and that a revival of the industry may be anticipated with reasonable certainty.

THE GOLD PRODUCTION

Gold has been known to exist in parts of Guiana since 1720, but it was not until 1863 that a well organized attempt was made, by a company of English capitalists, to develop the mining resources of the colony. During that year an expedition was sent up the Cuyuni river, on which gold-bearing quartz was discovered about 25 miles from its mouth. On account of the boundary dispute with Venezuela, no attempt was made to make use of the discovery, and it was not until 1886, when encouraging reports were received from the Essequibo and Cuyuni districts that paying alluvial deposits had been found, that the industry became recognized as of real importance, and the first mining regulations were adopted in the colony. From a small production of 250 oz. in 1884, it rapidly increased each year until the output reached its maximum limit in 1893-94, when over 138,000 oz. were produced. Subsequent to the year mentioned the industry has gradually declined, but during the fiscal year ending with 1909, 73,656 oz. were produced, with apparently some indication of a larger yield in the future.

From whatever viewpoint the industry is considered, it is unquestionably carried on under serious difficulties, and of these perhaps not the least important are climatic and sanitary considerations. The work is arduous and the prospectors are often driven to every expedient to obtain gold, including the sinking of small shafts on the hillside, the pay-dirt being carried up in sacks and taken to the nearest water, where it is washed. It is stated that many of the hills are riddled by shafts and tunnels, but in at least one district quartz mining is carried on, reefs having been located at Kanaimapu and Appaparu in the Demerara river, and in

By Frederick L. Hoffman *

Gold and diamond mining hindered by unhealthy climatic conditions and poor transportation facilities. The government has inaugurated preventive measures.

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the vicinity of Arakaka, on the Barima river, in the North West mining district, where an English company is doing some development work. In 1903 an American company purchased nine claims in the Puruni river, and since 1905 this company has steadily carried on the development work, which resulted up to March 31, 1909, in the obtaining of 28,549 oz. of gold. Some dredging is carried on, but as yet the possibilities, particularly in the Potaro district, have not been developed to any considerable extent. The outlook, however, for a reasonable degree of success seems encouraging.

POOR TRANSPORTATION HINDERS MINING

Diamond mining is carried on along the upper Mazaruni, but diamonds have been found also in other cities of the colony, particularly on the left bank of the Curtbrong river, near where it empties into the Potaro. The system of working in connection with diamond mining is stated to be practically the same as that of sluicing for gold, except, of course, that no quicksilver or riffles are used. A full account of the different mining fields would be necessary to emphasize the physical difficulties under which the industry is carried on. When it is taken into consideration that the colony of British Guiana has an area of a little over 90,000 square miles, but a population of only a little over 300,000, it is evident that the conditions of transportation and supplies must be very primitive and a serious hindrance to the more general development of the mining industry. Large tracts are entirely uninhabited, except by a few aborigines, and upon a conservative estimate the density of population is not more than 3.5 per square mile. The only large city is Georgetown, with an approximate population of about 55,000, while New Amsterdam has a population of about 10,000.

SANITARY REGULATIONS

Of the total population only a small proportion is of European descent other than Portuguese, while the remainder is composed of native-born blacks of Afri-

can origin, East Indians and some Chinese. The laborers employed in the gold and diamond industries are chiefly negroes, natives of the colony, and of French and Dutch Guiana and the West Indian islands. According to the handbook of British Guiana, "they are of strong physique and capable of great endurance, but they object to steady, continued work." According to the same authority, "all laborers engaged on a concession or claim, with the exception of aboriginal Indians, must be registered at the Institute of Mines and Forests . . . Where 50 men are employed a qualified dispenser must be employed to attend to them when ill. The regulations also require that certain medicines must be kept on each claim or concession. . . . All surroundings to camps and residences must be kept clean and in a sanitary condition to the satisfaction of the warden of the district, who can at all reasonable times enter the premises and claim to satisfy himself if this is done."

Under the rules which govern the lands and mines department, annual reports are required to be made by the wardens of the several mining districts, and these contain from year to year a considerable amount of interesting and instructive information. According to the report for 1910, the number of gold-mining laborers registered during the fiscal year 1909-10 was only 4391, against 11,088 registered during the year 1905-06. Assuming that the number of laborers registered represents the number exposed to risk of sickness and death, the accompanying table A will show the returns of the mortality in the goldfields of British Guiana during the period 1896-1910:

PRINCIPAL CAUSES OF DEATH

According to this table the mortality from all causes has averaged 6.3 per 1000, which cannot be considered excessive for a tropical country, but which probably requires correction for errors in calculating the numbers exposed to risk, and also perhaps in the returns of deaths from all causes and the distinctions as to natural causes, deaths by drowning, etc. The high death rate for 1909, however, is suggestive, but the reasons therefor are not fully explained, since the medical returns do not show the causes of death. It is stated, however, in the report of the Lands and Mines Department for the fiscal year ended with 1909, that "the health of the several districts during the year was, I regret to report, not as good as in recent years. The deaths amount to 82. The principal causes of death were diarrhea, dysentery and pneumonia. Eight of the deaths reported were caused by drowning, and in the case of seven persons the deaths were due to

accidents other than drowning. No returns of nonfatal accidents are available. Of the seven deaths from accidents, one was due to the person being crushed by a descending cage, one to a fall down a shaft, three were caused by the explosion of dynamite underground (two men being killed in one accident), one was suffocated by the closing in of earth, and one was killed by the fall of a tree. These accidents, I am of the opinion, were due in the majority of cases to the carelessness of the persons who lost their lives."

In an accompanying table the accidental deaths, other than those from drowning, in the goldfields of British Guiana have been consolidated by districts, for the period 1901-10:

It is suggestive that out of 45 accidental deaths from all causes except drowning, 14 should have been due to falls of earth or rock, and 12 to falls of trees or falls from trees—no doubt casualties incidental to the making of trails or roads through an interior still practically a primeval wilderness. In addition to the figures shown in the table there were 77 deaths by drowning, three by suicide, and two by snake bite.

NEWSPAPERS EXAGGERATE DANGERS

Describing the conditions in British Guiana as confronting the prospector for diamonds or gold, it was stated in the *New York Sun*, under date of March 15, 1903, that "often an expedition leaves Georgetown or Bartica to go up one of the three rivers leading to a diamond field and never comes back. It is hardly possible to pick up a Georgetown newspaper without seeing such headlines as, 'Another Boating Disaster in the Essequibo Rapids,' or 'Diamond Hunters Starved to Death along the Mazaruni,' or 'A Diamond Expedition Attacked by Indians along the Cuyuni.'" Aside from these dangers it was pointed out at the time that, "So numerous are the perils that a heavy toll in lives is being constantly paid for the jewels that are finding their way from the heart of the jungle to the seacoast. It has been estimated that for the 132,077 diamonds discovered and declared during the year ending June 30, 1902, 264 lives were sacrificed, or two for every thousand of the precious stones." That statement is not substantiated by official returns, which are approximately correct and certainly do not indicate anything like so serious a state of affairs, but under the prevailing regulations which require the registering of all laborers other than Indians, it would seem that a fair check is had upon the loss of life, which should come, sooner or later, to the attention of the wardens of the different mining districts. It may, therefore, safely be assumed that the loss of life is not so great as alleged.

TREATMENT AND PREVENTIVE METHODS

The amount of impairment of health is even more a matter of conjecture. There can be no question of doubt, however, but that malaria prevails throughout the larger portion of British Guiana, and a free distribution of quinine has been tried in the colony for a number of years, and, as far as known, with favorable results. For the purpose of encouraging a rational regard for health and life, the Department of Mines has published some very practical medical notes, prepared by Dr. David Palmer Ross, surgeon-general of British Guiana, including simple directions for the treatment of fever, diarrhea, dysentery, cough and snake bite. In connection with the latter, it is said in the notes that "There are not many venomous snakes found in the colony, though the number of poisonous species is somewhat extensive. Cases of snake bites from venomous snakes are known to have been cured in the col-

peans are differentiated from the Portuguese, the former experience a death rate of 15 per 1000, against 34.3 for the latter. Since the former, however, are chiefly of an age period at which the general death rate is low, the mortality must be considered excessive. It is even more suggestive that the death rate of the colored population should be 30.2 per 1000, although climatic conditions would be decidedly favorable to this element in British Guiana.

NATURAL FEVERS THE GREAT CAUSE OF DEATH

The principal causes of death throughout the colony are stated to have been, in the order of their importance: malarial and undefined fevers, bowel complaints, pneumonia and bronchitis, phthisis and other forms of tuberculosis and kidney diseases. Of course, some allowance must be made for errors in medical diagnosis, or rather in the diagnosis of causes

TABLE A. MORTALITY IN THE GOLDFIELDS OF BRITISH GUIANA, 1896-1910.

Year	Laborers Registered	DEATHS FROM NATURAL CAUSES		DEATHS FROM ACCIDENTS AND SUICIDES		Deaths, Causes Unknown	DEATHS FROM ALL CAUSES	
		Number	Rate per 1000	Number	Rate per 1000		Number	Rate per 1000
1896	17,638	93	5.27	31	1.76	56	180	10.21
1897	19,945	69	3.46	11	0.55	38	118	5.92
1898	27,147	71	2.62	29	1.07	47	147	5.41
1899	21,154	77	3.64	9	0.43	25	111	5.25
1900	19,550	98	5.01	13	0.66	28	139	7.11
1901	16,588	65	3.92	34	2.05	11	110	6.63
1902	14,041	55	3.92	6	0.43	8	69	4.91
1903	11,385	43	3.78	13	1.14	6	62	5.45
1904	12,003	54	4.50	10	0.83	1	65	5.42
1905	11,214	45	4.01	8	0.71	1	54	4.82
1906	11,088	38	3.43	8	0.72	1	47	4.24
1907	8,234	28	3.40	10	1.21	.	38	4.62
1908	7,069	36	5.09	10	1.41	.	46	6.51
1909	5,282	64	12.12	16	3.03	2	82	15.52
1910	4,391	27	6.15	10	2.28	.	37	8.43
1896-1900	105,434	408	3.87	93	0.88	194	695	6.59
1901-1905	65,231	262	4.02	71	1.09	27	360	5.52
1906-1910	36,064	193	5.35	54	1.50	3	250	6.93
1896-1910	206,729	863	4.17	218	1.05	224	1,305	6.31

ony by taking internally as soon as possible after being bitten a wineglassful of kerosene oil, and applying it freely to the part." With regard to malaria, it is suggested that "the best clothing to wear in the forest is woolen of all kinds, as there is less liability to chills and fever if the body is kept warmly clad. Opium in any form, it is suggested, should be carefully avoided, and stimulants are recommended to be used only in case of nausea, urgent vomiting or exhaustion, and then only in exceedingly small quantities." The notes are amplified by a concise list of contents of a medicine chest, with brief directions for their use, etc.

That the foregoing considerations are well deserving of careful attention on the part of the prospector or miner is emphasized by the statistical returns of the registrar-general for the year 1909. According to this return the death rate of the colony was estimated to be 28.9 per 1000 for Europeans, but if other Euro-

of death not medically certified, but there can be no question but that the prevailing diseases are malarial in character, and that most of the other principal causes of death are also more or less complicated by malaria. While, no doubt, preventive measures have been inaugurated, it is said in the report of the surgeon-general of British Guiana for 1910 that "there is no reason to believe that malarial fevers are any less or more prevalent than in the preceding year." Referring to the dissemination of typhoid fever and its frequency in the colony, the statement is made that in part the occurrence of this disease in British Guiana is accounted for by the reduced natural resistance of the individual, and that while many persons can swallow enteric bacilli with impunity while in the full bloom of health, it is a grave danger to do so while run down or convalescent from malarial fever or other diseases.

MALARIA CAUSED BY CLIMATE

The prevalence of malaria is, of course, largely favored by climatic conditions. As far as known, the temperature does not vary materially between the coast and the interior, for, according to the records kept at the penal settlement at Massaruni, situated in the forest region, the difference between the temperature at that place and on the coast is very small. The mean maximum temperature in the shade is 85.9, and the mean minimum 75.4, as recorded at the botanic gardens for the period 1899-1908; the average temperature is 80.3, and the average range 9.6. The range is somewhat greater during the months July to November, inclusive. At the penal settlement the average temperature for the year was 79.6, and the range of temperature 9.8.

The rainfall is excessive, the year being roughly divided into two wet and two dry seasons. At Georgetown the average annual rainfall during the period 1880-1908 was 92.84 in. The heaviest annual rainfall during this period was 135.24 in., and the lowest 52.70 in. Of the three countries, Berbice, the most

sulted in success. There has been health progress in British Guiana, but not by any means the sanitary advances required to place the colony on a par with other and more sanitary tropical sections of the earth.

NO YELLOW FEVER SINCE 1888

It is true that the topography of an alluvial country properly described as that of a mud flat, or a tropical Holland, presents unusual difficulties, but they can be overcome, and they unquestionably will be met in due course of time. Comparing the sanitary condition of Georgetown today with the prevailing condition of 50 or more years ago abundantly shows not only what has actually been achieved, but the still greater possibilities for the future. As far as known, there has been no yellow fever since 1888.

The modern theory of transmission of disease, and particularly by the stegomyia and anopheles mosquitos, brings the material improvement of health conditions within the sphere of practical hygiene. Anti-mosquito measures have been inaugurated, and the medical profession of

of primeval forests and impenetrable swamps, but even these will yield their treasures if the prospecting, exploring and exploiting are carried on with a greater regard to the considerations of life and health than has heretofore been the case.

Paint Shales of Pennsylvania

Black, red and yellow shales, which are of low tinting value, are used as fillers on both wood and metal surfaces; also in the manufacture of oilcloth and linoleum for the under surface, and for the mineral coating on which the color patterns are printed. In addition to the mineral composition, the amount of linseed oil required by a pigment is important. In some cheap paints the oil costs more than the dry colors. Materials requiring the minimum amount of oil are preferred by manufacturers of mineral paints.

B. L. Miller, in describing the mineral-paint deposits¹ of Pennsylvania, states that the prices of prepared pigments range from \$3 to \$50 per ton, according to their adaptability for definite purposes, and the supply available. Most of the ground shale produced in Pennsylvania is used by local paint and linoleum manufacturers, although a large portion is shipped to remote parts of the United States and even to foreign countries.

That the black-shale paint, used chiefly as a filler for ironwork is durable, is attested by its users. Yellow shales (much lighter in color than the ochers) are found in many places in Pennsylvania. Their principal use is in the manufacture of oilcloth and linoleum.

Red shales are worked in only three places. The operations are not limited by the distribution and amount of shales, but by the market for the product. They are made into fillers and sold to steel and iron manufacturers.

TABLE B. ACCIDENTAL DEATHS, OTHER THAN DROWNING, IN THE GOLDFIELDS OF BRITISH GUIANA, 1901-1910

Cause	DISTRICT					Total	Per Cent.
	No. 1	No. 2	No. 3	No. 4	No. 5		
Fall of earth.....	-	6	2	2	1	11	25.6
Fall of rock.....	-	2	-	1	-	3	7.0
Crushed in shaft.....	-	-	-	-	1	1	2.3
Closing of excavation.....	-	3	-	-	1	4	9.3
Land slip.....	-	-	-	-	3	3	7.0
Fall of tree.....	-	4	-	6	-	10	23.3
Fall from tree.....	-	1	-	-	1	2	4.7
Fall from cart.....	-	1	-	-	-	1	2.3
Fall across tacouba.....	-	-	-	1	-	1	2.3
Fall down shaft.....	-	-	-	-	1	1	2.3
Gunshot wound.....	-	2	-	-	-	2	4.7
Crushed by log.....	-	-	1	-	-	1	2.3
Explosion in mine.....	-	-	2	-	-	2	4.7
Dynamite explosion.....	-	-	1	-	-	1	2.3
Total.....	-	19	6	10	8	43	100.0

easterly one, has by far the lowest rainfall, and Essequibo, on the west, has usually the highest. Demerara occupies a position intermediate between these two, both geographically and in the amount of its rainfall. In the forest region of the interior of British Guiana, according to the Handbook, the usual contrast between the wet and dry seasons is less marked than on the coast.

UNHEALTHY CLIMATE HINDERS MINING

Considerations like the foregoing have a much more important bearing upon the mineral industry of British Guiana than is generally assumed. Considerations of health govern more largely today in the minds of men than mere considerations of wealth, however large the prospect or rapid material gain. The psychological factor of discouragement following repeated attacks of disease accounts for many a failure in mining expeditions where more careful consideration of comfort and health would possibly have re-

the colony has become fully alive to the importance of preventing malaria, as a first step necessary for advancing the colony in a material way. Arrangements have been made for the sale of quinine through the post offices at cost, and it is stated that the drug meets with a large sale even among the poorer classes. The utility of such measures in the interior is, of course, a matter of conjecture, but in almost exact proportion as white men learn to adapt themselves to the conditions of life in the tropics by a rational and intelligent mode of living, including abstinence from spirituous liquors, the wearing of suitable clothing, and the eating of suitable food, will they succeed in mastering the conditions under which the resources of tropical countries can be utilized on the largest possible scale for the incalculable advantage of the more densely populated countries of the temperate zone. Of no industry is this more true than of mining, which carries the prospector into the uttermost recesses

Austrian Petroleum Industry

The petroleum industry in Austria is at present regarded as being unsettled and depressed², owing to too severe competition, in some cases resulting in operating at a loss.

It is reported that British interests are acquiring many of the oil lands and pipe lines, no less than six of the eight Galician pipe lines being now controlled by English capitalists. This is supposed to be with a view to supplying the British navy with oil fuel. It is rumored that the new Austrian dreadnoughts will also be fitted to burn oil.

The exports of petroleum products from Austria-Hungary fell off from 543,905 tons in 1909 to 494,034 tons in 1910, of which 266,739 tons was illuminating oil, of which most went to Germany.

¹Bull. 470-I, U. S. Geol. Surv.

²Daily Consular and Trade Reports, June 5, 1911.

Designing and Sinking of Shafts

By R. G. Johnson*

Coal area, scale of working, thickness of seam, water encountered, air requirements, all must be considered in fixing upon the size and shape of a shaft. Concrete lining is widely used.

NOTE—Extract from a paper read at the summer meeting of the West Virginia Coal Mining Institute, White Sulphur Springs, W. Va.

*Engineer with Dravo Contracting Company, Pittsburg, Penn.

On the Mesabi range the cover of sand, gravel and boulders over the orebody in some localities is close to 200 ft. thick with the water level varying, but at some places 30 ft. from the surface. To sink through 170 ft. of running sand, etc., therefore requires methods which are distinctly products of later-day engineering. Formerly timber drop shafts were sunk in the shallow localities where the water was less troublesome. In the newer developments, and through the thicker overburden, concrete drop shafts are now sunk. These are concrete shells usually cylindrical in shape with a steel cutting edge, a general design of which is shown in Fig. 1. The excavating is done with orange-peel dredges and as the caisson sinks concrete is added at the top. The thickness of the shell is designed for weight to aid its dropping as well as to withstand hydrostatic pressure. Boulders,

edge of the concrete caisson. In this deck are openings, usually two in number, in which are placed flanged steel cylinders

for few men can stand the air pressure necessary to overcome the head of water at this depth.

EUROPEAN METHODS

The deep European shafts are circular or elliptical in shape and lined with brick, concrete or iron tubing. In going through wet surface a process of forcing down a steel cylinder with hydraulic jacks, sections being added at the top as the cylinder is worked down, has been used very successfully, and engineers are talking of its use in sinking some of the shafts for the Brooklyn end of the new Catskill aqueduct for New York City. The wet sand which overlies the rock on the lower section of Brooklyn is about 150 ft. thick, with the water level about 45 ft. from the surface. The lining of the European shafts, however, is different from our practice. When the

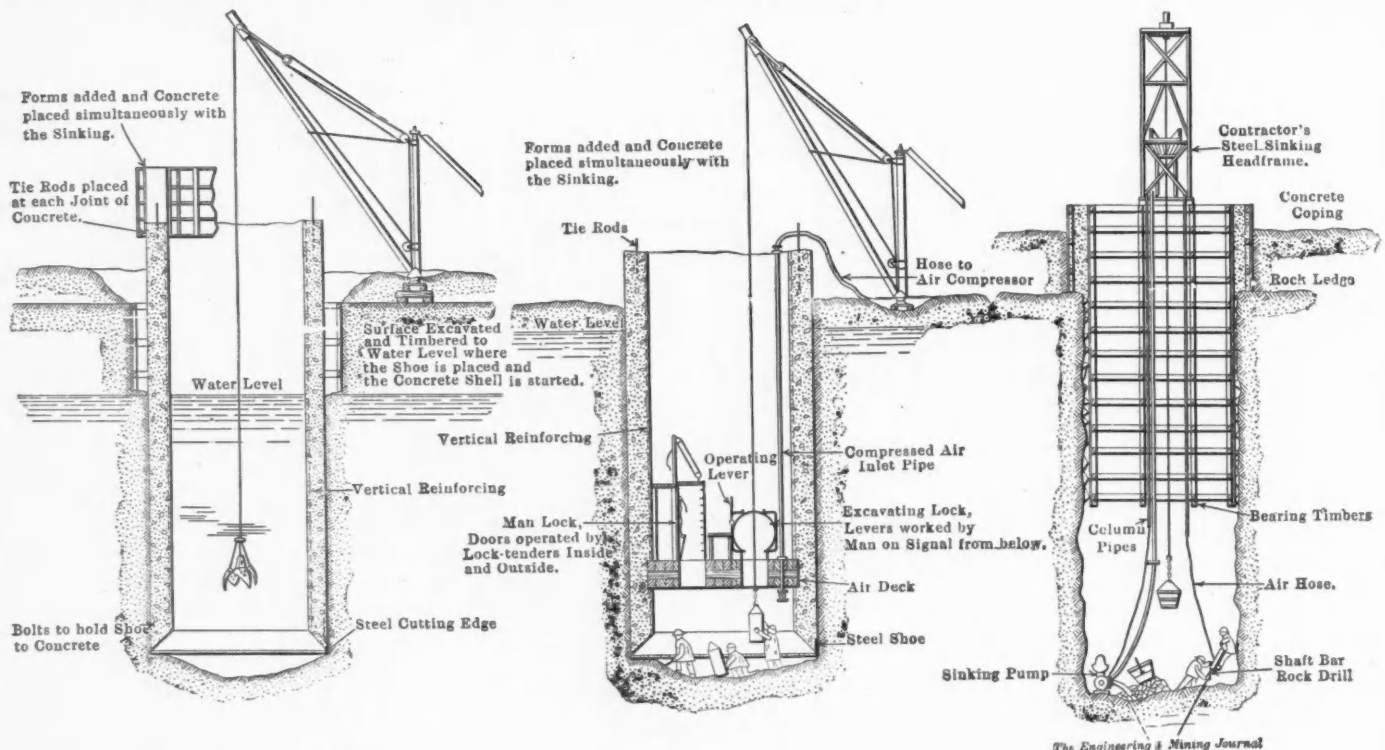


FIG. 1. CONCRETE DROP SHAFT

FIG. 2. CAISSON SINKING

FIG. 3. SINKING IN ROCK

hardpan, etc., require blasting under water.

PNEUMATIC SINKING

Many of the shafts in the Lake Superior region and some on the Mesabi range have been sunk under air pressure, and where the head of water is not too great, this is the ideal way. When the cutting edge of the caisson has reached the taconite, which is the brittle, stratified, low-grade iron ore which overlies the main orebody, it is practicable to seal it in the taconite. Referring to Fig. 2, a decking, usually of timber, is placed in the shaft 8 ft. or so above the cutting

about 3 ft. in diameter. To these cylinders are attached air locks, one arranged to permit hoisting the muck and one for the passage of men. The compressed air is admitted to the working chamber by pipes through the air deck. When the air is turned on an extra quantity is needed to "catch up," and the water is forced out of the working chamber. The men are then put through the lock for work. High pressures are dangerous and the attendant costs correspondingly high, for as the depth increases the wages per shift increase, and the length of shift decreases. The limit for pneumatic sinking is about 100 ft. below water level,

shaft is to be lined with brick the method is to lay the brick from a hanging scaffold so constructed with a hole in the center that the hoisting bucket can pass through and the sinking be carried on simultaneously with the lining process. A cast-iron ring in sections bolted together is placed on a circular hitch in the rock as a foundation for the brick work. Cast-iron tubing is placed in substantially the same manner, the tubing being in segments, machined and bolted together in the German shafts, but placed with rough leaded joints in most of the English types. In wet strata, cement grout is forced in behind the tubing.

TIMBER-LINED SHAFTS

It is seldom that shafts are lined today with the timber placed "skin to skin," that is, rings of timber placed directly on top of each other without any intermediate posts and without lagging. Timber is too expensive today to permit such extravagance.

Timber shafts are usually rectangular in shape, and to handle the many operations necessary in mining coal a shaft must have at least two passageways to the surface for the cages, a man escape way, an air way for the fan, a return air way and a pipe way. Aside from the fact that most State laws specify that there shall be two distinct openings to the surface for every mine, the shaft-bottom layouts and the plan of air courses in the mine practically dictate that the escape way and one air way shall be in one shaft and the hoist compartments and the other air way in another shaft; the pipe way may be placed in either opening according to the pump-room layout, but usually it is in the hoist shaft next to one cage way.

In designing the shafts the operator decides on a certain output per day to which his mine will ultimately develop. On his acreage, that is, the value of his holding, will largely depend the size and

ways. The size of the fan air way depends upon the number of men to be worked in the mine and whether animals are to be used for haulage. For every 1000 cu.ft of air required in the mine there should be one square foot of air compartment. If the fan is placed at the escapement shaft, usually called the air shaft, the return air way is, of course, placed in the hoist shaft. It is not necessary to partition this from the hoist compartments as is often done. Many now believe that by leaving off this partition the hoist ways can take a portion of the air and hence the return airways can be made much smaller.

The mining laws of most of the States dictate that the escape way shall be provided either with a stairway or a hoisting cage. Tennessee and Illinois specify a stairway and the former even specifies the minimum dimensions. In West Virginia the law specifies that either a hoisting way or a stairway for men shall be provided, but does not specify minimum dimensions. If a hoist way is used it should be of ample size to carry the standard mine car so that it can be used as a supply and repair shaft. Stairway compartments are usually about 6 ft. wide and the flights are placed at about a 45-deg. angle. The last of the essen-

clay likewise requires heavy timbering, for with the action of air and water it rapidly disintegrates and swells.

It therefore behooves the designing engineer to figure strongly in fire-clay country. White oak or long-leaf yellow pine, 8x10 or 10x10, are the usual requirements. These are framed in sets spaced 5 ft. center to center. Some engineers will space the timber sets on 2½-ft. centers in soft strata and it is a wise plan. Generally, with 8x10 timbers on 5-ft. centers no span longer than 12 ft. should be used. If conditions require longer spans, the timber should be heavier and the center-to-center spacing shorter. The long side timbers of a set are called the wall plates, the end timbers are called end plates or end buntons. The timber braces dividing into compartments are called center buntons or dividers and the vertical posts which separate the sets are called punch blocks. Behind the sets is placed lagging, usually 2-in. plank. (See Fig. 5).

Set accurately to plumb line and gage, the guides for the cages in the hoist compartments are dapped over the buntons and bolted to them, usually with lag screws. The guides should be the best long-leaf yellow pine and framed with exceptional care. There are several

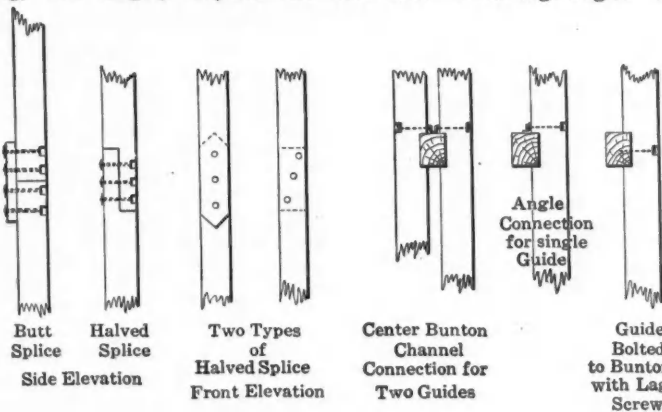


FIG. 4. TYPES OF GUIDES

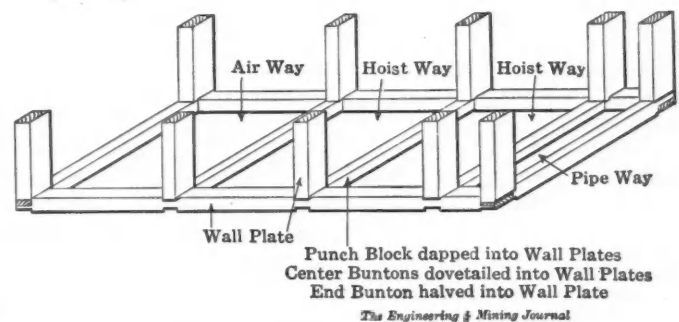


FIG. 5. ASSEMBLED SET OF TIMBERS

character of plant which he can afford to install. His daily output will determine the size and the estimated life of the mine will determine largely the character of equipment. When his output is determined, that is, the number of cars per day to be hoisted, the size of the car is computed. The thickness of the vein, or rather the height of coal to be mined, the grades, etc., determine within certain economical shoveling limits the height of the mine car and the area of the car is readily figured when its cubic contents are specified. With the adoption of a standard car, the cage dimensions are fixed and the size of the hoist ways are at once known.

With the width of the shaft determined by the cage way, the hoist-shaft air way is to be dimensioned. If the fan is to be placed at the hoist shaft the air compartment is partitioned from the hoist

tial compartments, the pipe way, is determined by water conditions in surrounding mines. If shafts are to be sunk in a new territory a pipe way should undoubtedly be placed as fast as the shaft is sunk.

TIMBER FRAMING

With the size of the compartments ascertained, the dimensions of the timbers are decided. Rock pressures are practically indeterminate. Sandstone actually requires no timbering if the walls are properly trimmed of all loose or shattered pieces. Only enough timber to support guides, air partition, stairs and pipe clamps is absolutely necessary in sandstone. In good limestone the same is true, but lime shatters more than sandstone and the scaling is too often not thorough. Limestone with fire clay, slate or sandstone is treacherous, and pure fire

schemes of splicing the guides; the simplest, which is the half-together joint, is probably the best. There are also many schemes for attaching the guides to the buntions other than direct bolting, one using angles screwed to the buntions and the guides bolted to the angles, but here again the simplest form shown in Fig. 4 is the best.

The partitions in the shaft are of yellow pine, tongued and grooved sheathing, usually in two layers of 1-in. material spiked with loose joints to the buntions. Stairways are usually built of the same material as the shaft timber, as recent tests have shown less rot from oak on oak or from pine on pine than from oak with pine.

DISPOSAL OF WATER

When water is encountered in quantities which it will be objectionable to

let fall in the finished shaft, or in quantities which will impede the progress of the sinking contractor, water rings are cut in the rock and concreted to form a drainage channel around the shaft. The general design is as shown in Fig. 6. Rings are connected to a column pipe leading to the sump in the pipe compartment of the shaft. Strainer plates are placed on each side of the outlet pipe and the lagging is left off so that the channel can be entered for cleaning. Where possible, splash boards are placed to deflect dripping water into the rings. The value of rings is often lost sight of. If the shaft is located in low ground where it is liable to influx of surface water, a ring should be placed in the first suitable rock ledge, before the water gets a chance to run through the lagging and dip into the shaft. A ring should be placed just above the coal so as to have as dry a shaft bottom as possible. On the first suitable rock in the shaft a concrete coping wall should be built as a foundation for the permanent headframe and as a retaining wall to withstand the earth pressure. Timbering at the shaft bottom is designed for cage landings and for the admission of the longest rail to be used in the mine.

DESIGN OF CONCRETE SHAFTS

In May, 1903, a contract was let for the first concrete-lined, coal-mine shafts in this country. These were sunk for the U. S. Coal and Coke Company, at Tug river, W. Va., and were practically elliptical in shape. The next few shafts were also elliptical except one or two, which were a combination of a rectangle and an ellipse, practically a rectangle with arched sides and ends, as shown in Fig. 7.

About two years ago designers grew bolder and started the construction of a pair of shafts with only the ends arched, the sides being straight, to give a surface parallel to the ends of the cages. Nearly all the deeper concrete-lined shafts have since been constructed along these general lines. The excavation is practically elliptical and this is, of course, a distinct advantage. Figuring the sides as beams the greatest thickness is, as it should be, in the center, and since the ends are arched and the thrusts are directed to the ends of the sides, that is, the beams, the assumption of the strains seems to be reasonable. In many shafts steel reinforcement has been used in the lining in soft strata.

The linings are not figured for hydrostatic pressure, and drains conducting the water to rings are usually put in. These are made of farm tile with broken stone packed around them and protected from the concrete by tar paper or corrugated iron. However, it is possible by means of diamond drill holes kept always below the bottom of the shaft to foresee excessive water troubles in most

cases. Grout machines may then be attached to pipes driven tightly into the holes and cement grout forced into the fissures under great pressure. By this process of cementation the crevices are filled and the ground made solid and dry. For sinking in a wet country it would seem a wise move to figure on such a method at the start, for not only will the shaft be dry but the money saved in pumping the shaft sump during the life of the mine will be very great. This method has been tried only once in this country to the writer's knowledge, but it was as successful here as it has been in Europe.

The concrete-lined shafts, the duntake and uptake of the huge siphons that pass under valleys and rivers for the new Catskill aqueduct, are circular in shape. Drains made of pieces of wrought-iron pipe, leading from the rock to the concrete forms, are laid in the concrete at the wet stratum and the water is allowed to run into the shaft. When the shaft is finished, grout machines are attached to the drains and cement is pumped into the crevices in the rock. This same method is used in the tunnels of the aqueduct.

METHOD OF PLACING CONCRETE

The best proportions for the concrete for linings are one part of cement, two

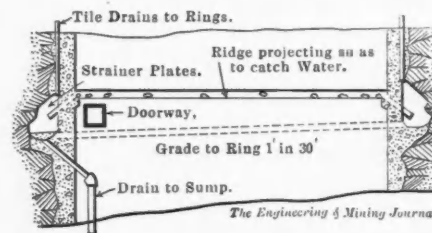


FIG. 6. ARRANGEMENT OF WATER RING

parts of sand and four parts of gravel or broken stone. If the excavation could be cut accurately to dimensions, the cost of lining with concrete would be no more than with timber. But the actual concrete to be placed is about $2\frac{1}{2}$ times the theoretical quantity, due to slippages and the scaling of shattered rock from the walls, a thorough performance of the latter job being essential with concrete lining. In fact it is more than probable that the natural tendency of soft strata to break back, due to disintegration and slipping, and the consequent thick lining at these points is the reason that no failures of lining are reported. It is customary to embed one-man stone in the concrete back of the theoretical lines, as being a cheaper, yet substantial form of back-filling.

If all the minute air bubbles could be removed from the concrete it would be absolutely impervious to water, but this is rarely possible. The concrete should be mixed fairly wet and placed in comparatively thin layers. It should be

spaded well, for only by thorough spading can air bubbles be worked out.

BUNTONS FOR CONCRETE SHAFTS

Opinions vary regarding the buntons for concrete-lined shafts, and cross-sections of several that are in use are shown in Fig. 8. By far the cheapest and certainly a satisfactory form is the timber buntun. The all-steel buntun has many advocates, but the arguments against it are many. In the first place it costs about four times as much per foot of shaft as the timber buntun, if only a 35-lb. section is used. Secondly it is necessary to allow for corrosion, necessitating a heavy section. One company in West Virginia uses a center buntun weighing about 96 lb. per foot. If a steel buntun is selected, the Bethlehem Steel Company's H-section is probably the best made, since it is ideal in shape and is rolled in a manner to give an even stress throughout the section. In the next place the procuring of new steel buntuns in case of wreck takes longer than the procuring of timber.

The strongest argument for the use of the steel buntun is its fireproof qualities, but whether any fire hot enough to burn out timber buntuns, wet from shaft water and from cage drippings and spaced 5 ft. apart in a concrete lining, would not warp and twist steel buntuns until they would have to be replaced is a question for the mine-fire expert. A reinforced-concrete buntun seems ideal in many ways and its cost would be no more than an all-steel buntun of standard section. A small steel I-beam or H-beam wrapped with expanded metal and incased in concrete seems a good design. Buntuns of this type are being placed in some Indiana shafts now in course of construction. If necessary to place a partition in the concrete-lined shaft, tongued and grooved pine sheeting is spiked to the buntuns, if they are of timber. In some cases a reinforced-concrete partition wall has been built, making the shaft absolutely fireproof. The new State mining law of Illinois specifies that the shaft in all new mines shall be of entirely fireproof construction.

WOOD VS. STEEL GUIDES

Guides for concrete-lined shafts are of practically the same form as for timbered shafts. One company in the South has made a radical departure in using a steel H-section with cast-steel, saw-tooth racks riveted to the web on both sides of each guide to engage safety dogs, in case of emergency. Besides costing many times as much as timber guides it does not seem to be as practicable. The steel dogs of a cage that is starting to fall gripping into timber guides will cause less damage than steel dogs thrown into the teeth of a steel rack. The dynamic force of a loaded cage, dropping only a few feet, is terrific and if stopped sud-

denly, as with a steel rack, something is going to break. The rings in concrete-lined shafts are the same as in timbered shafts, being practically catch basins running around and behind the concrete lining and piped to the sump.

Concrete-lined shafts permit of exceptionally good arching plans for the shaft bottom, quarter bends in the concrete making ideal air courses and providing ample space for handling of rails from the cages into the mine. The nature of the roof will, of course, determine the thickness of the arches and the necessity for reinforcement.

METHOD OF SINKING IN ROCK

A description of the usual methods of sinking in rock may be informative. The earth surface is excavated, dimensions being ample to allow for concrete coping

are again working, the men muck for the last bench, which is drilled, fired and mucked. The process is then repeated. Of course, there are many hitches in this scheme at times, crevices in the rock and soft strata often causing shots to break poorly, expending their force in strata beneath the bottom of the shaft. Ten-foot holes usually pull from 6 to 9 ft. of shaft, depending on the nature of the rock. The wise superintendent always has muck for the muckers, and the shift is regulated with this in mind.

The nature of the ground determines the distance the sinking can proceed before it is necessary to stop to timber. Bearing timbers are placed in hitches cut in the rock directly in line with the buntons. The character of the rock determines the depth of the hitches. These bearing timbers, usually called "dead logs," are lined, leveled and blocked and a set of timber placed on these as a foundation and wedged to line. The timbering is then built up and lagged. The space behind the lagging, which is spiked to the sets, is filled with saw-mill slabs or other suitable packing, to keep loose rock from falling behind the timbers. Practically the same method of lining is followed when a shaft is to be concreted. A platform is built on dead logs hitched in the walls and the forms started with the platform as a bulkhead. The forms are usually made in slabs as high as the distance from center to center of the buntons, which are concreted in place.

CONCRETE VS. TIMBER

There is no doubt that the concrete-lined shaft is the ideal form, the question of its adoption in place of the timber-lined depending on the life of the mine and the policy of the company. Long-leaf yellow pine and white oak will last from 20 to 25 years in a shaft. If the coal will last longer than this the lining should be of concrete, for not only will retimbering cost more than the excess cost of concrete at the time of sinking, but the shutdown of a mine for repairs at possibly a busy season would soon prove a rapid money loser. Again, fire may hasten the retimbering date and fire shows no partiality for dull seasons. However, doubts regarding the advisability of sinking concrete-lined shafts are rapidly disappearing and in nearly all the large developments lately this type has been specified.

SPEED OF SINKING

The question of speed in sinking is of biggest importance to the operator. With the interest charges amounting to several hundred dollars a day on a high-priced coalfield, it is readily seen that the speedy contractor is the one to employ at almost any reasonable figure. An average of 70 ft. sunk and lined is a fair monthly rate of progress in comparatively dry shafts. This is often exceeded

and just lately 183 ft. was sunk in 27 working days in hard granite on the New York aqueduct at Storm King, N. Y. Such progress has never been made before in this country in hard rock, although very good records have been made in the soft shales in Kansas and in southern Illinois. In South Africa, 213.5 ft. was sunk in one month in the New Kleinfontein shaft on the Rand. This work was carried on by three eight-hour shifts working for 31 days and is the world's record. It must be understood that these records are made only in dry shafts. With 150 gal. per min., 50 ft. advance per month is fair; with 500 gal. per min., 25 ft. per month is good sinking. Cameron pumps are used largely in sinking for they have long since proved their undoubted worth in such construction. Since sinking through increased quantities of water causes an extra cost the equity of the water clause in the contract is readily seen. This clause provides for extra payment for excavation done under conditions which necessitate the pumping of certain specified quantities of water. The

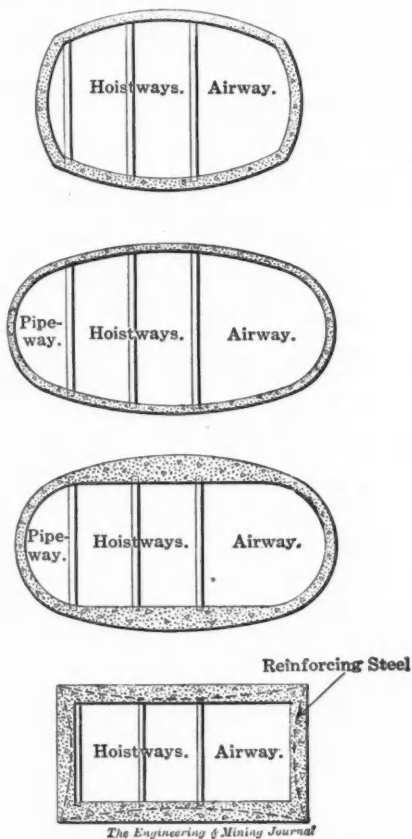


FIG. 7. TYPES OF CONCRETE LININGS

and headframe foundations. Rock drills, operated by compressed air, cut lines of holes at angles to blast out a sump. The holes are usually 8, 10 or 12 ft. deep, according to the size of the shaft. Pumps are then taken out of the shaft and the holes fired by battery or dynamo. The shooting of the sump fills the shaft with muck to a depth of 4 or 5 ft. As soon as the powder smoke permits, pumps are lowered and connected, and all hands muck at one end to find the solid, when the drills are again set up and the first bench drilled. Enough men are employed to muck the sump completely by the time the first bench is drilled and loaded. As soon as the bench is fired and the pumps

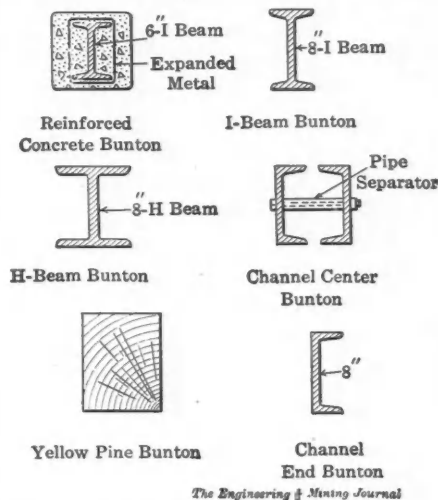


FIG. 8. BUNTONS FOR CONCRETE SHAFTS

contractor naturally bids lower when a water clause is included in the contract for he does not figure on nearly so great a risk when the greatest danger, water, is taken from the list of contingencies.

TIMING THE OPERATIONS

It is most important to start shafts at the proper time in reference to the other contracts for the plant. The power plant should be completed by the time the shafts are bottomed. The engines should be ready to operate and even the headframe can be built while the contractor is sinking. If all shafts were dry these points would not be vital, but since the dry shaft is so rare it is a question of either letting the pits fill up with water or renting the contractor's equipment. This may seem an easy matter to fix, but in only about one case out of four has it happened that the coal company was ready to take over and operate the shaft

with its own machinery. It costs no more to have engines set up a month before the shafts are bottomed than a month afterward, as far as the engines are concerned, and the money saved by not having to pump a drowned shaft, or by not renting boilers, engines and pumps, equals the profit on a good many cars of coal.

"WASTE" OFTEN AN ASSET

The disposition of the muck from the shaft is another point that can make or lose money for the coal company. Tipple piers, engine foundations, fan foundations, etc., should be built as soon as the shafts are started and the muck from the shafts filled in around them to grade. Distributing the spoil at random and then excavating for foundations through the rock dump is done surprisingly often.

The sinking contractor can even fill for the railroad for three or four hundred feet on each side of the shaft at little extra cost, yet this is often lost sight of and costly fill is borrowed. A judicious use of excess spoil from shafts will often turn a rough, hilly location into an admirable plant layout, convenient for mine-car repair tracks, mine buildings, etc., at a small cost. In most cases shaft muck is an asset and not a spoil.

Briquetting of Lignite Coal

The Bureau of Mines has been conducting a series of experiments at the Pittsburg testing station, looking toward the development of a satisfactory and economical process for manufacturing briquets from lignite coal. Recent reports say that the experiments have reached a stage where it is assured that such briquets can be made successfully and at a low cost.

Compared with the commercial grades of anthracite and bituminous coal, lignite in its native state is a poor fuel. It has a tendency to slack soon after being mined, which causes difficulties in transporting it, and it does not burn readily on account of the presence of between 30 and 40 per cent. moisture contained in it. In previous experiments in briquetting this material, the cost of the pitch which was used as a binder was found to be prohibitive. By the new method, the briquets are made without the use of a binder. This has been accomplished with the aid of a powerful machine imported from Germany.

It is estimated that the cost of briquets, loaded on cars, from a plant situated at the mines, is \$2.51 per ton in Texas, \$3.53 in North Dakota and \$5.24 in California. This cost applies to briquetting run-of-mine lignite to increase heat value and weather-resisting properties rather than to briquetting slack or waste coal. It has been said that there

are 150,000 square miles of land in the northwest which are underlain by lignite coal. Remembering this, the field for lignite briquets can be readily understood, if the process in question is successful.

A Coal Deposit of Unusual Thickness

BY E. JACOBS*

At the joint session of the American Institute of Mining Engineers and the Western Branch of the Canadian Mining Institute, held in Spokane, Wash., in September, 1909, William Fleet Robertson, provincial mineralogist for British Columbia, was asked by Dr. D. W. Brunton, president, to tell the meeting something of the occurrence of coal at the Corbin Coal and Coke Company's mine in southeast Kootenay, B. C. He did so, but first expressed his regret that he had been called upon to speak on this subject, since he felt that those present would hardly believe what he had to say concerning the size of the deposit of coal opened in the Corbin company's mine. When he was at the mine on an official visit two months previously he saw coal 175 ft. in thickness. He had that day been informed by the managing director of the company that the width was now fully 200 ft. In reply to an inquiry put to him by that official as to his opinion of the best method of working this coal he had, in all seriousness, suggested "glory-holing" it.

When in Spokane on June 24, the managing director of the Corbin company informed me that the maximum width of coal afterward developed in the part of the property referred to by Mr. Robertson was quite 300 ft. This great width did not continue, however, for as the main entry was advanced, what appeared to be a point of rock was encountered and as this widened the coal narrowed. The entry had not yet been driven beyond 2000 ft. from its portal, for so much coal had already been made accessible for mining that there was no need to open the mine further, only to have to maintain in good condition workings that for the present there was little use. Exploratory work to date, though, had not determined the nature of the occurrence of coal, for it was thought probable the rock intrusion would be eventually found to give place to coal farther in the mine.

Another problem has presented itself in connection with the working of the mine. At an altitude of 800 and 1200 ft., respectively, above the level of the main entry, there occur on Coal mountain what are known as the "lower big showing" and the "upper big showing." Both of these have, during the last six months, been prospected to some extent. From

the bottom of a short incline sunk to the coal a crosscut was driven 96 ft. in coal before rock was met with. Analyses of samples taken over each 10 ft., some of them in duplicate, all gave good results. The general average and the highest of the 12 analyses embracing this thickness of coal were as shown in the accompanying table.

Constituent	Average Per Cent.	Highest Per Cent.
Moisture	0.87	0.45
Volatile combustible	18.47	15.70
Fixed carbon	67.86	77.40
Ash	12.80	6.45
	100.00	100.00

The highest was obtained from the last 9 ft. of coal, before the crosscut entered the rock.

The "lower big showing" was crosscut from the surface, the drive being in coal a distance of 370 ft. before slate was encountered. The general average of 37 analyses of samples of each 10 ft. of coal was as follows: Moisture, 0.73 per cent.; volatile combustible, 20.02; fixed carbon, 64.25; ash, 15; total, 100 per cent. The highest results were from a sample taken at 20 to 30 ft. in the crosscut.

The "lower big showing" coal is overlain by wash, through which prospect pits were sunk to depths varying to 15 ft. The pit above where the crosscut ran into slate is at a vertical height of 200 ft. from the crosscut. As the coal is found in pits higher up the hill, it has not yet been taken for granted that none would be found on the crosscut level if that were extended further.

As a preliminary to working this enormous deposit of coal it is proposed to hydraulic the wash off the coal, there being a sufficient head of water obtainable higher up the mountain to admit of this being done. Then the coal will probably be quarried, and conveyed by gravity tram around and down the mountain to the tipple, the level of which is 500 ft. below that of the main entry of the mine. The coal from the latter, having to be handled several times before it reaches the railway cars, becomes too small for some purposes, and this is a disadvantage for, though a good class of bituminous coal, it will not coke. With fewer handlings the coal from the two "big showings" will be loaded on railway cars in better condition for general market requirements.

Work has been started on the mine-rescue station in Birmingham, Ala., and it should be completed within another month. The building will be of brick and concrete, and will be two stories in height. It is believed that a little later the Government will station a mine-rescue car in this district. R. A. Brown, an experienced miner, is in charge of the mine-rescue station.

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i PERSONAL i

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Lewis T. Wright left San Francisco July 18 for a trip to Asia.

Dr. F. G. Clapp, consulting geological engineer, is in Pittsburg, Penn., for a few days.

W. R. Ingalls expects to spend the week of Aug. 6-12 at Houghton, Michigan.

C. F. Dietz and D. V. Keedy, of Boston, have gone to Joplin, Mo., in the interest of some Boston people.

Gustave M. Gouyard has returned to New York after a two-months' trip to Sonora and Chihuahua, Mexico.

A. B. Willmott, consulting engineer, of Toronto, is in the Sudbury district, Ontario, making an examination of some iron properties.

J. B. Cleveland, late of Arizona, has been appointed manager of the West Dome mine, Porcupine, Ont., to succeed the late R. A. Weiss.

A. Anrep, peat expert of the Mines branch of the Canadian Department of Mines, is in Manitoba examining the peat bogs of the province.

J. B. Tyrrell, of Toronto, Ont., has left for a short visit to England. His address will be 224 Salisbury House, London, E. C., for the present.

William Fleet Robertson, provincial mineralogist of British Columbia, is doing field work around Hazelton, in Skeena river district of that province.

R. B. Lamb, of Toronto, Ont., has left for an extended trip to Cobalt, Porcupine and Swastika, to inspect properties with which he is connected, and will make several examinations.

H. J. Wallace is now with the Mason Valley Mines Company at Thompson, Nev., as superintendent of construction of the new smelting plant which the company is building there.

Edward L. Dufourcq left New York July 22 for Utah, to make an examination. He will go thence to Sonora, Mexico, expecting to be back in New York by the middle of September.

W. H. Trewartha-James, general manager of the Tyee Copper Company, has returned to Victoria, B. C., from a trip to southeastern Alaska, southern Yukon, and northern British Columbia.

J. J. Chisholm, formerly with the Westinghouse Electric and Manufacturing Company, is now superintendent of power for the Tennessee Coal, Iron and Railroad Company at Ensley, Alabama.

W. A. Grieves, of the Jeffrey Manufacturing Company, Columbus, O., has been appointed by the governor of Ohio a member of the board of awards under

the new employers' liability law of the State.

Donald G. Forbes, formerly general manager for British companies owning several silver-lead mines in Lardeau district, British Columbia, has returned to Victoria, B. C., after an absence of about a year in Great Britain.

Horace H. Howard, consulting engineer for the Globe Exploration Company, is at present doing special consulting work in the Porcupine district, in Ontario. He was in Porcupine at the time of the disastrous forest fire and narrowly escaped death.

F. Justice Grugan has recently completed the examination of iron ore properties in Virginia for a large furnace company, and left July 25 for an extended trip to the West. He will return to Philadelphia in September after examining mines in Idaho, Utah and Colorado.

D. A. McMillen, chief consulting engineer of the Globe Exploration Company, New York, is at present spending a few weeks in central and southern Mexico, where he is examining properties for his company. About Aug. 1 he will go to Sonora where he will continue his investigations and examinations of certain silver properties.

L. R. Lemoine, president of the United States Cast Iron Pipe and Foundry Company, together with several other officers and directors of the company, spent several days of the past week in the South, visiting plants at Chattanooga, Anniston and Bessemer. A couple of days were spent in Birmingham and the immediate Birmingham district.

Milton H. Fies, general superintendent of coal mines for the Birmingham Coal and Iron Company, secured the highest grade in the examinations recently held by the new Alabama State mining board for first-class mine foremen certificates. He secured something over 98 per cent. Out of 107 men examined for first- and second-class mine foremen and fire-boss positions less than fifteen failing to get the desired certificates.

+ OBITUARY +

Robert Weiss, manager of the West Dome mine at Porcupine, Ont., was killed at the mine in the forest fire of July 12. He was 60 years old and had had many years' experience as mining engineer and mine manager. He lived at Butte, Mont., for several years.

Nathan Haas was drowned July 12, while trying to escape from the forest fire in the Porcupine district in Ontario. He was 36 years old and was a graduate of the Michigan College of Mines. He was for some years at Spokane, Wash., but went to Porcupine five months ago.

Francis M. Osborne died at Toledo, O., July 16, having been taken ill suddenly while on his way from Cleveland to Chicago. He was born in Ohio and began his career as a coal operator at Palmyra, O., where he owned a small mine. Later he became interested in the Pittsburg district on a large scale and for years was one of the leading factors in that section, operating the West Newton mines in the Youghiogheny valley. He was ranked among the larger operators 20 years ago; he was instrumental in forming the Pittsburg Coal Company and was its first president. He resigned after two years' service and organized the Youghiogheny & Ohio Coal Company, with office at Cleveland. At the time of his death Mr. Osborne was president of 12 corporations and director in nearly as many more. He was at the head of the Youghiogheny & Ohio, the Beaver Dam Coal, the Big Vein Coal, the E. N. Boggs Coal, the Gilchrist Transportation, the Globe Steamship, the Lake Shore Transit, the Lisbon Coal, the Lorain Steamship and the Trumbull & Mahoning Water companies. Six years ago he helped form the Pittsburg Vein Coal Operators' Association and was president of that organization until quite recently. He always figured prominently in wage negotiations with the miners, acting as one of the chief spokesmen of the Ohio operators.

SOCIETIES and TECHNICAL SCHOOLS

Canadian Mining Institute—The next general meeting of the western branch of the Institute is to be held at New Denver, Slocan Lake, B. C., about the middle of September. Papers dealing with mining and milling silver, lead and zinc ores in Slocan district, with experiments in smelting zinc ores, and with the topography, geology and mineralogy of the district, will be read and discussed. Robert R. Hedley, Vancouver, is chairman of the branch, and E. Jacobs, Victoria, secretary.

International Geological Congress—The executive committee having in charge the arrangements for the Congress to be held in Toronto, Ont., in July, 1913, has decided that there shall be three series of excursions, one prior to opening the sessions in Toronto; another, to consist of short daily outings, while the Congress shall be in session; and the third after the close of the formal sessions. These excursions will give those attending the Congress opportunity to visit practically the whole of the more accessible portions of Canada. A committee, consisting of G. G. S. Lindsey, D. B. Dowling, Chas. Fergie, Jas. McEvoy, and Dr. J. Bonsall Porter, has been appointed to prepare a monograph on "The Coal Resources of the World," in two large quarto volumes, the same to be printed before the Congress shall be opened.

Editorial Correspondence

San Francisco

July 19—The State supreme court, in a decision affirming the judgment of the superior court of Trinity county, holds that an agricultural patent is ineffectual to transfer any title to such portion of the patented land which may contain mineral deposits known to exist at the time the patent was issued. The title of the case in the supreme court is "H. J. Van Ness, plaintiff and respondent vs. John Rooney *et al*, defendants and appellants." The Central Pacific Railroad Company obtained U. S. patent to the land on which the controverted portion is situated, Feb. 14, 1896, under its land grant from the Government, and subsequently conveyed it to the defendants in this action. Prior to the patent issue, on Aug. 26, 1895, one Baker located a quartz mining claim, which he subsequently conveyed to the plaintiff in this action. The trial court awarded the land to the plaintiff as the evidence showed the lands were actually held under location and known to be mineral at the date of the railroad patent, and such lands are under the law excepted and reserved from such patents. Should the State courts be sustained by the U. S. supreme court in thus defining the rights of prior mineral locators on odd sections of land granted to the railroads, the interesting sequence would be the judicial disposal of such mineral deposits that have been abandoned by the locators upon the succession of the railroad patent. The logical inference might be that such abandoned claims should revert to the Government and be again open to location. On the other hand the logical not being always the just inference, it may be well contended that the locator, having abandoned his mineral claim under a misapprehension of his rights, is himself entitled to relocate the abandoned claim. By the establishment of this law, as construed by the State supreme court, the mineral locator who seeks to maintain his right to the lands so located may be able to procure relief from the demands of the railroads or their grantees by direct action of the State courts. The conclusive jurisdiction of the U. S. Land Office has so long been conceded, and so generally accepted, that heretofore mineral claimants of such lands have submitted that railroad patents were not subject to collateral attack in the State courts, and have looked for relief through actions brought by the Federal Government to vacate the patent on the ground that it was obtained by fraud, a method of procedure both expensive and uncertain. This law, if maintained by the highest court, will affect a large aggregate area of land still held by the railroads, and

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World



others to which titles have been given by the railroads to innocent purchasers, which titles are thus held to be invalid. This decision and its effect further illustrate the imminent need for a thorough revision of the mineral land laws, not alone those of California, but of every mineral-producing State, and such revision should not contemplate one class of legislation for petroleum and another for metallic and nonmetallic substances, as is now being considered by the proponents of the oil-land leasing system. Just as well make one law for railroad lands containing mineral and another for Government entry lands.

Denver

July 22—On account of the increased demand for tungsten ore by the Pennsylvania steel works, the tungsten mines and mills at Nederland will open next week. The principal mill to reopen is the Wolf Tongue, the largest in the United States. Tungsten dropped so in value a few weeks ago that the mines and mills closed down until a rise in price should come. A new schedule has been received by Manager William Loach, which goes into effect at once. Nederland is recognized as the leading tungsten mining area in the world, while the Boulder county mine is said to be the deepest tungsten mine. When tungsten was listed at \$11 per unit four years ago, Nederland was one of the most prosperous mining towns in Colorado, and with the new demand for the ore it will probably forge ahead again.

According to latest measurements made from the flow from the portal of the Roosevelt deep drainage tunnel at the end of the first half of July, there is about 5800 gal. of water per min. flowing, or just the same as was reported at the first of July. The water is receding in the mines of the district at the rate of a foot per week, which is the lowest recession since the El Paso well was connected with the tunnel. The seepage water, which is carried out through the tunnel, amounts to about 1000 or 1200 gal. per min., and the additional 4800 gal. is

from the main body of water. The seepage-water estimate is made from the flow from the old El Paso tunnel. For several years there came from this tunnel about 1200 gal. per min., and it is believed this is the total seepage in the district. The committee to secure money to be used to run the tunnel another 1200 ft. into Beacon hill, has made no report as yet, but its members are working to get the money.

Butte

July 19—In the case of the Anaconda Copper Mining Company against the Modida Trust, James A. Murray and others, an order was signed on July 13, by Judge Lynch, of Butte, modifying the terms of the injunction issued about a year ago to prevent the defendant company from working the Ticon mine. It is claimed by the Anaconda company that the Ticon was taking ore from its ground and the court ordered an injunction to be issued, but a recent application was made to the court by the defendants to sink their shaft 350 ft. farther, for the purpose of demonstrating a counter claim, that the plaintiff company has been entering the defendant's ground, and Judge Lynch modified the injunction order to allow of the work being done, with the understanding that all ore taken out by the Ticon people should be stored, pending final determination of the suit.

The annual convention of the Western Federation of Miners will be held in Butte for a period of three weeks, beginning July 17, and for the first time in the history of the organization a reunion will be held in the city which fostered the first beginnings of the now powerful and far-reaching brotherhood. There will be between 120 and 125 delegates from all over the country in attendance.

Salt Lake City

July 20—The director of the U. S. Bureau of Mines, Joseph A. Holmes, arrived in Salt Lake City July 10, to investigate local mining conditions and to meet mining men in this part of the country. The work of the Bureau has so far been concerned with mine accidents and fuel investigations, and although, at present, work in regard to metals is outside of the scope of the Bureau, Doctor Holmes is in favor of investigations that will help to upbuild and develop the western metal-mining industry. The field offered for these investigations includes the question of the waste that occurs in mining and metallurgical operations, and in the treatment of the waste, seeking to make it a profitable byproduct, also the question of more uniform methods of sampling and assaying. The latter

should be of interest to the small producer who is certain that he is being "skinned" by the smelter, especially in regard to the moisture contained in the ore. This is usually determined by a hand sample, depending on the personal equation of one man; the sample being taken with a small shovel or scoop in such a way as to include more of the fines than lumps and, if there is any uncertainty in the results, it is not in favor of the shipper. Uniform sampling of shipments under the direction or supervision of the Bureau would be welcomed by the western ore producer. While here Doctor Holmes visited Bingham, the Utah Copper mills, and the smeltery at Garfield, also the United States Smelting, Refining and Mining Company's Midvale smeltery, baghouse plant and zinc concentrator. Conférences were held with John Dern, president of the American Mining Congress, and with Secretary J. F. Callbreath and other mining men, in regard to the possible work and needs of the Bureau. Doctor Holmes left July 12 for Butte and Alaska.

The Junior mining engineers of the University of Utah spent six weeks in the Tintic district doing surveying work under Professor Ketchum. Both underground and surface surveying were done at the Bullion Beck and other properties.

Deadwood

July 21—Continued dry weather has decreased the water supply in this district, and serious trouble may result if rain does not fall soon. The mills are in some instances conserving water at every possible point, and utmost economy is necessary in order to keep the plants running at full capacity. The Consolidated Power and Light Company is feeling the effects of the shortage both at its Red-water hydroelectric plant and at the Pluma steam generating station. At the latter plant there is a shortage of condenser water. There have been no serious forest fires for about a month.

The Mogul Research Society has been formed by employees at the Kildonan mill of the Mogul Mining Company. Many of the members are college men employed in various capacities about the plant. A laboratory has been fitted up in which have been installed a rack for percolation tests, two experimental Pachuca tanks, drying hood, analytical balances, a commodious and well arranged working table and a special machine for making filtration tests. Additional apparatus will be added from time to time, as needed. Monthly meetings will be held, at which discussions and papers will be the features.

Duluth

July 20—While the Mesabi range as a whole is at present more than ordinarily quiet, this is especially noticeable in the district of which Virginia is the center.

The Oliver company is confining its efforts here to its short-term leases and the independent operators are having great difficulty in selling the ore which they are mining, notwithstanding that their output this season will show a curtailment from last year's tonnage. A number of the mines are closed down, and most of those that are still open are being worked with greatly reduced forces. Operators like Jones & Laughlin, that usually crowd their mines to the limit, are availing themselves of the opportunity to conserve their reserves, and wherever possible are buying their ores at greatly reduced prices from those who must mine and ship. There is still a feeling, however, that the ore business must improve later in the season.

Hancock

July 21—The hammer and drill contest held by the Hancock home-coming celebration on July 21 for the John D. Ryan prize of \$1000 was won by the Butte team, consisting of John McCormack, H. J. McLain and Michael Kinsella. There were six teams entered and each team drilled for 15 min. on a granite rock, using a 1¼-in. drill to start and finishing with a ¾-in. drill. The Butte team succeeded in drilling 59¼ in. and the team representing the Tamarack Mining Company was second with a depth of 54¾ inches.

Cobalt

July 25—During the six months of the present year ended June 30, 11,980 tons of ore were shipped by 30 mines from the Cobalt camp. This is a decrease of 2890 tons over the corresponding period for last year, but on account of the greater tonnage of concentrates shipped, the total value is higher.

The purchasers of the Cobalt-Central mine plan a reorganization of the affairs of the company whereby the old shareholders may participate. A new company will be formed to take over the property, and the old shareholders may join in the new enterprise by subscribing for stock at 25c. per share, the subscription basis not being in proportion to their holdings of the old stock. The only limitation is that the minimum subscription be not less than 10 per cent. of the par value of the old shares. The reorganization calls for a company capitalized at 1,500,000 shares, par value \$1, of which 500,000 shares will be left in the treasury for future needs.

Considerable interest has lately developed in the Nipissing, on account of the decided weakness of the stock. To date, for the present year, the mine has shipped 1790 tons of ore as against 2997 tons for the corresponding period of last year, but the decrease in shipments is offset by the large amount of bullion produced in the company's own plant. A comparison of the statement of condi-

tions as of July 1, 1910, and July 1, 1911 shows that the company is \$227,443 better off in cash assets now than it was a year ago.

Chihuahua

July 17—Four camps in this state are now affected by labor strikes, Cusihiirichic, Naica, Almoloya and Parral, the last the least of all, but at the first three named their largest and most productive mines are closed down. The Chihuahua smeltery remains shut down and while many of the striking peons have offered to return to work at the old wage the company is averse to starting until it is sure of a sufficient force to operate at least three furnaces, and hence no date for blowing in is announced. Inasmuch as the strikers are weakening in almost every instance, and the number of unemployed has increased considerably since the mustering out of the *Maderista* forces it is not believed that the mines will suffer for any great length of time—not longer, in any event, than until October when the national elections will be held. The Terrazas camp shows considerable improvement; two lead properties are sending out ore and plans are being made for the operation of the mines and reduction works of the Rio Tinto Copper Company, of which R. B. Hutchinson is manager. The cyanide plants in the western part of the state are operating regularly and at about normal capacity.

Dr. Fred S. Pearson, of the Pearson lumber, oil and railroad companies, passed through El Paso recently on his way to Casas Grande. Doctor Pearson states that the 25-mile gap in the line of the Mexico Northwestern railway will be completed as soon as possible and that he anticipates that trains will be running from Juarez to Chihuahua by December via Madera and Guerrero. This line is a portion of the road projected from El Paso to the Pacific coast. In addition three extensions are projected: One from La Junta to Agiabampo, another from Pinos Altos to Tonichi and a third from a point 25 miles north of Madera to Agua Prieta across the boundary from Douglas, Ariz. These branches, together with the parent road, will tap the richest portion of the mineral belt of Sonora and Chihuahua and in addition the Tonichi line will touch the coalfields of Sonora.

Despatches from Mexico City indicate that there is considerable opposition to the transfer of the Pearson concessions to the Standard Oil people. Outside the Mexican Petroleum Oil Company, of Doheny and Canfield, the oilfields of Mexico are controlled by the Pearsons and the Standard Oil people and their consolidation under the former concessions is a factor in the politics of the new Mexican republic. Representations are being made to the British government in favor of the Pearson companies and the outcome is being watched with interest.

The Mining News

Alaska

Brooklyn Development—This company has finished the installation of its stamp mill. K. A. McVean, Knik, is manager.

Mile Four Mining—A crew is at work on this property, and Jack Hennessy, Seward, is considering the installation of a stamp mill.

Williams-Gentzler—A survey is being made on this property, near Valdez, for a tram system. A shipment of ore is being assembled for the Tacoma smeltery, and if the returns justify, the property will be equipped with stamps. James M. Hall has charge of the work.

Arizona

COCHISE COUNTY

Operations at the Gundaker properties continue steadily and a 50-ton concentrator is to be erected. A railroad is also one of the future possibilities. S. W. Gundaker is manager.

Joe Larrieu, of Paradise, and H. Hickey, of Ray, have recently purchased in El Paso, machinery for a 100-ton concentrator to be erected in the Paradise district. The company will handle its own and custom ores and it is hoped that a revival of the district will result from the erection of this plant.

Commonwealth—Work has been resumed at this property.

Calumet & Arizona—Operations at the Calumet & Arizona-Superior & Pittsburg properties following the consolidation show no material change. The usual tonnage of about 1500 tons daily is being shipped to the smeltery at Douglas from the Hoatson, Irish Mag, Oliver and Junction shafts. The first two named produce oxide ores, the Oliver produces both oxides and sulphides and the Junction mine, which is being worked at the greatest depth of any mine in the Warren district, produces heavy sulphides. As yet construction at the Douglas reduction works has been limited to grading and filling near the old smeltery site. The plans call for the installation of blast furnaces, reverberatories, roasters and a bedding plant similar to that at Cananea. About all that will remain of the old works will be the engines in the power plant. These changes will take about a year to complete and will involve the expenditure of about \$1,000,000 or \$1,250,000. The stack at the smeltery will reach a height of 300 ft. At the present time the lack of adequate storage facilities for the ores and for the proper mixing of them has been a great disadvantage. It has made it necessary to rush the mines to carry over the Sunday layoff in force at these properties and to keep the oxide and sulphide ores separated in shipping.

Reports of New Enterprises. New Machinery. Installations. Development Work and Property Transfers. The Current History of Mining

California

AMADOR COUNTY

South Eureka—This company is unwavering the Oneida mine, an adjoining property on which the South Eureka is reported to have a purchase bond.

Bay State—This mine, known also as the Rhetta, near Plymouth, has been sold at public auction for \$40,000 to satisfy judgments held by the Stockton Savings Bank. A. Levinsky, Stockton, made the purchase on behalf of the creditors.

South Jackson—Development work has been started at this mine, opening ground for a three-compartment shaft. A gasoline hoist and machine drills will be installed. The shaft will be sunk to 1000 ft. Adam Huberty is superintendent.

South Amador—Grading is being done for foundations for compressor and transformer house. Electrical machinery has been ordered. This mine was formerly known as the Amador Queen and includes that claim, the Doyle and others, embracing 100 acres. J. McSorley is superintendent.

COLUSA COUNTY

Ruby King—Development of this property for copper ore has disclosed a body of red ochre of commercial grade. Should the quantity warrant it, the company will install a mill. The development is reported to have proved that the property would not pay as a copper mine.

MONTEREY COUNTY

Native Copper Mining Company—This is a new incorporation, chiefly composed of Coalinga men organized to develop the Copper King, Native Copper and other claims on Table mountain. W. H. Kerr, of Coalinga, is president.

NEVADA COUNTY

Delhi—Surveys are being made for an electric-power plant for operating this mine that was recently closed on account of lack of power which was formerly obtained from the Northern Water and Power Company. The mine is owned by

the St. Gothard Consolidated Gold Mining Company, North Columbia, which owns water rights in Bloody Run. Hamilton Eddy is superintendent.

Pittsburg—The cutting of the station on the 1300-ft. level for installation of a new engine is about completed. A 200-ft. winze is being sunk, which will be finished by the time the machinery is in place. A recent disclosure of a fine shoot of ore on the south side of the shaft induced these improvements.

Alta—This gravel mine in the Rough & Ready district is reported to have been sold to O. Scribner, vice-president of the Associated Oil. This mine was opened 30 years ago and has been a big producer.

Champion—The first payment by the North Star Mines Company has been made on the purchase price of this property which has been under bond for the last six months.

SHASTA COUNTY

I. O. Jilson, managing owner of the Gladstone mine, has purchased the Breslauer tract of land adjoining the Gold Leaf mine near Redding; the price is said to be \$5000.

The proposed closing of the Balaklala smeltery has depreciated real estate in Coram to a point that has caused the county supervisors to reduce assessment valuations 50 per cent. The town trustees of Coram have abolished licenses and property owners have reduced rentals. Austin H. Brown, of San Francisco, manager of the Trinity Copper Company, spent a week in July visiting the company's property which adjoins the Balaklala, also the property on Squaw creek.

Mount Shasta—This mine has been unwatered to the sump by H. O. Cummins who holds a purchase bond at \$35,000. The levels will be explored and prospected. The property is one of the assets of the Bank of Shasta County, which is in the hands of the State superintendent of banks.

SIERRA COUNTY

Sovereign—Two Beer roller quartz mills, concentrating and cyanide plants will be installed at this mine in Ladies Cañon near Downieville. The vein has been exposed in a north and a south drift for a length of 100 ft. with pay ore all the way.

Tightner—It is reported from Nevada City that a contract has been made with the Nevada City Miners Foundry for the construction of a 10-stamp mill for this mine, on which a purchase option is held by J. M. O'Brien, of San Francisco. The mill will be electric driven, the power to

be transmitted from the Middle Yuba Hydroelectric Company. Underground work is done with air drills; the compressor, being the first in the Alleghany district to employ electric power, was installed at the end of June.

Oriental—The 4000-ft. tunnel in this old producing mine in Alleghany district is being cleaned out, after five years' idleness. In former days of operation this mine was the largest employer of labor in the district. It is owned by Colonel Mather, of Monterey county, and New York men.

TRINITY COUNTY

Headlight—This mine at Carrville is installing a new Joshua Hendy rock crusher to replace a smaller one that was found inadequate for the demands of the 40-stamp mill. The cleanup at this mine for May is reported at \$90,000.

TULARE COUNTY

A quartz vein carrying molybdenite is reported to have been located on Cow mountain in the Hot Springs district, by L. S. Wingrove, James Arnold, and C. W. Anderson, of Hot Springs.

Colorado

To stimulate mining further the Denver Post has offered to have assayed samples of ore sent in by any prospector, regardless of his connection with the Grubstake committee. This is a boon to the poor man in the hills, who cannot afford to have assays made; by not doing so, many a valuable claim has been overlooked.

BOULDER COUNTY

Cash—The first bar of gold was recently shipped from this new process cyanide mill at Magnolia. New workings have just been started on the Cash mine by the Colorado-Arizona Mining Company.

CLEAR CREEK AND GILPIN COUNTIES

Black Prince—A rich discovery has just been made on this property on Green Lake mountain. In the shaft, at a depth of 15 ft., a body of mineralized quartz seamed with small feeders of high-grade ore has been exposed. The shaft will be sunk 50 ft. before drifting is started. It is estimated that at least one ton of ore can be taken out daily.

Philadelphia—The Philadelphia Mining and Tunnel Company, which recently took over the Hamill tunnel and group of patented claims, is preparing for extensive development. The project was originated many years ago by the late William A. Hamill, for a long time owner of the Terrible mine.

Katy Emmett—The strike recently made by W. W. Cannady in the heading of the lower level of the Katy Emmett mine is proving with further development to be one of the most important of the

year. The vein of smelting ore, which is rich, is continuous and grows larger with the advance of the tunnel. As it runs several hundred dollars per ton, it will soon begin a production that will add largely to the output of the camp.

SAN JUAN REGION

Camp Bird—Notwithstanding that Manager Cox definitely denied the truth of the report of a strike in the east workings of the mine, one mile east of the main tunnel crosscut, the rumor persists and will not down. It has been stated by several people that they have positive information that a strike of a body of ore has been made at a depth of 1200 ft. just above Ironton. The strike is said to have been made in the breast of the main adit development tunnel.

Barstow—Until recently, work at this mine, which is close to the Camp Bird, has been in the nature of development. When the present management took hold it became necessary to develop new ore-bodies, the old shoots having been exhausted. After driving about 600 ft., the oreshoot now being mined was encountered, and while the gold is said to be not as regularly diffused through the ore as might be desired, during the month of June the mill made a record run, treating 1590 tons of ore with 10 of the 20 stamps.

Green Mountain—Albert Pearson and partners are running the mill steadily and are producing a zinc and a lead concentrate. They are still taking considerable ore from the dump, but began operating the mine after installing a compressor.

Silver Ledge—It is reported that the construction work on the mill will be completed this week. In the mine the ore reserves are large and the increased capacity of the mill will provide the means of enabling extensive production. Manager Kinney has purchased the compressor from the Arpad property.

El Mada—At this mine in the Bachelor district a leaser made a rich strike. This is another old timer coming to the front under the leasing system. Adam Hutzinger took out \$400,000 of silver ore in the early 80's.

SUMMIT COUNTY

Rock & Reiling have taken an option on several placer mines in Terryall gulch, among them the Fortune and the Peabody placers. Both have records for producing large quantities of gold. The operators have placed \$22,500 in bank to go to the vendors as a first payment at the end of 90 days if the placer deal is completed. Mr. Reiling is the president and general manager of the French Gulch Gold Dredging Company. The Reiling boat of that company is making at least \$500 per day over running expenses at present, and when the boat turns and runs upstream in the old channel the output will be in the neighborhood of \$1000 per

day. A gold bar, valued at \$8000, was shipped on July 11.

Lucky—The Lucky mine, on Mineral hill, is operated under lease and option by S. B. Wright, of Denver. Recently the lessee shipped 39 tons of lead ore to the smeltery at Salida.

Ground Hog—Wineland & Ellwood have taken a lease on this group in Cucumber gulch and are unwatering one of the shafts preparatory to further development. The ore contains lead, gold and silver.

TELLER COUNTY—CRIPPLE CREEK

Gold Dollar—A strike of extraordinary importance has been made in the main shaft of the Mabel M. claim, one of the Gold Dollar properties, on the east slope of Beacon hill. Not enough development work has been done to determine whether the shoot is a new vein or a continuation of one of the shoots mined in the upper levels. The ore is 4 ft. wide and was found in the drift run to the north from the shaft at a depth of 780 ft. This level was drained since the opening of the Roosevelt tunnel.

Iowa Mining and Milling—This company, owning the Iowa mine on Trail mountain, south of Victor, intends using the Philip Bernhard process in a mill. The machinery will be ordered soon. This will be the first commercial test to be made of this process.

Camilla—The contract for sinking the Camilla shaft, on the east slope of Guyot hill, will be let within a week. The shaft will go down another 200 ft. The Camilla, which is on ground owned by the El Paso Extension Company, is said to be one of the best prospects in that section.

Indiana

Miners in Crawford Mine No. 10, near Beech Grove, in Clay county, have made a demand for weekly pay days, according to the law enacted at the last session of the general assembly. This is the first action of the kind to be taken in the State, the miners generally abiding by their bimonthly pay contracts with the operators and seemingly being very particular that the contract is not broken by either party. The courts have held the new law constitutional and there is nothing for the companies to do but to pay each week if the men demand it.

GIBSON COUNTY

Fort Branch, a village in the southern part of the county, is experiencing an unexpected boom, resulting from the discovery of a second vein of excellent coal in the Fort Branch mine. Efforts are to be made soon toward developing the lower veins.

GREENE COUNTY

The Terhune Coal and Mining Company, incorporated March 13, 1900, the

Central Coal and Mining Company, incorporated by the same interests, and the Pan Handle Consolidated Coal Company, incorporated Feb. 11, 1903, all of Linton, Ind., have notified the Secretary of State that the stockholders of the companies have voted to dissolve the corporations and cease to do a mining business.

Onyx Mining Company—This company has been incorporated with a capital stock of \$50,000 to open a cave in this county which is said by former State Geologist Blatchley to abound in onyx of a high grade. The company will have its headquarters in Martinsville, Ind.; it is composed of T. O. Hudson, G. R. Hudson, C. A. Teague, Emil Rosier, J. L. Riddle and K. I. Hutton. The deposit was discovered by C. A. Teague, an agent of the Vincennes Bridge Company.

Michigan COPPER

Victoria—An assessment of \$1 per share has been called to meet the expense of providing additional water storage and the sinking of No. 6 shaft. This company recently acquired the rights for water storage around Lake Gogebic so that the lake level can be raised and this additional water supply will enable the hydraulic plant to operate the year around. Heretofore during dry spells there was not a sufficient supply and as a result it has been necessary to close the mill. The new shaft is down about 700 ft. Commercial copper has not as yet been opened, although a good showing is being made at the 10th level of the working shaft in the drifts toward the new shaft. The working shaft is bottomed at the 22d level.

Algomah—The north drift from the 104-ft. level of this company's shaft is gradually turning to the north in following the formation, and is swinging into line with the extension of the Lake lode. The drill has recently penetrated a conglomerate lode showing copper at a depth of about 2240 ft., but the identity has not been determined.

Calumet & Hecla—This company is erecting a large addition to its central blacksmith shop, and at the smelting works the new furnace building has been erected and the erection of the furnaces and the installing of the necessary machinery will soon commence.

Montana

BUTTE DISTRICT

Butte & Superior—Improved methods and machinery used in the mill at Basin, where the ore from the Butte & Superior mine is treated, are effecting a greater saving than formerly, and during June the company earned \$30,000 over expenses. Exploration of new veins has developed about 400,000 tons of ore and the mine

is steadily improving in the character and amount of the ore that is being added to the reserves.

Alex Scott—President Hugo has obtained permission from Superintendent John Gillie, of the Anaconda company, to run a drift from the 1800-ft. level of the West Colusa mine of the latter company, into the adjoining Alex Scott mine. This will save the expense of sinking the shaft from the 1600-, its present depth, to the 1800-ft. level, and a crosscut to the vein.

GRANITE COUNTY

Henderson Gulch—Judge W. B. Rulon, of Philadelphia, who is interested in placer mining in Henderson gulch, together with Ormand Rancho, B. P. Hutchinson and B. P. Rambo, has gone to the property on a trip of inspection. The Gulch has produced about \$5,000,000 in the past, and now that the litigation has been settled, Mr. Rulon intends to do extensive development work. An elevator has been in operation since June 1 with good results, and it is the intention to install a dredge in the near future.

JEFFERSON COUNTY

Boston & Corbin—According to computations of the engineer of the Boston & Corbin mine, there are \$6,000,000 worth of ore blocked out in the Bertha mine as a result of development work done there in the last five years, and a new plant capable of sinking the shaft from its present depth of 1300 ft., to the 2000-ft. level, has been ordered and is at Basin now. The company has 40 men on the payroll at present and will continue to develop the property, having decided not to erect the proposed concentrator this season.

LEWIS & CLARK COUNTY

American Smelting and Refining Company—The company will expend \$75,000 this season in improving the East Helena smeltery. A new steel-sampling mill will be constructed at a cost of \$50,000; the foundations are being put in and the mill will be ready for use in the autumn. A new steel blast-furnace building will also be erected at a cost of \$20,000, to replace the present wooden structure which was badly damaged by fire last January. Five hundred men are being employed at the plant; three of the four blast furnaces are being operated, and the roasting department is being operated to its full capacity.

LINCOLN COUNTY

Libby Placer—P. J. Brophy, president, reports that a \$20,000 hydraulic plant is about to be installed, and that the company will be producing within 30 days. The company owns 400 acres on Libby creek, south of Libby, and the gravels average about 30c. per cu.yd. The water supply, which is amply sufficient for the work, is piped from Libby and Ramsey creeks.

Nevada

HUMBOLDT COUNTY

The camp of Awakening, in the Slumbering Hills district, 20 miles southwest of Cave Springs, in Quinn River valley, is beginning to attract attention. The orebody is mineralized schist, and it is claimed that it has been traced for 4500 ft. The ore carries gold and is low grade. Water is obtainable at a distance of three miles; the vein dips into a hill at an angle of 25 deg. and strikes north.

Nevada Superior—At this silver-lead property, 25 miles southwest of Imlay, a concentrator is to be built. J. W. Geigher, of Salt Lake City, is general manager.

Kimberly Consolidated Mining Company—A mill is to be built at this property near Kimberly.

NYE COUNTY

Round Mountain Mining Company—During the quarter ended May 31, 8559 tons of ore was mined and milled at a cost of \$6.39 per ton. The recovery was \$9.95 per ton. The work of installing the milling machinery was completed and the new mill began operating July 5, increasing the company's milling capacity from 100 to 150 tons per day.

STOREY COUNTY

Mexican—In carrying the north drift ahead on the 2500-ft. level, the ground broken gave 21 mine cars of ore of an average assay value of \$117 per ton, by far the richest ore that has been secured from the drift in the last 75 ft. Further drifting has proved the existence of first-class ore to the north, as the vein continues regular and strongly defined with each blasting. The extraction for four days last week was 391 tons.

Ophir—Ore was taken recently from three levels, the 2100, 2200 and 2500, giving a tonnage of 295 and a gross output of \$11,864. The ore on the 2200 came from the north drift, which has recently opened the downward extension of the Hardy vein.

Union Consolidated—Drilling has been started for a north drift into Union ground, which will follow one of the rich streaks in the vein.

Pennsylvania

BITUMINOUS COAL

Monongahela River Consolidated Coal and Coke Company—A circular has been issued to the stockholders, signed by large stockholders, officers and directors, giving the terms offered by the Pittsburg Coal Company to the River Coal company stockholders for the exchange of River Coal for Pittsburg Coal securities. The persons named approve the plan, and recommend its acceptance by all stockholders. The offer provides for the exchange of one share of Pittsburg Coal Company common (par \$100) for two shares of common stock of the River

Coal company (par \$50) or par for par, and the exchange of 20-year 5 per cent. tax-free debenture bonds of the Pittsburg Coal Company for the preferred stock of the River Coal Company, the debenture bonds to figure in the transaction at the rate of 80c. for each dollar par value of River Coal preferred stock. The debenture bonds with interest are payable 5 per cent. per annum. The exchange offer is made providing that at least 90 per cent. of the outstanding common and preferred stock of the River Coal company, exclusive of that owned by the Pittsburg Coal Company, shall accept it. This agreement will complete a consolidation of the companies. The Pittsburg company has owned a controlling interest in the Monongahela for years.

South Dakota

BLACK HILLS DISTRICT

Homestake—The company has placed an order with the General Electric Company for 66 back-gear 25-h.p. motors, each to drive 10 stamps, and twenty 35-h.p. flywheel motors for driving crushers. This is a portion of the equipment that will be installed in the mills and surface plant and will be operated by current from the new hydroelectric plant.

Consolidated Light and Power—Among improvements being made by the company, is the enlargement of the substation at Flatiron, where power is used by the Wasp No. 2. This station will also serve the Bismarck mill. The three 75-kw. transformers are being replaced by an equal number of 200-kw. machines. This point is on the 24,000-volt line of the company, and General Electric oil-cooled transformers are used to step the current down to 440 volts.

Hidden Fortune—Receiver Kirk G. Phillips, on July 8 sold the property and personal effects of the company to the creditors, in the absence of other bidders. Twelve individual creditors, including the receiver, have claims approved by the court for \$13,000, and Lawrence county has \$33,000 due for taxes.

Texas

East Texas Brown Ore Mining and Development Company—Contracts have been let for a crushing and washing plant with a daily capacity of 1000 tons, to be erected at the company's mines at Ore City in Cass county. Mining operations are in progress, and a large quantity of ore will be ready by the time the plant is completed, which has been set for Oct. 1. By that time also the railroad from the mines to Longview, 34 miles, will be ready, and shipments can be made to Port Bolivar. Shipping docks at that place are under construction. The ore will be shipped to the Bethlehem Steel Company at Bethlehem, Penn., which controls the ore company.

Utah

GRAND COUNTY

Seattle, Los Angeles and eastern men are reported to have acquired control of several hundred acres of placer gold property on Wilson mesa. It is proposed to build a ditch four miles long, from Mill creek to bring water for hydraulic purposes.

JUAB COUNTY

Tintic shipments for the week ended July 7 amounted to 104 cars. This is considerably less than usual, owing to the closing down of the mines for three days during the Fourth of July vacation. Shipments for the week ended July 14 amounted to 148 cars. It has been estimated that Tintic mines during the first six months of 1911 shipped 4074 cars of ore, which amounted to approximately 203,700 tons of an average value of \$20 per ton. This would make a total value for the production of the camp of \$4,074,000, and the general activity now apparent promises a production greater than any made by the camp in several years.

Iron Blossom—A dividend of 6c. per share was posted July 10. The total is \$60,000 payable July 25. The amount per share is somewhat less than looked for by stockholders, but this was thought advisable on account of purchase of new equipment, which is to be made shortly. A new Nordberg hoist capable of sinking 3000 ft. has been ordered for the No. 1 or South shaft. Diamond drilling is being done on the 1900 level. The cave recently encountered on the 500 level of the No. 3 shaft will be developed on the 600 by a crosscut which is now being driven toward this point.

Selma—A new hoist will be installed at this North Tintic property.

Gold Chain—New machinery including a hoist, timber framer and drill sharpener has been received and hauled to the mine. It will probably be six weeks before the necessary buildings are put up and the machinery installed. Beside the new shaft house, a carpenter shop, mine and assay office will be built. Operations have been resumed after a three-days shutdown due to an accident to the old engine.

SALT LAKE COUNTY

Reed's Peak—The driving of a tunnel has been started on this Big Cottonwood property.

Big Cottonwood Consolidated—Tunnel driving at this property has been started, and rock mineralized with iron pyrites has been cut.

Verda—A tunnel is being driven at this property, near the mouth of Big Cottonwood, to cut a vein carrying some gold on the outcrop.

Columbus Extension—Arrangements have been made with the Columbus Con-

solidated for the use of its mill, which at present is not being used by that company. Power is also being furnished by the Columbus Consolidated.

SUMMIT COUNTY

Daly-Judge—Crosscutting and drifting are being done on the 1900 level. It is planned to raise and make connections with the main shaft. Drifting to the southwest has been started on the Daly vein on the 1900. Richards-Jainey classifiers are being installed at the mill.

Silver King Consolidated—The stock of this company has been listed on the Salt Lake Exchange. The capitalization is 500,000 shares, par value \$1.00, of which 156,849 shares are in the treasury. There are \$15,040 cash on hand, the current indebtedness is \$19,779, and the company has \$144,800 in bonds and notes outstanding. The company recently shipped 208 tons of ore, which brought \$8839. There are 34 patented claims, and improvements representing \$77,932 have been made. About 30 men are employed.

Kennely—W. J. Boring and G. E. Cox have obtained a lease on this group of claims on Scott Hill. An inclined shaft is down 125 ft., and there is a 485-ft. tunnel, which must be extended several hundred feet to reach the ore-bearing ground. A small force will be employed in cleaning prior to development work.

Washington

FERRY COUNTY

Swamp King—On this property an 8-inch vein of free-milling ore has been struck. R. M. McEntire, Orient, has charge of the work.

San Poil Consolidated—New machinery has been installed in this mine, and daily shipments of one car will be made. J. W. Lloyd, Republic, is superintendent.

OKANOGAN COUNTY

Multnomah—Some good silver ore was recently encountered on this property at Nespelem.

Canada

BRITISH COLUMBIA

Le Roi—The provisional sale of this mine, at Rossland, to the Consolidated Mining and Smelting Company of Canada, Ltd., has been ratified. The mine will be worked conjointly with the Consolidated's Center Star group, which it adjoins on the west and with which there are underground connections. Cabled advices from London state the consideration to be \$250,000 cash.

Granby—The further development of the newly acquired Hidden Creek copper mine, on the northern coast of British Columbia, is being energetically proceeded with. It has been decided to erect smelting works at Goose bay, Observatory inlet, near the mine, but only clearing the site and other preliminary work

will be undertaken at present. Meanwhile ore in considerable bulk will be shipped for tests to either the Tye Copper Company's smeltery, on Vancouver island, or the Tacoma smeltery, Puget sound, Wash. W. Yolen Williams is remaining in the North to obtain information relative to custom ore obtainable when the company shall be prepared to smelt it.

ONTARIO—COBALT

The shipments from Cobalt for the week ended July 14 were: La Rose, 147,051; Crown Reserve, 133,419; McKinley Darragh, 128,189; Townsite, 97,800; Temiskaming, 85,900; Right-of-Way, 66,047; O'Brien, 64,118; Hudson Bay, 62,840; Nipissing, 61,600; Beaver, 60,000; Cobalt Lake, 53,930; Buffalo, 50,824; Total, 1,011,718 pounds.

Nipissing—A statement of the company's condition as of July 1 shows cash in bank, \$803,205; ore in transit and at smelters, \$364,118; ore sacked for shipment, \$251,957; total \$1,419,280.

Ophir—Two good strikes have been made at the 300-ft. level. One vein averages 2 ft. in width and carries good concentrating ore; the other, 500 ft. distant in the opposite direction from the shaft, is 3 ft. wide.

Crown Reserve—A statement, issued for the six months ended June 30, shows a production of 1,582,994 oz. of silver, of a net value, less smelter charges, of \$795,829. This leaves a profit of \$654,287, after deducting expenses. The royalty amounted to \$74,575, and \$530,644 were paid in dividends yielding 30 per cent. for the half year.

La Rose—At the Princess mine an ore shoot 8 in. wide has been encountered at a depth of 250 ft. in a winze sunk from the 235-ft. level. Though 150 tons per day of milling ore is being treated at the Northern Customs plant, second-grade ore is being rapidly accumulated. Good ore is being taken from the roof of No. 8 stope at the Lawson property. The old shaft at the Violet mine is being unwatered, preparatory to commencing work there. A statement, July 1, shows cash in bank and value of ore in transit and at smelter, \$1,184,242; ore sacked for shipment, \$162,311; total, \$1,346,553.

ONTARIO—LAKE OF THE WOODS

Black Eagle—This property, which was worked successfully under the name of Regina for a number of years and is well equipped, has been put under option to an English syndicate. When closed down there was a large orebody in sight, which will be thoroughly tested.

ONTARIO—PORCUPINE

Hollinger—Ten additional stamps have been ordered bringing the total number up to 40. Four tube mills will be installed, which it is estimated will give a crushing capacity of 400 tons per day. The vein picked up in the northeast sec-

tion of the main claim is being explored by an upraise.

Dome—A new vein which is stated to be equal to any on the property has been discovered on low ground.

West Dome—John B. Cleveland has been appointed manager in place of Robert A. Weiss, one of the fire victims. Fire-proof buildings of steel and concrete will be erected as soon as possible.

Pike Lake—A good showing of quartz carrying grains of gold has been found in trenching on this Swastika property.

Porcupine Gold Mines—The company will install a complete plant to carry on underground operations.

Porcupine-Canada—This is a new company, financed by German capitalists, which has purchased three properties in the vicinity of the Hollinger and Rea.

Mexico

DURANGO

Western Durango Mining and Development Company—This company has been recently incorporated under the laws of Delaware, capitalized at \$700,000 (\$1 shares, no bonds to be issued) to work mining properties in northern Durango. A concession from the state of Durango has been obtained to permit the building and operation of a mill at Guanacevi.

GUERRERO

The Naranjo Taxco narrow-gage railroad is to be built by Chicago people. Grading on the right-of-way will be started as soon as the governor of the state approves the plans. The Santa Ana smeltery and Purisima concentrator will be started on completion of the railroad.

JALISCO

Keystone—The Keystone Mining Company, of Shamokin, Penn., a reorganization of the Keystone Copper Smelter Company, has arranged to resume operations at its properties in the Tapalpa district of this state. The original company built a concentrator and a 75-ton smeltery equipped to burn wood. In 1908 the concentrator was remodeled and a 30-ton charcoal furnace erected at Etzatlan, the wood-burning furnace having been abandoned. A modern smeltery will now be built.

MEXICO

Esperanza—During June 17,661 tons of ore were milled, yielding \$139,655, at a total cost of \$103,427, exclusive of London expenses. The net profit for the month is estimated at £6938.

SONORA

El Triunfo—Manager A. C. Charlotte is now shipping from the smeltery about \$15,000 in matte from mine and purchased ores. This property has been working in a desultory fashion for a number of years.

Agua Buena—At this property of the Silver Seal Exploration Company, C. B. Bell, who holds the property under lease, is shipping about one car per month of high-grade gold-silver-copper ore. Operations have continued through the revolution without interference.

Moctezuma Copper Company—The mine and mill have continued to produce the regular amounts of ore and concentrates and have been in no way interfered with during the revolution beyond the loss of a few small bridges on the road to Douglas and the accidental burning of the Agua Prieta depot and custom house.

Lampazos—C. M. Tozer is now preparing to equip this property of the Banco de Sonora with machinery. Little has been done here for some time; lack of fuel and transportation facilities has greatly retarded work formerly, although the veins have been explored to a depth of nearly 1000 feet.

Transvaal Copper Company—O. C. Rasch, of Cincinnati, one of the directors of the company, is now at the properties, near Cumpas. He states that construction of a narrow-gage railroad to the mines will commence within six months, also that a concentrator will be built. From the 100-ton smeltery of this company about \$750,000 in matte has been shipped in time past, but at no considerable profit, owing to the lack of transportation facilities. Mr. Rasch reports a fair tonnage of copper ore containing gold and silver developed. At the Verde mine of the company, about 7000 ft. of drilling has been done, the deepest hole going to 1409 ft. The results of this work and of the surface development at the Cobre Rico mine are reported to have been satisfactory. H. C. Beauchamp, of Cumpas, is local manager.

Asia

KOREA

Oriental Consolidated—In May 240 stamps crushed 30,120 tons in 30 days; gross receipts, \$125,661; net profit, \$54,830. Operating costs were, \$70,566 and \$266 were expended for improvements and development.

South America

CHILE

Braden—Cable advices are to the effect that the No. 3½ Fortuna tunnel has been driven 132 ft. since June 1 cutting ore containing 2.85 per cent. copper. It is stated that for each 100-ft. advance of the tunnel \$750,000 has been added to the value of the ore reserves, not including any probable ore below the tunnel floor. The No. 4 Fortuna tunnel has not yet cut ore but it is expected to enter an orebody when advanced a little more. Good results are attending development work at the Teniente, an outcrop mine. The work done so far indicates that the deposits are persistent in depth.

The Markets

Coal Trade Review

New York, July 24—The coal trade in the West shows no changes of importance from recent reports. There is no noticeable increase in demand for steam coal, and mines continue to work on short time for the most part.

The seaboard bituminous trade is quiet for the most part. There is a considerable amount of business, but no special activity.

In the anthracite region there has been some talk about preparing for a strike next spring. The only reason for this seems to be a desire to arouse interest in the union. For some time past this has been decreasing to such an extent that many members have dropped out or have failed to pay their dues. Strike talk seems to be the quickest way to bring back these delinquents, and it is being tried. The miners generally seem to be pretty well satisfied with the situation, and are not inclined to pay much attention to this talk.

COAL TRAFFIC NOTES

Coal and coke tonnage originating on all lines of the Pennsylvania Railroad Company east of Pittsburg and Erie, six months ended June 30; short tons:

	1910	1911	Changes
Anthracite.....	5,767,761	6,035,900	I. 268,139
Bituminous.....	20,218,095	19,748,713	D. 469,382
Coke.....	7,270,683	5,248,549	D. 2,022,134
Total.....	33,256,539	31,033,162	D. 2,223,377

Total decrease this year, 6.7 per cent. The loss was chiefly in coke tonnage.

Bituminous-coal and coke tonnage of leading railroads in Pennsylvania and West Virginia, five months ended May 31, short tons:

	Bituminous	Coke	Total
Pennsylvania.....	16,414,271	4,452,114	20,866,385
Balt. & Ohio.....	11,215,594	1,570,724	12,786,318
Buff., Roch. & Pitts.	3,068,414	165,943	3,234,357
Buff. & Susqueh'na	688,206	127,264	815,470
Penn. lines, N. Y. C.	3,402,939	37,501	3,440,440
Pitts. & L. Erie.....	3,488,353	2,226,290	5,714,643
Pitts., Shawmut & N.	600,241	8,586	608,827
Norfolk & Western.	6,992,528	767,444	7,759,972
Ches. & Ohio.....	6,032,153	75,454	6,107,607
Virginian.....	471,768	.....	471,768
Total.....	52,374,467	9,431,320	61,805,787
Total, 1910.....	54,018,003	12,967,792	66,985,795

Decrease in coal this year, 1,643,536 tons, or 3 per cent.; in coke, 3,536,472 tons, or 27.3 per cent.; total decrease, 5,180,008 tons, or 7.7 per cent. The Virginian does not report coke tonnage separately. Anthracite tonnages of Pennsylvania and of Baltimore & Ohio are given elsewhere.

Anthracite tonnage of Baltimore & Ohio railroad, five months ended May 31, was 450,446 tons in 1910, and 481,612 in 1911; increase, 31,166 tons.

Receipts of domestic coal at San Francisco, five months ended May 31, were 161,636 long tons in 1910, and 137,827 in 1911; decrease, 23,809 tons.

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics



Coastwise coal shipments from chief Atlantic ports, five months ended May 31, long tons:

	Anthracite	Bitum.	Total	PerCt.
New York...	6,859,443	4,364,448	11,223,891	59.8
Philadelphia	971,892	1,959,359	2,931,251	15.6
Baltimore....	122,830	1,786,117	1,908,947	10.2
Newp't News .....	.....	1,171,331	1,171,331	6.2
Norfolk.....	.....	1,527,900	1,527,900	8.2
Total.....	7,954,165	10,869,155	18,763,295	100.0
Total, 1910.	7,229,061	10,424,234	17,653,295	.....

Increase in anthracite, 725,104; in bituminous, 384,921; total gain, 1,110,025 tons, or 6.3 per cent. Norfolk includes Sewell's Point. New York includes all the harbor docks; it also includes barge shipments to city and neighboring wharves.

New York ANTHRACITE

July 24—About the usual summer trade is forward. Production has been cut a little, many collieries working short time. A fair quantity of coal is going to Buffalo for shipment by Lake. Some coal is also going to storage yards, but not more than is usual at this season. Steam-coal demand is fair; No. 2 buckwheat and rice are not too plentiful.

Schedule prices for July are: \$4.55 for lump, \$4.80 for egg and stove, and \$5.05 for chestnut; all f.o.b. New York harbor. On steam sizes quotations are: Pea, \$3 @3.25; buckwheat, \$2.30@2.75; No. 2, buckwheat or rice, \$1.80@2.25; barley, \$1.45@1.70; all according to quality, f.o.b. New York harbor. Some washery pea is reported sold at a small discount.

BITUMINOUS

Local trade is rather quiet. Coastwise shipments are not heavy and harbor trade is about as usual, and still inclined to be irregular. The mines are running a little better, but that is due mainly to increased shipments to the Lake trade.

Prices show little change, except that there is rather more coal at tide which is not under contract, and occasional sales are made low to get rid of the surplus. A good quality steam coal costs \$2.50, f.o.b. New York harbor; lower grades sell down to \$2.30 and better up to \$2.85. Gas coals bring \$1.10@1.15 for ¾-in., \$1@1.05 for

run-of-mine, and 70@80c. for slack, all at mines. Some gas slack has been sold cheap, as there seems to be a surplus of that grade.

In the coastwise trade vessels are plenty and rates are inclined to be weak, though there is no quotable change.

From Norfolk, off-shore trade is reported better, and bunker trade is also good.

Birmingham

July 24—The coal trade in Alabama as well as other parts of the South is steadily picking up. There is no doubt but that the last half of the year will see the production almost doubled as compared to the first six months. Orders have been secured that will require a very large tonnage to fill. Some of these orders will call for delivery until next spring. The railroads are being notified that idle cars must be gotten out from side tracks and a better feeling is noted. Coal producers in Alabama lately have been entering the Georgia field. It was for some time believed that the Georgia market belonged to the Virginia and West Virginia operators because the railroads wanted it thus, but the Alabama producers sought business and in the last two weeks some healthy orders were secured in that section. The word is being sent out that miners are needed and those men who formerly worked in mines and had to seek other employment when the work at the mines slackened up, are now returning and are taking up pick and shovel and getting busy. The commercial operators in Alabama are receiving orders from large producers.

The coke demand is steady and the production improving. Several batteries of ovens recently put in operation are doing well in the way of production.

Chicago

July 25—Quiet but firm conditions continue in the coal market, with the demand for even fine coals somewhat lessened by midsummer conditions and large shipments to this market. The harvesting trade, however, is large and promises to be larger than ever was known before, while the demand is for high-grade coal. Some country dealers are laying in supplies of domestic coals, both bituminous and anthracite, and the market is free from any large amount of coal unsold on tracks. Shipments, in general, are well regulated to the demand. Steam coals naturally are quiet because of summer conditions.

Illinois and Indiana bring, on cars, \$1.90@2.25 for lump, \$1.70@1.85 for run-of-mine and \$1.50@1.80 for screenings, with the lower-priced coals preferred in the city market. Outside the

city the higher-priced coals are in greater demand. Hocking is firm and quiet at \$3.15. Smokeless is nearer to normal, through less price cutting, though the list prices—\$3.05 for run-of-mine and \$3.55@4.05 for lump—are cut 10c. to 25c. on some sales. The anthracite trade is increasing toward the end of the month, to get the July discount, but is not heavy.

Cleveland

July 24—Lake trade is active; vessels are in good supply, some even having to wait for cargoes.

Local trade is quiet, steam coal demand being rather backward. Prices are unchanged, except that slack is in too large supply, and sales have been made 10 or 15c. lower than recently, to get the coal off the cars.

Indianapolis

July 24—The Clay County Coal Company has petitioned the Indiana Railroad Commission to compel the Vandalia and the Chicago & Eastern Illinois railroad companies to establish coal tariffs to junction points with other roads. It is set out that such tariffs were formerly in force, but have been withdrawn.

There is no material change in the coal trade in this State. Apart from the harvester demand the market is quiet and most mines are still working on short time.

Pittsburg

July 25—Shipments in the Lake trade are expected to pick up next month, having thus far been behind last season. Local demand continues light. Prices are fairly well maintained as follows: Nut, \$1.10@1.15; mine-run, \$1.15; ¾-in., \$1.25; 1¼-in., \$1.35; slack, 60@75c. per ton at mine.

Connellsville Coke—Demurrage furnace coke has disappeared from the market, there being little prompt coke available the past week, and all was readily absorbed by consumers and by dealers who needed additional coke to carry their contracts. This resulted in putting the prompt market up to \$1.50, and nothing below this can be done today. There have been no important negotiations on contract furnace coke, the furnaces now in operation being fairly well provided, while no idle furnaces are scheduled for blowing in soon. Foundry coke has been quiet. We quote prices unchanged, except for the advance in prompt furnace coke, as follows: Prompt furnace, \$1.50@1.55; contract, five months, \$1.65@1.75; prompt foundry, \$1.90@2; contract, \$2@2.25, at ovens.

The *Courier* reports production in the Connellsville and lower Connellsville region, in the week ended July 15, at 270,700 tons, a gain of 3600 tons, and shipments at 3185 cars to Pittsburg, 4501 cars to points west and 574 cars to points east, a total of 8260 cars.

St. Louis

July 24—The market has been seemingly dull with practically no change one way or the other during the past week. While prices have been low and operators have been complaining bitterly all summer, the tonnage reports of the St. Louis Coal Traffic Bureau are very encouraging.

The report of July 21 shows that during the first three weeks of July, 7621 cars were consumed in the St. Louis market which amounted to 322,302 tons of Illinois coal. Of this amount 38,175 tons was railroad coal. Of the 17 coal-carrying railroads entering East St. Louis the Baltimore & Ohio leads in tonnage with 38,000 tons. This is rather a surprise as the B. & O. has only nine mines as against the Illinois Central with 78 mines. The receipts for July up to date are greater than any preceding year with the exception of 1910, which shows a greater tonnage by 109,000 tons; however, this cannot be considered a fair comparison, as the mines in all other districts were shut down on account of strikes in 1910 and the Illinois mines were all running full blast.

Prices are the same as last week, with the exception of a drop of 5c. on Standard and Carterville screenings.

The demand from the country trade is steadily increasing. The improvement is being felt more by the mines in the Carterville district which are all now able to run three or four days a week.

Anthracite—The market has been very slow all during the month of July though as the month draws to a close a little more interest is being shown and a number of small orders are being placed in order to protect the July price. The tonnage up to date as far as St. Louis proper has been concerned has been larger than ever before, as it is estimated that the receipts for local consumption up to date have been about 210,000 tons.

FOREIGN COAL TRADE

German Foreign Trade—Exports and imports of fuel in Germany, five months ended May 31, in metric tons:

	Exports	Imports	Excess
Coal.....	10,712,366	4,142,121	Exp. 6,570,245
Brown coal..	23,897	3,026,064	Imp. 3,002,167
Coke.....	1,779,146	248,802	Exp. 1,530,344
Briquets.....	768,952	96,189	Exp. 672,763
Total.....	13,284,361	7,513,176	Exp. 5,771,185
Total, 1910..	11,244,300	7,341,558	Exp. 3,902,742

The exports this year included 5680 tons of coke to the United States.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, report prices of coal on July 14, as follows: Best Welsh steam coal, \$4.57 seconds, \$4.20; thirds, \$3.96; dry coals, \$3.84; best Monmouthshire, \$3.84; seconds, \$3.66; best small steam coal, \$2.46; seconds, \$2.28. All prices are per long ton, f.o.b. shipping port, cash in 30 days, less 2½ per cent. discount.

IRON TRADE REVIEW

New York, July 26—If any change is to be noted since our last report, it is a slight improvement in business and a growing tone of confidence in the future. There has been no important increase in orders, but mills are gradually increasing their activity in some lines. The railroads seem inclined to place more orders, especially for bridge and car work.

In finished material structural steel is not quite so active as it has been, but there is no lack of small orders; while larger contracts are probable in the future. Business in sheets and plates is reported active. In the lighter lines, such as bars, wire and tinplates, business is good. From Pittsburg there are reports of cutting in steel bars, some independent concerns taking orders at 1.20c., instead of 1.25c., which has ruled since the recent reduction. Some shading in sheets is also rumored, but the reports are not fully substantiated. The Steel Corporation is reported to be operating to about 70 per cent. of capacity, with some independents doing a little better.

In pig iron sales have been fair, both of foundry and basic pig. Prices continue low and no advances seem probable, though furnaces are inclined to be a little firmer in their views. It will be difficult to get more as long as there are still unsold stocks to be handled, and as long as there are so many idle furnaces. The continued urging of Southern iron is also quite a factor against any advance. A good many inquiries for fourth-quarter iron have been coming in, and some sales have resulted. Most buyers, however, are satisfied to place orders for early delivery.

Trust Investigations—It is stated that the Congressional investigating committee has secured evidence of the existence for several years of a pool controlling the manufacture and sale of steel plates, which was governed by a definite agreement. This contract, it is said, applied to prices and to the allotment of production among the several companies.

Some of the manufacturers indicted for participation in the wire pools have appeared in court and put in the legal plea of *nolo contendere*, which is an admission of the charge; leaving it to the court to decide whether there has been an infringement of the law. Some others have put in the plea of not guilty, and will stand trial. The peculiarity of the wire suits is that they have not brought against companies, but against the managers individually.

On the 37 defendants who pleaded *nolo contendere* the court promptly passed judgment, inflicting a fine of \$1000 for the first indictment in each case, with an addition of \$100 for each additional indictment, where more than one had been found.

United States Steel Corporation—The report for the quarter ended June 30 gives the following figures:

Net Earnings:	1910	1911
April.....	\$ 13,414,956	\$ 9,412,573
May.....	13,229,289	9,590,444
June.....	13,526,715	9,105,503
Quarter.....	\$40,170,960	\$28,108,520
Depreciation and other funds.....	\$6,268,680	
Interest and sinking funds.....	7,311,963	
Total charges.....	\$13,580,643	
Surplus.....	\$14,527,877	

From the surplus there was appropriated \$6,304,919 for 1¼ per cent. dividend on preferred and \$6,353,781 for 1¼ per cent. on common stock; a total of \$12,658,700, leaving an undivided balance of \$1,869,177. The net earnings for the half-year ended June 30 were \$41,627,723, against \$77,787,735 last year.

Baltimore

July 24—Exports for the week included 644,808 lb. tinplates and 104,648 lb. pipe to Hamburg, Germany. Imports included 415 tons ferromanganese from Liverpool; 1028 tons spiegeleisen and 222 casks manganese ore from Antwerp; 6200 tons iron pyrites from Huelva, Spain; 6080 tons iron ore from Cuba.

Birmingham

July 24—While there has been a little improvement in the Southern iron market there is much room for a better condition. Prices are being quoted a little higher, but the selling for immediate delivery on a basis of \$10 for No. 2 foundry iron continues. The manufacturers are not willing, however, to sell for the latter part of the year at the \$10 rate. The Tennessee company has but one furnace on foundry iron and the understanding is that orders are in hand that will require a steady operation of that plant for the balance of the year and longer.

As far as can be learned, there will be no general increase in the make in this territory for a while. There is too much iron on the yards yet, and the make of the furnaces in blast has not been sold entirely up for any long period ahead. The official figures will show another falling off in the make for July as compared to June.

The greatest activity among iron and steel industries in the Southern territory is with the cast-iron pipe plants. Those works which are in operation are melting a good quantity of pig iron and will for some time to come. There is a healthy shipment of the product as quickly as the same is manufactured. The United States Cast Iron Pipe and Foundry Company has not yet taken up the operation of the Dimmick Pipe Company's plant at North Birmingham, though the deal is said to have been consummated.

The steel plant at Ensley is doing well, the production being good and the products moving out steadily. The rail deliveries are in excellent quantities.

Fabricated steel is in good demand in Southern territory.

The scrap-iron market is still dull and prices are off. Charcoal iron brings \$22.50 per ton with a few scattering orders coming in for lots of small proportions. Foundries and machine shops in the Southern territory are doing a small business.

Chicago

July 25—The demand for pig iron has increased in the last week and melters are generally figuring on requirements for the last quarter—in several instances for the first quarter—but the volume of business is not great. Here and there is a sale for 1000 tons or more; the greater number of foundrymen cling to the practice of buying a carload to a few hundred tons, for about three months ahead and watching the market closely. There continues to be a large demand for iron and steel products, and the general tone of the market is decidedly better, sales being large in structural steel and railroad supplies. That this must reach the pig-iron market in a large way is evident, and prices on pig iron hold up well under the hope, Southern No. 2 selling for \$10@10.25 Birmingham—\$14.35@14.60 Chicago—and Northern No. 2 for \$15@15.25. The latter is very firm, and in demand for small lots evenly distributed. Local manufacturing remains at a low ebb, and is not likely to revive before September. Coke is dull at \$4.75, Chicago.

Cleveland

July 24—Sales are reported of several blocks of nonbessemer ore, including both Old Range and Mesabi ores. Current prices are unchanged, notwithstanding some reports of sales under the base.

Pig Iron—More inquiries are coming in and there are more sales, both of basic and foundry irons. The market has rather a better tone. Prices are unchanged.

Finished Material—Sales in most lines are keeping up pretty well. Sheet manufacturers are out for business, even if they have to shade prices a little to get it.

Philadelphia

July 26—The general improvement recently noted in pig iron continues, with large purchases of basic, malleable and foundry irons. Basic contracts absorb available supplies for the periods covered by the contracts. Prices given to recent inquiries for late deliveries are slightly stronger. Pipe iron is quite active and large purchases have been made for deliveries up to the close of the year. Makers of tools and machinery are also covering actual requirements, and in two or three cases have asked options for 30 days. The strongest feature of this mar-

ket is the small quantities of iron in consumers' hands. There is scarcely any disposition to buy beyond actual needs. There is less fractional cutting, due in some measure, to the absence of sharp Southern competition. Large users have said that when they see a genuine upward movement they will buy for later deliveries, but there is too much idle furnace capacity to hope for that. Average quotations are \$15 for No. 2X foundry; gray forge and basic, \$14.50; Southern No. 2 foundry would find a taker at \$14 for certain brands.

Steel Billets—Users of billets have been obliged to make purchases for immediate delivery to complete new work as it comes in.

Sheets—The sheet mills are now busier and have a larger volume of work than for months.

Bars—Refined bars are dull at 1.30c. average, with but little inquiry for late delivery. While manufacturers assert that there are no concessions, business has been done at 1.27½, and even, it is rumored, at 1.25. There is a better outlook for common iron.

Pipe and Tubes—Tubes are inactive.

Plates—All the new business has been in small orders for early delivery and there is a good deal of it.

Structural Material—All the business traced up this week has been in small, urgent delivery orders.

Scrap—Large quantities of Panama scrap will be ready for sale in September, and orders have practically been taken already, though prices have not been named. The local yards have accumulated considerable stock in the lower grades.

Pittsburg

July 25—There has been a slight increase in mill operations, produced by somewhat better buying of steel products. The market continues spotty, with improvement at this point or that point, frequently followed by renewed quietness, but the general trend is regarded as distinctly favorably. The Carnegie Steel Company is understood to be operating between 75 and 80 per cent. of its total ingot capacity, against an average of 72 or 73 per cent. in June, so that its July production will exceed that of June. In most departments its bookings are heavier than in June, although not markedly so. Independent interests are operating at various rates, two important interests in western Pennsylvania and eastern Ohio running at above 75 per cent., while others are running at 50 to 75 per cent. and a fair estimate for the whole steel industry would probably be that production is about 70 per cent. of capacity.

On account of irregularities in steel-bar prices a question has appeared whether the regular prices on bars, plates and

shapes can be maintained. It is expected that they will be, but there is some uncertainty. After a large part of the agricultural implement tonnage was booked at the price of 1.25c., Pittsburg, as reduced in May, shading began to appear and a number of contracts with agricultural implement interests were booked at 1.20c., Pittsburg, while in at least one case a price of 1.15c. has been named. These prices originated with western mills, for delivery near-by, so that mill prices were much higher than the Pittsburg basis. The 1.15c. price was made to a point taking 20c. per 100 lb. freight from Pittsburg, but only 5c. from Chicago, the delivered price being 1.35c., or 1.30c., f.o.b. Chicago mill, and it is known that this mill price at Chicago has been made in some other instances.

Ferromanganese—The importers have all put their price to \$37, Baltimore, for prompt delivery or delivery to April 1 next, and selling agents here are not permitted to quote any other prices. The new price has not been seriously tested. We quote the market at \$37, Baltimore.

Pig Iron—The market has been very quiet since last report. Basic has been quiescent, consumers being well covered by transactions recently made and already reported. Foundry iron is being brought in a limited way, at former prices. We repeat last week's quotations: Bessemer, \$15; basic, \$13@13.25; No. 2 foundry, \$13.50@13.75; forge, \$13@13.25; malleable, \$13.25 to \$13.50, all at Valley furnaces, 90c. higher delivered Pittsburg.

Steel—No transactions of any moment have been made, but sheet bar deliveries on contracts continue good, while prospects are that billet deliveries will be better in August than this month, having been light of late. We quote billets at \$21 and sheet bars at \$22, maker's mill, Pittsburg or Youngstown, and rods at \$27, Pittsburg.

Sheets—Buying continues fairly good. The leading interest is operating 70 per cent. of its sheet mills, partly on export business, while independent operations average 75 per cent. of the total number of mills. Regular prices are: Black sheets, 28 gage, 2c.; galvanized, 3c.; blue annealed, 10 gage, 1.50c.; painted corrugated roofing, \$1.40 galvanized, \$2.55 per square.

St. Louis

July 24—A little new business in pig iron is coming in right along though mostly in small orders for delivery during the next 90 days. Business is just a trifle better and it is anticipated that the situation will improve slowly. Consumers seem to be satisfied that prices are about as low as they are going to get. The market is \$10@10.25 per ton Birmingham, or \$13.75@14 St. Louis for No. 2 foundry.

Iron Ore Markets

Eastern Pennsylvania furnaces are reported to be negotiating for a large block of Swedish iron ore; also for several cargo lots. The larger imports at Philadelphia recently have been from Newfoundland.

Charles M. Schwab, president of the Bethlehem Steel Company, confirms the report that the company has negotiated for a very large tonnage of Swedish iron ores. Deliveries will extend over a term of years and the total, including future options, runs well up toward 25,000,000 tons.

Lake Superior Iron Ore—Shipments of iron ore from the Lake Superior region for the season to July 1 were, in long tons:

	1910	1911	Changes
Escanaba.....	1,739,735	1,067,708	D. 672,027
Marquette.....	1,150,243	533,738	D. 616,505
Ashland.....	1,515,555	662,420	D. 853,135
Superior.....	2,632,835	2,951,543	I. 318,708
Duluth.....	5,097,262	2,050,134	D. 3,047,128
Two Harbors.....	2,782,627	1,577,426	D. 1,205,201
Total.....	14,918,257	8,842,969	D. 6,075,288

The receipts at Lake Erie ports for the month of June were 3,746,383 tons, or 77.6 per cent. of the total shipments.

METAL MARKETS

New York, July 26—The metal markets generally continue rather quiet, though there are some indications of increased consumption and demand.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold:			
June 1911..	\$3,074,755	\$ 4,767,714	Imp. \$ 1,692,959
" 1910..	1,598,347	4,575,917	Imp. 1,279,212
Year 1911..	13,251,562	33,773,026	Imp. 20,521,464
" 1910..	49,516,731	19,390,531	Exp. 30,126,200
Silver:			
June 1911..	5,777,703	3,506,446	Exp. 2,271,257
" 1910..	4,587,383	3,308,171	" 1,279,212
Year 1911..	34,443,203	21,360,601	" 12,482,602
" 1910..	27,054,218	21,901,520	" 5,152,698

Exports from the port of New York, week ended July 22: Gold, \$2500; silver, \$845,559, chiefly to London. Imports: Gold, \$118,656, from Japan, Australia and the West Indies; silver, \$74,851, principally from Central America.

Gold—Prices on the open market in London were unchanged at 77s. 9d. per oz. for bars and 76s. 4½d. per oz. for American coin. Most of the gold arriving was taken for India or by the Bank of England. The demand for bar gold for India is considerable.

Iridium—The demand is steady and prices are unchanged, \$62 per oz. being asked for pure metal.

Platinum—The market is rather quiet, as usual at this time of the year, but is very firm. Prices have advanced slightly, and dealers now ask \$43 per oz. for refined platinum and \$45.50 per oz. for hard metal. The foreign market is firm.

Silver—The market opened this week

dull at unchanged quotations, but developed a sagging tendency on lack of orders and finally declined to 24 1/16d. in London on unsatisfactory weather reports from India. Closing tendency is uncertain and market limited.

SILVER AND STERLING EXCHANGE

July	20	21	22	24	25	26
New York....	52½	52¾	52½	52½	52¾	52½
London....	24 1/16	24 1/8	24 1/4	24 1/4	24 1/4	24 1/8
Sterling Ex..	4.8615	4.8610	4.8605	4.8600	4.8600	4.8615

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Exports of silver from London to the East, from Jan. 1 to July 13, reported by Messrs. Pixley & Abell:

	1910	1911	Changes
India.....	£3,569,500	£4,487,000	I. £ 917,500
China.....	1,113,500	890,400	D. 223,100
Total.....	£4,683,000	£5,377,400	I. £ 694,400

The Treasury Department estimates the coined silver in the United State on July 1 as follows: Silver dollars, \$565,031,508; subsidiary coins, \$159,453,575; total, \$724,485,083.

Copper, Tin, Lead and Zinc

NEW YORK

July	Copper		Tin	Lead		Zinc	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
12 7/8	12 7/8	12 4/5	4 40	5 67 1/2	5 52 1/2		
20 @12 80	@12 50	42 4 50	@4 42	@5 70	@5 55		
12 3/4	12 40		4 40	5 70	5 55		
21 @12 3/4	@12 50	42 1/4 4 50	@4 42	@5 72 1/2	@5 57 1/2		
12 3/4	12 40		4 40	5 70	5 55		
22 @12 3/4	@12 50	42 1/4 4 50	@4 42	@5 75	@5 60		
12 3/4	12 40		4 40	5 70	5 55		
24 @12 3/4	@12 50	41 3/4 4 50	@4 42	@5 75	@5 60		
12 3/4	12 40		4 40	5 70	5 55		
25 @12 3/4	@12 50	41 3/4 4 50	@4 42	@5 75	@5 60		
12 3/4	12 40		4 40	5 70	5 55		
26 @12 3/4	@12 50	42 4 50	@4 42	@5 75	@5 60		

The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—Sentiment has been unfavorably affected by the decline in the London standard market. This decline, however, is not due to any influence affecting the copper market directly, but is altogether the consequence of the disturbed political situation in Europe, of which the bear faction has not been slow to take advantage. Refined copper has been offered at corresponding reductions as a result of profitable arbitraging, and on this account, the market during the week of July 20 to 26 has presented a somewhat softer tendency, at least on the surface. American producers have been offering electrolytic at 12½c., usual terms, and the transac-

LONDON

July	Copper			Tin		Lead, Spanish	Zinc, Ordinaries
	Spot	3 Mos	Best Sel'd	Spot	3 Mos		
20	56½	57½	60½	191½	184	13½	25
21	56½	57½	60½	192½	184½	13½	25
22	.....	.....	.....	.....	.....	.....	.....
24	56½	57½	60½	190	186½	13½	25
25	56½	56½	60½	190½	187	13½	25½
26	56½	56½	60½	191½	186½	13½	25½

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £12 = 2.61c.; £ = 5c.; £60 = 13.40c. ± £1 = ± 0.21¼c.

tions that have been consummated, both for home and foreign account, have been chiefly at that figure, or slightly less. Some small transactions in Lake copper were made at 12¾c., but there have also been first-hand offerings at 12½c. At the close we quote Lake copper at 12½ @ 12¾c., and electrolytic copper in cakes, wirebars and ingots at 12.40 @ 12.50c. Casting copper is quoted nominally at 12¼ @ 12¾ cents.

Copper sheets are 18 @ 19c. base, for large lots. Full extras are charged and higher prices for small quantities. Copper wire is 14c. base, carload lots at mill. This price is shaded a little, according to reports, by some makers.

The London standard market, after being decidedly weak until Wednesday morning, closes steadier, quotations being cabled at £56 3s. 9d. for spot, and £56 15s. for three months.

Exports of copper from New York for the week were 6869 long tons. Our special correspondent gives the exports from Baltimore for the week at 1762 tons.

The Cape Copper Company reports the production of its mines in South Africa for the current year as follows: January, 965,440; February, 1,052,600; March, 967,680; April, 1,012,480; May, 1,001,280; total for five months, 4,999,480 lb., or 2232 long tons of copper.

Tin—The market in London has been kept steady throughout the week. Futures were bought liberally, with the result that the contango between spot and futures became smaller. Spot tin was probably manipulated in view of the Banka sale, which took place on July 25. The close is cabled at £191 10s. for spot, and £186 15s. for three months.

Business in this market is mostly confined to transactions between dealers while consumers are still holding aloof. July tin is quoted at about 42 cents.

Lead—There is again an excellent demand for this metal, particularly for electrical purposes, and the close is firm at

4.50c., New York, and 4.40 @ 4.42½c., St. Louis.

Owing to reduced shipments incidental to the disturbances in Mexico, the London market is again higher, the close being strong at £13 16s. 3d. for Spanish lead, and £13 18s. 9d. for English.

Spelter—Although business has by no means been exceptionally active, the market is creeping upward from day to day. Smelters are well booked up and consumption appears to have reached a point where it is slightly in excess of current production. The close is firm and higher at 5.70 @ 5.75c. New York, and 5.55 @ 5.60c. St. Louis.

Although it is reported from London that the Syndicate has been making efforts to keep the spelter market from advancing further, it is doubtful whether such a policy can be carried out, as a scarcity of labor is preventing an increase in the output of the smelters, and on the other hand, the consumption is considerably in excess of the production. The close is strong at £25 2s. 6d. for good ordinaries, and £25 7s. 6d. for specials.

Zinc dust is quoted this week at 6¾c. per lb., New York.

Base price of zinc sheets is \$7.50 per 1000 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Aluminum—The market shows a little more activity, but is still rather quiet. The quotations are 20 @ 20½c. per lb. for No. 1 ingots, New York.

Antimony—Business continues quiet, and the market is little changed. Cookson's is quoted at 8.50c. and Halletts at 8c.; while 7.20 @ 7.40c. per lb. is named for Chinese, Hungarian and other outside brands.

Quicksilver—The market is quiet, but steady. The New York quotation is \$50 per flask of 75 lb., with the usual advance for small lots. San Francisco quotes \$50 for domestic orders and \$47.50 for export. The London price is £9 per flask, with £8 15s. named from second hands.

Bismuth—The price quoted in London by the syndicate which controls the European production continues to be 7s. 6d.—equal to \$1.80—per lb. In New York a price of \$1.72 per lb. is named for metal produced from American ores.

Cadmium—This metal is quoted at works in Germany at 725 @ 750 marks per 100 kg.—equal to 78.3 @ 81c. per lb.—according to size of order.

Magnesium—The price of pure metal is \$1.50 per lb. for 100-lb. lots, f.o.b. New York.

Nickel—Large lots, contract business, 40 @ 50c. per lb. Retail spot, from 50c. for 500-lb. lots up to 55c. for 200-lb. lots. The price of electrolytic is 5c. higher.

Zinc and Lead Ore Markets

Platteville, Wis., July 22—The highest price paid this week for zinc ore was \$43.50; the base price, 60 per cent. zinc, was \$41 @ 42. The base price paid for 80 per cent. lead ore was \$54 @ 55 per ton.

SHIPMENTS, WEEK ENDED JULY 22

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville.....	971,650	.....	229,100
Mineral Point.....	744,600	.....	.....
Galena.....	582,300	.....	.....
Highland.....	571,870	.....	.....
Hazel Green.....	497,600	.....	.....
Harker.....	336,130	.....	.....
Benton.....	248,100	87,400	.....
Shullsburg.....	.....	62,500	.....
Total.....	3,952,250	149,900	229,100
Year to date.....	85,106,659	4,679,635	18,416,190

Shipped during week to separating plants, 2,638,970 lb. zinc ore.

Joplin, Mo., July 22—An effort to lower the market further met with opposition that left the situation as it was at the end of last week, the same prices prevailing. The highest price paid for zinc sulphide ore was \$44, the base price ranging from \$39 to \$42 per ton of 60 per cent. zinc. Zinc silicate sold on a base range of \$21 @ 23 per ton of 40 per cent. zinc. The average price, all grades

SHIPMENTS, WEEK ENDED JULY 22

	Blende	Calamine	Lead Ore	Value
Webb City—Carterville.....	3,437,200	.....	811,160	\$ 93,078
Joplin.....	2,596,280	.....	327,880	62,910
Miami.....	885,120	.....	151,850	17,756
Alba-Neck.....	795,360	.....	.....	16,702
Galena.....	489,200	.....	136,220	13,870
Duenweg.....	385,940	.....	.....	7,718
Spring City.....	201,820	121,290	80,070	7,570
Oronogo.....	247,430	.....	89,650	7,343
Carl Junction.....	187,780	.....	.....	4,037
Granby.....	172,740	94,490	11,470	3,995
Sarcoxie.....	121,430	76,710	.....	3,233
Jackson.....	153,000	.....	.....	2,983
Badger.....	132,210	.....	.....	2,464
Aurora.....	52,170	64,180	.....	1,685
Wentworth.....	71,460	.....	.....	1,429
Cave Springs.....	62,310	.....	.....	1,277
Quapaw.....	61,620	.....	.....	1,232
Stott City.....	61,040	.....	.....	1,220
Carthage.....	.....	81,000	9,190	1,080
Ash Grove.....	.....	.....	24,800	719
Totals.....	10,095,110	437,670	1,642,290	\$252,301

29 weeks... 286,245,980 19,488,240 49,632,230 \$7,225,780
Blende val., the week, \$198,693; 29 weeks, \$5,610,008
Calamine, the week, 4,650; 29 weeks, 225,558
Lead value, the week, 48,958; 29 weeks, 1,390,219

MONTHLY AVERAGE PRICES

Month	ZINC ORE				LEAD ORE	
	Base Price		All Ores		All Ores	
	1910	1911	1910	1911	1910	1911
January.....	\$47.31	\$41.85	\$45.16	\$40.55	\$56.99	\$55.68
February.....	40.69	40.21	39.47	39.16	53.64	54.46
March.....	43.60	39.85	39.71	38.45	51.26	54.57
April.....	41.00	38.88	39.33	37.47	49.72	56.37
May.....	40.19	38.25	37.51	36.79	48.16	55.21
June.....	40.20	40.50	37.83	38.18	48.80	56.49
July.....	39.63	.....	36.80	.....	48.59	.....
August.....	40.13	.....	37.32	.....	49.75	.....
September.....	43.45	.....	39.96	.....	54.73	.....
October.....	43.31	.....	40.50	.....	53.18	.....
November.....	47.20	.....	43.20	.....	54.80	.....
December.....	42.50	.....	40.70	.....	55.70	.....
Year.....	\$42.43	.....	\$39.79	.....	\$52.12	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

of zinc, was \$38.70. Lead ore sold as high as \$61, with the bulk of the ore sold above \$59.50. The average price, all grades of lead, was \$59.48 per ton.

The total increase this year was 109,664,407 gal., or 15.6 per cent.

MINING STOCKS

Other Ore Markets

Pyrites—Domestic pyrites are quoted at 12@12½c. per unit of sulphur at mines for furnace sizes; fines about 1c. less. Spanish pyrites, furnace size, are 13@13¼c. per unit, ex-ship. Arsenical pyrites are from ½@1½c. per unit less.

Tungsten Ore—Ferberite, wolframite and huebnerite ores, \$6.50@7 per unit per ton of 2000 lb. of ore containing 60 per cent. of tungsten trioxide. For scheelite ore, 50c.@\$1.50 per unit less.

Zinc Ores—For Rocky Mountain blende of good quality, especially as to iron and lead contents, the current price is for the zinc contents, less eight units, at the St. Louis price for spelter; with a deduction of \$16 to \$18 per 2000 lb. of ore; sellers to deliver ore at smeltery. Penalties may be charged for detrimental impurities. Blende is readily obtainable at Joplin on the basis of 87 per cent. of the zinc content at St. Louis quotation, less \$16 for treatment, and less penalties for iron and lime.

CHEMICALS

New York, July 26—The Virginia Carolina Chemical Company has arranged to sell \$2,000,000 preferred stock, authorized some time ago, to provide additional working capital. The new stock will carry 8 per cent. cumulative dividends, and is offered at 115; stockholders of the company to have preference in buying the stock.

Copper Sulphate—Business is good and demand continues steady, while supplies are a little better than they have been. Quotations are unchanged, at \$4.50 per 100 lb. for carload lots and \$4.75 per 100 lb. for smaller parcels.

Arsenic—The market is quieter, the recent special demand having largely subsided. Prices, however, are unchanged, \$2.25 per 100 lb. being asked for spot lots of white arsenic; while \$1.87½ per 100 lb. is quoted for futures.

Nitrate of Soda—The market continues rather active, with good sales. Quotations are 2.15½c. per lb. for spot nitrate and 2.17½c. for deliveries through the rest of 1911; while 2.20c. per lb. is quoted for 1912 deliveries.

Petroleum

Exports of mineral oils from the United States six months ended June 30, in gallons:

	1910	1911
Crude petroleum.....	61,492,920	63,097,336
Naphthas.....	42,416,497	54,460,275
Illuminating oils.....	464,908,140	545,665,962
Lubricating and paraffin..	78,654,176	88,011,403
Residuum.....	53,526,566	59,427,730
Total.....	700,998,299	810,662,706

New York, July 26—The general stock market has been irregular all through the week, and also extremely dull. Transactions were on a small scale and public interest was not evident. There was no general tendency apparent.

There was one sale of Homestake at \$83.50 per share. Virginia Iron and Coal has dropped out of sight and no sales were made.

On the Curb mining stocks were irregular also and dull, with only moderate sales. The larger transactions were in the Cobalt stocks, and these generally showed some weakness; but the losses were only fractional. Nipissing, La Rose and Kerr Lake were most dealt in. Porcupine stocks received some attention and were generally firm. In the copper shares there were transactions in Braden and some others early in the week, but later all the coppers were neglected.

Boston, July 25—Nipissing has been the local feature this week with a break of \$2.87½ to a low at \$7.12½. To date there has not been anything official as to the cause of this sharp decline but it is surmised that there has been heavy inside selling of the stock on prospects that the extra dividend will be omitted at the next payment period. The stock rallied to \$8.50 today on a covering movement.

There is little satisfaction in glancing over the mining-share list of the past week as it has been a dull and monotonous affair with an almost entire absence of public interest. At that an undercurrent of optimism prevails which might break out in unexpected places. The market lacks leadership.

Calumet & Hecla seems to have received inside support since the price was depressed to \$435 per share. Ahmeek is quoted at \$170 for odd lots. North Butte is fairly active and maintains a firm tone at \$33@34. Lake Copper went off \$1 to \$36 on light offerings. American Zinc rose \$1.62½ to 29.62½ on pool activity.

Curb trading has also been dull and uninteresting. First National is off to \$1. Davis Daly is off to 87c. Amalgamated Nevada has been the most active Curb issue with fluctuations between 16 and 10½ cents. The Porcupine issues hold steady.

July 13—The volume of trade on the Salt Lake Stock and Mining Exchange for the first half of 1911, ending June 30, amounted to 11,795,626 shares, valued at \$2,610,461, or about \$435,000 a month. January was the lightest month, 1,073,302 shares, valued at \$242,806, being traded in, while March showed 2,752,151 shares valued at \$587,031, this be-

ing the highest month. There was no call on the local board, July 3 and 4, and the present condition of the market is quiet. Stocks are drifting without any marked change and although there appear to be many selling at low figures, the public is almost entirely out of the

COPPER PRODUCTION REPORTS
Copper contents of blister copper, in pounds

Company	April	May	June
Anaconda.....	21,500,000	22,100,000	21,850,000
Arizona, Ltd.....	2,840,000	2,800,000	2,700,000
Balaklala.....	880,921	978,426	.....
Copper Queen.....	6,933,422	7,140,196	7,088,862
Calumet & Ariz.....	3,850,000	3,854,000	3,656,000
Detroit.....	1,814,740	1,709,530	1,732,692
East Butte.....	1,085,000	1,135,000	841,200
Nevada Con.....	5,298,632	5,277,355	5,307,400
Old Dominion.....	2,535,000	2,363,000	1,907,000
Shannon.....	1,258,000	1,229,760	1,098,000
South Utah.....	300,137	318,350	.....
United Verde*.....	2,500,000	3,000,000	3,000,000
Utah Copper Co.....	8,169,248	8,391,879	7,908,685
Lake Superior*.....	16,000,000	19,000,000	19,800,000
Non-rep. mines*.....	11,825,000	13,280,000	14,625,000
Total production.....	86,790,100	92,577,496	.....
Imports, bars, etc.....	25,655,122	19,481,190	.....
Total blister.....	112,445,222	112,058,686	.....
Imp. in ore & matte.....	5,207,484	6,801,365	.....
Total.....	117,652,706	118,860,051	.....
Brit. Col. Cos.:			
British Col. Copper	952,284	976,121	.....
Granby.....	1,825,340	1,238,328	.....
Mexican Cos.:			
Boleo.....	2,403,520	2,411,500	2,315,040
Cananea.....	3,644,000	4,098,000	3,462,000
Moctezuma.....	2,315,292	2,403,583	2,071,960
Other Foreign:			
Cape Cop., S. Africa	1,012,480	1,001,280	.....
Spassky, Russia.....	506,240	586,880	.....
Exports from:			
Chile.....	5,152,000	7,392,000	3,960,000
Australia.....	5,936,000	11,088,000	7,168,000

Figures are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners.
*Estimated.

STATISTICS OF COPPER

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
VI. 1910.....	127,219,188	53,363,196	65,895,948
VII.....	118,370,003	56,708,175	59,407,167
VIII.....	127,803,618	67,731,271	61,831,780
IX.....	119,519,983	64,501,018	75,106,496
X.....	126,469,284	67,814,172	68,186,312
XI.....	119,353,463	60,801,992	67,424,316
XII.....	123,339,219	43,594,018	88,104,075
Year 1910.....	1,452,122,120	749,426,542	722,431,494
I. 1911.....	115,696,591	42,078,567	53,208,739
II.....	109,828,297	50,518,998	45,111,019
III.....	130,532,080	66,080,789	59,081,127
IV.....	118,085,223	52,407,650	62,129,509
V.....	126,962,544	64,543,963	61,978,557
VI.....	124,554,312	61,655,561	71,460,519

	United States.	Europe.	Total.
VII. 1910.....	168,386,017	232,892,800	401,278,817
VIII.....	170,640,678	222,320,000	392,960,678
IX.....	168,881,245	218,444,800	387,326,046
X.....	148,793,714	211,276,800	360,070,519
XI.....	139,261,914	198,060,800	337,322,711
XII.....	130,389,069	193,200,000	323,589,069
I. 1911.....	122,030,195	236,629,120	358,649,373
II.....	142,439,490	236,992,000	379,431,134
III.....	156,637,770	233,385,600	390,023,009
IV.....	162,007,934	223,014,400	385,022,434
V.....	165,555,908	212,284,800	377,840,708
VI.....	165,995,932	202,540,800	368,536,732
VII.....	157,434,164	195,932,800	353,366,964

VISIBLE STOCKS.

	United States.	Europe.	Total.
VII. 1910.....	168,386,017	232,892,800	401,278,817
VIII.....	170,640,678	222,320,000	392,960,678
IX.....	168,881,245	218,444,800	387,326,046
X.....	148,793,714	211,276,800	360,070,519
XI.....	139,261,914	198,060,800	337,322,711
XII.....	130,389,069	193,200,000	323,589,069
I. 1911.....	122,030,195	236,629,120	358,649,373
II.....	142,439,490	236,992,000	379,431,134
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VI.....	165,995,932	202,540,800	368,536,732
VII.....	157,434,164	195,932,800	353,366,964

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month. From Jan. 1, 1911, stocks at Hamburg and Rotterdam are included in the visible stocks for Europe.

market. The trading is largely professional and no marked improvement is looked for until fall. A resolution was presented to the Exchange, July 11, proposing only one daily session from the middle of July to the middle of August, but was voted down.

Assessments

Company	Delinq	Sale	Amt
Alta, Utah	July 13	Aug. 3	\$0.05
Bonanza Mountain, Ida.	Aug. 15	Sept. 9	0.001
Bullion, Ida.	July 17	Aug. 17	0.005
Cedar Creek, Ida.	Aug. 9	Sept. 9	0.003
Chollar, Nev.	July 18	Aug. 10	0.10
Copper King, Ida.	Aug. 15	Sept. 16	0.01
Dalmatia, Ida.	Aug. 3	Sept. 4	0.002
Eagle Mountain, Ida.	July 31	Aug. 19	0.000
Holy Terror, Ida.	July 27	Aug. 12	0.001
Humming Bird, Ida.	July 7	Aug. 7	0.002
Hypothek, Ida.	July 28	Aug. 19	0.005
Ida. Copper, Ida.	Aug. 10	Sept. 1	0.003
Ivanhoe, Ida.	July 10	Aug. 10	0.004
Nine Mile, Ida.	June 15	Aug. 1	2.00
Old Colony, Mich.	July 7	Aug. 1	0.01
Oreano, Ida.	Aug. 1	Sept. 1	0.003
Pretoria, Ida.	Aug. 15	Sept. 15	0.000
Sierra Nevada, Nev.	July 21	Aug. 11	0.10
Silver Bell, Utah	July 29	Aug. 19	0.01
Silver Cliff, Ida.	July 21	Aug. 12	0.002
Silver Star, Ida.	July 10	Aug. 11	0.002
Spider, Utah	Aug. 15	Sept. 15	0.002
Torino, Ida.	Aug. 15	Sept. 15	0.001
Tyler, Ida.	July 7	Aug. 8	0.001
Union Con., Nev.	July 12	Aug. 4	0.15
Utah United Copper, Utah	June 24	Aug. 1	0.01

**Monthly Average Prices of Metals
SILVER**

Month.	New York.			London.		
	1909.	1910.	1911.	1909.	1910.	1911.
January	51.750	52.375	53.795	23.843	24.154	24.865
February	51.472	51.534	52.222	23.706	23.794	24.081
March	50.468	51.454	52.745	23.227	23.690	24.324
April	51.428	53.221	53.325	23.708	24.483	24.595
May	52.905	53.870	53.308	24.343	24.797	24.583
June	52.538	53.462	53.043	24.166	24.651	24.486
July	51.043	54.150	53.519	23.519	25.034	25.034
August	51.125	52.912	53.588	24.428	25.034	25.034
September	51.440	53.295	53.743	24.567	25.034	25.034
October	50.923	55.490	53.502	25.596	25.034	25.034
November	50.703	55.635	53.351	25.680	25.034	25.034
December	52.236	54.428	54.030	25.160	25.034	25.034
Total	51.502	53.486	53.706	24.670	25.034	25.034

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

Month.	NEW YORK.				London, Standard.	
	Electrolytic		Lake.		1910.	1911.
	1910.	1911.	1910.	1911.		
January	13.620	12.295	13.870	12.680	60.923	55.604
February	13.332	12.256	13.719	12.611	59.388	54.970
March	13.255	12.139	13.586	12.447	59.214	54.704
April	12.733	12.019	13.091	12.275	57.238	54.035
May	12.550	11.989	12.885	12.214	56.313	54.313
June	12.404	12.385	12.798	12.611	55.310	56.368
July	12.215	12.115	12.570	12.514	54.194	55.310
August	12.490	12.115	12.715	12.514	55.733	55.733
September	12.379	12.668	12.668	12.514	55.207	55.207
October	12.553	12.788	12.788	12.514	56.722	56.722
November	12.742	12.914	12.914	12.514	57.634	57.634
December	12.581	12.863	12.863	12.514	56.769	56.769
Year	12.738	13.039	13.039	12.514	57.054	57.054

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

TIN AT NEW YORK

Month.	1910.	1911.	Month.	1910.	1911.
January	32.700	41.255	July	32.695	33.972
February	32.920	41.614	August	33.972	34.982
March	32.403	40.157	September	34.982	36.190
April	32.976	42.185	October	36.190	36.547
May	33.125	43.115	November	36.547	38.199
June	32.769	44.606	December	38.199	38.199
		Av. Year.		34.123	38.199

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	4.700	4.483	4.582	4.334	13.650	13.009
February	4.613	4.440	4.445	4.266	13.328	13.043
March	4.459	4.394	4.307	4.238	13.063	13.122
April	4.376	4.412	4.225	4.262	12.641	12.889
May	4.315	4.373	4.164	4.223	12.550	12.984
June	4.343	4.435	4.207	4.292	12.688	13.260
July	4.404	4.400	4.291	4.291	12.531	12.531
August	4.400	4.400	4.290	4.290	12.531	12.531
September	4.400	4.400	4.289	4.289	12.582	12.582
October	4.400	4.400	4.271	4.271	13.091	13.091
November	4.442	4.442	4.314	4.314	13.217	13.217
December	4.500	4.500	4.363	4.363	13.197	13.197
Year	4.446	4.446	4.312	4.312	12.920	12.920

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	6.101	5.452	5.951	5.302	23.350	23.887
February	5.569	5.518	5.419	5.368	23.188	23.276
March	5.637	5.563	5.487	5.413	23.031	23.016
April	5.439	5.399	5.289	5.249	22.469	23.743
May	5.191	5.348	5.041	5.198	22.100	24.375
June	5.128	5.520	4.978	5.370	22.094	24.612
July	5.152	5.002	5.002	5.002	22.406	22.406
August	5.279	5.129	5.129	5.129	22.800	22.800
September	5.514	5.364	5.364	5.364	23.165	23.165
October	5.628	5.478	5.478	5.478	23.900	23.900
November	5.976	5.826	5.826	5.826	24.083	24.083
December	5.624	5.474	5.474	5.474	24.019	24.019
Year	5.520	5.520	5.370	5.370	23.050	23.050

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG.

Month.	Bessemer		Basic		No. 2 Foundry	
	1910.	1911.	1910.	1911.	1910.	1911.
	January	\$19.90	\$15.90	\$17.96	\$14.40	\$17.94	$14.75
February	18.96	15.90	17.21	14.50	17.38	14.81
March	18.53	15.90	16.93	14.65	17.00	14.96
April	18.28	15.90	16.84	14.65	16.75	15.00
May	17.10	15.90	15.94	14.30	16.18	14.72
June	16.52	15.90	15.60	14.06	15.53	14.56
July	16.40	15.90	15.40	14.06	15.40	14.56
August	16.09	15.90	14.89	14.06	15.16	14.56
September	15.92	15.90	14.73	14.06	14.93	14.56
October	15.90	15.90	14.05	14.06	14.88	14.56
November	15.84	15.90	14.26	14.06	14.78	14.56
December	15.90	15.90	14.15	14.06	14.65	14.56
Year	\$17.10	\$15.90	\$15.65	\$14.06	\$15.83	\$14.56

STOCK QUOTATIONS

COLO. SPRINGS July 25				SALT LAKE July 25			
Name of Comp.	Bid.	Name of Comp.	Bid.	Name of Comp.	Bid.	Name of Comp.	Bid.
Acacia	.03	Beck Tunnel	.21	Black Jack	.12	Carissa	.20
Cripple Cr'k Con.	.01	Cedar Talisman	.04	Colorado Mining	‡.43	Columbus Con.	.35
C. K. & N.	.10	Daly Judge	‡.25	Grand Central	.84	Iron Blossom	1.05
Doctor Jack Pot.	.05	Little Bell	.41	Lower Mammoth	.33	Mason Valley	8.85
Elkton Con.	.60	May Day	‡.08	Nevada Hills	‡.80	Prince Con.	‡.70
El Paso	.50	Nevada Hills	‡.80	Silver King Coal'n	1.60	Sioux Con.	.20
Findlay	.04	New York	‡.13	Uncle Sam	.50	Yankee	.16
Gold Dollar	.15	Prince Con.	‡.70				
Gold Sovereign	.02	Silver King Coal'n	1.60				
Isabella	.11	Sioux Con.	.20				
Jack Pot.	.05	Uncle Sam	.50				
Jennie Sample	.09	Yankee	.16				
Lexington	‡.01						
Moon Anchor	.02						
Old Gold	.02						
Mary McKinney	.35						
Pharmacist	‡.01						
Portland	.99						
Vindicator	.73						
Work	.01						

TORONTO July 25

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	6.50	Pearl Lake	.58
Hudson Bay	.75	Porcu. Gold.	.54
Temiskaming	.40	Porcu. Tisdale	‡.11
Wetlaufer-Lor.	.90	Preston E.D.	‡.38
Apex	.18	Standard Dome	1.98
Central	.81	Westward	.06
Doble	‡.12	Canada	‡.10
Dome Exten.	.84	Res.	5.34
Hollinger	10.75	Coronation	.30
Imperial	.10	Swastika	.52

SAN FRANCISCO

July 25

Name of Comp.	Cig.	Name of Comp.	Bid
COMSTOCK STOCKS			
Alta	.10	Belmont	6.50
Belcher	.40	Jim Butler	.26
Best & Belcher	.29	MacNamara	.17
Caledonia	.44	Midway	.18
Challenge Con.	.15	Mont.-Tonopah	.69
Chollar	.12	North Star	.13
Confidence	.65	West End Con.	.54
Con. Virginia	.95	Atlanta	.16
Crown Point	.48	Booth	.08
Gould & Curry	.13	C.O.D. Con.	.08
Hale & Norcross	.17	Comb. Frac.	.09
Mexican	‡.18	Jumbo Extension	.22
Occidental	.65	Oro	.05
Ophir	1.85	Silver Pick	.05
Overman	.40	St. Ives	.35
Fotosi	.30	Tramps Con.	.02
Savage	.13	Argonaut	1.75
Sierra Nevada	.40	Bunker Hill	7.00
Union Con.	1.40	Cent. Eureka	1.20
Yellow Jacket	.31	So. Eureka	7.00

N. Y. EXCH. July 25

Name of Comp.	Cig.
Amalgamated	69%
Am. Agri. Chem.	59%
Am. Sm. & Ref. com	79%
Am. Sm. & Ref. pf.	106%
Anacosta	38%
B	

Mining and Metallurgical Patents

A copy of the specifications of any of these patents issued by the United States Patent Office will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. British patents are supplied at 40 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

COAL AND COKE

COAL CUTTING—An Improved Portable Power-Driven Machine for Undercutting or Channeling in Coal and the Like. George W. Bousefield, Wakefield, Eng. (Brit. No. 11,870 of 1910.)

COALDUST EXPLOSIONS—Process for Preventing Explosions of Coaldust in Coal Mines. Hermann Kruskopf, Dortmund, Germany. (U. S. No. 995,261; June 13, 1911.)

COKE-OVEN GAS—Process to Recover Ammonium Sulphate from Coke-Oven or Retort Gas. Rene Farry, Sheffield, Eng. (Brit. No. 5667 of 1911.)

COKE OVENS—Improvements in or Relating to Doors for Gas Retorts, Coke Ovens and the Like. Ofenbau Gesellschaft, m.b.H., Munich, Germany. (Brit. No. 884 of 1911.)

CONVEYING APPARATUS—Improvements Relating to Conveying Apparatus Particularly Applicable for Use in Coal and Other Mines. Robert W. Glass and Thomas M. Archer, Whickham, Eng. (Brit. No. 4098 of 1911.)

PEAT-DREDGING MACHINE. Wilhelm Wielandt, Oldenburg, Germany. (U. S. No. 996,898; July 4, 1911.)

WASHING—Coal-Washing Jig. Albert Charles Hoecker, Collinsville, Ill. (U. S. No. 994,160; June 6, 1911.)

WASHING—An Improved Apparatus for Washing Coal. Joseph Dodds, Glasgow, Scotland. (Brit. No. 5970 of 1910.)

GOLD AND SILVER

CYANIDING—Process for Producing Metals from Ores. Raymond Patterson Wheelock, Searchlight, Nev. (U. S. No. 996,179; June 27, 1911.)

EXTRACTION—An Improved Process of Extracting Precious Metals from Ores. J. S. Island, Toronto, Ont. (Brit. No. 13,488 of 1910.)

PLACER MINING—Apparatus for Separating Mineral-Bearing Matter from Streams of Water. James V. Coleman, San Francisco, Cal. (U. S. No. 995,526; June 20, 1911.)

SEPARATION—Apparatus for Separating Precious Metals from Associated Materials. Frederick H. Prentiss, San Francisco, Cal., assignor to American Exploration and Guaranty Company, Phoenix, Ariz. (U. S. No. 995,718; June 20, 1911.)

STAMP MILL. Joseph W. Pinder, Oakland, Cal. (U. S. No. 995,713; June 20, 1911.)

STAMP MILLS—Improvements in Stamp Mills. P. N. Nissen, Durham, and Head Wrightson & Co., Ltd., Thornaby-on-Trees, Eng. (Brit. No. 24,266 of 1910.)

IRON AND STEEL

AGGLOMERATING—Method of Treating Finely Divided Substances Containing Iron Compounds. Tom Cobb King, Marion, Ala., assignor to National Metallurgical Company, Jersey City, N. J. (U. S. No. 995,542; June 20, 1911.)

BLAST FURNACE—Apparatus for Manufacturing Iron and Its Alloys. Marcus Ruthenburg, Lockport, N. Y. (U. S. No. 995,636; June 20, 1911.)

BLAST FURNACES—Hot-Blast Valve. Felix McCarthy, Pottstown, Penn. (U. S. No. 997,461; July 11, 1911.)

FERROCHROMIUM—Process of Effecting Reduction and Producing Ferrochromium. Edgar F. Price, Niagara Falls, N. Y., assignor, by mesne assignments, to Central Trust Company of New York, trustee. (U. S. No. 995,481; June 20, 1911.)

TITANIFEROUS IRON ORES, Treatment of. Alf Sinding-Larsen, Christiania, Norway. (U. S. No. 995,596; June 20, 1911.)

LEAD, ZINC AND OTHER METALS

ANTIMONY—Improvements in or Relating to the Electrolytic Production of Antimony. Marcus Ruthenburg, London, Eng. (Brit. No. 19,772 of 1910.)

TIN—Process of Purifying Tin Scraps Preparatory to Detinning the Same. Carl von

A Classified List of New Inventions



der Linde, Crefeld, Germany. (U. S. No. 996,380; June 27, 1911.)

ZINC—Method of and Apparatus for Condensing Zinc Vapor to Liquid Metal. Charles Thierry, Paris, France, and John Thomson, New York, N. Y. (U. S. No. 994,889; June 13, 1911.)

ZINC—Process for Obtaining Zinc Oxide from Materials, which Contain Metallic Zinc or Zinc Oxide. George Wannschaff and Josef Savelsberg, Papenburg-on-the-Ems, Germany. (Brit. No. 5577 of 1911.)

NONMETALLIC MINERALS

FELDSPAR—Process of Obtaining Potash Salts from Feldspar. Firman Thompson, Newark, Del. (U. S. No. 995,105; June 13, 1911.)

PHOSPHATE—Washer for Pebble Phosphate and the Like. Thomas Roberts, Charlotte Harbor, Fla. (U. S. No. 997,854; July 1, 1911.)

POTASH SALTS—Process of Extracting Potash Salts and Other Products from Silicious Rocks. Edward Hart, Easton, Penn. (U. S. No. 997,671; July 11, 1911.)

MINING—GENERAL

DRILL MOUNTING. William Prellwitz, Easton, Penn., assignor to Ingersoll-Rand Company, New York, N. Y. (U. S. No. 997,509; July 11, 1911.)

DRILL SHARPENING—Apparatus for Shaping and Sharpening Rock-Drill Bits. William H. Smyth, Berkeley, Cal. (U. S. No. 996,807; July 4, 1911.)

DRILLING—Improvements in or Relating to Rock-drilling Machines for Removing the Detritus or Cuttings from the Holes formed Therewith. Elisha Tippet, Johannesburg, Transvaal. (Brit. No. 13,575 of 1910.)

HOISTING—Safety Appliance for Mines to Prevent Overwinding. Samuel Green Bennett, Chesterfield, England. (U. S. No. 996,049; June 27, 1911.)

MINE DOOR—Automatic Mine Door. James Taylor, Peoria, Ill. (U. S. No. 996,949; July 4, 1911.)

MINER'S ACETYLENE LAMP. James Taylor, Peoria, Ill. (U. S. No. 996,950; July 4, 1911.)

PROSPECTING DRILL. Herman R. Ameling, Decatur, Ill. (U. S. No. 997,358; July 11, 1911.)

SHAFT LINING—An Improvement in Cast-Iron Tubbing or Linings for Mine Shafts, Tunnels and the Like. G. R. Thompson, Leeds, Eng. (Brit. No. 18,032 of 1910.)

TUNNELING MACHINE. George A. Fowler, Denver, Colo. (U. S. No. 996,842; July 4, 1911.)

ORE DRESSING—GENERAL

CLASSIFIER—Ore Classifier. John V. N. Dorr, Denver, Colo. (U. S. No. 996,624; July 4, 1911.)

CONCENTRATOR—Deck for Concentrating Tables. Frank Franz, Burke, Ida., assignor of one-half to Eugene R. Day, Wallace, Ida. (U. S. No. 995,448; June 20, 1911.)

CONCENTRATOR TABLE—Spiral Slimer. Joseph W. Pinder, Oakland, Cal. (U. S. No. 995,089; June 13, 1911.)

CONVEYERS—Improvements in Conveyers and Screens. Edgar Allen & Co., Ltd., Alexander Ogilvie and Andrew Armstrong Short, Sheffield, Eng. (Brit. No. 16,968 of 1910.)

CRUSHING—Improvements in Machines for Crushing Coke, Coal and Other Substances. Babcock & Wilcox, Ltd., and George Guest, London, Eng. (Brit. No. 22,997 of 1910.)

CRUSHING—Improvements in Ore, Mineral and Coal Breakers. Isaac Christ and Henry

K. Christ, Mahanoy City, Penn. (Brit. No. 4704 of 1911.)

CRUSHING—Ore Granulator. John Gideon Kirksey, Denver, Colo. (U. S. No. 994,934; June 13, 1911.)

CRUSHING MACHINE. Thomas Leggett Sturtevant, Quincy, and Thomas Joseph Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company. (U. S. No. 995,580; June 20, 1911.)

FLOTATION PROCESS—Magnetic Preparation of Ores. Alfred Arthur Lockwood, London, England, assignor to Murex Magnetic Company, Limited, London, England. (U. S. No. 996,491; June 27, 1911.)

JIG. Grant B. Shipley, Milwaukee, Wis., assignor to Allis-Chalmers Company, Milwaukee, Wis. (U. S. No. 995,381; June 13, 1911.)

GRINDING MILL. Richard F. Abbé, New York, N. Y. (U. S. No. 997,592; July 11, 1911.)

JIG—Ore and Coal Jig. Enos A. Wall, Salt Lake City, Utah. (U. S. No. 993,481; May 30, 1911.)

ORE CLEANING, ETC.—Improvements in Apparatus for Cleaning, Separating and Classifying Metalliferous Ores. George H. Harris, Wadebridge, Eng. (Brit. No. 16,443 of 1910.)

SEPARATION—Apparatus for Separating Solids from Liquids. H. G. Nichols, Ymir Gold Mines, Limited, near Ymir, B. C. (U. S. No. 996,877; July 4, 1911.)

SEPARATION—Method of Magnetically Separating Ores. Clarence Q. Payne, New York, N. Y. (U. S. No. 994,871; June 13, 1911.)

SEPARATION—Method of Separating Ores. Clarence Q. Payne, New York, N. Y. (U. S. No. 994,870; June 13, 1911.)

SEPARATOR—Ore Separator. Joseph Stanley Geary, Okla., assignor of one-half to Bertha A. Carpenter and F. S. Preston, Geary, Okla. (U. S. No. 995,578; June 20, 1911.)

STAMP MILLS—Cam for Stamp Mills. Henry Bolthoff, Denver, Colo. (U. S. No. 995,436; June 20, 1911.)

METALLURGY—GENERAL

AIR—Heating Air for Metallurgical Furnaces. Walter George Perkins and William Matthew Barker, London, England. (U. S. No. 996,132; June 27, 1911.)

BRIQUETTING—Mixer and Drier for Briquet Materials. Emil Fernholtz, Los Angeles, Cal., assignor to National Briquetting and Clay Working Machinery Company, Phoenix, Ariz. (U. S. No. 994,991; June 13, 1911.)

ELECTRIC FURNACES—Improvements in or Relating to Electric Furnaces. Carl Hering, Philadelphia, Penn. (Brit. No. 15,139 of 1910.)

ELECTRIC FURNACES—Improvements in Revolvable or Oscillatory Electric Furnaces. John Thomson, New York. (Brit. No. 15,165 of 1910.)

ELECTRIC FURNACES. James H. Reid, Newark, N. J. (Brit. No. 19,804 of 1910.)

MELTING FURNACES—Improvements in and Relating to Furnaces for Melting Metals. H. J. Mundy, Hull, England. (Brit. No. 16,511 of 1910.)

REFRACTORY BRICKS—Improvements in the Manufacture of Refractory Bricks, Blocks, Tuyeres and the Like Employed in Connection with Furnaces for Smelting Metals. Herbert E. Mason, Horwich, near Bolton, Eng. (Brit. No. 16,036 of 1910.)

ROASTING—Cooler for Ores. Thomas Edwards, Sebastopol, Victoria, Australia. (U. S. No. 995,445; June 20, 1911.)

ROASTING—Improved Process for the Roasting of Ores to Separate the Metals contained Therein. (Charles Gabrielli, Paris, France. (Brit. No. 27,741 of 1910.)

ROASTING—Process and Apparatus for Roasting Ores. Arthur R. Wilfley, Denver, Colo., assignor of one-half to Joseph Seep. (U. S. No. 996,548; June 7, 1911.)

SMELTER SMOKE—Process of Refining Smelter Fume Products. Alexander Roy, San Francisco, Cal., assignor of one-half to Wallace A. Houts, Oakland, Cal. (U. S. No. 996,146; June 27, 1911.)

SMELTING—Method of Smelting Coarse and Fine Ores. John W. Nesmith, deceased Denver, Colo., by Harper M. Oranhood, executor, Denver, Colo., assignor to Colorado Iron Works Company, Denver, Colo. (U. S. No. 995,366; June 13, 1911.)