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CIRCULATION STATEMENT

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Contents

The Copper Statistics for July

As we forecasted last week, the production of American refineries decreased in July, and this was by all means the pleasing factor of the statistics for that month. The average daily rate of production in June was 4,240,639 lb.; in July, 3,818,400 lb. The June production was generally recognized as abnormal, and even without the curtailment begun in August it was not to be expected that the production during the remainder of 1910 would average more than 4,000,000 lb. per day.

Quite apart from the stress that a price of less than 13c. per lb. puts upon many producers, we were approaching closely to the limit of present smelting and refining capacity. The capacity of the refineries treating blister copper, disregarding two or three small works that perhaps are permanently out of commission, at the end of 1909 was about 1,262,000,000 lb. per annum. Adding 230,000,000 lb. for Lake copper and 77,000,000 lb. for casting and pig copper, the total is 1,569,000,000 lb., or 4,300,000 lb. per day, which is approximately the present maximum capacity. The refiners have not been making or planning any additions during 1910. Doubtless they will have to do so before long if conditions require them to take care of the new copper of 1911 on top of the monthly maximum production of 1910.

Let us remark in passing, however, that the new copper of 1911 is not going to burst upon us like the flood that many persons expect. Miami will probably start its mill about Jan. 1, 1911, but it will probably be a long time after that before its full capacity is attained. Nevada Consolidated began smelting about July 1, 1908, but it was not until near the end of 1909 that a production of 5,000,000 lb. per month was realized. If consumption increases in the normal ratio during the next three years, Miami, Ray, Utah, Chino and Braden will probably do no more than supply the additional requirements.

While the decrease in the American production in July was particularly gratifying, the substantial repetition of the returns for June in the matter of domestic deliveries was unsatisfactory, indicating without doubt that consumption in this country has undergone some contraction. On the other hand, the continued large exportation is encouraging, especially when taken in connection with the numerous reports of growing business among manufacturers abroad.

The net result of the American statistics for July was an increase of 2,254,661 lb. in the stock on this side, against which was a decrease of 10,570,000 lb. in Europe, making a decrease of 8,315,339 lb. in the combined statistics. The statistics for July go far to prove our contention that the world's consumption of copper had overtaken production even before the drastic curtailment of production was inaugurated.

The Mine Workers' Convention

An important crisis in the organization of the United Mine Workers comes to a point this week, when a general convention will meet at Indianapolis. The convention has been called specially by

President Lewis and its objects are clearly stated in the call. The chief one is to decide whether the authority of the central board of the coal miners' union shall maintain its authority, or whether it is to be set aside by district officers of a different opinion. Incidentally the settlement of the prolonged strike in Illinois will be brought up and an effort at settlement made.

The contest is between the moderate and conservative element, led by President Lewis, which believes in order and respect for contracts; and the turbulent element which advocates violence and a loose construction of agreements. This element is led by District President Walker, of Illinois, to whose influence it is chiefly due that the recent compromise offer of the operators was rejected. The general belief is that the conservative element is the stronger in numbers, but the other is more active and noisy. The convention will be, without doubt, an exciting one, and its proceedings may even be turbulent. There is even talk of a possible split in the union.

President Lewis has so far proved himself a safe leader and has tried to conduct the affairs of the union on the lines laid down by John Mitchell. In the trouble of the present summer he has been everywhere in favor of reasonable compromise. Moreover, he has insisted upon that adherence to contracts and agreements when made, which is necessary to the future success of the union. It is to be hoped that he will be supported by the convention.

Pig Iron Production in 1910

The curtailment of pig-iron production, of which so much has been said, was certainly not at all in evidence until after July 1. The make of pig iron for the first half of the year, as reported by the American Iron and Steel Association, was the largest ever recorded in a similar period. The total was 15,012,392 tons, which was 239,267 tons more than in the second half of 1909, and 3,990,046 tons more than in the first half of that year. It was 1,534,348 tons more than in the first-half of 1907, which has hitherto been considered the year of unequaled boom. It may also be noted that the make for the half-year exceeded by more than a million tons that of the entire year 1900, which was considered a large output. In 10 years our output was more than doubled, and even then the full manufacturing capacity of the furnaces was not reached.

There are some peculiarities in the half-year reports which are not entirely susceptible of explanation. In making these comparisons it is necessary to take the second half of 1909, when conditions were nearly the same as in the half-year under review. It is well known that for several years the growth of the basic open-hearth steel process has been rapid, carrying its total above those of the bessemer process. In the present year, however, there was, apparently, at least a check to this growth. The production of basic pig was substantially the same in both half-years, the difference being only 1166 tons on a total of 4,953,810; while there was an increase of 238,995 tons in bessemer pig. It may be that this resulted from the fact that an unusual proportion of the 1910 production was made by the furnaces owned and operated by the steel companies; but this is only a suggestion.

It is generally admitted now that the great production of the first half of this year was a mistake, or a miscalculation. It was an output in excess of the demand. A great volume of business was done, but there was in no sense a boom in the iron trade, and consumption did not reach the high point which many expected. There was a surplus of iron which brought down prices in the open market by 20 or 25 per cent.; and which caused the accumulation of unsold or unused stocks. Before the end of the half-year, the existence of these stocks was well known and it became apparent that production must be curtailed or stocks would reach a point where they could not be carried. The movement to reduce the make began, as usual, with the steel-works furnaces, but the merchant furnaces followed. That it has not yet gone far enough is generally believed. The extent of the accumulation is not exactly known, since stocks are not reported; but competent judges have estimated that on July 1 there was approximately 1,000,000 tons of unused iron held by the steel companies and 500,000 tons by the merchant furnaces. One thing is known, and that is that the surplus, whatever it was, was carried chiefly by the makers. Users of pig iron had been for some time buying only as they needed it; throughout the country there has been and is little iron held in the yards of foundries and the smaller steel companies. Moreover, few of these buyers are covered by contracts running far ahead. Users of iron have preferred to take the chances of the open market, and they are probably right.

Our manufacturing capacity at the present time is over rather than under 36,000,000 tons yearly. Allowing for the proportion of stacks necessarily out of blast for repairs and rebuilding, this means a possible production of 32,500,000 tons a year; and this will be increased by 1,000,000 tons when the furnaces now under construction are completed. Our manufacturing capacity has increased faster than the consuming capacity; and a halt is necessary. There is no doubt that the demand will grow up to the supply; but it will take time.

Is There a Cut in Rail Prices?

Considerable interest has been aroused by a report in Pittsburg that on an order for 20,000 tons of rails for a Western road the Illinois Steel Company, the Western subsidiary of the Steel Corporation, made a price of about $26.50, or $1.50 below the standard which has been maintained since February, 1901. Categorical denials have been made by corporation representatives in Chicago, Pittsburg and New York, but in some quarters it is believed that the report, although perhaps inaccurate in details, has a foundation in fact, not along the line that any cut has been made through competition between domestic producers, but because of the troubles in the International Rail Syndicate. It is said that foreign manufacturers were trying to get into the United States market and the Illinois Steel Company cut the price, presumably with full knowledge on the part of the other rail makers, in order to keep the foreign steel out, and to show foreign mills that their competition can be met.

In a recent lecture in London, Sir Hugh Bell estimated the early value of the total iron and steel production of the United Kingdom at £204,000,000; while the number of men employed is 1,400,000, or about one-sixth of the occupied male population of the country.

CORRESPONDENCE and DISCUSSION

Views, Suggestions and Experiences of Readers

Circular Steel Bins

In A. Van Zwaluwenburg's description of the plant of the Teziutlan Copper Company in the JOURNAL of July 23, 1910, on page 170, he says: "The shells are constructed of 3/16-in. steel and carry no load except that due to side pressure. The load of the bin contents is carried directly by the rock filling in the bottom, etc."

If this is true it is time for some of us to wake up and get over the idea that in a bin of these dimensions, i.e., 25 ft. in diameter by 40 ft. high, the greatest part of the load comes down the sides of the bin.

The tanks of the Old Dominion Copper Company at Globe, Ariz., are 15 ft. in diameter and 26 ft. deep, with hemispherical bottoms, and the first course above the hemisphere is of 5/16-in. plate. There is a large plant now building in the Southwest where weights were cut to a minimum and the ore tanks, which are 25 ft. in diameter by 40 ft. high, have a bottom course of plates 5/16 in. thick.

F. W. C.

Kelvin, Ariz., July 30, 1910.

Calculation of Recovery in Concentration

The article by Theodore J. Hoover, in the JOURNAL, of June 11, entitled Calculation of Recovery in Concentration, recalls a series of tests I made in 1908 to determine the comparative efficiency of several different types of concentrating tables on various feeds. The tests furnish a practical example of the problems presented by Hoover.

About 200 tests were run under normal working conditions with each table in its regular place in the milling system, and with each test running from four to six hours continuously. All the concentrate produced during each test was saved and carefully weighed, sampled for moisture and assay, by thoroughly mixing and sampling with a split, hollow "try-rod." A regular fire assay was employed.

A ten-second time sample of the feed and of the tailing was taken half-hourly during the test by cutting out, with a sharp-edged spout, the whole stream falling through a two-inch pipe. The samples were dried, weighed and assayed for lead by the Guess electrolytic process, and for silver by the regular fire assay. The weights of feed, concentrate and tailing were each reduced to tons per 24 hours.

CALCULATING THE RECOVERY

The concentrates having been weighed and having followed the course regularly taken by the shipments upon which final smelter settlements are made, were assumed to be correct. The recovery of each test was figured from the relation of the feed and tailing to the concentrate in three ways, as follows: By dividing the contents of the concentrate (1) by the contents of the feed, by time sample; (2) by the contents of the tailing plus the contents of the concentrate, by time sample; (3) by the contents of the feed, calculated from a formula.

This formula was derived by letting X = tons of feed; Y = tons of tailing; F = assay of feed; T = assay of tailing; L = contents of concentrate, and C = tons of concentrate. Then $X - Y = C$ (1) and $FX - TY = L$ (2). Multiplying (1) by T yields (3) $TX - TY = TC$. Subtracting (3) from (2) yields (4), $FX - TX = L - TC$. Solving (4) for X gives $X = \frac{L - TC}{F - T}$.

The average assay of the concentrate, figured from the assay of each test, was 55.84 per cent. lead, but 1.08 per cent. lead was added to provide for the difference between the wet assay of the feed and the tailing and the fire assay of the concentrate, a long period of experimenting having determined this figure.

TIME SAMPLING AN ACCURATE METHOD FOR DETERMINING MILL TONNAGE

The accompanying summary of the tests shows that the tonnage of the products by time sample check closely the sum of the tonnages of tailing and concentrate, being practically equal to the tonnage of the feed. This condition prevailed generally throughout the tests, and coupled with the results attained in many other tests by the same methods, leads me to believe that careful time sampling is an accurate way to determine mill tonnages.

SUMMARY OF TESTS AT THE BUNKER HILL & SULLIVAN MINING AND CONCENTRATING COMPANY.

	Feed.					Concentrate.					Tailing.					Per Cent. Extraction.			
		Assay.		Contents.			Assay.		Contents.			Assay.		Contents.		Time Sample.		Formula.	
	Tons 24 Hrs.	Pb.	Ag.	Tons Pb.	Oz. Ag.	Tons 24 Hrs.	Pb.	Ag.	Tons Pb.	Oz. Ag.	Tons 24 Hrs.	Pb.	Ag.	Tons Pb.	Oz. Ag.	Pb.	Ag.	Pb.	Ag.
"A" = time sample	847.41	11.16	5.22	94.55	4427	86.89	56.92	22.40	49.45	1946	760.26	5.33	3.12	40.53	2372	52.30	43.95	.....	.....
"B" = tailing plus concentrate	847.15	10.62	5.10	89.98	4318	86.89	56.92	22.40	49.45	1946	760.26	5.33	3.12	40.53	2372	54.95	45.06	.....	.....
"C" = formula applied to "A" using lead	768.76	11.16	5.22	85.79	4013	86.89	56.92	22.40	49.45	1946	[1]681.87	5.32	3.03	36.34	2067	.....	.....	57.64	52.20
"D" = formula applied to "A" using silver	797.51	11.16	5.22	89.01	4163	86.89	56.92	22.40	49.45	1946	[1]710.68	5.56	3.12	39.56	2217	.....	.....	55.55	46.74
"E" = formula applied to "B" using lead	847.26	10.62	5.10	89.97	4321	86.89	56.92	22.40	49.45	1946	[1]760.37	5.33	3.12	40.52	2375	.....	.....	54.96	45.03
"F" = formula applied to "B" using silver	845.90	10.62	5.10	89.83	4314	86.89	56.92	22.40	49.45	1946	[1]759.01	5.32	3.12	40.38	2368	.....	.....	55.04	45.10

[1]Tailing results by difference.

TIME SAMPLE VS. FORMULA

Referring to the summary, the results in "B" indicate that the tonnage and assay of the concentrate and tailing being correct, the feed assay is too high by 0.54 per cent. lead and 0.12 oz. silver. Assuming the feed to be correct, under like conditions, the tailing is too low by 0.6 per cent. lead and 0.14 oz. silver. If we assume, on the other hand, that the tonnage and assay of the feed and tailing are correct, and taking the weight of the concentrate for a constant, the assay of the concentrate would have to be 62.18 per cent. lead—a difference of 5.26 per cent. over the compensated assay. This is improbable.

The above formula applied to "A," as shown in "C" and "D," gives a wide difference in the feed tonnages and shows a discrepancy between the lead and the

silver assay in the feed or in the tailing, or both.

Hoover's Formula Compared

Using Hoover's formula for percentage recovery, and applying it to "A," the lead recovery is 57.71 per cent. lead, corresponding to "C" and 46.74 per cent. for silver corresponding to "D." In "C" and "D," however, the tonnage of the concentrate is a factor, while Hoover's formula is based only on assays. The close results from the two formulas indicate that the tonnage of the concentrate is correct.

But assuming the tonnage and assay of the concentrate and the assay of the feed and the tailing to be correct, there is no tonnage of feed which will satisfy the equations in the formula, applying both lead and silver.

The above tests were run for comparative efficiency only, so that the actual recovery was not vital, and, therefore, in drawing conclusions from the results, I used the recoveries as calculated in "A;" employing "B," "C" and "D" as checks against "A." It would be an interesting problem, however, to determine from the above data what the actual recovery was.

R. S. Handy.

Kellogg, Idaho, July 6, 1910.

Standards of Work

Engineers and mine superintendents in charge of the execution of work are grappling every day with the problem of how much can or ought a man to do, and there is little to help him in the matter but his own common sense and experience. If one has kept notes of one's work, one will find them to consist almost entirely of how to do things, and how much certain men and machines can do. The essence of an engineer's work today is to obtain the maximum output with the minimum cost. The latter is easily reckoned, but it is the former that is so difficult to obtain and to appraise.

All Conditions Must Be Known before Comparisons Can Be Made

The output of a man or machine should, theoretically, be the same all over the world, but those who have worked in different parts realize how much it varies. But if one is handling the native races of the East, or the Latin American, although it is well to know how much a man will do in Europe or the United States on similar work, it is not to be expected that one will get the same result in India or Peru. So we come to the necessity of knowing the conditions and environment. These cannot be too carefully and clearly stated, in order that a man, say, digging a water-ditch in Burma, may compare the cubic yards per man with those obtained by another engineer doing the same thing in the Chilean Andes.

In established mining camps, certain amounts of work and output have by long usage become standard, and the engineer who tries to improve on them has to face a lot of organized opposition and will usually get only temporary results. In new countries, however, it is possible to gradually increase the output of work per man considerably and permanently by a combination of experience, firmness, tact and system.

Increasing Efficiency of Labor

On a mine, perhaps 70 per cent. of the costs are for labor and wages, and 10 per cent. increase in the work per man per day means a good deal more than 10 per cent. reduction in the cost of supplies. I know managers who will spend months in reducing the price of a box of dynamite one dollar, while the same amount of work and thought might, by proper encouragement of the miners who use the dynamite, increase the work they do by 20 per cent. per day for the same pay.

The reduction on the cost of the dynamite is excellent, but it should go hand in hand with the increase in the work of the man who uses it. But it is not so easy to get the latter, either by intermittent aggressiveness or persuasion, and mere dollars in cost per meter or ton will not tell how the results compare with those obtained elsewhere. One may find that the rate of sinking on the Kolar goldfields is so much per month and that in Guanajuato they pay so much per meter drifting in medium ground, the miners on contract figuring to get so much per day as a minimum wage.

This may help but one wants to know a whole lot more before applying either standard to a mine in Bolivia. One must know the size of the drift or shaft, the hours worked, the hardness of the ground and how it breaks, the method of drilling, whether by single-jacking or double or machines, the size of steel and the kind of powder, the number and length of holes per shift, whether the ground was dry or wet, the ventilation, the kind and weight of hammers and the amount drifted per man per shift. The latter is an important criterion when comparing workings of equal size.

Record Results Not Comparable in Different Districts

If all these data for mines in a dozen different places were available, the amount of work done in a mine could be accurately judged and it would be easy to determine if it was below the standard for the prevailing conditions. The published information on records of sinking, raising, drifting, etc., do not help one in coming to a decision as to what one's own men ought to do. If the number of feet of holes drilled per foot of progress made, be calculated for any of these records, one will be agreeably surprised to find how much better work one's own miners are doing. But that is a long way from proving that one's present results are sufficiently satisfactory. One may figure and compare similarly the powder per foot of hole or per ton of rock and once more get a better result than the record figures show.

But it will be of considerable assistance to know that on a certain mine in Mexico, the average rate per man per day, taken over a year's work on similar development in drifts, etc., is, say, 20 cm., with a maximum rate of so much in the easiest ground. Such information would help the miner amid new conditions. It is in the hope that the Journal will devote an occasional page to such "standards" and that its readers will help by sending the complete itemized data on practical operations, reviewed from time to time, that these notes are written.

A standard of work does not mean the record for the particular class considered, but rather the average over a long period. At the same time a maximum rate should always be given when possible, as it indicates what is to be attained under the more favorable circumstances. If one takes the best peon on the mine and bribes him sufficiently he may mine, say, a record number of tons in a day, or load a phenomenal number of cars, but this would be no criterion for other similar work, although it might help in forming an idea. What is needed are average results, taken over periods sufficiently long to equalize the irregularities of varying conditions and different laborers.

Special Records Are Useful When Properly Applied

The statement, however, of so much work done on one single occasion by so many men, is also a valuable standard when properly used. Standards may be worked out on all sorts of things, showing the rate per man or supplies per unit. For example, in drill sharpening, the number of drills per day dressed, or the amount of coke or charcoal per drill used is useful data; and may be recorded as a standard, to improve on if possible. On a certain mine in Mexico, I have seen it stated that a ton of rock was broken for every foot of hole drilled in a certain year. That statement is too bald and requires supplementing in order to make useful comparisons; even as it stands it is a neat standard of work done.

I know another mine where two men drilling double-handed break about four tons a shift, but to make that information useful one needs to state the width of the lode, the kind of mining, and a number of other details that are inti-

mately related to it and are included in the final result. Again, two men with a certain size car can load and tram so many tons a day a certain distance; when the actual size of car and the distance is given you can work out the ton-mileage per year and apply this factor to any particular drift where the conditions are somewhat similar. Furthermore, so many men on a windlass, or a certain size barrel with a stated bucket load, can raise a certain number of tons per shift of eight hours from a certain depth; if you work out the foot-pounds per man you have a useful factor to apply elsewhere.

Standards of Work Unconsciously Observed in Many Mines but Seldom Recorded

Standards of work are as necessary to the mine superintendent as costs per ton or foot and are closely interdependent. A mason can do so many cubic yards of dry-stone walling in a day; if one happens to know this figure it is something, but the width of the wall and its hight are also factors in the total of cubic yards and are necessary to apply the standard.

In rock drilling there is a large scope for comparisons and standards and data relating to it from all parts of the world would make a useful little volume. One needs the maximum that a man can do, as for instance in drilling contests, and also, the working averages actually obtained in the regular course of mining work, both in development and in breaking ore. This information must be figured in various ways, such as feet per shift, powder per foot, feet of hole per foot of drift, or raise, or winze, feet of hole per ton of rock, feet of drift per day per man, etc.

In every department of a mine, on the surface and underground, day by day, these standards are being used almost unconsciously, but rarely noted. Yet if they were placed on record and could be compared with similar data obtained in various other countries, where, due to economic conditions, climate, altitude, etc., the results were different, it is probable that in many cases it would be found possible to improve on one's own attainments. In obtaining and recording such data, however, it is essential to note every dimension and fact that would apparently influence the result Then one has a valuable criterion and can accurately sum up the merits of one's own or another's work.

All this does not apply only to human output, but also to that of machines and animals. All facts that would indicate the capacity of a machine or the ton-mileage abilities of a mule are useful standards.

A. Livingstone Oke.

Rodeo, San Juan, Argentina,
June 7, 1910.

California Oil Dividends

Dividends paid by a number of California oil companies during July, 1910, together with the total dividends to date as reported by the San Francisco Stock Exchange, are shown in the accompanying table:

Name of Company.	July, 1910, Dividend.	Total Paid to Date.
Alma Oil Co.	$ 11,400	$ 182,400
Amalgamated Oil Co.	50,000	1,550,000
American Petroleum, pfd	16,667	250,301
American Petroleum, com.	83,333	1,305,525
Caribou Oil & Mining Co.	20,176	781,234
Claremont	10,000	365,000
Columbia	9,992	314,767
Del Rey	3,927	15,710
Empire	.....	6,000
Euclid	3,500	138,000
Home	2,000	482,000
Homestake	1,000	79,250
Imperial	800,000	4,000,000
Kern River	2,000	108,000
Mascot	5,000	30,000
Mecca	12,675	71,825
Mexican Petroleum	87,693	3,324,115
Monte Cristo	50,000	590,000
New Penn. Petroleum	5,000	10,000
Palmer	18,020	322,441
Pinal	15,000	946,999
Premier	10,000	40,000
Record	7,500	85,000
S. F. & McKitrick	15,000	400,000
Sauer Dough	4,987	537,253
Section 25	10,000	50,000
Sesnon	6,000	132,000
Superior	5,000	62,500
Union	124,813	6,867,507
United	40,375	2,340,462
Wabash	60,000	189,000
Total for July, 1910.	$1,474,570	

Injunctions against Oroville Dredges

The California Anti-Débris Association, through its attorneys, has succeeded in obtaining injunctions against eight dredges in the Oroville field on the plea that they are allowing their tailings to flow into Feather river. The eight injunctions cover the dredges of three companies, including the Oro Water, Light and Power Company, and the Viloro company. The association considers this the first important step toward controlling and perhaps stopping dredge mining at Oroville. As the people of Sacramento are complaining about the dredges in the Folsom dredging field on the American river, and are taking steps to prevent the pollution of the water, it is evident that the dredge men of the State have some litigation ahead of them.

An injunction was recently issued by Judge Post, of the Superior Court, in Sacramento in the anti-débris suit of Yuba county, against the North American Consolidated Hydraulic Mining Company. The peculiarity of the injunction in this case is, that it is issued against the mining ground itself, as well as its owners, which is the first time that such a thing has been done. The injunction attaches a perpetual prohibition upon the land, no matter who the subsequent owners or lessees may be. There is no doubt of a serious legal question as to the validity of an injunction of this sort. The individual owner or manager is by this action virtually eliminated or ignored.

If the hydraulic miners and the dredge miners could get together and resuscitate the California Miner's Association by bringing in new blood and bringing forward new and vital issues connected with the mining industry of the State, the Anti-Débris Association could no longer have things all its own way as it appears to have at present. The same steps are being taken against the dredge men as were taken against the hydraulic miners and by the same association. A lukewarm and passive defense will no longer answer if these two branches of the gold-mining industry are to continue to thrive in California.

Drainage of Daly-Judge and Daly-West Mines

An agreement was reached between the Daly-Judge and the Daly-West mines, July 27, by which drainage connections will be made, and the Ontario tunnel extended into Daly-Judge territory. The Daly-West is to drive its 1550-ft. level to the end lines of the Daly-Judge, and started work on this, July 28. The Daly-Judge will take up the work and extend the drift under the Anchor shaft, which will give a depth of 1950 ft. The Anchor shaft is 1650 ft. deep, and will be sunk to connect with this work. Later the Ontario drain tunnel, the Daly-West 2100-ft. level, will be extended into Daly-Judge ground. This will give a depth of 2500 ft. at the Anchor shaft.

The Daly-Judge has not been able to develop its property below the 1500-ft. level, owing to water, and mining on the Ontario-Daly fissure has been carried on to the 1200-ft. level only. This fissure extends across the Daly-Judge, and is now opened on the strike for 2600 ft., from which much ore has been mined in the Ontario, Daly, and Daly-West. Ore was opened in this fissure from the 1600-ft. level of the Anchor shaft, but the miners were driven out by water. At present, the Daly-Judge is mining some of its best ore from the Ontario-Daly fissure on the 1200 level.

Negotiations have been carried on between the Daly-Judge and Daly-West for over two years. The heavy flows of water, and the inability to reach an understanding resulted in the starting of the Snake Creek tunnel. This work will not be interfered with, and the tunnel will be continued to develop the Bonanza Flat holdings of the Daly-Judge, which extends two miles from the Anchor shaft; it will also permit the exploration of the territory owned by the Knight and other interests in the southwestern part of the camp. Aside from the drainage royalty which will be paid the Daly-West, the latter will secure better ventilation when connections are made, and will be enabled to develop 700 ft. or more of unexplored territory lying close to the Daly-Judge lines.

DETAILS of PRACTICAL MINING

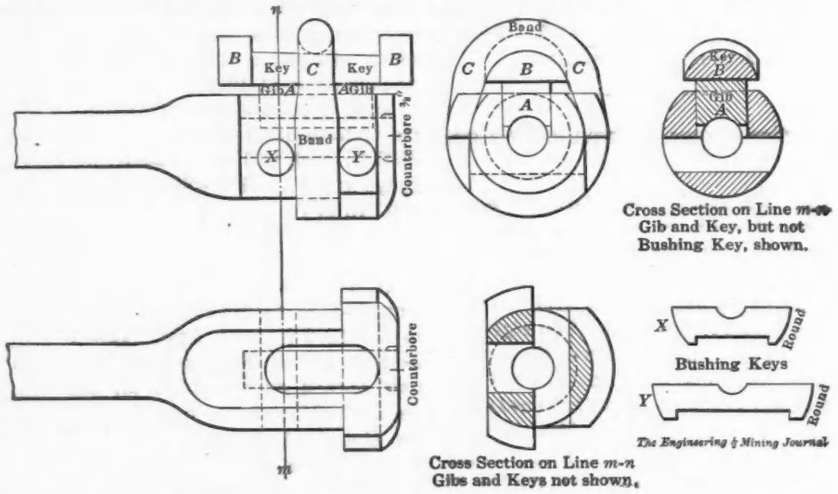
Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

Improved Chuck for Piston Drills

In the North Star mines, at Grass Valley, Cal., a special type of chuck designed by Messrs. Paynter and Bastian, employees of the company, is used on the piston-machine drills. The peculiarity of the chuck is that it includes no bolts, and hence does not require the use of a wrench for tightening the hold upon the drill shank. The accompanying working drawing shows the details of the chuck and clamping arrangement.

The chuck is drilled as usual to receive the shank of the drill steel. A slot, above and parallel to the shank of the steel, is cut in the chuck to receive a gib *A* that bears against the shank of the drill. Below the drill socket and perpendicular to the axis of the chuck two holes are cut to receive bushing keys *X* and *Y*, that bear against either end of the lower part of the drill shank and take up wear from the chuck. A strap or band *C* fits around the chuck and over a tapered key *B* that bears on the gib *A*. The key *B* is tapered away from the end of the chuck so that when every impact of the drill against rock drives it further under the strap *C*, the gib is forced more tightly against the drill shank. There is, hence, no tendency of the drill to become loose in the chuck. On the other hand, it is held more securely at each stroke. The key *B* is made with a heavy head at either end.

To fasten the drill in the chuck the key is driven tight by a blow upon the head at the larger end. A blow on the other end of the key serves to loosen it and allows the drill to be removed. This type of chuck has been used for several years in the North Star mines and has proved entirely satisfactory. Its advantage over the ordinary type where bolts have to be drawn tight every few minutes should be evident. The construction embodies no particular difficulties.



NORTH STAR BOLTLESS CHUCK FOR PISTON DRILLS

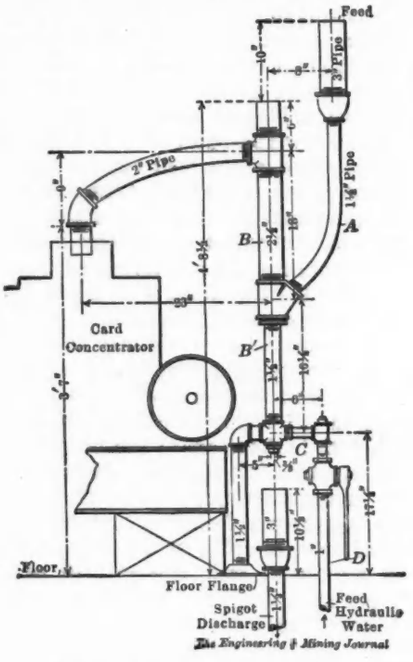
Holding Shaft Timbers with Wire Cables

The Fremont shaft, at the Fremont Consolidated mine, near Amador City, Cal., has two compartments and dips at an angle of 52 deg. It is 650 ft. deep with a 50-ft. sump, and is true throughout its depth, being unquestionably the best inclined shaft on the Mother Lode. In sinking this shaft, some heavy ground that caved badly was encountered. It was impossible to get a bearing for the wall plates or caps, and the more the ground was trimmed away to secure a bearing for these timbers, the worse it caved, until a large cavern was formed above the shaft.

In order to timber the shaft through this ground, the expedient of securing the timbers in place with old hoisting cable was tried and proved quite successful. The sets in the caving zone were tied with the cable to those above which had firm bearings in the wall rock. This hanging of the timbers was continued until firm ground that would give sufficient bearing for the timbers was again encountered. Stringers were then placed over the suspended shaft sets and upon them a cribbing built up in the opening; old timbers and waste were stowed in it until it was entirely and tightly filled. No trouble has since been encountered with the shaft at this point, and, as stated, it is true throughout its course.

Pipe Classifier in Bunker Hill & Sullivan Mill

In the new concentrating mill of the Bunker Hill & Sullivan Mining and Concentrating Company, at Kellogg, Idaho, the product from the first hutch of the classifying jigs go to pipe classifiers. The overflow from these pipe classifiers passes to Card concentrating tables, the dewatered spigot product being shipped directly.



BUNKER HILL & SULLIVAN PIPE CLASSIFIER

The pipe classifier is ideal for the conditions under which it is operated, i.e., for handling a hutch product under 2 mm. in size and consisting mostly of straight galena ore. If the feed contained a middling product this classifier would not be satisfactory, as the middlings would be discharged with the spigot product. The pipe classifier raises the percentage of lead from 50 per cent. in the feed to 80 per cent. in the spigot material. Feed water under 20 ft. is used on the classifiers.

As shown in the drawing, the classifying machines are extremely simple in construction, and can be readily built up

from sections of 1-, 1½-, 2-, 2½- and 3-in. pipe, and suitable connections. In the detail drawing accompanying this article, the feed is through *A*, *B*—*B'* is the sorting column, *C* the spigot and *D* the pipe through which the hydraulic water is supplied. The various portions of the classifier have the following volumes, expressed in gallons per minute: *A*, 5.8; *B*, 9.2; *B'*, 3.3; *C*, 4.7; *D*, 8. The sorting velocity is about 7 in. per second.

The pipe classifier is peculiarly adapted to the treatment of the heavy silver-lead galena ores of the Cœur d'Alene district, and has given satisfactory results in the Bunker Hill & Sullivan mill.

Determining the Sun's Declination from an Old Ephemeris

By A. W. Warwick*

Engineers working in isolated parts of the world encounter many unforseen difficulties. This is especially true in regard to surveying problems. Several years ago, while in Mexico, I had occasion to determine the true meridian. The ephemeris for the current year had been sent for, but had been intercepted or lost in the mail. The problem was to obtain the declination of the sun for the current year from a previous year's ephemeris. Of course, this problem could be solved by the ordinary astronomical computer's methods, but these are generally beyond the mining engineer's skill, even if he had the necessary elements for making the calculation.

Under such circumstances an easily remembered rule which can be applied mentally is useful and accurate enough for all ordinary surveying purposes. The rule is:

Take out the declination for the corresponding date in the previous year's ephemeris, as well as the hourly difference in seconds; move the decimal place one figure to the left and call them minutes. Add or subtract, inversely as the declination, north or south, is gaining or losing.

Principle of the Rule

The principle of this rule is simple. The solar year is approximately 365¼ days. The normal calendar year is 365 days. Hence the calendar year gains 6 hours on the solar year. It is obvious, therefore, that the declination of the sun for noon, June 1, 1910, should be the same as the declination of the sun at 6 a.m., June 1, 1909. Hence, by multiplying the hourly difference in seconds (June 1, 1909) by 6 and dividing by 60, gives the correction, in minutes, to be applied. The declination is gaining north, hence the correction must be subtracted and the result is the sun's declination for noon, June 1, 1910.

	Deg.	Min.
Dec. of sun June 1, 1909	N 22	0.5
Diff. for 1 hour 20.8 min.: correction	....	2.08
Dec. of sun, June 1, 1910	N 21	58.42
Check with ephemeris 1910	N 21	58.5
Error	0	0.08

It is obvious that if the ephemeris is two years old the correction to be applied must be multiplied by two. Of course, this correction takes no account of the change in the sun's declination due to precession, etc. Remembering, however, that the year would be 20 min. longer if there were no precession, the declination can be calculated for the current year, even from an ephemeris 10 years old.

Leap year causes no confusion if one remembers that the date in leap year corresponds to the date of the previous year plus one, after Feb. 28. Thus, March 2, 1908, corresponds to March 3, 1907. Hence to calculate the declination March 2, 1908, from the ephemeris for 1907, the following steps are taken:

	Deg.	Min.
Dec. of sun, March 3, 1907	S 7	8.9
Diff. for 1 hour 57.26 min.; correction		5.67
	S 7	14.57
Ephemeris 1908 gives	7	14.5
Error	0	0.07

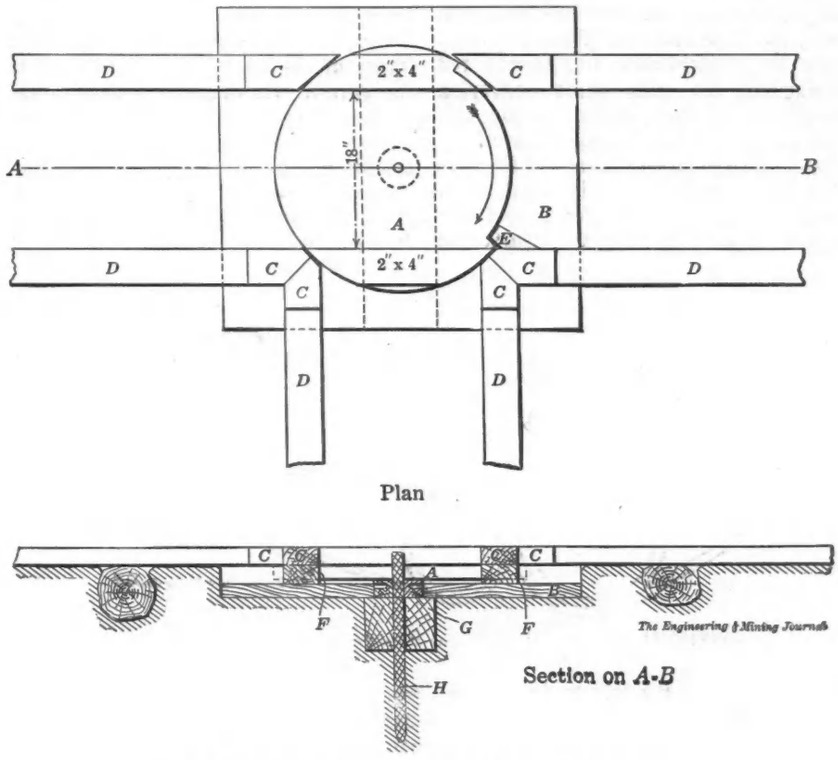
The sun's declination was diminishing, hence the correction was added. It is interesting to note that, allowing 20 min. each year for precession, the declination for Jan. 1, 1910, was calculated from a 1902 ephemeris with an error of five seconds, which is quite negligible for the surveyor's purpose when using a light mountain transit.

*Mining engineer, McPhee building, Denver, Colo.

Mining Turntable

By W. C. Richards*

The turntable shown in the sketch was made to use with a wooden track while doing exploration work. It consists of a circular table and a stationary platform of suitable size to go between mud sills. The platform is about 3 ft. square made of 1½x12-in. boards with a 6x8-in. sill across the center. In the center is sunk



Simple Mining Turntable for Use in Prospecting

half of a 1¼-in. flange union *G*. Another flange is placed over this but reversed to form the bearing. The 2x4-in. pieces *C*, are nailed to the platform so as to form a continuation of the track and are raised to the level of the track by the blocks *F*. The sections of track are nailed to the table *A*. A 1-in. cut is made for about one-fourth of the circumference of the table and a stop *E* placed where it will engage the table at the right place.

When the platform is set in place the iron pin *H* is driven through a hole bored in the 6x8-in. sill to form the pivot for the table. Tilting of the table is prevented by fastening four small rollers to the platform near the edge of the table.

*Superintendent, American Fluorspar Company, Mexico, Ky.

Cars carrying tubs of 500-lb. capacity are handled easily on such a table as is here described.

Marking Launders for Mill Solutions

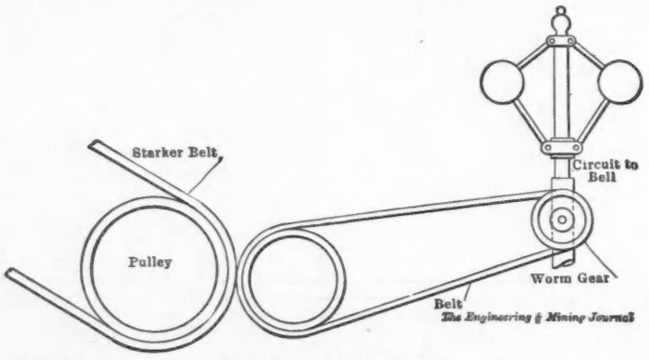
In concentrating mills it is always advisable to have launders marked plainly, so that the millmen and laborers can immediately tell what each line carries without following it to its source to determine this fact. In the new mill of the Bunker Hill & Sullivan company, at Kellogg, Ida., this is accomplished my painting in various colors the launders and pipes carrying the different pulps and solutions, the same color being used on all launders throughout the mill that carry the same material. Pipes and launders for concentrates are painted red throughout the mill; those conveying middlings, yellow; slimes, white; and tailings, gray. This is especially advisable where ignorant or untrained laborers have to be employed as is usual about most mills. It is easy for almost any person to keep in mind the significance of the colors, but it might be impossible to follow through the mill and tell whether a certain pipe carried concentrates or tailings. In any case, pipes and launders should be painted, and its is little more expensive to use the different colors and this is a decided advantage, as explained.

Indicator for Dredge Stacker Belts

On the Yuba No. 1 boat of the Yuba Consolidated Goldfields company, operating near Hammonton, Cal., an ingenious device is used for attracting the attention of the winchman when the stacker belt is not running. It often happens that the stacker belt will slip on the drive pulley, and before this is noticed, a large accumulation of gravel will pile up on the lower end of the belt. With the arrangement shown in the accompanying sketch a small pulley is hung so as to rotate with the belt of the stacker. This small suspended pulley is in contact with the belt where it passes over the lower pulley and is belted to another pulley which drives a short vertical shaft by a worm gear. On the vertical shaft is arranged a ball governor connected in an electric-bell circuit. When the governor balls are spread, the circuit is open, but as soon as they drop, the circuit is completed and a bell is rung in the winch room. This indicates to the winchman that the stacker belt is, for some reason, not in motion. He then immediately stops the bucket line until the trouble with the stacker belt is rectified.

Mirror Arrangement

On the No. 2 Yuba boat, operated by the same company, the winchman has rigged up a mirror to one side and in front of his place at the controlling levers, and in such a position that the image of the stacker belt is reflected in the mirror. He thus has a view of the tailings stacker belt while watching the bucket chain and attending to the levers controlling the operation of his boat. This is a convenient and simple arrangement, the only objection being that it does not overcome the element of danger from personal negligence. If the winchman does not watch the mirror, he will not, of course, know when the stacker belt is stopped. The bell arrangement, on the other hand, is sure to attract the attention of someone on the boat.



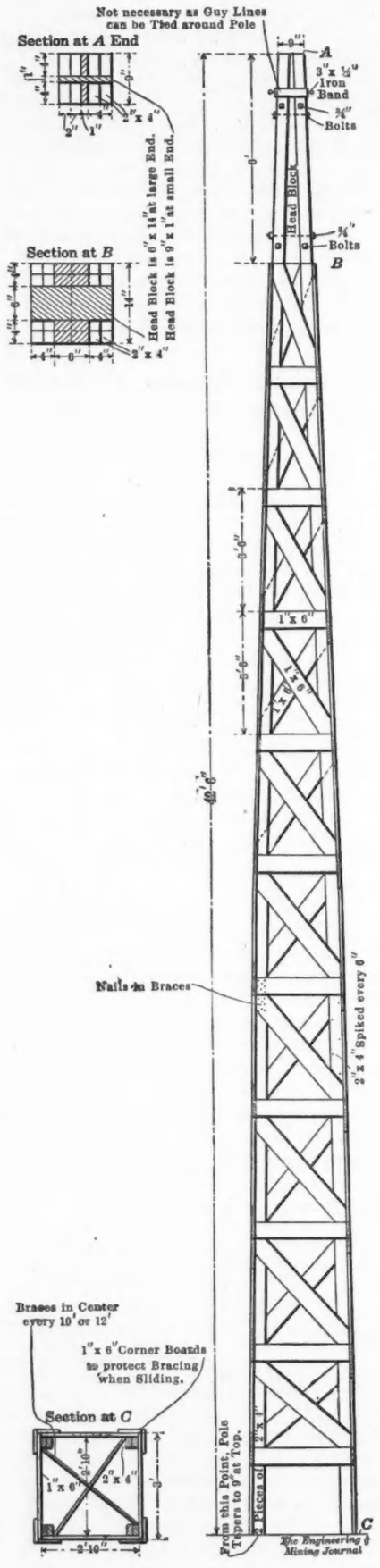
Arrangement for Indicating Stoppage of Stacker Belt

A Built-up Gin Pole

By W. B. Rosenberger*

The accompanying illustration shows a light, strong and easily constructed gin pole. The pole is 42 ft. 6 in. long and has been used by the Colby Iron Mining Company over two years. Its principal use is in raising smokestacks, the largest on which this pole was used being 60 in. in diameter and 85 ft. high. The pole being a framed structure is easy to climb in case it is necessary for a man to go to the top to adjust pulleys.

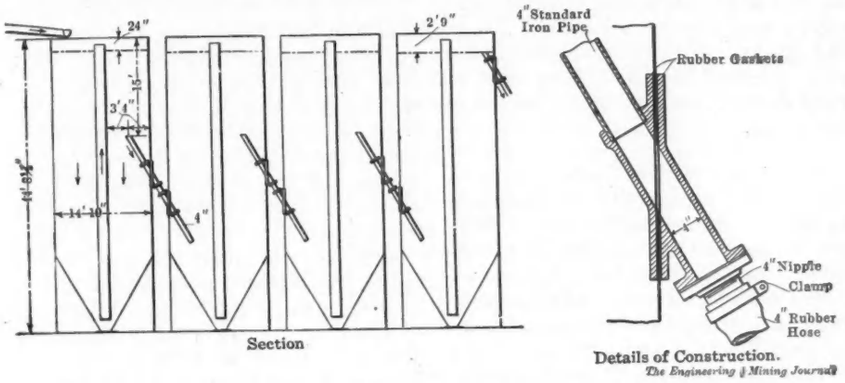
*Mining engineer, Colby Iron Mining Company, Bessemer, Mich.



Gin Pole Used by Colby Iron Company

Continuous Agitation in Pachuca Tanks

In a discussion of M. H. Kuryla's paper[1] on "Continuous Pachuca Tank Agitation at the Esperanza Mill," A. Grothe proposed an improvement in the mechanical connections between the Pachuca tanks, as shown in the accompanying illustration. This connection avoids the numerous curves in the pipes of the original Esperanza installation and tends to eliminate the clogging of the pipe by sediment, which would reduce the useful section of pipe. Mr. Grothe claims that with a much smaller head, the discharge through a 4-in. pipe should answer the purpose, if no obstruction existed. The pipes have an inclination of 60 deg. and a moderate velocity of pulp keeps them clean. The connection with a flexible pipe outside the tank nullifies the effect of vibration and expansion.



CONNECTIONS PROPOSED FOR CONTINUOUS AGITATION IN PACHUCA TANKS

Practical Drill Tests in Rand Mines

At the Robinson Deep mine, on the Rand, a series of tests of small drills in stopes and of drill steel, entirely distinct from the recently completed Transvaal Government Chamber of Mines tests, are in progress. About 20 per cent. of the ore mined in the Robinson Deep, according to the *South African Min. Journ.*, June 25, is broken by small drills.

The results obtained may be summarized as follows: (1) A 100-lb. machine, unless constructed of the highest class material, cannot withstand the rough usage that must come upon it. The standard of weight that seems to be ideal is 150 lb., but it is possible that as engineering practice improves and materials become cheaper this may be reduced. (2) The small machines can break out a narrower stope than can native hammer-boys. (3) The probable necessity of educating white men, specially for the operation of stope drills as distinct from large machines, is indicated.

The drill-steel experiments are being carried out under the auspices of the Mines Trial's Committee, and personally directed by Mr. Allen. They are reported to be conducted in a most thorough and exhaustive manner, complete analyses and pyrometer and tempering tests being made publis. They should be of great these experiments have not as yet been made public. They should be of great interest to the mining profession.

[1] *Informes y Memorias* del Instituto Mexicano de Minas y Metalurgia, April, 1910.

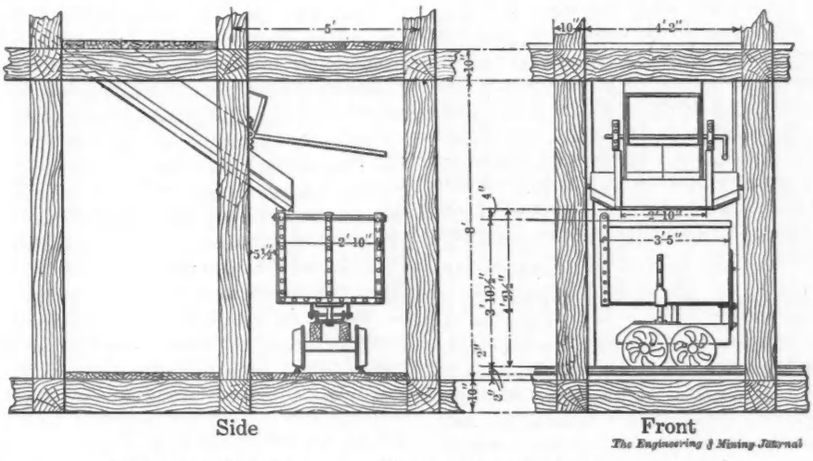
Ore Chute Construction

Ore chutes of standard design are used in the mines of the Goldfield Consolidated company, at Goldfield, Nev., to deliver ore from stopes to main haulage tunnels. Light, steel, arc gates, with a long lever handle, are provided for the chutes. The drawing shown herewith gives the dimensions and details of the standard chutes.

DETAILS OF THE CHUTE

Posts of the drift or tunnel sets are placed at 5-ft. centers, allowing an opening 4 ft. 2 in. wide (10x10-in. timbers are used) or 8-in. clearance on either side of the ore cars. The drifts are 8 ft. high in the clear. The bottom of the chute is inclined at an angle of about 35 deg. from the horizontal and passes through the next set to one side of the drift. It is supported by a piece of 8x8-in. timber set with its upper face parallel to the inclination of the chute bottom and let at its ends into the posts at either side of the chute. The lip of the chute extends 5½ in. over the edge of the tram car.

A double lining of 2-in. plank is used on the bottom of the chute. The sides are made of one thickness of plank. The chute is carried the full width of the set from the stope to the lip, which is tapered down to a width of 2 ft. 10 in. The body of the cars used is 3 ft. 5 in. long. So as to allow the gates to be readily closed against the stream of ore, the gate should be set at such an angle that as soon as the stream of ore is intercepted its force tends to close the gate.



STANDARD ORE CHUTE IN GOLDFIELD CONSOLIDATED MINES

"Sand Filling" Stopes in the Transvaal

The "sand filling" process of charging the worked-out stopes is being put into operation at several mines on the Rand, where are prospects that in the immediate future it will be extensively adopted.

The mill tailings supply exactly the class of material required. They are handy and enable the filling to be done in a cheap and efficient manner. An ordinary pack of large material, waste rock, is built next to the level, backed by smaller material against which the water-carried tailings are deposited until they completely fill the stope. The water drains off and is pumped to the surface to be used over and over again. Under favorable conditions, it is estimated that the tailings can be deposited in the mine for less than 2d. per ton. In a short time the filling becomes solidified and is capable of steadying the subsidence of the hanging-wall.

Notes from California Oilfields

LOS ANGELES CORRESPONDENCE

The Oil Consumers' Association, of Los Angeles, has been made a permanent organization. Nearly all the large consumers of crude oil in southern California have pledged their support to the new association, the chief object of which will be to eliminate the middleman in the purchase of oil for fuel and other purposes. A great deal of preliminary work has been done and while plans have not yet been satisfactorily worked out, it is believed that members will eventually be enabled to purchase oil at a more reasonable figure, at the same time paying the producer a better price. It is figured that the interests represented by this association consume a total of 5,000,000 bbl. of oil yearly.

The recent cut by the Standard Oil Company from $1 to 90c. per bbl. for oil at San Francisco has not as yet precipitated a disastrous war on the part of the marketers of oil. It is stated that no large contracts have been entered into at the lower price. Reports from San Francisco indicate that market conditions are slightly better. While some consumers are holding off in the hope of getting better prices, there are indications that they will not profit by this attitude. One fact stands out significantly just now; the renewal of activity in some of the California oilfields is decidedly out of line with the announcement several weeks ago that many of the large producers would curtail their output on account of the tremendous production of the Lakeview gusher.

ANOTHER GUSHER IN THE MIDWAY FIELD

A new gusher has been brought in by the American Oilfields in the Midway field. This well is almost due west of the original Lakeview gusher. Until the men were successful in placing a gate on the new gusher, oil was spouted high above the crown block at a rate of about 25,000 bbl. per day. When the gate was attached and closed the well did not sand up, but resumed flowing whenever the valve was opened. The Lakeview gusher is said to be slowly diminishing in volume; the flow on one day last week varied between 22,000 to 28,000 bbl., a decided shrinkage from the original flow of over 70,000 bbl. per day.

The new Sunset-Coalinga rifled pipe line of the Associated Oil Company is now in operation between McKittrick and Carneras, a distance of about 17 miles. Work is being pushed on the other stations to the north and pumps will be put in operation as soon as possible. The oil being handled is from the upper Midway field, principally from the property of the Pioneer Midway Company, now owned by the Associated.

The Traffic Oil Company, operating in the north Midway belt, has gone into oil at a depth of 1791 ft. Heaving sand prevented the under-reaming of the shell and the sinking of the present casing deeper; a 6¼-in. string will be put in to finish the well. The Corrigan Oil Company has suspended operations in the extreme north Midway field. The company drilled 1200 ft. without results, and although nearby wells are in promising sand streaks, it was decided to suspend.

After being shut down for about 30 days, the Kingpin Oil Company, operating in the Elk Hills, has resumed work and is now down to a depth of 200 ft. The Midway Basin Oil Company, in the same district, has a hole down 1600 ft. Present work consists of fishing for a lost string.

COALINGA FIELD

American Petroleum has 14 wells drilling in the Coalinga district. Three wells were finished in July and five others are rapidly nearing completion. The United Development has completed the erection of all its buildings and has started drilling. On the Lucile property well No. 4 is down over 2500 ft. in 6¼-in. casing, and is expected to go into the sand at any moment. The British Consolidated Oil Corporation, Ltd., has acquired the property of the Wabash Oil Company and will immediately erect a rig for well No. 18. There are 17 wells pumping, flowing and under drilling operations on this property.

The Mohawk company has 2032 ft. of 12½-in. casing in its No. 3 well. This is the longest string of casing of this size in the district. The Confidence Oil Company is erecting a rig for well No. 15 and will be drilling in a few days. There are at present 10 producing wells on this property. The Creme Petroleum company is down 1830 ft. in an open hole, drilling with a rotary. It was the intention of the company to put on a standard drill at 1800 ft. but the rotary will be continued as long as conditions remain as favorable as they are now.

In the Kettleman hills the Medallion company has completed all its buildings and has material on the ground for the construction of its first drilling outfit. Rig builders have started work. The Coalinga Kettleman Oil Company has one hole down 1000 feet.

Accidents in Canadian Mines

TORONTO CORRESPONDENCE

The Department of Mines, Canada, has issued an official statement by J. G. S. Hudson showing the loss of life in Canadian coal and metalliferous mines for the 10-year period, 1899-1908.

During this time the average fatalities per thousand men in the coal mines of British Columbia were 9.21 and of Nova Scotia, 2.67. In the metalliferous mines of British Columbia for 1908 the average was 5.93 and in Ontario for 1907 in copper and nickel mines it was 2.19, and in silver and iron mines, 7.35.

In Ontario for the year 1908, 13 fatal underground accidents occurred in the silver-producing mines of Cobalt in which 1089 men were employed, making the ratio 11.94 per 1000. There were also 14 fatalities underground in nonproducing mines in which the total number of employees were not recorded.

FEWER FATALITIES IN ENGLAND DUE TO BETTER REGULATIONS

In England, the average per thousand men employed during 1903 to 1907 was: Coal mines, 1.29; metal mines, 1.08. Commenting on these figures, Dr. R. W. Brock, director of the Geological Survey of Canada, says that the greater number of fatalities in Canadian mines is due to the utter absence of protective legislation in Canada.

With the view of providing a remedy Doctor Brock has recommended that a central station, similar to those established in England and the United States, be built in Ottawa for the testing of explosives, and that an act be passed effectively regulating the manufacture, sale and use of explosives in mines and other operations.

Utah Copper Operations

Since publishing the preliminary review of the quarterly report of the Utah Copper Company additional information has come to hand. The alterations of the Magna plant are nearly completed. At present only one-third of the plant is operating in its remodeled form; the alterations in the remaining portion will be completed within a short time. The remodeling of the Arthur plant, recently acquired from the Boston Consolidated Mining Company, has not been started.

The ore treated for the second quarter of 1910 contained about one pound of copper per ton in excess of that of the first quarter. During the quarter, stripping operations were actively resumed on the property acquired from the Boston Consolidated Mining Company, so that at an early date underground mining will be entirely suspended in this area.

Contracts were awarded by the railway company early in the quarter for the grading of the line between the town of Garfield and the Bingham district. About 25 per cent. of the open-grading work is completed. A considerable amount of tunneling will be necessary, but this can be carried on throughout the winter. It is expected that the entire work of grading and tunneling will be completed by early spring. The line will be laid with 90-lb. steel, upon a maximum gradient of 2½ per cent. and with maximum curvatures of low degree.

railroad, properly located, designed and constructed for the accommodation of heavy traffic. It should be in operation in the summer of 1911.

Homestake Aid Fund

BLACK HILLS CORRESPONDENCE

The Homestake Aid Fund, an insurance system for the employees of the Homestake Mining Company, was inaugurated on Aug. 1, 1910. Five directors, elected by the employees of the various departments, have drawn up a set of rules, the principal provisions of which are briefly summarized. Every employee will pay $1 per month to the Aid Fund. To the amount so contributed the Homestake Mining Company pledges itself to add at least $1000 per month; the superintendent of the company acts as treasurer and the company furnishes free of charge all necessary stationery, office room, and clerical help. The board of five directors, elected yearly, will administer affairs through an executive committee consisting of the secretary and treasurer of the Aid Fund and the chief medical officer of the company.

BENEFIT PROVISIONS

Disabilities and claims will be investigated by the hospital department, the records of which will govern. Benefits will be as follows: Disability by accident while actually working for the Homestake company, $1 per day for a maximum period of six months; disability by sickness, or by accident occuring while not engaged in actual labor, $1 per day after the sixth day, for a maximum of six months; total disability—loss of both eyes, hands or feet, or permanent paralysis—$800; loss of one hand, foot, or eye, $400; insanity, $200; death due to accident while at work for the Homestake company, or to sickness, $800; suicide, $200. These death benefits are payable if claimed within one year to (1) widow, (2) children, equally, (3) parents, equally or to survivor, (4) brothers and sisters, equally, (5) executor or administrator of estate. No benefits will be paid for death or disabilities resulting from intoxication, immoralities or fights.

The dues of a new employee will be charged to his account the first day he works, and his interest in the fund will cease as soon as he is discharged or leaves the service. No distinction is made as to the nature of employment, or amount of salary or wages.

ABOUT $18 PER MAN ANNUALLY AVAILABLE FOR INDEMNITIES

Assuming the total number of employees at 2500, the payment by the company of the minimum of $1000 per month will make a 40 per cent. addition to the employees' contribution, or an average available indemnity of $16.80 per man per year; should the company pay as much as $1250 per month, or 50 per cent. of the employees' total, there will be available $18 per man per year. The experience of several years gives the total number of deaths from accident as less than 5 per year, or 2 per 1000; such figures as are available are said to indicate a total death rate from all causes among the mine employees of approximately 8 per 1000 per annum, which seems remarkably low.

BENEFITS COMPARE FAVORABLY WITH OTHER COMPANIES

While the amount paid by the Aid Fund for accidental death when at actual work is slightly less in proportion to the dues than that paid by some similar institutions, it is proportionately higher than is paid by some others, while the extension of an equal benefit in the case of death from practically all other causes, and of accident benefits to the first day of disability, makes these provisions extremely generous. The lowest rate charged by old-line insurance companies for term insurance on life only is about $14 per year per $1000, at age 35, which is probably not far from the average age of mine employees, while at the Homestake there are many much older, as a large number belong to the Veteran's Association, having worked 20 years or more for this company. At the above rate a life policy alone for $800 would cost $11.20, while for an annual payment of $12 the Aid Fund gives this with an accident and sickness insurance in addition.

It will be noted that no provision is mentioned for medical attendance. This was already provided for by the hospital department, which has been in existence for many years, and for the last three years has been managed by the Homestake company for the employees. Each man pays $1 per month to the hospital fund, and is furnished medical attendance, hospital accommodation, and medicines for himself or any member of his family. This makes the total monthly payment for insurance purposes, $2 per man, the monthly payroll probably averaging a little over $90 per man.

Closing the Balaklala Smeltery

SAN FRANCISCO CORRESPONDENCE

The Shasta County Farmer's Protective Association has refused to let the Balaklala smeltery at Coram continue operations pending the installation of the Cottrell process for condensing fumes. The company had hoped that this installation would be completed by July 1. The company has been operating only one furnace lately but the Farmer's association has insisted on this being closed down. It is contended that the farmers took this action in order to be fair to the Mammoth Copper Mining Company, which is running only two furnaces because its bag house can only handle the smoke from that number. In order to keep within the court decree the other two furnaces remain idle. The Balaklala managers wanted to keep one furnace running until the completion of the installation of the Cottrell condensing plant. This plant will not be ready for use much before October and the farmers are not willing to wait that long. The Balaklala company does not like to lose its skilled employees for it is difficult to get them together again. General Manager White intends posting notices asking all the staff to remain until October if possible. Meantime the entire smelting plant must remain closed down.

Railroad Lands and Mining Claims in California

The Southern Pacific Railroad Company has recently filed railroad selections covering about 30,000 acres in the indemnity limits of Shasta, Trinity and Siskiyou counties, Cal., on the west side of its tracks. The list of lands selected will be advertised and mineral claimants must then file protests in the Land Office or their claims will be embraced in the indemnity land and be taken by the railroad unless the claims have been patented.

This is one of the ways by which the railroad companies obtain mineral land in a perfectly legal way, but to which they are not entitled. The advertisements are printed in solid columns of apparently confusing figures in small county papers. The ordinary miner would not recognize that his claim was being covered, since in most cases the prospectors or miners pay little attention to exact boundaries when their claims have not been surveyed, holding them by mere possessory title only.

In the majority of cases no surveys have been made, as must be the case where patent is applied for. The first thing the miner knows his claim has become the property of the railroad company. This is bound to occur unless he files his protest in a legal manner before the Land Office. Great hardship will doubtless be worked in many instances but the miner really has no one to blame but himself. The opportunity is given him to file a protest against his mineral land being taken as indemnity land and the railroad company cannot take it if he does file his protest. But if he fails to pay any attention to the matter the legal proceedings will take their usual and regular course and the railroad will get the mining claims with the rest of the land they select.

Progress of the Miami Construction

By J. PARKE CHANNING*

The accompanying photographs form a portion of the regular monthly progress report of the Miami Copper Company, and show the condition of affairs at Miami, Ariz., on July 22, 1910.

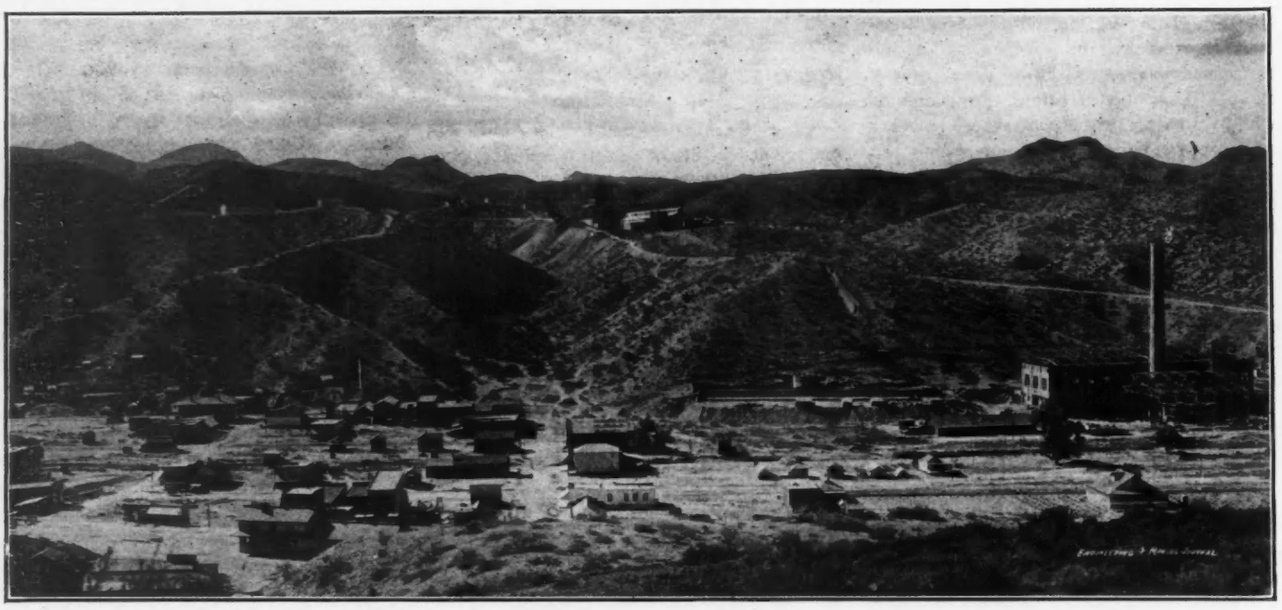


FIG. 1. GENERAL VIEW OF MIAMI, ARIZ., LOOKING WEST

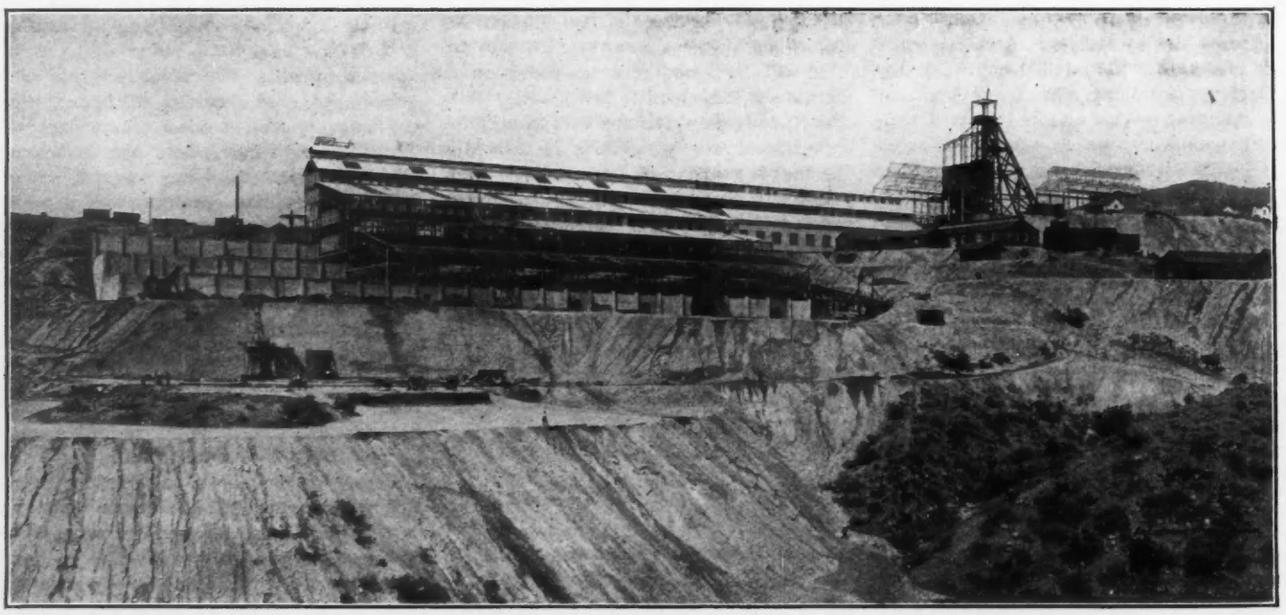


FIG. 2. VIEW OF MIAMI COPPER COMPANY'S MILL, LOOKING SOUTH

Fig. 1 is a general view of the district looking west. In the foreground, to the left, is the townsite of Miami, and to the right is the power plant. In the middle in the distance may be seen the headframe of No. 4 shaft, and the upper part of the concentrator with two of the mill bins completed and the third half way up. To the left, in the upper portion of the picture, can be seen the main bunk house, the Y. M. C. A. building, and headed straight toward the observer, the main street of Tinkerville, the name of one of the company's locations.

The headframe on No. 4 shaft is shown more clearly in Fig. 3. To the left is the house which will cover the two hoisting engines, one of which is seen in front of the building previous to its erection. The dark mass in the center of the picture represents the large bin into which the 7½-ton skips will dump. The steel skeleton to the right of this covers the crusher building, where the ore will be crushed before being carried to the six storage bins at the six sections of

*Vice-president, Miami Copper Company, 42 Broadway, New York.

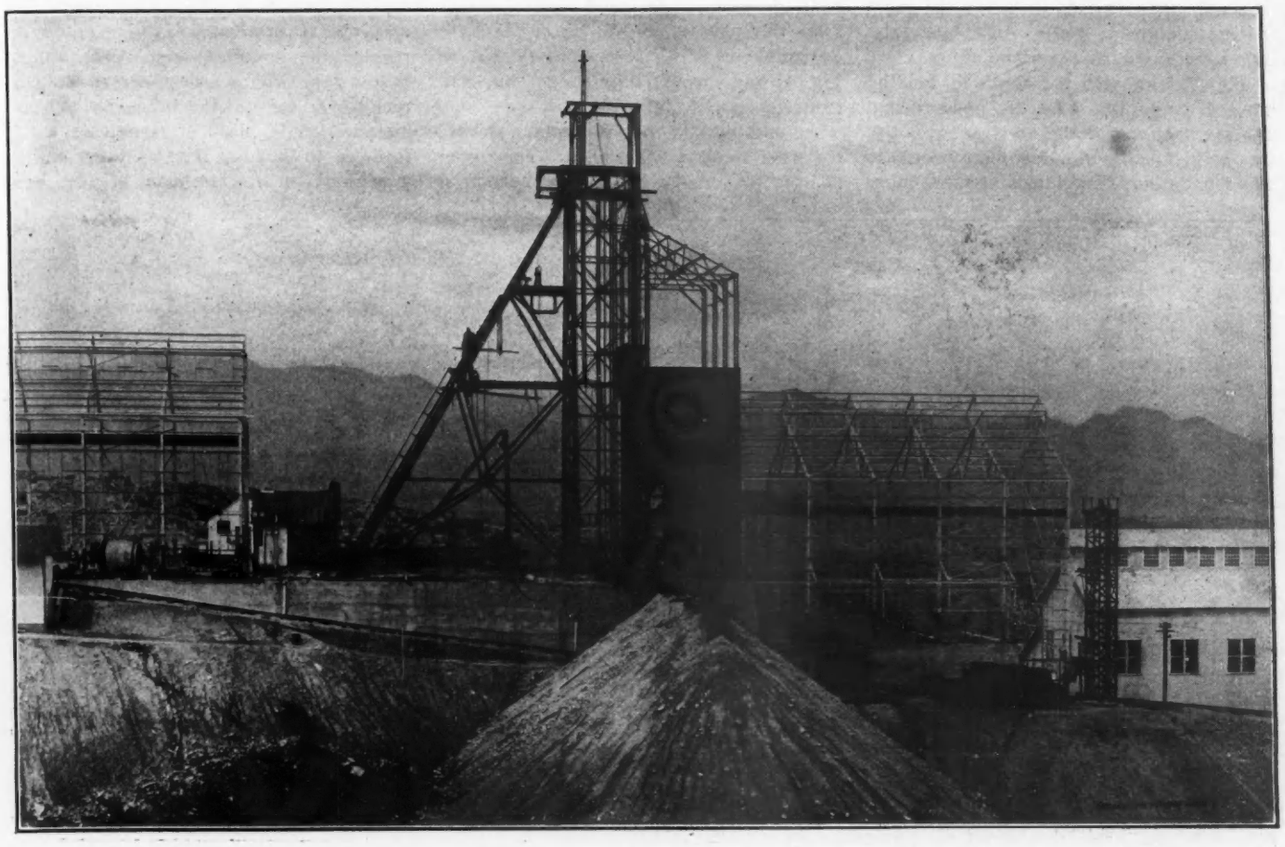


FIG. 3. HEADFRAME AT MIAMI NO. 4 SHAFT, LOOKING NORTH

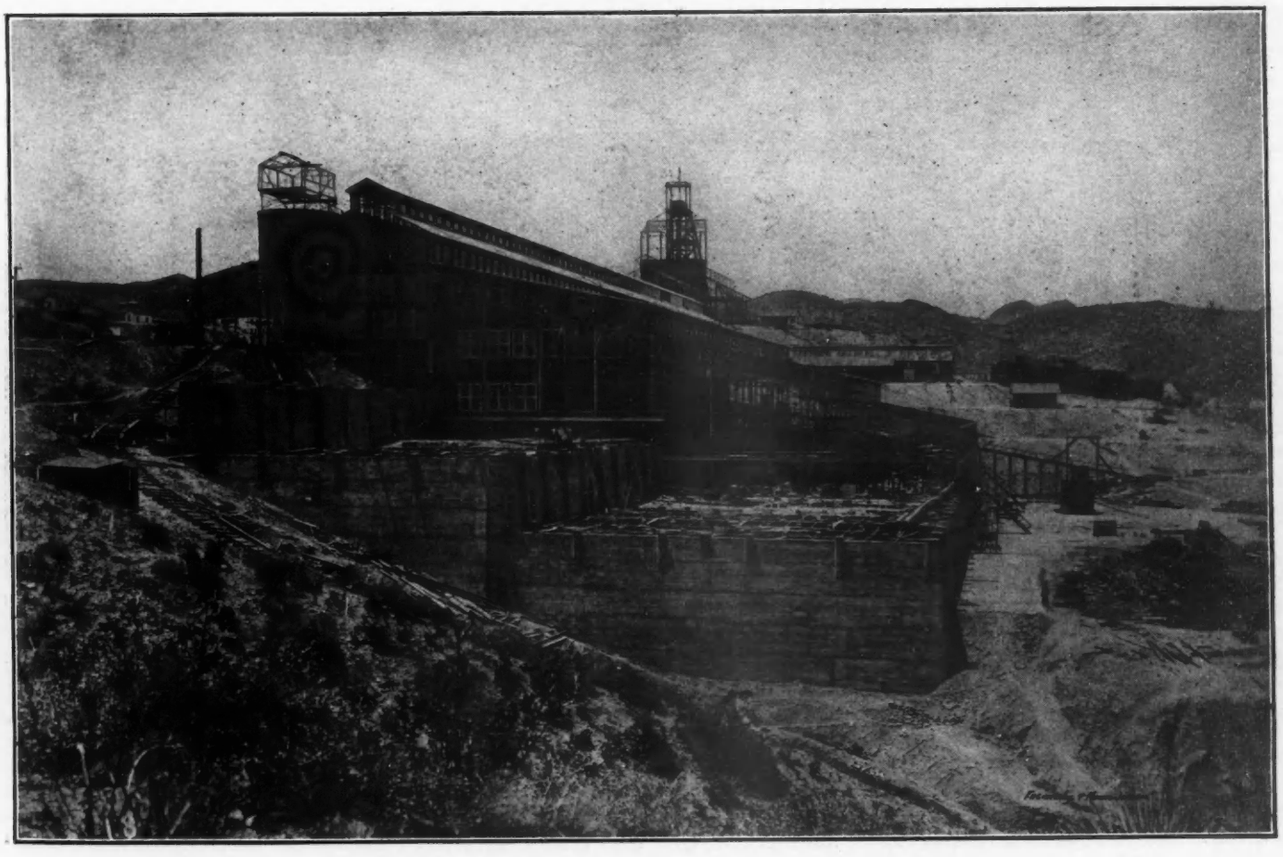


FIG. 4. EASTERN END OF THE MIAMI CONCENTRATING MILL

the mill. The small tower at the right of the picture is simply used for raising concrete during construction.

Fig. 2 is a view of the mill looking toward the south. One will observe that the six sections of the mill are well under way, and on the left-hand side are the foundations completed for three more sections. This will make the total capacity of the mill when finished 3000 tons. The extension of the upper portion of the mill toward the crusher building houses the various shops, and a traveling crane runs from them over the full length of the mill. In the foreground is the excavation for the water-reclaiming system; one of the concrete tanks can be seen completed. A tunnel is being driven from this side of the hill to cut into the gulch shown directly in the middle of Fig. 1, and through this tunnel the concentrates will be delivered.

An end view of the mill looking toward the west is shown in Fig. 4. The upper floor is the crushing floor, the second is the sand floor and the third is the slime floor. The foundations for the extension of the mill are seen in the foreground.

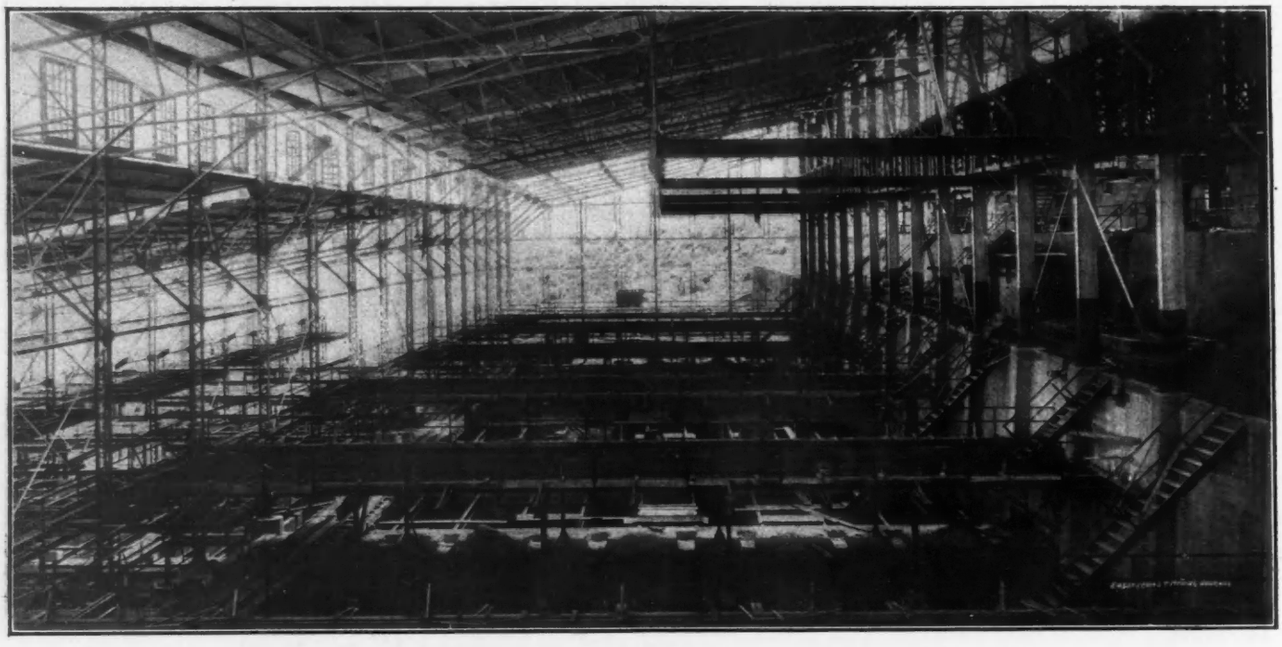


FIG. 5. SHOWING INTERIOR CONSTRUCTION OF CONCENTRATING MILL, MIAMI, ARIZ.

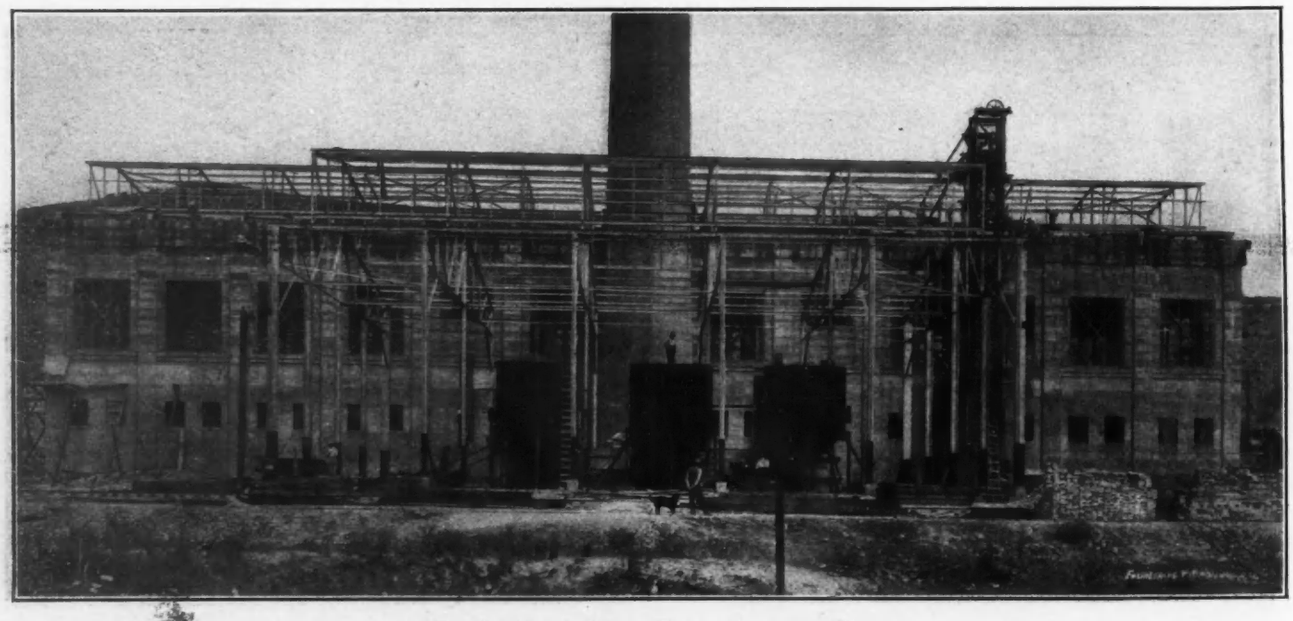


FIG. 6. MIAMI POWER PLANT, LOOKING WEST

Fig. 5 gives a clearer view of the interior construction of the mill, looking eastward, the point of view being directly through the center of the sand floor. This also shows the galleries for the classifiers which have been covered over with corrugated plate, ready to receive the concrete floor. The trolley beams appearing overhead are situated directly over each of the tunnels which are intended to be used in connection with trolleys to handle the Hardinge mills, which are in the trenches at the foot of the stairway leading to the chilean-mill floor above. These Hardinge mills are used for regrinding a certain portion of the product.

It perhaps will be remembered that the coarse crushing will be done with rolls, and for fine crushing two different types of machines will be used for comparison; one is the standard chilean mill

and the other is a special fine-grinding roll in which one of the rolls has a slow lateral movement, this having been designed by H. Kenyon Burch, who is superintending the building of the mill. It is hoped that these fine-grinding rolls will give better general results than the chilean mill, experiments in the testing mill having so indicated. It remains to be determined what the mechanical efficiency of the rolls will be and what their upkeep will be as compared with the standard chilean mills.

A nearer view of the power plant is given in Fig. 6. It shows in the foreground the boiler house in which are set up three large water-tube boilers. Next behind can be seen the concrete stack, and in the back is the power plant proper, which contains the four-cylinder triple-expansion electric-generator sets and the four-cylinder triple-expansion two-stage air compressors. The power plant is placed in the valley so as to be convenient to the railroad and the fuel-oil supply. Electricity will be conveyed up the hill to run the mill and crusher plant, and in the same direction will run the air line which will be used for operating the drills underground and also the two hoisting engines, the air for this latter purpose being preheated before being introduced into the cylinders. It is hoped when running that an interesting comparison may be made between the air-operated hoists at Miami and those of some other hoists in Arizona of the same size which are to be run by electricity, probably using one of the flywheel systems.

Library Card Index

The Library of Congress is getting out a series of index cards designed to meet the popular demand for indexing special subjects for both private and public libraries.

The cards are of standard size, about 3x5 in. The cards are printed with the author's name, and the full subject of the article referred to. They are also printed under the subject name. The price of the cards varies according to the amount of work required in selecting. If cards are ordered by number the price of the first card is 2c. and additional cards on the same subject ½c. Cards of the U. S. Geological Survey publications are 1c. each for the first copy.

C. H. Hastings, chief of the card section, Library of Congress, Washington, has issued a pamphlet entitled "L. C. Printed Cards, How to Order and Use Them," which gives all the details as to distribution and subjects covered. The system should be a great convenience to men in the field when information is wanted on subjects somewhat foreign to one's regular work and for which no reference literature has been filed.

Mining Activities in Sierra County, N. M.

By Brigham Leatherbee*

There is much mining activity in the northern portion of Sierra county and well into Socorro county. At Hermosa the Ocean Wave Mining Company is working its property to advantage. A steam plant has been installed to operate a 120-h.p. Hendrie & Bolthoff hoist and a Sullivan compound air compressor. There is a 20-stamp mill on the property with four Wilfley concentrating tables and two Wilfley No. 3 slimers. The mill has a daily capacity of 50 tons and is furnished with water from Las Palomas creek by two Knowles steam pumps. In addition the company has recently purchased a three-stamp Merrill mill which is now on the ground. There is also a well equipped sawmill, running two circular saws from a 40-h.p. engine.

The main shaft on the property is down 220 ft. with levels at 100, 130 and 200 ft. From the 200 level a drift is being run under the old Ocean Wave tunnel, across the gulch; connection will be made by a 150-ft. raise, thus affording a free circulation of air. Two 2¼-in. Sullivan piston drills and three Sullivan stopers are being used on this work. The ore occurs in large kidney deposits, in chambers from 10 to 15 ft. in diameter. It runs high in lead and silver, the gangue being talc and quartz.

About two miles east of this property, in what is known as the Lower camp, the El-Cliff Mining Company has erected a Partridge hot-blast furnace. Wood will be used as fuel. Already about 1200 ft. of tunnel work is completed on the El-Cliff properties. A new shaft is now down about 85 ft. The Las Palomas Chief properties, just east of the El-Cliff, are being developed by the driving of a 1900-ft. tunnel, at an elevation of about 20 ft. above the creek bed, to connect with the old shaft on the hill.

Chloride District

Twenty miles north of Hermosa, at Chloride, the United States Treasury company is actively engaged in working its gold claims on which a fissure vein has been proved for about 3000 ft. The present development has shown the lode in places to be over 28 ft. in width. A two-compartment shaft is being sunk on the vein on a 65-deg. incline and is now down 210 ft. A level has been run at 108 ft. which connects 212 ft. north with the old Eagle No. 1 shaft. A level has also been run at 200 ft., with a drift south 140 ft., and one north 125 ft. The main shaft is served by a 40-h.p. Fairbanks-Morse steam hoist, and a five-drill Norwalk air compressor supplies power for three 2¼-in. Sullivan piston drills and a Sullivan stoper. Assays show that the average ore runs from $8 to $12 per ton in gold and carries some silver; some sulphide ores carry 7 per cent. copper. A few treatment tests have been made which show that 60 per cent. of the valuable contents can be extracted by straight amalgamation, while cyanide tests on the tailings from the amalgam pulp show 65 per cent. extraction. The company controls a large timber tract about eight miles north of its mine and operates an Erie mill of 1200 ft. daily capacity.

At Phillipsburg, 15 miles north of Chloride, the Black Range Reduction Works has secured control of and is developing the old Phillipsburg properties, covering eight claims along Poverty creek. A two-compartment shaft is now down 125 ft. The ore averages $15 per ton in gold and silver. The old cyanide plant is being entirely remodeled. Four new water tanks, each of 45,000-gal. capacity, are being erected above the old mill and a new steam pump is being installed to supply them. In addition to the 20 stamps already installed, two new 50-ton crushers and two grinders are being put in.

Fluorine District

The Fluorine district embraces many rich properties. The veins occur in a large andesite upheaval, which has a northerly and southerly trend. The opening of the Phillipsburg mill should do much to develop this district. Since February about $15,000 has been expended in developing the Gold Dollar mines. The Gold Reserve mine now has a 35-ft. shaft sunk in the bed of Poverty creek. A 30-h.p. steam hoist has been installed and ore is being produced. The Golden Star group has a 185-ft. shaft operated by a whim. The Republic group, undoubtedly the richest property of the region, with a fissure vein running the entire length of four patented claims, has just proved a rich oreshoot 130 ft. in length and 7 ft. wide. This property has a 100-ft. shaft and a 90-ft. one, a 200-ft. tunnel and other workings. The Polar Star, just across the line into Socorro county, shows a large vein from which some gold ore was shipped last year. The property is developed by a 100-ft. shaft.

Ten miles north of Fairview is a deposit of high-grade magnetite, occurring in three parallel veins of from 75 to 100 ft. in width, and showing for some two miles in length. At present the bulk of freighting for this section is done over the roadway from Magdelena as the consumers at Chloride, Fairview and Phillipsburg find it much more convenient and cheaper than to freight from Engle on the Jornada del Meurto, which necessitates crossing the torrential Rio Grande.

*Hillsboro, N. M.

Development of the Hegeler Roasting Furnace*

By Otto Muehlhaeuser

The development of the Hegeler blende-roasting furnace dates back to the year 1884 and many alterations and improvements have been made since that time. The original patent (U. S. Pat. No. 303,531, Dec. 8, 1884) covers the main characteristics of the modern furnace.

The construction of the Hegeler furnace is somewhat similar to Peter Spence's roasting furnace, but it differs in details to meet the requirements of blende roasting. High efficiency and extremely low cost of production are noteworthy features of the furnace. It has been constructed since the beginning of its development as a double-hearth furnace in order to resist heavy wear and to secure heat economy. The muffles are arranged on both sides of a middle wall and are open on the two ends of the furnace, the sides, which are longer, are provided with openings for the stirrer carriage. The hearths are arched.

The original furnace was also equipped with a mechanism for controlling the movement of the rabbles; this apparatus has been only slightly changed during the development of the furnace. However, the driving gears were originally provided only on one end of the furnace wnich indicates that the inventor intended to rake the ore in one direction. The two stirrer cars had to be replaced after every raking in order to place the rabbles in the direction of the intended movement. The original furnace shows, therefore, much similarity with Spence's pyrite furnace, but Hegeler has improved the construction of the furnace in a novel and simple way.

Novel Means of Supplying the Heat

The means of supplying the heat required for the roasting of the ore is also of an unique character and is effected by introducing air into the muffles through two channels which are situated below the hearths. The air enters at the end of the furnaces through two high wind channels, which are connected with the fourteen muffles by an equal number of openings. The gases are discharged at the opposite end of the furnace in a similar way by means of a high stack.

In a later phase of development a change in the rabbling system has been made by providing a stirring apparatus at both ends of the furnace in order to enable raking in opposite directions. The manner of supplying the heat, which originally consisted of allowing hot air to enter the muffiles, was later accomplished by heating chambers situated between the three lowest muffles, somewhat similar to the system employed in Eichhorn and Liebig's furnace. The cold air is preheated by the combustion gases of the firebox, then heated strongly under the hearth of the first combustion chamber and is finally allowed to enter the first and second roasting muffles where it is heated still higher, and finally passing to all other muffles in turn. By this system of heat supply and by means of the new raking appliances at both ends of the furnace, the principal features of the uptodate furnace were established, although lately some minor improvements have been made in order to simplify the operation of the furnace.

Size and Efficiency of Furnace Increased

After having worked out all the details of construction, Hegeler concentrated his energies to increasing the roasting efficiency by enlarging the dimensions of the furnace. The original furnace had a capacity of 10 tons of ore while at present furnaces of 40 tons capacity are constructed.

Many alterations have been found necessary at the different plants employing the Hegeler furnace, on account of local conditions. In some smelteries the number of roasting muffles and the number and situation of the heating chambers had to be changed, owing to the character of the fuel employed. The heating of the air for oxidation and the method of directing the air currents in the muffles had to be varied. In some plants the combustion gases are utilized for steam and power generation. However, all these alternations did not detract from the general characteristics of the invention. The furnace, as developed by Hegeler, can be considered to have been nearly perfect.

Improvements in the Acid Chambers

The qualitative and quantitative improvements of the roasting plant have retroacted in an equal measure on the development of sulphuric-acid apparatus. The Glover and Gay-Lussac towers, the flue chambers, acid pulsometers, etc., were improved in construction and the dimensions were increased in accordance with the enlargement of the roasting plant.

In order to control the direction of the air currents required for oxidation, and also to overcome the resistance of the gas current due to the tower fillings, the introduction of a ventilator[1] was found necessary. This ventilator has exerted a great influence on the roasting efficiency and on the increase of production and capacity of the roasting furnace and chambers.

It is obvious that Hegeler's invention and achievements are not only of highest value to the zinc industry, but also to the sulphuric-acid industry as well. His accomplishments have opened many new and promising channels for improvement and development. The Matthiessen & Hegeler Zinc Company, La Salle, Ill., is in technical construction and development, the work of Hegeler; and the rapid growth of this plant to its present size is proof of his restless energy. It shows in all details the master hand of the ingenious expert who has endeavored to accomplish the most difficult problems by simple and effective means.

*Translation of an article in *Zeit. f. Angew. Chem.*, Vol. XXIII, page 347.

[1]*Zeit. f. Angew. Chem.*, O. Mühlhäuser, Vol. 16, p. 672.

South African Notes

Special Correspondence

Much has been heard lately about the promising manner in which the Rhodesian gold mines are opening up. In March there were 188 producing mines with an output of 54,377 oz. of gold for the month. The most striking feature is the large number of producers for such a small output, the producers being nearly double those of the Transvaal for less than one-tenth of the output. The output of silver was 18,267 oz.; lead, 56 tons, value £648; and chrome ore, 1714 tons, with a value of £3825.

Orange River Colony

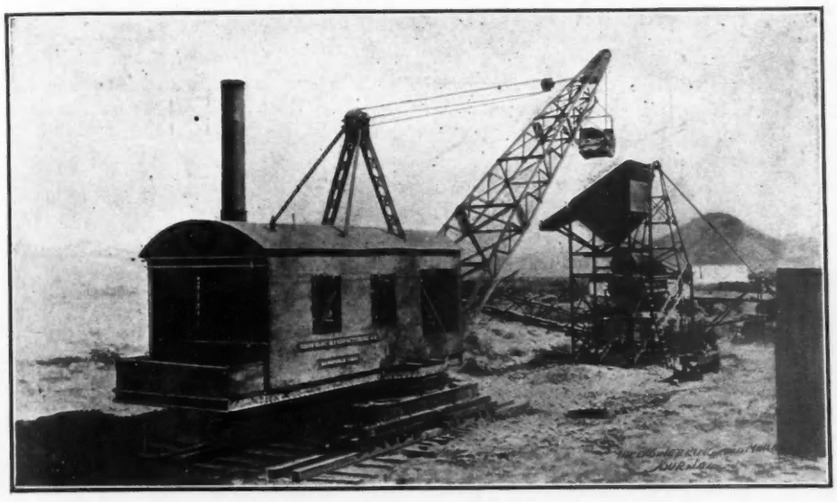
In the Orange River Colony the principal output is that of diamonds, for which the demand and prices seem to be improving. In March the output was 81,721 carats, as compared with 65,759 carats in February; the value of the output increased from £138,222 to £176,507. Coal is the only other mineral worked to any extent. The output in March was 44,026 tons, valued at £11,183, as compared with 39,974 tons in February, valued at £10,461. Several companies are busily searching the northern portion of the Orange River Colony for a payable extension of the Transvaal Witwatersrand goldfields, but without any success.

The Consolidated Goldfields of South Africa is understood to have a promising tract of country near Parys. The supervision of the work of prospecting is under the charge of Doctor Corstrophine. Boring operations have been resumed by the New Rand Limited, under the supervision of Mr. Sawyer. This is the twelfth borehole put down, and the last four holes gave no encouraging results. The Witwatersrand formation dips south and is covered by a thick deposit of the Karroo beds lying horizontal. A series of upthrow faults and dikes seem to prevent the Rand reefs being found, having evidently been removed by denudation before the deposition of the overlying horizontal beds belonging to the Karroo formation.

Scraper Bucket Excavator in Placer Mining

In sections of the country where water is practically unobtainable, a machine has been devised to separate gold by a dry process. Such a machine now in use at Quartzite, Ariz., is shown in the accompanying illustration, together with a scraper bucket excavator made by the Browning Manufacturing Company, of Cleveland and Mansfield, Ohio.

The excavator has a 75-ft. radius, so that it does not require frequent moving. The excavator is moved along on rollers and the dry washer is supported by the same means, and is pushed along to keep it within range of the bucket. The soil at this place extends about 8 ft. to bed rock and the machine will strip all of this before any blasting is done. The bucket is so arranged and handled that it will dig and scrape up the loose rock from large seams and cracks which saves much on the cost of operation. This excavator was hauled 57 miles and erected in a desert country for the Interstate Gold Dredging Company of Los Angeles. The bucket has a capacity of 1½-cu.yd. and will handle approximately 1200 yards per day. The machine is substantially built and will permit of continuous operation.



SCRAPER BUCKET EXCAVATOR AT WORK AT QUARTZITE, ARIZONA

Excavators of this kind are also being used in the Western States for digging irrigation ditches and also along the New York barge canal for building the levees behind which the spoil from dredges is to be thrown. The machines are applicable to stripping any kind of overburden and can often be used in far more satisfactory manner than a steam shovel as there are places where its range of action is preferable to that of the other machine.

Tin Mining in the Black Hills

The tin deposits of the Black Hills, in South Dakota, are found mainly in two somewhat separated districts, which are commonly known as the northern hills and the southern hills. The deposits in the northern hills are found in the vicinity of Spearfish, extending over the line into Wyoming. The most active company in this district is the Tinton Mining Company, with mines at Tinton, 16 miles from the railroad. The deposits in the northern hills are characteristically wide veins or dykes, reaching widths of 60 ft. and over. The Tinton company has developed a large tonnage. For several years it has been experimenting on the problem of concentration, but has not yet satisfied itself as to the construction of its mill. It has gone so far as to demonstrate that with the large orebodies at its command, and with an aërial tramway by which the mine output can be shipped cheaply, it will be possible to operate at a profit with ore yielding a net return of ½ per cent. of tin, when operating the mill at a capacity of about 200 tons of ore per day.

The shipments from this mine heretofore have consisted of concentrates containing 65 to 70 per cent. of tin. Some of this has been sold in Chicago and some in Wales. The English smelters pay the better price, but this is offset by the heavier charge for transportation. The operations of this company are in charge of Charles Henropin, an American mining engineer, who has had experience in modern methods of cheap mining in South Africa.

OPERATIONS OF THE PAHASA COMPANY

The principal operations in the southern hills are those of the Pahasa Mining Company, successors to the old Harney Peak company. The mines of this company are undergoing a thorough examination under the supervision of Dr. A. R. Ledoux, who was receiver of the Harney Peak company during its long litigation, which terminated last year. After ascertaining the prospects in such of the old workings as were accessible, the company settled upon the Cowboy claim, near Hill City, inasmuch as the records and the general knowledge of the camp had indicated that here was to be found one of the best showings of tin. The former workings consisted of two shafts, the deeper of which was 300 ft., connected by levels at 40, 60, 100 and 200 ft. So far, the unwatering has proceeded to a point just below the 200-ft. level. As fast as the orebody has been exposed, it has been sampled most thoroughly. The oreshoot varies from 60 to 300 ft. in length along the strike, and, like all other veins in the southern hills, is lenticular. The width of the exposures varies from 18 in. to 4 ft. The average of all the exposures shows 1 per cent. of tin. Unwatering is proceeding, together with drifting on the strike, and some crosscutting for the purpose of encountering additional lenses. It is not intended to install a concentrator until enough ore is actually blocked out to run a small mill for a reasonable length of time. The Pahasa claims also contain indications of gold, but these are not now being developed.

THE TIN ORE MARKET

It is interesting to know that considerable activity has lately been shown by smelting concerns in this country in the search for supplies of tin ore. The buyers of tin ores in Chicago pay, for tin in concentrates, 9c. less than the commercial value of the tin. The Welsh buyers pay at the rate of only 5c. below the market price of the metal, but the extra freight rates absorb most of this difference. The tin concentrates from the Black Hills are much freer from arsenic, antimony, sulphur and copper than are the Cornish ores. About the only impurity that is likely to affect the quality of the Black Hill ores is a small percentage of iron.

Consumption of Fuel Oil in Russia

In the consumption of oil as fuel Russia leads the world (*Min. Journ.*, July 9, 1910) using about 6,000,000 tons annually. The railways of Russia consumed 3,000,000 tons of fuel oil in 1908 and only 5,000,000 tons of coal. The advisability of adopting oil fuel on Russian warships is now being considered. The price of petroleum at Baku has reached 20s. 6d. per ton, and 49s. at Moscow. At present the receipts from the sale of kerosene amount to barely one-third of the total receipts from the petroleum produced.

Constant Errors in Mine Sampling

BY L. D. RICKETTS *

All who mine so called porphyry ores are familiar with the great diserepancy between the copper found in the miner's grab sample and the actual average content of the ore. A part of this discrepancy is often due to the natural optimism of the miner, but even where trained samplers are employed at the mines, my experience is that the hand samples of the class of ores specified are richer than the ore really is. These inaccuracies have often led the larger producing mines to install sampling works adequate to the accurate determination of the composition of the ores sent to mill or furnace.

Physical Character of the Lode Often Indicative of the Grade of Ore

While the laws governing the grade of porphyry ores are complex, it is a common experience to find, in chalcocite enrichments, that the extent of fracturing and fissuring previous to enrichment is a function of the grade of the ore. It is also a fact that a metallic or earthy sulphide is a more friable substance than a highly altered rock. When such ores are broken they tend to break along joints, fissures and seams where chalcocite exists in more or less solid streaks, and those portions of the matrix containing more disseminated metal tend to crumble and powder more than the leaner rock. In special cases I have seen very pure and massive bands of copper glance in clay where this rule would not apply. Such occurrence is, however, rare and does not obtain in the class of ores to which I refer. As a consequence, it is usually, if not always, the case that the fines in ore broken by blasting are much richer than the coarse, and I have known of cases where the fines of an ore below ⅛ in. uniformly assay about double the grade of the true average of the fines and coarse combined.

The same principles are involved in groove sampling, or in any other system where the ore is broken by a blow or shock, and a parallel line of reasoning suggests itself. If an opening that has been groove sampled is examined, it will be noticed that the groove is seldom regular in size, and by running the hand in the groove, the irregular surface will be found to be made up of hollows and humps. These irregularities are largely due to variations in friability and the tendency of the rock to break along seams.

*General manager, Greene-Cananea Copper Company, Cananea, Sonora, Mexico.

Despite Precautions a Factor of Error Must Be Allowed for in Sampling

Groove sampling is essential in the preliminary examination of developed ground, but it is necessary to observe a number of precautions. The face to be sampled should be thoroughly and vigorously cleaned to remove dirt, sulphates and loose slabs. The groove is cut at an obtuse angle to any prevailing line of fracture. I think that not less than 10 pounds of sample should be taken to the linear foot of groove, and great care should be used to cut about an equal bulk from each linear foot. These precautions will tend to reduce, not to efface entirely, the constant of error, and the engineer must look for a margin over costs and losses that will allow for a factor of safety.

The great advantage of drilling in certain classes of deposits is recognized, and desirable rapidity in the development of prospects is thus obtainable. But if what I have said above be true, the drillings will show a similar factor of error. We cannot expect a churn drill or any other drill to bore a hole of uniform diameter in a rock that is not of uniform texture. The hole will ravel, the softer and brittler spots will tend to bore with a larger diameter, which will be assisted by the swash of the water. Possibly the settling of the heavier material will permit the larger opening to partly fill with clay. The larger the bit the less the error, but nevertheless a constant error will occur.

An investor of my acquaintance remarked that he had great confidence in a certain mine because the breast samples taken from the pile averaged closely with the breast samples taken from the cars after loading. In both instances it was a case of grab sampling, and the fact that the two series tallied closely month by month only indicates to me that they would show about the same screen analysis, and, therefore, as both had the same constant of error they checked.

Check Samples May Often Have Same Constant of Error

Assume a mine in process of development, but with no mill or reduction works, and that the ground is drilled first, and afterward the drill samples are partly checked by drifting under the ore and raising through the ore zone on some of the holes. Round by round the foreman takes a grab sample and when the raise is finished the usual groove sample of 2 or 3 lb. to the foot is taken. The fact that any two, or all, of these sets of samples checked would not indicate to me that the sampling was correct; it would merely indicate that the checking series would have the same constant of error.

As a matter of fact, however, I should hardly look for a check, but should expect the grab sample to show the highest value, the groove sample the next and the drill sample lowest, and that all would show too high a value. Of course, if the ore is rich and the tonnage moderate, carefully taken hand samples will abundantly answer because the margin of operating profit will be so large that the constant error will become a small risk, as the amount of the necessary investment is the important factor. If, however, the merit of the property lies in a tremendous tonnage, the margin per ton required for investment and profit may be so low that a constant error, however small, becomes of immense importance.

Preliminary Estimates Should Be Checked by Underground Work and Mechanical Sampling

My conclusions are that in developing irregular masses of tremendous tonnage and admittedly low grade, the various methods of sampling should be checked by underground work. As frequently earlier faults form the locus of later orebodies, these faults sometimes have to be followed so that it is excusable in some cases to have one or more of the strike drifts depart from a straight line. All crosscuts, however, should be equidistant, parallel, and cut the prevailing fissuring at an obtuse angle, and all raises should be equidistant and vertical. All ore extracted should be sampled in adequate mechanical sampling works as carefully as if the ores were to be bought or sold. If there are strike drifts on enriched streaks, only that portion of the ore in the drift opposite the crosscuts should be included in the average of the ore; in other words, assay figures in the crosscuts and vertical raises alone should be used to obtain the general average.

Considering the large sums to be invested for development and construction, the additional cost for sampling would be trifling. It should be understood that one cannot sell a single carload of ore on a hand sample, and it seems hardly reasonable to undertake to spend millions on properties where the profits are avowedly small per ton, unless careful sampling is done.

Recent Progress in Blast Roasting of Sulphides

Modern Methods of Handling Material Introduced. Down-draft Furnaces Continuous. Process Has Become Important Adjunct to Smelting

BY H. O. HOFMAN*

Blast roasting is the generic term for the process of forcing air through a finely divided metallic sulphide, with the object of simultaneously roasting and agglomerating. At first only galena was treated, for at that time the addition of lime, limestone or gypsum was thought necessary to avoid premature fusion of the galena, and to assist in the sintering of the roasted ore through the formation of some slag. It developed, however, that this addition prevented proper desulphurization.

The term "lime roasting," then current, was applied by Ingalls to this process, although it is now known that lime is unnecessary and that sulphides other than lead yield to this treatment.

The process is divided into two great divisions, according to whether the draft is up or down. To the first belong the Huntington-Heberlein, Savelsberg and Carmichael-Bradford modifications; the Dwight-Lloyd is the only representative of the down-draft in actual use.

Huntington-Heberlein Process

The Huntington-Heberlein process consists essentially of a preliminary treatment in a roasting furnace, followed by the blast roasting proper. It is in use in almost its original form at three plants in British Columbia. The Trail plant of the Consolidated Mining and Smelting Company, of Canada, Ltd., with eight Huntington-Heberlein roasting furnaces and 24 converting pots has the largest installation. The ore treated is a concentrate, having an average assay of 28 per cent. SiO_2, 6 Fe, 56 Pb, 15 S and some Cu, with 65 oz. Ag per ton. (As this totals to 105 per cent. it is evidently inaccurate.)

A charge is made up with the threefold idea of working well in the preliminary roast, in the blast roasters and in the furnace. The reverberatory roaster charge averages Pb, 40 to 44; Fe, 10 to 13; SiO_2, 8 to 11; CaO, 7 to 10; and Zn, under 10 per cent. The final clinker is dense, fairly hard, yellow to grayish-yellow in color and is not too tough to be readily broken to the required size for blast-furnace use. Lead above 45 per cent. gives trouble, as too much sulphur is left in the roasted product, but this may be overcome by a more intimate mixture of the charge. The lowest lead content carried of 38 per cent. sinters faster and gives less trouble than the ordinary content of 42 per cent.

Proper Proportions of Iron and Lime Essential

Experience has shown that the iron should be equal to, or at least be from one to two per cent. in excess of the silica. The reverse condition always gives trouble in a blast furnace; causing reduced tonnage, richer slags and top-firing. With less than 7 per cent. of lime the results are unsatisfactory, producing excessive toughness of the roasted material. No charges have been run with over 10 per cent. of lime.

The first roasting requires about 1¾ hours, reducing the sulphur to about 50 per cent. of the original content, or to approximately 7 per cent. S as sulphide and 1.5 per cent. as sulphate. For good results in the converting pots the reverberatory product should contain over 9 per cent. sulphur. The elimination of 50 per cent. of the sulphur is large as compared with results on pure galena concentrate without other metallic sulphides. Where the sulphide is nearly all converted to a sulphate, the chief object of the first roast is to prevent incipient fusion by reducing the calorific power of the ore.

Description and Operation of the Converting Pot

The converting pot, taking 12 to 15 tons of charge, is 8.5 ft. in diameter and 4 ft. 2 in. deep. The grate is made in four quadrants of cast-iron, as one piece cracks too readily. Cast steel is unsatisfactory, owing to its tendency to buckle. The analysis of a charge was SiO_2, 10.5; Fe, 10.3; Pb, 42; Cu, 1.3; S, 8.5; H_2O, 8 per cent. and Ag, 55 oz. per ton. The average percentage of water, however, is about 5 per cent. The roasted ore from the furnace is conveyed by an elevator through a water spray to a brick bin, from which it is hauled in cars to the iron hoppers of the converting pots.

To begin operations, a few slabs of wood are placed in the converter with a shovelful of glowing coal and the blast turned on. When ignition is well advanced the charge is dropped from the hopper and the blast is increased to from 6 to 8 oz., but is gradually reduced until toward the end of the blow of 8 hours it is only 2 oz., the fire by this time having reached the surface of the charge. The product is coarse, containing about 5 per cent. of fines, which are retreated in subsequent charges, and carries Pb and Cu, 44 per cent., S, 3 per cent., and Ag 60 oz. per ton.

Since introducing the Huntington-Heberlein process the lead tenor of the blast furnace charge has been increased, until it is now 40 per cent. of the weight of the ore and flux. The roasted ore composes 85 per cent. of the charge with the remainder consisting of oxidized lead ore, silicious ore, limestone and foul slag. A 45x160-in. furnace, smelting 170 tons of ore (not charge) produces 60 to 70 tons of lead bullion daily.

Blast-roasting Lead Matte

The blast-furnace matte containing lead up to 25 per cent. and from 8 to 10 per cent. copper is also blast roasted. The matte is granulated as it is tapped from the forehearth, rough roasted in an O'Hara or Godfrey furnace, reducing the sulphur to 12 per cent. and then moistened and blown in the Huntington-Heberlein pots, where the sulphur is reduced to about 3 per cent. and occasionally even to 1 per cent. The converted material is smelted with silicious ore to form a copper matte of about 42 per cent. Low-grade copper matte consisting of 15 per cent. Cu, 27 S and 56 Fe, is similarly treated.

To overcome the toughness of the blast-roasted matte, one plant puts in a layer of lime after the pot is half full of matte charge. This layer gives a plane along which the roasted matte divides when dumped.

Practice at East Helena, Mont., and Murray, Utah

The East Helena plant of the American Smelting and Refining Company has 12 Huntington-Heberlein pots, treating principally galena-concentrates from the Cœur d'Alene district carrying 47 to 55 per cent. lead.

The Murray plant of the same company has 14 pots, 9 ft. in diameter, together with 5 Godfrey roasters, each 26 ft. in diameter for the preliminary roasting. Each of the latter puts through about 30 tons of ore in 24 hours, and reduces the sulphur content of 18 to 25 per cent. to from 8 to 12 per cent., using 130 lb. coal per ton of ore. The pots take a charge of about 9 tons and treat it in 12 hours.

The charge is made up of raw ore, high in sulphur, with SiO_2, 40, and FeO, 20 per cent., and of roasted ore containing sulphur 8 to 12; SiO_2, 10; FeO, 20 per

Note—Abstract of a paper in *Bull.* No. 42, A. I. M. E.

*Professor of metallurgy, Massachusetts Institute of Technology.

cent.; so proportioned as to keep the lead between 18 and 20, the zinc under 10 and the sulphur from 6 to 20 per cent. After placing a layer of ashes to protect the grate, the pots are charged as follows: Upon these ashes are placed one ton of hot roasted ore containing about 8 per cent. sulphur, followed by another ton of similar ore of 12 per cent. sulphur content and then 7 tons of the mixture described above, moistened sufficiently to cohere when squeezed in the hand.

During the operation the blast pressure reaches 25 oz. and the sulphur is reduced to 4 per cent. The top of the finished charge is always made up of partly desulphurized dust, which is retreated with the moistened ore mixture in succeeding charges. When a charge is finished, the pot is tilted by an electric crane to pour off the fine dust, then transferred to the breaking platform, inverted, and the cake dumped on conical castings on a floor laid with closely set rails. The small pieces go to a 10x20-in. Blake crusher, while the large pieces are raised and dropped again until broken into the proper size.

In general it may be said that the successful treatment in the Huntington-Heberlein pots of ores containing not over 20 per cent. of lead, particularly in a custom smelter treating diversified consignments of ore, is a matter of careful and systematic experimenting. The elimination of sulphur may be too small, or the proportion of residual fines too high.

The practice at the various plants of the American Smelting and Refining Company is far from uniform. The old Huntington-Heberlein standard pot was a single casting 9 ft. in diameter, 4.5 ft. deep with a 5-in. air pipe in the bottom. The hight of the sectoral grate was 15 in., and the conical holes in the four-, six-, or eight-grate sections were three-eighths inch in diameter. The modern pot is 11 ft. in diameter, 3 ft. deep to top of grate and takes 15 tons instead of 9 to the charge, and is cast in four sections bolted to a flat bottom, with joints calked with asbestos cord.

The Savelsberg Process

The Savelsberg[1] process is used by the St. Joseph Lead Company, Flat River, Mo., for treating a non-argentiferous galena concentrate whose gangue is dolomitic limestone. This process differs from the Huntington-Heberlein process in that the preliminary roasting is omitted, but enough limestone and silicious flux must be present to form a slag. Eighteen pots, 8.5 ft. in diameter by 4.5 ft. deep are used to treat in 10 to 12 hours 10 tons of the following charge: SiO_2, 13.12; FeO, 5.9; CaO, 6.6; MgO, 3.3; Pb, 47.4; Zn, 2.1; S, 11.2 and H_2O. 6.0 per cent. The blast pressure at the start is 10 oz. and rises to 20 oz. during the blow, reaching 25 oz. at the end, with a blast consumption of 1000 to 1500 cu.ft. of air per minute. The finished product carries from 10 to 15 per cent. of fines, which must be retreated. The solid cake is dumped and broken by hand, and assays: SiO_2, 17.2; FeO, 9; CaO, 7; MgO, 4; Pb, 44.2; Zn. 3.8 and S, 2.3 per cent.

[1]Eng. and Min. Journ., June 16, 1906, p. 1136.

Practice at the Tintic and Midvale Plants, Utah

At the Tintic smeltery, F. G. Kelley, installed tilting tray-shaped steel vessels 8 ft. long by 4 ft. wide and 14 in. deep, with a grate pierced with three-eighth inch holes, in sections of 12 to 14 in. A primer of 500 lb. of rough-roasted ore and 3000 lb. of mixed sulphide ore composed one charge. The blowing occupied 4 hours.

The Midvale plant of the United States Smelting, Refining and Mining Company uses 20 roasting boxes of 6 tons capacity, lined with firebrick and having a hearth 6 ft. square and 3 ft. deep, with the bottom pierced by ⅜-in. holes. The roof is hopper shaped. At the back of each box is a door 12x18 in. for the admission of an electrically operated ram, which pushes the clinker out of a sliding door forming the front of the box. Through a slot in the upper part of this door the progress of the operation, including the leveling of the charge, is controlled.

Priming Mixture of Blende, Coal and Coke Screenings

The mixture used for a primer consists of one part impure blende concentrate, one part soft coal and 1½ parts of coke screenings; one box serving to supply primer material for the other 19. The blende assays 30.4 Zn, 6.8 Pb, 1.6 Cu, 12.7 Fe, 31.7 S and 7.6 per cent. SiO_2. Enough of this mixture for one ore charge is brought to a red heat in the primer box and then put into the roaster. It forms a layer about 1.5 in. thick on top of a 2-in. bed of limestone or silicious ore.

A charge of six tons of ore consisting of 33 parts concentrate, 5 to 10 of flue-dust, and from 62 to 57 parts of fine ore is then placed in the roaster. The mixture is calculated to contain S, 19; SiO_2, 28; Fe, 18; Pb, 13; and Zn, 6.5 per cent. and is transferred to a Smith concrete mixer where 10 per cent. of H_2O is added. The blast at the beginning of the blow, which lasts from 5 to 8 hours, is 2 oz., increasing to 9 at the end. The temperature is kept as low as possible to reduce volatilization losses, which, however, amount to 4 per cent. of the lead and silver.

When sulphur fumes cease to come off the sintered cake is pushed out on a sheet-steel boat and sprayed with water to cool it and to wash off the fines. It is then taken to a 24x36-in. Farrel crusher and broken to 6-in. size. Nineteen boxes treat 320 tons of charge a day, eliminating 65 to 70 per cent. of sulphur. The crew consists of a foreman, a ram man, 5 pot men and 2 chargers. The cost is given as $1.25 per ton of ore. As only 37 per cent. of the sulphur content of matte charges is driven off, matte is regularly roasted in reverberatories.

Blast Roasting of Copper and Copper Nickel Ores

There is no established procedure in the operation of the various processes, owing to the great difficulties encountered. Many expedients have to be adopted, such as the mixing of 10 per cent. of flue dust with the fine copper concentrates, or by crushing the silicious coarse ores to 1-in. size, then blowing in a pot, followed by crushing the caked material to the usual fineness and again blowing.

At the Garfield plant of the American Smelting and Refining Company the raw concentrates carry 25 to 30 per cent. S and about 8 per cent. Cu. They are roasted in McDougall furnaces to 17 per cent. S and then charged into standard Huntington-Heberlein pots, treating 8 tons in 8 hours. The kindling charge consists of one ton of hot calcines, to which are added 7 tons of cold calcines containing 5 per cent. of water. The blast is 6 oz. at the beginning of the roast and gradually increases to 25 oz. and then is diminished to 20 oz. toward the end of the blow. The sulphur is brought down to 6 per cent., but 40 to 50 per cent. of the charge does not agglomerate.

Operations at Morenci

At the plant[2] of the Detroit Copper Mining Company, Morenci, Ariz., the sulphide ores and flue dust were roasted for a time in hemispherical pots. The charge consisted of two tons of flue dust and 8 tons of concentrate, of which 55 per cent. passed a 40-mesh screen. The analysis of the concentrate was 14.3 SiO_2, 24.9 Fe, 5 Al_2O_3, 32.2 S, and 18.8 per cent. Cu; and of the flue dust, 23.9 SiO_2, 25.9 Fe, 5.5 Al_2O_3, 16.2 S, 1.9 CaO an 17.1 per cent. Cu.

In beginning operations a layer of ashes ¾-in. deep, is placed on the grate and a small fire of waste and wood started in the center. When burning well about 75 lb. of sawdust is fed in to a depth of 6 in. at the center and tapering toward the periphery. Two tons of warm flue dust at 80 deg. C. are then added, followed by a 3-in. layer of concentrate; the blast is started at 2 oz. and allowed to act about 30 min. After the concentrate is thoroughly ignited, the blast is increased to 18 oz. and the concentrate then fed in as fast as the heat creeps upward. The above charge required 20 hours for treatment and, while a metal-

[2]*Bull.* 42, p. 487, A. I. M. E.

lurgical success, was an economic failure. The best results gave 93 per cent. of coarse material.

Practice at Copper Cliff

The Canadian Copper Company, at Copper Cliff, used pots to roast ore assaying 31 SiO_2, 19 Fe, 6.15 Cu-Ni, 10 S and about 1 per cent. H_2O; or a mixture of one volume of flue dust assaying 23 SiO_2, 42 Fe, 6.6 Cu-Ni, 26 per cent. S; with one volume of flue dust assaying 23 SiO_2, 7.6 Fe, 6.8 Cu-Ni and 8 per cent. S. The pots were 8.5 ft. in diameter and 6 ft. deep, with an arched grate having ⅝-in. holes. The grate was two feet above the center of the bottom of the kettle.

To begin operations a space of 2.5 ft. in diameter on the grate was covered with kindlings and two pails of coke-breeze spread upon this in a layer about one foot in diameter; the wood was ignited and a half blast turned on until the coke was well kindled, when charging began under a full blast pressure. When the ore started to burn in the center the coke was gradually worked toward the periphery of the pot until a good layer of ore was kindled when the pot was filled with the rest of the charge. The roasting occupied 8.5 hours, during which about 7500 cu.ft. of air per min. at 15 oz. pressure was used. In this time 5.25 tons of first ore would be roasted to 2.75 per cent. sulphur, producing 15 to 20 per cent. of fines; or 6 tons of the mixture to 12 per cent. sulphur and 20 to 25 per cent. fines. This also was an economic failure.

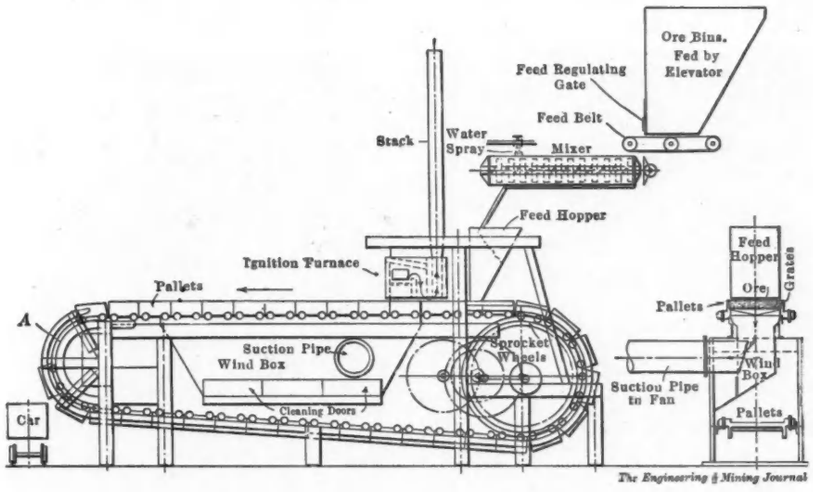
The Carmichael-Bradford process is not used in the United States as far as it is known.

Down-draft Apparatus

The following are the disadvantages of pot roasting: (1) Long exposure to heat with consequent volatilization loss; (2) intermittent operation; (3) constant attention required; (4) amount of fines produced may be large; (5) sintering is uneven; (6) the breaking of the cake is expensive.

The Dwight-Lloyd down-draft apparatus attempts to overcome these disadvantages. The process is continuous, exposing the ore to a heat for a period of about one minute for each per cent. of sulphur. It makes little fines and furnishes a porous coke-like sinter which usually can go direct to the blast furnace.

There are three types of machines, the drum, the straight-line, and the horizontal-table. All embody the following features: (1) The layer of ore is spread mechanically from 2.5 to 5 in. thick on a traveling herring-bone grate; (2) the ore thus spread travels under an igniter which fires the surface and then travels over a suction box which causes the combustion to proceed downward; (3) the sintered ore is discharged automatically. An intermittent form of this apparatus is in use at Cerro de Pasco, Peru.



Straight-line Dwight-Lloyd Blast-roasting Machine

A drum[3] machine is installed at the Maurer plant of the American Smelting and Refining Company and at the Baltimore Copper Smelting and Rolling Company's plant in Baltimore. It consists of a horizontal cylinder 11 ft. 4 in. in diameter with a 3-ft. face, made up of a pair of circular-iron rims carrying cast-iron herring-bone grates of 30-in. effective width. The stationary suction box occupies the upper quadrant. The drum rests on two pairs of friction rollers, one of which is used as a drive. The ore, fed on the rising grate, is ignited by gasolene jets, travels over the suction box in about 20 minutes and is removed by the points of an upturned grizzly. The machine at the Maurer plant using a 4-oz. vacuum, roasted in a 4-in. layer, 30 tons of a 50-per cent. galena concentrate in 24 hours without the addition of lime, to 3.4 per cent. S. The power consumed was 12 horsepower. Bag filtration showed the metal loss to be under 0.5 per cent.

[3]Eng. and Min. Journ., Mar. 28, 1908, p. 649.

The Straight-line Down-draft Roaster

The straight-line machine is shown in the accompanying cut; most of the construction is self-evident. The four wheels of each truck-like element called pallets engage the tracks or guides except just when passing over the suction box, when the planed bottom of the pallet slides on the planed top of the suction box. Cast-steel sprockets lift the train of pallets from the lower to the upper track by engaging their teeth. The drive along the upper track comes from behind, so that the joints are kept tight, and there is a planed dead plate at the beginning and end of the suction box. After passing the terminal dead plate, the wheels of the pallet engage the circular discharge guides, *A*. These raise the pallet about one-half inch, thus loosening the sintered cake. On reaching the curve, the pallets drop one by one, striking the preceding pallet, and shaking loose the sintered mass. The force of this blow can be regulated by the gap left in the train of pallets at this point, which is the only break in the continuity of the pallets.

The igniter is a small coal-burning furnace with a grate area of 10x30 in. burning about 500 lb. of coal per 24 hours. The suction box is 12.5 long by 30 in. wide, giving an area of 31.25 sq.ft. Such a machine weighs 16 tons.

Ohio & Colorado Roaster Handles 50 Tons Daily

At the Ohio & Colorado Smelting and Refining Company's plant, at Salida, Colo., the machine is 30 ft. long, the distance between the brick deflecting curtain of the igniter box and the surface of the ore is 2 in. and the pallets travel 8 in. per minute. The largest permissible ore particle is 0.25 in. in diameter, and this size should not exceed 25 per cent. of the charge. Fifty tons of ore per 24 hours is roasted from 17.7 S. to about 4 per cent. with 5 oz. suction. The cost is given as 75 cents per ton of ore.

These machines are in use in a lead smeltery in Illinois, where on a basis of 100 tons a day, the roasting cost is said to be less than 50 cents per ton. At East Helena, raw blast-furnace matte to the extent of 62 per cent. of the charge is roasted successfully. These machines require a total of 12 to 26 horsepower.

The Horizontal-table Down-draft Roaster

The horizontal-table machine consists of a ring of herring-bone grates, of 15 ft. outer diameter and 8 ft. inner diameter, with an effective area of about 50 per cent. The table makes one revolution in 45 min., the feed hopper and igniter are stationary, and the charge is removed by

a scraper and a deflecting apron. The disadvantage of such a machine is that the scraper forces a large amount of fines through the grate slots. The horizontal machine at the Garfield plant treats about 35 tons a day of a concentrate, 45 per cent. of which will pass a 200-mesh screen. The sulphur is reduced from 30 to 6 per cent.

Details Common to the Three Types of Machine

For 30 sq.ft. of grate area and 15 per cent. S., about 3000 to 4000 cu.ft. of hot gases must be handled per minute. In making up the charge it is essential that the constituents be intimately mixed and uniformly moistened, for which purpose 6 to 10 per cent. of water is added. The charge components should be calculated to give a slag with both a low formation and solidifying temperature. The silica may vary from 10 to 35 per cent., the iron should exceed the lime and the sulphur may be as low as 10 per cent. although the operation is run successfully on 18 per cent., but over 20 per cent. sulphur greatly retards the process. The lead content may be high or low.

Tungsten in San Juan County, Colo.

By Warren C. Prosser*

Tungsten, as hübnerite, occurs widely distributed over the Silverton quadrangle, as a vein mineral associated with quartz and fluorite. In the early eighties it was noticed as a peculiar brown mineral in the Adams lode on Bonita mountain. It occurred in radiating, flat, needle-like crystals with flashing faces. Being unknown by the miners in the section at that time, samples were sent to Freiberg, where it was classified as the tungstate of manganese. In the Adams lode the hübnerite occurred in isolated and irregular bunches, streaks and nests of crystals imbedded in the quartz and fluorite. It held no commercial value at the time of discovery, and outside of a few pieces saved for specimen purposes, was thrown over the dump. The containing vein lay in pyroxene andesite.

Attempt Made at Concentrating

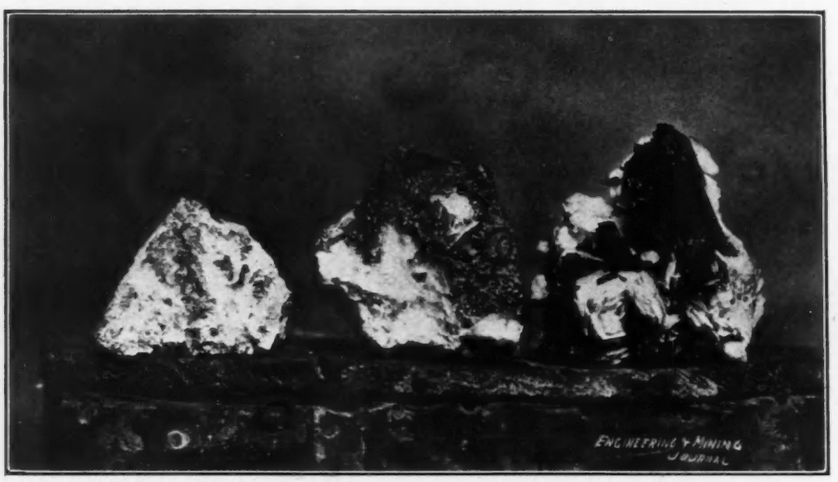
Hübnerite was next found in Dry gulch in a strong quartz lead, on which were located three claims, the Dawn of Day, Sunshine and Minnesota. The deposit occurred in streaks from two to six inches wide, resembling that found in the Adams lode. These veins have since been worked, and several levels driven into them to uncover larger deposits. A considerable amount was found in the upper level of the Dawn of Day, and an attempt was made by William Lucas to concentrate this in the old Fisher mill. He succeeded in getting a good extraction of 40- to 50-per cent. tungsten product, but not having enough ore blocked out, the mill was soon abandoned. The Anglo-Saxon mine in Porcupine gulch opened up a body of several tons of the mineral about this time, but threw it over the dump when this mill closed down. The mineral has frequently been reported as occurring in pockets in the Ariadne and Yukon mines, on Boulder mountain, but never in commercial quantities.

Numerous Occurrences

In 1908 the Eveline tunnel was driven into the foot of Dry gulch, to come under some known deposits of the mineral, but on entering the vein it was found to be rather scattered although a good concentrating material. On the DeLano lode and its extension, a mile and one-half distant from Silverton on Cement creek and on Anvil mountain, the containing vein is 6 ft. wide, with inclusions and kidneys of quartz, galena, sphalerite and hübnerite, in porphyry and gouge. One streak of exceptionally pure mineral is opened for 1300 ft., and is from two to six inches wide. On the hanging-wall of this vein, crystals containing much iron and of a black color, probably approaching in composition the mineral wolframite cover the quartz faces. This fissure as well as those of the Hoosier City, Henrietta and Dry-gulch lodes, lies in a complex series of rhyolite and andesite flows. On the Henrietta and Hoosier-City properties the mineral has been reported as occurring in considerable quantity.

In 1908 the mineral was found in sheaf-like crystals of three-inch length and less, occurring in vug holes in the Gold King mine on Bonita mountain. These were partially incrusted with quartz and fluorite, and were exceedingly beautiful specimens, some being so compact and closely associated as to resemble the old-style, copper, dynamo brushes. The color was a rich, reddish brown. In the Tom Moore mine above Eureka it has been noticed as minute brown crystals in quartz, lying in a latite formation. On Sultan mountain it has been found in the North Star mine and in moderate quantities in the Hercules. Here the veins lie in quartz monzonite.

The main tungsten deposits are confined to a district about nine miles long extending from Silverton to a short distance above Gladstone. It appears that the greater portion is present in the Silverton series of undifferentiated and intermingled rhyolitic and andesitic flows, and the formations immediately bordering these. The mineral, in the majority of cases, can be concentrated by a series of rolls, jigs and concentrating tables. The occurrence of tungsten ore in San Juan county is not commonly known. It is expected, however, that the deposits will be profitably exploited in the near future. Some development is at present being done on the DeLano group.



Specimens of Huebnerite from San Juan County, Colo.

*Mining engineer, Silverton, Colo.

Prospecting in Asiatic Turkey

From Trebizond in Asiatic Turkey, United States Consul Milo A. Jewett reports that foreigners have recently manifested an unusual interest in the mining prospects of Asia Minor. Numerous foreign engineers, including four French and four or five English engineers, are investigating mining properties. No Americans have appeared. A good, strong prospecting and exploration company would be desirable.

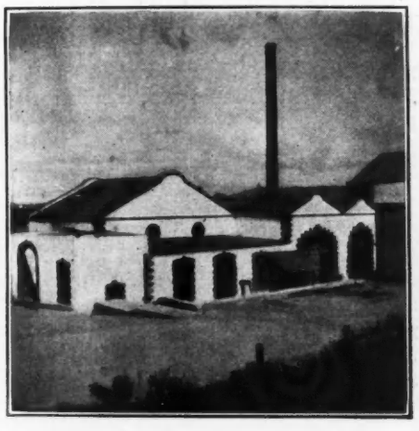
Practically all the mineral deposits of this region are undeveloped, and their character, extent, workability and value are yet to be determined. The natives do not possess the capital and technical knowledge required to develop the deposits, and foreign companies do not care to buy claims that have not been explored and proved of probable practical value.

Reconstruction of the Angustias Cyanide Mill

Mill Was Built for Patio Process; 50-ton Cyanide Plant Installed. Treatment Costs 4.55 Pesos per Ton; Extraction: Gold, 93; Silver, 86 Per Cent.

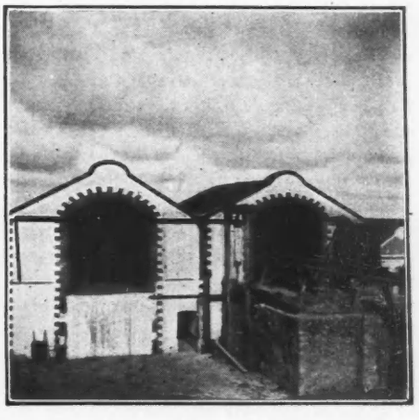
BY HERBERT A. MEGRAW*

It is usually simpler to design and construct a new mill, adapted to a prescribed system of treatment, than it is to change an old plant which was intended for an entirely different treatment. When it is desired to make a change of this sort with the expenditure of the least possible amount of money, the problem is still further complicated. Full advantage must be taken of the existing installation, which means that existing construction must be put to uses for which it was never intended. Often this can be done with inexpensive changes, an illustration of a case in point being shown in the mill of the Angustias, Dolores y Anexas Company, at San Luis de la Paz, Guanajuato, Mexico.



POWER PLANT OF ANGUSTIAS MILL

SAND TANKS NOW IN USE AT ANGUSTIAS MILL



DELIVERY OF ORE AT MILL BINS

The mill was originally designed for the treatment of the ore by the patio process, and in compliance with the requirements of this system, a level site was chosen. When a change was contemplated, for a cyanide mill, this site was found to be a serious obstacle. An attempt had been made two years previous to adapt the mill for cyanide treatment, but the work had not been carried to its logical end, and much remained to be done to put the mill in condition for modern work.

TREATMENT EMPLOYED BY THE OLD MILL

My first step was to conduct a series of experiments in the laboratory, and later in the mill, in order to determine the necessities of the situation. The arrangement and equipment of the mill at the time of my first visit was about as follows. The ore was passed through rock breakers at the mine and brought to the mill patio in small cars. At the patio all the ore was carefully sampled and checked against a similar sampling at the mine. No ore was milled until the two samplings and assays checked, thus forming an absolutely reliable basis for computing the value of the ore entering the mill. This point is worthy of notice as it is extremely rare that such attention is paid sampling in many of the larger modern mills.

The grinding was performed in four chilean mills of the older style, driven from beneath by means of gearing. The tread of the mill is a solid plate or ring of steel 5 ft. in diameter and 5 in. thick. The crushing is performed on this die by the rolling of the heavy wheels, of which each mill has two, 7 ft. in diameter, 19-in. face, and weighing about five tons each. The hight of discharge, from the die to the screen, is 13 in., and under ordinary circumstances the mills are driven at a speed of 15 r.p.m. When the mills are grinding at their maximum capacity, they require 15 h.p. each.

SLIME TREATMENT

From the mills the pulp was conducted through sheet-iron launders, with insufficient grade, to a spitzkasten, where a separation of the sand and slime was made. This separation was later found to be one of the chief weaknesses of the system, as both products, sand and slime, contained abnormal quantities of the other product which it was designed to eliminate.

The slime product was delivered to two dewatering cones, each 8 ft. in diameter and 10 ft. deep, from which the thickened slime was conducted directly to the slime treatment tanks, the overflowing solution being returned to the mills for further grinding.

The 16 slime-treatment tanks were masonry pits, originally constructed for use as slime settlers in the patio process. In these pits the slime was agitated with compressed air led into the charge with pipes and hose. The main difficulty in this case was the compressor, which was so small that its delivered air could not keep up perfect agitation. The slime was discharged by withdrawing a plug in the bottom of the tank. The slime ran into a wide ditch, and peons, with wooden rakes, passed them to the intake of a small tailing wheel, also operated by hand, which raised the pulp to the level of the yard where it was impounded in dams, allowed to dry, and finally removed in sacks carried by peons.

SAND TREATMENT

The sand from the spitzkasten was passed over four Wilfley concentrators and thence to the sand-treatment plant. This sand plant comprised seven round wooden tanks, having a capacity of 45 metric tons each, and four 140-ton rectangular masonry tanks. The masonry tanks are particularly objectionable as their shape and size make them unhandy to operate, and the method of delivering the sand pulp, through a simple open launder, does not allow a proper distribution of the pulp. The result is that it is impossible to avoid the settlement of a certain portion of slime in the tank, which retards the leaching. All of these sand tanks had to be discharged by hand

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shoveling, there not being sufficient water to wash them out.

Precipitation Department

The precipitation department contained seven small wooden extractor boxes of the usual type for use with zinc shaving. The total capacity of these seven boxes was about 100 cu.ft. of shavings, which was quite inadequate for the capacity of the mill. They required cleaning every day or two, depending upon the grade of the ore milled, and were extremely unhandy to work in. Sulphuric acid treatment was used on the zinc shorts, and the precipitate was melted in small crucibles using charcoal as fuel.

Reconstruction of the Mill

In reconstructing the mill it was necessary to use the least possible amount of money in order to demonstrate the efficiency of the process before going to large expense. It was arranged to use practically all the old machinery, with a few indispensable additions, and considerable study was necessary to devise feasible means of doing it, and also to overcome the lack of grade, which was serious.

The river bed, outside the *hacienda* walls, had a slight fall, and had been so filled up with tailing in years past that the bed is three feet higher than the ground level inside the *hacienda*. Due to the danger of overflowing the surrounding fields, during the rainy reason, the municipal government forbade delivering any solids into the river, so that another problem was presented in finding a way to get rid of the tailing.

Chilean Mills Retained

The most practical solution of the difficulties encountered seemed to be the following: A study of the work performed by the chilean mills induced us to retain them as primary grinding machines, as they delivered ground ore at an extremely reasonable cost, and their replacement by any other grinding machine seemed useless at this time. The capacity of the mills was shown to be 1.042 tons per hour through a 40-mesh screen for each mill. It is my intention to take up the study of these mills in a separate paper, making a comparison of the work performed by them and its cost, the results of which will be interesting and, I trust, of importance.

The ore available at the time of starting the mill required the use of only two of the mills. The launders leading from the mills were given more inclination. The spitzkasten were replaced by three iron cones, which proved quite satisfactory, delivering a clean, leachable sand and a light slime which could be agitated by the compressed air. The concentrators were all raised 15 in. in order to give a better grade to the launders which carry the sand.

New Equipment

A new compressor, capable of compressing 300 cu.ft. of free air per minute to 30 lb. was installed for agitating the slimes. Four new zinc boxes of iron were made and installed, these boxes having a total capacity of 225 cu.ft. of shaving. The discharge openings of the slime tanks were fitted with 4-in. pipe connected to a centrifugal pump, which was used to discharge them. A steel tank was installed with the bottom 14 ft. above the patio level. This tank was to receive the slime tailings, allow it to settle for a short time in order to recover cyanide and metal in solution, and discharge the final tailing outside the walls of the *hacienda* by gravity. The slime was stored in a pond, thus avoiding the filling of the river bed. As no filter had been arranged for, this scheme seems the most feasible.

The sand tanks were all renovated, new launders were put in and the whole generally improved. The old method of treating both sand and slime with one weak, cyanide solution, was changed to allow the use of two grades of solution, both stronger than that used formerly. The two solutions are kept separate at all times.

The whole system of pulp flow was renovated and all weak places strengthened and all leaks stopped, in order to allow economical crushing in cyanide solution.

Power Plant

The present power plant includes three 50-h.p. boilers; one 100-h.p. Read-Campbell compound slide-valve engine; one 9x14x11-in. steam-driven air compressor; one small dynamo for lighting, driven by a 10-h.p. slide-valve steam engine; and one 15-h.p. motor for driving the centrifugal pump for discharging the slime tanks. The fuel is wood and is delivered by the same railroad which brings the ore from the mine. The cost for power is 0.02967 pesos per horsepower-hour.

In designing all these changes, a special effort was made to avoid, as far as possible, the elevation of pulp. The only case in which it was found necessary to elevate any material was in the discharge of the slime tanks. This was due to the topography, as explained above.

Results of Three Months' Operation

After three months of operation, the results obtained were as follows: Average ore milled, 50 tons per 24 hours; average assay, 397 grams of silver and 16 grams of gold per ton; value per ton, 34.77 pesos. The extraction in concentrates was: Silver, 21.50 per cent.; gold, 42.2 per cent.; and in bullion, 64.83 and 51.15 per cent., respectively. The total extraction of silver was 86.33 per cent. and of gold, 93.35 per cent.

The cost of treatment, including all mill charges and local taxes on output varied from 4.08 to 4.55 pesos per ton milled. The consumption of principal chemicals was: Cyanide, 1.25 kg. per ton milled; acetate, 0.089; lime, 2.435; zinc, 0.35.

Precipitation

No difficulty was experienced with precipitation, the precipitate recovered being melted with a small amount of flux in large crucibles in coke furnaces. The precipitate averaged from 65 to 75 per cent. of its weight in bullion which assayed from 850 to 925 fine in silver and from 30 to 60 fine in gold. The use of acid in treating zinc short was discontinued. The fine zinc was returned to the strong boxes and the small excess of zincky precipitate was melted directly. The calculation of per cent. extraction above noted was based on actual output upon which taxes were paid.

From the data presented, it may be seen that the object of the reforms was successfully accomplished. Naturally, a plant of this sort could not be expected to reduce expenses to the point reached by modern plants where the most economical systems are incorporated in the original design. The costs, as given above are, however, reasonable, and allow treatment of the ore at a substantial profit.

Larger Percentage of Slime Will Be Made

A study of the conditions during the period of operation of the plant has shown that it can be much improved by adopting some system of making a larger per cent. of slime. Under present conditions, the proportions are 42 per cent. sand and 58 per cent. slime. Plans have been made and operations are under way to return the sand product, after concentration, to a third chilean mill for regrinding. As the slime does not have to be moved by hand, its treatment is much cheaper in addition to the better extraction. It is particularly desired to avoid, if possible, the use of the large masonry sand tanks, which are costly and inefficient.

Plans are also under way for the treatment of the concentrate in order to avoid the high cost of shipping to the smeltery. With these economies, the company hopes to secure good extraction and a cost per ton low enough to be comparable with the best work anywhere.

Increase of Mill Capacity

Plans are being made to increase the capacity of the mill. This will probably be accomplished by using all four of the chilean mills as primary grinders, with a coarser screen to increase the output, and regrinding the entire product in tube mills. Modern tanks and treatment system will be installed and every effort made to produce a first-class plant.

Smelting Briquetted Zinc Ore

BY THEODORE J. HOOVER*

A zinc-smelting test was made on a lot of 613 tons of mixed concentrates by the briquetting process.[1] The concentrates were made from slimes from the Broken Hill mines by the flotation process employed by the Minerals Separation Ltd., and had the following composition:

Zinc, 31.70 per cent.; lead, 24.38; tion: Zinc, 31.70 per cent.; lead, 24.38; manganese, 1.69; lime, 1.18; alumina, 1.74; silica, 8.08; oil, 0.40; and loss, 0.26 per cent. The silver content was 24.7 oz. per long ton.

This analysis shows that the material has little or no market value to either lead or zinc smelters.

A screen analysis of the concentrates is shown in the accompanying table.

SCREEN ANALYSIS OF BROKEN HILL CONCENTRATES.

Size Aperture of Screen.	Approximate Mesh.	Per Cent. of Sample.
On 0.0124 inch	40	0.98
0.0098 inch	50	0.65
0.0078 inch	65	0.30
0.0062 inch	80	0.62
0.0049 inch	110	1.66
0.0039 inch	130	4.10
0.0031 inch	160	7.56
0.0025 inch	200	2.16
Through 0.0025 inch	200	81.97
Total.....	...	100 per cent.

It is plain from the screen analysis that little benefit can be anticipated by any ordinary wet-table or vanner treatment.

To treat this material a combination of roasting, briquetting and distillation was employed, whereby the lead and silver were retained in the briquets as residues, and the zinc was volatilized and condensed.

Roasting and Briquetting

The roasting was done in a single-deck hand calciner of the ordinary type having a capacity of four to five tons of raw ore per day. With care the roasting was not difficult, the sulphur being reduced to under 3 per cent., with metal losses of zinc, 1.82; lead, 5.93; silver, 2.74 per cent. These show that the dusting loss was probably low, and that in a proper equipment part of the lead lost could be recovered. The roasted material assayed, zinc, 34.5, lead, 25.43 per cent., and silver, 26.68 oz. per ton.

Previous tests by retorting this material in ordinary zinc furnaces had been very destructive of retorts and had yielded spelter so high in lead as to be unmarketable. For this reason it was decided to try briquetting. The most suitable mixture for the briquets, determined by trial, was; roasted ore, 70 per cent.; good-grade bituminous coal, 25.5, and pitch, 4.5 per cent.

Charging

The briquets were 5¼x4¼x8 in., a size which, when arranged two deep, seven long, and one wide, just filled the retort, leaving a space about ¼ in. between the retort and the briquets. The retort was of the familiar Welsh type, 5¾ in. wide by 9½ in. high by 5 ft. long. One furnace contained 144 retorts arranged in six rows of 24 each. In charging, six men working in two sets formed the crew, each set taking half the furnace. The briquets came in on cars running on a track about 10 ft. back from the furnace front.

Taking the average of a number of days, the periods of time for charging one row of retorts was found to be: Filling, 3 min.; setting condensers, 4; mudding, 4; tamping, 2; coaling, 1; rest, 1; a total time of 15 minutes per row, or 1 hour 30 minutes for the whole furnace, with perhaps one-half hour added for delays due to replacing retorts, repairs and cleaning up.

The charging was done by the three men neatly and rapidly. One man stood at the truck and tossed the bricks two at a time to the second helper who stood near the front of the furnace. The second helper placed the two briquets on the charging tool. The instant the two bricks were in position on the charging tool the charger shoved them into place in the retort.

From the above figures it is seen that one set of men placed 158 bricks in the retorts in 3 minutes, being at the rate of a little less than a brick per second. All the old Welsh zinc men who have worked with this method of charging prefer it to the loose charging system because of the reduced labor and cleanliness.

Distillation

As soon as the briquets were in the furnace the pitch began to give off an olive-colored smoke which burned when ignited. After charging was finished and the pipe extensions put on, the furnace was given over to the distiller at 12 o'clock noon. The first tapping was done at 12 o'clock midnight, the second at 3 a.m., and the last at 6 a.m. These tappings were kept separate at first until assays showed they were fairly uniform in lead content. At 6:30 a.m. the run was complete and the furnace was turned over to the day crew who replaced broken retorts and recharged the furnace.

The distilling of the charge presented no difficulty except perhaps the necessity of running the furnace a little cooler than on the ordinary loose charging of a good zinc ore free from lead. The briquets came out of the retort quite porous but intact, and were well suited for direct lead smelting. There was no tendency for the retorts to "slag up" in the bottom, because the briquets came away clean and entire each time.

On the whole, the distillation recovery may be considered eminently satisfactory, bearing in mind the fact that the period of the test included not only the starting up of the furnace, but also several series of experimental runs. There were long periods when the indicated recovery of zinc was upward of 85 per cent., but the general average is lower, no doubt due in large measure to the experiments at the beginning of the run. It was found that the best recovery was obtained when the four lower rows were charged with briquets, the two top rows being devoted to the distillation of sweeps. This shows that the two-row gas-fired type of furnace with its more equally distributed heat would be more suitable and give better results than this old six-row coal-fired furnace. Although the recovery of zinc based on the whole run is only 70 per cent., I have no doubt that upward of 80 per cent. could be secured in continuous running.

The Product

The spelter was of excellent grade, assaying 99.25 per cent. zinc and 0.73 per cent. lead and often as low as 0.5 per cent. lead.

The weight of the residues produced was about 75 per cent. of the weight of the raw ore, and both the lead and silver were well held up in the briquets during the distillation. About one-half of the lead in the briquets was in the form of minute prills. The residues assayed 6 per cent. zinc, 28 per cent. lead and 30 oz. silver per ton.

Advantages

One material advantage of this method of zinc smelting is that the furnace charge contained nearly six tons of roasted material, whereas with loose charging four and one-half tons of roasted material was the maximum that

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[1]U. S. Patent 665,744 and 692,148, Sulman & Picard; British Patent 2151 of 1900, Sulman & Picard; property of the British & Foreign Construction Company.

could be charged. This was an increase of 33⅓ per cent., reflecting advantageously, not only on smelting costs, but also on recoveries.

The loss in pots was below the average zinc work. An interesting feature in this connection was as follows: In a later test on similar material the briquetting machine was not available for the latter end of the run, and several tons were charged loose after the furnace had been running on briquets for some weeks. The old retorts held up well under this loose charging of a high lead concentrate, but the new retorts would all fail in two or three days, the old retorts, however, most of them, lasting to the end of the run. This can be accounted for on the assumption that the latter had acquired a protective saturation during the period when only briquets were being retorted.

RESULTS OF ZINC SMELTING TEST.

LOSSES.

ROASTING.				DISTILLING.		
Weight, Per Cent.	Zn, Per Cent.	Pb, Per Cent.	Ag, Per Cent.	Zn, Per Cent.	Pb, Per Cent.	Ag, Per Cent.
9.5	1.82	5.93	2.74	29.2	8.96	9.96

RECOVERIES.

BASED ON RAW CONCENTRATES.			BASED ON ROASTED CONCENTRATES.		
Zn, Per Cent.	Pb, Per Cent.	Ag, Ounces per Ton.	Zn, Per Cent.	Pb, Per Cent.	Ag, Per Cent.
69.5	85.66	87.57	70.8	91.04	90.04

LOSSES

The figures for loss of lead and silver in distillation demand some explanation, for if the quantities indicated were lost during distillation the inference is that they went into the spelter. They were not in the spelter, however, as it was sold at a premium because of its purity. The losses are partially accounted for in that the handling loss both before and after distillation was charged to distillation. Also as previously remarked the lead was about half in the form of prills with the result that the residues were hard to sample and assay accurately; and the suggestion that our assays were not quite correct is borne out by the fact that the lead smelter paid us for more lead and silver than we expected.

As to the zinc loss, about 15 per cent. is accounted for in the residues, leaving about 15 per cent. to be accounted for, as loss by volatilization and handling, etc. This seems very high and no adequate explanation can at present be advanced.

The fact remains that the recovery of zinc is based on spelter sold, and that the sales of lead and silver overran the recovery indicated by assay to such an extent as to completely wipe out the losses of those two metals during distillation.

The residues were disposed of under a favorable selling contract; to wit, lead at the market price and silver at the market price; less a returning charge of 50s. per ton.

Taking zinc at £20 per ton, lead at £13 per ton and silver at 2s. per oz., the test shows, on a conservative estimate for the purchase of slimes, working costs, freight and amortization, a profit of £1 10s. per ton of concentrates. Taking the higher recoveries justified by the samples when the furnace was running under established conditions and on the same prices of metals, there would be, on the basis of 50 tons per day for five years, a profit of £3 per ton.

Palmarejo & Mexican Goldfields

LONDON CORRESPONDENCE

Mines in Mexico owned and worked by London companies have provided at intervals sensations in mining circles by reason of the discovery of rich sulphide ore. There is at present one case, that of El Oro, where rich ore is being opened up. Three or four years ago there was the Esperanza, which, when passed over to the English company, was not considered to be a rich mine. Shortly afterward, however, a rich sulphide vein was opened up in one portion of the mine from top to bottom, which, being readily accessible from the existing levels, allowed its contained wealth to be so quickly turned to account that dividends of more than one million sterling were distributed within a comparatively short space of time.

PALMAREJO NOT A BONANZA

The Palmarejo & Mexican Goldfields, Chinipas, Chihuahua, is almost the reverse of sensational, and in so far as can be gathered from the reports, the attractive possibility of encountering a bonanza is not offered.

It is recorded that for a great number of years this mine was profitably worked by the inhabitants of the country. It has also been worked by an English company for the last 20 years or so. The fact, however, remains that toward the end of 1908 the mill was closed down because there was not sufficient payable ore in the mine to keep it running, and because the mill was of an old and unsatisfactory type.

EXAMINATION SHOWS NEW POSSIBILITIES

An exhaustive examination by a well known engineer, called in at this crisis, showed that there are in the mine two veins from 7 to 15 ft. in width and from 2000 to 3000 ft. in length, from which the samples taken indicated, when estimated conservatively, a value of about 18 oz. of silver per ton. It was considered that there was promise that a satisfactory amount of ore of this value could be opened up by development work, and tests showed that about 87 per cent. of the total value, or say 31s., could be obtained by means of concentration, all-sliming and subsequent cyanidation. It was also figured, that, treating 250 to 300 tons per day, the total cost would be in the neighborhood of 17s., leaving a working profit of 14s. per ton, or £60,000 per year. These were the possibilities of the mine and the principal asset of the company.

FINANCIAL POLICY

It was estimated that to carry out this scheme in its entirety would make necessary the provision of further capital to the extent of about £116,000. Before the whole of the capital was called up it was determined to spend from £25,000 to £30,000 to see if previous estimates of the mine's value were well based.

Since then, 18 months have almost passed and considerable development work has been done in the mine, with the result that at the end of 1909 the amount of positive ore developed was 81,116 tons of 41s. value, and the amount of probable ore stood at 106,160 tons, the manager being further of the opinion that by the end of 1910 the amount of positive ore would reach about 175,000 tons of 39s. value.

ORIGINAL ESTIMATE OF ORE CONTENTS CONFIRMED

The appearances, therefore, are that the original estimates were well based, in so far as the value of the ore is concerned. In addition the estimates of the cost of development have been more than borne out by the actual figures, thus showing that the payable ore, or the oreshoots in the reef, are of greater extent than the original estimate allowed. In view of these facts the further progress of this mine will be watched with great interest, and particularly so, because it was not many years ago that ores carrying less than 30 oz. of silver to the ton were considered as but little attraction for the employment of capital.

Ore Deposits in Western Ontario

The region covered by this report[1] extends 220 miles westward from Lake Nipigon, its average southern limit being north latitude 49 deg. 50 min. Its northern extent is irregular, in a few places reaching the Ontario boundary. Much of the information embraced in the report is compiled from previous surveys since 1869, and in order to meet the demand created by railway-building activity, this was supplemented by an examination of the country adjacent to the transcontinental railway route begun in 1906. The entire region is glaciated and exhibits the usual uneven, moderately low relief characteristic of the Archean peneplain. Lake Nipigon is 852 ft. above sea level; Lac Seul, which receives most of the water in the west, is 1140 ft., while Chivelston lake, just north of Sturgeon lake, is 1425 ft. The difference of 573 ft. between Chivelston and Nipigon is distributed over a distance of 80 miles. The surface of the peneplain is hilly and exceedingly irregular in configuration. With few exceptions the hills are bare, rocky knobs, less than 200 ft. high. The lower levels are occupied by lakes and limited areas of soil. Water power is afforded by most of the large streams, in many cases within a short distance of the railway route. Since the railway surveys, much has been done to render the country more accessible by regularly appointed services of power-driven boats. Rapid progress is being made with the building of the line.

Geology of the District

A detailed description of the geology of the region is given in the report. With the exception of a small amount of metamorphosed sediment near Lake Nipigon, the entire region is underlaid by crystalline rocks of pre-Cambrian age. The oldest division includes what are variously termed schists, green schists, Keewatin or Huronian. The schist areas are bounded by younger granites and gneisses, which have produced a contact metamorphic zone of variable width, the outer edge of which constitutes a transition zone between the schists and Laurentian gneisses.

The gneisses and schists near Lake Nipigon are overlaid by a series of Keweenawan sediments, which are capped in turn by a thick mantle of diabase. The configuration of the Keewatin and Huronian makes three Laurentian areas distinguishable: A large western area; a central area traversed by Sturgeon river; and a large eastern area. These, however, are not completely separate or physically unlike. Bedded deposits of extensive nature occur on Lac Seul, and an extended clay area is traversed by the Walrigoon river and its upper tributaries.

Gold in Fissure Veins

Gold occurs in small quantities at many points in the green-schist areas, but the deposits are seldom sufficiently large or rich to be profitably operated. The most important deposits are of the true fissure type, which occur near Sturgeon lake, at the north of which the Keewatin schists are intruded by a body of granite, the contact extending down the western side of the large median peninsula. Various points along this contact have proved gold bearing, the best known of which is the Sturgeon Lake Gold Mining Company's property, west of Couture lake, where the shattered zone is 200 ft. wide. The granite, with which are associated a coarsely crystalline quartz porphyry and dikes of coarse granite, bearing light-colored mica, is traversed by a branching mass of quartz veins, lenses and stringers. Free gold, pyrite, chalcopyrite, galena and zinc blende are contained in a gangue of quartz and small amounts of calcite.

Mining operations have been conducted since 1901. On East and Northeast bays many claims have been staked. and recently interest has been directed to Belmont bay. The geology here is complicated by the presence of numerous igneous bodies cutting the schists, near which auriferous veins occur. Several claims were located, test pits sunk and camp buildings erected. The Belmont Bay Mining Company was engaged in operations for several years, a shaft being sunk 250 ft. and then abandoned. Work was afterward resumed and a three-stamp mill installed. Little prospecting has been done in the Savant area. Quartz veins are abundant near Island lake, though igneous intrusions are not so common as on Sturgeon lake. Small quartz veins bearing free gold were reported north of Kimmewin lake.

Iron Ore Deposits

Iron ore occurs in the Keewatin-Huronian areas. Where best known this formation is a phase of the Huronian slate, in which magnetite is present in visible quantities. The magnetite is in parallel bands from a fraction of an inch to several feet wide, and appears at the surface as glossy blue-black seams in the dull-colored slate. With the possible exception of the imperfectly known Obonga area, all the Keewatin-Huronian areas contain iron formation, the most extensive occurrence being near Kashaweogama lake in the Savant area. Iron formation occurs both north and south of Kashaweogama. On the north its extent is little known and the observed exposures are of no value. The most important body commences on the south shore at the narrows just northeast of Fisher lake. It outcrops all along the shore reaching nearly to Grebe lake. The range is about four miles long and between one-quarter and one-half mile wide. Other magnetite seams occur on Iron lake; on the portage to Savant lake and along the west shore of Savant lake. These are narrow and commercially valueless. A sample taken from the narrows analyzed by F. G. Wait, chief chemist of the Mines Department, showed metallic iron 30.74 per cent.; insoluble silicious residue 55.70 per cent.; titanic acid, none. Another sample analyzed in the laboratory of the Atikokaw Mining Company yielded 53½ per cent. metallic iron. A number of claims have been staked and some exploratory work done.

In the Minnitaki area, a lean iron formation partly altered to horneblende schist occurs near Sioux Lookout on Pelican lake. Narrow magnetite seams are visible on the islet below Frog rapids, and more extensive ones were noted on the east shore of Pelican lake. A reported find of iron ore near Hidden lake may indicate the presence of iron formation in that vicinity. Iron formation occurs in association with schist conglomerate near the head of East bay in the Sturgeon lake area, and iron pebbles have been found in the Huronian conglomerate, but nothing is known as to the extent of the deposits.

Pyrite

Pyrite is common in the schists as disseminated grains. It often carries a low gold content. At one point the Northern Light Mining Company began work on a vein at the east end of Big Vermillion lake, where 40 men were at work. A shaft was sunk 110 ft. and drifting done at 90 ft. Other portions of the property have since been explored. The deposit occupies a well defined, nearly vertical fissure in green schist and sheared dioritic rock. The orebody is 5 ft. wide at the surface, but underground operations have revealed greater dimensions. About eight miles west of this property seams of pyrite 2 to 6 ft. wide have been found on the lake shore and are said to extend into the lake and attain greater thickness. Some of the Laurentian pegmatite is sufficiently coarse textured to afford possible sources for feldspar and muscovite. The large stock on the south side of Gull lake yields muscovite plates up to 6 in. diameter and feldspars much larger.

[1] "A Geological Reconnaissance of the Region Traversed by the Transcontinental Railway between Lake Nipigon and Clay Lake, Ontario." Canadian Department of Mines, Ottawa.

Alabama Operators Discuss Coal Problems

All Measures Tending to Prevent Accidents Adopted. Sprinkling, Electric Shot Firing and Hydraulic Mining Cartridge Introduced

SPECIAL CORRESPONDENCE

At a meeting of Alabama operators, superintendents, mine foremen and fire bosses, held at East Lake Park, Alabama, on July 30, many interesting papers were read. E. H. Coxe delivered a talk on "Safety in Coal Mines." Following is a brief abstract of Mr. Coxe's paper:

The two principal points which I wish to emphasize are discipline and proper inspection, both of which seem to me to be all important for the safety of our underground employees. These two subjects go hand in hand. It is too often the case that inspections are made in a perfunctory manner by an inspector who seems to think that his duty is done and his object accomplished when he walks around and covers a certain amount of territory in a day. Such an inspection is of no benefit. The inspector should be continually on the lookout for ways to protect employees and should be vested with sufficient authority to correct such evils. The mine foreman must realize that he is personally responsible and to blame when any employee under his charge is killed or injured as the result of failure or negligence on his part to see that proper precautions are taken to force employees to properly protect themselves. The foreman must also instil the same feeling of responsibility in his assistants.

Some foremen feel that if they are too rigid in their discipline they will lose some of their men and reduce their output. Such men as will be lost by the exercise of proper, fair and unprejudiced discipline will be a good riddance, and the better class of men will be attracted by the fact that proper and fair discipline is exercised. The foreman must make all men realize that when instructions are given they must be obeyed.

Shot Firing

I want to emphasize the danger of firing "skinnen backs" or shots with short fuses improperly tamped. I wish also to say a word about the use of the term "safety explosives," which is an expression frequently used in referring to what should be properly termed "permissible explosives." No explosive is safe, but the explosives as listed by the United States Government as permissible explosives, if used within proper limits, which in most cases is in quantities not exceeding 2 lb. to any one shot, are much safer explosives than either black powder or dynamite. The Tennessee Coal, Iron and Railroad Company has now equipped two mines for firing all shots by electricity; this system is being used with great success.

An Effort to Abolish Explosives

We would probably have continued the installation of this system at all our mines but for the fact that we are now arranging to equip one mine with what is known as the hydraulic mining cartridge, with which I believe a number of you are familiar. Experiments with one of these machines seem to indicate that the cartridge will be a great success in the Pratt seam of coal, and we are therefore equipping one mine to blast the coal altogether with this cartridge, to determine whether it would be commercially successful in that field; if so, it will eliminate the use of explosives for shooting the coal, and possibly for shooting rock and brushing entries, although as yet we have made no experiments along this line and therefore cannot say.

It is to be regretted, however, that this cartridge will only break down coals of a certain nature, and experiments in the Blocton field demonstrated to us that the cartridge was not suitable for that seam. It is certainly to be hoped that these cartridges will prove successful in many seams of coal, and by their means the use of explosives can be eliminated as much as possible.

Precautions Taken at Mulga Mine

Another interesting paper was read by Mr. Fies, of the Birmingham Coal and Iron Company. Mr. Fies dealt with the "Precautions Taken at the Mulga Mine." Following is an abstract of his paper: Mulga was the first mine in the district that successfully and exclusively used permissible explosives. Since the mine has been operated there has never been a pound of coal shot off the solid and there never has been a blown-out shot. Shot-firers were employed and the rules governing firing were stringent. We are criticized because the record of mine casualties in this country as compared to foreign countries is against us. One of the strongest reasons for this is the transient character of our labor. In Europe, generation after generation work in one mine, but here in our country it is generally the case that the miners do not remain in one mine long enough to learn how to properly and economically mine the coal or become familiar with the top. The ignorance of the average miner is a serious menace to the safety of the man who knows his business. The solution of this problem is to sell land and build permanent homes for the men.

Before the fatal explosion at the Mulga mine, the workings were regularly sprinkled and the dust in most places was so dampened that it could be rolled into a ball. It is also true that at the time of the accident the fan was making 52,000 cu.ft. of air per minute on two splits and was running as slowly as possible. In addition to the fan affording ventilation, air pipes were carried to the face of all headings. No standing bodies of gas were permitted, nor were any sudden gushes experienced. A 1-in. live-steam line played in the intake continually. In spite of these precautions an accident occurred.

Safety Lamps Abolished

After the Mulga explosion, many changes were made, and it may be interesting to mine men generally to know why safety lamps were removed from the mine. If I thought that the majority of this audience had had the misfortune of trying to operate a mine with safety lamps in the hands of men inexperienced in their use, this portion of my paper might be omitted, but since Mulga is more or less of a pioneer in this field, it may be interesting to know why the lamps were removed:

1. Mulga does not generate enough methane to render mining with open lamps dangerous, provided the mine is kept sufficiently wet. The real value of a safety lamp begins only when the ventilation is not efficient in the removal of gas. I make these statements, not from hearsay, but from my own experience, as I spent from 14 to 18 hours per day in this mine for a period of three months. I experimented carefully with the gas and made frequent trips with the fire bosses on their early morning rounds. I can sight no more positive example than this incident: The explosion at Mulga occurred at 9.10 p.m. The fan was operating at 11.35 p.m., though all the air was short-circuiting from No. 2 to No. 1 shaft, 400 ft. apart. No fresh air was going into the workings, as all brattices were knocked out. However, at 3.40 a.m., 6½ hours after the explosion, the superintendent, without a helmet, accompanied by a man with a helmet, was able to go 1000 ft. from the shaft, encountered no gas and would have been able to proceed further had it not been for the inexperience of the man with the

helmet. It must be remembered that the seam at Mulga is flat and the dangers encountered from large volumes of gas in a pitching seam, as in the Cahaba field, are never experienced. In Alabama, last year, 21 men were injured from gas, six fatally and 15 nonfatally. None of the accidents occurred at Mulga.

2. A safety lamp in the hands of inexperienced men or the general run of negroes is not a safety lamp. With a safety this type of man is generally careless, with an open light he is naturally cautious.

3. In a mine using open lights and generating a comparatively small amount of marsh gas, the ventilation is naturally made efficient; with safety lamps it is not as good.

4. In my opinion it is absolutely incongruous to work safety lamps in a mine and permit the use of electricity in any form whatsoever. Electric haulage is exclusively used at Mulga, and after open lights were introduced, electric machines in most instances replaced punchers. By this means the quality of the coal was improved and the amount of dust in the gob reduced.

5. Men working with safety lamps are seriously handicapped. When two hands were required to do a piece of manual labor, a second man was always needed. When trackmen moved rail, requiring both hands of each man, a third man was necessary to carry lamps. Miners could not easily distinguish coal from bone, and hence the quality of the coal was impaired. The distance between track and rib was hard to gage and the danger from passing trips was increased.

6. That one-fifth of the time of men was spent in going to the shaft bottom is a conservative estimate and I have known many triflers to purposely injure their lamps or the lighting device, so as to have an excuse to go to the shaft bottom, where they would slip out.

Precautions after the Explosion

That the mine was not sufficiently wet, the explosion is, in the opinion of many, an evidence. Regardless of how the explosion originated or where the point of inception was, dust (much of which was very damp) propagated it. That this is not impossible was recently demonstrated at the Pittsburg testing gallery, where fine dust containing 20 per cent. moisture was exploded. The proposition then before those interested in the safety of the mine was, naturally, to increase its humidity.

The water lines were extended to every face and the number of sprays increased to 35, some of which are located in the air course. Four men are employed, whose sole duty is to "wash down" the "gob" and sprinkle at the "faces."

In addition to the above method of humidifying, calcium chloride or chloride of lime is sprinkled in the gob in a 40 per cent. solution, or 4 to 1 with water. The characteristic of this chemical is that it will hold moisture regardless of whether the air is saturated or not. We hope by this means to keep the gob wet.

It has been my observation that if a seam of coal possesses a parting that the possibilities of the mine being dusty are more likely than in a clean seam, and more particularly is this true in a mine using punchers with a parting within 16 in. from the bottom. The reason for this is that when the miner or scraper separates the coal from the slate, much fine dust adheres to the slate and is mixed with it as it is thrown into the gob. While the use of calcium chloride is, more or less, in an experimental stage, I have been reliably informed that beneficial results have been obtained in West Virginia. It is our plan to establish humidity stations in the mine and require the fire boss to make each morning humidity reports. Hygrometric readings will be taken at each station, and this, together with the condition in regard to dryness of the floor, ribs, gob, etc, will be noted. Each week the engineer makes out the same report and in addition a general humidity report.

Electrical Shooting from the Outside

It has been our experience that if a man touched off a small quantity of gas, it was usually directly after going into his place after shooting. Besides electrical shooting from the outside being the safest, it also, in a great measure, eliminates any possibility of a man lighting gas immediately after the shots are fired, as in most instances 14 hours elapse before he returns to his place, and two fire bosses will have examined his place between 4:30 p.m., when he leaves, and 7 a.m., when he returns.

The ventilation has been changed to five splits. It was interesting to note that where the fan had been intaking 51,000 cu.ft. of air per minute at 108 revolutions on two splits, on five splits this was increased to 80,000 cu.ft. per minute and the speed of the fan was not increased. In addition to the man in charge of the power-house who looks after the fan, we have attached to the fan shaft a Gardner governor. If, for any reason, the fan stops, a bell rings in the engine room, power house and at the boilers. The bell is tried twice daily.

Four hundred feet of fire hose has been purchased for the shaft, 200 ft. for the top and 200 ft. for the bottom. Fire plugs will be stationed at each point. In addition to work in "first aid," the corps will be drilled for fire fighting.

Mine Sprays at the Banner Mine

Another interesting address was delivered by Erskine Ramsay in regard to "Mine Sprays at the Banner Mine." An abstract of the address follows:

The Banner shaft mine began operations Oct. 14, 1904, mining what is known as the big seam, which averages at this point a total thickness of about 9 ft., having a top coal, including some slate of 54 in., a bottom coal of 36 in. with a "middle man" of about 15 in. The coal is dry and friable, and when machine mined and shot with bituminite, only 25 per cent. of it passes over an automatically fed shaking screen having perforations of 2½ in. in diameter. The daily output runs from 1000 to 1200 tons. An analysis of the coal shows about 29 per cent. volatile matter.

The shaft is located near the western outcrop where the seam has a dip to the southeast, or, in other words, into the field of about 3 per cent. With this dip and with the working places extending into the fields the mine water drains toward the face of the slope and away from the older workings, thus causing them to become dry and dusty in many places. Mine cars without end gates have been installed, resulting in a minimum of coal being spilled on the roadways, and, as electric locomotives are used on the main haulages, there is not as much dust produced from this source as where the mule haulage is in vogue.

Until 1906 the coal was mainly shot on the solid with 3F black powder. From then until Sept., 1908, varying proportions were machine mined. Since 1908 practically all coal in headings, air courses and rooms has been machine mined. All of the undercutting is done with Sullivan longwall machines, making a cut of 5½ ft. in depth by about 5 in. In making such a cut in rooms 42 ft. wide, about 8000 lb. of slack coal is produced, part of which is very fine and calculated to go a long ways toward supplying the mine and ventilation with the troublesome and dangerous mine dust. The fine coal is loaded out along with the other coal.

As the mine grew in extent and under the conditions stated it was found that some of the workings contained dust in such an amount as to demand that it be handled in some way that would remove as far as possible the danger from explosions. The mine itself gives off some gas, but not in sufficient quantities to make it dangerous, from this source alone, with proper ventilation. No safety lamps are used except by the fire boss. It is well established that a small amount of gas in the air of a mine becomes dangerous when considerable mine dust is present. With these conditions it was necessary to do away with the danger, and, at first, pipe lines were laid to such portions of the mine as were dry and contained dust. Tees were provided at frequent intervals in these pipe lines, so that hose pipes could be connected, and such dangerous places, including rooms,

were watered sufficiently to dampen and lay the dust. At least this was attempted.

Moistening Sprays Installed

While this plan did much good, it was not found to be sufficiently effective, and especially as the watering process with the hose pipes was not attended to with sufficient regularity. The watering with the hose was supposed to be done at least once a week, but in many cases it was found not done thoroughly. The pipe lines supplying water for the hose pipes were connected with the mine pump, used in unwatering the mine, and which discharged against a head of about 150 feet. After finding by experience that this plan of taking care of the dust was not effective and that the hose proposition by itself was not what the conditions demanded, a few sprays made by the American Moistening Company, of Boston, Mass., were brought into service and the number increased from time to time until there are at present 31 installed.

For some time the water supplying the sprays was furnished by the mine pump, previously mentioned, but trouble developed in the fact that the fine sediment taken up by the pump from the dump and forced through pipes to the sprays lodged in the small spray outlets and clogged them up. To get around this trouble the connection to the mine pump was abandoned and instead one was made to the reservoir located on the outside and near the shaft. At the present all of the water used in the sprays comes from the reservoir, which is supplied from the Warrior river, and no trouble has been experienced since with the sprays clogging up. While it adds somewhat to the expense as more pumping must be done from the river to the reservoir and from the mine to daylight, there is some recompense for this in the fact that the pipe lines and nozzles should last longer, as the same corrosive action will not exist. Sprays connected with the reservoir also have the additional advantage of receiving a much more uniform and constant supply than is the case where connection is made to the mine pump.

At the time we experienced the trouble with the sprays clogging up when supplied with water from the mine pump the question was gone into somewhat of installing a filter in the mine, drawing its supply from the mine pump and designed to take out the troublesome sediment. It is believed that an arrangement which would do this effectively would be installed without great expense and would result in some saving in the cost of pumping.

Location of the Sprays

The sprays are located in the airways at various points leading from the main air inlet to the working places. Usually no sprays are located in the air current after it leaves the working places. The split system of ventilation is in operation, and each room heading is given as a rule its own separate current of air. Each heading is supplied with a water line of 1¼ in. in diameter with connections at intervals as seem necessary for the sprays, and at points between the sprays hose connections are provided so that a hose may be used in sprinkling or for fighting a fire. These room headings will have an ultimate length of approximately 3500 ft., and it is thought the 1¼-in. pipe lines with the pressure derived from the reservoir, of about 135 lb., will be sufficient to supply as many sprays and hose connections as will be required.

Fewer Sprays Needed in Warm Weather

The pipe lines are located in the room headings and not in the air courses, for the reason that the air is taken into the headings and out the air courses. With the sprays located in the headings the tracks and walls are kept moist, and there is no danger of passing trips stirring up dust. As a general proposition, it is found that the cross-entries do not get dusty until they have been driven in quite a distance and the coal has had time to drain or dry out. As soon as necessary the sprays are installed in the various headings. The sprays are kept in operation in cold weather continuously day and night, and do not require much attention. At the preset time, however, it should be stated that with our July weather the same necessity for spraying does not exist, and, as a conseqence, only 10 sprays out of a total of 31 are operating. When the cold weather comes and the air is drinking up all the moisture in sight, the other idle sprays will be turned on and even more will probably be installed.

It is due to the well known fact of air in cold weather containing less moisture than in summer that we find more explosions occur in winter than in warmer weather. It should be the purpose of any moistening system to supply the air entering a mine after it conforms to the same temperature as the mine, with all the water it will take up. We have noticed how in the winter a mine dries up, beginning at the inlet and extending just as fast into the workings as the air is able to absorb the moisture. When the outside air is warmer than the air in the mine, there is no necessity for attempting to aid moisture to the air current. When cold air enters a mine it becomes warmer, thus increasing its capacity to contain moisture, and, following the laws of nature, it acts accordingly, and takes up moisture wherever it finds it.

It Is Thought Advisable to Dam Up the Airways

A thirsty mine atmosphere will take up moisture from pools of water as well as from any dampness which may be on the walls or in gob of places traversed by the air, and with this fact in view it has been thought at Banner that it would be well to dam up the airways, where they are not traveled, with frequent, small and temporary dams, the water from one dam overflowing into the next one below. With this arrangement it would be possible in many places to convert the floor of the airway into a more or less continuous sheet of water. It might also be arranged, as the rooms drive up from one heading into the air course of the heading above, to let these rooms tap some of the air-course water and allow it to flow through the rooms and dampen any dust lying on the floors. Of course, this would not be as good as keeping the floor dampened while the rooms are driving up, but, no doubt, there would be some advantage in keeping any part of the mine floor moist rather than otherwise.

Miners Are Not Seriously Affected by the Dampness

In some mines in foreign countries the moistening of the air has caused serious sickness with the miners, but in such mines the temperature is much higher than in Alabama, and for this reason trouble of this kind is certain to be much less here, if not absent entirely. The doctor at Banner mines states he has found no trouble from this cause, although at first some little complaint was made on account of the dampness.

The amount of water an air current will take out of a mine in cold weather is surprising and startling. At Banner the ventilating current amounts to 200,000 cu.ft. per minute, and for the purpose of calculation the inlet and outlet will be considered of equal volume. From the tables it is found that this volume of air when thoroughly saturated and at a temperature of 40 deg. F. will carry into the mine in 24 hours about 14,000 gal. of water in the shape of moisture. The same current, heated to the temperature of the mine, say 65 deg. F., will carry out of the mine about 34,000 gal., thus robbing the mine of 20,000 gal. each 24 hours. Unless the mine is to be dried out and become dusty, this moisture must be supplied to the air current from steam jets, pools of water, hose, sprays or other means.

At Banner it is sought to supply by sprays at least a part of this loss. The 31 sprays now installed will deliver about 30 gal. per hour and with all of them working, a total of over 22,000 gal. would be delivered during each 24 hours or a little more than is taken out by the current.

Electrification of Mines

Another valuable paper was contributed by Morris Bush, of the Woodward Iron Company. Mr. Bush discussed the "Electrification of Mines." An abstract of his paper follows:

The No. 1 Dolomite mine was opened in 1882 by the Woodward Iron Company, the No. 2 mine about two years later. Both of these mines have been operated continuously since then, except for slight interruptions caused by strikes. The output has been steadily increased until now for several years an output of 1000 tons per day for each mine has been maintained. The face of the coal was necessarily rapidly driven away from the mouth of the slopes until now the bottoms of the slopes are about three miles from the tipples. As the developments in electricity had been so rapid and electric machinery had been so much simplified it was decided to introduce electric haulage and, at the same time, to avoid a double power system to also ventilate and pump the mines by electricity.

For economy's sake the central power station was located at the furnaces and the steam is furnished from the furnace boilers generated by waste of gases from the furnaces. Alternating current of 3300 volts, 3 phase, 0.125 cycle is generated and transmitted nearly three miles to Dolomite. For supplying the direct current to the electric locomotives, rather an innovation was introduced in the location of the substations. It was not feasible to locate the station outside, owing to the distance necessary to transmit the current, the loss and high copper cost. It was not considered desirable to locate the station above the workings and drop the line through a bored hole, because the station would have been located about 2½ miles from the railroad and in some of the roughest country in Jefferson county. It would have been very difficult to reach to make necessary repairs. It was therefore determined to shoot out a chamber in each mine and place the rotary converters underground. The 3000-volt current is taken down the slopes in a three-conductor cable, thoroughly insulated and steel armored. It is suspended from the roof out of reach of cars and men. In addition to these cable feeds, there is an overground line running to the fan shaft and then down to the converters. Thus there is a loop supply which will run the mines in case a fall of rock should disable the cable, or a storm put out of business the outside line.

Haulage Equipment

In the No. 1 mine are four six-ton locomotives and one eight-ton slope motor; in No. 2, four sixes and a 10-ton. Any four of these will keep up the output. Taking it as a fact, though, it is seldom recognized, I am sorry to say, by most mine superintendents that a track underground should be as good as a track outside. All of the mine tracks were rebuilt for the electric haulage. Sixty-pound rails were put on the slopes and 30-pound on the headings. It is possible for the slope motors to pull their full tonnage and maintain when necessary a speed of 25 to 30 miles per hour. Thus it is now possible to handle 60 per cent. more coal with 10 locomotives, 10 motormen and 10 switchmen, than was possible with 70 mules and a host of drivers.

Of course the haulage was the most vital point in our conditions, but scarcely less important was the matter of drainage. We have to drain more than 2500 acres of worked-out territory. The system used is a number of small geared pumps, throwing the local drainage to a central pumping station consisting of two triplex geared pumps of a capacity of 750 gal. each per minute, discharging through 4000 ft. of 14-in. main against a vertical head of 635 feet.

Our ventilating problem has been wonderfully simplified by the introduction of electricity. Instead of the old paddle-wheel fan of slow speed, which took occasion periodically to shed some of its arms, it was possible to use the compact high-speed fan, mounted directly on the motor shaft. The Dolomite mines are ventilated by a large fan located at the top of air shaft in No. 2 mine, assisted by a small booster fan in No. 1.

Preliminary Trials with Hydraulic Cartridge Satisfactory

Another great convenience in having electricity is the possibility of introducing the electric coal cutters. The art of pick mining is rapidly being lost and the miner with dynamite, shooting on the solid, is abroad in the land, menacing the mines and miners. We find the coal cutters of immense advantage, particularly where the coal has any partings that would be shot up and mixed with the coal. If our further experiments are as satisfactory as the preliminary trials we hope behind the machines to use a small electric drill and hydraulic cartridges, thus doing away with explosives in a large part of the mines.

Now, as to some of the small conveniences of having electricity readily available at all parts of the mine: It is the work of only a few minutes with a portable pump to unwater any local sag that may give trouble. It is of immense advantage in preventing accidents and delays to have all concentrating yards thoroughly lighted and all main turnout switches to show automatically whether the switch is open or closed. There is also the convenience of doing away with the expensive and troublesome storage batteries for signaling and instead tap the main transmission line with a low-voltage bell-ringing transformer. Frequently it is of considerable advantage to use in a long, tight heading a small, self-contained portable fan. These can be carried around on a truck and set off at any desired point.

Advantages of Electricity

To sum up briefly the advantages of electricity in our Dolomite operations: In the No. 1 mine the locomotives deliver to an endless rope, driven by a variable-speed alternating-current motor, 3300 volts. This was considered at the time more or less of an experiment in variable speeds, as the motor was so large and the voltage high. The operation, however, has been absolutely satisfactory, and we now have at the ore mines a hoist six times larger, same voltage and variable speed, working splendidly. In No. 2 mine the coal is delivered to an endless rope 9000 ft. long and 1½ in. in diameter and taken out to the top house. This system results in (1) making available at economical cost distant coal; (2) better air and sanitation by taking out mules; (3) economical distribution of a very flexible and efficient power at small cost, available at all parts of the mine for all kinds of work.

The Coal Deposits in Texas

Special Correspondence

It is estimated that the known deposits of coal in the State of Texas aggregate approximately 8,000,000,000 tons, and of lignite 23,000,000,000 tons. This is sufficient fuel to keep Texas supplied for 3000 years at a rate of 10,000,000 tons production per annum. During the year 1909 the coal production in Texas was 1,144,108 tons, valued at $2,714,630. The production of lignite in the same year was 715,151 tons, valued at $592,421. It will be years before the production of coal and lignite in the State will aggregate 10,000,000 tons per annum. In addition to the domestic fuel that is used, large importations of coal are made from Oklahoma and Alabama. The lack of railroad facilities is the greatest factor preventing a more rapid development of the Texas coalfields. There are two coal-producing districts in the State, one in the northern counties of Palo Pinto, Parker, Wise and Young, and the other in the southwestern counties of Maverick and Webb. The lignite production area includes the counties of Bastrop, Fayette, Hopkins, Houston, Leon, Medina, Milan, Robertson and Wood. It is the belief of geologists that the coal belt in the southwestern part of the State extends for a great distance along the Rio Grande. There is an enormous territory in which no exploration has been made.

A phosphate-rock region has recently been recognized in northern Mexico and will be the subject of further investigation.

Rescue Station in Alabama

After spending several days in Birmingham and the immediate district, looking over the situation and viewing the sites suitable for a mine rescue station, H. M. Wilson, technologist, from the United States Geological Survey, Bureau of Mines, at Washington, has returned to his headquarters and will in the next few days make a recommendation. The construction of the rescue station in the Alabama district is just a short while removed now.

Mr. Wilson was shown every attention during his stay in the Birmingham district by the Alabama coal operators, and the chief State mine inspector, James Hillhouse, gave him much assistance in looking over the various sites suitable for the station. As has been stated before, the Government is putting up three rescue stations immediately in mining sections, putting in men and apparatus to be available in time of accident.

COLLIERY NOTES

A conveyer system is to be built by the Plymouth Coal Company, Wilkes-Barre, Penn., from the culm pile at the river, near the Dodson colliery to the opening in the Dodson mines for the purpose of flushing the abandoned portions of the mine with culm, thus affording protection to the mine property and the surface.

There were 2412 coal mine fatalities in the United States in 1909, which compare with 2450 fatalities in 1908. This decrease in coal-mine fatalities occurred notwithstanding an increase of 10 per cent. in the quantity of coal mined. The blackest of recent years was 1907, when 3125 men were killed.

A good working knowledge of geology is quite necessary in the development of a coal seam where faults occur. When a fault occurs in a seam and lies at right angles to the bedding plane, it is often difficult upon encountering such a dislocation to determine whether the coal lies above or below. If the seam lies level, about the only thing to do is to go through the fault and then attempt to recognize the strata as being above or below the coal. If this method fails, the only alternative is to bore both ways. This occurrence, however, is rare, as faults do not often occur in horizontal seams. The greatest problem arises when the coal is pitching and an entry encounters a fault. In this case if the coal is dipping to the fault, it is customary to treat the fault as an upthrow. If the coal rises to the fault, we should treat it as a downthrow. In this connection, it should be remembered that it is the inclination of the fault from the vertical and not its inclination as regards the seam itself, that determines whether it is an upthrow or downthrow.

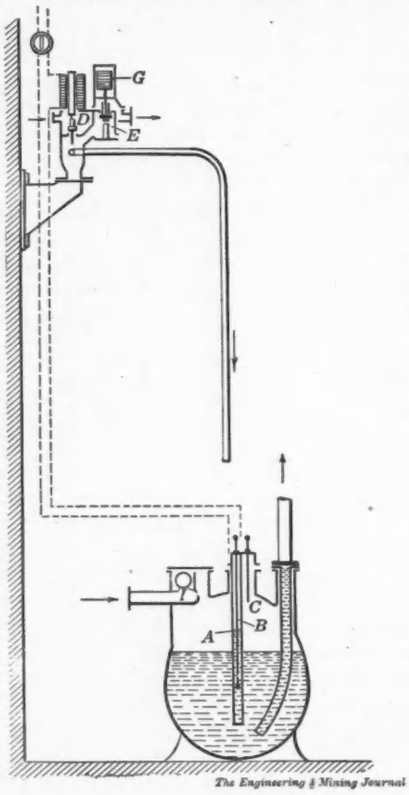
Schuetze's Automatic Acid Elevator

By A. Innerhofer*

The accompanying figure illustrates a new patented automatic acid elevator in which the valve gear is actuated by an electromagnet. By this arrangement all floats and bells in the interior of the acid egg are dispensed with. The egg contains no movable parts, but only a set of contacts, which pass through a stuffing box and are insulated from the metallic egg.

Method of Operation

The working of the apparatus is as follows: The liquid is admitted by the



Schuetze's Automatic Acid Elevator

valve *I* and first reaches the outer contact tube *A*. When the egg is completely filled the liquid reaches the external contact *C* and completes an electric circuit. The electromagnet now becomes active and lifts the air inlet valve *D*. Compressed air is admitted, which closes the exhaust valve *E* and forces the liquid out of the egg into the rising main. As soon as the level of the liquid sinks below the edge of the contact tube *A* the circuit is opened and the electromagnet releases the inlet valve, which closes and cuts off the supply of compressed air. The rest of the liquid and the air contained in the egg escape through the rising main. The exhaust valve *E*, which is slightly loaded by a weight *G*, opens and the egg again begins to fill.

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Arrangement of Contacts

The simplicity of the apparatus and its absolute reliability in action are obvious. There are no floats, which must always be adapted to a certain specific gravity and cause occasional trouble by sticking in even the best designed apparatus. The valve gear is connected to the egg only by two wires and may, therefore, be placed in any convenient position. Existing acid eggs may be transformed into automatic ones simply by the addition of the valve gear and the insertion of the contacts. The latter, as well as the egg itself, can easily be made of material suitable for any liquid.

Iron Industry in Brazil

United States Consul-General G. E. Anderson, at Rio de Janeiro, reports that the Brazilian government has formulated the following general rules for concessions for operating iron mines and establishing iron works:

Consideration has been given to several proposals which have been made to the government for the establishment of the iron industry, and it has been decided to make general provisions relative thereto. To establishments which shall undertake to operate furnaces for the smelting of iron ore, with facilities for the reduction and refining of the same and machinery adapted to production of plates, rods and various iron and steel products, the following concessions will be granted, with special privilege to none: Reduction of freight rates on Federal railroads for raw and manufactured products on the following bases: Coal, coke and other materials destined for use in ore reduction and iron working shall pay 8 reis per ton-kilometer, or about 0.4c. per ton-mile; pig iron in bars and ingots shall pay 12 reis per ton-kilometer, or about 0.6c. per ton-mile; iron or steel in a manufactured or partially manufactured state shall be given a rate of 14 reis per ton-kilometer, or about 0.7c. per ton-mile; exemption from consumption taxes and charges for despatching through customs for all machinery and apparatus and for necessary materials for use in such establishments; privilege of constructing quays, bridges, docks, and other apparatus necessary for the handling of ore and other material going to or from the establishments; reduction of dock charges for ore and coal; privileges for building connecting spurs or switches from the mines or furnaces to any Federal railroad; and special facilities for the transfer of materials in transit from a railroad of one gage to one of another.

The government claims the right to insist upon the installation of special equipment for supplying armament and naval equipment and to fiscalize the establishments temporarily. Time limits for the installation and equipment of these establishments will be set.

PERSONAL

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

Prof. H. E. T. Haultain has opened an office in Toronto.

Fred T. Williams, of Park City, Utah, is in Idaho on professional business.

S. R. Heakes, manager of the Kerr Lake and Wetlauffer mines at Cobalt, Ont., is in New York.

Prof. J. J. Brown, Jr., of the Oklahoma School of Mines and Metallurgy, is in Sonora, Mexico, making an examination of mines.

Stanly A. Easton, of the Bunker Hill & Sullivan Company, Kellogg, Idaho, has returned from a trip to Douglas Island, Alaska.

O. Gmehling retired in May from his position at Guayacan, Chile, and has gone to Germany, where he will reside at Pegnitz, Bavaria.

S. N. Graham, formerly manager of El Favor mines, Jalisco, Mexico, has been appointed superintendent of the Provincial mine, Cobalt, Ontario.

Edwin Higgins has returned to Los Angeles, Cal., after an extended professional trip, during which he made a number of examinations in the Butte district.

C. A. Durkee and C. M. Clarke, of Clifton Springs, N. Y., have returned from an investigation of the Minnehaha gold mine, Manitou Lake district, Ontario.

William Wilkins, heretofore manager at Ashland, Wis., for the Lake Superior Iron and Chemical Company, has been transferred to the main offices of the company at Detroit.

W. Spencer Hutchinson has just returned from a tour of inspection to Vulture Mines in Arizona and other properties operating under his direction in Mexico.

T. Evans, formerly purchasing agent for the Cananea Copper Company, has been appointed manager of the Mine and Smelter Supply Company's branch office at Denver.

Rowland Lea, manager of the Nevada Copper Hills Mining Company, Luning, Nev., who has been in New York for some time, will return to Nevada early in September.

Harry Sanderson Mulliken, for the past five years in charge of the smelting operations of the Peñoles Company at Mapimi, Mexico, is in New York on a combined business and pleasure trip.

Frank W. Hopkins, of the Mill and Smelter Engineering Company, New York, left this week for an extensive trip, and will superintend the installation of several plants of machinery.

A. C. Dart has resigned his position as head of the Department of Mining in the University of Wyoming, at Laramie, to take the general management of the Rambler Copper and Platinum Company.

W. R. Wardner has resigned his position as general manager of the Golden Star Mines Company, Polaris, Arizona, to engage in practise as a mining engineer, with office in the Bradbury building, Los Angeles, California.

Andrew Bryden, for years superintendent of the Dunsmuirs' Extension colliery, on Vancouver island, B. C., has been appointed superintendent for the Coal Hill syndicate, to open new coal mines in Nicola Valley, British Columbia.

Thomas L. Livermore retires from his position as vice-president of the Calumet & Hecla Company at the annual meeting this week. He has been with the company 21 years. Col. Livermore also retires as chairman of the Copper Producers' Association.

S. J. Lewis, who has been making geologic studies and directing development work for the Cinco Minas, in the Hostotipaquillo district, Jalisco, Mexico, has finished his work at that property, and undertaken similar studies for other companies in the same district.

John A. Hunter has bought the assay office and laboratory of Kadish & Bosch at 217 West Ninth street, Los Angeles, Cal., and will take charge Sept. 1. Mr. Hunter is a graduate of the New Mexico School of Mines, and has held responsible positions in Arizona and Mexico.

William G. Mathias, superintendent of the structural and blooming mills of the South Works of the Illinois Steel Company, has been appointed assistant general superintendent of the Tennessee Coal, Iron and Railroad Company, Birmingham, Ala. James Walsh succeeds Mr. Mathias at South Chicago.

Dr. George Otis Smith left Washington Aug. 2 for New York, whence he sailed Aug. 6 on his way to attend the International Geologic Congress at Stockholm, Sweden. Dr. Smith, with Waldemar Lindgren, George F. Becker, S. F. Emmons and Whitman Cross, will attend the congress as representatives of the United States Geological Survey.

J. B. McIntosh, lately engineer-in-charge of the newly completed Tooele plant of the International Smelting and Refining Company, has resigned his position to accept that of superintendent of construction at the Garfield plant of the American Smelting and Refining Company. E. E. Thum, lately chief civil engineer for the Tooele plant, has been transferred to the position of engineer for the Boston & Montana Reduction works of the Anaconda Copper Mining Company.

OBITUARY

Auguste V. Ewing died at Spring Park, Minn., July 20, aged 72 years. He was born in St. Louis, but removed to Montana many years ago. He was largely interested in mining and had been president of the Granite Bi-Metallic Mining Company for a number of years.

James McNulty, president of the Mill and Smeltermen's Union of Anaconda, Mont., died suddenly in that city, Aug. 5, aged 44 years. He was born in Ireland. After working in Colorado several years he went to Anaconda 16 years ago. For a number of years he had been prominent in the labor unions of Montana.

Boudinot Seeley, a pioneer in the development of the charcoal-iron industry of southern Ohio, died, July 23 at Portland, Ore., aged 88. Born on an Chio farm in 1822, he located at Buckhorn furnace in 1843 and became one of the early pig-iron makers of the Ohio valley, retiring from active business in 1869, after having attained much success. He removed to Oregon in 1893, joining his son, L. B. Seeley, E. W. Crichton and Capt. W. B. Scott, all former Ohio iron men, who were associated in an iron plant at Portland.

SOCIETIES and TECHNICAL SCHOOLS

American Mining Congress—The official call has been issued for the thirteenth annual meeting, to be held at Los Angeles, Cal., Sept. 26-Oct. 1. Local arrangements are in charge of the Sierra Madre Club, of Los Angeles, and will be announced later.

At a recent meeting in Denver, the leading mining men of the State perfected the organization of a Colorado Chapter of the American Mining Congress, D. W. Brunton, president, and A. W. Warwick, secretary.

Lake Superior Mining Institute—The fifteenth annual meeting has been called to meet in the city of Ironwood, Mich., on Wednesday, Aug. 24. The day will be spent in visiting the various points of interest on the Gogebic iron range, and a business session will be held in the evening. From Ironwood the party will leave by special train at 11 p.m. On Thursday the party will arrive in Chicago by the Chicago & Northwestern. Stops will be made at the shops of this line, at the plant of the Sullivan Machinery Company, and the plant of Joseph T. Ryerson & Son. In the evening the party will go to Gary, Ind., by train. On Friday the members will visit the works of the Indiana Steel Company for an inspection of the plant, returning to Chicago in the evening. At 6:30 a banquet will be held at the Auditorium annex. Trains will leave for the return trip to Ironwood about midnight.

EDITORIAL CORRESPONDENCE

Reports From Our Own Representatives on Important Events From Many Important Mining Centers of the World

San Francisco

Aug. 6—The Stone Cañon Coal Company of Monterey county did not make a success of mining and selling its coal and had to quit work some time since. As a result the railroad built especially for hauling the coal from the mine to the main line, 22 miles, was no longer of any use. This road runs from Nelson creek to the Southern Pacific line at San Miguel. The commissioner appointed to sell the property in the suit in which the Guaranty Trust Company of New York is plaintiff, has reported that he has sold the road to James Sheldon Riley for $150,000. The whole investment in the coal mine and railroad seems to have been unfortunate. The production of such large quantities of cheap fuel oil in this State in late years had a disastrous effect on this coal mine as it could not find a market for the product at remunerative rates.

One of the curious effects of the absorption of numerous mining claims by individuals or corporations is shown in the changed destination of gold shipments from the Klondike and Alaska. Since the mines in those regions became productive, the gold has been shipped mainly to the United States assay office at Seattle, the Selby Smelting company at San Francisco, and the San Francisco mint. The latter institution has usually received only a small portion of the crude gold direct, although the fine bars from both the Selby smeltery and the Seattle assay office eventually come to the mint for coinage. The assay office for a time received much the larger proportion of the gold, though of late the smelting company has caught up with it in gold receipts from the sources named. Now, since the Guggenheims have bought and consolidated so many claims, all their gold is sent direct to the Selby smeltery. The July receipts of the Seattle assay office fell off $400,000 in gold as compared with the month of July last year. Much of this gold is shipped by registered mail.

Denver

Aug. 6—Referring to the new Portland mill at Victor, mentioned in the JOURNAL of July 30, it is now freely stated that by eliminating the preliminary roast of the sulpho-telluride ores, and substituting the addition of a special solution in the agitators, the saving on the low-grade ore (which averages $4 per ton) is brought up to 90 per cent., and at a reduced cost of 40c. over the roasting method. The total cost of treatment is said to be $1 per ton. These statements, however, are not officially made by the Portland company. No information has been given out as to the exact nature of the special solution, though cyanogen iodide has been indicated. The reason for keeping it secret at present is said to be some threatened trouble as to patents. However, this new metallurgical departure has created much interest in the West. In the Cripple Creek district, the ores are largely in high-grade streaks of a few inches, to extract which 5 or 6 ft. of low-grade rock has to be mined. Now, if this material, averaging say $4 per ton, can be produced at say $1 per ton profit, the cost of production of the higher grade will be lowered; and with the now near completion of the deep drainage tunnel, which is expected to render over 700 ft. of ore-bearing ground all over the camp available for mining without pumping, Cripple Creek may be said to be on the eve of a great revival.

The Georgetown district is joining in the general mining revival in the most strenuous manner. The new camp of Beshear is attracting large numbers of prospectors, and it is estimated that there are 200 men at work there. Strikes of daily occurrence are reported, and we may soon expect something tangible in the way of ore shipments. The Pelican is being operated by the Burleigh Leasing Company, W. A. Hood, manager, and is now to the fore with a strike of 6 ft. of rich silver-lead ore. From the district, it is also reported that a Mr. Milliken, of New York, has purchased for his clients, the Kelly tunnel, now 2800 ft. in Democrat mountain. This tunnel would drain a large number of old producers, besides intersecting at great depth, if continued, a large number of rich veins, which, owing to the elevation of their outcrops, cannot be worked to advantage from the surface.

Salt Lake City

Aug. 6—An effort is being made to consolidate the Daly-West, Ontario, and Daly mines at Park City. The stockholders of the Ontario and Daly are practically the same, and they control the tunnel, water rights, power plant and coal mine. The rights are held by subsidiary companies which could come in on a merger. The combination, if effected, would make one of the largest properties in the district. At present the Daly-West is the only one of the three which is actively producing.

The Copperton plant of the Utah Copper was closed down Aug. 1. The mill had a capacity of 1000 tons per day, and employed about 150 men. The direct cause of the shutdown has not been given out, but may be in line with the proposed decreased production on the part of the Utah Copper. There is no doubt, however, that the tonnage can be more economically treated at one of the company's larger mills, which will also obviate the maintenance of an extra plant. It is generally understood that the millsite, machinery, etc., are for sale. The Copperton mill was originally built as an experimental plant, and has been in operation several years. It was designed to treat 750 tons, and afterward enlarged to 1000 tons capacity.

The capacity of the Magna and Arthur mills is being increased, and the tonnage treated by the Copperton mill will be sent to these plants. Eight sections of the Magna mill have been altered and equipped with Garfield or roughing tables, and when the changes are completed, the mill will be able to treat 12,000 or 13,000 tons of ore as against 8000 tons, its present daily capacity. It was originally designed for 6000 tons. The Boston Consolidated mill, now called the Arthur, is also being remodeled along the same lines, with substitution of chilean mills and rolls instead of Nissen stamps. This mill was designed for 3000 tons, but has been treating 5000 tons.

The Yampa smeltery at Bingham was closed down Aug. 1. The company will continue to operate its mine, and ship to the Garfield smeltery.

Butte

Aug. 6—There has recently been considerable agitation in Butte against the increase in the number of Austrians and Slavonians employed in the mines. An enterprising local newspaper has published a series of articles disclosing the alleged characteristics and methods of business of the "Bohuns," as they are called. It is charged that these men pay the different foremen in order to hold their jobs and that, owing to their extremely economical habits, they take a vast amount of money out of circulation. While it is extremely difficult to get actual proof of instances where these foreigners pay for their jobs, yet it is quite generally accepted as a fact that considerable dealings of that nature are had. As to the charge that much money is taken out of circulation, there is no question of such being the case. The men

receive the same wages as all others, but it is a conservative estimate that they send 60 per cent. of their earnings back to their native lands. It is common for six of them to live together in a room which one white man would consider small, and they purchase the smallest possible food supply and cook it themselves. The Butte Post Office records show that an astonishing sum of money is transmitted every month to Europe. With the gradual increase in the number of these men in the camp the monthly exodus of money increases and the volume of money in circulation decreases accordingly. Those in charge of the mines take the position that with increasing deptn in the mines comes increasing heat and that white men will not work in many of the places, whereas, the Slavs are always ready and willing. This is, in a measure, undoubtedly true, and experience in the older mining camps of the country has shown that the natural tendency is for the foreigner eventually to replace the native born.

Total receipts for July at the United States Assay Office at Helena were $135,738. Fergus county was first, with $61,396, and Madison county second with $47,926.

Goldfield

Aug. 6—After some months of controversy and litigation over various leasing interests on the Manhattan-Dexter property, an agreement has been reached whereby a new company is to absorb all the leases, prosecute active mining operations and mill the ore in the War Eagle mill at a fixed charge, the latter company having been involved in the dispute. Directors of the new company were elected as follows: President, R. T. Harris; George S. Green, C. E. Mack, E. S. Van Dyke and Arthur Raycroft.

D. R. C. Brown, president of the Pioneer Consolidated Mines Company, has just issued a report to the stockholders in which he gives the following information concerning the merger: The Gold Hills Mining and Milling Company stock has all been exchanged for Consolidated on a basis of 10 shares for nine. Of the Bullfrog-Pioneer stock 85 per cent. has been exchanged share for share, and 90 per cent. of the Bullfrog-Valley View certificates have been turned in on a 5: 1 basis. The property is being developed by leasers.

L. L. Patrick has brought suit in the district court to have the election of directors of the Diamondfield-Black Butte reorganized company, held July 20, declared illegal. The contention is that at this election, Thomas Manning, of the Registration Trust Company, under whose direction the reorganization was effected, wrongfully voted 645,587 shares of stock which had not been taken up, but were to be placed in the treasury. This action was taken under the protest of the Patrick interests and the latter now seek to have the election declared illegal.

Birmingham

Aug. 6—Changes in the officials of the Southern Iron and Steel Company are announced. W. H. Hassinger, president, is to retire later on. James Bowron, at one time treasurer of the Tennessee Coal, Iron and Railroad Company will be vice-president and treasurer of the company, while A. R. Forsythe, now treasurer, will be secretary. The new president is to be announced later. C. A. Grenfels, of London, and W. W. Miller, of New York, members of the board of directors, have been in the Birmingham district for the past week looking over the affairs of the company. They are quoted as saying the prospects in the district are bright and a favorable report will be made to the directors.

The Union Trust Company, of St. Louis, as trustee, has filed a bill in equity in the Federal courts in Birmingham to declare a lease made a number of years ago on some coal lands in Bibb and Shelby counties, Ala., now being worked by the Galloway Coal Company and the Choctaw Coal and Mining Company, terminated, and to collect alleged unpaid royalties on coal taken out. The property in question is of some importance.

Lead, South Dakota

Aug. 8—Little change has taken place during the last month in the mining situation in the Black Hills. The larger mines continue to operate at full capacity, but the smaller concerns are slow in resuming work although there is no difficulty in securing labor at present.

The report that the Golden Reward Mining Company was going into the hands of a receiver was originated by a representative of the Western Federation of Miners at its Denver convention.

The Homestake Mining Company has dispensed with a large number of the detectives who have been employed since last November. A sufficient number has been retained to guard its property. The most important movement has been the inauguration of the Homestake Aid Fund, an insurance system for the benefit of its employees, which went into effect Aug. 1.

Cobalt

Aug. 8—On account of the intervention of the Dominion government, the work of building the dam at the mouth of the Frederickhouse river in Porcupine, has been abandoned. This work was undertaken with the object of raising the water sufficiently to allow the running of gasolene launches on the river. After it was started, notice was received from the government to cease operations, and an engineer was sent up to examine into the conditions. Although permission was subsequently given to proceed, the restrictions were such that those who started the work decided to abandon it. It is believed by many familiar with the country that this dam is the only means by which the river can be rendered navigable.

Toronto

Aug. 6—The question of securing cheap power for the development of the Porcupine gold mines is likely to be solved by the installation of hydroelectric plants in the neighborhood. A. M. Bilsky, of Cobalt, and H. D. Symmes, of Niagara Falls, Ont., have leased the water power at Sandy falls, a few miles west of the Tisdale mines, and have engineers engaged on the preliminary survey which is nearly completed. It is proposed to develop between 4000 and 5000 h.p. by June 1911. A. E. Wallberg, of the Mines Power Company, of Cobalt, has acquired a large water power on the Metagami river, approximately nine miles from Porcupine. It is estimated that between 6000 and 7000 h.p. of electric energy can be developed at this point. Preliminary surveys are completed, and parties will be put in the field at once to make the final survey for transmission lines. It is expected to have power from this source early next summer.

At Cobalt, on Aug. 3, George Scabbo was sentenced to nine months' and Bill Romonhoka to six months' imprisonment for having ore illegally in their possession. Two other Poles charged with the same offense were acquitted. Highgrading has been greatly checked since the new law went into operation and is now only practised on a small scale.

The iron-ore deposits on the Metagami river are receiving much attention from the large iron and steel interests. A number of men representing American steel concerns are examining locations or arranging for assessment work. The Mackenzie and Mann interests and the Nova Scotia Steel and Coal Company are both bidding for extensive locations on Grand Rapids, Metagami river, 75 miles from Moose Factory. Professor Baker has just left the region after several months spent in making investigations, and it is understood that his report will be of a favorable character.

London

Aug. 4—There is a decided tendency on the part of the mining investors in London to become more interested in Mexico, and it is quite safe to predict that unless there is some political disturbance in the interim the large South African interests will be well into Mexico within the next five years. This will be an important move for Mexico, as well as for London capital.

THE MINING NEWS

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

Alaska

According to the U. S. Assay Office at Seattle, the gold shipments from Alaska for the fiscal year ended June 30, 1910, are as follows: Nome district, $4,167,304; Fairbanks, $5,676,477; other districts combined, $948,744; total, $10,792,525. As some of the Alaska shipments go direct to San Francisco, the above figures do not represent the entire output.

Candle Creek—Gold shipments to Seattle for this season, including a portion of last year's work, amount to $200,000.

Treadwell—A new crusher plant and a large hoisting plant have been purchased for these mines. R. A. Kinzie, Treadwell City, is general superintendent.

Arizona

Cochise County

Denn-Arizona—The main shaft is down 1425 ft. Rich sulphide ore has been encountered in drift No. 25. The pumps are now installed on the 1350-ft. level, and handling 900 gal. per minute. Sixty-five men are employed.

Gila County

Cactus—A recent report of the directors of this company comprises a report by C. W. Pritchett, consulting engineer, under date of June 8. Mr. Pritchett made the following statement: "Our surface consists of an altered schist much brecciated and copper stained. At 250 ft. in the shaft we began to encounter sulphide ores and carbonates, and our development in 300- and 400-ft. levels has been mainly in sulphides (chalcocite) running from ½ to 4 per cent. We have developed so far approximately 2,500,000 tons of such material of which we estimate that about 500,000 tons is of commercial grade, that is, over 2 per cent., although no effort has been made to block out ore, but simply to explore the ground.

"Our work thus far having shown us, as we believe, that our body has been tremendously faulted and that we have been working on the upper faulted portion of this orebody, we have recently abandoned further development through the Hamilton shaft and are putting all our energies into drilling the ground north of the fault."

Live Oak—It is reported that 2¼ per cent. copper ore has been encountered in drill hole No. 10, at a depth of 290 ft. The second annual report states that since beginning operations Dec. 3, 1908, and up to July 1, 1910, the total development work amounts to 4039 ft. in drifts and raises, and over 3400 ft. of churn-drill holes. Disbursements to July were $227,439, leaving a cash balance of $45,080 in the treasury.

Inspiration—Advices received from Globe state that on July 30 drill hole No. 69 contained 155 ft. of ore averaging 2.75 per cent. copper and with high-grade ore in the bottom. This hole is 1200 ft. east of the Joe Bush shaft. Drill hole No. 705, which is 3000 ft. west of No. 69, is drilling in ore averaging 2½ per cent. The total eastward and westward extent of the ore as shown by drill holes to date amounts to 3800 feet.

Graham County

Cobre Group—A. F. S. Cooper, superintendent, has made the first payment of 10 per cent. on these claims, situated in the Aravaipa mining district, 23 miles west of Fort Thomas. At a depth of 128 ft., a body of chalcopyrite has been encountered, carrying about $1.50 in gold per ton. Twelve men are employed at the mine.

Mohave County

Golden Trail—William Ochs, Bingham, Utah, has secured a bond on this group of claims in the San Francisco district. The claims were located last January by L. McKesson. The ore carries free milling gold. Development work will begin at once.

Yavapai County

United Gold Mines—D. J. Sullivan, president, has finished a four-months' run at this mill, and has closed the plant pending the unwatering of the lower levels of the mine.

Congress Consolidated—The mill is treating its usual quota of ore. This mine is one of the oldest gold mines in the Southwest, having been worked nearly 30 years. O. Longacre, Jr., is general manager.

California

Eldorado County

Lady Edna—L. S. Woodberry, owner of this mine at Grizzly flat, has encountered rich gravel at the end of the 900-ft. tunnel.

Modoc County

Hess—At this mine, near Adin, a small mill is steadily at work and plans are being made for a larger one. It is reported that C. T. Hess has leased the ground to Los Angeles men. James Harvey, who recently bought a five-year lease on one of the group, has sold his interest at good profit.

Monterey County

Los Burros—At this mine, 18 men are now working. The vein is being crosscut at the 100-ft. level and is as satisfactory as at the surface.

Nevada County

The North Star Mines Company is said to be preparing to reopen the Massachusetts Hill mine at Grass Valley. This mine was at one time one of the great mines of the district, but was closed on account of litigation with adjoining property owners.

Plumas County

Quartz—A. H. Jones and J. McArthur are opening a new vein at Rocky Bar, below Nelson Point, on the Middle Fork of the Feather river.

Shasta County

Sybil—This French Gulch Company, has brought suit against G. A. Von Kruze et al to prevent the sale of certain shares of the capital stock of the Accident Gold Mining Company held by them. The complaint alleges that in March 1907 Von Kruze sold to the Sybil company the Sybil and other adjoining mines for 600,000 shares of Sybil stock. Von Kruze assumed general management and was in possession of the claims. The company in its complaint charges that Von Kruze neglected to do the required assessment work on the claims. It is charged in the complaint that he procured other persons to relocate each of the claims with the understanding that the Accident Gold Mining Company was to be organized to take the relocated properties. The company now asks the court to adjudge it the owner of the property and the shares of the Accident Gold Mining Company.

Siskiyou County

A plan is being formulated looking to the reorganization of the old company and the reopening of the Yellow Butte mine in Siskiyou county. The lowest adit on the property is in 1200 ft. and is over 600 ft. below the apex of the vein.

Tehama County

California & Massachusetts—The mines at Camp Wrigley on Tom Head mountain are yielding copper ore of quite a high grade. The ore also carries gold and silver.

Tuolumne County

Gold Ship—A raise is being made to the surface in this mine to obtain better

air in the tunnel where they are drifting in gravel. Electric power will soon be available and then a mill to crush the gravel is to be installed. W. J. Graham is manager.

YUBA COUNTY

In the Superior court of Yuba county, Judge Mahon has decided in favor of the defendants in the suit of the California Mother Lode Company against Edward Page, *et al.* The suit involved title to the rich Eagle claim, in the Indiana mining district near Marysville. The Eagle claim was recently the scene of a rich strike of ore and the trouble arose over an indefinite boundary.

Colorado

CLEAR CREEK COUNTY

Smuggler—The leasers on this Brown mountain mine have opened 9 in. of silver-lead ore, and a wagon load shipped to Georgetown this week returned 432 oz. silver per ton, and 47 per cent. lead. The streak has already been opened 90 ft. in length.

Ure Creek—This mine, operated by Charles Taylor, is paying for its development, it is said, and a steam plant is now being installed.

LEADVILLE—LAKE COUNTY

Yak Tunnel—Connection has been effected with the Resurrection No. 2 shaft, and the company will now be enabled to develop several known orebodies.

Cleveland—The fissure vein in the granite is from 45 to 50 ft. in width, carrying several ore streaks rich in gold, silver, lead, copper and zinc.

New Monarch—Now that the unwatering of the shaft has been accomplished, development work is progressing steadily. One of the workings has just broken into good ore.

Silent Friend—The fissure vein encountered by the Yak Tunnel extends to the overlying sedimentaries, where it becomes a blanket deposit. The proved orebody is 200 ft. high by 35 ft. wide, while laterally the workings are still in ore. The average value is about $20 per ton. The lessees hope to ship 150 tons per day.

Corona—Lessees working this California Gulch mine are shipping about 300 tons of lead ore per month.

St. Louis Tunnel—Shipments of ore from the main vein continue to be made.

Gold Basin—Upraises from the 450-ft. level to the 350-ft. level are being driven by the lessees of this mine. The vein at the deeper level carries values of 11 oz. gold per ton, besides silver and copper.

Valley—This South Evans mine is shipping about 50 tons daily.

Garbutt—Lessees on this property are working two shafts and outputting three cars of good-grade ore per day.

Dunkin—This Fryer hill mine has been leased to Comer & Brady, who are cleaning out some of the old workings, preparatory to working an iron orebody.

Emmet—This mine is being wired underground for electric lights—the first Leadville mine to be entirely lighted by this means.

OURAY COUNTY

Calliope—This property, in the Paquin district, north of Ouray, is said to have opened up a 6-ft. vein of $200 silver ore. The vein on this property has been opened altogether for 2300 ft.; and large bodies of low-grade ore are said to be exposed.

Mineral Farm—At this property, sinking is being pushed, and large bodies of high-grade silver-lead and copper ore are being opened up.

PARK COUNTY

Colorado Gold Mining and Smelting—Joseph Irving, manager, states that the smeltery at Alma was blown in July 2. Daily capacity 200 tons. Power plant consists of two 175-h.p. boilers; one 200-h.p. engine; one 150 kw. generator. There is also a complete sampling plant, water and lighting system. The installation was made by the Traylor Engineering Company. Semi-pyritic smelting has been adopted, and custom ore will be treated.

SAN JUAN COUNTY

Iowa-Tiger—The rich strike of gold ore in this mine is proving up well, the vein having been stoped for 70 ft. as high as 25 ft. in places. The rich 6-in. streak still continues.

Silver Ledge—The mill owned by this company is running 24 hours per day on ore mined from the bodies recently opened up. The lead concentrates, which carry silver and gold, are being shipped at the rate of a carload per day to the smeltery, while the zinc concentrates are being stored at the mill.

TELLER COUNTY—CRIPPLE CREEK

El Paso—Work on the drill hole from the bottom of the El Paso shaft, to connect with the deep-drainage tunnel, has been delayed because of the nondelivery of casing. Lessees operating on the Beacon Hill-Ajax claim of the El Paso company are breaking ore from a 5-ft. vein, discovered north of the shaft on the 400-ft. level. During June 375 tons were shipped, while 125 tons have been produced from these workings this month, yielding $35 per ton. A strong vein is reported as having been cut by the deep-drainage tunnel in the Orizaba claim, but no tests were made by the tunnel contractor. Excavation has been completed for the new No. 2 shafthouse, situated at the north end of Beacon hill.

Stratton Estate—Lessees working in Callie ground on the Little Clara flat vein are said to have encountered a streak of ore a few inches wide carrying as high as $8000 gold per ton. A 23-ton shipment of ore mined on the first level of the American Eagle shaft has been settled for by the Portland (valley) mill at the rate of $128 per ton. It is reported that lessees are working in ore on the eighth level of the same shaft, in a drift 6 ft. wide, with no walls, the ore carrying $30 to $60 per ton.

Stratton's Independence—June production was 1643 tons of ore averaging 24 dwt. 8.4 gr. per ton. Dump ore milled 8000 tons. Net working profit from both mine and mill departments $12,500 less $1375, special development.

Acacia—This Bull Hill property is maintaining a steady output from the various shafts.

Doctor-Jack Pot—A strike of $72 gold ore is reported as having been made in the Doctor vein by lessees working through the old incline shaft. A crosscut was driven into the supposed foot-wall of the vein, exposing 4 ft. of sylvanite ore.

Lexington—A 30-ton shipment of medium-grade ore was made from the 350-ft. level of this Gold Hill property this week by lessees.

Findley—The Shurtloff, leased for two years to Thomas Bailey and J. P. Kano, has been started up. Twelve hundred to 1800 tons per month of ore of good grade are being brought to the surface through the main Findley shaft.

Beacon Hill Consolidated—The Rocky Mountain mine of this company, being worked under lease, has reëntered the list of shippers, the ore coming from a 5-ft. vein and yielding about $17 per ton.

Little Bessie—Ore assaying about 1 oz. gold per ton is reported as having been encountered in an adit tunnel on the Bessie claim. The vein is supposed to be an extension of one of those in the Henry Adney and Old Gold properties adjoining.

Idaho

SHOSHONE COUNTY

Caledonia—Now that the original stockholders have received their money back, dividends will be discontinued indefinitely. All income from ore shipments will be used in running a long tunnel to facilitate mining at depth, to putting in a mill, and generally developing the mine. Meanwhile the regular production of 1000 tons per month is to be kept up, and in case a surplus is secured over the necessities of operation, it is promised that it will be paid out in dividends.

Snow Storm—Reports submitted by the management at the annual meeting of the shareholders show 91,308 tons of ore mined during the year ended June 30,

1910; the average content was 6.908 oz. of silver per ton, and 4.067 per cent. of copper. The silver was marketed at an average price of 52.208c. per oz. and the copper at 12.954c. per lb. The receipts from all sources, including a surplus of $46,402 and the estimated value of ore in transit, amounted to $507,473, while the operating expenses and exploration and improvements cost $264,210, leaving $243,202 as earnings for the year. The dividends paid during the year amounted to $179,940.

Rex—Rapid development is being made. Forty men are working on the mill and in the mine. Electric lights and machinery have been installed.

Original Ajax—Work has been resumed after a shut-down of six months. A contract has been awarded for 150 ft. of drifting on the ledge.

Indiana

SULLIVAN COUNTY

Extensive improvements, including the construction of a new tipple, are being made at the Klondyke mine belonging to the Sullivan & Greene Coal Mining Company, west of Sullivan.

VANDERBURG COUNTY

The fight between the district of Terre Haute, Linton, Clinton and Brazil and the Vincennes and Evansville district for the mine-emergency station, has resulted in a victory for the latter district. The authorities at Washington have decided to construct and equip the station in Evansville with a view of serving the States of Indiana, Kentucky and southern Illinois.

VIGO COUNTY

The burning of the tipple and surface buildings at the Hocking mine near Farmersburg, July 28, entailed a loss of $80,000. The mine is owned by the Alliance Coal Mining Company, composed of Chicago men who are interested in the final disposition of the John R. Walsh properties. The fire started on the roof of the boiler house. The cage could not be operated and burning wood fell down the shaft a distance of 216 ft., greatly alarming the 200 men in the mine. They were warned by telephone and were removed from the mine by the manway, climbing the full distance from the bottom of the mine; but 15 mules were suffocated. The work of rebuilding the mine tipple and buildings will begin at once.

Kansas

Kansas produced during the month of July 2,775,920 lb. of blende and 188,870 lb. of galena, with a total value of $57,827.

North Empire—A. O. Ihlseng is pumping out this old tract at Galena and will open it to miners down to the 170-ft. level.

Kentucky

HARLAN COUNTY

A number of transfers and sales of coal lands in the Black Mountain district are reported, in consequence of the approaching completion of the Wassoto & Black Mountain branch of the Louisville & Nashville into the region.

Harlan Coal Company—This company is beginning work to develop 3000 acres on Puckett creek which it bought several years ago, but which has not been opened on account of the lack of transportation.

Harlan Mining and Manufacturing Company—This company has bought 3000 acres of coal land on Jones' creek, one mile from the railroad, and will construct a spur track to its property and develop a mine at once. W. J. Loughbridge, H. B. Henderson and W. B. Nelson, of Lexington, Ky., are interested.

LAWRENCE COUNTY

Majestic Coal Company—Extensive improvements are to be made on the 10,000 acres owned by this company, situated along Tug river, close to the West Virginia line. Two openings will be made and a steel tipple built with a capacity of 2000 tons daily.

Maryland

George's Creek Coal Company—This new company has bought the property of the old George's Creek Coal and Iron Company, including the mines at Lonaconing and the coal shipping pier at Baltimore. H. E. Weber has been elected president, R. L. Somerville, general manager, and Wm. H. Cooper, treasurer.

Michigan

COPPER

Oneco—No. 8 drill hole has reached a depth of about 1400 ft. An amygdaloid formation carrying copper was cut. This is believed to be the extension of the lode exposed in previous drilling.

New Arcadian—Trenching continues to expose the lode that was cut near the surface by a drill on Section 17. This drill is down over 700 ft. One drill is down about 1700 ft. on its way to cut the Arcadian lode.

Adventure—Sinking is going forward at this company's new vertical shaft at the rate of about 70 ft. per month. A depth of over 700 ft. has been obtained. The first of the series of three lodes will not be encountered until a depth of about 950 ft. is reached.

Twin Lakes—The sand pipe, through which its drill will operate, has been driven to a depth of over 650 ft. without encountering bed rock.

North Lake—No. 9 drill hole has been established in the bed rock after passing through about 300 ft. of overburden. A sand pipe has been started at the site of No. 10 hole.

IRON

Gleason & Goodman—The New York State Steel Company is developing this property in the Iron River district. The terms of the lease called for the highest royalty and bonus ever paid in the Iron River field. The royalty is 50c. a ton. The Steel company has continued the drilling operations and seven or eight holes have been sunk, showing the properties to contain fully 3,000,000 tons. The opening of the Gleason and Goodman properties is an important step in the development of the extensive territory to the north of Iron River.

Imperial—The Cleveland-Cliffs Company has a seven-years' lease on this Michigamme property. Two diamond drills are now testing the ground.

Minnesota

Scranton—The concrete shaft has just been completed. It is 285 ft. deep and 16 ft. square. The mine is near Hibbing and is estimated to contain 20,000,000 tons of ore. It will be several months before production begins.

Susquehanna—The stripping of this mine in the eastern edge of Hibbing will include all of the area east of Fourth avenue. The mine covers 80 acres and has long been worked as an underground mine. The overburden is heavy and the stripping contract was one of the largest ever awarded on the Mesaba range.

Superior Ore Dock—Rapid progress is being made with the building of the Great Northern's new steel ore dock at Superior. The structure will be 1812 ft. long and 75 ft. above water level. It will contain 302 pockets. The foundations are of piles and concrete and the superstructure of steel. The dock will cost, approximately, $1,000,000. It will give the Great Northern a total of 1350 ore pockets.

Missouri

The July production of the Missouri mines was 32,091,680 lb. of blende; 4,957,640 lb. of calamine and 3,059,740 lb. of lead concentrates with a total value of $773,446.

Muskingum—A 250-ton mill is to be erected on this lease in the West Joplin sheet-ground district.

Moler-Smith—This company, operating at Carl Junction, has shut down its mill on the Jubilee land and is moving the tram so that the steam shovel will be able to remove the dirt from under the old tram.

Granby—This company has been drilling Poor Man's gulch, northwest of Joplin, and has made a good strike of ore at 105 to 120 feet.

Hella Land and Development—This company has secured a 20-acre lease at Cave Springs on the Schmuck land and is sinking a shaft after drilling the land. Otto Schoenherr is manager.

Montana

Deer Lodge County

Southern Cross—Ex-senator Lee Mantle, who is a part owner in the mine, states that no negotiations are now pending for the sale of the property. This disposes of the rumors which have been circulated regarding the sale of the property to the United States Smelting, Refining and Mining Company. It is understood that, while there is an abundance of ore in the mine, it is of such a refractory character that it is difficult to treat.

Silver Bow County

Reins Copper—The Reins company, which owns property in Butte, has recently been made defendant in several suits. John P. Reins, former president, has instituted suit for $20,000 upon a note executed in 1908 and also for accounts assigned to him by R. S. Wilson, G. L. Thompson and H. C. Dahl for $2286. John S. Willard, receiver for the business of J. M. Guffey, of Pittsburg, has begun suit upon a note for $130,427, originally executed by the company to J. M. Guffey. Thomas B. McKaig has brought suit upon a note for $2454 and W. J. Johnson for $3685. The company's mine has not been in operation for several years.

Nevada

Esmeralda County

Goldfield Consolidated—The temporary shortage in water has been relieved and the mill is now operating at maximum capacity, about 925 tons daily. The new pipe line from the fire tank on Columbia mountain is almost completed and in case the regular supply fails, mine water will be used for milling purposes.

Red Top Extension—After a long period of inactivity, the company has started operations on the Bull Dog Fraction. The Bull Dog is surrounded by the Red Top, Miss Tessie and Clermont claims of the Goldfield Consolidated, and the Vinagerone and Polverde of the Jumbo Extension. A large tonnage of low-grade ore has been developed by former operations.

Florence Extension—An amply financed California syndicate has taken hold of the property in the hope of recovering the lost Little Florence oreshoot. The workings are already being dewatered.

Coalition Crown—An orebody just exposed on the 300-ft. level is reported to sample exceptionally high. It has been crosscut 5 ft. with the second wall not yet in sight. The property is in Rawhide.

Goldfield Annex—At 1020 ft. stringers of quartz carrying low-grade ore are entering the latite. The formation is similar to that encountered before entering the shipping ore encountered at 800 feet.

Nye County

Tonopah—The record of last week is the best in the history of the mine in amount of development. New footage amounts to 663 ft. exclusive of stoping operations. Results were exceptionally gratifying in the Silver Top workings.

Tonopah-Belmont—The new steel head frame being erected on the recently widened Belmont shaft is the largest in this district.

Tonopah Extension—The mill, with 30 stamps, crushes 120 tons daily, effecting a saving of better than 90 per cent. The semi-monthly cyanide cleanup for last half of July produced nearly $15,000 in bullion.

New Mexico

Socorro County

The Mogollon-Silver City stage was held up on Aug. 6. The bandits shot the Mexican driver, took the strong box keys from his pocket, looted the mail sacks and express packages, and carried off the bullion of the Socorro Mines Company and the Ernestine Mining Company, which were making their weekly shipment from the mines to Silver City for shipment to New York. It is reported that the bullion has been recovered. This is the second holdup within two weeks.

Socorro Mines—The management has decided on the installation of another Harvey-Steele tilting furnace to facilitate melting the bullion, the present equipment now being inadequate owing to the increased production. This week about 1400 lb. of refined gold and silver were cast into bars weighing about 100 lb. each. The vein on the 600 level west has widened to 12 ft. The width is 23 ft. where last crosscut on 600 east. This, the lowest level, is furnishing the best ore.

Ernestine—The president of the company will arrive in camp at an early date after an extended absence of several months. Mine and mill are in full operation.

Ohio

Columbus & Hocking Coal and Iron Company—The bondholders' committee has submitted a plan of reorganization, under which the property is to be sold at foreclosure sale and a new company organized with $4,000,000, stock and $2,000,000 bonds. The division of the new securities is to be made as follows: To present holders of first mortgage 5 per cent. bonds, 75 per cent of the principal in new first mortgage bonds; to holders of second mortgage 6 per cent. bonds, 75 per cent. of the principal in new first mortgage bonds; to present preferred stockholders who pay $10 a share, par in new first mortgage bonds for such payment and an amount of new common stock equal to par of their present holdings of preferred; to common stockholders who pay $10 a share, par in new first mortgage bonds and an amount of new common stock equal to 50 per cent. of their present holdings.

Oklahoma

The production of the Oklahoma mines for the month of July was 1,247,390 lb. of blende, 533,485 lb. of galena and 14,550 lb. of calamine with a total value of $30,021.

Oregon

Lane County

Vesuvius—F. J. Hard, manager, has just returned from the East and has resumed operations at the mine. Development work is continually uncovering more rich ore. The mine is near Bohemia.

Golden Slipper—Mr. Lilly has let a contract for a 100-ft. tunnel on this property situated near Bohemia. He reports good ore in the face of the drift.

Oregon & Southeastern Railroad—A contract has been let for a mile of rock work, and as soon as this is completed another extension will be made, thus bringing this road near the Bohemia mines.

Pennsylvania

Anthracite Coal

Bear Valley Colliery—The fire in this colliery, near Shamokin, which was supposed to have been extinguished, has broken out again and the mine is in a dangerous condition. It belongs to the Reading Company.

Bituminous Coal

Pennsylvania Coal and Coke Company—Fire on Aug. 5 destroyed the boiler house, engine house, tipple and office of this company's No. 9 mine between Cresson and Gallitzen. All the men in the mine were brought out uninjured. The loss is about, $100,000, not counting a quantity of coal ready for shipment.

Utah

Beaver County

Dragon Iron—Three shifts are employed in sinking the shaft from the 600-ft. level. Work will be pushed. It is planned to sink to the 1000-ft. level to prospect the ground below the heavy iron deposits.

Bullock—Work was resumed July 23, after a shut-down of two weeks, caused by an accident to the engine.

Eagle & Blue Bell—The shaft has reached 350 ft., and 50 ft. of raising has been done from the 1000-ft. level. The work is being done to make connections.

Scranton—The strike made in the Del

Monte section of the property has been followed 43 ft. High-grade zinc and lead ore is exposed, and the limits of the body have not been determined.

Primrose—Arrangements are being made by Salt Lake interests to lease the Primrose mine near Silver City. This property is reported to have produced lead-silver ore of good quality from shallow workngs, and to have ceased operations on encountering copper ore with depth.

Tintic-Humboldt—A fissure carrying iron-stained quartz and some lead carbonate has been encountered by the crosscut on the 100-ft. level.

Lower Mammoth—A drift on the 2000-ft. level is being extended to prospect for the ore opened some time ago by a winze from the 1800-ft. level.

Grand Central—The orebody developed on the 2100-ft. level and drifted on 500 ft., is 30 ft. and upward wide, and is said to have attained a width of 200 ft. in places. Ore is being broken with drills and shipped without sorting. This orebody has been encountered on the 2200-ft. level, but has not been extensively developed here.

Uncle Joe—Drilling is being done on this property near Goshen, and two veins carrying gold and silver have been cut.

TOOELE COUNTY

Bullion Coalition—The main Honerine tunnel at Stockton is being extended, and the incline retimbered from the 600- to the main-tunnel level—about 700 ft. This ground will be thoroughly prospected. Most of the 18 or 20 sets of lessees at work are making regular shipments.

Buffalo Consolidated—A car of ore has been shipped from this property at Ophir.

Cliff—Development work is being carried on in the middle tunnel, which is further to the west than the upper levels. Several bunches of ore have been cut. Between 60 and 70 tons of ore, taken from eight places in the mine, are produced daily.

Dry Cañon—A car of ore was shipped recently, which assayed: gold, 0.34 oz.; silver, 46 oz.; lead, 27.8 per cent.; copper, 2.39 per cent.; iron, 14.4 per cent. This ore came from the incline, which is down 900 feet.

Daisy Combination—At this property, 3½ miles from Mercur, a mill and slimes plant similar to that at the Boston Sunshine has been installed, and some of the old-time refractory ore is being treated.

Consolidated Mercur—The cleanup for June amounted to between $45,000 and $50,000.

Washington

FERRY COUNTY

Alice E—Development work is to be started at once on this group of claims. The property adjoins the First Thought.

Pacific Ore—A contract has been let for a 120-ton crushing and cyanide plant to be installed at once.

Kettle River—An order has been placed for a 50-ton concentrating mill for this silver-lead property. E. W. Scothorn, of Orient, is manager.

First Thought—A plan is under way to install a large cyanide plant on this property near Orient.

West Virginia

Davis Coal and Coke Company—This company is now opening three new shafts and one drift mine near Thomas, and the plants are to be fireproof constructions and include central power station at Thomas. The present daily output is 8000 tons and it is proposed to increase it 4000 tons. Lee Ott, of Thomas, is general superintendent.

Canada

NOVA SCOTIA

Acadia Coal Company—This company has secured about $1,000,000 new capital from the sale of stock to French and Belgian investors. Emile Franqui, of Brussels, Belgium, has been chosen first vice-president. The new capital will be used in opening new mines and installing new machinery at the company's plant at Picton, enlarging the productive capacity from 300,000 to 600,000 tons yearly.

Canada Iron Corporation—John J. Drummond of this company announces that ore will be shipped from the new mines near Bathurst by the middle of August. The company will mine about 1000 tons per day to fill orders from the United States and England.

ONTARIO

Shipments of ore from Cobalt for the week ended July 29, were as follows: Buffalo, 61,790 lb.; Chambers-Ferland, 64,000; Crown Reserve, 126,330; Kerr Lake, 445,900; La Rose, 325,900; Nipissing, 184,550; Temiskaming, 192,480; McKinley-Darragh, 119,750; Cobalt Central, 84,000; total 1,604,700 pounds.

Temiskaming—High-grade ore is being taken out on the 400-ft. level, the vein showing some enrichment at depth. The main shaft is now down about 500 ft. at which depth another level will be started. The mill is treating about 100 tons of ore daily.

Chance—A Detroit syndicate has purchased this property in Munroe township. Several veins showing free gold have been found. A company will be formed and a plant installed.

Vipond—The working force has been reduced, owing to the difficulty of getting in provisions into Porcupine. Twenty men are working on two veins, which have been opened up for over 300 ft. One of them, 18 in. wide on the surface, has widened at the 20-ft. level to 3 ft. Free gold is shown through its entire length. The other vein also widens at depth.

QUEBEC

Graphite Limited—Col. Charles A. Smart, president, recently made an inspection of the property, comprising 700 acres. A recent find of high-grade molybdenite is regarded as materially increasing its value.

Mexico

SONORA

Greene-Cananea—The electrical department is being enlarged and made more efficient. It is intended that light and power shall be furnished to mines two miles distant from the plant, where heretofore the power has been generated by a smaller plant at the mine itself. At the Puertocitois mine the output has been heavy and is being increased as more territory is being opened up.

ZACATECAS

A movement is on foot to organize a miners' association for the purpose of attracting the attention of capital to the immediate Zacatecas district. The advance in silver has resulted in the opening of many new prospects, as well as increasing working forces on all the shipping mines. The outlook is good for a prosperous season for the district.

Zacatecas Metallurgical Company—The new cyanide plant at San Cristobal mine is nearly ready for operation. The work of building the plant and installing the machinery, tanks, etc., has been in charge of Parish McDonald. William Larson is mine superintendent.

San Roberto—The mill is producing one carload of concentrates per week. The larger part of the concentration is carried on by hand jigs, planillas and hand washing.

Africa

WEST AFRICA

Gold production in June was 17,194 oz., being 604 oz. more than in May. For the six months ended June 30 the total was 131,341 oz. bullion in 1909, and 102,107 oz. in 1910; a decrease of 29,234 oz. The bullion reported this year was equal to $2,032,000, or 98,307 oz. fine gold.

Asia

KOREA

Oriental Consolidated—The result of the July cleanup was $97,000, according to cable advices.

South America

BRITISH GUIANA

Gold exports for the six months ended July 1 were 30,770 oz. bullion in 1909, and 26,977 in 1910; a decrease of 3793 oz. The bullion reported this year was equal to $466,544, or 22,571 oz. fine gold. Exports of diamonds this year were 1850 carats, valued at $10,707; a decrease of 360 carats.

THE MARKETS

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

Coal Trade Review

New York, Aug. 10—The coal trade presents a sharp contrast in the East and in the West at the present time. In the East trade is reported dull and prices are low, because there is an undoubted oversupply. Coal of good quality has been sold at the seaboard at prices less than the cost of mining and hauling. There are no signs that this condition will improve, as long as the mines continue to keep up their output.

In the West, on the other hand, not only is business more active and consumption consequently larger, but the stoppage of mines in several important districts has resulted in a short supply. The result is that at the large consuming centers coal is scarce and prices have advanced. In smaller places also supplies are light and high prices have to be paid.

The settlement of the strikes in Illinois and the Southwest depends largely upon the result of the general convention of the United Mine Workers, which meets in Indianapolis tomorrow. The convention is likely to be an exciting one.

Strike Conditions—President Lewis has issued a call for a general convention of the United Mine Workers to be held at Indianapolis, Aug. 11. The objects of the convention are to consider the strike situation in those districts where wage contracts have not been negotiated and agreed upon. To make clear the position of the United Mine Workers on the question of complying with and enforcing the terms of wage contracts. To take such action as necessary to require the officers and members of the United Mine Workers to respect and comply with the authority of the international executive board. To consider ways and means to raise funds to support members who are on strike and can negotiate no settlements.

Coal Traffic Notes

Anthracite-coal shipments in July were 4,202,059 tons, being 1,196,064 tons less than in June, but 181,294 tons more than in July, 1909. For the seven months ended July 31 the shipments were, in long tons:

	1909.	1910.	Changes.
Reading	6,779,385	7,052,018	I. 272,633
Lehigh Valley	5,968,862	6,569,466	I. 600,604
N. J. Central	4,509,519	4,833,269	I. 323,750
Lackawanna	5,479,357	5,592,255	I. 112,898
Del. & Hudson	3,809,122	3,681,254	D. 127,868
Pennsylvania	3,346,379	3,449,620	I. 103,241
Erie	4,477,348	4,240,346	D. 237,002
N. Y., Ont. & West.	1,602,523	1,598,579	D. 3,944
Total	35,972,495	37,016,807	I. 1,044,312

The total increase was 2.9 per cent. Three of the companies—the Delaware & Hudson, the Erie and the New York, Ontario & Western—show decreases. The Lehigh Valley shows a large gain and the Central Railroad of New Jersey a good one; while the Philadelphia & Reading, the Delaware, Lackawanna & Western and the Pennsylvania made smaller increases.

New York

Anthracite

Aug. 10—There is nothing new in the anthracite trade. July production showed a heavy decrease from June, but was larger than that of July last year. Stoppages for holidays and for repairs make July always a slow month. The collieries are threatened with short water supply, owing to the unusual drought.

Schedule prices for domestic sizes are now $4.65 for broken and $4.90 for egg, stove and chestnut, f.o.b. New York harbor points. For steam sizes, current quotations are: Pea, $2.95@3.25; buckwheat, $2.15@2.50; No. 2 buckwheat, or rice, $1.65@2; barley, $1.35@1.50; all according to quality, f.o.b. New York harbor.

Bituminous

Demand from New England and New York harbor points has fallen off, and the market has been unmistakably dull. Prices have fallen sharply. Fair qualities of Miller vein steam coal can be had at $1 at mine. A lot sold under demurrage this week brought a price which realized only 55c. per ton at mine.

Car supply continues good, but transportation is slow. As usual at this season, special trains and excursion traffic interfere with the movement of coal trains.

In the coastwise trade more vessels have come in. This and the dull trade have brought about a break in rates. From Philadelphia boats can be had at 65@70c. to Boston, Salem and Portland. From New York, schooners have offered to take charters as low as 45c. to ports around Cape Cod.

Birmingham

Aug. 8—Coal operations in Alabama are active and the production is large. The coal is being handled promptly by the railroads. Some of the coal companies are making preparations against any possible car shortage the coming fall and winter. One concern has installed a box-car loading machine so that coal can be placed in box cars, if it becomes necessary. Contracts for coal have been coming into this district from the West and Louisiana.

The coke demand is strong and production is being kept up. There is no accumulation of coke.

Chicago

Aug. 8—Sales of coal have increased with the general knowledge among consumers that the Lewis plan to settle the strike in Illinois has not met with support from the miners. Nearly all the buying is on a week-to-week or at most month-to-month basis, consumers of large and small amounts alike refusing to put in storage supplies or to make contracts for more than a month ahead, in the expectation that prices will drop with the resumption of supplies from the mines of this State. In the absence of any marked change in the present conditions of production and of consumption, Indiana coals dominate the market as for several weeks heretofore, selling at $2@2.15 for lump, $1.90@2 for run-of-mine and $1.90@2.15 for screenings. The principal size in demand continues to be screenings and this will probably be the case throughout August.

Eastern coals are in good demand and almost featureless, the only change worth noting being in smokeless, which is in stronger demand as a result of storage by those who used this coal regularly in apartment buildings and hotels and may have occasion for steam-making in September. Smokeless is firm at circular prices, $3.55 for lump and egg and $3.15 for run-of-mine. Hocking is firm and also in good demand at $3.15; Youghiogheny at $3.22 for ¾-in., and Pittsburg No. 8 at $2.85 for the same size.

Cleveland

Aug. 8—Lake trade shows some decrease, and shipments recently have been rather slow. Local trade is improving, and while there is coal enough there is no oversupply, and prices are firm.

Middle-district coal, f.o.b. Cleveland, is $2.15 for 1¼-in., $2 for ¾-in., $1.80 for run-of-mine and $1.55@1.65 for slack. No. 8 and Cambridge districts about 10c. higher. Pocahontas has been advanced and is now $3.10, Cleveland, for lump and egg and $2.60 for run-of-mine.

Indianapolis

The coal-mining business in Indiana continues brisk and there are few or no idle mines. The mining industry has had to keep pace with increasing popula-

tion and industries; but the labor troubles in other mining territory have been conducive to the big business done by the Indiana mines.

The impression prevails among coal men that a decided increase in price at the mine and in the market is to be expected before winter. The railroads in Indiana that raised the rates on coal in June have notified the Railroad Commission of Indiana that these rates are suspended until Nov. 1. This announcement will have a tendency to induce retail dealers and large consumers to stock up before that date.

Pittsburg

Aug. 9—The local market has been extremely quiet, consumption having decreased. There is a little more cutting upon occasion, but the quotable market remains at $1.20@1.25 for mine-run and nut, $1.30 for ¾-in., $1.50 for domestic 1¼-in. lump and 70@80c. for slack, per ton at mines.

Connellsville Coke—The market has been extremely quiet in furnace coke. No new contracts have been made, while in prompt there has been practically no demand and very little coke offered. The Standard Sanitary Manufacturing Company has closed for its coke, placing two contracts, one for 12 months to Aug. 1 next, and one for 11 months to July 1 next, aggregating 10 to 15 cars weekly at a shade under $2.25, for standard 72-hour foundry coke. Prompt foundry coke can be quoted 5c. higher, other prices being unchanged. We quote standard grades of Connellsville coke: Prompt furnace, $1.65@1.70; contract furnace (nominal), $1.75@1.85; prompt foundry, $2.15@2.25; contract foundry, $2.25@2.50 at ovens.

The *Courier* reports the production in the week ended July 30 at 409,206 tons, and shipments at 3931 cars to Pittsburg, 5326 cars to points west and 1040 cars to points east, a total of 10,297 cars.

St. Louis

Aug. 8—With all mines in the fifth and ninth districts of Illinois running to their maximum for the last 60 days, supply and demand remained balanced to a nicety and prices remained stationary and moderate, being about 20c. per ton above the cost of production. However, this week the commencement of fall buying destroyed this balance and now demand is outrunning the supply, consequently the market has advanced about 25c. per ton all down the line. There is very little free coal on the market as the larger part of the tonnage is still being applied on old orders taken at lower prices; however, in the course of the next two weeks most of these will be cleaned up and there will be large available tonnage for those who wish to pay the price.

The anthracite situation opened up for August better than was anticipated. The demand is fair for all sizes and prices firm. The last of July was characterized by efforts to dispose of demurrage coal at considerable concessions off circular and it is rather a surprise that the market should be restored to a normal basis so soon.

Current prices are as follows for the St. Louis market:

	Mine.	St. Louis.
Illinois, Standard:		
6-in. lump and egg	$1.50	$2.02
2-in. lump and nut	1.30	1.82
Mine-run	1.20	1.72
Screenings	1.10	1.62
Trenton:		
6-in. lump and egg	1.90	2.42
3-in. nut	1.75	2.27
Staunton or Mt. Olive:		
6-in. lump	1.70	2.22
2-in. nut	1.60	2.12
Mine-run	1.50	2.02
Screenings	1.50	2.02
Carterville:		
6-in. lump or egg	1.90	2.57
3-in. nut	1.50	2.17
Mine-run	1.50	1.97
Screenings	1.25	1.92
Pocahontas and New River:		
Lump or egg	1.75	4.25
Mine-run	1.50	4.00
Pennsylvania Anthracite:		
Nut, stove or egg	.....	6.85
Grate	.....	6.60
Arkansas Anthracite:		
Egg or grate	3.35	5.35
Coke:		
Connellsville foundry	.....	5.40
Gas house	.....	4.90
Smithing	.....	4.15

East St. Louis, Ill., prices are 20c. per ton less than St. Louis prices on soft coal.

FOREIGN·COAL·TRADE

German Coal Production—Coal production of German Empire, five months ended May 31, metric tons:

	1909.	1910.	Changes.
Coal	59,931,082	60,782,144	I. 851,062
Brown coal	27,026,370	26,959,305	D. 67,065
Total mined	86,957,452	87,741,449	I. 783,997
Coke made	8,683,507	9,490,330	I. 806,823
Briquets made	7,395,082	7,566,957	I. 171,875

Of the briquets reported this year 5,830,334 tons were made from brown coal or lignite.

IRON·TRADE·REVIEW

New York, Aug. 10—The iron and steel markets have shown even less activity, and upon the whole have been marked by August dullness.

Buying of pig iron has been light, both for foundry and steel-making irons. Some further curtailment in production has been made, but it is still reported that unsold stocks are large, and consumers will not do business except at shaded prices. Southern foundry and forge have been pressed, and it is admitted that there are stocks of 300,000 tons in the Birmingham district.

In finished material trade has been rather better than in pig iron. Structural steel is still the leader, and small orders are in evidence. Small building material sells well. On the whole there is a good volume of business, all things considered, but it is not up to the requirements of the mills; consequently prices are not firm.

The average monthly make of pig iron for the first half of the year, according to the figures of the American Iron and Steel Association, was 2,502,000 tons in round figures. The output for July is estimated at 2,177,500 tons, showing a reduction of 13 per cent. from the six months' average. Compared with February, when the rate of production was heaviest, the decrease is over 19 per cent. The make for the first half was at the rate of 30,000,000 tons a year; for July it was at the rate of about 26,000,000 tons.

Pig Iron Production—The reports of the blast furnaces, as collected and published by the *Iron Age*, show that on Aug. 1 there were 256 coke and anthracite stacks in blast, having a total daily capacity of 68,750 tons; a decrease of 4500 tons as compared with July 1, and of 15,400 tons as compared with Jan. 1. Making allowance for the charcoal furnaces, the estimated make of pig iron in July was 2,177,500 tons. This, added to the official report for the first half of the year, makes a total for the seven months ended July 31 of 17,189,900 tons.

Baltimore

Aug. 8—Imports for the week included 1438 tons ferromanganese and 26 tons silicospiegel from Liverpool; 50 casks manganese ore from Hamburg; 37,550 tons iron ore from Cuba.

Birmingham

Aug. 8—The Southern pig-iron market continues quiet. Manufacturers are holding for $11.50 per ton, No. 2 foundry, and no offer is moving them, apparently. The reports that some of the iron makers in this section have been selling iron at $11 per ton cannot be verified. The make in Alabama during the month of July went above 140,000 tons.

Unless there is an improvement in conditions in the near future, further curtailment in steel production is proposed. The big plant of the Tennessee company at Ensley may be shut down for a few weeks. The steel plant of the Southern Iron and Steel Company at Gadsden is now down, but there is an accumulated stock of billets at this place which is being worked off. It is estimated that there is between 200,000 and 300,000 tons of accumulated pig iron in Alabama. A little iron was removed from these piles recently.

Chicago

Aug. 8—The iron market continues to be flabby for pig iron and finished materials alike. Sales of pig iron are light and for small lots scattered about the Chi-

cago district. Inquiries for large tonnage, while showing more interest than was displayed among melters last week, are hardly numerous enough to excite hope on the part of sales agents. The curtailment of pig iron production does not yet help the situation for the furnaces, because users of iron seem to see in this only another evidence of their long-existing belief that overproduction has caused the accumulation of stocks that will keep prices of pig iron low for a long time. Buying is for delivery within the next 30 to 90 days, with a little general fourth-quarter business and a few inquiries for 1911 tonnage. Southern No. 2 is said to be obtainable at $11 Birmingham, or $15.35 Chicago; the price commonly quoted still is $11.50 Birmingham. Northern holds to $16.50 for No. 2. These prices apply to early delivery on last quarter and 1911 delivery quotations are 25c. or 50c. higher, though hardly more than nominal.

Coke is rather weaker, at $4.85 for the best Connellsville.

Philadelphia

Aug. 10—The crude-iron market appears to have reached the extreme limit of inactivity. A month ago quite an amount of business was in sight and makers counted upon closing for large quantities for fall and winter delivery, much of the material being for the New England States. For some reasons scarcely any of this business has been booked. There is no room for further shading. This is simply a waiting period and only current and urgent requirements are likely to be covered. Best No. 2 X foundry is held at $16.50; best forge, $15.50; basic at the same figure.

Steel Billets—Billets have weakened under Western influences but recent offerings have met with no response among consumers.

Bars—Bars are dull, no new orders of moment having been booked. Common iron deliveries are being hurried to consumers who appear anxious to get control of all the iron they can.

Sheet—Sheet has also weakened particularly on galvanized. Buyers wait for further developments.

Pipes and Tubes—A few trifling orders have been placed, calling for quick delivery. A good business is being done in cast pipe.

Pittsburg

Aug. 9—Some steel interests report a slight improvement this month over last in specifications for finished steel. All unite in stating that new business is extremely light. It seems likely that production will have to be decreased further. Producers are taking a very conservative view of the future and are far from optimistic.

Prices of finished-steel products are well held at new levels as they are developed by reductions. Plates and shapes remain at 1.40c., Pittsburg, $3 a ton below the opening price of the year. Steel bars are at a minimum of 1.40c., which has lately been done as noted in last report, but some sales of small lots are still made at 1.45c. for early delivery.

Pig Iron—A sale of 2000 tons of basic iron was made late last week at $14.10, Valley. The United Steel Company, Canton, O., mentioned in last report as inquiring for 10,000 to 12,000 tons of fourth-quarter basic, has bought about 5000 tons from a Cleveland interest, at a price not ascertainable. Cherry Valley furnace, at Leetonia, O., will blow out the end of this week and will be relined immediately. This will leave nine of the 21 merchant furnaces in the Valleys in blast. Four steel-works furnaces are going in, probably before Sept. 1: Hall of the Republic Iron and Steel Company, the new No. 3 furnace of the Youngstown Sheet and Tube Company and one each of La Belle Iron Works and the Wheeling Steel and Iron Company. The market is extremely quiet. In view of occasional recent sales and some offers we reduce former quotations 15c. on basic and No. 2 foundry and 25c. on bessemer and malleable, quoting as follows: No. 2 foundry, $14.35@14.50; gray forge, $13.75; malleable, $14.75; basic, $14.10@14.25, all at Valley furnaces.

Ferromanganese—The market is a trifle weaker again, and quiet. We quote prompt at $39@39.50 and forward at $39.50@40, f.o.b. Baltimore.

Steel—The market on unfinished steel is slightly easier, particularly on bessemer, and we quote prices 50c. lower on the latter, with rods down $1 a ton, as follows: Bessemer billets, $24.50@25; sheet bars, $26; open-hearth billets, $26; sheet bars, $26.50@27; rods, $28@29 f.o.b. Pittsburg or Youngstown.

Sheets—The market remains at shading of $3 a ton on black and $4 a ton on galvanized, from nominal prices, which are 2.40c. on black, 3.50c. on galvanized, $1.70 on painted corrugated roofing and $3 on galvanized corrugated roofing. Blue annealed sheets are held at the regular price of 1.75c. for 10 gage. Specifications are fairly good, but new buying is light.

Sheet and Tinplate Strike—Late this afternoon officials of the Amalgamated Association announced that the result of the vote whether or not to continue the strike against the open shop of the American Sheet and Tin Plate Company was 63.2 per cent. favoring and 36.8 per cent. against the continuance of the strike, so that it will be continued.

St. Louis

Aug. 8—The market for pig iron is slightly better locally though it is still slow. A few buyers were induced to take on small lots by shading the price down to a basis of $11.50 per ton, f.o.b. Birmingham. Orders are all small being only for a carload or two at a time. Special brands of iron from local producers are in much better demand at better prices. The price of $11.50@12 per ton Birmingham, or $15.25@15.75 St. Louis is the prevailing market.

METAL MARKETS

New York, Aug. 10—The metal markets show more activity and some business is developing on several lines. Changes in price are small.

Our index number for the metals, calculated on the approximate production and sales of pig iron, copper, tin, lead, zinc and aluminum, was 127 for the month of January; 124 for February; 118 for March; 118 for April; 113 for May; 107 for June; 112 for July.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
June 1910..	$1,598,347	$ 4,575,917	Imp.$ 2,977,570
" 1909..	8,346,446	2,367,735	Exp. 5,978,711
Year 1910..	49,516 731	19,388,531	" 30,128,200
" 1909..	63,834,337	20,135,592	" 43,698,745
Silver:			
June 1910..	4,587,383	3,308,171	Exp. 1,279,212
" 1909..	5,505,037	4,339,275	" 1,165,762
Year 1910..	27,054,218	21,901,520	" 5,152,698
" 1909..	29,359,666	22,872,028	" 6,487,638

Exports from the port of New York, week ended Aug. 3: Gold, $2150; silver, $1,135,486, to London and Paris. Imports: Gold, $2,175,603, mainly from London; silver, $127,683, nearly all from South America.

Exports of silver from London to the East from Jan. 1 to July 28, reported by Messrs. Pixley & Abell:

	1909.	1910.	Changes.
India.....	£3,736,300	£3,576,600	D. £ 159,700
China.....	1,214,700	1,113,500	D. 101,200
Straits.....	82,800	.....	D. 82,800
Total.....	£5,033,800	£4,690,100	D. £ 343,700

India Council bills in London brought an average of 15.97d. per rupee.

Gold—There was a good demand for supplies arriving on the open market in London this week; but no premiums were offered and the price was unchanged at 77s. 9d. per oz. for bars and 76s. 5d. per oz. for American coin. About $2,750,000 in all was taken for New York account.

Platinum—Business is reported better, but prices are unchanged. Dealers quote $33 per oz. for refined platinum and $37.50@38 per oz. for hard metal.

Our special correspondent in Russia writes under date of July 28 that the quotations remain nominally unchanged, but there is a considerable difference in individual sales. At Ekaterinburg small lots have been sold as high as 7.40 rubles per zolotnik—$27.82 per oz.—for crude metal, 83 per cent. platinum. At St. Petersburg sales have been made at 28,000 rubles per pood—$27.44 per oz. The higher price at Ekaterinburg is unusual.

SILVER AND STERLING EXCHANGE

Aug.	4	5	6	8	9	10
New York....	52¾	52¾	52⅞	53	52⅞	52⅞
London	24⅜	24⅜	24 7/16	24⅛	24 1/16	24 7/16
Sterling Ex..	4.8530	4.8540	4.8555	4.8560	4.8560	4.8555

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

Silver—Recent advices from India report the crop situation as favorable, so the chances are that silver will remain steady around current prices for the present.

Copper, Tin, Lead and Zinc

Aug.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
4	12⅝ @12¾	12¾ @12⅞	55 7/16	33	4.40	4.27½ @4.30	5.00 @5.02½
5	12⅝ @12¾	12¾ @12⅞	55¾	33	4.40	4.27½ @4.30	5.00 @5.02½
6	12⅝ @12¾	12¾ @12⅞	....	33	4.40	4.27½ @4.30	5.00 @5.02½
8	12⅝ @12¾	12¾ @12⅞	55 7/16	33⅛	4.40	4.27½ @4.30	5.00 @5.05
9	12⅝ @12¾	12¾ @12⅞	55 5/16	33⅛	4.40	4.27½ @4.30	5.00 @5.05
10	12⅝ @12¾	12¾ @12⅞	56⅛	33¼	4.40	4.27½ @4.30	5.00 @5.05

London quotations are per long ton (2240 lb.) standard copper. 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 Production—We are able to state on the best authority that the understanding among the principal copper producers of this country, looking toward a reduction in the output of copper, in regard to which so much speculation has been indulged, is likely to become an accomplished fact. According to recent advices, not long ago it happened that the leading interests held an informal meeting in London and exchanged views on the subject. Among the interests represented were the Rio Tinto, of Spain, the Amalgamated, the Guggenheim and the Lewissohn interests. While no formal or preconcerted action was resolved upon, it is understood that ideas were exchanged, the probable result of which will be that the copper production of these interests will be more or less curtailed within the next few months. The Phelps-Dodge companies and the Calumet & Hecla have already inaugurated a curtailment of output, which they will make no effort to increase for the present.

Copper—During the week of Aug. 4 to 10, a good average of business has been transacted, both in Lake and electrolytic copper. Although there was a little halt in the demand up to Saturday, the favorable statistics appearing on Monday increased interest and activity. A firmer tone was manifested in the market, which was specially noteworthy in the greater interest of manufacturers in contracting for forward delivery, some sales having been made as far ahead as November. Contracts for distant delivery have been made at a slightly higher price than for the earlier dates. However, all of the agencies are offering electrolytic copper at 12⅝c., delivered, 30 days, for domestic business, corresponding to a little less than 12½c., cash, New York, and at about 12.60 delivered in Europe, corresponding to about 12.40, New York, and the business transacted has been chiefly at these prices or at small concessions. Moderate sales of first-class Lake copper have been made at 12⅝@12¾c., while some special transactions have been reported at 13c. At the end of the week the market had a strong tone and there prevailed a feeling of confidence. Manufacturers realize that the fundamental position of the metal is changing for the better and are dropping the hand-to-mouth policy which has contributed to the accumulation of stocks in the hands of the producers. The market closes strong with an advancing tendency at 12⅝@12¾c. for Lake copper, and 12⅜@12½c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 12⅛@12⅜ 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.

The standard market in London closes about £1 higher than it did a week ago. There is a large bear account, part of which has been driven to cover; besides, toward the close there was again some bull speculation. A great deal more confidence is shown in the metal on the other side and higher prices are looked for. The market closes at £56 2s. 6d. for spot, and £56 18s. 9d. for three months.

Refined and manufactured sorts we quote: English tough, £58; best selected, £59 10s.@£60; strong sheets, £67 10s.@£68 10s. per ton.

Exports of copper from New York for the week were 9728 long tons. Our special correspondent gives the exports from Baltimore for the week at 1024 tons.

Tin—The feature of the London market for the week under review was the advance in the spot over the future quotation. It is a long time since future tin has sold at a discount from spot. This fact discloses a corner in spot tin in London but does not augur well for the intrinsic position of the market. Business in this market was taken at considerably below the importation point, so that no orders from this side were placed in London. The close is steady at £150 10s. for spot, and £152 7s. 6d. for three months; while 33¼c. is asked for September delivery in New York.

Lead—The market is quiet and without special feature. At New York, lead is quoted at 4.40c., and at St. Louis 4.27½@4.30 cents.

The London market for Spanish lead closes at £12 10s., and English at £12 12s. 6d. per ton.

Spelter—There is a fair demand, which, however, is freely met, and the market is quiet at 5@5.02½c., St. Louis, and 5.15@5.17½c., New York.

New York quotations for spelter, Aug. 4 to 6, inclusive, were 5.15@5.17½c.; Aug. 8 to 10, inclusive, 5.15@5.20 cents.

In London, good ordinaries are quoted at £22 15s. and specials at £23 per ton.

Base price of zinc sheets is $7.50 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Imports and exports of spelter and zinc products in Germany, half-year ended June 30, metric tons:

	Imports 1909.	Imports 1910.	Exports 1909.	Exports 1910.
Spelter	17,753	18,085	32,658	38,907
Zinc scrap	1,186	741	2,778	3,127
Zinc sheets	42	88	8,859	10,073
Zinc dust	407	728	1,529	1,465
Zinc pigments	3,526	4,096	12,680	15,617

Imports of zinc ore, 93,049 tons in 1909, and 113,902 tons in 1910; exports of ore, 17,648 tons in 1909, and 23,887 tons this year.

Other Metals

Aluminum—The market is quiet, and demand is still falling off. Prices are again a shade lower, quotations being 22½c. per lb. for No. 1 ingots in large lots, New York.

Antimony—This metal is only in retail demand, and prices are nominally unchanged in the absence of large business. Cookson's is 8.15@8.20c. per lb., while 7⅞@8c. is quoted for U. S. and 7¼@7½c. for outside brands.

Quicksilver—The New York price was reduced $1 on Aug. 9, and is now $46 per flask of 75 lb. on large orders; $47@48 for jobbing lots. San Francisco, $46 for domestic orders and $2 less for export. The London price has been reduced 2s. 6d., and is now £8 12s. 6d. per flask, with £8 10s. quoted by second hands.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 500-lb. lots, up to 55c. for 200-lb. lots. The price for electrolytic is 5c. higher.

The Bayonne Casting Company, Bayonne, N. J., has contracts for 12 propeller wheels for the ships now building for the Argentine navy. These will be cast in one piece from Monel metal—nickel-copper alloy—and will be the

largest castings ever made of that metal. They will be 15 ft. 6 in. in diameter and weigh 16,000 lb. each. The company will also make four propellers for the United States navy to be 10 ft. 6 in. in diameter and weigh 8000 lb. each.

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

Cadmium—Current quotations are 60 @70c. per lb. in 100-lb. lots, f.o.b. New York; according to quality of metal.

Zinc and Lead Ore Markets

Joplin, Mo., Aug. 6—The highest price paid for zinc-sulphide ore was $43.50 per ton, the base ranging down from $41 to $37 per ton of 60 per cent. zinc, in carlots, with small lots and scrap ore selling as low as $36 and $35; zinc silicate on a base of $20@24 per ton of 40 per cent. zinc. The average price, all grades of zinc, was $36.94. Lead continued at $49. There was a rumor during the week that another buyer had entered the market and bought a quantity of ore at $50, but sifted down the buyer purchased but one car and that at $49. The average price, all grades, was $48.74 per ton.

The shipment was an increase of 278 tons of zinc over the previous week and the output gained as much or more.

SHIPMENTS WEEK ENDED AUG. 6.

	Zinc, lb.	Lead lb.	Value.
Webb City-Carterville	3,968,650	776,700	$94,431
Joplin	2,059,440	174,960	44,400
Alba-Neck	829 590	4,850	17,947
Duenweg	808,140	87,140	16,454
Oronogo	569,230	.....	11,537
Galena	486,230	42,810	10,276
Spurgeon	301,660	242,960	9,983
Miami	286,570	253,840	9,020
Granby	482,820	15,830	6,400
Jackson	133,350	100,000	4,983
Sarcoxie	205,130	.....	2,935
Cave Springs	149,830	.....	2,846
Badger	126,290	.....	2,525
Carl Junction	102,280	.....	2,198
Stott City	96,910	.....	1,938
Carthage	64,270	.....	1,349
Aurora	76,690	.....	766
Totals	10,747,080	1,699,090	$239,988
32 weeks	348,757,510	51,888,800	$8,205,496

Zinc value, the week, $198,581; 32 weeks, $6,873,794
Lead value, the week, 41,407; 32 weeks, 1,331,702

MONTHLY AVERAGE PRICES.

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$41.25	$47.31	$38.46	$45.16	$52.17	$56.99
February	36.94	40.69	34.37	39.47	50.50	53.64
March	37.40	43.60	34.71	39.71	50.82	51.26
April	38.63	41.00	37.01	39.33	55.63	49.72
May	40.06	40.19	37.42	37.51	56.59	48.16
June	44.15	40.20	40.35	37.83	57.52	48.80
July	43.06	39.63	41.11	36.80	53.74	48.59
August	48.25	.....	44.54	.....	57.60	.....
September	47.70	.....	44.87	.....	56.11	.....
October	49.50	.....	45.75	.....	55.02	.....
November	51.31	.....	48.29	.....	53.94	.....
December	49.45	.....	47.57	.....	55.26	.....
Year	$43.98	.....	$41.20	.....	$54.60	.....

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.

Platteville, Wis., Aug. 6—The base price paid this week for 60 per cent. zinc ore was $49@50 per ton; no premium price was reported. The base price paid for 80 per cent. lead ore was $51; the highest price paid was $53 per ton.

SHIPMENTS WEEK ENDED AUG. 6.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	1,015,040	.....	443,700
Galena	762,180	60,000	.....
Cuba City	670,690	149,620	276,100
Highland	591,600	129,400	.....
Mineral Point	471,500	.....	.....
Shullsburg	116,000	.....	.....
Benton	84,380	.....	.....
Montfort	.....	68,000	.....
Total	3,711,390	407,020	719,800
Year to date	52,571,236	5,250,264	13,506,965

In addition to the above there was shipped during the week to the separating plants, 3,107,817 lb. zinc concentrates.

CHEMICALS

New York, Aug. 10—The general market is still dull, and prices show no change of moment.

Copper Sulphate—The market remains steady and unchanged at $4 per 100 lb. for carload lots and $4.25 per 100 lb. for smaller parcels.

Arsenic—A few sales of white arsenic are reported at $2.25 per 100 lb. Business is dull.

Sulphur—Messrs. Parsons & Petit report the importation by them of 2100 tons of crude brimstone, 600 tons at New York and 1500 tons at Baltimore.

Nitrate of Soda—This article is quiet but firm at 2.10c. per lb. for all positions.

Petroleum

Aug. 8—Production in the Oklahoma or Midcontinent field in July is reported at 4,623,802 bbl. of 42 gal. each; deliveries were 4,763,369 bbl. Stocks on Aug. 1 were 51,034,060 bbl. There were 286 new oil wells and 7 gas wells completed.

MINING STOCKS $

New York, Aug. 10—The general markets have been dull, but on the whole rather firm. Changes hinged on the Government crop reports and the Copper Producers' report. Price movements were not large, but generally in an upward direction. The close is quiet, but firm.

On the Curb the Cobalt stocks made some business and there was a small demand. Nevada stocks were not much in evidence. There was a good deal of trading in copper stocks, with fractional gains in most of them. On the whole the Curb was rather quiet.

Sales at auction in New York, Aug. 4, included one lot made up of 3500 shares Diamondfield Black Butte Consolidated Mining Company, 4000 shares Goldfield Blue Bell, 2000 Goldfield Lone Star and 100 shares Security Gold Mining and Milling Company, at $75 for the lot.

Boston, Aug. 9—Copper shares are on the mend. They have shown a hardening tendency for some time but the favorable showing made by the Copper Producers' Association gave prices quite a boost which has been maintained in today's market. The market is more or less professional.

Arizona Commercial has been the leading feature with a high at $19.25. The company has struck rich copper glance by diamond drilling 200 ft. below its present workings. The management is now quite sanguine as the water ques-

COPPER PRODUCTION REPORTS.
Copper contents of blister copper, in pounds.

Company.	May.	June.	July.
Arizona, Ltd	2,610,000	2,802,000	2,910,000
Balaklala	1,148,762	1,226,000	1,100,000
Boleo (Mexico)	2,735,680	2,115,314	.....
Copper Queen	10,283,855	10,219,687	10,730,372
Calumet & Ariz	1,778,000	2,490,000	.....
Cananea (Mexico)	4,300,000	4,280,000	.....
Detroit	2,035,639	2,017,000	1,800,000
Imperial	700,000	800,000	.....
Nevada Con	6 164,493	6,186,832	.....
Old Dominion	2,174,000	2,092,000	.....
Shannon	1,326,000	1,528,000	2,207,000
Superior & Pitts	2,276,000	2,245,000	.....
Utah Copper Co	8,862,913	8,358,496	.....
Butte District	24,850,000	23,750,000	.....
Lake Superior	19,250,000	18,000,000	19,000,000
Total production.	90,495,342	88,130,329	.....
Imports, bars, etc.	24,850,919	20,817,978	.....
Imp. in ore & matte	6,487,243	5,579,618	.....
Total	121,833,504	114,527,915	.....

Butte district and Lake Superior figures are estimated; others are reports received from companies. Imports duplicate production of Cananea, and that part of Copper Queen production which comes from Nacozari. Boleo copper does not come to American refiners. Utah Copper report includes the output of the Boston mill.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
VIII, 1909	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124,657,709	66,359,617	56,261,2:8
XI	121,618,369	66,857,873	55,266,595
XII	117,828,655	69,519,501	59,546,570
Year	1,405,403,056	705,051,591	680,942,620
I, 1910	116,547,287	78,158,387	81,691,672
II	112,712,493	66,618,322	37,369,518
III	120,067,467	62,844,818	40,585,767
IV	117,477,639	67,985,951	31,332,434
V	123,242,476	59,305,222	45,495,400
VI	127,219,188	53,363,196	65,895,948
VII	118,370,003	56,708,175	59,407,167

	Visible Stocks. United States.	Europe.	Total.
VIII, 1909	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII	153,003,527	236,857,600	389,861,127
I, 1910	141,766,111	244,204,800	385,970,912
II	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392
IV	123,824,874	249,625,600	373,450,474
V	141,984,159	246,870,400	388,854,559
VI	160,425,973	239,142,400	399,568,373
VII	168,386,017	232,892,800	401,278,817
VIII	170,640,678	222,320,000	392,960,678

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.

tion has been overcome. The Cole-Ryan stocks have also given a good account of themselves, while Lake Copper crossed $40. A fair-sized short interest exists in the latter which makes it easy to maintain a firm price. There has apparently been steady accumulation of North Butte stock and the price is up $5.75 during the week to $28.75. Calumet & Arizona has also moved along rather rapidly, having added almost $10 to its price.

The most significant thing about the market is the continued strength of Calumet & Hecla stock as well as that of its affiliated companies.

Business is picking up on the Curb and prices show some response to the big market. Calaveras and Chino hold strong and are the most active features. Algomah, Bohemia, South Lake and Inspiration did better today.

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha Con., Nev.	July 30	Aug. 24	$0.05
Best & Belcher, Nev	July 31	Aug. 24	0.10
Black Jack, Utah	Aug. 16		0.01
Bullion, Nev	Aug. 11	Sept. 12	0.05
Con. Imperial, Nev.	July 31	Aug. 25	0.01
Con. Virginia, Nev.	Aug. 1	Aug. 26	0.25
Ely Cons., Nev.	Aug. 17		0.05
Gould & Curry, Nev.	July 17	Aug. 10	0.10
Hale & Norcross, Nev.	Aug. 2	Aug. 26	0.10
Hancock Con., Mich.	Au.Oct.		3.00
Julia, Nev.	Aug. 6	Sept. 6	0.03
King Philip Copper, Mich.	Aug. 9		1.00
Live Oak, Ariz.	Oct. 1		3.00
Lower Mammoth, Utah.	Aug. 15		0.05
Mexican, Nev	July 23	Aug. 17	0.20
New York, Utah.	Aug. 15		0.02
Opex, Utah	Aug. 29		0.03
Ophir, Nev.	July 4	Aug. 2	0.25
Raven, Mich.	Aug. 15		0.10
Scorpion, Nev.	Aug. 11	Sept. 6	0.02
Silver Hill, Nev.	July 27	Aug. 22	0.05
Winona, Mich.	Aug. 9		1.00

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1909.	1910.	1909.	1910.
January	51.750	52.375	23.843	24.154
February	51.472	51.534	23.706	23.794
March	50.468	51.454	23.227	23.690
April	51.428	53.221	23.708	24.483
May	52.905	53.870	24.343	24.797
June	52.538	53.462	24.166	24.651
July	51.043	54.150	23.519	25.034
August	51.125	.....	23.588	.....
September	51.440	.....	23.743	.....
October	50 923	.....	23.502	.....
Novemb	50.703	.....	23.351	.....
December	52.226	.....	24.030	.....
Total	51.502	.....	23.706	.....

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

COPPER.

	New York.				London.	
	Electrolytic		Lake.			
	1909.	1910.	1909.	1910.	1909.	1910.
January	13.893	13.620	14.280	13.870	61.198	60.923
February	12.949	13.332	13.295	13.719	57.688	59.388
March	12.387	13.255	12.826	13.586	56.231	59.214
April	12.56½	12.733	12.93⅝	13.091	57.363	57.238
May	12.893	12.550	13.238	12.885	59.338	56.313
June	13.214	12.404	13.548	12.798	59.627	55.310
July	12.880	12.215	13.363	12.570	58.556	54.194
August	13.007	.....	13.296	.....	59.393	.....
September	12.870	.....	13.210	.....	59.021	.....
October	12.700	.....	13.030	.....	57.551	.....
November	13.125	.....	13.354	.....	58.917	.....
December	13.298	.....	13.647	.....	59.906	.....
Year	12.962	.....	13.335	.....	58.732	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1909.	1910.	Month.	1909.	1910.
January	28.060	32.700	July	29.125	32.695
February	28.290	32.920	August	29.966	.....
March	28.727	32.463	September	30.293	.....
April	29.445	32.976	October	30.475	.....
May	29.225	33.125	November	30.859	.....
June	29.322	32.769	December	32.913	.....
			Av. Year.	29.725	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1909	1910.	1909.	1910.	1909.	1910.
January	4.175	4.700	4.025	4.582	13.113	13.650
February	4.018	4.613	3.868	4.445	13.313	13.328
March	3.986	4.459	3.835	4.307	13.438	13.063
April	4.168	4.376	4.051	4.225	13.297	12.641
May	4.287	4.315	4.214	4.164	13.225	12.550
June	4.350	4.343	4.291	4.207	13.031	12.688
July	4.321	4.404	4.188	4.291	12.563	12.531
August	4.363	.....	4.227	.....	12.475	.....
September	4.342	.....	4.215	.....	12.781	.....
October	4.341	.....	4.215	.....	13.175	.....
November	4.370	.....	4.252	.....	13.047	.....
December	4.560	.....	4.459	.....	13.125	.....
Year	4.273	.....	4.153	.....	13.049	.....

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

SPELTER

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	5.141	6.101	4.991	5.951	21.425	23.350
February	4.889	5.569	4.739	5.419	21.562	23.188
March	4.757	5.637	4.607	5.487	21.438	23.031
April	4.965	5.439	4.815	5.289	21.531	22.469
May	5.124	5.191	4.974	5.041	21.975	22.100
June	5.402	5.128	5.252	4.978	22.000	22.219
July	5.402	5.152	5.252	5.002	21.969	22.406
August	5.729	.....	5.579	.....	22.125	.....
September	5.796	.....	5.646	.....	22.906	.....
October	6.199	.....	6.043	.....	23.200	.....
November	6.381	.....	6.231	.....	23.188	.....
December	6.249	.....	6.099	.....	23.094	.....
Year	5.503	.....	5.352	.....	22.201	.....

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

PRICES OF PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$17.18	$19.90	$16.40	$17.96	$16.26	$17.94
February	16.73	18.96	16.09	17.21	15.90	17.38
March	16.40	18.53	15.84	16.93	15.62	17.00
April	15.79	18.28	15.05	16.84	15.06	16.75
May	15.77	17.10	15.02	15.94	15.08	16.18
June	16.13	16.52	15.84	15.60	15.63	15.53
July	16.40	16.40	15.90	15.40	15.96	15.40
August	17.16	.....	16.17	.....	16.20	.....
September	18.44	.....	16.80	.....	17.03	.....
October	19.75	.....	17.84	.....	18.02	.....
November	19.90	.....	18.37	.....	18.09	.....
December	19.90	.....	18.15	.....	17.90	.....
Year	$17.46	.....	$16.46	.....	$16.40	.....

STOCK QUOTATIONS

COLO. SPRINGS Aug. 9

Name of Comp.	Bid.
Listed:	
Acacia	.05⅞
Cripple Cr'k Con.	.02⅜
C. K. & N.	.18½
Doctor Jack Pot	.09½
Elkton Con.	.76
El Paso	.85½
Fannie Rawlins	.05½
Findlay	.09½
Gold Dollar	.14½
Gold Sovereign	.03½
Isabella	17⅛
Mary McKinney	.53
Pharmacist	.03½
Portland	1.18½
Vindicator	.92
Work	.03½
Unlisted:	
Golden Cycle	‡1.00
United Gold Mines	.07½

SALT LAKE Aug. 9

Name of Comp.	Clg.
Carisa	.19
Colorado Mining	.33
Columbus Con.	.72
Daly Judge	‡4.50
Grand Central	1.20
Iron Blossom	.73
Little Bell	1.10
Little Chief	‡.22
Lower Mammoth	.14½
Mason Valley	6.75
Maj. Mines	.53
May Day	.02⅜
Nevada Hills	2.30
New York	.13
Prince Con	.69
Red Warrior	‡6.00
Silver King Coal'n	2.02½
Sioux Con	.23
Uncle Sam	‡.20
Victoria	‡1.07½

SAN FRANCISCO. Aug. 9.

Name of Comp.	Clg.
COMSTOCK STOCKS	
Alta	.09
Belcher	‡.70
Best & Belcher	.51
Caledonia	.55
Challenge Con.	.16
Chollar	.23
Confidence	.73
Con. Cal. & Va.	1.25
Crown Point	.54
Exchequer	.17
Gould & Curry	.26
Hale & Norcross	.40
Mexican	1.50
Ophir	1.47
Overman	.90
Potosi	.32
Savage	.24
Sierra Nevada	.36
Union Con.	.49
Yellow Jacket	.63
MISC. NEVADA	
Belmont	4.35
Daisy	.04
Jim Butler	.25
MacNamara	.29
Midway	.24
North Star	.08
West End Con.	.63
Atlanta	.13
Booth	.14
C.O.D. Con.	.07
Columbia Mt.	.06
Comb. Frac.	.48
Great Bend	.02
Jumbo Extension	.63
Oro	.09
Red Hill	.04
Sandstorm	.02
Silver Pick	.09
St. Ives	.17
Tramps Con.	.05

N. Y. EXCH. Aug. 9

Name of Comp.	Clg.
Amalgamated	66⅜
Am. Agri. Chem.	35
Am.Sm.&Ref.,com	69
Am. Sm. & Ref., pf.	102⅛
Anaconda	41
Bethlehem Steel	‡24½
Col. & Hock. C. & I.	6
Colo. Fuel & Iron.	29
Du Pont P'd'r, pf.	84¾
Federal M. & S.	55
Great Nor., ore ctf.	53¾
Nat'nalLead,com.	50½
National Lead, pf.	100½
Nev. Consol.	21⅜
Pittsburg Coal	16
RepublicI&S,com.	30
Republic I & S, pf.	90¾
SlossSheffi'd,com.	60¾
Sloss Sheffield, pf.	103
Tennessee Copper	25
Utah Copper	46½
U. S. Steel, com.	70
U. S. Steel, pf.	116
Va. Car. Chem.	58½

N. Y. CURB Aug. 9

Name of Comp.	Clg.
Bonanza Creek	‡3
Boston Copper	‡18
Braden Copper	3¾
B. C. Copper	4¾
Buffalo Mines	‡2½
Butte Coalition	20
Caledonia	⅝
Chino	13¾
Cobalt Central	12
Cobalt Prov.	‡59
Con. Ariz. Sm.	1¾
Cumberland Ely	‡9
Davis-Daly	1 1/16
Dominion Cop.	‡7
Ely Con.	.21
El Rayo	3½
Florence	2½
Gila Copper	‡5
Giroux	7¼
Gold Hill	⅛
Goldfield Con.	8 7/16
Greene Cananea	7½
Guanajuato	‡1⅝
Guggen. Exp.	185
Kerr Lake	6 1/16
La Rose	4
McKinley-Dar-Sa.	.96
Miami Copper	22
Mines Co. of Am.	57
Mont. Shoshone	‡.37½
Mont.-Tonopah	‡.98
Nev. Utah M. & S.	⅝
New Baltic	5
Newhouse M. & S.	‡3¼
Nipissing Mines	10⅛
Ohio Copper	1 1/16
Pacific Sm. & M.	1/16
Ray Central	2⅝
Ray Con	18½
Silver Queen	‡.35
Standard Oil	605
Stewart	1/16
Tonopah	8¼
Tonopah Ex.	.83
Tri-Bullion	‡⅝
W. Va. Wyo. Cop.	‡2 1/16
Yukon Gold	4

LONDON Aug. 10

Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton'sInd.	0 3 3
Camp Bird	1 7 6
Esperanza	2 16 3
Tomboy	0 16 3
El Oro	1 6 6
Oroville	0 5 9
Mexico Mines	8 12 6

BOSTON EXCH. Aug. 9

Name of Comp.	Clg.
Adventure	6¼
Allouez	41
Am. Zinc	23¼
Arcadian	5
Arizona Com.	18⅞
Atlantic	7
Boston Con.	‡15
Butte & Balak	12⅝
Calumet & Ariz.	59⅛
Calumet & Hecla	535
Centennial	16¼
Con. Mercur	6
Copper Range	65
Daly-West	7
East Butte	8
Franklin	11⅛
Granby	31
Hancock	19⅛
Helvetia	‡2
Indiana	14½
Isle Royale	19¾
Keweenaw	2⅞
Lake	39
La Salle	11¼
Mass	8
Michigan	4⅛
Mohawk	50
Nevada	20⅝
North Butte	28
North Lake	9⅜
Ojibway	6
Old Dominion	38
Osceola	131
Parrot	15
Quincy	75
Shannon	11
Superior	45
Superior & Bost.	9¼
Superior & Pitts.	12⅛
Tamarack	60
Trinity	6¼
U. S. Smg. & Ref.	39⅜
U.S.Sm. & Re., pd.	47⅜
Utah Apex	3⅛
Utah Con.	24¼
Victoria	2¾
Winona	9
Wolverine	119
Wyandotte	1½

BOSTON CURB Aug. 9

Name of Comp.	Clg.
Ahmeek	180
Bingham Mines	‡3
Boston Ely	1½
Boswyocolo	.07½
Cactus	1⅞
Calaveras	10½
Champion	.05
Chemung	‡8½
Chief Cons	1½
Cons. Ariz.	1¾
Corbin	6¼
Crown Reserve	2½
First Nat. Cop.	3¼
Inspiration	7 1/16
Mackinaw	.07
Majestic	.50
Nat'l Mine	.22
Nevada-Douglas	2⅜
Oneco	2¼
Raven Copper	.20
Rhode Island Coal	6¼
San Antonio	7
Shattuck-Ariz.	22½
South Lake	7
Superior & Globe	.25
Trethewey	1⅛
Tuolumne Copper	2¾
Vulture	9¼
Yuma	.15

‡Last quotation.