The Engineering and Mining Journal

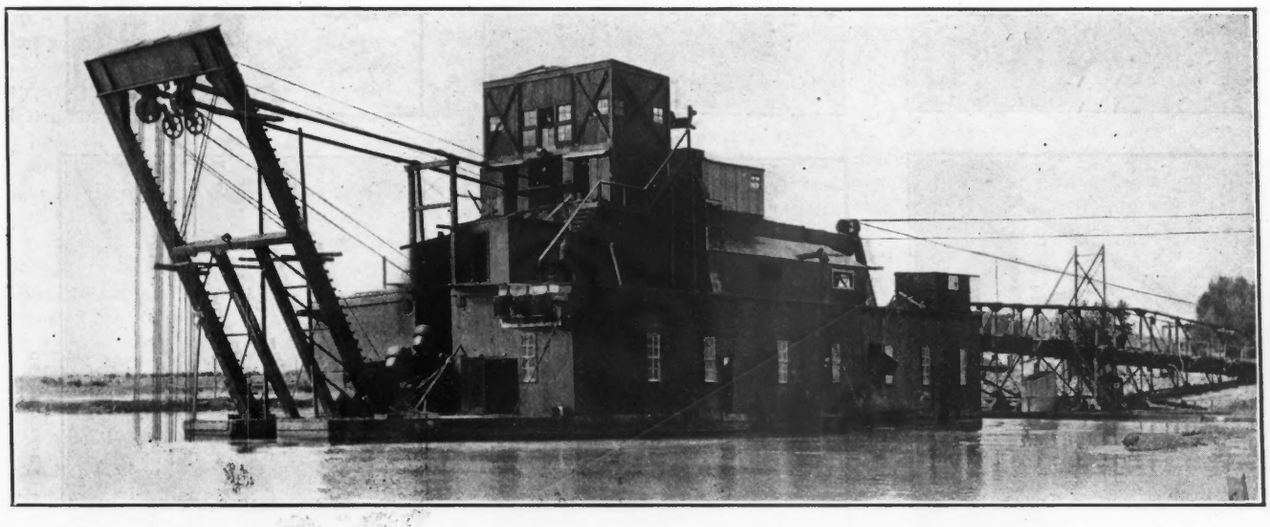
VOL. LXXXIII. NEW YORK, JUNE 29, 1907. NO. 26

Gold-dredging Practice at Ruby, Montana—I

How the Conrey Placer Mining Company Has Met a Series of Difficult Conditions in Handling Clayey Gravel and Boulders

BY J. P. HUTCHINS*

During a recent visit to Ruby, Madison county, Mont., my second in the last four years, I was forcibly impressed with the dredging operations of the Conrey Placer Mining Company, particularly as illustrating marked progress and successful development under peculiar and difficult conditions. The commendable resourcefulness of the operators and the unique features in dredge design which they have introduced, will be described in this article. I take this occasion to thank A. H. Wiseman and Charles Kammerer, of the Conrey Placer Mining Company, for many courtesies to visitors interested in dredging; they always give most generously the benefit of their valuable experience and manifest a strong desire to aid anyone in solving the many problems involved in dredging.



DREDGE NO. 3, THE LARGEST GOLD DREDGE IN THE WORLD

Location of Alluvion

The material being dredged is about 5200 ft. above sea level in Ruby valley, Madison county, Mont., just below the debouchment of Alder gulch from the foothills of the Gravelly range. Alder gulch was one of the rich placer deposits discovered in the early sixties. In 13 miles of its course, with an average width of about 300 ft. and average depth of about 20 ft., it has produced a gross yield estimated by various authorities at from $75,000,000 to $150,000,000. The expensive methods of rocking and hand-sluicing material, which was mined by open cutting with hand shoveling (often with ground sluicing of over-burden), when the material was shallow, or by drifting and hoisting to the sluices when it was deep, were used. Attempts have been made to work parts of the gulch gravel with various types of mechanical excavators, but not with success.

One noteworthy installation included a cableway such as is used in canal construction, but it had only one movable suspension point, the hoisting end, while the dump end was fixed (being moved only occasionally as the exigencies of the work and the need of dumping room dictated). The method of excavation was a peculiar one; it combined the use of ground sluicing (to make cuts through the gravel) and of a bucket, which was also a drag scraper, excavating the material from the cuts as it was dragged across them. When full, it was hoisted and trammed on the cableway to a sluicing apparatus high enough to allow grade for the sluices and dump for the tailings. The plant, requiring over 30 men to run it, and costing about 30c. per cu.yd. to operate, was too expensive and, handling only about 500 cu.yd. per 24 hours, was too limited in capacity. Like numerous other placer-mining plants of but slight mobility, resultant low capacity and high cost prevented successful operation.

Most of Alder gulch—practically all that could be drained—has been thoroughly mined; but in the lower end, just above its debouchment, there is an area that has not been worked, low value and excess of water preventing. It is thought that this ground can be worked with floating dredges, although an uneven bedrock, large boulders, steep grade of the creek, penetration of gold into the bedrock, and great concentration of gold content, are obstacles. As a means of working it, the method of hydraulic dredging, used so successfully in Australia and New Zealand, naturally suggests itself as possibly being well suited.

Features of the Gravel

The deposit now being worked contains about 600 acres of proved dredging ground. Like many other debouchment deposits, it is generally fan-shaped with the apex at the mouth of the gulch. Its age is, probably, late Pleistocene and the boulders and gold, in their sub-angularity and irregular bedding, denote a time of deposition much less than that of the California dredging fields. Other features in-

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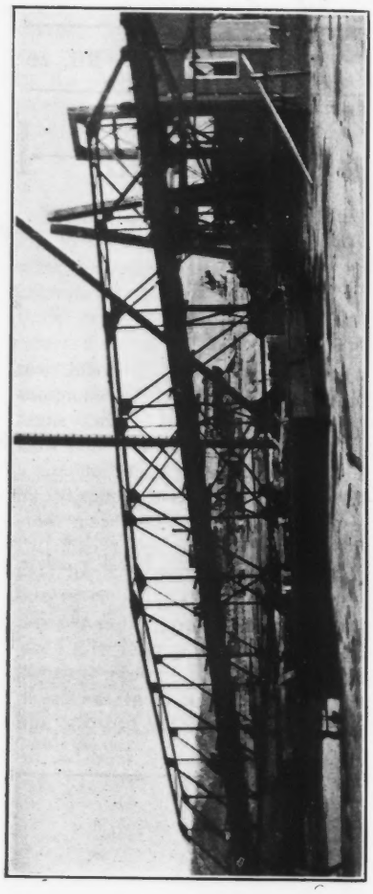
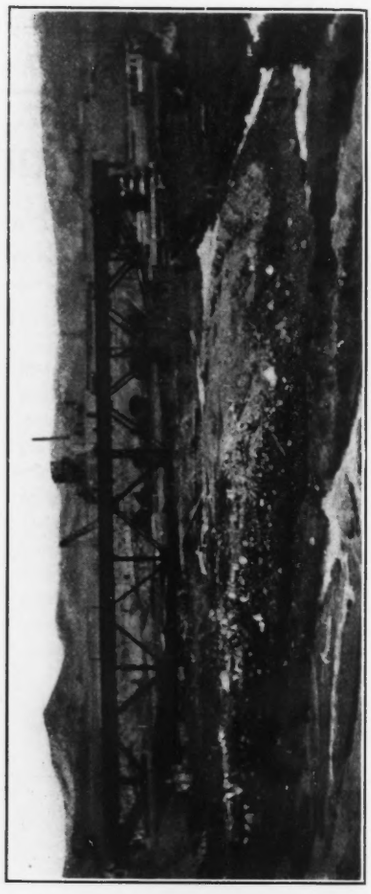
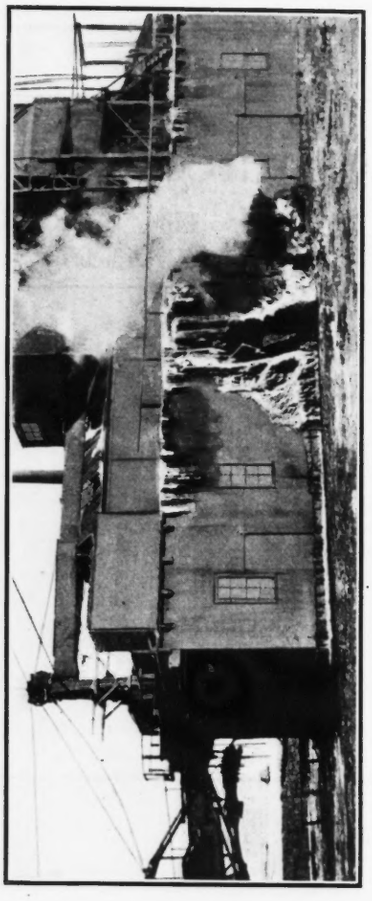


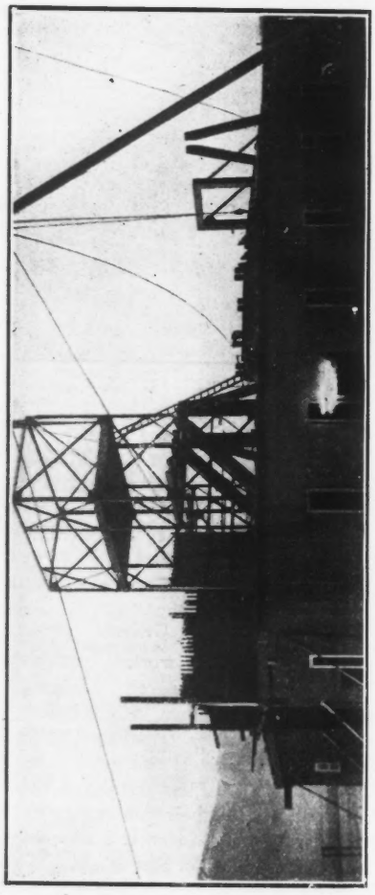
SLUICE AND SLUICE SCOW, NO. 3 DREDGE



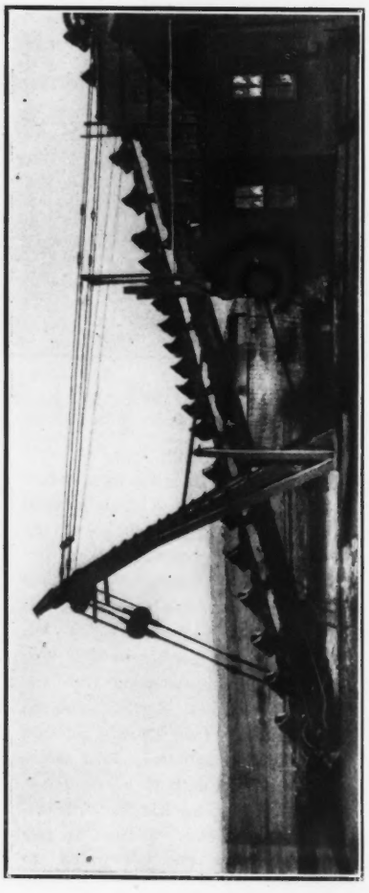
BUCKET LADDER OF 12.5-CU.FT. DREDGE



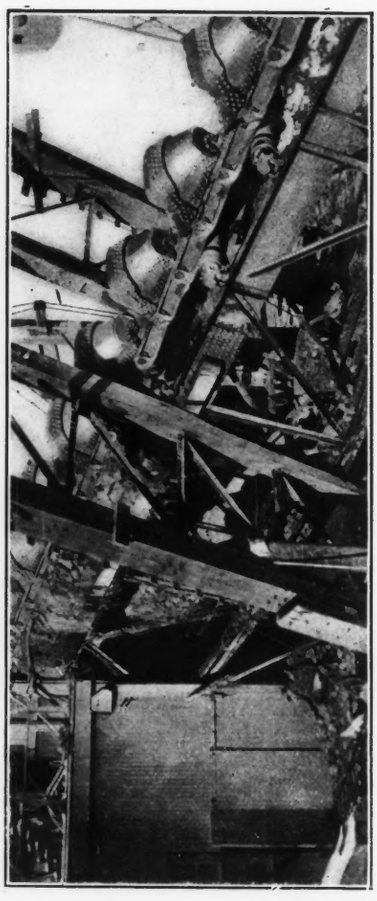
ICE ACCUMULATIONS IN WINTER



DREDGE NO. 3 IN COURSE OF CONSTRUCTION



OPEN AND CLOSE-CONNECTED BUCKETS ON THE SAME CHAIN



DREDGE IN WINTER, SHOWING REDUCED FREEBOARD

dicate that it may be contemporaneous with those of Colorado.

The surface has a slope to the west of about 1 per cent., while the bedrock slopes slightly more to the west; thus as the work progresses in a westerly direction, depth increases until the maximum of 60 ft. is met, 2.5 miles from the mouth of Alder gulch. In this circumstance the deposit resembles a true flood-plain gravel though it seems to be an area of debouchment resulting from deposition by decreasing stream gradient or smaller volume of steam flow or, as is more likely, through a combination of these two factors. To the present time the maximum depth of material handled has been 40 ft. with the 10-cu.ft. bucket dredge. Ruby valley is a large area of alluvial or, possibly, lacustrine gravel, all said to be slightly auriferous.

Through the center of the deposit and running generally west is a trough supposed to have been the original channel of the creek before its choking with gravel. A greater gold content and an occurrence of larger boulders within its limits indicate the probability of this belief.

Tenacity of the Gravel—Boulders

The gravel, though not indurated, in the ordinary sense, is tenacious and compact, due to the existence of clay irregularly through it, but particularly near bedrock. The material is generally most tenacious near bedrock where a greater amount of clay and heavier pressure have combined to give a tenacity difficult to overcome, first in excavating with the buckets, second in discharging from the buckets, third in screening in the trommels, and fourth in sluicing. It has been found that best results are attained when a chain speed of 30 to 35 ft. per minute is maintained by the buckets in tight and loose gravel respectively. When greater speed is attempted it is difficult to fill the buckets and a lower actual capacity results although theoretically the capacity should be higher.

A greater amount of time seems necessary to disengage tenacious or sticky gravel from place than to accomplish the same result with cemented gravel. The former seemingly must be slowly torn and wrenched from the digging bank, while the latter, though harder, seems to crumble and detach itself by breaking away from the digging bank at a more rapid rate, as if the impact of the buckets had some effect. In other phases, namely, in discharging from buckets, in screening and in sluicing, tenacity makes time an important and necessary factor to do complete work.

As will be noted in an accompanying illustration, some large boulders are occasionally encountered. With the open-connected bucket now used, no particular difficulty is experienced in handling them. Several notable dredging failures in rich gravel have been caused by installing small close-connected buckets in gravel of similar character. Perhaps a 3-cu.ft. close-connected dredge, or, possibly a 5-cu.ft. close-connected dredge, would be failures at Ruby. Not only are large boulders encountered but the extreme tenacity makes either long-pitch close-connected buckets or open-connection essential.

Experiment with Close-connected Buckets

Some experimenting has been carried on with close-connected buckets on the 7.5-cu.ft. dredge. As is shown in an accompanying illustration, a number of buckets were close connected among open-connected buckets. It was found that a larger capacity was obtained; just how much, has not yet been determined. Indicator cards showed that it required about 14 per cent. more power to run the chain when the close-connected buckets were digging. This would signify that probably the close connection is preferable, for it is likely that more than 14 per cent. more material was excavated.

Not enough experimenting has been done at Ruby, nor have observations been determinate enough, to say that it takes more or less power per cubic yard excavated with the one or the other type of connection, but the opinion is that the close-connected buckets will dig with less power per cubic yard excavated, will dig more per unit of weight of the digging apparatus, will dig with less surging, will dig with less wear and tear per cubic yard excavated, and will thus be more economical and reduce operating cost. Indicator cards also showed an increase of about 17 per cent. in the power required to dig the indurated bottom gravel over that needed in loose top material.

Character of the Bottom

The "bedrock" is an extremely tenacious clay; it varies in color from light cream to dark brown. It seems to owe its origin to deposition of tufa and volcanic ash from slow-moving or still water. It resembles the Oroville bottom, though it is more tenacious and sticky. It is generally smooth, with but gentle undulations. There is no particular concentration of gold on or near it, and no penetration into it; these features and the circumstance that when any considerable volume of it is excavated by the buckets it must be pried or dug out of them (for it will not discharge) make it only unnecessary but undesirable to attempt more than to skim it very slightly.

There is a marked contrast between the bottoms of Alder gulch and its debouchment. Not only are they different in that one is said to be rough, "true" bedrock, with deep crevices, while the other is a smooth "false" bedrock without cracks, but in the gulch a marked concentration and penetration of gold have been noted, while absence of these features are observed in the dredging area.

Percentage of Gold Extraction

The dredging ground has been prospected by test holes made with a Keystone drill. In one part holes were staggered 150 ft. apart on lines 200 ft. apart. Part of the ground was divided into rectangles 330x660 ft., and holes were drilled at the corners. A comparison of prospecting content with dredging recovery indicates about 5 per cent. loss in the tailing.

An interesting experiment to determine the gold content of the tailing was made. Holes were drilled in it and about 5 per cent. of the prospect value was found. Most of this was recovered as amalgam, which would indicate that the loss was principally in the gold-saving phase of the work, though it is likely that the only content, while being largely, if not entirely, responsible for the loss from the sluice (by "stealing" gold as it rolls along in balls) is also to blame for another percentage of the loss, causing, as it does, faulty discharge from the buckets and incomplete disintegration and washing in the screen and sluice.

These conclusions are not definite inasmuch as early day placer mining, carried on near the point where the experiments were made, employed quicksilver. However, it is certain that there is a percentage of loss by balls of clay picking up amalgam in the sluice and conveying it to the dump, inasmuch as clay, with adhering amalgam, is sometimes found on the dump. This is particularly noticeable when dredging rich gravel results in amalgam filling the riffles to such a degree as to permit contact with clay balls.

The save-alls (colloquially called "deck sluices" because of their location on the lower deck) save about 5 per cent. of all the gold recovered. This again shows the result of the clay content preventing easy discharge (even though the bucket speed is slow, and thus allows considerable time for the buckets to empty themselves as they round the upper tumbler).

Characteristics of the Gold

The gold is 840 to 860 fine. Its coarseness varies; about 40 to 50 per cent. passing a 60 mesh, and about 15 to 30 per cent. passing a 100-mesh. Much of the gold is sub-angular and is coarse in comparison with the gold of the California dredging fields. It resembles the gold from Alder gulch, showing the same relation to it as is observed elsewhere between gold of debouchments and that of the creeks above them. The average gold content is about 30c. per cu.yd.

Types of Dredges

The first attempts to dredge the deposit included an excavator with an orange-peel bucket. The excavating machinery was mounted on a large car and track to permit movement; and a long boom was installed to enable discharge of the material from the bucket into a high hopper and washing machine, also mounted on a

car. This installation was a failure; while possessing the many faults common to placer-mining machines mounted on cars, it was also incapable of excavating the tenacious gravel. Attempts to work it were soon abandoned.

The next attempt was made with a double-lift dredge, named the "Maggie Gibson." This machine had been at work at Bannack, Mont., and was re-erected on leased ground belonging to the Conrey Placer Mining Company. Open-connected buckets of 5 cu.ft. capacity, weighing about 600 lb., 3-in. steel pins, a lightly-built trussed I-beam ladder, a weak sprocket wheel on an upper tumbler shaft of only 8 in. diameter, and other features of parallel weakness, resulted in many breakdowns.

A 12-in. dredging pump was used to elevate the material (after its discharge from the buckets at a point about 17 ft. above water level, and its passage through the 4x5-in. openings of a chain-driven revolving screen) to a sluice about 80 ft. long, sustained on an auxiliary scow.

A 48x48-in. wooden spud was first used as a means of anchorage, but it was often broken. This is explained as follows: The oversize (which was discharged from the screen over the side) formed a loose layer of coarse boulders on the bottom; into this the spud buried itself to a considerable depth by its boring action as the dredge was swung from side to side in lateral feeding. The leverage on the spud was tremendous and the character of the resulting fractures in every instance showed that torsional stress was largely if not entirely to blame for the trouble. A contributory factor was the loose fit of the spud in its casing, thus permitting considerable play and heavy shocks. Had a long, instead of a short, round point been used on the spud, thus allowing easier turning in the boulders, it is probable that no trouble would have been experienced. This dredge ran for five years, until the lease expired.

The first elevator dredge installed (in 1899) by the Conrey Placer Mining Company, had 5-cu.ft. open-connected buckets. They weighed about 750 lb. They were of weak construction and much difficulty was encountered. Buckets of 7.5 cu.ft. capacity, weighing 1400 lb., are now used on this dredge. The dredge is 100x44x7 ft., and draws 5.25 ft. of water; it has three 70-h.p. boilers, and 14 and 10-cu.in. centrifugal pumps lifting 24 ft. The dredge is of the single-lift type discharging material 30 ft. above water level into a revolving screen having 5-in. perforations. Oversize is chuted over both sides, while the fine material drops into a sluice, 140 ft. long, articulated at the stern, 52 in. wide on a 7 per cent. grade, the outboard part 120 ft. long, being sustained on an auxiliary scow. The sluice was divided into two parts by a longitudinal partition (to allow continuous running in one-half of it while the other half was being cleaned up). This partition was soon removed principally because unequal distribution of material on the two sides of the partition, due to listing, gave bad results.

The No. 2 dredge has 10-cu.ft. buckets, is 110x44x7 ft., and draws 5 ft. 4½ in. It contains 200,000 ft. of lumber, board measure, has two 6-in. and four 4-in. longitudinal bulkheads, and two 100-h.p. boilers. The sluice is 4 ft. 3 in. wide and 2 ft. 4 in. deep.

Anchorage

Because of the difficulty from broken spuds encountered on the "Maggie Gibson," a new method of anchorage was used. With a dredge having an auxiliary sluice scow, a pivotal point coincident with the point of articulation of the sluice to the dredge is highly advantageous. An A frame was erected at the stern and from the top of this frame, four cables were led to quadrant anchorages by a device resembling the top gudgeon of a derrick. The dredge thus dug and tailed in two arcs, each subtending angles of about 90 deg., and each bisected by the longitudinal median line through the dredge when digging and tailing in the middle of the cut. This arrangement was soon afterward adopted on the "Maggie Gibson," and it has been installed on the other dredges at Ruby. Considerable difficulty was experienced until the machinery for holding the mooring lines was improved and strengthened so as to withstand the heavy strains resulting from digging tenacious gravel.

Moving ahead usually takes 25 to 30 minutes. The aft lines are slackened, the forward lines are reeled in, then the slack of the stern lines is reeled in after the buckets are lowered and turned in contact with the digging bank and the dredge "kicked back" until the forward lines are taut. The lines are not strained to their limit in moving ahead as a small amount of slack is considered advantageous in excavating. Winchmen who have worked elsewhere on spud dredges, generally prefer the mooring lines and the elasticity resultant from using them. The No. 3 dredge, with 12.5-cu.ft. buckets, has double 1¼-in. forward lines and single 1-in. aft lines. They lead to a four-drum winch weighing 45 tons. This will give some idea of its massive character.

(To be continued.)

Immense numbers of jute sacks are annually used in the shipment of nitrate from Chile. They come principally from Australia and the East Indies and cost, delivered in Chile, about 10c. American each. They hold about 100 kg. each and are never used the second time, as the nitrate rots the fiber. During 1906 about 20,000,000 sacks were used, and the demand is constantly growing. The jute sacks are not ideal, as much of the nitrate sifts through, which makes them disagreeable to handle.

Prices in the Klondike

Consul G. C. Cole, of Dawson, in *Daily Consular and Trade Reports,* June 6, 1907, gives the cost of living and the wages paid for labor in the Yukon territory as follows (retail prices):

FUEL AND LUMBER.	
Coal, native, per ton	$15.00 to 20.00
Wood, per cord	12.00 to 15.00
Spruce, native undressed, per M	45.00
Fir, imported undressed, per M	125.00
Oak, imported undressed, per M	400.00
FOODSTUFFS.	
Oats, per ton	80.00 to 120.00
Hay, native, per ton	60.00 to 80.00
Hay, imported per ton	80.00 to 120.00
Beef, per pound	.25 to .50
Pork, per pound	.40 to .50
Ham, per pound	.35
Bacon, per pound	.35
Turkey, per pound	.50
Chicken, per pound	.50
Cheese, per pound	.40
Butter, per pound	.50
Lard, per pound	.20
Tea, per pound	.50 to .75
Coffee, per pound	.35 to .65
Rice, per pound	.08 to .10
Flour, per hundred	6.00
Potatoes, per hundred	8.00 to 14.00
Eggs, domestic, per dozen	2.00
Eggs, imported, per dozen	1.00
Milk, per quart	.35
Milk, canned, per case of 4 dozen	7.50
Canned vegetables, per case	4.00 to 8.50
Canned fruits, per case	6.00 to 8.50
Oranges, per box	12.50 to 25.00
Apples, per box	4.00 to 6.50
BOARDING.	
Hotels, per day	3.00 to 6.00
Restaurants, per meal	.70 to 3.00
Board and room, per month	90.00 to 150.00
HORSES.	
Cost of draft horses per span	1,000.00 to 1,800.00
Boarding horses per month	60.00 to 100.00

The wages of mechanics per day of 10 hours are $10; common laborers, with board, $4 to $5; without board, $6; draft teams, per day (two horses), $25; clerks, per month, $150 to $300.

Everything consumed in the way of living costs from two to three times as much as in the United States. There is no article sold for less than 25c., no matter how trivial, as there is no money in circulation of a less denomination than that. The cost of living will remain high so long as the means of getting supplies into the country remain as they are, and what is true of the Yukon territory is true of the Yukon valley from the Alaskan line to the coast.

The Central Zinc Company

The new works of the Central Zinc Company at West Hartlepool, England, are well advanced and should be in operation by the late autmn. The concentrates from the Central mine, at Broken Hill, belonging to the Sulphide Corporation, are to be smelted there. Plant capable of treating 10,000 tons of zinc concentrate is being erected. The output of zinc should be about 80 tons a week. The land purchased for the works extends over 52 acres and cost £100 an acre. It is situated on the north bank of the mouth of the river Tees. The North Eastern Railway Company is building a branch line 10 miles long to connect the works with its railway system.

The Disposal of Smelter Smoke

Suggestion That Smoke Be Conveyed by Flue to Remote Places Where It Will Be Harmless. Computations To Show Feasibility

BY HERBERT LANG*

The time-honored method of getting rid of the smoke of smelting works by discharging it into the atmosphere in the immediate vicinity of the furnaces is rapidly becoming impracticable in inhabited regions, and smelting companies, in consequence of the hostility of the public, abetted by complaisant courts, are finding themselves in no enviable position. I do not suppose that the methods of abating the smoke nuisance have ever before been subjected to such anxious examination. The problem is a great one, and the solutions which have been offered heretofore are fresh in the minds of engineers the world over. Only one radical method is known in metallurgical literature, viz., the conversion of the sulphur dioxide, the actively injurious constituent, into sulphuric acid, which renders it completely innocuous, but is out of the question under ordinary circumstances for reasons that are well known. In this direction I have nothing to add to what has already been so well said, but it has for a long time seemed to me that a solution of the difficulty may be found to lie in the cheap conveyance of the smoke to distant, sterile and unsettled localities. In fact, I have for several years been expecting that someone would suggest such a course as I now suggest, that experiment be made to determine its feasibility. Is it not possible or practicable to convey these hurtful fumes through long pipes of acid-resisting material, forced by machinery, to points several or many miles distant? I believe it is, and I would not be surprised to see in time such a method made use of. It is well known that examples exist where the smoke of such works has been carried for considerable distances—in one case, viz., the Alston Moor lead works in England, as far as five miles. But in this case natural draft is (or was) made use of, which limits the velocity of the gases and hence involves the employment of conduits of large cross section. Now that so much experience has been acquired in the propulsion of air and other gases through comparatively small pipes, and in the recent advantageous use of forced draft on steamships and in industrial works on shore, we are entitled to assume that smelter fumes may be thus handled, and perhaps with great advantage.

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A Pyritic Smelter in a Vine-Growing District

This subject came most forcibly before me in connection with the designs for a copper smelter destined to treat sulphide ores by the pyritic process. The site of the works is on the edge of a highly cultivated and prolific region chiefly given up to the culture of the grape, which of all plants might be most injuriously affected. The grape is a rapid grower, assimilating moisture with avidity, and withal is very sensitive to exterior influences. Ten million dollars' worth of these tender plants lie within what I may call the sphere of influence of this smelter, and the state of mind of their owners while the works were going up may be imagined. But the actual facts of the case were different from what may be pictured. It would have been inexcusable rashness to build the works there, except for two facts, which have a great bearing on the choice of site, namely, the direction of the air currents, and the propinquity of a high hill, to which smoke ducts may be led. For the greater part of the year, and especially during the dry season, the winds blow persistently from the northwest. The tract to the southeast, to which the winds would naturally carry the smoke for the greater part of the year, is in the main uninhabited, and is at present valuable only for its grasses, which serve to keep alive a few stray cattle. It is not impossible, however, that with the rapid spread of population in this State, portions of this tract, especially those susceptible of irrigation, may in time become settled up, and it is necessary to be prepared for this undesirable condition. There is a hill, rocky, sterile, and almost devoid of plant growth, which stands three miles from the site and rises a thousand feet above it. Across the intervening space, which is moderately level, it would be practicable to construct a flue capable of conducting the fumes to the top, whence they would be discharged into the atmosphere at a hight sufficient to insure their being so mixed with air that no harm could be caused by them to the growing grasses or other plants in any direction. This hill is a portion of the barren tract alluded to, and I am fully convinced that if the fumes were once got to the top they could never again be harmful to anything. I believe, therefore, that by taking advantage of the nearness of this hill, the investment in the mine and smelter would be saved, whatever may be the condition of popular sentiment. The intention is to run the plant as it stands, discharging the smoke at first from the stack adjoining the furnaces, and wait a while for developments. If opposition appears among the settlers it will be ample time to set about building the long flue to the hill. This, of course, would take considerable time, but so long as the smelting company manifested a disposition to protect the neighbors and improve the conditions, doubtless the "suffering" public would wait.

Proposed Use of Wooden Flue

Before venturing on the actual construction of such a flue much study should be bestowed upon the details, the more so as the whole subject is in a tentative condition, and nothing as yet reduced to practice. It is evident that a construction similar to the dust chambers and flues of ordinary smelting works would be quite out of the question where it was found necessary to convey the smoke as great a distance as several miles. The material of construction, the size of the conduit, and the character and power of the propelling mechanism by which the gases are to be propelled are the most important considerations. As the whole subject is experimental, I considered that a wooden flue, placed upon or above the surface of the earth, might be advantageously used, its principal recommendations being cheapness and the ease with which a trial length might be put up. There is some warrant for believing that this material, which to the casual reader might seem the most unfit that could be used, might prove sufficiently durable, for it has been actually used for smokestacks and other constructions where the wood came in actual contact with the sulphur gases without too rapid deterioration. A wooden stack of considerable size and excellent performance was described in the Journal a year or two back; and I myself have built and used as a temporary makeshift a dust chamber of boards, which, barring an unfortunate tendency to take fire at inopportune times, did very good service. The difficulty with such constructions lies in the tendency, not of the wood itself, but of the iron fastenings, to be eaten up by the sulphur gases in the smoke, when the whole structure collapses. The obvious

remedy is to protect the iron by copious applications of coal tar, asphaltum, and the like, which resist to a great extent the action of the vapors; and if these applications are made with sufficient care and frequency there is no doubt that the wooden structure will have a reasonably long life; but it is found in practice that there are always spots that cannot be reached by the paint brush, and it is there that the fumes are found to react most injuriously.

Form of Flue

Many forms of the wooden flue suggest themselves. Of these I conclude that the cheapest per unit of capacity would have the A-section, like the steep roof of a house. This would be easy to construct, requiring little carpenter work; would shed the rain; and if made broad at the base would resist the winds very well. The earth would form the bottom, while the side boards would meet at the top. The outside would be battened. The principal objections would be the propensity of lumber to become warped by the sun's heat, producing leaks, and the inefficiency of the triangular section as compared with the circular form, which would be preferred in case that metal flues were adopted. The remote corners of the triangle would be almost useless as a passageway for the smoke, in which interfering currents would doubtless be set up. I estimated that a conduit of this description having a cross section of 24 sq.ft. could be built at the place designated for $11,000 per mile. It is hardly necessary to say that the application of forced draft would be essential to the success of the undertaking in any case, whatever form of conduit were adopted, for it would not be possible within the limits of practical expenditure to build a tube so large that natural draft would suffice. On account of the impracticability of admitting hot gases into the wooden duct, and of the cooling effect of a metallic one, the ascensive power of the gases would be very small, while to overcome their friction and to generate a velocity commensurate with the amount to be handled, a considerable power would be necessary. The amount of smoke in this case is nearly 25,000 cu.ft. per minute, reduced to the temperature of 125 deg. F., at which it is supposed they will enter the horizontal part of the flue, being the wooden part in case that material were adopted. Prior to this they will have passed through such a length of sheet-steel dust catchers and flues that their heat will have become largely dissipated and their dust and condensable matters mostly precipitated.

Estimate of Fan Power Required

To afford the necessary impetus my plan is to introduce suction fans of the Sturtevant "Monogram" type, in the line at intervals of about a mile, through which the gaseous current will pass, these to be driven by electricity from a parallel line of wire. It would be necessary, of course, to provide means for cleaning the interior of the tube from deposited solids, which would undoubtedly gather, and this would necessitate doors, slides, or other means of getting in, or else some mechanical arrangement to serve the same end and obviate the cost of hand work, which would perhaps be quite an item of expense. I presume it would be good policy to make the tube large enough to admit of the formation of considerable deposits of zinc, antimony, arsenic, lead, etc., or other matters, without seriously diminishing the capacity of the flue. The tube should be duplicated at the lower end, where the fumes tend to precipitate most copiously, so as to admit of one side being cut out and cleaned, while the smoke was passing through the other.

While this style of flue would probably answer the comparatively transient needs of most smelters, there are reasons for preferring other types of construction. Most engineers would prefer a sheet-steel tube of equivalent section, although of greater first cost, on account of its greater durability under these circumstances and of its better mechanical appearance. It seems probable that a cylindrical tube 5 ft. in diameter would be equal in efficiency to a triangular one 8 ft. high by 6 ft. wide at the ground, the former having a sectional area of 24 sq.ft., the latter of 19.63 sq.ft. The 5-ft. tube of No. 8 sheets, I estimated could be provided and set up for $15,000 per mile. I assume that the amount of power necessary to compensate for friction in the cylindrical pipe would be 32 h.p., assuming the correctness of the tables in the Sturtevant publication, "Mechanical Draft," and probably quite as much in the case of the triangular wooden flue.

It would undoubtedly be quite feasible to employ smaller and less expensive sections, but always bearing in mind that a diminished section means increased power of propulsion. I have calculated the power necessary in the case of a 4-ft. cylindrical tube of the same length and find that about 100 h.p. would be needed to overcome friction. A 2-ft. tube would consume for the same purpose nearly 3000 h.p. A limit would therefore be quickly reached in our efforts to reduce the first cost of the conduit by diminishing its size.

Other Considerations

Where the operations of the smelting works are expected to be in a measure permanent, it would be natural to canvass the merits of brickwork and cement concrete as materials for such flues. The expenses in constructing such would no doubt be greater, and so would be the engineering difficulties involved in arranging for their rapid cleaning, inasmuch as they would of necessity be seated upon or buried in the ground, and difficult of access.

There are some situations in this and other countries where some solution of the fume problems is of great and pressing importance. It appears to me that in a situation like that of the Salt Lake plants the solution would be found to lie in the direction which I have herein pointed out. The surrounding mountains would surely furnish convenient eminences to which the smoke might be carried, the interests at stake being, as viewed from the outside, sufficient to render some radical movement advisable, even if it proved very costly. This suggestion is so obvious that I must own that I shall be surprised if it has not been canvassed before by the parties in interest in many smelting works not only in this but in foreign countries. Should I proceed farther in this matter and gain experimental or practical knowledge of its actual workings, it will give me pleasure to communicate them to the readers of the Journal.

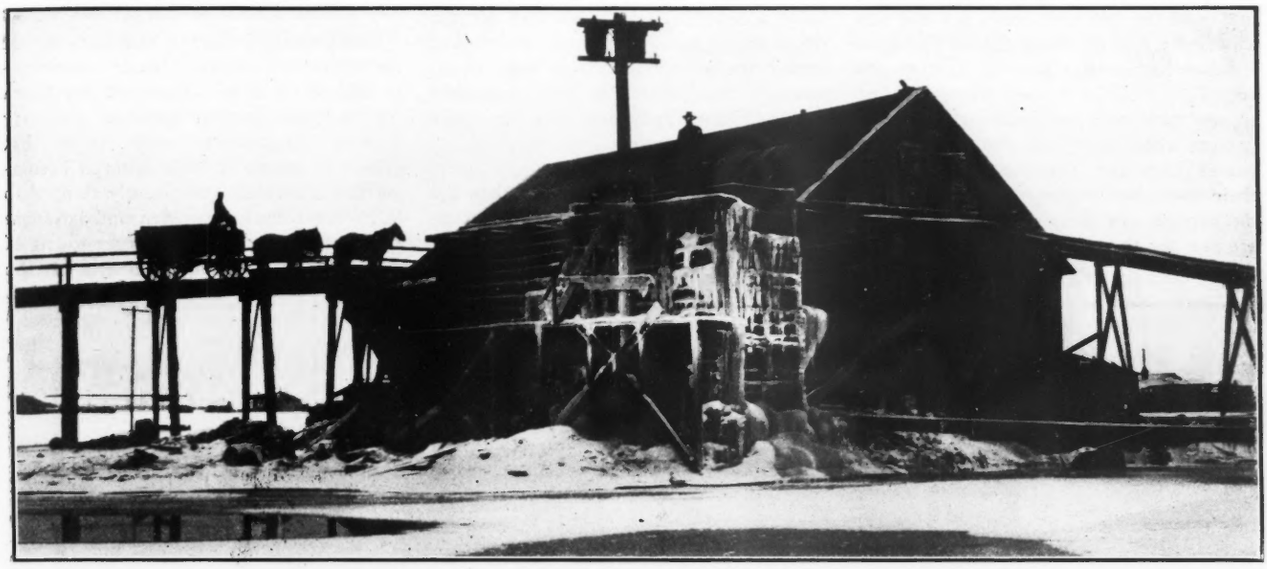
By-product Coke for Domestic Fires

In a paper read by Paul Schlicht before the Society of Arts at London, May 8, an earnest plea was made for the use of coke in domestic fires, and particularly for coke made in by-product ovens, by which certain quantities of inflammable gas are left in the fuel, rendering it more flaming than that turned out in the ordinary way. The use of bituminous coal in domestic fires was condemned as being very wasteful, for about 14 times the air necessary to burn the coal was generally sent out of the chimney. This is impregnated with steam and sulphuric acid, as well as with particles of carbon, which produced fog. In addition to this, in the consumption of every ton of coal 100 lb. of coal tar are destroyed; also many valuable constituents useful in the arts and in medicine, besides oils useful for lighting and motor purposes, together with solids that might be employed in road-making. If in place of such form of combustion the coal were treated in the modern by-product oven, there would be, in addition to the products named, about 14 cwt. of coke, suitable for domestic and metallurgical purposes. Flaming coke can be made in the by-product ovens in from four to five hours less time than the low volatile coke required for metallurgical purposes, a certain percentage of hydrogen and hydrocarbons being allowed to remain in the coke.

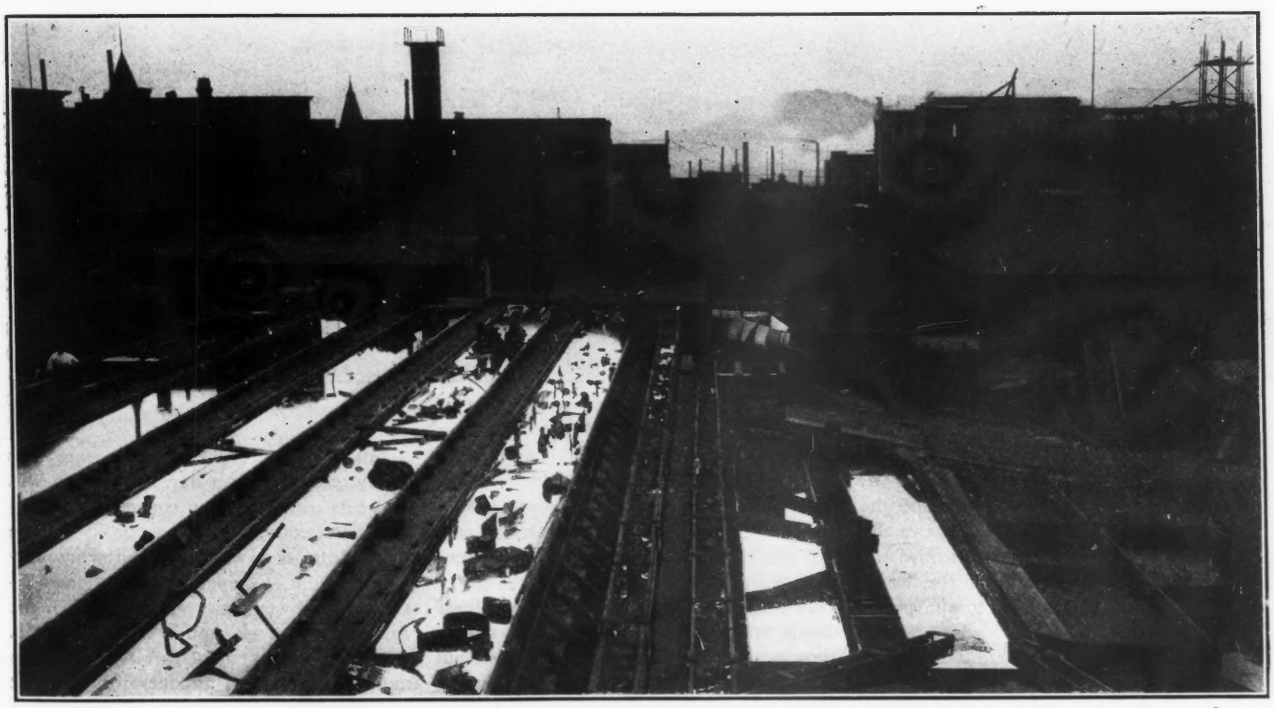
Precipitating Copper from Butte Mine-water

By A. F. Bushnell*

During recent years the recovery of copper by precipitation at Butte, Mont., has made great advancement. How much money has been lost in the water going down Silver Bow creek by failure to do this earlier cannot be told, but doubtless the amount is large. The idea of recovering copper from this water first occurred, in 1888, to a Welshman named Morgan, who lived not far from the Anaconda and St. Lawrence mines. The water pumped from these properties ran close by his home. He noticed that tin cans and scrap iron, which were thrown into the water, disappeared after a month or more and left in the mud a dark, red sediment. Morgan gathered some of this sediment and had it assayed, thus discovering that it was copper. Morgan undertook the business, but had little success, and died a few months later. Fred Miller then tried it, introducing methods that were more effective than Morgan's, but were crude compared with those in use at present. Miller made small ponds of the water from the St. Lawrence mine and threw into them great quantities of tin cans and scrap iron. When this material had been eaten up, the ponds were drained, and the precipitate scraped up. Miller made good money at this, but when others encroached upon what he considered his rights, he became disgusted and quit.



PLANT OF EAST BUTTE COPPER COMPANY IN WINTER



BOX SYSTEM AT THE ORIGINAL MINE—SETTLING TANKS ON THE RIGHT

The precipitation of copper was first put upon a business basis in 1901 by William Ledford, who secured a three-year lease on the water of the St. Lawrence and Anaconda mines at a 25 per cent. royalty. In these three years, it is said,

*Butte, Montana.

he realized more than $100,000 from his venture. During this lease the copper water became so strong that in a short time it ate up the pipes through which it was pumped to the surface, wherefore the companies weakened the water by passing it over iron underground. Ledford contested this on the ground that he was to have the entire right of precipitation, and sued the Anaconda company and was awarded a few thousand dollars' damages.

After Ledford's successful venture the companies refused further lease, deciding to do their own precipitating. At the present time nearly all the large companies have two precipitating plants of their own, one underground and one at the surface. In many of the mines drifts are run for the sole purpose of precipitating copper.

means of floors 18 in. apart. These floors are made of 2x4-in. scantlings, placed 3 in. apart, running lengthwise. Tin cans and scrap iron are placed on the several floors. By means of a small motor the copper water is raised to the top of the tower, where it is distributed to fall equally and constantly over the scrap iron. The tin cans and smaller pieces of iron are eaten up in a comparatively short time, but the larger pieces must be scraped or knocked against the walls regularly in order to remove the precipitate. The latter is washed to the bottom and then into the tanks alongside of the towers.

The owners of these plants sell their output to the smelters at 4c. less than the market quotation for copper. The average precipitate runs between 40 and 60 per cent. copper, but J. C. Kemp, who operates near the old Colorado smelter, often has precipitate as high as 84 per cent. Men working near the long-disused Parrot smelter, by allowing the water to seep through the tailings, have precipitates running close to 70 per cent.

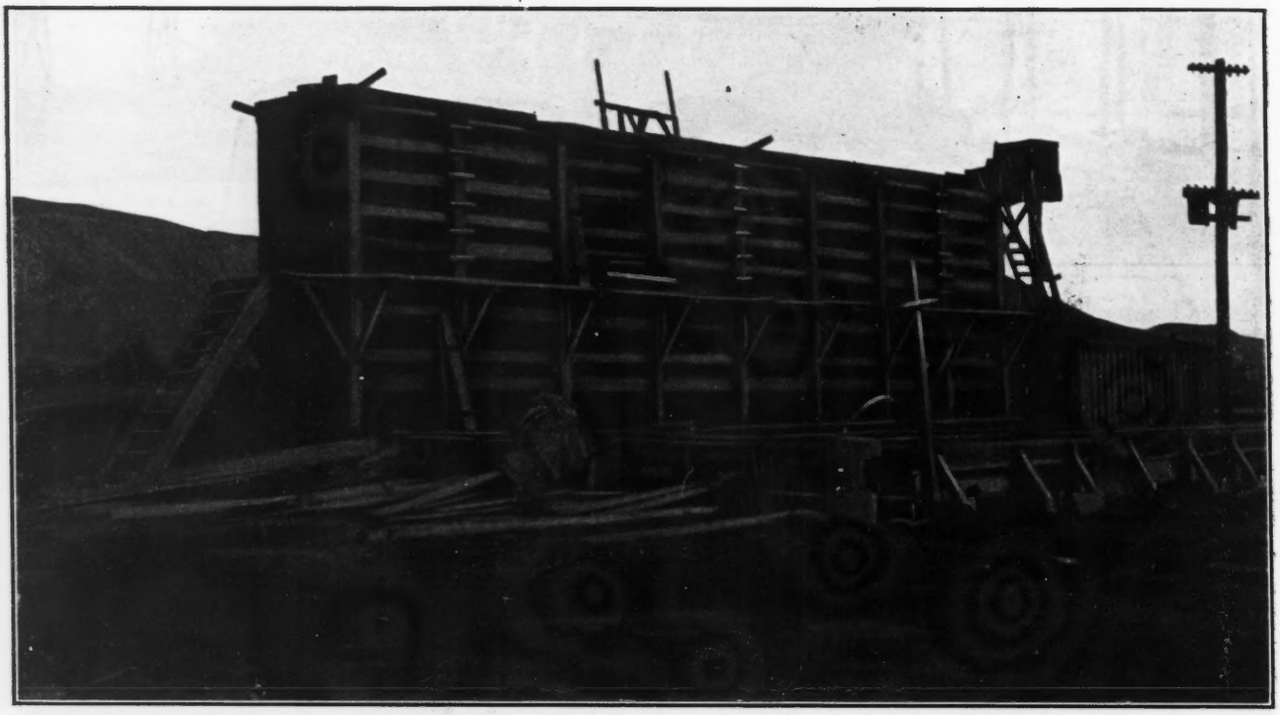
It might be thought that the plants would be compelled to close in the winter time, but not so. The water coming from the mines is quite warm, and the chemical action in precipitation liberates heat. The water has a greater percentage of copper in it during the winter months because there is no surface water, caused by rains, with which to contend. As a matter of fact almost as much copper can be made in winter as in summer.

There are about 50 concerns operating in the Butte district, comprising about 75 towers, besides the numerous box systems. The Amalgamated has the largest plant, consisting of six towers between 30 and 50 ft. high. Other prominent operators are W. A. Clark, the Boston & Montana, the East Butte company, John MacGinniss, F. E. Speidel, J. M. Kennedy, Emil Hansen, Fred Rowe, William Kelley and Green & Bryant. Several new towers are being erected at the Gagnon mine.

The Supply of Scrap Iron

One peculiar feature of this work is that the streets and alleys of Butte are entirely free of tin cans. Operators pay $10 a ton for precipitating material, and say they are fortunate to secure it at that price. So scarce is such material becoming that a carload was recently shipped to Butte from Spokane. Men and boys are making a living in all the larger towns of Montana by supplying material for the plants. Two persons with a team can easily gather a ton a day. A tin can will make its own weight in copper.

As an example of what profit can be made from this work the following may be cited: F. E. Speidel and others constructed a tower plant on the banks of the Silver Bow creek, south of Butte, at a cost of $4000. It paid for itself in eight months. However, all operators are not as fortunate. The expense of operating a tower plant is small, as two men on a shift can care for three towers. Seven hundred tons per month is a conservative estimate of the output of the copper precipitate in the district, to make which costs 8c. per pound.



TOWER SYSTEM—PUMPING PLANT ON THE RIGHT—TANKS IN THE FOREGROUND

Methods of Precipitation

There are at present two methods of precipitation, viz., the box system and the tower system, the latter being generally conceded to be the more successful; the towers occupy less space and the water is more thoroughly exposed to the precipitant.

The box system consists of a series of troughs from 1 to 3 ft. wide and 1 ft. deep, covering a great deal of surface. Into these troughs the scrap iron is thrown and the copper water is caused to run over it. The copper precipitate, after being washed through the many compartments, sinks to the bottom of the tank, which is cleaned out once a month.

The tower system was introduced about 10 years ago by Huddleston & Turner. The usual tower is about 3 ft. wide, 20 ft. high and 30 ft. long, and is partitioned off by

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According to an official report, monazite sand has been discovered in Kangaroo island, which belongs to Australia.

The Electric Furnace in Steel Making and Copper Smelting

By T. Scott Anderson*

Until within the last two or three years the electric furnace was used exclusively for the manufacture of such refractory substances as carbide of calcium, for the treatment of which the temperature at which the ordinary furnace works is too low. Since then, however, the electric furnace, somewhat modified, has been applied not only to the reduction of ores, but also to the production of steel of any desired grade, and of alloys such as those of iron with molybdenum, titanium, chromium, tungsten, vanadium, etc. It is to this class of work that I shall refer in particular.

The question of electric smelting is controlled chiefly by the prime cost of electrical energy. Wherever this can be obtained either by means of water-power or by cheap coal, within reasonable distance of the supplies of raw material, and in a favorable position for the distribution of the finished product, there is a great future for this branch of metallurgy.

Reduction of Iron Ore

Assuming that electrical energy can be produced at a cost of 40s. per h.p. year, 1 h.p. for 8760 hours (a cost based upon the use of water-power and which could hardly be equaled if coal be used), the cost of the production of one ton of steel-making pig would be £1 15s. 6d. This figure includes: electrical energy at £2 per h.p. year, lime, electrodes, coke, labor, miscellaneous material, repairs and maintenance, general expenses and sinking fund. It does not include the cost of the ore delivered to the furnace. These figures are taken from trials of about 90 tons. It will therefore be seen that for the reduction of iron ore, the electric furnace can compare favorably with the blast furnace where the conditions mentioned above can be met.

If coal must be used for generating the electric current, using a gas-producer plant of fair size and efficiency, this cost would probably be increased to £2, 7s. 6d. During the trials referred to a number of castings were made, the results of which were excellent. The metal ran fluid and gave sharp solid castings which in every case were soft for machining.

Where a good ore is procurable the advantages of the electric furnace over the blast furnace are obvious, the chief advantage being a higher degree of purity which can be obtained owing to the absence, to a large extent, of the action of sulphurous gases.

*Electrical and civil engineer, Sheffield, Eng.

Production of Steel

It will be understood that the process of making steel is quite separate from the ore-reducing process. The furnaces which I have patented are each for a distinct operation: for reducing ores to pig iron and for converting the pig thus made into steel. The cost of producing steel from scrap is: scrap steel, £2 18s.; labor and other charges, £3 5s.; total £6 3s. This represents a good grade of crucible steel selling at, say, £14 per ton.

The cost of producing 1 ton of steel from the pig produced in the electric furnace and charging the pig according to the estimate of £1 15s. 6d. per ton, and also including, coal, electrodes, electrical energy, labor, molds, tools and sundries, repairs, depreciation and sinking fund, would be £3 6s. per ton.

Every grade of steel can be produced. Mr. Harbord, late of Cooper's Hill College, London, and the metallurgical expert sent out by the Canadian government to investigate the question of electric smelting in America and on the Continent, concludes his report by saying: "Steel equal in all respects to the best high-class Sheffield crucible steel can be produced in the electric furnace at a cost considerably less than the cost of producing a high class crucible steel in the ordinary way."

Iron sand such as that found in New Zealand and elsewhere has been smelted electrically with success; the steel produced gave the analysis show in the accompanying table:

ANALYSIS OF STEEL MADE FROM IRON SAND IN THE ELECTRIC FURNACE.

Carbon (by color)	0.730 per cent.
Silicon	0.050 per cent.
Manganese	0.155 per cent.
Sulphur	0.010 per cent.
Phosphorus	0.017 per cent.
Iron (by difference)	99.038 per cent.

Smelting Other Metals

In addition to the use of the electric furnace in iron and steel smelting, ores of manganese, zinc and copper can also be reduced. A series of experiments was made on two classes of copper ore, one a pyrite containing roughly 7 per cent. copper and 9 per cent. sulphur; the other a low-grade ore from Chile, mixed with manganese and lime. The ores were crushed and the furnace was charged with a hand shovel, all charges being carefully weighed and sampled. The furnace was one having two carbon electrodes. When the charge had been placed, the electrodes were lowered and the current switched on. As soon as the charge became molten, the tap hole was unplugged, and the mass flowed into the second furnace, where separation is effected by other electrodes.

When this second charge is full, the slag is run off through an upper opening, and the underlying matte is taken from a lower tap. The furnace had a capacity of smelting 25 tons of ore in 24 hours, converting it into matte. The current employed was equal to 620 h.p. To treat 100 tons of ore in 24 hours would require say 2500 h.p.

ANALYSIS OF MATTE PRODUCED IN THE ELECTRIC FURNACE.

Silica	0.800 per cent.
Alumina	0.500 per cent.
Iron	24.300 per cent.
Manganese	1.400 per cent.
Sulphur	22.960 per cent.
Phosphorus	0.005 per cent.
Copper	47.900 per cent.

ANALYSIS OF SLAG PRODUCED IN ELECTRIC COPPER SMELTING.

Silica	27.200 per cent.
Alumina	5.200 per cent.
Lime	9.900 per cent.
Magnesia	0.290 per cent.
Iron	32.500 per cent.
Manganese	8.230 per cent.
Sulphur	0.570 per cent.
Phosphorus	0.062 per cent.
Copper	0.100 per cent.

This slag can be used for the manufacture of a valuable by-product ferro-silicon alloy, costing £22 per ton.

The Anderson Furnaces

My patents cover two forms of the electric furnace, a reductive furnace and a steel or converting furnace.

The reduction furnace is constructed with two melting holes which communicate with one common receiver in which the molten metal collects. The slag from this receiver may be drawn from a special tap-hole provided in the side of the furnace; while the metal can be run off from another hole situated preferably in the central well of the furnace.

The material to be operated upon (pulverized ore or sand need not be briquetted) is first mixed with the necessary flux and then fed into the furnace by means of a hopper; the feeding being regulated by shutters in the inclined chutes connecting the hopper and the furnace. Supported from above and entering into the furnace, are powerful electrodes, wired to the source of current and capable of being adjusted vertically through the furnace covers. Directly underneath the floor of the furnace, and in a vertical line with each electrode above, are fixed electro-magnets which may be made adjustable if desired, but are preferably fixed. The object of these electro-magnets is to counteract any interference with the formation of, and generally to control the arc; also that the concentration of the incandescent gases around the electric arc may be utilized and act to the best advantage. An auxiliary electrode, also capable of being raised and lowered by any suitable means such as a rack and pinion, is situated centrally and immediately over the well to keep the metal in the receiver in its molten condition.

This arrangement of electro-magnets used in combination with the electrodes is the important feature of the invention and contributes greatly to the efficiency of the operation of the furnace. The electrodes are provided with water jackets. The furnace may be duplicated and any number of electrodes may be

used, and the receiver may with modifications be used as a mixing vessel for the conversion of the iron into steel in one operation.

THE STEEL OR CONVERTING FURNACE

The steel or converting furnace is mounted upon trunnions for tilting like an ordinary Bessemer converter, and is not only provided with a mouth for pouring, but also has tapping holes in the side. When the metal is at the lowest point in the furnace hearth it can be tapped. At this stage it is preferable to pouring, it not being an uncommon occurrence for pouring from so low a point to cause a distinct change in the quality of the steel, even though both metal and slag may be quite settled and quiescent prior to pouring. Here again electromagnets are located in immediate line with the electrodes to assist the arc and to maintain a constant temperature during the earlier stages of the work.

The current passes through the positive electrode, through the narrow airspace between the electrode and the slag line, through the slag and molten metal, and returns in a similar manner to the negative electrode. The essential part of this invention lies in the utilizing of the magnetic action in connection with the electric arc, and the regulation of the current is obtained by making the air space deeper or shallower, either by hand or otherwise.

Mining in Argentina

According to a recent British consular report, the prospects in mining for gold, silver, and copper in Catamarca and Rioja are good. The difficulties of transport are being overcome by the construction of railways. The Famatina Copper Company is reported to have 80,000 tons of ore in sight. Mining in Neuquen territory to the west of Bahia Blanca is a new industry. A number of companies have been formed to work the reefs and development is being carried on vigorously with good prospects. The auriferous area is said to be very large, and copper and soft coal are also found. Water power is plentiful. A railway is projected from Bahia Blanca to Chos Malal and thence across the Cordilleras to Antuco. For many years this district has been worked for gold by Chileans by ground sluicing. A 15-stamp battery is being erected, and should be working by the middle of 1907. Hitherto most of the gold produced has been sent to Chile.

According to *Engineering*, May 10, 1907, the first move of the new Union of German Brass Works, recently formed at Cologne, has been to put up the price for brass considerably, a fact which is being somewhat keenly felt in several German industries.

Legal Status of Canadian Provincial Corporations

BY PHILLIPS THOMPSON

A legal question involving the interests of every company operating under a charter of incorporation issued by any of the Provincial Governments of Canada has arisen in a case now before the Supreme Court at Ottawa. This suit of the Canadian Pacific Railway Company against the Ottawa Fire Insurance Company involves directly the question of provincial rights in the matter of granting incorporations. The more important points to be decided are:

1. Is every charter issued by virtue of provincial legislation to be read subject to a constitutional limitation that it is prohibited to the company to convey on business beyond the limits of the province?

2. Can an insurance company incorporated under a provincial act carry on extra provincial business, i.e. make contracts and insure property outside the province or make contracts within to insure property beyond?

The case is regarded as of such significance that counsel representing the Dominion Government and several of the provinces, are in attendance. In the course of the hearing on June 3, E. L. Newcombe, Deputy Minister of Justice, who appeared for the Dominion Government in answer to a question from the court advanced the contention that a company operating under a provincial charter would be precluded from purchasing its raw material abroad and from selling its finished product either in a foreign country or in another province of the Dominion.

C. Ritchie, representing the province of Ontario, urged that a decision to that effect would practically nullify the whole provincial power of incorporation, as it would be almost impossible for any company to carry on business without for some purposes over-stepping the territorial limits of the province. The purchase of raw material and special machinery, the sale of the manufactured product and the taking of mail orders were instances of common commercial operations, which under the contention put forward on behalf of the plaintiff would involve nearly every provincial company almost daily in some *ultra vires* proceeding. In Ontario alone companies had been incorporated with an aggregate capitalization of over $1,400,000,000, not one in twenty of which could carry on its business exclusively within the limits of the province.

The case naturally excites great interest in mining circles, as the great majority of companies are operating under Ontario charters, which would be rendered practically void if the view of the Dominion Government were sustained. All important companies would in such case have to apply for incorporation to Ottawa, which would entail a loss of from $150,000 to $200,000 per year revenue to the province.

Sulphuric Acid Manufacture in Great Britain

In Great Britain sulphuric acid is made almost entirely from pyrites, imported chiefly from Spain. Brimstone is used less and less every year, and is reserved for the manufacture of acid for very special purposes. Sulphureted hydrogen derived from the waste gases of sulphate of ammonia manufacture has been applied extensively during recent years and is an important source of supply of sulphur. British producers of sulphuric acid complain of the increasing difficulty in obtaining pyrites free from or low in arsenic, and several new plants for de-arsenication have had to be erected. The process now used by the United Alkali Company for removing arsenic produces it as pure arsenious acid, instead of the mixed mud of arsenious sulphide as formerly. It is interesting to note that in the midland counties of England "coal brasses" from the coal mines are used as a surce of sulphur at the sulrphuric-acid works.

The Philipsburg Mines, Mont.

In a recent bulletin of the Geological Survey, it is stated that a production of over $32,000,000 in gold and silver, from which nearly $15,000,000 has been paid in dividends, is the record of two mines located in the Philipsburg quadrangle, Montana, and the total production of the quadrangle is provisionally estimated at $45,000,000 to $50,000,000.

A number of mining camps are located within the district, the most important being Philipsburg, Cable, Georgetown, Combination, Henderson and Flint, and some of these were among the first in Montana to receive the serious attention of quartz prospectors.

The Granite Mountain and Bimetallic mines are about 2½ miles southeast of Philipsburg, on the steep western slope of Granite Mountain, which rises 3,000 ft. above the valley of Flint creek. Although located on the same ore shoot and controlled from the first by nearly the same interests, the mines were worked separately until 1878, when a consolidation was effected, since which time they have been operated as one. More than half of the total mine production of the Philipsburg quadrangle is credited to the Granite mine.

How One Corporation Helped Its Employees

Sociological Department of Colorado Fuel and Iron Company Furnishes Education and Amusement, Incidentally Increasing Production

BY LAWRENCE LEWIS*

Social betterment work, in a limited way, was begun by each of the companies which were afterward merged to form the Colorado Fuel and Iron Company, as early as 1882. Reading rooms were established at that time in several camps and, a little later, social organizations, brass bands and local-talent entertainments of various kinds were fostered by contributions from the officers and by the company itself. Money was advanced liberally from these sources for the erection or enlargement of public school buildings in new districts, and for various improvements in the coal camps. Generous rivalry was encouraged among the people of neighboring camps, as to which should show the greatest efforts to improve, and even to beautify these all too bleak settlements. Every Christmas, General Manager J. A. Kebler, of the Colorado Fuel Company and Mrs. Kebler made the children in many of the camps happy by means of trees laden with playthings and "goodies".

In 1891, a kindergarten was started in Sopris by Mr. and Mrs. Kebler, assisted by a few friends. The success of the experiment in Sopris was so gratifying that other kindergartens were established at Old Rouse, Starkville, El Moro, Rockvale and Santa Clara, the first named partly supported, though for a time only, by contributions from employees, the others maintained from the first by General Manager Kebler, by President John C. Osgood and by other officials and friends.

TERCIO, COLORADO—COKE OVENS ON THE RIGHT, DWELLINGS AND SCHOOL BUILDING ON THE LEFT

Organized Effort

Such was the status of the betterment experiments when, July 25, 1901, the sociological department was formally organized "in order to better living conditions among employees" and to have "general charge of all matters pertaining to education and sanitary conditions and any other matters which should assist in bettering the conditions under which the company's men live". Chief Surgeon R. W. Corwin, of the medical department, who from the first had taken a lively interest in all these efforts toward social improvement, was made superintendent of the department and at once began aggressive and systematic work. An assistant was employed who travels almost constantly from camp to camp in order to keep in close touch with the people, to hear complaints and suggestions and to attend to numerous details. An illustrated weekly journal, *Camp and Plant*, first of 8, then of 16 and finally of 24 pages,

*Cambridge, Mass.

exclusive of an elaborate cover, with occasional special editions of 36 and even of 48 pages, was established as the organ of the medical and sociological departments. This was found of great assistance in developing *esprit de corps,* and in arousing interest among employees in their work, in bringing the people of the various camps closer together and in stimulating healthful rivalry for the improvement of general living conditions and for making of the camps better places to live in.

Principle of Coöperation

In all this work, Dr. Corwin has discarded purely paternal methods for those of suggestion, awakening of interest and coöperation. No effort has ever been made to force improvements upon indifferent communities. The people are educated up to the point of asking for betterments, and then the department meets the employees at least half way. The principle has been kept constantly in mind that no improvement can be made with any security of ultimate success or permanence without coöperation as a result of the earnest desire of those most affected. The introduction of kindergartens will serve as an example. All the camps were informed by illustrated articles in *Camp and Plant,* by casual remarks dropped by Dr. Corwin and his assistants during popular lectures, and in conversations with the men and their families, of the success of the kindergartens already established. Presently interest quickened in other camps. But only in those places where the demand seemed most sincere and insistent and the need greatest and where consequently, a considerable measure of success was assured from the first, were new kindergartens established. The same method of suggestion has been followed in all other branches of the work. The employees and their families justly feel that they themselves are largely responsible for almost every improvement.

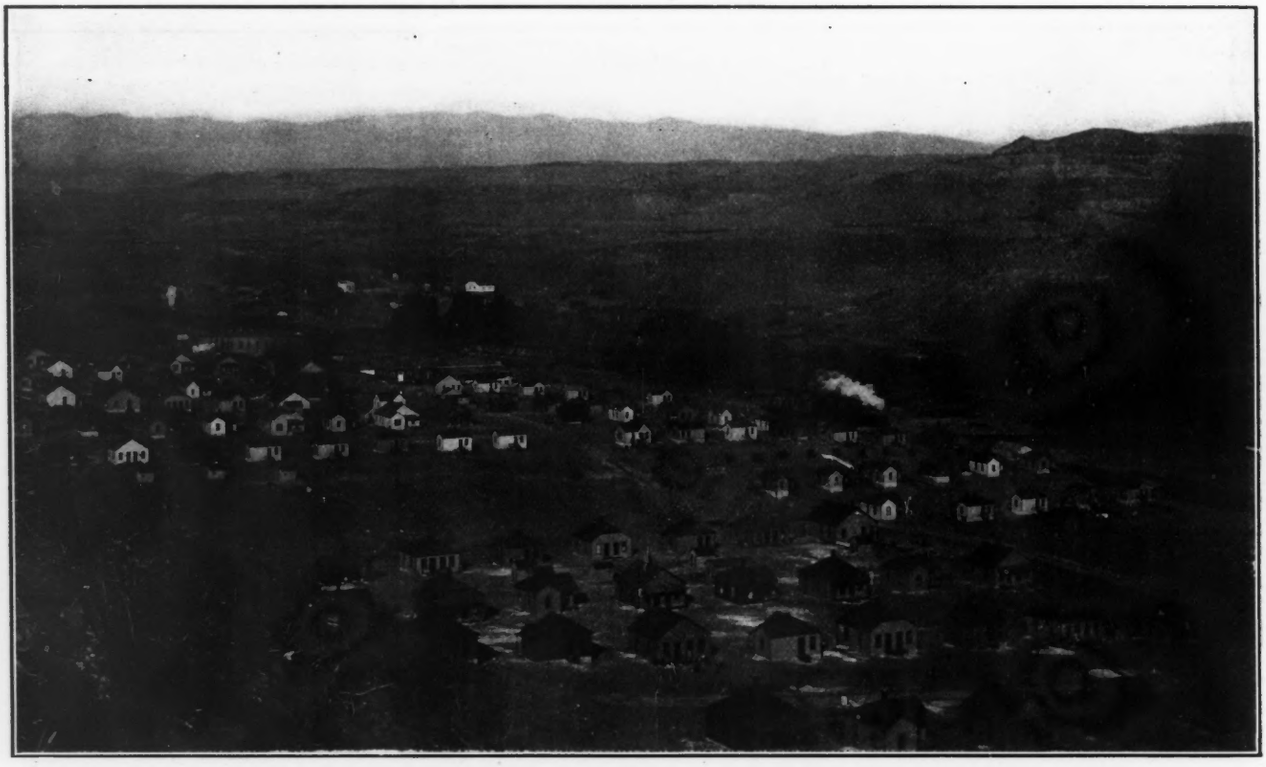
Branches of the Work

The efforts of the sociological department may be grouped roughly under four heads; educational work; non-sectarian religious work; improvements in general sanitation and housing; and regulation of the sale of liquor and the provision of places of entertainment and amusement to help keep the men out of the saloons.

Educational Work

Although all the betterment work is educational in the broadest sense—an effort to teach the men to help themselves—educational work in the narrower sense may be classified under the following subordinate headings: (a) improvement of the public schools; (b) surgeons' lectures; (c) night schools; (d) reading rooms and reference libraries; (e) circulating art collections; (f) circulating libraries; (g) kindergartens; (h) mothers' meetings, women's clubs and industrial classes; (i) boys' and girls' clubs; (j) penny savings banks and other savings institutions; (k) domestic science instruction; (l) teachers' houses, serving as models of economy and better taste; (m) normal instruction, especially adapted to qualify teachers for the peculiar needs of this field.

Detailed consideration of these thirteen subdivisions would make a long article. Suffice it here to note, as an example of the expenditures of the company on these "educational" branches of its betterment work, that between 1901 and 1903 the Colorado Fuel and Iron Company erected ten public school buildings in camps at an aggregate cost of $24,056.90, receiving in return warrants of school districts. Of this amount only $1224 had been repaid at the close of 1903 and very little since. Nor did the above sum include the expense of converting company houses in three camps to the uses of public schools; nor the cost of the elaborate school-house of stone and wood, at Redstone, which Mr. Osgood paid for out of his own pocket; nor the $3900.67 advanced by the company during one year (1902-3) for public school nor teachers' salaries; nor in addition, the salaries of kindergarteners paid by the company; nor the $1307.06 advanced during the one year, which was but typical of other years, nor of free text-books which are now uniform throughout the camps. All this work has accomplished most gratifying results. But, aside from the improvement of the camp public schools, which are now in a state of high efficiency, perhaps the greatest success



PART OF SEGUNDO, COLORADO—DWELLINGS ERECTED BY THE COLORADO FUEL AND IRON COMPANY

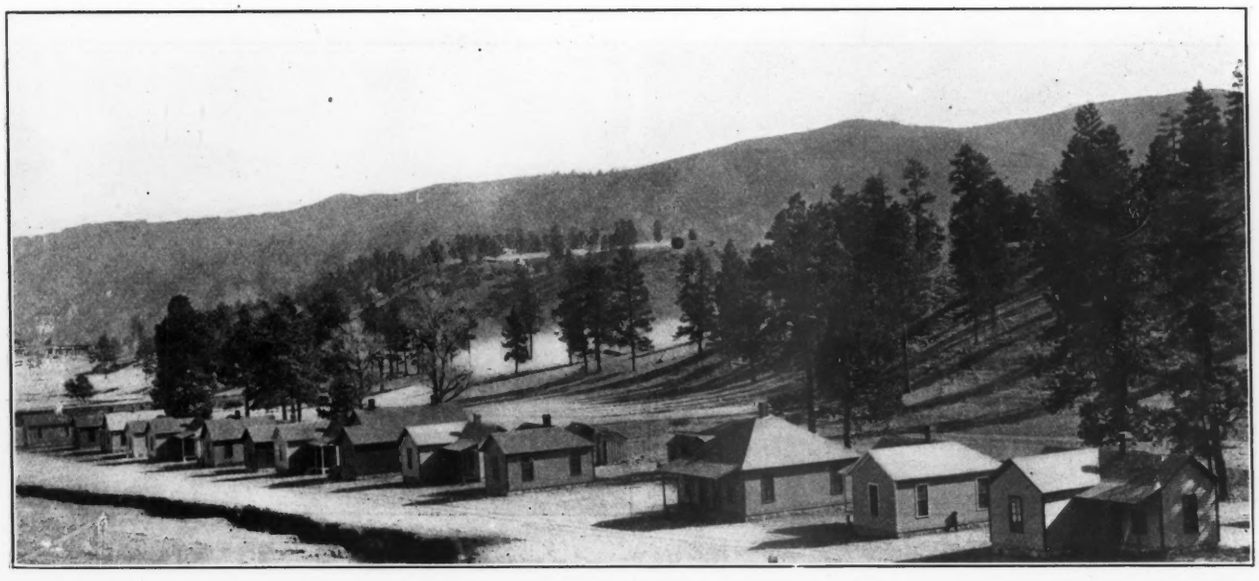
along strictly educational lines has been achieved with the kindergartens, the circulating libraries and the reading rooms.

The Housing Problem

In the early days, the company was, like most new corporations, pressed for money to develop what are generally regarded as the essentials, the opening of mines and the building of coke-ovens. Consequently the houses put up at that time were necessarily of the cheapest sort. In most cases of a monotonous "box-car" style of construction, with battened walls, without eaves or porches or any ornamentation, they had not the slightest attractiveness except as shelters against the elements. Painted a dull mineral red, these company houses, although sanitary, were so ugly that there was no inducement for the miner to beautify his dooryard, and little around which he could twine associations of "home". In these early days, too, some houses were built upon company ground by the men themselves according to their old-world ideas of sanitation; others were erected by private individuals with the permission of the company, as investments.

Seven or eight years ago, Dr. Corwin made a careful personal inspection of El Moro, to which his attention had been called by the inordinate expense of that camp to the medical department, because of the abnormally high percentage of sickness among the coke-workers living in houses built on company ground by employees and padrones. The superintendent, too, had reported that, although there were surely enough men living in the camp, there was a shortage of efficient labor about the ovens which had "caused the shortage in production of coke complained of," etc. Dr. Corwin soon got at the underlying cause. In one adobe bunk-house 40x15 ft., the doctor found that 38 Italians, each earning an average wage of $3 a day, slept in "two shifts" in the midst of unspeakable filth and vermin. The roof was leaky and there were but two small windows. In a lean-to, 10 ft. square, meals were cooked by the padrone and eaten by the men.

When the chief surgeon reported this and other like conditions to Mr. Kebler and Mr. Osgood, they immediately ordered the worst places on company ground torn down and the camp generally cleaned up. Employees and padrones were no longer permitted to build upon the company's land any sort of dwelling they desired. These had varied from dug-outs and shacks to the poorer sort of adobe or mud huts. The general improvement in health and the lowered death rate at El Moro was so gratifying that the management was encouraged to extend to other camps the work of improving sanitation and replacing unfit structures on company ground with decent dwellings.



ROW OF DWELLINGS AT CUATRO, SHOWING VARIETY OF DESIGN

Providing Sanitary Dwellings

But many disease-breeding structures remained on land adjacent. Indeed, not until early in 1901, when planning eight new towns, was the Osgood-Kebler management able to carry out, untrammeled by other property owners, their own ideas of how coal camps should be built. These new towns, where the company erected all the buildings, were laid out with proper care for general sanitation and drainage and with regard not only to the comfort of the individual houses but also to the general appearance of the camps. During the next two years the company put up 895 two-, three-, four-, five-, and six-room frame cottages with projecting eaves, porches and simple ornamentations. This number does not include 309 dwellings erected at Pueblo, during the same period for employees of the steel works which was then being trebled in size. The new houses in the camps were painted in different colors and those of different styles and sizes were alternated so as to avoid the depressing dull red uniformity of what had before been the "typical company town". In the arrangement upon the wide, regular streets, each house was placed in an ample lot and in some cases these were enclosed by neat fences. The interiors of these houses were finished with good woodwork, lath and plaster walls, and, in some camps, running water and electric lights are supplied.

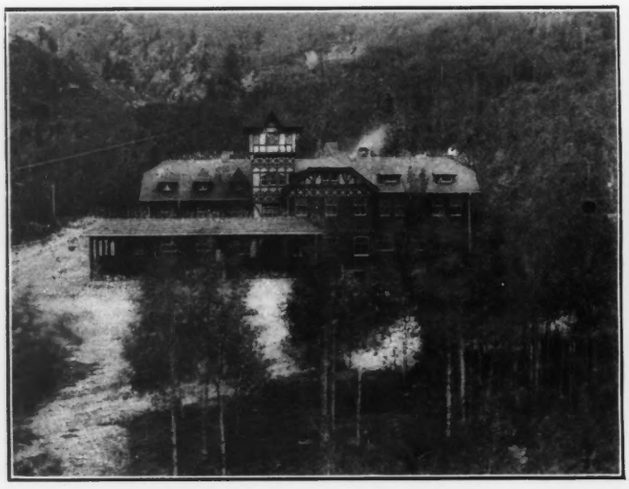
Costs and Details

The houses rent for $2 a month for each room. For example, a five-room dwelling rents for $10 a month. The relation this bears to the men's incomes can be gathered from the fact that the average net wage of coal miners, working six days a week and full time, is on the average for all Colorado Fuel and Iron Company mines and all miners, about $87 a month; and the average for coke workers, under the same conditions, about $78 a month. The company's mines are operated throughout the year. Some of the very best miners earn as high as $150 a month or even more. The rental was calculated on the basis of paying the interest on the money invested and providing for a sinking fund to cover the principal in approximately ten years, the average life of a coal mine in that region.

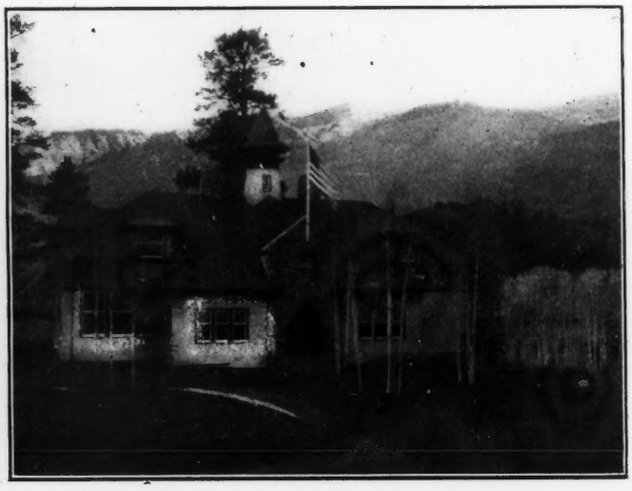
Arrangements were made in each new camp for a regular gravity system; so that free water, if not actually piped into each house, as in some camps, is to be had, for fire protection and domestic use, by every resident, from a near-by hydrant. No disorderly establishments, gambling houses nor saloons of the lowest class are now permitted in those camps which are entirely under the control of the company. At Segundo, however, which is a fair example of the new towns in other respects, such dives

flourish across the river in the old settlement of Varros, over which the company has been unable to secure control.

At Redstone, near which place Mr. Osgood has his beautiful mountain home, the erection of houses was put in the hands of an auxiliary corporation, the Redstone Improvement Company. Mr. Osgood also spent a large amount of his own money in making this a model town in all respects, even superior to the more typical new towns like Segundo. "This certainly is a most beautiful camp!" I exclaimed to Superintendent T. M. Gibb of the branch railway and of the coke ovens and czar of Redstone. "Huh? This isn't a *camp* —it's a mountain village!" was his reply. Here five-room dwellings, furnished with baths and complete water connections, rent for $18.50 a month. They are wired for incandescent electric lights, for each of which the tenant pays 35c. a month, provided he wishes to use electricity. One house in Redstone is particularly



REDSTONE INN, REDSTONE, COLORADO



SCHOOL AT REDSTONE, ONE OF THE COKING CAMPS

worthy of notice for it has been set aside as a special object lesson and is kept open to public inspection.

The Redstone Improvement Company has erected, also, the very attractive Redstone Inn, which affords not only accommodations for transients but also board and rooms at a reasonable rate for foremen, mechanics, railroad men and other of the better paid employees of the allied companies. This inn is fitted up in rather elaborate style and has its sitting room, its reading room, its card and game rooms.

With the improvement in the character of the houses has come a greater pride on the part of the workmen in seeing them properly furnished. Many of the employees have papered the walls of their dwellings, have put curtains as well as roller shades on their windows and have fitted up their rooms with floor coverings and furniture.

"The Pay-Day Drunk."

The liquor problem or "the pay-day drunk" as the operating department heads call it from that phase of the question which is most objectionable to them is, of course, the most difficult practical question with which the sociological department has to deal. In an isolated mining camp, on the desert or far up in the hills, the saloon used to be not merely the workingman's only club but also his only place of amusement. Here, sometimes, were pool and billiards, often music and song and always a rendezvous where he could smoke and chat and drink in an atmosphere of a certain sort of good fellowship. The temptation was almost irresistible for the miner—and sometimes even for his wife and children also—to spend in these places an undue proportion not only of his time out of working hours but also of the money that by rights belonged to his wife and children as well as to himself.

It used to be that the superintendents dreaded the approach of holidays and the monthly pay-days which were made occasions by the men, and sometimes by their families also, for grand sprees from which only a part recovered enough to go to work the next day. A typical case was the Fourth of July celebration in 1901 at Coalbasin, followed by a total suspension of work in the coal mine for four or five days until the majority of the 265 men had time to sleep off the effects of four barrels of whiskey, eight kegs of beer and a large quantity of "jugged" and "bottled goods" smuggled into the camp in spite of the utmost vigilance of the company. Closing this mine temporarily compelled the shut-down of the coke-ovens at Redstone, where the Coalbasin coal is reduced to coke; the enforced idleness of 100 coke workers; the suspension of trains on the coal road between the two places and on the "coke road" from Redstone to Carbondale; and even the laying off of men at remote smelting works where the cake was used. This meant a less of thousands of dollars to coal miners, coke workers and railroad men in wages; and a loss of more thousands to the company due to delay in shipments of fuel and non-productiveness of hundreds of thousands of dollars of capital invested in mines, coke-ovens and two lines of railroad.

The general demoralization in a camp caused by most of the men and even some of the women and children loitering around saloons and, every so often, going on a drunken debauch was of even more grave ultimate importance than the direct financial loss. It tended to lower the self respect and the social state of an entire community, consequently, to decrease the efficiency of the workmen and to undo the good results accomplished by kindergartens, schools, libraries and sanitary work

Failure of Prohibition

For the regulation of the sale of liquor, several experiments have been tried by the company. Prohibition, as usual everywhere, failed. In some camps where the company owns all the land, attempts were made to prevent drinking by refusing the saloon an entrance. With the possible exception of the Japanese, however, most of the men regard drinking as an incident of their daily life and consider prohibition or extreme restriction as an unwarranted invasion of their personal liberty. Where prohibition was tried, the result was always the same. Intoxicants were shipped into the camp in spite of the utmost efforts of the company, and were sold secretly in dwellings, in the rear of stores or bunk-houses, at "blind-pigs", or from "wet bread wagons". Periodically, employees went off on sprees to the nearest saloon town. Drinking became more closely associated with lower forms of vice; while drunkenness, of the aggravated sort, often as a result of bravado, was frequently more persistent than where saloons were allowed to run.

In view of the failure of prohibition, the company has tried several experiments for the regulation of the sale of liquor, of which the most noteworthy

are: the regulated saloon; the restricted club; and the soft-drinks club.

The Regulated Saloon—A monopoly of the liquor trade, has been given by the company in some camps, notably Primero, to a responsible person, who is held strictly responsible for the order and sobriety of his place. The "no-treating rule" is not enforced; but decency and a few cases of drunkenness are the price of the manager's position. The regulated saloon has been found preferable to the unregulated saloon; but experience has shown it is not so good as the restricted club.

The Restricted Club — To John C. Osgood personally is due the credit for two practical tests of the restricted club which embodies measures more closely restricted than those in force in the regulated saloon yet in no sense prohibitive. Mr. Osgood's theory is that the average workman, if allowed to buy intoxicants under well advised restrictions, in a place and under circumstances in no way associated with vice, will not abuse his privileges.

The Coalbasin Club.

After the costly celebration of July 4, 1901, Mr. Osgood risked several thousand dollars of his own money in an experiment of building a club-house by which he expected to convert Coalbasin from a prohibition to a temperance town. On June 22, 1902, the Coalbasin Club was organized among the miners. It is managed by a board of seven directors elected for one year; it has a membership which varies between 100 and 200; and the monthly dues are 50 cents. The club-house is a one story frame building of four rooms and pleasant verandah. There is a bar-room, with a billiard and pool room, a card and game room and a reading room furnished with magazines and periodicals, adjoining. Profane or vulgar language is prohibited.

Playing games for money in the club is not forbidden; but in no case are the stakes to exceed the following limits: Poker, penny ante and twenty-five cent limit; billiards, twenty-five cents a cue; pool, ten cents a cue.

Although the club has a monopoly of the sale of liquor in the camp, no treating is allowed. No man is sold any more drinks after he has shown signs of approaching intoxication. All charges must be paid for at the time they are incurred. Rules embodying these and minor regulations are printed in English, Italian and German and are posted in prominent places. The club has been fully self-supporting since early in its history. Not since the club was well started has the mine been closed down a single day on account of "mornings after" pay days or "celebrations"; nor have there been any cases of chronic durunkenness such as were not uncommon before the club was opened, and when Coalbasin was nominally a prohibition town.

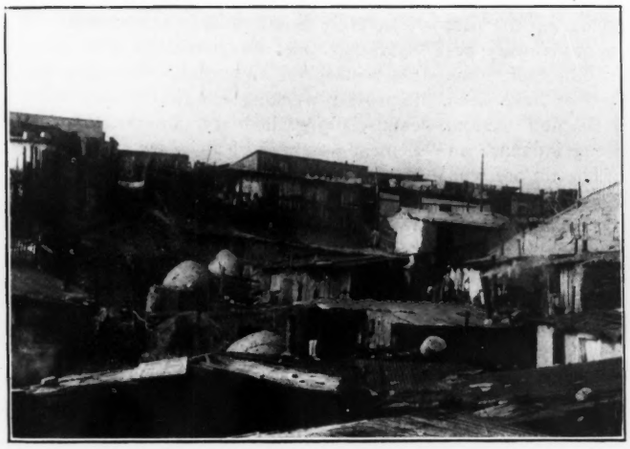
The Redstone Club

So encouraged was Mr. Osgood by the results of the Coalbasin Club that he laid out still more of his money in erecting a larger and more elaborate clubhouse at Redstone. This is as well appointed as any club building in Colorado, outside of Denver, Colorado Springs and Pueblo. It is two and one half stories high over a substantial basement. The commodious lounging room, in which is the bar, is fitted with big leather cushioned arm-chairs, settees and tables for serving refreshments. Steam heat is supplied; but a generous fireplace at each end of the room adds cheer and comfort on cool evenings.

This club also has a monopoly of liquor dealing and the "no-treating" rule prevails. By-laws and rules of the club are practically the same as those in Coalbasin. Active members are required to pay an initiation fee of one dollar and six months dues in advance, at 50 cents a month. Associate members pay one month's dues in advance. The active membership has been about ninety.

Although women are not eligible to membership, they are not barred entirely from the privileges of the club. Two evenings each month are given over to the wives, daughters and visiting friends of members. Whist and euchre parties, billiards, pool and light refreshments, together with instrumental music, make these evenings pass pleasantly.

Unlike the Coalbasin Club, that at Redstone has never, unfortunately, been quite self-supporting. But the Redstone Improvement Company, of which Mr. Osgood is still the chief stockholder, makes up the deficits. Nevertheless the members are made to feel that they are paying for what they get and not that they are objects of charity or of patronization. Some have thought that this club is slightly too expensive and others that it is too elaborate for coal diggers, coke workers and railroad men. This club is a great success in the broadest sense; for there has been no drunkenness or vice in Redstone and no cleaner and better social atmosphere could be found in any industrial community than in this delightful mountain village.



ITALIAN QUARTER, BEFORE IMPROVEMENT

HOUSE BUILT TO SUIT THE WISHES OF ITALIAN LABORERS

The Soft-drinks Club

The third method of dealing with the saloon problem, the soft-drinks club, which is really a sort of mitigated prohibition, is being tried at Segundo, where one of the company houses has been converted to the uses of a club. One of the three rooms contains a pool and billiard table; another is furnished with three card tables; the third is supplied with periodicals furnished by the members. Cigars and sometimes soft drinks are on sale. The initiation fee is $1 and the dues 50 cents a month. There are about 40 members. In spite of the competition of the saloons, dance halls and dives in Varros, across the river from the company's town, this club has been a success. A small club room, similarly fitted up, in the boarding house at Floresta, also proved successful.

Work in connection with the other branch of the saloon problem, that of

providing sources of amusement to compete with those found in the saloons, where there is the ever present temptation to drink and to drink too much, has passed the experimental stage, in fact it has always been highly successful.

Aside from the social features of the clubs at Redstone and Coalbasin, are the amusement halls which the company has erected at Starkville and Sunrise. In each of the new public school buildings one end of the kindergarten room is fitted up with a stage and scenery. Here illustrated lectures, dramatic entertainments, meetings and dances are often held of evenings. The reading rooms and circulating libraries, containing books in Italian as well as English, have already been referred to. Fostered by the sociological department four excellent brass bands have flourished in the camps besides numerous other instrumental and many vocal organizations.

All this betterment work is now costing the Colorado Fuel and Iron Company between $20,000 and $30,000 annually. At the beginning, of course, it cost far more each year. Except in the cases specified to the contrary, it is all absolutely free to the men. A staff of over 20 persons is regularly employed by the department.

Doubtless the work of the medical and sociological departments has its purely commercial side; doubtless the shrewd business men in control realize the great economic truth that better sanitary and social conditions for employees and their families make for better work and heavier tonnage. But it would be a mistake to regard this as the sole or even the primary motive of this company which is striving to give its men a square deal to help them to help themselves to better ways of living.

Australian Mining Notes

By F. S. Mance*

The returns for the first quarter of the year 1907 show that the Broken Hill mines have contributed a considerably augmented output, and the value of the production is about £287,000 ahead of that for the first three months of 1906. Some anxiety is felt respecting the prosecution of future operations owing to the threatened failure of the water supply, as for some months past there has been no rain fall to replenish the reservoir on which the town and the mines depend. The number of miners employed in and about the mines on the field at the end of March totalled 9600, and it was confidently anticipated that this number would be augmented by two or three thousand more by the end of June. The seriousness of any cessation or limitation of operations becomes a matter of great moment, and nothing but a copious rainfall can relieve the situation. The necessity of providing an independent water supply has been brought home to the several companies, and united action to this end is to be immediately taken.

The lode at the 1100- and 1200-ft. levels in the Proprietary mine is opening up satisfactorily. The ore mined during the past four weeks totaled 41,596 tons, and the output could be considerably increased.

Another creep has occurred at Block 10 mine, between the 400-ft. and 600-ft. levels, which has caused the temporary suspension of all work in the affected area, and the confining of operations to the lower levels. The directors of Block 14 mine have decided to pursue a policy of development, and the main shaft is to be carried down to 800 ft., and two additional levels opened up.

Tin

The drifts which are being worked by the Briseis company, in Tasmania, are yielding satisfactorily, and during the past month 105¼ tons of tin oxide were recovered. At the Mount Bischoff mine some rich ore is reported to have been discovered in the Wheal Bischoff section, which has had a brightening influence on operations. The value of the tin-ore won in New South Wales during the first quarter of this year is £143,000. The yield, as hitherto, has been chiefly contributed by the dredges working in the Tingha-Inverell districts, and handsome profits are being earned. There is every promise of the Stannery Hills Company ranking shortly among the foremost tin producers of the commonwealth.

Zinc

The Broken Hill Proprietary Company using the Delprat process, is maintaining a fair output of zinc concentrate, but only slight progress is being made in the matter of zinc distillation. In fact, work is in abeyance at present, pending the tempering of further batches of retorts, as those previously made proved unsatisfactory.

Copper

The benefit of the increased price of copper is likely to be fully shown in the result of the operations of the Mount Lyell Company, Tasmania, for the half-year just closing, as, although the material handled has been of a much lower grade, it is expected that an increase of £15,000 will be shown on the net profit earned during the previous term, and which amounted to £239,000. These figures are based on an approximate output for the half-year of 3800 tons of copper, and, considering that the ore treated only averaged 2.25 per cent. copper, the results are exceptionally gratifying.

In the State of Queensland the copper-mining industry continues to make great headway, the output for the first three months of the year being estimated at 2602 tons, valued at £279,694. The largest contributor was the Mount Morgan Company, and during the month of March, 10,478 tons of ore were treated at the copper reduction works, producing 345 tons of copper and 4362 oz. of gold.

A company with a working capital of £175,000, known as the Great Fitzroy Gold and Copper Mines, Limited, has been formed to work a big property north of Rockhampton, formerly known as the Mount Chalmers Gold Mine, but which has now developed into a copper proposition. The directors of the company are W. L. Bailleu, W. J. Loring, Phillip Charley and G. P. Doolette. It is reported that the value of the ore in sight has been estimated at £1,000,000, and active operations to develop the orebodies are at once to be entered on.

It is represented that negotiations are in progress for the purchase of the Wallaroo and Moonta mines, the largest and most profitable copper-producing properties in Australia.

In New South Wales a suspension of operations was threatened by a strike of the miners for an increase in wages and improved working conditions, but wiser counsels prevailed and an amicable settlement was arrived at. The value of the copper produced in this State during the first quarter of the year is £235,000.

Gold

The gold yield of the four principal States of Australia for the first four months of this year compares unfavorably with the production for the same period in 1906, as shown in the accompanying table:

GOLD PRODUCTION OF AUSTRALIA.

	1906. Oz. Fine.	1907. Oz. Fine.	Changes. Oz. Fine.
Western Australia...	604,581	555,242	D. 49,339
Victoria.....	247,003	215,579	D. 31,424
Queensland.....	159,548	150,936	D. 8,612
New South Wales ...	102,722	85,885	D. 16,837
Total.....	1,113,854	1,007,642	D. 106,212

The decline noticeable during 1906 continues, and under present conditions there are small prospects of any improvement. The activity displayed in mining for the industrial metals has caused the gold mining industry to be greatly neglected. Comparatively little prospecting is being carried out, the demand for competent miners at high wages having attracted the prospectors to the established metalliferous mines. Consequently, no new gold mines are coming to the front, and as the ore which is now being won on the principal fields is of much lower grade, the outlook, so far as this branch of the industry is concerned, is not a bright one.

Tellurium is an element almost without use in the arts; small amounts are used in medicine, but the output of one of our copper refineries for one day would stock a large chemical supply house with enough tellurium to last a year.

*Department of Mines, Sydney, Australia.

A Concrete Shaft Sinking Through Quicksand

EDITORIAL CORRESPONDENCE

The cylindrical concrete shaft known as the Bangor which is being sunk by the Foundation Company of New York for Pickands, Mather & Co. at Biwabik, Minn., on the Mesabi range, has reached a depth of 110 ft. and so far the work has progressed rapidly and without any serious delays. This shaft is unique and presents a new and successful method of sinking through quicksand which reduces the chances of loss or delay to a minimum. Briefly, the method consists of placing in position a steel shoe, to which are attached an inside and an outside form, between which concrete is allowed to set. The diameter of the inner form is, at the Bangor shaft, 14 ft. 6 in. while that of the outer form is 22 ft. 6 in. This permits the formation of a hollow cylinder of concrete 4 ft. thick.

Inside of the two forms is placed a hollow steel cylinder, with flanges at top and bottom, about 6 ft. in diameter and 8 ft. high. Two successive sections are joined by bolting through the flanges. Through this inside cylinder all the sand is brought up in dredges, of either the clam-shell or orange-peel types, no attempt being made to elevate the water, which remains in the shaft all through the sinking.

When the clam-shell bucket has removed sufficient sand the shoe is allowed to drop and 8 ft. of concrete is poured between the two forms. Reinforcing rods 1-in. square are first placed all around and near the outer form, every fourth rod being staggered; these rods are made of special high-carbon steel and are bent at right angles, 6 in. from the ends, to allow them to hook on to the next set of rods. A steel band every 4 ft. gives added strength to the reinforcement.

The dredging then continues, the sand coming up the center cylinder and the water remaining behind in the shaft, until the excavation permits another drop of about 8 ft., when two more sets are placed and concrete added. In this way the concrete shaft is sunk deeper and deeper through the sand, and with each drop new sections of the form and of the steel cylinder are added.

USE OF COMPRESSED AIR

There is an impression among those who have heard of the work but have never seen it, that the shaft is being sunk entirely by the aid of compressed air. This is not true. Should the sand become too compact, or should large boulders be encountered which could not be handled by the clam-shell bucket, it would be necessary to remove the water from the inside cylinder and send men down to loosen the ground or break the rocks by some carefully placed shots.

To do this a double air-lock is bolted to the steel sinking cylinder and compressed air is turned on. This expels the water from the cylinder on the principle of the laboratory wash-bottle, the outward pressure of air preventing the inward flow of the water. When the ground again permits excavation the clam is lowered through the air-lock and the lower door is opened after the upper door has been closed. After taking its load the bucket comes up and a reversal of the doors takes place. When the ground is again suitable for simple excavation the air-lock is removed. When the ledge is reached, at a probable depth of 126 ft. air will be required to anchor the shaft securely in place.

PRINCIPLES OF THE METHOD

The Foundation Company started sinking the Bangor shaft in April, 1907, and expects to strike the ledge with only 16 ft. more of sinking, probably in July 1907. Recently the Syracuse shaft, adjoining the Bangor, was turned over to Pickands Mather & Co., after having been completed by the Foundation Company.

In sinking shafts through quicksand the principles used in river and harbor pier construction have been applied, and no attempt was made to remove water or lower the water level by pumps. When complete, the shaft will consist of a hollow cylinder of concrete with walls 4 ft. thick, impervious to water, and containing two skip-ways, a ladder compartment and ample room for water and air pipes. The work has been done on contract and it is stipulated that the shaft must be perfect or the contract is void. Complete details will be published when the work has been finished.

Liquid Air as an Explosive

A few notes on the use of liquid air as an explosive are given in the *Montan-Zeitung* (May 15, 1907). The substance was first used only in combination with others. It is now used alone, its explosive power depending upon its property of turning suddenly into vapor at an elevated temperature. If the vessel in which the liquid air is contained is sufficiently tight, very high expansive powers are attained. For this reason it is stored in vessels having a small opening. This property of the liquid air makes it necessary to place the cartridge in place in the rock before it is loaded. In English mines the cartridges are made of thick phosphor-bronze, the loading being calculated so that the pressure reaches 5.6 kg. per sq.cm. The explosion takes place in six or eight minutes after loading and about 30 tons of coal are broken by one shot. The coal falls in blocks about 60 cm. in circumference. A heavier loading of the cartridge causes the coal to be broken into powder.

Placer Gold on Snake River

The existence of gold in the gravels forming the terraces along Snake River and its tributary streams has long been known. As early as 1862, attempts were made by various prospectors to extract the shining colors of gold flakes from the coarse gravels and fine sands along the streams, some of the earliest workings above the Grand Cañon of the Snake being in Jackson Hole, north of Gros Ventre river. In recent years considerable prospecting has been done along Snake and Fall rivers, but very little real development work has been carried on. Claims have been located and staked out, but only enough work has been done to hold them.

In the summer of 1906, a Geological Survey party gave attention to the occurrence of gold along Snake river, and a preliminary report on this subject has been prepared by Alfred R. Schultz. The placers along the Snake comprise both stream and bench deposits. None of the stream placer deposits within the area is at present worked, and in only two localities are the bench placers systematically mined. The metal in all these placers is a flour gold of a high degree of fineness, but the placers show locally great variations in the character and occurrence of pay streaks.

The map presented by Mr. Schultz in connection with his report shows the distribution of the placer workings along the Snake between the Davis diggings in Uinta county, Wyo., and Milner, Idaho, and the paper discusses briefly the Idaho holdings, particularly those near the Government dam at Minidoka. This dam has raised the water over an adjacent high terrace, known as Diamond Bar, which represents an old river bed and contains some of the best values in fine gold along the river. Already a company has been organized for the purpose of taking advantage of the favorable situation created by the Government irrigation enterprises.

Samples of Snake River concentrates were examined by the United States Geological Survey at Portland, Ore., in connection with the experiments on the heavy placer concentrates of the Pacific slope, to determine their value in other metals and minerals besides gold, and nearly all yielded from a trace to an appreciable amount of platinum. Two or three enterprises now on foot along the Snake will test the practicability of saving possible by-products of the placer gravels in addition to their gold contents, and the result will be watched with much interest; for if in any way platinum can be made an important factor of the output, with any margin of profit, the country at large will be benefited, since there are billions of cubic yards of these low-grade gold and platinum-bearing gravels along the banks of the Snake.

Disposal of Slag from Smelting Works

By Herbert Lang*

One of the best planned and best conducted smelting plants that I have ever seen is that of the Compagnie du Boleo, at Santa Rosalia, in Lower California. It is a copper smelter, and has several very interesting and advanced features. I was much interested and at the same time a little chagrined to notice in use at that works some improvements that I had fondly supposed were of my own invention, and others that I had had some time in mind, and was about to install at a certain works. But I desire to speak more particularly of the method of utilizing the slag which falls from the smelting. This is used in the construction of the large breakwater that surrounds the anchorage and forms the harbor of Santa Rosalia—a harbor said to be the best and almost the only one on the Gulf coast north of La Paz.

The Breakwater of Santa Rosalia

The breakwater is in the form of the letter L, and extends around the north and east sides, leaving an entrance at the south. As many as four or five deep-water ships find room inside, as well as the miscellaneous flatboats, lighters, steam tugs, dredgers, and the numerous paraphernalia which the exigencies of the work have collected there.

The slag is drawn first into large tanks fixed upon flat cars running upon the narrow-gage railway which extends from the mines to the smelter, and from the latter to and over the breakwater, which serves as a wharf. Figs. 2 and 3 show sufficiently the mechanism in question, while Fig. 1 gives some impression of the harbor. The tank, when filled with hot slag, is drawn by a locomotive crane to a convenient point, where its contents are tapped out into molds, and cast in masses which are then added to the work already completed. The method of casting is not by any means what it might be, as will be seen. Rough cavities are scooped in the dirt alongside the track, in which a staple or hook of iron (commonly a piece of junk, for anything will answer) is placed, at such a hight that it will project above the surface, and the tank is tapped, and sufficient slag allowed to flow out to fill the cavity to the requisite hight, when the car is pushed forward to the next one, mold or cavity, and so on. When the rough, shapeless masses have cooled and solidified, the crane lets down its block and makes fast to the projecting hook or staple in the cake, and lifting it from its bed carries it away to the end of the breakwater and places it in position there, which it is enabled to do by reason of the very long boom. The breakwater built up thus is not a very strong structure, the masses not fitting closely, and portions have been washed away bodily in the fierce storms to which the region is frequently subjected. It is aimed to cement the masses together by tapping fluid slag into the work as it proceeds, but the brittleness engendered by the necessarily rapid cooling of the cementing slag renders this more or less abortive.

Suggested Improvements

This method might, I should think, be improved upon by using more care in casting the blocks, which should approach the rectangular form if they are to be of any great use. I dislike to appear in the attitude of a critic of a work which is in the hands of persons whose skill and ingenuity are clearly of the first order; and there can be no question as to the usefulness of the great structure that they have reared, by what seem to be crude, very crude, methods. But there is an opportunity for progress in even so simple an art as the casting of slag cakes. Their handling of the slag in such copious quantities proves that they appreciate the essential conditions. Now if they will cast it in prismatic blocks, of a size that can be handled by the cranes, it will advance the art another step. It would mark a still further advance on the art if the blocks were to be cast *in situ*, which would allow them to be made of any size, even of hundreds of tons in weight, which would be immovable, and impregnable to wave action. It might reasonably be expected that the amount of material necessary for the work would then be much decreased, as compared with that necessary to the hit-or-miss method now in use, where mere bulk is made to serve the purpose, which is merely to resist the onslaught of the seas.

Use of Slag Blocks

In a communication on the subject of the lay-out of smelting works, published in the Journal of March 23, 1907, I referred incidentally to the use of slag blocks, and mentioned that I had evolved a plan to use them in filling in the worked-out stopes of a certain mine. As I had in previous issues described my method of annealing and toughening the blocks by prolonged exposure to a slowly decreasing temperature, which the more attentive readers of the Journal will recognize as my process for utilizing the heat of molten slag, I did not think it necessary to enter into explanations as to how this was to be accomplished, nor what were the results to be expected. Two gentlemen have offered criticisms of my proposal as to such use of the blocks. One remarks that the slag will prove too brittle; the other that the roads will be too rough to haul it over. The answer to these criticisms is simple. There are methods of removing the brittleness, while in the case in hand I have constructed a standard-gage railway to connect the furnaces with the mine chiefly for the purpose of delivering the blocks at the pit mouth. What more can be desired?

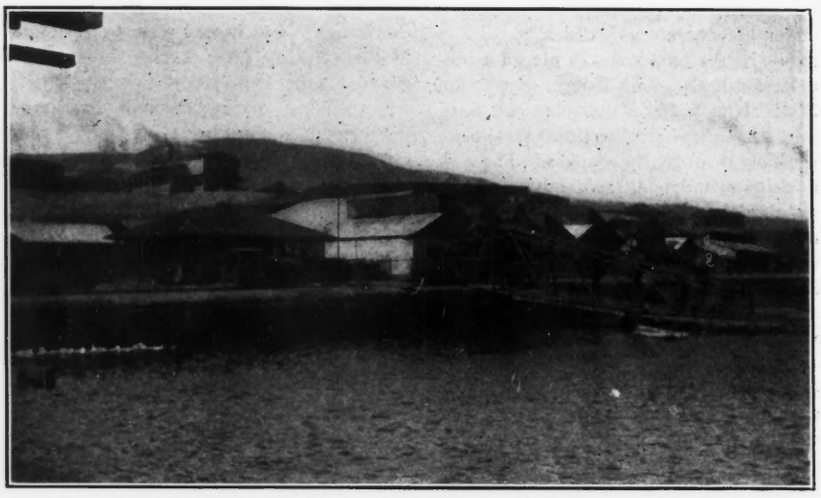


FIG. 1. BOLEO WORKS, SANTA ROSALIA

In the *Zentralblatt für Eisenhüttenwesen*, Vol. II, No. 3, a description is given of the iron-ore deposits at Kiirunavaara and Luossavaara, Sweden. At the former locality the ore, containing 50 to 70 per cent. of iron and 0.05 to 3 per cent. of phosphorus, occurs at the surface. The chief impurity is apatite. The amount of ore available is estimated at 215,000,000 tons. At Luossavaara the ore does not lie open at the surface, but is, as a rule, richer in iron (67 to 71 per cent.) and poorer in phosphorus. The amount available is estimated at about 18,000,000 tons.—*Min. Journ.*, May 4, 1907.

*Mining and metallurgical engineer, Oakland, Cal.

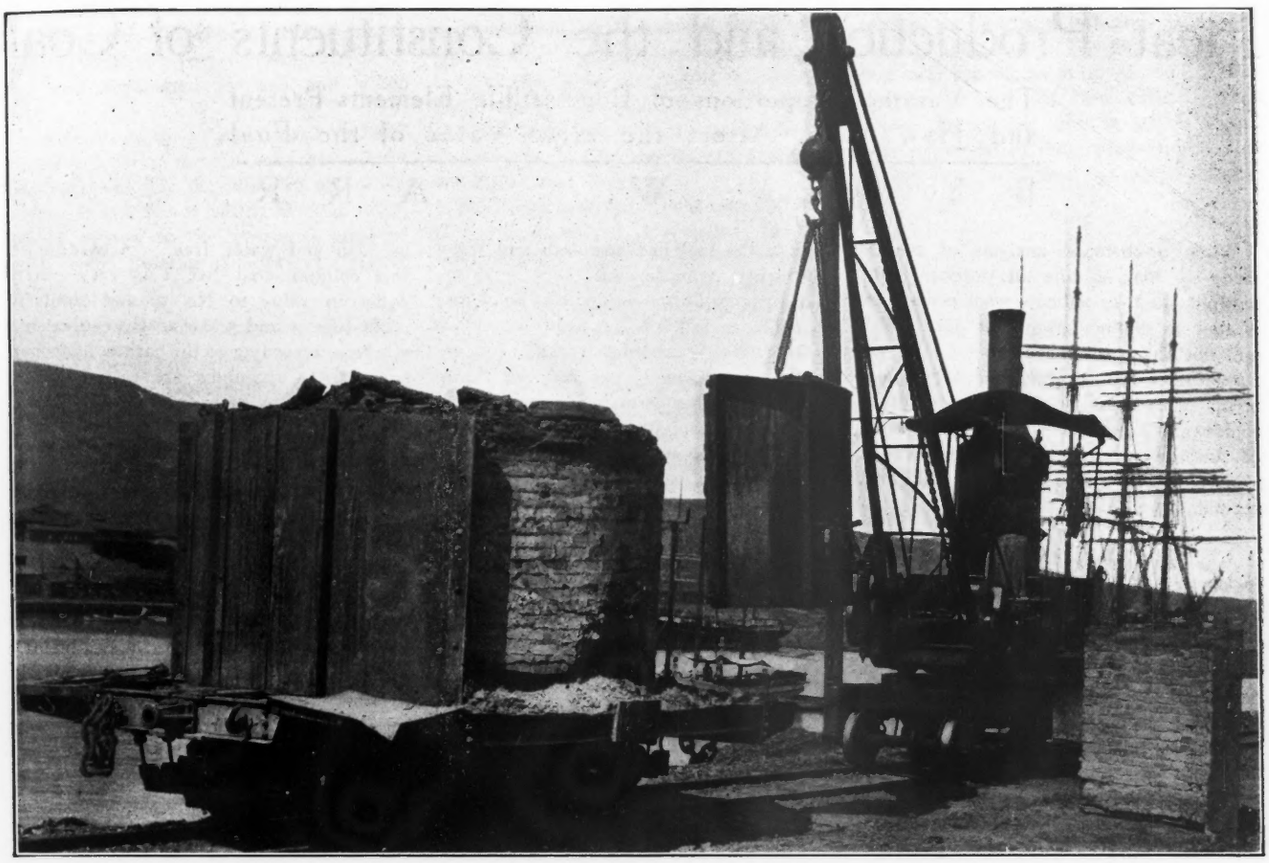


FIG. 2. HANDLING SLAG, SANTA ROSALIA, MEXICO

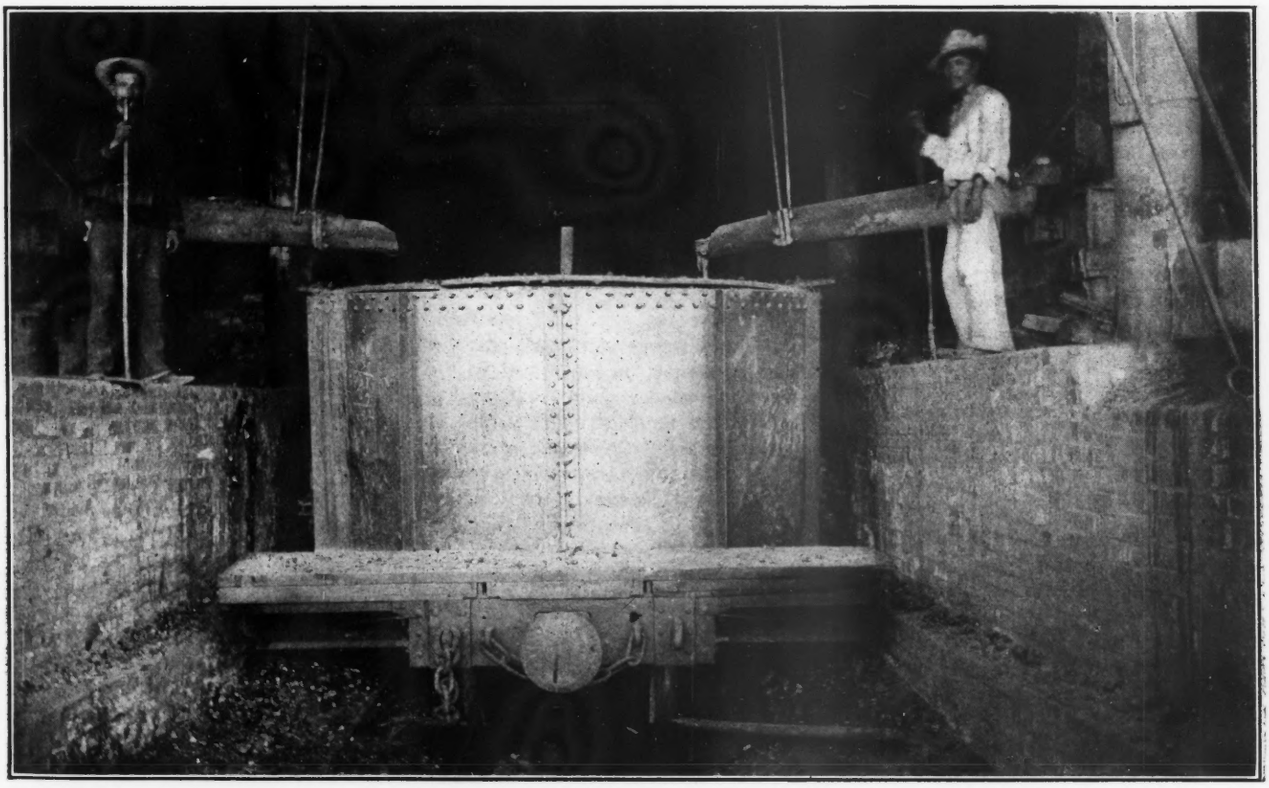


FIG. 3. HANDLING SLAG, SANTA ROSALIA, MEXICO

Heat Production and the Constituents of Coal

The Varying Proportions of Combustible Elements Present and How They Affect the Heat Value of the Fuel

BY S. W. PARR*

When a chemical analysis of coal is made we may assume the purpose to be twofold: first, to indicate what proportion is fuel as distinct from that part which will not burn; second, to afford some information as to the behavior of the material when brought into service. Two topics are therefore suggested as being of fundamental importance in connection with coal analysis: first, fuel units, and, second, fuel ratios.

Fuel Units

In the ordinary chemical analysis of coal, determinations are made of the ash and water. These are obviously non-combustible, and since the purchaser is supposed to be buying fuel, he is interested to know how much inert material he is obliged to pay for in the mixture. Similarly, the engineer is interested to know the evaporative efficiency of his steam generators. If the amount of ash and water were constant in all coals, he would probably base his estimate on a pound of coal as the unit; but the water and ash vary widely. Their combined amount may be anywhere from 5 to 35 per cent; hence, these variables, at least, must be eliminated if we would arrive at any common basis of comparison. The most natural fuel unit, therefore, to suggest itself is that portion which remains after deducting the ash and water. This is referred to as "fuel" by the engineer. Others have suggested the term "pure coal." Neither expression is satisfactory, though less objection attaches to the latter, as may appear later.

Combustible Constituents

The constituents of coal which directly contribute to the production of heat are carbon and hydrogen. Sulphur adds a small increment, but ordinarily only a fraction of a per cent., and since it is foreign to the coal proper, it is not now enumerated with the true fuel constituents.

Let us suppose that the carbon and hydrogen may be readily determined and as easily available as the factors for ash and water; what advantage would there be, and what use would likely be made of them? The first suggestion that presents itself is the possibility of establishing on this basis a fuel unit which would be fairly uniform in value and comparable with itself. This cannot be done if we take as the fuel unit the "ash and water free" portion of the coal.

A concrete illustration of this point may be made as follows: A semi-bituminous coal of the Pocahontas variety, for example, may have 85 per cent. of "combustible," as that term is ordinarily used; that is, "ash and water free." A coal of the true bituminous sort may also have 85 per cent. of "combustible," but the material is not the same in both cases, and indeed there is little relationship in the matter of heat value. For example, in the first case, the carbon and hydrogen, the real fuel constituents, may amount to 80 per cent. of the total coal.

In the other type, there is associated with the "ash and water free" portion a relatively large amount of non-combustible material, so that as a result we may have in this case only 65 per cent. of the coal present as carbon and hydrogen, and hence available for heat production. These latter factors, therefore, of 80 per cent. and 65 per cent., if used to indicate the fuel units, would more nearly express the relative value of these coals. If we go one step further and take their reciprocals, we shall have 125 and 153 respectively. These figures represent in each case the number of pounds of actual fuel of the unit type above described. A term has been suggested for these numbers, that of "gross coal index."[1] It has the advantage of being based on a common unit and hence expresses always a readily interpreted value.

The Gross Coal Index

As illustrating the use of such a factor, we may tabulate a few of the results from the United States Government Coal Testing Plant, Bull. No. 261, as in Table No. 1.

Comparison columns have been added, the first showing the amount of coal needed in each case to make 100 lb. on the basis of the unit ordinarily described as "ash and water free." According to this column, coal No. 1 is very nearly equal in value to No. 2, and similarly coals Nos. 4 and 5 are nearly equivalent; whereas, according to the carbon-hydrogen basis, these samples are rather widely separated as to their true values.

Ultimate Variations

In thus arguing for a more concordant fuel unit, we are not unmindful of the fact that even where so obtained, it is not exactly constant as to composition, and is, therefore, in a measure variable as to its heat value. But these ultimate variations may be indicated by calorimetric values. They occur, however, within relatively narrow limits, and are due to varying ratios of carbon and hydrogen. For example, the average of ten Illinois coals shows available hydrogen to the amount of 3.75 per cent., while the average of 50 West Virginia, Pennsylvania, and Ohio coals shows 3.85 per cent.; so that in the case cited above, the semi-bituminous fuel unit of 80 per cent. would be made up of approximately 76.15 per cent. carbon and 3.85 per cent. hydrogen, and the bituminous unit of 60 per cent. would consist of 61.25 per cent. carbon, and 3.75 per cent. hydrogen.

TABLE NO. 1.

No.	Coal.	Ash. Per Cent.	Moisture. Per Cent.	Gross Coal to Make 100 lb. of "Ash and Water Free."	Gross Coal to Make 100 lb. of Actual Combustibles; (C + H).	Error per 100 lb. of Actual Combustible. Per Cent.
1.	W. Va. No. 10.....	4.63	.65	105	110	5
2.	Ky. No. 1.....	4.44	1.92	106	120	14
3.	Ala. No. 1.....	12.64	1.55	116	130	24
4.	Kan. No. 2.....	18.27	2.63	126	136	10
5.	Ia.. No. 1.....	16.52	5.21	127	142	15
6.	Ill. No. 5.....	19.19	5.16	132	154	22
7.	Mo. No. 3.....	23.30	5.51	140	162	22
8.	N. Dak. No. 1.....	14.85	13.42	138	175	37
9.	Tex. Lig. No. 1.....	14.85	13.40	139	180	41

These figures are somewhat misleading, it is true, in that they seem to indicate a smaller variation than really exists. In the Illinois samples, for example, the hydrogen constitutes approximately 6 per cent. of the absolute fuel, while in the eastern coals it amounts to 5 per cent. This gives a small advantage in heat value per unit of fuel in the case of western and other coals high in volatile matter, because the heat value of hydrogen is approximately 4¼ times that of carbon. But this feature is more than offset by the greater difficulty attending the combustion of coals high in ash, and with combustible matter so largely in the volatile form. At any rate, the error is in the right direc-

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[1] *Journ.* Am. Chem. Soc., XXVIII, 1430.

tion in that its tendency is to show a more nearly accurate relation of potential values, while the very opposite is true of the unit designated as "ash and water free."

Concerning the "gross coal index," therefore, which is only a concrete form of expression for the unit we are advocating, it is a factor which, if established, would convey to the every-day user of coal some intelligent idea of relative values.

Methods for Determination

It has been said above that the fuel constituents are essentially the carbon and hydrogen of coal. It is in place, therefore, to consider methods for their determination to see if they may be made available for use as a basis for coal data, or coal units as above suggested. The combustion of coal by use of sodium peroxide as carried out in the Parr calorimeter brings all the carbon of the coal into the form of carbon dioxide joined with the chemical employed, as sodium carbonate. The principal part of the apparatus for effecting this reaction is shown in Fig. 1.

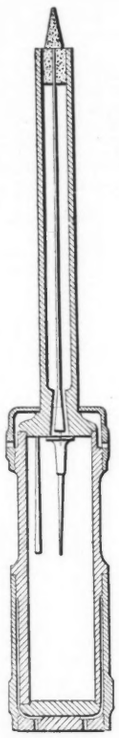


FIG. 1

It consists of a closed chamber in which the ingredients are thoroughly mixed by shaking, after which, ignition is brought about by dropping a short piece of red-hot wire into the charge, or by means of the electric current, as may be preferred. So much of the description of the calorimeter is necessary for a proper understanding of the method for arriving at the amount of carbon present. The calorimeter bomb, it will be thus seen, lends itself readily to the purpose of carbon determination and may be used separately, if desired, where it is not the prime purpose to make a calorimetric measurement.

After obtaining the carbon, as sodium carbonate, it is transferred to any apparatus for liberating and measuring carbon dioxide gas, a very convenient form for which is shown in Fig. 2.

The fused material is put into the flask *C* and acid from *A* is admitted; the volume of gas liberated is measured in the jacketed pipette *P*, and at the same time note must be taken of the temperature and barometric pressure. After reading the volume, the gas is discharged into some form of absorption pipette having the usual KOH solution, and after completion of the extraction of CO_2 the residual gas is returned for reading under exactly the same conditions as to temperature and pressure as before. By this means and by further correcting for such carbonate as may be in the reagents employed, the weight of the carbon is directly deduced. It would seem from this brief description that by a comparatively simple process we may arrive at the most important of the two fuel constituents.

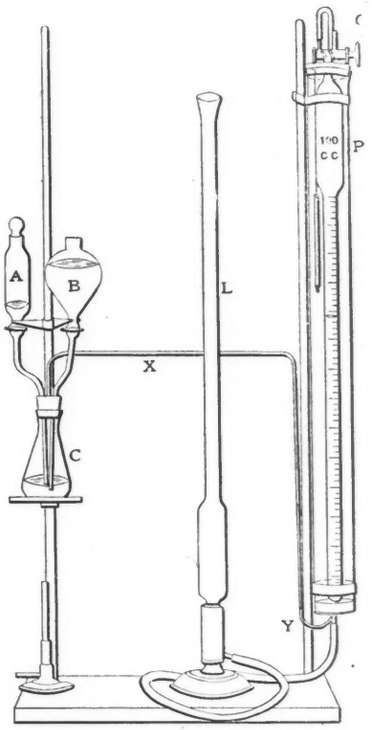


FIG. 2. APPARATUS FOR TOTAL CARBON DETERMINATION

Available Hydrogen

It now remains to consider that part of the hydrogen of the coal which takes part in the combustion, the available hydrogen, as it is termed.

The method here suggested is based on the hypothesis that for any given ratio between the volatilizable carbon (joined to hydrogen as hydro-carbon), and the total carbon, a certain ratio of hydrogen to such volatile carbon exists. Hence, knowing this carbon ratio, we have the percentage of hydrogen indicated as a constant for that ratio. For example, a certain coal has 62 per cent. of total carbon and 41 per cent. of fixed carbon. This shows that 21 per cent. is carbon joined with hydrogen in some proportion. This carbon ratio multiplied by 100, to express it as per cent., would be $\frac{21}{61} \times 100$, or 33.8 and if our above hypothesis is correct, there is present a certain fixed and definite amount of hydrogen joined with the volatile hydrogen at the ratio found. This, by experiment, is found to be 16.8 per cent., that is, $\frac{H}{21} \times 100 = 16.8$; hence, $H = 3.52$ per cent. By empirically determin-

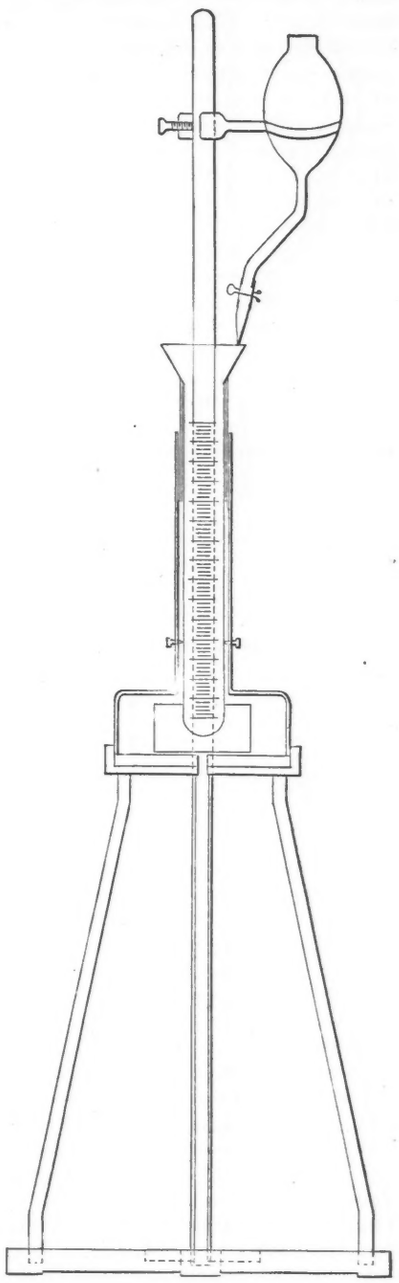


FIG. 5. SULPHUR PHOTOMETER

ing and plotting a number of such points, we get the curve shown in Fig. 3.

It will now be in order to test the value of such a curve by means of data that have not entered into its location. Such data we may find in the Second Preliminary Bulletin[1] of the United States Fuel Testing Plant at St. Louis. Application of the curve to the coal there analyzed shows an even greater concordance for the hydrogen so deduced than for that constituent as determined by the method of ultimate analysis, comparison being made in each case with the hydrogen required together with the total carbon (and sulphur) to yield the indicated calories as observed by means of the Mahler calorimeter.

In the chart herewith, Fig. 4, the horizontal straight line represents the standard of comparison, while the broken line shows variations above or below in tenths of a per cent. as derived by means of the curve. The continuous line shows the same values as derived from ultimate analysis, and the table following summarizes the variations in a form for convenient reference.

TABLE NO. 2.

	Available Hydrogen.	
	From Curve.	From Ultimate Analysis.
Total plus error	26.0	4.0
Total minus error	69.0	142.0
Highest plus error	5.5	1.3
Lowest minus error	5.5	9.5
Average per sample of all errors	1.4	2.1

From this comparison of results it would appear that the extreme of error by use of the curve is much within that resulting from the ultimate analysis, and that on the average the error represented by the latter is 50 per cent. greater than the average error represented by the curve method.

These considerations indicate that the determination of the two prime fuel constituents of coal may be readily available. The only possible fuel constituent remaining is sulphur. It is not a part of the coal proper and does not enter into the case as above considered. It has a small fuel value, but a large influence in its relation to other constituents; hence, a brief reference to its determination should be made.

Sulphur

If an analysis be made of the sulphur in the ash from a boiler grate, it will be found ordinarily to be of such small amount as to indicate that the original sulphur content of the coal has been very largely utilized as fuel. In the combustion of coal for calorimetric measurement by use of sodium peroxide, as we have seen above in the case of carbon which is all brought into the form of sodium carbonate, similarly in the case of sulphur, its final state after combustion is that of sodium sulphate. From this condition, it may be readily precipitated as barium sulphate and determined gravimetrically, or this precipitate may be made to show directly the amount of sulphur by means of some form of turbidimeter.

In the apparatus shown in Fig. 5, the graduated tube indicates in millimeters the depth of the turbid liquid through which may be seen a light of constant power. This graduated tube has a clear lens bottom which dips below the surface of the liquid in the flat-bottomed cup placed in the dark chamber below the tube. Light from the candle is admitted through a ¼-in opening which thus serves as a diaphragm to cut out the reflected rays. In this process the sodium peroxide fusion is dissolved, made slightly acid, and an aliquot part shaken in a flask with one or two good sized crystals of barium chloride. The content of sulphur is read off at once by means of the photometer.

Actual Fuel Units

But while the sulphur may be thus conveniently determined and while it has actual fuel value, its disadvantages outweigh its virtues, and it is questionable whether we should give it a place in counting the fuel constituents of coal. It would probably give us a more just basis of comparison to confine our fuel unit to the content of the carbon and hydrogen only, but custom has come to look upon the sulphur as actual fuel, and it would seem as though it should be admitted on some basis. However, its calorific value

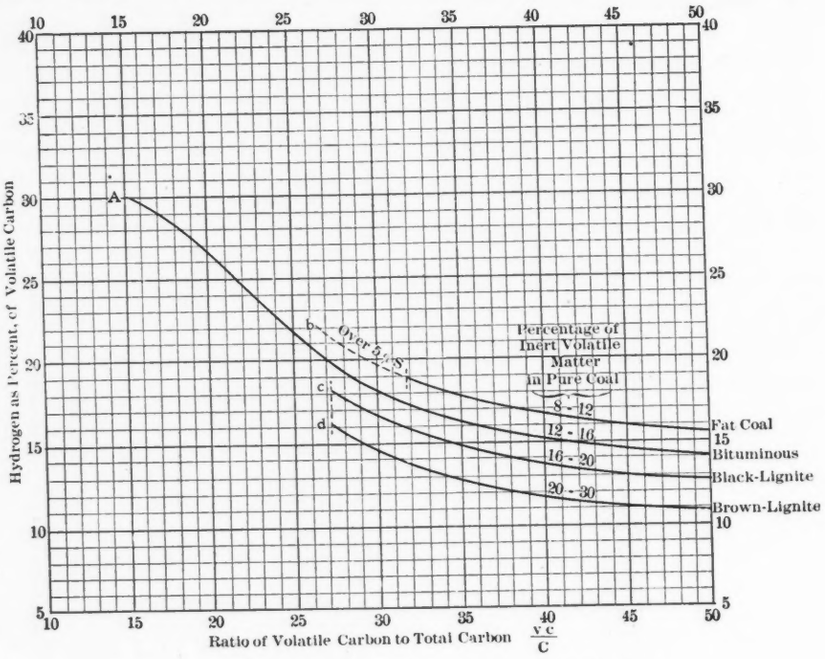


FIG. 3. CURVE FOR INDICATING AVAILABLE HYDROGEN

TABLE NO. 3.

	Ash. (Iron as Fe)	Moisture.	Inert Vol. Matter.	Total Non-Combustible.	Sulphur.	Total Carbon.	Available Hydrogen.	C + H + ⅛ S.	Gross Coal Index.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1 Ala. 1	12.37	1.55	9.29	23.90	0.73	72.16	3.90	76.24	131.1
2 Ala. 2	12.17	2.58	11.21	26.98	1.02	69.24	3.78	73.27	136.4
3 Ark. 1	12.43	1.17	6.05	20.92	1.27	75.68	3.40	79.39	125.9
4 Ark. 2	8.65	0.74	5.18	16.47	1.90	80.03	3.50	84.00	119.4
5 Ark. 3	11.32	0.80	6.38	19.80	1.30	76.37	3.83	80.52	124.1
6 Col. 1	6.16	13.49	15.59	35.82	0.58	61.13	3.05	64.32	155.4
7 Ill. 1	12.16	6.28	11.78	34.47	4.25	62.01	3.52	66.59	150.1
8 Ill. 2	22.57	5.31	10.73	42.91	4.30	54.06	3.03	58.16	171.9
9 Ill. 3	10.93	5.96	10.35	29.01	1.77	67.30	3.69	71.43	139.9
10 Ill. 4	11.37	11.40	10.78	34.89	1.34	61.79	3.32	65.46	152.7
11 Ill. 5	17.78	5.16	12.12	38.82	3.76	58.02	3.16	62.12	160.9
12 Ill. 6	13.08	5.13	13.53	36.14	4.45	60.51	3.30	64.92	154.0
13 Ind. 1	12.85	8.66	10.26	34.35	2.58	62.20	3.44	66.28	150.8
14 Ind 2	11.80	6.24	10.89	33.53	4.60	62.97	3.50	67.62	147.8
15 I. T. 1	9.63	3.87	11.90	27.39	1.99	69.85	3.76	74.10	134.9
16 I. T. 2	10.75	1.70	10.60	24.61	1.56	71.49	3.90	75.78	131.9
17 Ia. 1	14.57	5.21	9.84	34.82	5.20	61.80	3.38	66.48	150.4
18 Ia. 2	15.04	4.25	11.84	36.33	5.20	60.36	3.31	64.97	153.9
19 Kan. 1	11.52	3.74	8.50	28.10	4.34	68.22	3.68	72.98	137.0
20 Kan. 2	15.87	2.23	8.67	33.17	6.40	63.14	3.69	68.43	146.1

[1]U. S. Geological Survey Fuel Testing Plant, Bull. No. 290.

is approximately but one-fourth that of carbon and but one seventeenth that of hydrogen. Its effect, therefore, as fuel would be given its fair proportionate valuation if it were transferred to a carbon basis by dividing the percentage content in each case by four.

The table below, which has been made up from analytical data contained in Bulletin No. 290 of the Fuel Testing Plant of the United States Geological Survey, is presented to illustrate the results as above outlined and to assemble them in such manner as to give the information in available form for the user of coal.

Pure Coal

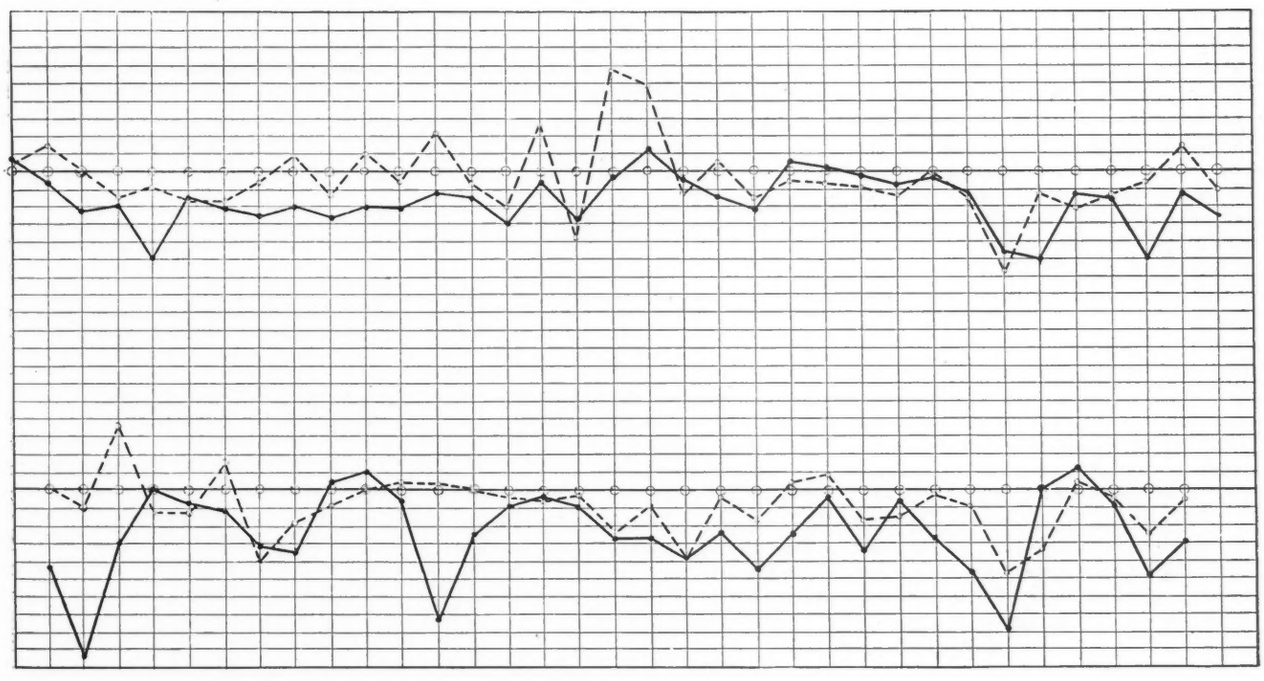
While we have been arguing for a unit which would have value from a fuel standpoint, we should not leave the discussion of fuel units without further reference to pure coal. From what has already been said regarding the low fuel value of sulphur, it is manifestly unfair to compare coals on this basis which have widely varying sulphur constituents. This may be more clearly demonstrated by the following illustration: A certain Indiana coal has 7.55 per cent. of sulphur. The same coal washed has 2.93 per cent. When calculated to "pure coal," that is, to "ash and water free," the natural coal shows 14,170 B.t.u., while the washed part shows 14,478 B.t.u.

Evidently the standard of "purity" varies even though the samples are the same, the washed portion being simply taken from the main lot. As a matter of fact, wherever the pure-coal basis is made use of, it should exclude not only ash and water but pyrite as well. In the illustration above given, if the two analyses be calculated to such basis and the pyrite excluded with the ash and water, the heat value for each case is identical, viz., 14,653 B.t.u. Of course such a close agreement is unusual, but the illustration is not overdrawn. It is taken from the table given below, prepared by W. F. Wheeler, of this laboratory, who has recently had a good opportunity to study this phase of the matter by reason of some work done on samples from the same mines, but covering a wide range as to sulphur content by reason of the washing or floating of a part of each lot in a solution having a pecific gravity of 1.35.

The calculation for this correction is based on the fact that the iron pyrites in burning to ferric oxide loses in weight to the extent of five-eighths of the amount of sulphur present; thus, $2FeS_2 + 11O = Fe_2O_3 + 4SO_2$. Hence, by increasing the weight of ash obtained by five eighths of the percentage content of sulphur, we have the combined weight of the normal ash and pyrite of the coal. This, of course, assumes that all of the sulphur is present in this form. There is always present a small amount of organic sulphur varying from ¼ per cent. to 1 per cent., but correction for this ingredient cannot be readily made.

TABLE NO. 4.

No.	Sample.	Sulphur.	Moisture.	Ash.	Corrected Ash i.e. (Ash + FeS_2).	Corrected B.t.u. on Ash, Water and Pyrite Free.	Common B.t.u. Ash and Water Free.
1	Sangamon Co., Ill. Lump	5.97	0.26	11.63	15.3	14,319	13,987
2	Sangamon Co., Ill. Washed	3.04	4.94	5.82	7.7	14,335	14,164
3	Vigo Co., Ill. Nut	7.55	0.87	16.07	21 4	14,653	14,170
4	Vigo Co., Ill. Washed	2.93	4.83	4.06	5.9	14,653	14 478
5	Sullivan Co., Ind. Lump	3.18	5.65	5.76	7.7	14,738	14,451
6	Sullivan Co., Ind. Washed	1.26	2.43	2.47	3.3	14,709	14,624
7	Sangamon Co., Ill. Scgs	4 23	0.55	18.1	20.8	14,285	14,031
8	Sangamon Co., Ill. Washed	2.75	6.70	7.58	9.3	14,356	14,192
9	Williamson Co., Ill. Nut	1 78	4.24	12 28	13.4	14,471	14,361
10	Williamson Co., Ill. Washed	1.34	3.60	3 86	4.7	14,585	14,509
11	La Salle Co., Ill. Scgs	3.21	6.34	9.41	11 4	14.517	14,316
12	La Salle Co., Ill. Washed	2 14	8.12	3.62	4.9	14,619	14,487



○ From Calories ◦ From Curve • From Ultimate Analysis.

FIG. 4 COMPARISON OF VALUES FOR AVAILABLE HYDROGEN

Calculated from Report, Coal-Testing Plant, St. Louis, 1905.

Index of Values

Table 4 suggests that the pure-coal idea may have a value quite aside from its use as a fuel unit. Mr. Bement[1] argues for its constancy for any given region, and hence for its use as an index of values upon determination of ash and moisture.

[1] *Journ.* West. Soc. Eng., Vol. XI, p. 763.

By examination of the results of the table, which are grouped in pairs, it is evident that no such use of the pure-coal idea could be made without introducing also the correction for sulphur. Other disturbing elements may be present, but they may prove to be of minor effect. One fact, however, must be borne in mind: the deterioration of certain kinds of coal is of sufficient moment to make it necessary that comparisons be made on freshly mined samples. Recent experiments here have demonstrated a very positive drop in heat values on samples stored in the laboratory, a total of from 3 to 5 per cent. being found in certain cases. The subject of deterioration as well as the discussion of fuel ratios must be reserved for some other time.

The Commercial Situation

In an address before the Virginia Bankers' Association, at the Jamestown Exposition, June 21, Vice-President Frank A. Vanderlip, of the National City Bank, of New York, discussed the business and financial outlook. He said in conclusion:

"But now, what of the future? Industry as yet has shown only scant signs here and there of declining activity. The crop outlook is not altogether satisfactory, but considering the advanced prices and the great stores left over from other harvests there is nothing in that situation to bring real disaster. The mercantile situation seems healthy. Labor is still fully employed at the highest rate of wages ever paid. The banking position is sound But in spite of all this, in spite of a half-year's record just closing, which in most lines of business will be the equal of last year's phenomenal figures, nearly all experienced business men are of the opinion that we are facing a practically certain recession in trade, that we have ahead of us a period of smaller industrial totals. Such a view is almost universal among well-informed business men. There is no longer the disposition courageously to enter upon new enterprises. Railways are curtailing expenditures. Bankers are inclined to exercise caution in extending accommodation. Most manufacturers and merchants are planning their fall campaigns with much conservatism.

"That the period ahead of us is one in which commercial activities will be curtailed and manufacturers' totals show a decrease, there is really little division of well-informed opinion. The question that is desirable to consider is only in relation to the extent of this recession. Will it be but a dip, lasting only a few months, giving us but time to catch our breath before we march on to renewed accomplishments in this most wonderful development of prosperity, or is there to be a more protracted and serious disturbance?

"I believe the answer to that lies wholly in the public mind and temper. There is no inherent reason in the conditions of agriculture, trade, industry and finance in the United States that would make necessary a period of further disturbance and depression. There are a thousand influences that should lead toward continued prosperity and renewed accomplishments throughout the fields of industry and commerce. The business of the country will turn into one of these roads, solely as the result of whether or not the public and the public's legislative representatives are wise and patient or are hasty and inconsiderate. If the intricate problem of railway regulation is worked out in a spirit of fairness and intelligence, if the vastness of the problem is recognized, if the involved relationships encountered are taken into account and the far-reaching effects of paternal regulations when applied to so great and complicated a network are reckoned with, and if an intelligent understanding of the complications will lead to a patient attitude toward results, then I believe we will resume the road toward further prosperity. The moment that investors have become convinced that the problem is to have fair and patient consideration in its solution, we will start on that road again with full measured pace."

The Production of Arsenic as a By-product in Sulphuric-acid Manufacture

By Edward Walker

Until recently the arsenic removed from sulphuric acid has been wasted, owing to its production in the form of sulphide, which is not a commercial commodity. During the last year or two the United Alkali Company has conducted experiments with a new process by means of which the arsenic is recovered as arsenious acid. The process promises to be a commercial success, and in all probability will bring an important new supply of arsenic on the market, as well as make it possible to use highly arsenical ores profitably in sulphuric-acid manufacture.

The process is described in a series of British patent specifications, the most important of which is No. 5151 of 1906. That the process is a success is shown by the fact that five plants are already in operation, and that arrangements are being made for building several more.

According to this process, the arsenical sulphuric acid, as it flows from the Glover tower is first brought into contact with a reducing agent such as charcoal, in order to bring the arsenic to the arsenious state. It is then brought into contact with dry hydrochloric-acid gas, the result being that the arsenic is converted into liquid arsenious chloride. This chloride is an oily liquid and a good deal of it can be separated from the sulphuric acid by settlement. The sulphuric acid drawn off from the settling tanks still contains arsenious chloride. To remove the latter, air is blown through the acid. The chloride comes off as vapor, and is taken to a scrubbing tower. Here it comes in contact with water, with the result that arsenious acid and hydrochloric acid are formed. The hydrochloric acid is used over again, and the arsenious acid is collected as a commercial product. Very often, however, the arsenic contains selenium. If so, some of the arsenious chloride, which had previously separated as an oily liquid is added to re-dissolve the whole of the precipitated oxide, and then, on addition of water, the selenium is found to be precipitated.

The process is naturally one which requires very careful attention, owing to the existence of arsenic as a volatile compound. The manufacturers and the alkali inspectors, however, speak well of the process, so it should develop into a standard method of recovering arsenic.

Fume Filtering at the Works of United States Smelting Company

The new bag-house for filtering the smoke of the lead blast furnaces at the plant of the United States Smelting Company at Bingham Junction, Utah, was put in commission about June 1. It consists of a brick building 192 ft. long, 58 ft. wide and 60 ft. high, and contains 2080 cotton bags, each bag being 32 ft. 6 in. in length and 18 in. in diameter. About 12 ft. above the ground level there is a steel floor covering the entire space between the walls. In this floor, at regular intervals, about 2 ft. apart, holes are cut 18 in. in diameter. A nipple 18 in. in diameter and 6 in. long extends upward from each hole, over which the lower ends of the bags are slipped. The general design and operation of the bag-house follow conventional practice.

The fan delivering the smoke into the bag-house is driven by an electric motor which receives power from a special General Electric 750-h.p. steam turbine in the power-house. In case this steam turbine should be shut down for repairs, the power to run the motor can be furnished from another dynamo. It is thus possible to keep the bag-house in operation continuously, and there is no chance that a shut-down in the power house would stop the operation of the bag-house.

Turbine pumps may be used for high pressures by mounting two or more impellers on one shaft and inclosed in one piece, the water being delivered from the diffusion vanes of one stage to the impeller of the next stage. The discharge head in this case is the sum of the heads produced by all the impellers.

Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

DEVELOPMENT AND MANAGEMENT

All discharge pipes, exhaust connections, etc., should have easy bends.

When a long suction pipe is used, many engineers advocate having a foot-valve to keep the pipe full.

The points in favor of compressed-air haulage are; simplicity, safety, convenience, economy and reliability.

By using a locomotive the expense of maintaining a footway for animals used in hauling is avoided. Often from $1 to $2 per day is saved on this item alone.

A yearly cost of from $1500 to $1800, or $5 to $6 per day will operate a light locomotive that will do the work of from 10 to 25 animals. The initial cost of an engine is often saved in less than a year.

The injector on a supply pipe should be provided with a strainer to prevent any stoppage of the tubes by chips, waste or any other dirt in the feed water. Such stoppage is a frequent cause of trouble when a strainer is not used.

In laying rails on stringers instead of ties or cribwork, reverse-point spikes are used. Stringers laid on ties or crib-work should be tied by wooden cross-pieces let into the top faces of the stringers, in order to prevent rolling or spreading.

Drain pipes for condensing water from heaters or traps in the exhaust pipe should be connected with the condenser and fitted with a check valve and also a stop valve. Failure to obtain a good vacuum is usually caused by air leaks.

At a Pennsylvania plant a light locomotive is economically used for hauling larries to supply a double battery of coke ovens. The locomotive is standard gage, 56½ in. Five or six larries are hauled per trip and from 100 to 400 ovens are charged per day of 10 hours.

In a mine where steam locomotives are used the system of ventilation should provide fresh air to the workings independently of the main haulage where the locomotives run. The haulage should be used for the return air only, so that the products of combustion cannot cause annoyance to anyone.

Storage-water tanks should always be provided with an overflow pipe of ample size, and the supply should be controlled by a ball-cock and float. Storage tanks of moderate size are preferably made of wood, lined with planished or tinned copper. Sheet lead, zinc or galvanized iron should not be used for lining tanks containing drinking water; also they are not as durable as copper.

An exhaust condenser should be placed vertically. The choice of location and type of condenser are governed by the conditions of the water supply. The water supply should preferably be arranged under pressure. If the condenser works under suction, it should not be placed too low. The discharge pipe should always be carried down to the lowest level and should not, in any case, be led above the foot-elbow.

In hauling coal from mines to the point of shipping, several authorities claim that it is cheaper to haul with narrow-gage mine cars than to run a wide-gage track to the mines. The gages most commonly used for such purposes are 36 and 44 in. A light road of such width can be built cheaply in rough and hilly countries. The arrangement of tracks at each end should be planned for making up trains by gravity and exchanging trains with the least delay.

The experience of mine superintendents has shown that on narrow gage, with locomotives, motors and cars of short wheel-base and with sharp curves, it is best to widen the gage of the track 1/16 in. for each 2½ deg. of curvature. For instance, a 40-deg. curve should have 1 in. increase in the gage of the track. On very sharp curves, it is well to widen the gage as much as can be done and still keep the required amount of bearing on the rail for car wheels, allowing for wear of flanges and wheels hugging one rail.

When a curve comes on a grade, the grade should be reduced on the curved part of the track, so that the combined resistance of the flattened grade and the curve will not exceed the resistance of the steeper grade on the straight part of the track. In practice, the compensation for curves on grades is at the rate of 0.02 ft. grade in each 100 ft. for each degree of curvation. Sharper curves may be used on narrow gage than on wide gage, because there is less difference between the length of the inner and outer rails on curves of the same radius and because narrow-gage rolling stock usually has a shorter wheel-base.

The resistance of gravity in a haulage road increases in exact proportion to the percentage of the grade. It is always 20 lb. per ton of 2000 lb. for each per cent. of the rise. For a ½ per cent. grade, the resistance of gravity is 10 lb. per ton. For a 2 per cent. grade, 40 lb. per ton, for a 5 per cent. grade, 100 lb. per ton, etc. The resistance due to friction varies with the character and conditions of the car and track. With cars in good condition and track well laid, it may be as low as 5 lb. per ton. For bad cars with rough track, it may run up as high as 80 lb. per ton. For mine cars, with loose wheels, it is seldom less than 20 lb. per ton and often it exceeds 30 lb. The resistance of flange friction on wooden rails is about twice the resistance on iron rails. Poorly laid track and crooked rails increase the resistance considerably, while overloading cars also has the same effect.

The frictional resistance to cars around curves is considerable, and is variable. The shorter the radius of the curve the greater is the resistance. The length of the wheel-base of the motor and of the cars, the elevation of the outer rail, the speed, the condition of the cars and track, the length of the trip and the length of the curved track also affect the resistance. If the gage of the track on curves is not sufficiently widened to prevent the wheels from binding against the rails the resistance may be very great. Irregular curves, especially sharp curves in connection with steep grades, should be avoided as they greatly decrease the hauling capacity of locomotives or motors, besides necessitating an increase in the cost of operation. It is therefore preferable to increase the length of the track and the expense of construction rather than save on first cost and have to meet a continual loss in operating expenses.

According to the inspector of mines there is a very prevalent but erroneous belief among shot-firers in English mines that hang-fires are impossible when firing by electricity. It is supposed that when the firing cable has been disconnected from the battery all danger is over, and that the men may return to the shot without delay. This idea is rather favored by the Staffordshire special rule which provides that "if a shot misses fire no one shall return to it until after the lapse of at least an hour; if, however, the shots are fired by electricity, the authorized shot-firer may return immediately, after disconnecting the cable of the battery and taking the battery with him." It cannot be too widely known, says the inspector, that this idea is erroneous, and that if the flashing charge is a detonator or the electric fuse becomes damp, the shot may hang fire for an appreciable time after the disconnection of the battery, or even after the fuse wires have been pulled out or their connection with the firing cable broken. This is certainly a somewhat unexpected phenomenon, but the inspector gives quite a number of cases where it has happened.

Metallics

The intensity of a magnetic field is the greater, the closer the particles to be attracted can be presented to the magnet. The interposition of a belt, or drum, or similar device, which may be necessary to effect the removal of the attracted material from the magnetic field, inevitably reduces to some extent the intensity of the latter.

In a thoroughly modern zinc work, costing about $16 per ton of annual capacity, in the United States, the smelting of 2000 lb of sulphide ore would require approximately the labor of 2.25 men for one day at an average wage of $2; in other words, the labor cost of smelting would be $4.50 per ton. Wages range from 15 cents per hour to 25c. per hour ($1.50 to $3 per day).

The final element in the valuation of zinc ores, namely, the percentage of metal extraction, is difficult to generalize inasmuch as it depends greatly upon the character of the ore mixture that is smelted and the metallurgical practice. An extraction of 90 per cent. of the zinc in the ore is sometimes effected, but this is above the average. On a good grade of ore an extraction of 88 per cent. would be a very fair result, and with a poor grade of ore and in inferior plants the actual result will be a good deal below that figure. In the early treatment of Colorado ore in Kansas the extraction was only about 72 per cent. The retorts in use would not stand the high temperature necessary to distil off the last of the zinc, and residues assaying high in zinc were discharged from the furnace. Improved practice, including the manufacture of a superior retort, has bettered that result, but the extraction from these ores is still inferior to that which is yielded by the clean ores of the Joplin district.

The main points of difference between the multiple system and the series system of copper refining are in power cost, compactness, and cost of preparing anodes. The power required is practically half greater in the multiple tank. The series tank has relatively no contacts or conducting bars and the electrodes are very close together, the anodes being thin even plates. To produce such anodes they must be either rolled or specially hand-cast, and the grade of material used must be good. The interest on the metal tied up in process and on the investment in plant is less in the series system. The series system requires no starting sheets, but much closer supervision to keep the quality of the cathodes up. As lead-lined tanks cannot be used in series work, due to the relatively high voltages employed, tank maintenance becomes an important item. The fact that large refineries on both systems are being satisfactorily operated bears witness to the close balancing of the pros and cons in each case, although much more material is refined by the multiple than by the series process.

According to Richards ("Ore Dressing," I, p. 488), a man is able to pick from a moving belt a little more than 4.8 tons of galena of 1-in. size in 10 hours, which would make the cost 20½c. per ton with labor at 10c. per hour. With labor at 37½c. per hour the cost would be 76c. per ton. The cost of picking blende on the same basis would be $\frac{7.4}{4.0}$ times as much, or $1.40, because of its lower specific gravity. These estimates are established on a theoretical basis, or rather on an experimental basis, which fails to take into account all of the varying conditions. Thus, a man can pick more galena (or blende) from a stream of ore which carries a large proportion of the mineral in clean, free and unmistakable pieces, than he can from a stream of ore carrying only a small proportion of pieces and these of doubtful classification. Richards' table is, however, valuable in showing how rapidly the quantity of material that can be picked diminishes, and the cost per ton increases as the size of the individual particle diminishes. In other words, it is much cheaper to pick mineral of 2-in. size than 1-in. size.

Zinc ore is being today, in spite of increased cost for both labor and gas, smelted more cheaply in Kansas than it can be in Europe. Even with coal it can be smelted with approximately the same cost, although this is hardly being done at the present time. European smelters have the advantage of very much cheaper labor than the American, and, unlike the experience in some other arts, the low-priced European smelterman has in zinc smelting practically as high an efficiency as the high-priced American. The difference in the labor cost per ton would be greater were it not that the American smelters economize in labor through the use of mechanical roasting furnaces and other mechanical devices, wherever they can be installed, to a greater extent than the European. The European smelter has, moreover, an advantage in various other items in the cost of smelting, but these are all offset by the cheaper cost of fuel in America, although the inferior character of the coal in the chief zinc-smelting districts requires the consumption of a greater quantity of it per ton of ore.

The cost of culling mineral is largely dependent upon the character of the ore, but it is seldom much in excess of the cost of milling in the general practice of mills of small or moderate size. Under ordinary circumstances culling by hand is to be advised as a step in the milling process, where all the ore from the mine, having been broken by a crusher to the size determined for the next machine, passes over a grizzly or through a trommel from which the coarse material would go to the picking table and the rejected stuff from the latter to the next crushing machine. In this case there is no extra cost for crushing, and only the cost of culling, minus the cost of milling the mineral picked out, would have to be considered against the increased saving of mineral. For example, if the cost of milling be 50c. per ton of crude ore and 16 tons be concentrated into one, the cost per ton of contrates is $8; leaving out of account the question of losses in treatment (very important) and cost of repairs on picking tables, interest, amortization, etc. (comparatively unimportant), it would be an equal thing to produce a ton of culled mineral of the same grade at $8 in so far as operation only is concerned. Having regard to the recovery of mineral, instead of the 75 per cent. which milling may yield, the hand sorting will yield 100 per cent. If the mineral be worth $75 per ton, consequently, instead of one ton obtained by milling, there is 1 1/3 ton obtained by culling, or a yield of $100 instead of $75. The gain is therefore $25 + $8 = $33, from which is to be deducted, of course, the cost of culling.

Magnetic lines of force are analogous to electric currents, and like the latter form closed circuits. The magnetomotive force in a magnetic circuit is directly proportional to the number of ampere-turns. The reluctance is directly proportional to the length of the circuit and inversely proportional to the sectional area, and also to the permeability of the substances in the circuit. Magnetomotive force ÷ reluctance = magnetic lines of force. By the term permeability is meant a numerical coefficient which expresses how much greater the number of lines generated in a substance by a given magnetomotive force is than those which would be generated in air by the same force. It is not possible to obtain much more than 20,000 magnetic lines per square centimeter in soft, annealed wrought iron, without using enormous magnetomotive force, and in designing electromagnets it is not generally good economy to go above 16,000. Leakage is the number of extra lines which must be produced in order to attain a desired strength of field. This will depend upon the shape of the magnet and the length of the air gap. In a magnet of which the poles are bent around to face each other, with an air gap of only 0.25 in., the leakage may be about 0.3 of the useful lines; for larger air gaps it will be greater. In a poorly-designed magnet it may be much greater. Where a very strong field is desired, the lines of force may be condensed by beveling off the poles so that their sectional area is less than that of the core, but this is done at some loss of power, inasmuch as halving the area does not by any means double the strength of the field.

THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the

Hill Publishing Company

505 Pearl Street, New York.

London Office: 6 Bouverie Street, London E. C., Eng.

CABLE ADDRESS "ENGMINJOUR, N. Y."

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Mexico Cuba, Porto Rico, Hawaii or the Philippines. $6.50 in Canada.

To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

For sale by all newsdealers generally.

Entered at New York Post Office as mail matter of the second class.

During 1906 THE ENGINEERING AND MINING JOURNAL *printed and circulated* 462,500 *copies, an average of* 8896 *per issue. Of this issue,* 9000 *copies are printed. None sent regularly free. No back numbers beyond current year.*

Contents

Zinc Smelting in New Countries

The art of zinc smelting is a peculiar one, inasmuch as there are few metallurgical processes which for their success are so dependent upon the quality and training of the labor that is necessary in carrying it out. Given the best design of plant that the engineer can furnish, his plans and those of the manager may be defeated, in fact probably will be defeated, until the management has developed the right kind of labor organization. In districts remote from those wherein zinc smelting has been carried on for many years, where experienced zinc smelters are unavailable, the difficulties are enormously enhanced. For this reason projects for zinc smelting in new countries, like Mexico for example, should be approached very cautiously. In this connection the following remarks from the report of the Canadian Zinc Commission may be quoted:

"While the labor cost in smelting a ton of ore is a fundamental consideration in determining rentability, there is another important consideration which must be reckoned upon in starting a new plant in a new locality. This is the question of obtaining skilled men. The zinc smelter is made, not born. There is no metallurgical process in which so much is dependent upon the skill of the workman as in zinc smelting; nor is it possible to eliminate manual labor by mechanical devices to so great a degree as it is in other smelting processes. No matter how perfectly the zinc smeltery be designed, how elaborate its construction, and how modern its methods—poor smelter-men will neutralize all the advantages planned by the engineers. This is one reason why zinc smelting has been for 100 years confined largely to certain localities, where men skilled in the art are obtainable; it is a reason why European smelters are sometimes slow to extend their plants; and it is a reason why certain modern and very costly plants established in new localities have proved disappointing for several years while the workmen have had to be trained, in spite of the proportion that could be imported from older smelting centers. This is a consideration which often is not taken into account in planning a new plant, but it must not be lost sight of."

The recent experience of the Broken Hill Proprietary Company has been apparently somewhat on the above lines. During 1906 this company was engaged in the construction of a zinc-smelting plant at Port Pirie, South Australia, which was completed before the end of the year and was given a trial. Evidently the latter was not successful, because the chairman of the company remarked at its last semi-annual meeting: "I may tell you at once that the distillation of zinc is a very intricate problem, as all producers find out at the commencement." The Port Pirie plant will soon have another trial. In the meanwhile we learn from the Australian papers that Mr. Delprat, the distinguished general manager of the Proprietary Company, has gone to Europe to investigate the methods of zinc smelting in use there. Nothing has been said respecting the new type of distillation furnace erected at Port Pirie. It is a remarkable fact that the promoters of new zinc-smelting enterprises in foreign lands, not content with the difficulties by which they are naturally confronted, as pointed out above, seem always to find it necessary to increase them by designing a new and special type of distillation furnace, apparently only for the excitement of giving a new form of furnace a trial in a new works, with new men. The combination, which certainly is exciting, usually proves a difficult one, and the outcome is a return to some standard type, which had been evolved through long experience.

Production of Arsenic

The article by Mr. Walker, elsewhere in this issue, on the production of arsenic as a by-product in sulphuric-acid manufacture, records a new development that is likely to be of considerable importance in the chemical, metallurgical and mining industries. It is important, in the first place, in adding to the commercial supply of arsenic, of which there has recently been a great shortage, leading to an extraordinary advance in the price. The average value of the domestic production of white arsenic was 3c. per lb. in 1904; 3.25c. in 1905 and 5c. in 1906; these being the prices at which the production was contracted for delivery f.o.b. works, but in the wholesale market at New York the price has been correspondingly higher, large sales having been made in 1906 at 7c. per lb., the average for the year having been about 6.5c. The development of a new large supply will, of course, tend to reduce the price to a more normal level, which will affect the metallurgical

companies engaged in the production of the substance as a by-product, and also will have a bearing upon plans for the treatment of arsenical ore, such as that of Cobalt, Ontario.

Another result will be to increase the value of pyrites containing a little arsenic, which will be less objectionable for sulphuric-acid manufacture than heretofore. It is well known that sulphuric acid made from arsenical pyrites is itself arsenical and acid of that character is excluded from many important uses. The removal of the arsenic from such acid, by precipitation as sulphide, is a simple chemical process, which has been extensively practiced, but it has involved additional expense, and the precipitate of arsenic sulphide has been not only of no value, but also has been a nuisance to dispose of. We have no recent information as to the magnitude of the amount of this by-product, but a few years ago, two important chemical companies of the United States were each producing about 150 tons of arsenic sulphide per annum, both of them burying the substance in the earth to get rid of it. It may be remarked here that the annual production of white arsenic in the United States is about 800 tons, while the consumption is about 4000 tons. The production of white arsenic in Great Britain is about 1800 tons per annum.

The Disposal of Smelter Smoke

The article by Mr. Lang, which is published elsewhere in this issue, takes up one of the live questions of the day in metallurgical practice. There was a time, only a few years ago, when the smelters of the West were at liberty to discharge their sulphurous gas into the atmosphere without restraint, but as agriculture has developed in their environments complaints of damage to crops and cattle have become frequent, and there has been much litigation. To those smelters who are in places where there is no market for sulphuric acid, the only way out of difficulties has been to erect high and costly chimneys which will discharge the gas so high in the atmosphere that it will not cause trouble; or to remove the works to desolate places that have no agricultural promise.

Mr. Lang now proposes to remove the gas to such places, instead of removing the works. The idea is original and worthy of consideration. We are disposed to think that Mr. Lang has underestimated the cost of such removal, and we hope that there will be a discussion upon that point, as well as upon the general feasibility of his idea. This is a kind of problem that can be settled only by engineering computations. The case of the lead works at Allston Moor, England, where smoke is carried through a flue for a distance of five miles or so, which is cited by Mr. Lang, is an interesting precedent.

Sociological Work of Mining Companies

The sociological work done by the Colorado Fuel and Iron Company for the benefit of its employees is described in another part of this issue. The article deserves attention since it shows the results which can be attained by systematic work in this direction. Not all large corporations are indifferent to the health and welfare of their employees; some have endeavored to aid them in various ways, but in few cases have plans to that end been so carefully and thoroughly worked out as in this instance. The officers of the company upon whom the work devolved certainly deserve much credit for what they have done, and much is also due to the higher executive officers who supported them in their work.

The results of this work have been encouraging. On the purely commercial side there is no doubt that well-housed employees, contented with their surroundings, are apt to do better work, and give less trouble. At the same time tact and judgment are necessary in work of this kind to avoid too great a sense of unearned benefit. It must be managed so as to make the men partners and not beneficiaries; and to make them feel that they are working for their own advantage, and of their own volition. The example set in Colorado may well be studied elsewhere, and by other large companies.

THE ADDRESS OF Frank A. Vanderlip, vice-president of the National City Bank, of New York, on the business and financial outlook, made before the Virginia Bankers' Association last week, has attracted wide attention, as does everything that Mr. Vanderlip says in his public addresses and writings. An important feature of his recent remarks was the frank recognition that the industries of the United States are now facing a practically certain recession in trade, which heretofore has been strenuously denied in many quarters. However, as the weeks have slipped by, it has become more and more certain that the conditions of 1903 are being repeated in a measure; in what measure it has not yet been possible to say, but the general feeling is that while there will be a further recession in business, it will probably not go anywhere near so far as in 1903. The point in Mr. Vanderlip's address about which there will be disagreement is his opinion that political conditions will determine the parting of the ways between further prosperity and a great depression. Inasmuch as the conditions which are now affecting commerce and industry appear to be not only of American effect, but also of European, it is hard to believe that the causes are to be ascribed solely to American political conditions.

A MEETING OF chemical engineers was held at Atlantic City, June 21, to discuss the advisability of organizing an American society of chemical engineers. Unfortunately, the meeting was not very well attended, wherefore the expression of views was not sufficiently representative to determine finally the advisability of going ahead with the project; but a committee (Dr. Chas. F. McKenna, of New York, chairman) was appointed to take up the matter further by correspondence with the leading chemical engineers of the United States. The American chemical industry has now attained so much importance that there is a good field for such an organization as is now proposed; indeed there is a real need for it.

THE ERECTION of a memorial to the late John Stanton was recently proposed by Capt. James Wilcox, of the Mass Mining Company, and the idea has been taken up by several prominent men in the Lake Superior copper country. Just what form the memorial will take has not yet been determined, but the present plan is to erect a shaft or statue in some central place, probably in the campus of the Michigan College of Mines at Houghton. No man deserves such a memorial more than John Stanton; his long identification with the copper country, his success as a mine manager and the high example he set of unswerving integrity should all be held in remembrance and set forth as an example.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

Utilization of Black Sand

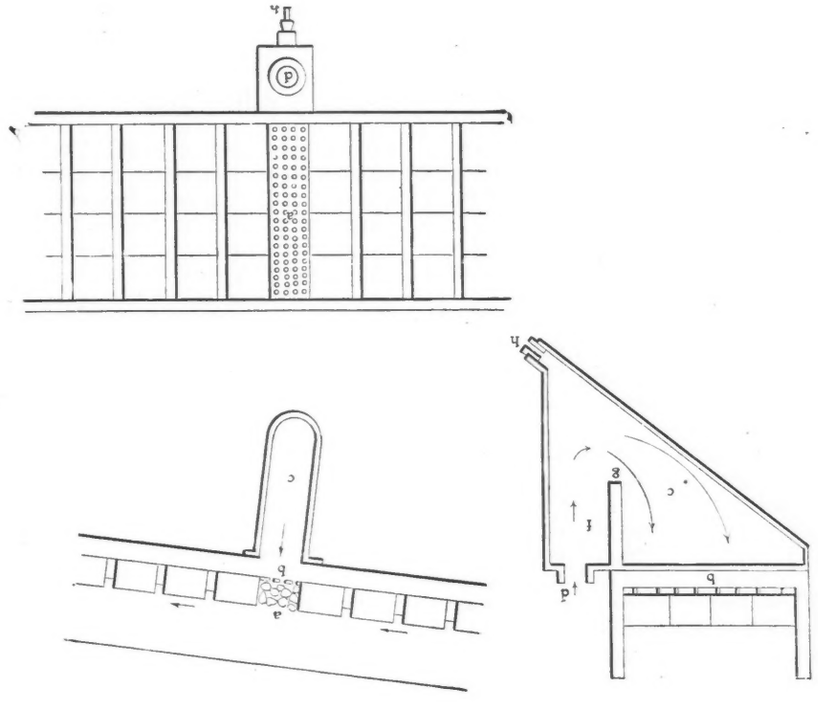
It was my fortune to serve under the U. S. Geological Survey in the black-sand investigation at Portland, Oregon, for two and a half months in the summer of 1905. During that period under the direction of Dr. David T. Day my duties lay in the direction of experimenting upon the different sands which came to the pavilion to find out what minerals they contained and what methods we could employ for separating those minerals so that they could be put in condition to market. In general the conclusions were as follows:

That if we sized the sands on 8-mm., 2-mm. and ½-mm. screens, this would give us four sizes. The first upon 8-mm. was in every instance rejected as having no value. However, it could have been jigged or hand-picked if that appeared necessary. The second size (which passed through the 8-mm. and rested on the 2-mm.) was jigged in certain cases, which took out quite a lot of gold, and we found some of the other heavy minerals. We did not go further with this concentrate, but commercially it would be in condition to treat further if its value so indicated. The third size (which passed through 2-mm. and rested on ½-mm.) was run on a Wilfley table, and this in case of certain hydraulic clean-up sands yielded much free gold, together with other heavy minerals available for after separation. The portion which went through the ½-mm. screen was in every case treated on Wilfley (or other riffle table, of which we had with us the Pinder, the Woodbury and the Christenson tables), and this treatment yielded a concentrate of heavy mineral and, if so desired, a middling product, and tailings which were let go to waste.

The treatment was mainly that devised by Henry E. Wood, of Denver, and consisted in drying the concentrates and subjecting them to several successive treatments of Wetherill magnets, taking out the strongly magnetic minerals with a weak current in the first passage, and successively weaker magnetic grains with stronger currents in the following passages. We found, for example, that magnetite was lifted out with 0.2 ampere, chromite and ilmenite were lifted out with 0.8 ampere, that garnet was lifted out with 1.75 amperes. Hypersthene was lifted out with 1.9 amperes; this being a useless mineral, was simply thrown away. Monazite was lifted out by 3 amperes, and zircon was left behind with the gold. The platinum came largely with the chromite and garnet, and the iridosmium came mostly with the zircon.

We also added two points both of which seemed to us important, to the list of known methods of handling these minerals. First, we found that a 2-gal. bottle revolved slowly endwise on a flange on the end of a shaft would extract in one hour from a kilogram of black sand all of the fine native gold when the sand was treated wet with 50 grains of concentrated sodium amalgam. This assay of sand proved so valuable that some of our Wilfley table runs checked up to a point of accuracy where the sum of the products gave 99 per cent. of the value fed. Secondly, we proved that this concentrated sodium amalgam would amalgamate platinum and the platinum metals as freely as gold, and that as soon as the sodium was spent by oxidation in contact with water, the platinum would come out from the amalgam as quickly as it went in, and the mercury or the gold amalgam in it would have no more to do with the platinum grains than if it were so much sand. This seemed to point to a means of recovering platinum from concentrated black sands if the quantity of platinum were sufficient and the cost of sodium did not prove too high; and also the separation of platinum from gold.

It did not come within the region of possibility for me to go out and investigate methods of catching black sand from the dredge sluices or hydraulic sluices. However, I realized the importance of this branch and the need that some early effort should be made in that direction in order to make the other part of the investigation possible of yielding profit commercially. I have been thinking from that time until now of methods which might be employed, as time allowed in the drive of other work.



DEVICE FOR COLLECTING BLACK SANDS

The recent articles which have appeared in various journals criticizing the Geological Survey have made it appear important that I should put forward such ideas as I have developed at the present time. In regard to catching sand, we applied to the Robins Conveying Belt Company for suggestions and plans, which it furnished. For the beach, they were in the form of a pit with a bridge and hopper over it, allowing an indefinite number of scrapers to bring sand to the hopper. The conveying belt carried this up on to the bluff, where the mill could be placed. In

case of a sand bank, it was found to have value. It consisted of a steam shovel with a contributing conveying belt discharging upon a main conveying belt, and that delivering to the mill. Mr. Hammond, of Portland, and Mr. Woodbury, of San Francisco, also contributed a bucket-elevator plan with bridge and hopper over it for much the same scheme for beach work. So far for the black sand and the beach sand.

Now in regard to the dredge and hydraulic sluices, which seem to be the greatest want, I would suggest the apparatus shown in the accompanying diagram. In thinking this out there has been the misfortune of not being on the ground to put the apparatus in and try it, to find out what its faults are, correcting them and trying it again, and in this way developing the perfected apparatus. I have been obliged simply to think and think, to try to bring up every obstacle and mishap that could happen, with the efforts to meet them and the suggestions that are here given.

The idea is that of a hydraulic classifier. It consists of a pit *a*, between the riffle blocks of the sluice at the bottom of which is a screen plate *b*, with holes ¼-inch diameter punched in it. Over this is to be laid rounded pebbles about the size of a hen's egg, which will take the blows of the boulders rolling over the top and prevent them from settling into the pit and wearing out the screen. These pebbles can come up to the level of the top of the riffles. Under the screen is a space *c*, which acts like a hutch of a jig up which water to a limited extent is brought to pass through the sieve. The wash water is introduced from a pipe *d*, in a separate side compartment, and between its portion of the hutch *f* and the space *c* is a vertical partition *g*, running part way down to force an equal rising current to all parts of the sieve *a*. A spigot *h* is provided for discharging the sand as fast as it comes into the hutch. The bottom of this hutch should have a steep angle, as much as 60 deg., to give free discharge of the sand.

In regard to this device I see some difficulty that can only be overcome by experiment and trial. For example, the size of the pebbles may prove too small or too large. It is barely possible that the quicksand around these pebbles may form a natural sand filter, having larger pebbles at the bottom and smaller pebbles at the top, and in this way become absolutely impervious for the downward passage of sand. Should these difficulties happen, I think they could be overcome by raising the screen nearer to the top of the riffle blocks. The spigot *h* will need a pretty large hole in it in order to discharge the material, and in consequence will use considerable water. This hole will certainly need to be as large as 1 in. and possibly as large as 1½ in., in order to run freely with ¼-in. grains.

Suppose that we have succeeded in constructing and installing this device successfully, we shall now have a free discharge of heavy sand from this spigot to be dealt with. The natural method of dealing with it will be to put it through screens and provide the machinery indicated above as having been successfully used at the Portland Fair. It will, therefore, require a little mill to treat this material. There is another method which might give hope of success, viz., to put in a Missouri zinc jig, or a Hancock jig, as the machine to treat this spigot product. In this case it is presumable that the hutch product of the jig would be the only part which would have value. However, I believe that the riffle table as illustrated by the Wilfley, Pinder, Woodbury, Christenson tables, would be the machines best for handling this product. Several of these classifiers could be put in to secure all the values. The ordinary undercurrent is not mentioned here, because that is well known to all hydraulic miners.

ROBERT H. RICHARDS.

Massachusetts Institute of Technology, Boston, Mass., May 29, 1907.

Crushing Mills—Makers vs. Users

Recently the writer was approached with the request to write an article on tube mills. There is something of greater importance to both the builder and the user of crushing, grinding, drying and pulverizing machinery; but to cover it a voluminous article would be required. I would therefore invite interested parties to publish their opinions on both sides of the subject of a national alliance between the builders and the users of mills and only wish to mention a few items which will show the immense value of such combination.

First and most contemptible is the bribing of employees, which has spread to such an extent that one only wonders that the employers do not notice it in a forcible way.

Second is the necessity of education on both sides. At present the purchaser is of the opinion that the builder of the machine ought to know exactly what his machine can do on a certain material. He does not consider that the builder cannot acquire full knowledge, even if he had the opportunity, as to what his machine can do on the thousands of different materials that are reduced by crushing, grinding, or pulverizing machinery. The reports from customers differ to such an extent that they are entirely unreliable.

I wish to mention only one instance which occurred in two different departments of one large concern. A mill was sent to Iowa to grind gluten meal, and the makers received the report that the mill was utterly useless for the requirements. Only six weeks after this report another was received from a plant in Glen Cove, stating that the same mill was the best they ever saw.

As stated before, the papers would prove to be too small for an article which would explain in any intelligent manner all that could be obtained from a combination of the parties mentioned above.

I am very desirous to hear opinions and suggestions about such a combination and am always ready to assist.

R. F. ABBE.

New York, June 13, 1907.

Slag Blocks in Place of Mine Timbers

I have read with interest Mr. Lang's suggestions as to the use of slag-blocks for props in place of timber in the mines. I have also read Mr. Austin's reply, in which he explains that they fail, owing to their breaking upon handling. Some years ago I was instructed by the superintendent of this mine, Mr. Chalmers, to experiment with slags for the same purpose, and our experience was identical with Mr. Austin's; but we are still hopeful of making slag blocks that will not fall to pieces. The question unanswered is the ingredient necessary to prevent the twinning of the crystals, etc., largely the cause of the breaking of the blocks. The pieces that do hold together are beautifully tough; our trouble was that the corners of the blocks fell off, leaving edges like that of broken glass, which would cut the miner's hands when wall building.

I do not think the question should be allowed to rest, as it is one of the most important items on a mine far from civilization and from cheap and suitable timber. Mr. Jones, our analyst, found the composition of the slags to be approximately as follows: Silica, 47.0 per cent.; sulphur, 0.44; FeO, 21.9; Al_2O_3, 21.5; MnO, 1.5; CaO, 3.9; MgO, alkalies, etc., by difference, 3.76 per cent.

My object in writing this is to emphasize the importance of the utilization of furnace refuse cheaply worked up into useful material at the point of production.

FREDERICK L. WILDER,
Head of Reduction Department, Morro Velho mine.

Villa Nova de Lima, Minas Geraes, Brazil, May 30, 1907.

The Thermit Patents

We notice in your issue of June 1, 1907, under the above heading, that Mr. Vautin and Messrs. Sulman & Picard were "at the back of weldite." We wish to point out that our firm never held any interest in that company, and our only connection with them consisted in acting for them occasionally in a professional way, and being retained by them in the recent action taken by Thermit, Ltd., against them with regard to the patent rights.

SULMAN & PICARD.

London, June 11, 1907.

Patents Relating To Mining and Metallurgy

A Selected and Classified List of New Inventions Described during the Past Month in the Publications of the Patent Offices

UNITED STATES AND BRITISH PATENTS

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

ALUMINUM

ALLOY — Aluminum Alloy. Alexandre Chambaud, Paris, France. (U. S. No. 856,392; June 11, 1907.)

SMELTING PROCESS. A. G. Betts, Troy, New York. Reducing aluminum ore in the presence of iron or other metal to produce an aluminum alloy, and then electrolytically extracting the aluminum from the alloy. (Brit. Nos. 7277 and 7277a of 1906; May 4, 1907.)

WELDING. S. O. Cowper Coles, London, England. Method of joining pieces of aluminum, utilizing the heat of combustion of the two heated ends for joining the molten ends together. (Brit. No. 28,354 of 1906; May 25, 1907.)

CEMENT

HYDRAULIC CEMENT—Manufacture of Hydraulic Cement. Bernard Enright, South Bethlehem, Penn. (U. S. No. 854,342; May 21, 1907.)

COAL AND COKE

BRIQUETS—Process for Manufacturing Briquets from Coal, Peat and Bog-Earth. Jakob Buss, Munich, Germany, assignor of one-half to Carl Fohr, Schloss Wallenburg, near Miesbach, Germany. (U. S. No. 854,565; May 21, 1907.)

COAL-CUTTING MACHINE. Friedrich Stiepel, Essen-on-the-Ruhr, Germany. (U. S. No. 854,612; May 21, 1907.)

COKE. Process of Coking Coal. Samuel B. Sheldon, Buffalo, N. Y. (U. S. No. 855,069; May 28, 1907.)

COKE-WORKING APPARATUS. George F. Myers, Columbus, Ohio, assignor to John C. Pennie, Montclair, N. J. (U. S. No. 856,980; June 11, 1907.)

DRILLS. Ingersoll-Rand Co., New York, N. Y. In percussive drills for working in coal, methods of automatically governing the cutter when not striking coal. (Brit. No. 9603 of 1906; May 18, 1907.)

COPPER

ELECTROPLATING. S. O. Cowper Coles, London, England. Improvements in the inventor's method of electrolytically depositing copper sheets and tubes in a mandrel revolving at a high speed. (Brit. No. 13,972 of 1906; May 18, 1907.)

GOLD AND SILVER

CHLORINATION-BARREL. William J. Armbruster, St. Louis, Mo. (U. S. No. 856,384; June 11, 1907.)

GOLD-WASHER. Benaiah K. Jayne, New York, N. Y., assignor to Idanha Machine Co., a Corporation of New York. (U. S. No. 855,640; June 4, 1907.)

GOLD-WASHING. Machine for Handling Dirt and Saving Gold. Maro L. Proctor, Elkhart, Ind., assignor to Czarra & Proctor, Elkhart, Ind., a Copartnership. (U. S. No. 854,702; May 21, 1907.)

PLACER MINING MACHINE—Portable Placer-Mining Machine. James E. Pennick and John O. Hale, Topeka, Kan. (U. S. No. 855,200; May 28, 1907.)

SEPARATION OF GOLD. Apparatus for Separating Gold from Magnetic Sands. Elmer Gates, Chevy Chase, Md., assignor, by mesme assignments, to Washington Loan and Trust Co., a Corporation. (U. S. No. 854,997; May 28, 1907.)

IRON AND STEEL

ALLOYS—Art of Heat Treatments of Steel Alloys. James Churchward, New York, N. Y. (U. S. No. 855,756; June 4, 1907.)

BLAST-FURNACE-CHARGING APPARATUS. Charles H. Sample, Homestead, Penn., assignor to Walter Kennedy, Bellevue, Penn. (U. S. No. 857,259; June 18, 1907.)

CASTING AND CONVEYING MACHINE. William McVay, Bellaire, Ohio. (U. S. No. 854,520; May 21, 1907.)

COPPERAS—Process of Electrolytically Removing Scale and Producing Iron Sulphate. Charles J. Reed, Philadelphia, Penn. (U. S. No. 855,667; June 4, 1907.)

ELECTRIC FURNACE. G. Gin, Paris, France. An improved electric furnace for the manufacture of steel. (Brit. No. 10,396 of 1906; June 1, 1907.)

FERRO-ALLOYS—Process of Smelting Refractory Ores and Producing Ferro-Alloys. Edgar F. Price, Niagara Falls, N. Y. (U. S. No. 855,478 and 855,479; June 4, 1907.)

IRON OXIDES—Process of Reducing Iron Oxides. Horace W. Lash, Cleveland, Ohio. (U. S. No. 856,351; June 11, 1907.)

MANGANESE STEEL — High-Manganese Steel with Low Carbon. Robert A. Hadfield, Sheffield, England. (U. S. No. 856,250; June 11, 1907.)

SPONGY IRON. F. C. W. Timm, Hamburg, Germany. Improvements in the method of producing spongy iron by reduction of the ores by gases. (Brit. No. 8648 of 1906; May 11, 1907.)

STEEL MANUFACTURE. H. J. B. Picand, Firming, France. Improvements in the manufacture of steel in furnaces having neutral linings, with the object of removing the phosphorus without removing the whole of the carbon. (Brit. No. 7892 of 1906; May 4, 1907.)

STEEL PLATING. J. F. Monnot, New York, N. Y. Method of producing ingots of iron and steel coated with other metals, such as aluminum or copper and of producing sheets, etc., from the compound ingot. (Brit. No. 8913 of 1906; May 11, 1907.)

STEEL REFINING—Apparatus for Treating Molten Steel. Francis S. Adams, Pueblo, Colo. (U. S. No. 855,603; June 4, 1907.)

WELDING—Société L'Air Liquide, Paris, France. Improvements in blow pipes using oxygen and ordinary coal gas for welding iron or steel. (Brit. No. 26,799 of 1906; May 11, 1907.)

PETROLEUM

LUBRICATING OIL—Process for Obtaining Lubricating Oil from Crude Oil. William J. Ryan, Chester, and Charles R. Burke, Overbrook, Penn. (U. S. No. 854,057; May 21, 1907.)

OIL-WELL PUMP. Frank H. Taylor, Toronto, Ohio. (U. S. No. 854,255; May 21, 1907.)

PLATINUM

PLATING PROCESS. A. C. Hyde and K. R. Swan, London, England. In making articles of steel or nickel, coated with platinum, heating the articles in an atmosphere of hydrogen to a temperature just below the melting point of the base metal, in order to make the platinum coating adhere more firmly. (Brit. No. 18,803 of 1906; June 1, 1907.)

TIN

ELECTROLYTIC TIN. A. Therot and L. Mage, Avignon, France. Improvements in the electrolytic production of tin from slimes, dross, etc. by the stannate of soda process, consisting of method of purifying the stannate of soda and of regulating the concentration, etc., of the solution during electrolysis. (Brit. No. 28,342 of 1906; May 19, 1907.)

ZINC

LEACHING PROCESS. G. de Bechi and R. W. Rucker, London, England. Improvements in the leaching process for removing zinc from zinc-lead ores by boiling with ferric sulphate. (Brit. No. 9339 of 1906; May 25, 1907.)

LEACHING PROCESS. J. H. Gillies, Melbourne, Victoria, Australia. A leaching tank, more especially intended for extracting zinc, in which opposing currents of ore and leaching solution come in contact, and in which the ore is never allowed to rest and so clog up the apertures. (Brit. No. 994 of 1906; May 18, 1907.)

LEACHING PROCESS. J. H. Gillies, Melbourne, Australia. Improvements in the process for removing zinc from ores, by first roasting, and leaching first with water and then with acid. (Brit. No. 1004 of 1906; May 18, 1907.)

LITHOPHONE—Process for the Preparation of Lithophones. Rudolf Alberti, Goslar, Germany. (U. S. No. 854,011; May 21, 1907.)

RETORTS. W. P. Gibbons, W. Smith and R. Gay, Stafford, England. Machines and dies for making retorts of fire clay, taper in form and oval in cross section. (Brit. No. 10,011 of 1906; June 1, 1907.)

ORE DRESSING

CRUSHING AND GRINDING MILL. Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Co., Portland, Me., a Corporation of Maine. (U. S. No. 857,121; June 18, 1907.)

CRUSHING MILL—Vertical Crushing and Grinding Mill. Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Co., Portland, Me., a Corporation of Maine. (U. S. No. 856,311; June 11, 1907.)

CRUSHING-ROLLS for Ore, Rock, and other Material. Thomas C. Walker, Jr., Denver, Colo. (U. S. No. 856,559; June 11, 1907.)

CRUSHING ROLLS—Roll Crushing-Machine. Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Co., Portland, Me., a Corporation of Maine. (U. S. No. 855,358; May 28, 1907.)

DISINTEGRATORS. J. B. Tonya, Tarbes, France. An improvement in centrifugal disintegrators for ores in which a rotating disc carrying pins revolves closely to a stationary disc similarly equipped. (Brit. No. 12,822 of 1906; May 18, 1907.)

GRINDING-MILL. James F. Winchell, Springfield, Ohio; Lida L. Winchell, administratrix of said James F. Winchell, deceased, assignor to Charles E. Pease and William B. Anderson, Dayton, Ohio. (U. S. No. 854,861; May 28, 1907.)

GRINDING-MILL. Michael Schreck, Cincinnati, Ohio. (U. S. No. 856,918; June 11, 1907.)

MAGNETIC SEPARATION. J. Dietzsch and J. Paull, London, England. In the process for the magnetic separation of tin, iron and wolfram, improved methods of preventing magnetic particles from adhering to the tin. (Brit. No. 23,567 of 1906; June 8, 1907.)

MAGNETIC SEPARATOR—Magnetic Ore-Separator. Edgar A. Edwards, Cincinnati, Ohio, assignor to Alice V. Edwards, Cincinnati, Ohio. (U. S. No. 855,166; May 28, 1907.)

ORE-DISTRIBUTER. Philip Argall, Denver, Colo. (U. S. No. 855,744; June 4, 1907.)

ORE DISTRIBUTER—Radial Ore-Distributer. Philip Argall, Denver, Colo. (U. S. No. 855,745; June 4, 1907.)

ORE DRESSING—Method of Dressing Ores. Otto Witt, Kaafjord, Finmarken, Norway. (U. S. No. 856,124; June 4, 1907.)

ORE REDUCTION—Process of Preparing and Reducing Ores. Emil Pollacsek, New York, N. Y. (U. S. No. 854,527; May 21, 1907.)

SCREEN—Rotary Screen, Ore Sizer, and Sampler. Howard G. King, Denver, Colo. (U. S. No. 854,744; May 28, 1907.)

SEPARATION—Method of Separating Minerals. Adolphe F. Kirschner, Pittsburg, Penn. (U. S. No. 855,895; June 4, 1907.)

SEPARATION OF ORES—Process of Separating or Classifying Ores. Herbert E. Wetherbee, Cleveland, Ohio, assignor of six-twentieths to William Rattle, one-eighth to James F. Leitch and seven-fortieths to Cyrus W. Merrell, Cleveland, Ohio. (U. S. No. 856,611 and 856,612; June 11, 1907.)

SEPARATOR — Shaking-Table Separator. Frederick T. Snyder, Chicago, Ill., assignor to International Separator Co., Chicago, Ill., a Corporation of New Jersey. (U. S. No. 854,768; May 28, 1907.)

METALLURGY—GENERAL

BRIQUETTING. A. and W. J. Maiden, London, England. The use of borate of lime as a binding agent for making fine ores into briquettes. (Brit. No. 9210 of 1906; May 18, 1907.)

CALCIUM ALLOYS—Production of Calcium Alloys. Franz von Kügelgen and George O. Seward, Holcombs Rock, Va. (U. S. No. 856,475; June 11, 1907.)

COMPOUND INGOTS. J. F. Monnot, New York, N. Y. Method of making compound ingots such as can be made into sheets and tubes of iron and copper or iron and aluminum, by bringing the iron into contact with copper or other metal which has been raised to a temperature considerably above its ordinary casting temperature. (Brit. Nos. 8913 and 8913a of 1906; June 8, 1907.)

DESULPHURIZING. N. Lebedeff and B. Pomeranzoff, St. Petershurg, Russia. Improvements in the method of removing sulphur from ores by mining the ores with equal quantities of clay and submitting the mixture to a gradually increasing temperature up to 300° C. (Brit. No. 5479 of 1906; May 4, 1907.)

FUSION OF METALS—Apparatus for Fusing Metals. Adolph E. Menne, Crenzthal, Germany, assignor to Cölnmusener-Bergwerks-Actien-Verein, Crenzthal, Germany, a Corporation of Germany. (U. S. No. 857,247; June 18, 1907.)

INGOT-MOLD. Francis McMahon, Cambridge, Mass. (U. S. No. 855,655; June 4, 1907.)

METAL EXTRACTION—Process of Extracting Metals from their Ores. William L. George, Williams, Ariz., assignor to George Metal Extracting Co., of Arizona. (U. S. No. 854,998; May 28, 1907.)

METALLIC OXIDES—Process of Reducing Metallic Oxides. Frederick M. Becket, Niagara Falls, N. Y., assignor to Electro Metallurgical Company, a Corporation of West Virginia. (U. S. No. 854,018; May 21, 1907.)

METALLIC SULPHIDES—Process of Reducing Metallic Sulphides. Frederick M. Becket, Niagara Falls, N. Y. (U. S. No. 855,157; May 28, 1907.)

NODULIZING. J. Savelsberg, Papenburg, Germany. Agglomerating fine iron or other ores by blowing the ores with a flux and coal into a suitable vessel. (Brit. No. 9426 of 1906; May 25, 1907.)

SMELTER FUMES. W. W. Fyfe, London, England. Improved chamber for catching fumes from smelting and similar operations. (Brit. No. 14,401 of 1906; June 8, 1907.)

SULPHIDE ORE TREATMENT. H. Baker, Runcorn, England. Improvements in the inventor's process for treating sulphide ores with chlorides for the production of lead, copper or zinc chlorides, with the object of preventing the undue precipitation of these metals from the solutions obtained. (Brit. No. 26,934 of 1906; May 18, 1907.)

MINING MACHINERY AND APPARATUS

BOREHOLE SURVEYING INSTRUMENT—Instrument for Surveying Boreholes. Kurt W. O. Schweder, Johanneshurg, Transvaal. (U. S. No. 856,990; June 11, 1907.)

CAGE—MINER'S CAGE. Wilhelm Massing, Borheck, Germany. (U. S. No. 856,276; June 11, 1907.)

CONVEYOR. August H. Dahl and Arthur E. Whitney, New York, N. Y., assignors of one-tenth to Charles O. Dahl, New York, N. Y. (U. S. No. 856,682; June 11, 1907.)

CONVEYOR. William T. James, Chicago, Ill. Filed Aug. 27, 1906. Serial No. 332,149. (U. S. No. 856,527; June 11, 1907.)

CONVEYOR TIGHTENER—Belt, Apron, Canvas, or Conveyor Tightener. George E. Clarke, Toronto, Ontario, Canada. (U. S. No. 856,620; June 11, 1907.)

CONVEYING—Apparatus for Conveying Loads between Points of Varying Distance. Walther Mollier, Hamburg, Germany, assignor to Siemens-Schuckert Werke Gesellschaft mit Beschrankter Haftung, Berlin, Germany. (U. S. No. 854,052; May 21, 1907.)

CONVEYING SYSTEM. Alvin C. McCord, Chicago, Ill. (U. S. No. 857,096; June 18, 1907.)

DREDGE-BUCKET JOINT. Alexander T. Fraser, Butte, Mont. (U. S. No. 854,731; May 28, 1907.)

DREDGER-CUTTER. John F. Ollrich, San Francisco, Cal. (U. S. No. 856,487; June 11, 1907.)

DREDGER-CUTTER. John F. Ollrich, San Francisco, Cal. (U. S. No. 856,544; June 11, 1907.)

DRILL—Core-Drill. Robert M. Downie, Beaver Falls, Penn., assignor to Keystone Driller Co., Beaver Falls, Penn., a Corporation of Pennsylvania. (U. S. No. 854,570; May 21, 1907.)

DRILL—Hydraulic Drill. James Charlton, Houston, Tex. (U. S. No. 854,464; May 21, 1907.)

DRILL—Mining-Drill. William Hauxwell, Canal Fulton, Ohio. (U. S. No. 854,350; May 21, 1907.)

DRILL—Pneumatic Drill. Albert C. Murphy, East St. Louis, Ill., assignor to Standard Railway Equipment Co., East St. Louis, Ill., a Corporation. (U. S. No. 856,285; June 11, 1907.)

DRILL—Pneumatic Drill. Peter H. Murphy, St. Louis, Mo. (U. S. No. 856,651; June 11, 1907.)

EXCAVATING-DIPPER. George W. King, Marion, Ohio, assignor to The Marion Steam Shovel Co., Marion, Ohio, a Corporation of Ohio. (U. S. No. 856,707; June 11, 1907.)

MINE CARS—Check-Holder for Mine-Cars. William J. Connell, Huntington, W. Va., assignor of one-third to A. E. Youmans and one-third to J. W. Kootz, Huntington, W. Va. (U. S. No. 855,388; May 28, 1907.)

MINING-AUGER. Charles C. Lockhart, Brookfield, Nova Scotia, Canada. (U. S. No. 855,108; May 28, 1907.)

RESCUE APPARATUS. Westfalia Company, Gelsen Kirchen, Germany. Improved method of strapping on chest bags used for rescue work in mine. (Brit. No. 13,705 of 1906; May 25, 1907.)

ROCK-DRILL CHUCK. Charles A. Huitquist, Lowell, Ariz. (U. S. No. 856,877; June 11, 1907.)

ROCK DRILLS. G. H. Rayner, Shefficld, England, and C. Walton, Whitehaven, England. In percussive rock drills, an improved method of making the valve, so that steam shall not escape when it becomes slightly worn. (Brit. No. 24,936 of 1906; June 8, 1907.)

SAFETY-FUSE. William J. Phelps, Detroit, Mich. (U. S. No. 856,292; June 11, 1907.)

SAFETY LAMPS. J. Prestwich, Manchester, England. Method of preventing oil running over the burner and into the base, in miners' safety lamps. (Brit. No. 22,679 of 1906; June 1, 1907.)

SAFETY LAMPS. R. Wolf, Zwickau, Germany. Improved frictional igniter for miners' safety lamps. (Brit. No. 3835 of 1907; May 11, 1907.)

TIME CHECKS—Device for Collecting Miners' Checks. Frank C. Greene, Cleveland, Ohio. (U. S. No. 853,971; May 21, 1907.)

METALLURGICAL MACHINERY AND APPARATUS

BRIQUET-MACHINE. David E. Bangs, Medford, Mass. (U. S. No. 855,379; May 28, 1907.)

ELECTROLYTIC TANK. John F. Biller, Trail, British Columbia, Canada. (U. S. No. 856,277; June 11, 1907.)

GAS-PRODUCER. Arpád de Gálocsy, Ladislas de Bánó, and John Terény, Budapest, Austria-Hungary. (U. S. No. 856,137; June 4, 1907.)

GAS-PRODUCER. Arpád de Gálocsy, Ladislas de Banó, and John Terény, Budapest, Austria-Hungary. (U. S. No. 855,845; June 4, 1907.)

MECHANICAL ROASTERS. R. F. Abbé, New York, N. Y. Improved gearing for driving rotating cylinders used in roasting or grinding ores. (Brit. No. 17,752 of 1906; May 25, 1907.)

ORE TREATMENT—Apparatus for Treating Ores. Thomas D. Pitts, New York, N. Y., assignor to New Cyanide Process Co., New York, N. Y., a Corporation of New York. (U. S. No. 854,526; May 21, 1907.)

PRODUCER GAS—Process of Generating Producer-Gas. Max F. Mangelsdorff, New York, N. Y., assignor to Combustion Utilities Co., a Corporation of New York. (U. S. No. 854,228; May 21, 1907.)

PULP DISTRIBUTER—Revolving Distributer for Pulp or Liquid. Edward H. Moyle, Los Angeles, Cal. (U. S. No. 855,328; May 28, 1907.)

STAMP-MILL. George Coon, Mount Vernon, Wash. (U. S. No. 855,284; May 28, 1907.)

TUBE MILL LINING. M. F. Abbé, New York, N. Y. In preparing linings for tube mills, making the blocks to fit exactly, so as to minimize the use of cement, and thus decreasing the time during which the mill is out of commission while relining is going on. (Brit. No. 7474 of 1907; June 1, 1907.)

TUBE MILL LINING. M. F. Abbé, New York, N. Y. In tube mills using pebbles as grinders, making the joints of the lining at an angle with the plane of motion of the pebbles, so as to decrease the wear at the joints. (Brit. No. 7126 of 1907; June 1, 1907.)

TUBE MILLS. M. F. Abbé, New York, N. Y. An improved feeding device for tube mills. (Brit. No. 2463 of 1907; May 18, 1907.)

FURNACES

ELECTRIC FURNACE. Aldus C. Higgins, Worcester, Mass. (U. S. No. 856,061; June 4, 1907.)

ELECTRIC FURNACE CONSTRUCTION. O. Frick, Saltsjobaden, Sweden. In electric induction furnaces, method of construction to prevent leakage. (Brit. No. 22,519 of 1906; May 25, 1907.)

ELECTRIC FURNACE ELECTRODES—Cooling-Jacket for Electric-Furnace Electrodes. Frederick M. Becket, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., a Corporation of West Virginia. (U. S. No. 855,441; June 4, 1907.)

ELECTRIC FURNACE PRACTICE. E. Gronvall, A. Lindblad and O. Stahlane, Ludvika, Sweden. In electric transformer furnaces, shaping the crucible to get the greatest effect from the induced current. (Brit. No. 1658 of 1907; May 25, 1907.)

ELECTRIC FURNACES. Allmanna Svenska Elektriska Aktiebolaget, Westeras, Sweden. In electric furnaces improved arrangements of the rotating magnets. (Brit. No. 5345 of 1907; May 11, 1907.)

ELECTRIC - RESISTANCE FURNACE. Edgar F. Price, Niagara Falls, N. Y. (U. S. No. 855,480; June 4, 1907.)

FOREHEARTH. Charles M. Allen, Lo Lo, Mont., assignor to Ralph Baggaley, Pittsburg, Penn. (U. S. No. 856,616; June 11, 1907.)

FURNACE LINING. H. L. Hartenstein, Constantine, Mich. An improved lining for electric smelting furnaces, consisting of asbestos, lime and coke held together with an agglutinant such as pitch, tar or rosin. (Brit. No. 10,161 of 1906; May 25, 1907.)

FURNACE-TOP. Charles H. Clark, Ensley, Ala. (U. S. No. 857,158; June 18, 1907.)

ORE-ROASTING FURNACE. Antonio Dacco, Turin, Italy. (U. S. No. 855,289; May 28, 1907.)

ORE-ROASTING FURNACE. William H. Smyth, Berkeley, Cal. (U. S. No. 854,766; May 28, 1907.)

SMELTING-FURNACE. Edwin Bosshardt, Cologne, Germany, assignor of one-half to Henry Garda, Leipzig, Germany. (U. S. No. 855,927; June 4, 1907.)

SMELTING FURNACES. W. H. Webb, W. G. Brettell and A. J. Adamson, Liverpool, England. Apparatus for producing the right humidity and temperature of air used in smelting furnaces. (Brit. No. 10,536 of 1906; May 11, 1907.)

INDUSTRIAL CHEMISTRY

CALCIUM CARBIDE—Process of Producing Calcium Carbide. Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Co., Niagara Falls, N. Y., a Corporation of Virginia. (U. S. No. 855,476 and 855,477; June 4, 1907.)

CHROMIUM PIGMENTS—Process of Regenerating Waste Liquors from the Manufacture of Chrome Pigments. Alexander S. Ramage, Detroit, Mich. (U. S. No. 855,019; May 28, 1907.)

EXPLOSIVES—Process of Manufacturing Nitro-Glycerine Explosives of Reduced Freezing-Point. Oscar E. W. Stöhrer, Charlottenburg, Germany. (U. S. No. 855,595; June 4, 1907.)

HYDROGEN GENERATION — Process of Generating Hydrogen. Carleton Ellis, White Plains, and Byron E. Eldred, Bronxville, N. Y., assignors to Combustion Utilities Co., N. Y., a Corporation of New York. (U. S. No. 854,157, May 21, 1907.)

NITRIC ACID—Method of Concentrating Nitric Acid. Emil Collett, Christiania, Norway. (U. S. No. 854,928; May 28, 1907).

SODIUM SALTS. L. Riviere, Paris, France. Modification of the process for producing stannate of soda by digesting tin oxide or scrap tin plate under pressure with caustic soda. (Brit. No. 10,309 of 1906; June 8, 1907.)

SULPHURIC ACID—Apparatus for Concentrating Sulphuric Acid. Antonio Gaillard, Barcelona, Spain. (U. S. No. 856,048; June 4, 1907.)

ANALYTICAL CHEMISTRY

ANALYSIS OF GASES—Apparatus for Analyzing Gases. William Jones, New York, N. Y., assignor to Jones-Julia Mfg. Co., New York, N. Y., a Corporation of New York. (U. S. No. 854,696; May 21, 1907.)

Personal

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

Louis Janin is in El Paso, Tex. on his way to Denver from Mexico.

D. W. Brunton has returned to Denver from a trip around the world.

Frederic Nicholls, of Toronto, has returned to that city from England.

P. G. Lidner has returned to New York after 5 months' absence in Bolivia.

G. C. Weber, of Idaho Springs, Colo., has gone to Omaha, Neb., on mining business.

L. W. Aldrich, of Boulder, has gone to Nevada and California on mining business.

E. N. Van Courtlandt, of Denver, is at present at Bingham, Utah, on professional business.

Richard A. Parker returned from Idaho to Denver a few days ago and is in Nevada at present.

George E. McClelland, of the Idaho Springs district, Colo., has returned from a trip to the East.

Edward S. Wiard has returned to Denver from a four months' professional trip to Chihuahua, Mexico.

W. J. Pentland is general manager of the Compañia Minera Juarez, S. A., at Caborca, Sonora, Mexico.

Norval J. Welsh, general superintendent of the Santa Brigida mines, Ocampo, Chihuahua, Mexico, has resigned.

James A. Simmons, of New York, has been looking over mining interests in Gilpin and Clear Creek counties, Colorado.

Forbes Rickard, of Denver, has been making an examination of mines in the Pine Creek district, Gilpin county, Colo.

R. B. Brinsmade left Lawrence, Kan., on June 4, for El Paso and other points in the southwest on professional business.

John Owen, manager of the Saratoga property near Idaho Springs, Colo., has returned from a business trip to the East.

August Heckscher, has been elected president of the Central Foundry Company, New York, to succeed A. F. Gartz.

H. H. Claudet, of Claudet & Wynne, Rossland, B. C., has returned from an extended trip to Mexico and Denver, Colorado.

C. E. Rowe, head of the School of Mines of the University of Texas, is spending the summer in Denver, Colorado.

G. W. Teal and T. J. Sipple, of Boulder, Colo., have returned from a visit to look at mining property near Hermosillo, Mexico.

C. L. Graves, general manager of the Mexican Mines Corporation, of Chihuahua, has been seriously ill for several weeks.

J. H. Plummer, president of the Dominion Iron and Steel Company, has returned to Sydney, N. S., from a trip to England.

N. O. Bagge, of New York, is in Chihuahua, visiting the properties of the Rio de Plata Mining Company, of which he is president.

A. E. Harper, of Chicago, is on a visit to the mining properties in which he is interested in Pachuca and the state of Puebla, Mexico.

J. F. James succeeds T. B. Bassett, recently resigned, as general manager of the Belen Mining Company, near Cumpas, Sonora, Mexico.

A. B. Roeder, president of the United Rico Mines Company, of Rico, Colo., has been visiting New York on business in connection with his company.

J. E. Carpenter, of Eldora, Colo., manager of the Swarthmore Copper Company, is making a visit to Ohio to consult with stockholders of that company.

John Hays Hammond, mining engineer of New York, received the honorary degree of doctor of laws from St. Johns College, Annapolis, Md., June 18.

Duncan MacVichie, in charge of the Coram and Heinze mine interests in Utah, spent several days in Butte recently inspecting Davis-Daly Estates mines.

O. J. Potter, of Breckenridge, Colo., left this week for London, England, having accepted a position with an English dredging syndicate operating in Russia.

Harvey B. Small, a graduate of the Colorado School of Mines of '01, and in charge of property in Colombia, South America, is making a visit to Colorado.

Charles Howbert, of Colorado Springs, has gone with his family to his mining properties, at Cieneguita, southeastern Sonora, Mexico, and expects to be there a year.

Alexander McLeod, consulting geologist, Sydney, Cape Breton, Canada, is making an examination of iron-ore properties in Newfoundland, for Alabama capitalists.

Jacob Bewley, Bristol, Tenn., has resigned as assistant vice-president of the Virginia Iron, Coal & Coke Company to take effect July 1. He will enter the coal business.

Angus Sutherland, for a nmber of years in charge of the Mattie mine at Idaho Springs, Colo., has accepted a position with the Boston Consolidated mines at Bingham, Utah.

G. H. Armstrong, formerly manager of the coke department of Matthew Addy & Company, has been appointed general manager of the Pittsburg-Connellsville Coal and Coke Company.

John A. Balch, formerly superintendent of the Mountain Copper Company smelting works at Martinez, Cal., has been appointed manager of the Wireless Telegraph Company, Honolulu, H. I.

John A. Church, mining engineer, of New York, has gone to Mexico, whence he will proceed to San Francisco, and thence to the Far East. He will be absent for several months.

Adolphe Carnot, for many years director of the Ecole Nationale Supérieure des Mines, Paris, France, will retire on October 1. His successor will be M. Nivoit, inspector general of mines.

John V. N. Dorr, consulting metallurgist of the Mogul Mining Company is in the Black Hills to superintend the beginning of operations of the new Lundberg, Dorr & Wilson mill at Terry.

Allen H. Rogers, mining engineer, of New York City, recently returned from South America, and has now gone to Mexico where he will be occupied on professional business for several weeks.

James Macnaughton, general manager of the Calumet & Hecla mine, received the honorary degree of bachelor of science from the University of Michigan at the year's graduating exercises at Ann Arbor.

President Anthony Blum, of the Laurentian gold mine; President Bliss, of the Detola Development Company, and Superintendent B. J. Elliott, of the Paymaster mine, arrived in the Manitou Lake district, on June 7.

C. E. Cleaver, who has been connected with the Brooklyn Rapid Transit Company, has been appointed superintendent of engineering, designing and construction by the Copper Range Consolidated Copper Company, in th eLake Superior district, Michigan.

A. H. Brown, formerly superintendent of the Consolidated Mercur Gold Mines Company's property at Mercur, Utah, has been appointed superintendent of the Lower Mammoth Mining Company at Mammoth, Utah. He succeeds the late William Ball.

W. R. Mowery, of Toledo, Ohio, and Laurence W. Luellin, of Kansas City, Mo., were recently in the Manitou Lake gold area, Ont. Mr. Mowery has for some weeks been studying the mineral resources of the district, and has taken options on several locations.

Louis W. Vidler, for a number of years superintendent of the Transcontinental Company, operating in the Argentine district, Clear Creek county, has resigned and accepted a similar position with the Lookout Mountain Leasing and Development Company, near Golden, Jefferson county, Colorado.

Lewis E. Aubury, State mineralogist of California, is continuing his good work in running down mining swindlers. He has recently secured the conviction, at San Francisco, of E. W. Emmons, on the charge of obtaining money under false pretenses in connection with the sale of stock in the Drummer Boy mine in Siskiyou county, California.

Obituary

Reese G. Brooks, coal operator, of Scranton, Penn., died at his home in that city, June 12. He was born in 1846 and for years was a prominent independent coal operator, but later sold his collieries to the coal-carrying companies.

Charles Francis Patton, one of the oldest members of the American colony in Mexico City, and identified with mining in Mexico during almost his entire life in the Republic, died in the American hospital, Mexico City, on May 29, of locomotor ataxia.

Isaac N. Bunton, a well known coal operator of the Pittsburg district, died at his home in Pittsburg, June 8. He was active in the organization of the coal-shipping firm, Joseph Walton & Co., about 30 years ago, and later in the formation of the Monongahela River Consolidated Coal and Coke Company.

Gilbert C. Simpson died June 8, of a hemorrhage from the lungs, in El Paso, Texas, where he had gone to purchase an assaying and chemical outfit preparatory to opening up an office in Chihuahua, Mexico. He had for the past year been in charge of the ore-buying agency of the American Smelting and Refining Company. Mr. Simpson was a native of Glasgow, Scotland, and had been for nearly ten years in Mexico as assayer and chemist. He was a member of the American Institute of Mining Engineers.

Walter Grant, civil and mining engineer, was drowned the last of May in the Rio Grande, near Boquillas, Houston county, Texas, where he had gone preparatory to building a wagon road in the northern part of Mexico for Carlos Moser, of Mexico City. Mr. Grant was born in Liverpool, England, about 37 years ago, and had spent the greater part of the last 15 years in Mexico. Among his more important works in the republic was the construction of the San Diego mill, Santa Barbara, Chihuahua, for the Torreon Metallurgical Company.

Societies and Technical Schools

Michigan College of Mines—This institution has received an appropriation from the State of $4300 for building and equiping a power plant and $60,000 for a library and meteorological building. Professor Hood and the class in mechanical engineering are busily engaged in drawing up plans and specifications for the new power plant.

American Society for Testing Materials—This society held its tenth annual meeting at Atlantic City, N. J., June 20 to 22, 1907. The meeting was well attended by representative chemists and metallurgists. There were interesting and valuable discussions, in connection with which the steel-rail question, which is now absorbing so much attention, was largely in evidence.

Columbia University Summer School—The eighth summer session of Columbia University will open July 9 and continue until Aug. 17. This is the first time that engineering courses have been offered and the announcement is made that courses will be offered in hydraulics, structural and concrete steel, gas engines and experimental engineering, covering the period of six weeks. Frederick A. Goete is dean of the Faculty of Applied Science.

Lake Superior Mining Institute—The following circular has been issued by the secretary at Ishpeming, Mich.:

The thirteenth annual meeting of the institute will be held on the Minnesota Ranges, beginning Wednesday, July 24. Local committees are arranging a program for this meeting, which will be very interesting, and a large attendance is desired. The last meeting on these great ranges was held in 1902, since which time many new mines have been opened and much progress made at the older mines. Members are invited to prepare papers for this meeting and to send the same to the secretary as early as possible, so that they can be distributed to members in advance of the meeting. The paper by Dr. B. W. Jones on "Mine Sanitation," read at the last meeting, proved very interesting, and it is suggested that the matter be given further attention at this meeting. The subject of sampling ore at mines and upper and lower lake docks is receiving much attention at present, and papers should be prepared and brought up at this meeting.

On April 20, 1907, the following circular letter was addressed to some of the members, and is again presented herewith, for the information of those not receiving it:

"A paper containing biographical sketches will be read at the next meeting of the Institute by J. H. Hearding, of Eveleth, Minn. May I ask you to send to Mr. Hearding any biographical data that you may have concerning any of the old settlers or prominent men of the Lake Superior district who have been connected with the mining industry, or with its development in a commercial or business way? We desire to make this paper as full and complete as possible and wish the sketches to bring out the work and the history of the subjects. It will of necessity be rather brief and on account of limited space may have to be condensed to some extent; but we desire to include in the biographical sketches all data that will be interesting to the general public. This paper will be a very interesting feature in connection with our work in the Lake Superior field and a fitting tribute to the pioneers of this district who contributed much to its present success. An early compliance will greatly oblige."

Industrial

The offices of the Allis-Chalmers Company at Seattle, Wash., G. W. Pulver, district manager, have been moved to No. 115 Jackson street.

The Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has purchased the business of the Wirt Electric Company, Philadelphia, Penn., and will continue the manufacture of Wirt apparatus in addition to its own line of electric controlling devices.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Buffalo Forge Company, Buffalo, N. Y. Buffalo Electric Disk Wheels. Pp. 4, illustrated, paper, 3½x7 in.

American Rotary Tunnel Machine and Development Company, Denver, Colo. Tunnelology. Pp. 35. illustrated, paper, 8x11 inches.

The Green Fuel Economizer Company, Matteawan, N. Y. Bulletin 105. On drying brick and tile. Pp. 16, illustrated, paper, 6x9 in.

Blaisdell Company, 334 Pacific Electric Building, Los Angeles, Cal. Catalog G. The Blaisdell Pressure Filter. Pp. 11, illustrated, paper, 6x9 inches.

Keystone Driller Company, Beaver Falls, Penn. Catalog No. 2B. Keystone Percussion Core Drills. Pp. 19, illustrated, paper, 8½x11½ inches.

Pittsburgh Coal Washer Company, Pittsburg, Penn. Engineers and Contractors Complete Coal Washeries, Coal Tipple Equipments. Pp. 32, illustrated, paper, 6x9 inches.

C. W. Hunt Company, West New Brighton, S. I., N. Y. Pamphlet No. 073. An introduction to the general line of machinery manufactured by the company. Pp. 32, illustrated, paper, 3½x6 in.

Stromberg-Carlson Telephone Manuacturing Company, Rochester, Ill. Quality apparatus. Pamphlet No. 1. Series and bridging dry battery wall telephones. Pamphlet No. 2. Central energy portable desk telephones. Pp. 10, illustrated, paper, 3x6 in.

Construction News

Tolland, Colorado—The Union Exploration Company will install an air compressor plant at the Gold Run property. New Yorkers are interested and D. L. Webb, Equitable Building, Denver, Colo., is agent.

Idaho Springs, Colorado—The Stanley Consolidated Gold Mines Company intends to erect a large and modern concentrating plant on its property on Clear Creek. A. G. Brownlee, Idaho Springs, Colo., is manager.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

June 19—The P. B. Steifer Mining Company which is operating a drift mine at Magalia, Butte county, has been troubled with water in the gravel channel and is about to install a large electric plant to furnish power to be used in working the mine. On the west branch of the Feather river, about one and a quarter miles above Magalia bridge and about 100 ft. below the mouth of Empire gulch a power plant will be erected that will supply all the power and lights needed to operate the mine. The water will be taken from the river several hundred feet higher up, and will be conveyed to the plant in a 3-ft. pipe, and will have a 66-ft. fall. After being used through the power-house the water will be turned back into the river, so that none will be wasted, and corporations will not be deprived of what is due them, it is claimed. The plant will be of the twin or two-unit style and will develop 400 kw. or 600 horse-power.

The California & Massachusetts Copper Mining Company, operating the Tom Head mine, Tehama county, has prepared designs for a smelting plant, which manager N. E. Guyot expects will shortly be installed. The plant is designed for a capacity at the present time of 300 tons per day and is so arranged as to be enlarged in the future by units of 300 tons capacity each. The furnaces are similar to those used by the Anaconda Company, United States Mining Company, Balaklala Company, and at other modern plants. The entire plant is electrically driven, the current being furnished by a generating station, operated by water and located near the river. The smelter and blower-room buildings will be steel structures and the power plant will be concrete and steel building. The smelting plant will be located on a gradually sloping site in order to facilitate the handling of materials into the plant and the disposal of slag.

E. M. Hamilton, defendant in a suit brought by the Big Three Mining Company of Kern county to gain possession of overlapping mineral claims in Kern county, has by the verdict of a jury, won every point in his contentions. Hamilton located the claims nine years ago, and a negro named Graves located joining and overlapping claims which were later sold to the Big Three Mining Company.

The Sierra Exploration and Mining Company has been organized with O. L. Hoese as superintendent to develop what is known as the Home group of mines, consisting of six claims situated two and a half miles west of Sisson in Siskiyou county. A gang of men has already started to work. The original locators prospected these claims thoroughly devoting three years to the work. They have made seven openings to determine the character and extent of the ore. A wagon road that connects with the main road to Sisson has been completed and negotiations with the Northern California Electric Light and Power Company to furnish electric power (which will be converted into compressed-air power) have been concluded.

The big stone quarries operated at Rocklin, Placer county, are in danger of being tied up despite the granting of the demands of the quarrymen for increase of 25c. a day. The quarrymen have been receiving $2.75 for eight hours and their demands for an increase have been granted by nearly all the companies operating. It is with the stone cutters that the trouble is anticipated. This branch is now receiving $4.50 for an eight-hour day. It is known that the men intend to ask for an increase of a dollar per day before the next pay-day. It is the sentiment that this request will not be granted without a contest.

Large numbers of prospectors who have been over the Nevada fields are flocking into the country about Victorville, San Bernardino county. A number of good mines are being opened up. The Sidewinder, the oldest mine in the district, 18 miles north of Victorville, has a mill running. Several other mines will have mills running next fall. The Gold Eagle has already started its mill. There are other active properties in Ord Mountain district northwest of Victorville; and at Copper mountain six miles north. Some gold properties are being opened near the Dixie hills, 15 miles north of Victorville.

The Vulcan group, lying between the Balaklala and Shasta King mines, Shasta county, will soon be the scene of interesting activities. This property was formerly owned by William T. Shaw, its discoverer, and J. R. Lyle. Some months ago the Vulcan Stock Company was formed and the stock offered for sale and the company had no difficulty whatever in raising by this means a development fund of $50,000. A wagon road to the mine will be finished in a few weeks, when actual development will begin.

The Klau quicksilver mine, in San Luis Obispo county, closed down recently.

Salt Lake City

June 19—The shareholders of the Bingham Central and Bingham Standard Copper companies have ratified the action of the directors in arranging for a coalition of interests and the organization of a new corporation to be known as the Bingham Standard Copper Company. The capitalization will be 1,000,000 shares, out of which 400,000 shares will be divided among shareholders of the Bingham Central, an equal number going to shareholders of the Bingham Standard Copper and the balance placed in the treasury. Samuel Newhouse will be president.

The second section of the new concentrating mill of the Utah Copper Company, at Garfield is in commission, each section treating 500 tons of ore daily. The Copperton mill of the same company is treating an average of about 900 tons of ore daily.

The old Dyer mine in Uintah county, which is equipped with a small smelting plant and has produced considerable copper ore, has for the second time passed into the hands of John C. Gates, of Milwaukee. Several years ago he bought the mine at auction for $63,000 and later disposed of it to the Uintah Copper Summit Mining Company. For the greater portion of the past few years it has been idle. It was supposed until recently that the property had been optioned to the Colorado Fuel and Iron Company, but such seems not to have been the case.

The litigation which has been pending in Utah courts for the past ten years between the Grand Central and Mammoth Mining companies is still unsettled. In the district court at Nephi, the case will receive attention during the coming week. The case has been twice tried in the district court and in each case a verdict was rendered in favor of the Grand Central. The Supreme Court of the State affirmed the decision of the lower court and the case now comes up to determine the amount of damages the plaintiff is entitled to. The suit arose over a question of apex.

Jesse Knight and associates, of Provo, have secured control of the Sioux Consolidated mine in the Tintic district. The company has been re-organized and the capital stock increased to one million shares. It owns six patented claims. Senator Reed Smoot, of Provo, is president.

Dividends have been posted for payment on June 20, by the following Tintic mining companies: Grand Central, $10,000; Beck Tunnel Con., $40,000;

Colorado, $40,000; Lower Mammoth, $9500. The directors of the Utah mine at Fish Springs have posted the usual monthly dividend of 3 cents a share, or $3000.

The United States Smelting, Refining and Mining Company has completed the installation of its new bag house system for the collection of flue dust and eradication of the smoke and fume evil and is in successful operation at the Bingham Junction smelter of that corporation.

Denver

June 21—The Golden Cycle Mining Company, in order to secure payment of a bond issue of $1,000,000, has given a trust deed for that amount, to the International Trust Company, of this city, covering the mines in the Cripple Creek district, and the reduction works at Colorado City. There are 1000 bonds of $1000 each, bearing interest at 6 per cent., and payable in five years.

The contractors for the construction of the new Cripple Creek drainage tunnel, have already thrown up the contract and the drainage tunnel company, consisting of the mine owners who have subscribed to it, will go on with the work. The rock proved so hard that in five days the best efforts advanced the breast only 18 ft., whereas the contract required driving an average of 10 ft. daily. It is understood that the tunnel committee will pay for the work done, less 25 per cent. forfeit.

Within a short time the enormous dump of the Portland Gold Mining Company, at Victor, will be shipped to the reduction works at Colorado Springs, which is made possible by the reduction of freight charges on low-grade ore. Possibly, the Stratton Independence dump will also be shipped, the aggregate of the two companies being about 750,000 tons of ore, running about $5.50 per ton.

On account of the additional trouble in handling the ore twice, the railroad companies have notified the managements of the sampling works, of an extra charge of 20 per cent. for hauling Cripple Creek ores, sampled in the district.

The largest cave-in ever known to have occurred in this vicinity, occurred a few days ago, when about 10,000 tons of dump rock fell a distance of 400 ft. in the old Anna Lee workings of the Portland property. No work has been done there for some time.

The tungsten fields of Boulder county are keeping up a good production. Last month nearly $100,000 worth of ore was shipped, of which about one-half came from the Wolf Tongue property.

Work on the construction of a new matte smelter, at Lake City, under the direction of Nelson Hopper, president of the Lake City Mining and Smelting Company, has begun. At first the capacity will be 75 tons daily.

Secretary James F. Callbreath, Jr., of the American Mining Congress, has issued the call for the tenth annual session, which is to be held at Joplin, Missouri, November 11 to 16.

The acting Secretary of the Interior has restored to the public domain for entry, about 80,000 acres in the Durango district, and about 225,000 acres in the Santa Fé district in New Mexico.

During the first five months of the current year mining companies operating in the Cripple Creek district have paid dividends to the extent of $522,755. This does not include the profits realized by close corporations or leasers.

London

June 15—A year ago I gave some information in this column of the satisfactory state of the Scottish shale oil industry, and mentioned how, with modernized plant, the producers were well able to meet the competition of the standard oil trust. This year the Scottish companies are doing even better. The reports of the four chief companies show, in every case, that the profits have increased. The four companies are the Broxburn, Pumpherston, Young's, and the Oakbank. The Pumpherston has made the largest profit and the largest increase, having made a gross profit for 1906 of £116,046 as compared with £94,515 in 1905. The aggregate gross profit of the four companies was £342,664 in 1906, as compared with £314,492 in 1905.

The nineteenth annual report of the Burma Ruby mines has just been published. The report for the twelve months ended Feb. 28 shows a profit of £21,978, of which £6818 goes as royalty to the Government of India, leaving a divisible profit of £15,150. Out of this a dividend at the rate of 5 per cent., absorbing £14,950, has been paid. During the year 1,890,944 trucks of ruby earth were washed at a cost of 7.7 pence per truck, which is a slightly lower cost than last year. The washing was divided between five mills, each of which has two main pans and a safety pan. The construction of the Magok drainage tunnel progresses favorably, and 4000 ft. of it have already been driven. The remaining 1400 ft. should be finished by the end of the present year. The company is addressing a petition to the Indian Government asking for a reduction of the royalty. Up to the present the government has received three times as much in royalty as the shareholders have received in dividends. The government gets 30 per cent. of the net profits and the fact that the government has received more profits than the shareholders, is explained by the expenditure of large sums of money out of net profit on the improvement of the conditions at the mines.

The boom in smokeless semi-coked coal continues. Following on coalite, and the Scottish smokeless Coal Syndicate's product, which so far has no fancy name, comes "Carbo," which is being placed on the market by the Gas Light and Coal Company, the organization which supplies most of London with illuinating gas. It is being sold at 23s. a ton. At this time of year best bituminous coal is sold in London at about 25s. a ton. In appearance "Carbo" is very like "coalite."

Johannesburg

May 27—The general strike that has been declared by the Transvaal Miners' Association is probably the most destructive strike from the men's point of view ever started. The trouble began at the Knights Deep mine. Although most of the miners on this property were non-union men, the Miners' Association saw an opportunity for a master strike, so the cause of the Knights Deep was taken up. At first they succeeded in bringing out several mines on a sympathetic strike, but there were many setbacks, and in order to liven things up the executive committee ordered a general strike of all underground employees of mines affiliated with the Chamber of Mines. The proclamation has met with extraordinary success, and today every mine affiliated to the Chamber of Mines is affected by the strike.

One group, however, is exempt from the disturbance. All the mines controlled by J. B. Robinson, which are not affiliated to the Chamber of Mines, are unaffected by the strike.

There are hundreds of men, principally Africanders, who have been longing to get work on the Rand, and who will now jump into the vacant jobs, in spite of intimidation. These men are willing to work for less than half what the labor aristocrats demand for their services. They are of course, untrained, but being eager and intelligent, it will not be long before they can be "licked into shape." Many recruiters are out among the Boers, and before long there will be enough white labor to replace the malcontents. This breaking in of raw farm labor will disorganize the mines for awhile, and no doubt stamps will be hung up, but the ultimate result will be beneficial to the mining industry. It is felt that a great improvement will be made if the white laborers, born and bred in this country, are used in the mines. They do not intend to leave South Africa, and all their earnings will be spent here. The Boer leaders have pointed out to their people what a great chance is offered them, and the Dutchmen are steadily coming to the mines for employment.

Hardly any stamps have been hung up. Every effort is being made to keep the mills running. Managers, surveyors, samplers, office men, etc., are now in the mines superintending the work which the strikers left. Chinese and Kafirs are now so efficient that they do not require much supervision. Every precaution is being taken to prevent acts of violence.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alabama

WALKER COUNTY

McCollum—These coal mines have been purchased by the Yolande Coal and Iron Company.

Kelso Mining and Manufacturing Company—This company, James Kelso, of Jasper, general manager, has leased 700 acres of coal lands about seven miles south of Jasper, and, it is reported, will construct a railroad 12 miles long, for the shipment of coal.

Arizona

YAVAPAI COUNTY

Knight Copper Company—This company has been organized by Humboldt men to take over a group of copper claims near that place. The group consists of five claims. Although little work has been done there is an excellent showing. The ledge is from 10 to 25 ft. in width having a porphyry hanging wall and schist for the foot. Development work has been started by the new company. The property will be equipped with machinery in a short time.

New England-Arizona Gold and Copper—This company is installing a new air compressor and will change from hand work to machines. Its shaft has reached a depth of 240 ft. Considerable ore has been exposed.

Proposed Smelting Works—J. W. Boileau has secured from the City of Prescott a grant of an additional 80 acres of land upon which to construct his proposed smelter. The terms of the grant are such that construction work must be started and prosecuted within six months from the time of the grant. The site as now proposed contains 160 acres.

Starlight Group—This group of mines, situated in the Weaver mining district, has been taken under bond and lease by William F. Whitney, of Wallingford, Conn. The original owners, Genung & Scott, have reached a depth of 140 ft. The ledge is strictly gold-bearing, and will permit of recovery by amalgamation.

Storm Cloud—These mines are being operated by the H. J. Beemer Company, one car of ore being shipped each day to the Humboldt smelter. Most of the ore shipped is taken out in development work.

California

AMADOR COUNTY

Kennedy Mill and Mining Company—The pipe-line for delivering fuel oil from Martell depot to this mine at Jackson has been completed. The oil flows readily to the tanks at the mine and no trouble has been experienced.

BUTTE COUNTY

Chrome Iron—Deposits of this mineral have been found on Middle Butte creek by S. E. Starrett, of Oroville. Assays show 55 per cent. chrome and 5 per cent. nickel.

CALAVERAS COUNTY

Moosehead, Water, Power and Mines Company—This New York company has purchased from E. C. Rigney and Thomas Thorkeldsen the Moosehead claims adjoining the Sheepranch quartz mine, 12 miles from San Andreas. The claims are patented and cover a large area. The company owns 15 miles of ditches and has options on dams and reservoir sites, and has a bond on the San Antonio ditch system. The company is now hydraulicking with two giants.

EL DORADO COUNTY

Woodside-Eureka—At this mine, Georgetown, high-grade ores are being found at a depth of 170 feet.

FRESNO COUNTY

Florence Mack Mining Company—At this quicksilver mine, 25 miles from Coalinga, 1500 tons of ore are on the dump. A new shaft has been sunk 200 ft. deep. The company has decided to continue its lease on the mine for two years more.

INYO COUNTY

Dunlap—At this mine, W. G. Scott superintendent, the ledge is 4 ft. wide in the tunnel and it is thought that the pay shoot has been struck earlier than expected.

Greenwater—Through the inability of Nash and Wallace to meet the $75,000 payment on May 24, Arthur Kunze, original locator of Greenwater and the Schwab mine, again becomes the owner of 100 claims and properties in this district, including the Greenwater and Grand Central groups.

Southern Belle Mining Company—The miners on the 400-ft. level of the Bullion claim have cut through 30 ft. of ledge matter. The middle shaft now being sunk is to go to 500 ft. and 1000 ft. of drift will connect it with the Bullion workings.

KERN COUNTY

Silver—J. E. Miller and associates, while prospecting in the Indian Creek section, 30 miles from Bakersfield, have located a large vein of silver ore, which they have named the Eureka.

MARIPOSA COUNTY

Geneva Gold Mining Company—This company has begun operations under management of R. W. Frierson. Tools, timbers, etc., have been shipped in and a steam boiler, hoist and pumps are on the way.

Yosemite Consolidated Gold Mining Company—This company, of which O. S. Williams, of Los Angeles, is president, has purchased 22 claims comprising 440 acres at Horseshoe Bend, on the line of the new Yosemite Valley railroad. An electric power plant and a 20-stamp mill are to be installed.

NEVADA COUNTY

Lincoln—At this mine on the Cooley ranch, Canada hill, a hoist is to be erected which will permit the company to sink the shaft 200 ft. deeper.

Mistletoe—This mine at Rough and Ready, formerly owned by Clifford Graham, has been transferred to a new company, composed by L. M. Clark, F. M. Spaulding, M. Clark, I. C. Lindley and Henry Goering.

Niagara—A new hoist has been installed at this mine by the new management, and another pipe line is being finished.

Town Talk—This property at Grass Valley, between the Idaho, Maryland and Empire mines, has been bonded by L. C. Heler, who intends organizing a company to develop it.

Young America — Robert Kemp, the principal owner of this mine at French Corral, is making arrangements to work it on an extensive scale.

PLACER COUNTY

Gold Blossom—Manager Brice, of this mine at Ophir, is opening the 200 and 400 levels.

Herman—Superintendent Sherwin added 50 men to the force last week and will put on 50 more when he can get them.

Lost Emigrant—This mine near Summit, owned by F. L. Heath and others, is to be reopened by Wm. H. Bray and other men from Nevada, who intend to put up a 10-stamp mill and employ 20 men at the start.

Southern Cross—This mine at Towle has been started and a new 10-stamp mill has been ordered, to be operated by electric power.

White Oak—As soon as the legal differences with the Mayflower are settled, Peter Crary will start up this old mine.

PLUMAS COUNTY

Nevada-Plumas—High-grade ore has been struck in this property at Beckwith. A long tunnel is being run to crosscut the vein at depth.

SAN BERNARDINO COUNTY

Tungate and Caldwell—Work on an extensive scale has commenced on this mine, adjoining the Crackerjack Gold Mining Company's property on the north. The shaft will be sunk 200 ft. at once.

SISKIYOU COUNTY

Arbuckle and Temple—This mine, near Callahan, has been sold to men from Eureka, Humboldt county, and F. H. Heinze has been selected as superintendent. A mill will be erected.

McFadden and Chapman—Work has been resumed on this mine at Mill Creek, near Callahan.

Dr. Maggi—The first carload of ore from this mine has been hauled to the railroad and shipped to the smelter at Kennett.

Yellow Butte Copper Mining Company—This company has been organized to open and work the Yellow Butte mine on the east side of Hay Stack mountain. The officers are: W. P. Veuve, of San Jose, president; J. D. Ball, of San Juan, San Benito county, secretary; L. D. Ball, of Yreka, superintendent. A hoist and other machinery have been ordered.

Colorado

Land-fraud Arrests—Ten prominent citizens of Colorado were arrested June 24, charged with conspiracy to defraud the Government under the coal and timber land law. Those arrested are: John B. McMillan, Robert Forester, chief geologist of the Denver & Rio Grande Railroad; Otis B. Spencer, formerly clerk of the District Court; F. W. Keitel, a coal operator in Routt county; John A. Porter, formerly president of the Porter Fuel Company; Edgar M. Briggs, president, and John J McGinnity and Charles D McPhee, directors of the New Mexican Lumber Company; Alex Sulenberger, president of the Pagosa Lumber Company, and Charles H. Freeman, of Pagosa.

All were arraigned before United States Commissioner Sanford H. Hinesdale and held in $5000 bond each. The grand jury indicted 73 persons in all, representing six States.

BOULDER COUNTY

Coal Mining Company—Denver and West Virginia capital is interested in the purchase of 160 acres of coal land, and lease of 240 acres, situated near Lafayette. The mines are to be equipped for a daily output of 1500 tons.

CLEAR CREEK COUNTY

Golden Glory Tunnel Mining Company—Denver and eastern capitalists are interested in driving a tunnel into Saxon mountain, below Georgetown, and are figuring on installing an air compressor plant and drills. A. A. Arbuckle, of Georgetown, Colo., is manager.

Inspiration Mines and Tunnel Company—Nebraska, Iowa and Colorado capitalists propose to drive a parallel tunnel from Gilson gulch to cut the mines of that section as well as others in Gilpin county. Electric power will be used. J. J. Hoban, Idaho Springs, is manager.

Stanley Mining and Milling Company—The Hyland mill and water rights on Clear Creek, have been purchased by this company and the water rights will add to the power resources. A. G. Brownlee, Idaho Springs, Colo., is manager.

GILPIN COUNTY

Free Gold Group—This group in the Perigo district has been sold to F. A. Burnell, of Denver, for a consideration of $22,000. Development work will be extensive.

Keystone—Denver and Eastern capital is interested in the purchase of this property from J. C. Jenkins, Central City. Heavier machinery is to be installed, and A. J. Smith, Central City, Colo., is to be superintendent.

King Bee—Southern capitalists are interested in starting up the Clifton Bell group, in Russell district, with A. H. Heller, Central City, as manager. Machinery is to be installed, and the company will develop the holdings through the Newhouse tunnel.

Saratoga Mining, Smelting and Reduction Company—Articles of incorporation of this company have been filed showing $1,000,000 capital. The officers are: President and general manager, John Owen, Idaho Springs; secretary and treasurer, H. T. Rogers, New York City. The corporation has been formed for the purpose of purchasing the Saratoga group of nineteen claims situated in Russell district, as well as other property, the option on the Saratoga calling for $500,000.

Vigilant Mining Company—Denver and Eastern people are interested in the purchase of the Mabel tunnel property in Russell district, and machinery is to be installed. Robert Denton, Central City, Colo., is manager.

LAKE COUNTY—LEADVILLE

Best Friend—This property, upper Big Evans gulch, has been worked steadily during the winter and considerable ore is ready to be shipped whenever the roads become passable. The ore is found in a fissure vein which averages 3 ft. wide and contains gold and silver.

Cleveland—Drifting north and south from the bottom of the shaft, South Evans, is proceeding satisfactorily and the streak of ore followed runs well in gold. Winnie, the adjoining property to the south and owned by the same company, New Monarch Mining Company, is still producing an average of four carloads of high grade ore. The property also produces 1200 tons per month of medium-grade ore.

Damascus Mill—The experimental stage at this plant has been passed, and it is the intention of the company to enlarge the plant and also to install a wet process for the treatment of the low-grade ores of the camp.

Dinero Tunnel—The tunnel, Sugar Loaf, is approaching the 100-ft. point and it is expected that several veins will be cut in the next 200 ft. The Bartlett claim in the same district is shipping high-grade ore. The company is making preparations to sink the shaft deeper.

Little Jonny—This property, Breece hill, continues to yield rich ore in several parts of the mine. A set of lessees on No. 4 shaft at the 900-ft. level recently took out 63½ lb. of ore that netted 33 lb. 10 oz. pure gold. From other parts of the mine lessees are shipping good ore amounting to 8000 tons per month.

Louisville—This property, Iron hill, is being worked from the Yak tunnel, a lateral having been run from the main tunnel, cutting the shaft at a depth of 600 ft. Electrical machinery was installed and the present work is being carried on 150 ft. below the tunnel level; 75 tons daily of lead and iron sulphides are being shipped, and the output could be doubled.

Weston Pass—Several properties in this section will resume operations this summer, among them being the Ruby and Colin Campbell. Both have good bodies of lead; extensive development will be carried on. The section is eight miles directly south of Leadville.

ROUTT COUNTY

Oil—California capitalists have formed a company with a capital of $1,500,000 to sink for oil, and are arranging for the purchase of the Milner tract, near Steamboat Springs. A. E. Lea, of Los Angeles, Cal., is at the head of the syndicate and the headquarters of the company is to be at Steamboat Springs.

Georgia

MURRAY COUNTY

Iron Mountain Mining Company—This company, organized in Atlanta, has acquired large deposits of iron and manganese ores in Murray county and will erect washeries and build a branch road to its mines.

Kentucky

BELL COUNTY

Black Raven—These coal properties at Four Mile have been leased to Crawford & Company, a new corporation, of which

W. M. Nixon, general manager of the Brushy Mountain mines, Tenn., is president. The daily output of the Black Raven is about 300 tons of domestic coal.

KNOX COUNTY

Black Hawk Coal Company—This company has been organized in Middlesborough with a capital stock of $30,000 to develop coal deposits about nine miles from Artemus, said to be the Dean seam. The officers include John Howard, Charles I. Dawson and E. P. Nicholson.

Louisiana

CALCASIEU PARISH

Jennings Heywood Oil Corporation—This company has two new wells in the old portion of the field producing 500 bbl. daily.

Crowley Oil and Mineral Company—This company has paid the seventeenth dividend of 10 per cent. on a capital stock of $200,000.

CADDO PARISH

Hughes Hunter—This well, Shreveport, came in May 23, at 2170 ft., and is flowing 100 bbl. daily. Ten big gassers, having an estimated daily capacity of 125,000,000 ft., have been completed in this field. Some of the gas is being sold at Shreveport at 25 cents per thousand to private consumers, and 10 cents per thousand to manufacturers. The gas will eventually be piped as far west as Fort Worth, Tex.

Michigan

HOUGHTON COUNTY—COPPER

Centennial—Work is approaching the mineral in the No. 2 shaft. Fifteen additional drills have been put in operation.

Hancock—The annual meeting held in the office of the company at Hancock resulted in the election of the following: J. D. Cuddehy, James Hoatson, Thomas Hoatson, S. B. Harris and A. F. Rees. Parts for the new hoisting engine for the new shaft are being received.

Montana

BUTTE DISTRICT

Anaconda—The shaft on the High Ore is 2830 ft. deep, and is going 45 deeper, after which no more sinking will be done for some time. The odd 75 ft. will be a sump. Sinking at the St. Lawrence was resumed at 2100 ft. Drifting in the vein of the Anaconda mine at the 2200-ft. level continues, but at the 2400-ft. level it will be necessary to supply air before further work can be done. This will consume about two months.

Boston & Montana—The shaft of the West Colusa, bound for the 2000-ft. mark, is down nearly 1700 ft., and the Mountain View shaft is sinking from the 1800-ft. level to connect with the 2200-ft. level of the High Ore. The company is shipping nearly 3500 tons of ore a day, the capacity of the smelter. It is doing considerable development work for Coalition in Minnie Healey and Tramway ground.

Coalition—The company is increasing its advantages and is maintaining a production of nearly 1800 tons a day. This output will probably not be augmented much until Jan. 1, when the new shaft on the Tramway will be in use and new territory opened in the Rarus, Cora and Minnie Healey. At the 1300 and 1400-ft. levels of the latter great bodies of high-grade ore have been blocked out recently.

Davis-Daly—The company claims to have ore in the Thomas vein cut by way of the 1800-ft. station of the Original, but none of it has been raised to the surface. Development continues on all claims.

East Butte—The president of the company reports the discovery of 11 ft. of copper ore of fair grade at a point about 130 ft. north of the 400-ft. station of shaft No. 11, and says the vein in the bottom of No. 1 is still strong and productive.

La France Copper—According to the report of this company to the assessor for taxation purposes, the daily production for 360 working days of the year ended May 31, was 95½ tons of ore, the total being 34,336 tons, 3½ tons a day more than during the previous year. The total net earnings for last year were $151,012, $1027 greater than the previous year. La France is a branch of United Copper.

New Work—The Butte & London shaft is 1030 ft. deep, and a station is being cut at 1000 ft. Amazon-Butte is 400 ft., and is preparing to crosscut its veins north and south. Butte & Bacorn is down 1000 ft. in its Calumet shaft, and will crosscut north and south from the bottom. Colusa-Leonard Extension is 690 ft.

North Butte—This month the ore production of the company has been as great as it has been during any similar period. The crosscut north of the 1600-ft. level of the Jessie has advanced 70 ft. since June 1, which brings it within about 250 ft. of the Berlin vein, for which it is driving. Shipments aggregate between 1300 and 1400 tons of ore a day, a large portion of which averages from 5 to 7 per cent. copper.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Atlanta—The shaft is down to the 350-ft. level, where a station is being cut to prepare for drifting. A large amount of cross-cutting and drifting was done on the 250-ft. and 300-ft. levels without disclosing any very high-grade ore. There are indications, however, that the lessees will meet with better success at the 350-ft. level.

Consolidated—The mill is being supplied with 75 tons of ore daily. The returns are reported to be excellent.

Jupiter—The crosscut on the 200-ft. level is being extended with the view of cutting one of the big ledges outcropping at the surface.

Mohawk—The litigation which for the past half year has tied up the Sheets-Ish and Kalfus leases, has been settled. The lessees have agreed to form a corporation to take over all interests and resume working the leases immediately. The management of operations has been entrusted to M. C. Ish.

Mohawk-Florence—The returns from recent shipments from the Little Florence and Mohawk-Florence mines, amounting to 450 tons total $120,000 net. The mines are at present shipping between 50 and 100 tons of ore per day.

Red Hills—The shaft has been sunk to a depth of 230 ft., and will be continued to the 300-ft. level before driving is undertaken.

Simmerone—Crosscuts are being extended east and west at the 250-ft. level. Both are in low-grade ore.

Velvet—The Bartine and Hassell lease at the 300-ft. level, has cut a large body of high-grade ore. The vein is believed to be a continuation of the rich shoot in the Codd lease, in the St. Ives mine.

NYE COUNTY—BULLFROG

California—The tunnel has cut a vein of silver ore giving high assays. Some of the assays also yield gold.

Columbia—A vein of milling-grade ore is being developed in the Lucy B. claim on this property.

Gold Bar—A station is being cut at the 450-ft. level for driving. When it is completed sinking will be continued to the 550-ft. level.

Mayflower—The machinery for the new hoist has all been delivered at the Beatty railroad station.

Mayflower Annex—A large ledge, which is apparently an extension of that being developed in the Pioneer, has been opened by surface trenching. Arrangements are being made to purchase a power hoist and sink a shaft on the ledge to a depth of 200 ft.

Montgomery-Shoshone—The new shaft has been sunk to the 500-ft. level, where a station has been cut and crosscutting started. The Shoshone and Polaris workings are now connected, and both are being worked through the Shoshone shaft. The new shaft is connected with the old main tunnel.

North Star—The main crosscut has entered a new formation carrying quartz stringers and exhibiting indications of the approach to an orebody.

Original—About 50 ft. of drifting is being done weekly in addition to sinking. The West and Pierce shafts have been

connected and improved the ventilation of the workings. A fair-sized orebody of milling grade has been opened in the northeast drift from the West shaft.

NYE COUNTY—MANHATTAN

Consolidated—The new mill for this mine has arrived at Reno and will be forwarded as soon as the freight blockade is raised.

Giant—A shipment of 5 tons of ore from the Walker lease was made during the week. The ore assayed a little over $25 per ton. The ledge from which this ore was mined was opened up a month ago, and is developing well.

Gold Crater—The returns from a recent ore shipment average $100 per ton.

Gold King—A shaft will be sunk on the rich vein on the Uno claim.

Granny—Shaft-sinking has been resumed from the 200-ft. level, and will be continued until the 350-ft. level is reached.

NYE COUNTY—TONOPAH

Ore Shipments—Ore shipments over the Tonopah Railroad for the week ending June 13 were: Tonopah Company, 1242 tons; Belmont, 224; Tonopah Extension, 220; Montana-Tonopah, 100; Midway, 37; Jim Butler, 30; total, 1853 tons. Shipments from Goldfield were 811 and from Lone Mountain 30 tons, making a total of 2694 tons. In addition the Tonopah Company sent 1978, and the Belmont 1060 tons to the mills, a total of 3038 tons.

Belmont—The new 60-stamp mill has been running steadily on the company's ore during the past two weeks.

Jim Butler—About 100 tons of high-grade ore weekly are being shipped and a large amount of ore of milling grade is being stacked.

West End—The new shaft has been sunk to a depth of 130 ft., and the usual amount of development work is being done. During the week a shipment of 40 tons of high-grade ore was made to Salt Lake.

Pennsylvania

ANTHRACITE COAL

District President John Fahy, of district No. 9, United Mine Workers, has agreed to serve as secretary of the Anthracite Conciliation Board, to succeed William Dettery, who resigned as a member of the board.

The Lehigh Coal and Navigation Company is electrifying the tow path of the canal from Coalport to Weissport, a distance of four miles, as an experiment to demonstrate the advisability of equipping the entire length of the canal.

As the result of a partial report made by Professor Louis M. Haupt, consulting engineer to the directors of the Trades League, of Philadelphia, the members will be recommended to make shipments of coal from the Panther Creek district by way of the canal of the Lehigh Coal and Navigation Company. Professor Haupt states that the coal can be sent to dealers who have wharfage facilities for 15c. a ton less than by way of the railroads.

George M. Christ, of Pottsville, has been awarded a contract to build a breaker for the McTurk Coal Company; at Girardville and also one at Excelsior.

David D. Randall, mining engineer for the Susquehanna Coal Company, was given a banquet at Kingston upon his appointment as superintendent of the Penn colliery, of the same company, at Shaft, Penn. He was also presented with a gold watch by his fellow employees.

Congressman T. D. Nicholls, president of District No. 1, United Mine Workers, is indignant at Governor Stuart, of Pennsylvania, who vetoed the bill, passed by the legislature, prohibiting a miner from having charge of more than one chamber. Mr. Nichols in discussing the action of the governor said "Unless the present miners' certificate law can be interpreted to mean that a miner cannot have charge of more than one working place, then there is nothing to prevent the employers from employing one miner to have charge of several places, as has already been done at a colliery in Olyphant and to have the laborers mine the coal in some of the places and to take care of themselves while doing this work."

South Dakota

Men Wanted—Six hundred more miners and mill men are needed in the Black Hills, owing to the resumption of work after the settlement of the strike. The fire in the Homestake has been extinguished and that company will need a large number of men.

LAWRENCE COUNTY

Branch Mint Mining and Milling Company—The new mill of this company at Galena is nearly completed and 120 stamps will be dropping within a short time. All the machinery and tanks of this, the largest cyanide plant in the Black Hills, have been installed. There are twelve tanks 6x18 ft.; nine, 7x18 ft.; four, 6x36 ft., and one, 6x30 ft., besides 17 tanks, 12x18 ft., for the treatment of slimes by decantation. The building is 86x140 ft. and has room for five more tanks. The Hoodoo shaft is down 400 ft. and there are more than 2000 ft. of tunnels crosscutting the orebodies. The bins at the mill are already full. J. D. Hardin is president of the company.

Texas

The Texas legislature at its last session passed the Gross Receipts Tax Bill. The vigorous fight made by the oil operators resulted in many modifications of the obnoxious clauses. As passed the crude oil producer is only taxed one-half of one per cent. on gross receipts; pipe lines, 2 per cent.; wholesale dealers in refined oils, 2 per cent.; tank car lines, 3 per cent. Dealers in crude oil (other than actual producers) escape all taxation.

The labor troubles, which have caused some annoyance in the Texas fields, have been settled. The operators made no concessions whatever, and the strike ordered by the Oil and Gas Workers' union was a failure.

The King Crowther Oil Corporation has been reorganized and revived. This company received hundreds of thousands of dollars from Eastern investors in 1902, and then was placed in the hands of a receiver. The location of its Texas wells(it claims 15 proved wells, capacity not stated) is about 60 miles south of San Antonio. Apparently no effort is being made to sell stock in Texas and Eastern investors can readily learn what operators here think of its property and its methods.

Field operations in the coastal field were quiet in May, only 54 wells being completed, of which 45 were producers, a decline of 37 wells compared with April.

The May production declined about 90,000 bbl. The gross output was 1,351,000 bbl., and the consumption 1,750,000 bbl., leaving stocks of crude at 5,870,000 bbl. The Security Oil Company and the Gulf Refining Company used Glenn crude in some of their stills, so that the refinery consumption of Texas crude decreased about one-third. The Batson field showed an increased flow, while all other fields declined. Part of the decrease was occasioned by excessive rains flooding the fields.

The crude oil market is very firm, and in many cases fuel oil is bringing $1.05 to $1.10 f.o.b. on cars. The Standard Oil Company is out of the market, prices being too high for their use to ship to Eastern points.

The May output of the various fields and current credit balance prices are as follows: Batson, 216,000 bbl., 86 cents; Humble, 312,000 bbl., 90 cents; Saratoga, 210,000 bbl., 86 cents; Sour Lake, 211,000 bbl., 86 cents; Spindletop, 114,000 bbl., 88 cents; and Jennings, 270,000, 80 cents.

Utah

BEAVER COUNTY

Frisco Contact—Work at this property has been retarded by the scarcity of miners.

Newhouse Mines and Smelters—The mill of this company is handling an average of 800 tons daily. Additional crushing facilities are being installed that will bring the capacity up to 1200 tons a day.

BOXELDER COUNTY

Salt Lake Copper—This company is making regular shipments of copper ore

from its property south and east of Tecoma, Nevada.

JUAB COUNTY

Tintic Ore Shipments—Last week Tintic mines forwarded to the Salt Lake valley smelters a total of 153 carloads, the contributing mines and amounts being: Ajax, 3; Bullion Beck, 3; Beck Tunnel, 8; Bullock, 1; Carisa, 5; Centennial Eureka, 57; Colorado, 6; DePue, 6; Eagle & Blue Bell, 4; Eureka Hill, 9; Grand Central, 6; Gemini, 5; Lower Mammoth, 8; La Clede, 1; May Day, 4; Mammoth, 10; Scranton, 6; Uncle Sam Con., 4; Victoria, 3; Yankee Consolidated, 4 cars.

PIUTE COUNTY

Annie Laurie Extension—The directors have called on shareholders for another assessment and expect to resume development work shortly.

Annie Laurie Mill—This plant is being overhauled and re-equipped with modern machinery.

SALT LAKE COUNTY

Columbus Consolidated—This Alta company is shipping from 50 to 60 tons of ore daily. The usual dividend will be posted in July, 20c. a share, or $56,000

Standard Copper—The Burning Moscow vein has been encountered in the Saginaw vein at a distance in from the portal of 600 ft. Eighteen inches of good shipping ore is exposed. The find was made 125 ft. below the older workings of the mine.

Silver Shield—This Bingham company is operating a small mill, which is being supplied with ore carrying values of about 8 per cent. lead, 10 oz. silver, 1 per cent. copper and $1 in gold.

Ute Copper—This company, recently formed by a syndicate of Salt Lake and Ohio mining men, has a force of men engaged in cleaning out the old workings of the Winnemuck mine in Bingham.

SUMMIT COUNTY

Ontario—Work has been suspended at this property and preparations are being made to pump out the lower workings before renewing the attempt to reopen the drain tunnel.

TOOELE COUNTY

New Stockton—The mill on this property is to be enlarged to treat 150 tons of ore per day. It is now handling about 75 tons and two cars of concentrate is being marketed weekly. J. J. Trenam, of Salt Lake, is manager of the company.

West Virginia

RALEIGH COUNTY

Slab Fork Coal Company—This company, incorporated several months ago with a capital of $300,000, will, it is reported, develop about 2700 acres of coal land in the Windy Gulf district, accessible to both the Deepwater and Chesapeake & Ohio railroads. W. G. Caperton will have charge of operations.

Canada

ONTARIO—COBALT DISTRICT

Cobalt Ore Shipments—Shipments of ore for the week ending June 15, were as follows: Coniagas, 278,000 lb.; Nipissing, 57,400; Right-of-Way, 72,830; total, 408,230 pounds.

Argyle Silver—This mine, situated two miles south of Haileybury, on the shore of Lake Timiskaming, is preparing to make shipments and commencing extensive development work. The two shafts are being timbered to the depth of 40 and 25 ft., respectively, substantial camp buildings are approaching completion and the force of 15 men will be increased. J. B. Phillips is superintendent.

Cobalt Lake—No. 4 shaft is down 74 ft., and sinking is progressing at the rate of about one foot per day. It is 65 ft. below the water level. At the 76-ft. level in No. 5 shaft, the vein is found to hold its width with a more even distribution of silver. As soon as the compressor is ready, eight drills will be started in addition to the two now in operation.

Erie-Cobalt—A third vein of calcite has been discovered in the cross-cut from the 100-ft. level. It is 6 in. wide and carries a good proportion of silver. Forty-eight men are at work.

O'Brien—Two good surface strikes were made this week. One vein was upward of 2 ft. wide, the other 3 in.

Philadelphia Cobalt Mining Company—At the St. Denis mine, Lorraine township, owned by this company, a main shaft has been sunk on No. 5 vein from which a cross-cut can be driven for about 25 ft. to cut vein 6. Both of these carry cobalt and silver, and there are others which promise well. The mine was visited last week by President H. B. Hanford, Philadelphia, and a party of officials and directors. Machinery has been ordered.

Mexico

Transportation Difficulties—The mining and smelting industries of the republic are suffering from the inability of the railroads to move ores and coke. The American Smelting and Refining Company has, it is reported, more than 100,000 tons of ore tied up along the Mexican Central lines, and all the smelters are suffering for lack of fuel. A number of mines have been forced to shut down because of failure to ship and realize returns.

CHIHUAHUA

Veta Colorado Mining Company—This company has concluded the purchase from Juan Creel of the Rio Tinto Mexican mine and smelter, situated about 30 miles north of Chihuahua.

Hinds Consolidated Mining Company—This company which recently took over the Clarinas and Refugio groups of mines in the Santa Barbara section of the Parral district has been granted a concession for the erection of two reduction plants.

Africa

RHODESIA

The Chamber of Mines reports the gold production in May at 52,668 oz. bullion, a gain of 2896 oz. over April, and the largest monthly output yet reported. For the five months ended May 31 the total was 216,802 oz. bullion in 1906, and 267,738 oz. in 1907; an increase of 50,936 oz. The bullion reported this year was equal to 238,287 oz. fine gold, or $4,925,392 in value.

TRANSVAAL

The Chamber of Mines reports the gold output for May at 524,477 oz. fine gold: which is 12,542 oz. less than in April, but 75,817 oz. more than in May, 1906. For the five months ended May 31 the total was 2,180,474 oz. in 1906, and 2,631,173 oz., or $54,386,346, in 1907; an increase this year of 450,699 oz., or 20.7 per cent.

There were distributed to the mines during the month of May 7649 natives, while 7804 left through time expiry and other causes, the net loss on balance being 155. Exclusive of the Robinson group of mines, the number of natives employed at the end of the month was 91,669.

WEST AFRICA

Gold production in May is reported at 24,854 oz. bullion; an increase of 8443 oz. over May, 1906. For the five months ended May 30 the total was 88,064 oz. in 1906, and 120,234 oz. in 1907; an increase of 32,170 oz. The bullion reported this year was equal to 112,825 oz. fine gold, or $2,332,100 in value.

New Zealand

The mines department reports the exports of gold for March and the three months ended March 31 as below, in ounces bullion:

	1906.	1907.	Changes.
March	35,281	50,573	I. 15,292
Three months	129,689	118,119	D. 11,570

The bullion reported this year was equal to 111,477 oz. fine gold, or $2,304,230. The exports of silver for the same period were, in ounces:

	1906.	1907.	Changes.
March	78,550	101,550	I. 23,000
Three months	232,867	303,241	I. 70,374

This shows a considerable gain this year, notwithstanding light exports in February.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

In the Alabama coalfields the controversy between the miners' union and the coal operators, concerning the concessions by both sides is still in abeyance. Many union miners have deserted the union mines to work in those not recognizing the unions. The demand for coal is exceptionally strong in this field and the present rate of production indicates a large output for the year.

In the West the usual summer dullness has set in but business is reported better than for other years at this time. Prices are fairly strong but show a tendency to weaken.

The feature of the Atlantic seaboard soft-coal trade is the scarcity of vessels and the prevalence of winter freight rates. It is rumored that certain shippers contracted for large vessels early in the year at low rates and have since been active in boosting the rate so as to profit by the difference in prices.

The local demand for anthracite has fallen off considerably and the usual summer dullness has set in. Small steam sizes are not quite so scarce and producers are slowly catching up with this class of business.

Coke is weak and subject to demurrage conditions.

Coal-traffic Notes

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to June 15 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite	1,891,035	2.586,235	I. 695 200
Bituminous	14,362 619	17 251,031	I. 2,888,412
Coke	5 830 398	6,417,488	I. 587,090
Total	22 084.052	26,254,754	I. 4,170 702

The total increase this year was 18.9 per cent.

Shipments of bituminous coal and coke over various railroads in western Pennsylvania and West Virginia are reported as below, in short tons, for the four months ended April 30:

	Coal.	Coke.	Total.
Balt. & Ohio	8,245,061	1,916,110	10,161,171
Buff., Roch. & Pitts.	2,191,169	211,889	2,403,058
Beech C., N. Y. Cent.	2,702,981	28,463	2,731,444
Pitts. & L. Erie.	3,260,923	1,771,270	5,032,193
Norfolk & Western	3,695,915	870,708	4,566,623
Total	20,096,049	4,798,440	24,894,489
Total, 1906	20,644,494	4,526,836	25,171,330

The total shows a decrease of 276,841 tons, or 1.1 per cent. In addition to the tonnage above, the Baltimore & Ohio carried 260,101 tons of anthracite in 1906, and 375,689 tons in 1907; an increase of 115,588 tons.

Shipments of coal over the roads in the Ohio Coal Traffic Association for the four months ended April 30, are reported as below, in short tons:

	1906.	1907.	Changes.
Hocking Valley	1,224,208	1,102,642	D. 121,566
Toledo & Ohio Cent.	553,867	547,676	D. 6,191
Baltimore & Ohio	500,057	671,132	I. 111,075
Wheeling & L. Erie.	924,985	1,109,278	I. 184,293
Cleve., Lorain & Wh.	698,365	823,136	I. 124,771
Zanesville & Western	380,314	488,661	I. 108,347
Toledo Div., Pen. Co.	767,377	854,320	I. 86,943
L. Erie, Alliance & Wh.	298,977	383,393	I. 84,416
Marietta, Col. & Clev.	.....	6,040	I. 6,040
Total	5,408,150	5,986,278	1. 578,128

The total increase shown this year was 10.7 per cent.

Shipments of coal from mines on the Southern Railway for the three months ended March 31, were: Tennessee district, 372,878; Alabama district, 588,857; total, 961,735 short tons, an increase of 33,559 tons over last year.

Coal receipts at St. Louis for the four months ended April 30, were 2,698,061 tons in 1906, and 2,516,016 tons in 1907; a decrease of 182,045 tons.

Receipts and shipments of coal at Chicago for the four months ended April 30 were, in short tons:

	Receipts.	Shipm'ts.	Balance.
Anthracite	566,184	412,373	153,811
Bituminous	5,367,117	1,429,768	3,937,349
Coke	147,641	104,157	43,484
Total	6 080,942	1,946,298	4,134,644
Total, 1906	4,720,241	1,486,155	3,234,086

The balance represents approximately the city consumption. Bituminous receipts were from Pennsylvania, 355,179; Ohio, 324,791; West Virginia, 211,825; Indiana, 1,076,723; Illinois, 3,398,599 tons.

Coastwise shipments of coal from the leading Atlantic ports for the four months ending April 30 are reported as follows:

	Anthracite.	Bituminous.	Total.
New York	5,591,306	4,375,961	9,967,267
Philadelphia	734,338	1,509,743	2,244.081
Baltimore	72,278	1,137,307	1,209,585
Newport News	.....	818,215	818,215
Norfolk	.....	551,719	551,719
Total	6,397,922	8.392,945	14,790,867
Total, 1906	5 205,766	7,458 517	12.664.283

The total increase this year was 2,126,584 tons, or 16.8 per cent. New York includes all of the New York harbor shipping ports.

New York

Anthracite

June 26—The hard-coal market shows great dullness and considerable falling off in business, which is usual at this season of the year. The small sizes continue in good demand, however, but the extreme shortage which was prevalent earlier in the year has been somewhat relieved, especially in buckwheat Nos. 1 and 2; rice, barley and pea are still very scarce, and in stong demand. Car supply is fair and nearly up to all requirements. We quote prices as follows: Broken, $4.45; egg, stove and chestnut, $4.70; pea, $3.10; buckwheat, $2.60; rice, $1.90; barley, $1.60; all f.o.b. New York harbor.

Bituminous

The Atlantic Seaboard soft-coal trade is dull so far as current business is concerned, but fair shipments are being made upon season contracts. Lack of water-transportation facilities is still the feature of the business at this time. Trade in the far East is calling for considerable coal, and it is reported that some consumers are a little short. Consumers in this territory are not putting in their stocks to the extent they would if the winter freight rates were not prevailing. Trade along the Sound has quieted down and orders from this district are simply regular contract business.

New York harbor trade is dull and prices are low; good Clearfield coal is being offered at $2.40 f.o.b. New York harbor shipping ports. All-rail trade is quiet; most consumers have fair stocks on hand and are not ordering for present delivery to any extent. Transportation from mines to tide is fairly good. Car supply is satisfactory when the embargoes are not considered. Main-line railroad superintendents are using their embargoes with the producers to an extent which injures business. Shippers are unable to calculate when their supplies will be cut off, with or without cause, and without notice being given.

In the Coastwise vessel market vessels are scarce, and in good demand. Current rates of freight are quoted as follows: From Philadelphia to Boston, Salem and Portland, $1.10@1.15; to Portsmouth, $1.15@1.20; to Lynn, Newburyport, Saco, Bath, Gardiner and Bangor, $1.25; to the Sound, 90c., with towages where usual.

Birmingham

June 24—The convention of the Alabama district No. 20, United Mine Workers of America, adjourned *sine die* Thursday of the past week, resolutions being adopted that the matter of making a contract with the commercial coal operators who recognize union labor be left to the district officers; it was understood that the concessions asked for by the

operators, that pay days be monthly instead of semi-monthly and that a rule be established allowing each miner a laborer, should be disallowed. The commercial operators at a meeting held on Saturday instructed their scale committee to insist on the concessions and this association adjourned *sine die* also. This means that if the two bodies cannot get together between now and July there is likely to be a suspension of work. The commercial coal operators claim that they are at a disadvantage in that the non-union mines have but one pay day a month, which means that trouble and expense in the double pay day are avoided and again the miners are inclined to work steadier with only one pay day a month. They further claim that the non-union mines permit the miners to have a day laborer and as a consequence many of the union men are leaving the union mines and going to the non-union mines. The resolutions adopted by the union miners cries down the labor or contract system and forbids the district officials granting the concession. W. B. Wilson, the national secretary of the United Mine Workers of America, was here and in his talk to the miners said that he believed that President John Mitchell would give the miners of Alabama moral and other support in their contention. The organization in this State has a membership of something over 3000. Of this number between 700 and 1000 work for the Alabama Consolidated Coal and Iron Company, which signed a wage contract with the union. The Alabama Consolidated is the only iron company in Alabama recoginzing the miners' union.

Chicago

June 24—Summer dullness seems to be upon all branches of the coal trade. With the coming of warm weather over Chicago territory generally the wholesalers look for no briskness in sales until the harvesting business begins. Business, however, is generally in better condition than is usual at the opening of summer. There is yet little demurrage coal forcing down prices, though it must be said that the amount of coal on tracks is increasing, shipments having been large from the mines. Prices in consequence are fairly strong, though showing a tendency to weaken.

Illinois and Indiana domestic coals have little sale and steam coals are running to fine sizes with the better grade of screenings strengthening. Lump and egg sell for $1.80@2.65; run-of-mine for $1.60@2 and screenings for $1.35@1.65. Eastern coals are not selling actively, but demurrage is not so threatening as in the case of western coals, shipments being well restricted in general. Smokeless brings $3.15@3.35 for run-of-mine and $3.40@3.65 for lump and egg. Hocking is quiet at $3.15 . Anthracite is featureless as regards new business, and Pittsburg and Youghiogheny are in light demand.

Cleveland

June 25—The local coal market has taken a decided slump during the past week and, as a heavy supply is accumulating, dealers are sacrificing prices. Particular weakness in slack is due to heavy receipts during the week from the Pittsburg and southern Ohio fields. Pittsburg grade is bringing 50c. at the mine and $1.45@1.55 on track here. No. 8 is quoted at $1.50. No. 8, ¾ lump is quoted at $1.95 and run-of-mine 10 to 15c. less. Pittsburg grade is quoted $2@2.10, maintaining a steadier market than the other coals on account of heavy consumption.

An item of interest to the local trade has been the ruling by the Pennsylvania that no more steel hoppers will be brought into the city over the Baltimore & Ohio as it wishes to reserve the cars for the lake trade. Its effect will be to add further switching charges to deliveries.

Columbus, Ohio

June 22—The new car service rules, established by the State commission, which give 72 hours of free unloading time on cars of 66,000 lb. and over, will not go into effect until Aug. 1. After a recent discussion of the situation this delay was granted by the Ohio Railroad Commission. Under the original order of this body the rules were to have been in force on and after May 15. The railroads asked for further time, on the plea that they could not get their new tariffs filed with the Interstate Commerce Commission 30 days before the proposed change, as required by law. The commission then extended the time until June 15 under the impression that the rules would then be accepted without contest. Subsequently there was a concerted movement to fight them. This fell through, but the railroads failed to qualify before the Interstate Commerce Commission with the 30 days' notice, and the latter body, though solicited by the Ohio commission to waive this technicality, refused to do so. As the majority of the railroads of the State have agreed, individually, to accept the rules, the further extension was granted, in the expectation of a peaceable settlement. Among the roads who will comply with the rules without controversy are the Hocking Valley and the Pennsylvania; and it is doubtful whether any resistance will be made by the other lines.

Pittsburg

June 25—There is but little change in the coal markets this week. Prices are fairly strong, except for slack, there being a further decline for early delivery, some sales having been made as low as 35c. The bulk of the business in slack, however, was at prices ranging from 45 to 60c. On contract for delivery in the last half 85c. is quoted. Mine-run coal is quoted at $1.15@1.20 f.o.b. mine. Nearly all the mines are in full operation, and the railroad car supply is good. Most of the coal mined is being rushed to lake ports, and the shipments to the northwestern markets this season promise to exceed all former years. All the river mines are being operated to capacity, and will be kept going steadily for several months, as there is an unusual supply of empty coal boats and barges. The rivers were navigable all of last week, and all the coal loaded in the pools and harbor was sent to the lower ports.

Connellsville Coke—Buying of coke for both prompt and future delivery by the H. C. Frick Coke Company, has added considerable strength to the market. There is but little spot furnace coke available, and the price is firm at $2.35@2.50, which is a decided increase compared with the price of $2 and less that prevailed a couple of weeks ago. For second half furnace coke is quoted at $2.50@2.75. Foundry coke for prompt and second half is firm at $3@3.25. The *Courier,* in its summary for the week, gives the production in both regions at 421,157 tons. The shipments aggregated 14,606 cars, distributed as follows: To Pittsburg, 5118 cars; to points west of Connellsville, 8648 cars; to points east of Connellsville, 840 cars.

Foreign Coal Trade

The production of coal in the German Empire for the four months ended April 30, is reported as follows, in metric tons:

	1906.	1907.		Changes.
Coal	45,342,714	46,870,753	I.	1,528,039
Brown coal	18,285,781	19,842,617	I.	1,556,836
Total mined	63,628,495	66,713,370	I.	3,084,875
Coke made	6,428,148	7,015,189	I.	587,041
Briquets made	4,686,618	5,089,411	I.	402,793

A large proportion of the briquets is made from brown coal, or lignite.

Imports of coal into Germany for the four months ended April 30 were, in metric tons:

	1906.	1907.		Changes.
Coal	2,560,525	3,366,625	I.	806,100
Brown coal	2,763,901	2,833,082	I.	69,181
Total	5,324,426	6,199,707	I.	875,281

Imports of coke this year were 142,608 tons; of briquets, 54,614; of peat fuel, 3657 tons.

Exports of coal from Germany for the four months ended April 30 were, in metric tons:

	1906.	1907.		Changes.
Coal	6,720,123	6,582,930	D.	137,193
Brown coal	6,590	5,330	D.	1,260
Total	6,726,713	6,588,260	D.	138,453

Exports of coke for the four months were 1,175,903 tons; of briquets, 371,182; of peat fuel, 5563 tons.

The coal bunkered, or supplied to steamers engaged in foreign trade, at United States ports for the four months ended April 30 was 1,928,058 tons. Adding this to the exports, previously reported, makes a total of 5,157,990 tons of coal sold for

consumption beyond the limits of the United States.

Exports of fuel from Great Britain, with coal sent abroad for use of steamers in foreign trade, for the five months ended May 31, were as follows, in long tons:

	1906.	1907.	Changes.
Coal	22,282,645	24,354,681	I. 2,072,036
Coke	287,429	354,333	I. 66,904
Briquets	600,572	573,885	D. 26,687
Total exports	23,170,646	25,282,899	I. 2,112,253
Steamer coal	7,538,014	7,592,875	I. 54,861
Total	30,708,660	32,885,774	I. 2,167,114

The total increase this year was 7.1 per cent. Exports of coal to the United States, included above, were:

	1906.	1907.	Changes.
Atlantic ports	20,384	7,321	D. 13,063
Pacific ports	20,463	15,679	D. 4,784
Total	40,847	23,000	D. 17,847

The larger exports this year were 4,507,011 tons to France; 3,382,734 to Germany; 3,371,836 to Italy; 1,204,388 to Sweden.

Iron Trade Review

New York, June 26—The usual summer dullness has affected the Western and Eastern markets, but in the Alabama field there seems to be a continued activity and it is predicted that the June production will be at least 5 per cent. more than in May. However, buying has quieted down generally, and the foreign market has weakened on account of the cessation of new business from this country. Consumers who have contracted are incessant in their demands, and there seems to be no let up along manufacturing lines. In the South a number of new furnaces are nearly completed and several are about ready to blow in. The demand for pig iron in the East is confined to basic iron which is offered at 50c. less. Foreign iron is also off 50c., with no takers.

One of the interesting topics of the week in steel circles was the announcement that the Carnegie Steel Company had notified the Pennsylvania Railroad that in order to roll the rails, to be ordered by that road for next year, under what are known as the "Cassatt specifications," it would be necessary to ask $33 a ton, or $5 above the regular price, for standard bessemer steel rails. The Pennsylvania estimated its requirements for 1908 at 142,000 tons, but deferred placing the contract until the railmakers had figured on the cost. The quality of rails desired under the specifications furnished has not been made public as the secret has been carefully guarded. It is merely a rumor that the Pennsylvania will not pay the price asked.

Baltimore

June 25—Imports for the week included 50 tons of spiegeleisen, 1832 tons ferromanganese and 24 packages chrome pig iron. Receipts of iron ore were 4900 tons from Cuba. There was also recived 5200 tons of manganese ore from India.

Chicago

June 24—The iron market is dull and signs indicate indefinite continuance of this condition. Sales are for small quantities and quick-delivery. Pig-iron is about 50c. lower than a week ago. Contract iron holds to practically the same quotations, but there is little contract business being done. The market is a waiting one; both sellers and buyers, however, expect this in the normal course of summer business. Such buying as is occurring is for lots to piece out requirements, with here and there an order placed for fourth quarter of 1907 and first quarter of 1908 delivery.

On general sales Southern brings, for quick delivery, about $22@22.50, Birmingham ($26.35@26.85 Chicago) and Northern $26@26.50. For fourth-quarter delivery Southern brings $20@20.50, and Northern iron, $25.50@26. Lake Superior charcoal sells at $27.50 for quick delivery.

Cleveland

June 25—There is little news in the lake trade. Heavy receipts from upper lake ports continue to swell the iron-ore stocks on the docks.

Pig iron has ruled dull with a small volume of business handled. Quotations are hanging around $21.50 for deliveries during the first half of 1908, at furnace. Last-quarter delivery is quoted around $22.50@22.75. Prices show little change from last week. No. 1 Northern foundry is quoted at $24.50 for last-half delivery; No. 2 $24; No. 3 $23.50; bessemer $23.90; No. 2 Southern $24.35; gray forge $22.50.

Pittsburg

June 25—Despite the dullness in the iron and steel markets as to new buying, reports given out this week by large interests show that more business has been booked so far than in any previous year, and that the mills will have some difficulty in filling orders in some of the principal lines this year. This is notably the case in merchant pipe and boiler tubes, plates and steel and iron bars. A representative of one of the largest producing concerns in this district declared today that he would welcome an entire cessation of orders for a month, as it would give his company time to arrange for filling the orders already placed. He said that while there are no large contracts being made the aggregate of the small orders taken since the first of the month is enormous.

The closing of the big new steel plant of Milliken Brothers, on Staten Island, has affected the market in the Pittsburg district. It developed today that the concern had contracted heavily for both bessemer and basic pig iron from the Valley furnaces and also had been a large buyer of heavy melting scrap. This material is rapidly being resold, but as the contracts were at top prices the sellers will likely be the losers. Some secrecy is being observed regarding the resale of the material, but it is understood all will be out of the market before the end of the week. The failure of the new company will benefit some producers of structural material who have some open capacity, as the orders booked will necessarily have to be transferred. A great deal of this business is expected to go to Eastern mills.

The sheet and tin-plate mills have made some progress in catching up on deliveries, and are booking business for the fourth quarter at the same prices as have prevailed since the opening of the year. As outlined in the last report, the American Sheet and Tin Plate Company refused the demands for an advance in wages made by the Amalgamated Association of Iron, Steel and Tin Workers. After a three days' conference the Amalgamated withdrew its demands and the company signed the scales for another year dating from July 1. Another conference on the iron wage scale opened this morning in Detroit between representatives of the Western Bar Iron Association, and the Amalgamated. Unless demands for an advance are withdrawn it does not seem likely that a settlement will be reached. No trouble is expected by the manufacturers, who express confidence that the present agreement will be renewed for another year.

Pig Iron—Outside of a few small sales of all grades of pig iron and the resale of 5000 tons of bessemer iron bought by Milliken Brothers to the Jones & Laughlin Steel Company there have been no transactions of any consequence. The price paid for the resale iron is not made public. For prompt delivery, bessemer prices have declined to $23.50, Valley furnaces. This is regarded as the maximum price for delivery during the next few weeks. Buying for second half has stopped, and when it begins prices are likely to be a trifle lower. No. 2 foundry iron for June delivery remains around $24.50, Valley furnaces, but there have been no sales on which a quotation can be made. Gray forge is unchanged, and is quoted nominally at $22.90, Pittsburg.

Steel—The Cambria Steel Company continues to sell bessemer billets, the latest contract calling for 7000 tons. Bessemer billets are quoted at $30, and open-hearth at $31 to $32, Pittsburg. Sheet bars remain at $31, steel bars at 1.60c., and plates at 1.70c.

Sheets—The sheet market is fairly active, although there have been no particularly large sales lately. All the mills are well filled with orders. The American Sheet and Tin Plate Company is op-

erating all of its 172 sheet mills, and has booked enough business to keep them going steadily until the fourth quarter. Prices remain unchanged, black sheets being quoted at 2.60c. and galvanized at 3.75c. for No. 28 gage.

Ferro-Manganese—The market is quiet and prices are a trifle lower, $64 to $64.50 being quoted for spot and $63.50@64 for last-half delivery.

Metal Market

NEW YORK, June 26.

Gold and Silver Exports and Imports

At all United States Ports In May and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
May 1907..	$4,505,444	$ 2,641,879	Exp. $1,863,565
" 1906 .	5,722,148	34,911,028	Imp. 29,188,880
Year 1907..	12,410,407	20,216,984	Imp. 7,806,577
" 1906..	28,354,322	60,168,698	Imp. 31,814,376
Silver:			
May 1907..	4,326,216	3,496,458	Exp. 829,758
" 1906..	5,539,546	4,405,959	,, 1,133,587
Year 1907..	23,858,610	18,803,468	,, 5,055,142
,, 1906..	28,918,841	19,916,816	,, 9,002,025

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York

For week ending June 22 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 6,172,038	$ 61,163	$ 857,144	$ 58,171
1907.....	19,476,339	5,676,514	19,874,633	818 420
1906.....	5,734,521	44,691,293	29,815,137	1,028,203
1905.....	33,521,946	5,827,847	15,487,852	1,829,665

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

The joint statement of all the banks in the New York Clearing House for the week ending June 22, shows loans $1,134,352,100, a decrease of $5,403,100; deposits, $1,106,582, or decrease of $7,290,300, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	$188,883,800	$208,290,500
Legal tenders.	84,397,200	74,081,600
Total cash	$273,281,000	$282,372,100
Surplus.....	$10,912,925	$ 5,626,600

The surplus over legal requirements this year shows an increase of $1,111,975, as compared with the previous week.

Specie holdings of the leading banks of the world, June 22, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$208,290,500
England.....	$178,341,660	.....	178,341,660
France.....	550,796,920	$198,573,155	749,370,075
Germany	178,900,000	59,635,000	238,535,000
Spain.....	77,645,000	128,585,000	306,230,000
Netherlands....	26,710,000	28,416,500	55,126,500
Belgium.....	15,866,665	7,933,335	23,800,000
Italy.....	161,455,000	24,723,500	186,178,500
Russia	581,520,000	32,390,000	613,910,000
Aust.-Hungary.	228,290,000	63,255,000	291,545,000
Sweden.....	20,705,000	.....	20,705,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports. The European statements are from the cables to the *Commercial and Financial Chronicle* of New York.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell, as follows, for the year to June 13:

	1906.	1907.	Changes.
India.....	£ 8,496 113	£5,656 544	D. £ 2,839,569
China....	.....	.....	.....
Straits..	1,750	505,362	I. 503,612
Total	£ 8,497,863	£6,161,906	D. £ 2,335,957

Imports for the week were £99,000 from China, £2000 from the West Indies, £186,000 in bars and £10,000 in Mexican dollars from New York; a total of £297,000. Exports were £13,500 to the Straits, £243,300 in bars, and £68,000 in Mexican dollars to India; £324,800 in all.

Indian exchange has been strong, the Council bills offered in London being taken at an average of 16.09d. per rupee. The shipments of silver to India have not been heavy.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	$0.52¾	$0.54
Peruvian soles and Chilean.....	0.47	0.50
Victoria sovereigns.....	4.85	4.87
Twenty francs.	3.85	3.89
Spanish 25 pesetas...	4.78½	4.80

SILVER AND STERLING EXCHANGE.

June.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	June.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
20	4.8735	67⅛	30 5/8	24	4.8725	67⅜	31
21	4.8725	67⅛	30⅞	25	4.8720	67⅜	31
22	4.8735	67⅜	31	26	4.8700	67¼	30 15/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

June.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
20	23½ @24	22¼ @22½	97¾	43	5.75	6.35 @6.45	6.20 @6.30
21	23½ @24	22¼ @22½	95⅝	42½	5.75	6.35 @6.45	6.20 @6.30
22	23½ @24	22¼ @22½	.....	42¾	5.75	6.35 @6.45	6.20 @6.30
24	23½ @24	22 @22¼	94⅜	43	5.75	6.35 @6.45	6.20 @6.30
25	23½ @24	22 @22¼	95½	43¼	5.75	6.35 @6.45	6.20 @6.30
26	23½ @24	22 @22¼	97½	43½	5.75	6.35 @6.45	6.20 @6.30

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electroytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The market this week has been a repetition of last week—sales of electrolytic for export, and still no domestic business. The business done in Europe has been at the expense of prices. Every order is eagerly competed for, and buyers have not been slow to avail themselves of their advantage. Lake has been offered at further concessions, as also has casting. The deadlock in the home market remains unbroken, but the time is rapidly approaching when there ought to be a change. The close is lower at 23½@24c. for Lake copper, and 22@22¼c. for electrolytic in cakes, wirebars or ingots. The market for casting during the week has been 21 to 21¼c.

The standard market has again shown a very erratic tendency, illustrating the uncertainty of operators. Early in the week there was an abrupt break, but covering on the part of the bear element resulted in an advance of several pounds during the last few days, the close being cabled as £97 10s. for spot, and £92 12s. 6d. for three months'.

Refined and manufactured sorts we quote: English tough, £102; best selected, £106; strong sheets, £113.

Exports of copper from New York for the week were 2554 long tons. Our special correspondent reports exports for the week from Baltimore at 225 long tons copper.

Tin—It appears that all the incoming tin had been sold prior to its arrival, and the scarcity of spot is, if anything, more acute. Business has been done as high as 43½ cents.

The London market has shown a tendency to recover, and the close is cabled as £191 10s. for spot, and £182 10s. for three months'.

Lead—The price for desilverized remains unchanged at 5.75c., New York, and 5.67½c., St. Louis. Corroding brands are 0.1c. higher. Business is slow and it is difficult to make sales at the trust prices.

The corner in London appears to be broken, and after fluctuating widely, prices at the close show a heavy decline, the quotations being cabled at £19 17s. 6d. for Spanish lead and £20 for English.

The movement of foreign lead in the United States for the four months ended April 30 is reported as below, in short tons:

	1906	1907	Changes
In bond, Jan. 1....	8,148	5,691	D. 2,457
Imports, 4 mos....	29,595	25,579	D. 4,016
Total supplies...	37,743	31,270	D. 6,473
Re-exports, 4 mos..	16,956	8,171	D. 8,785
In bond, April 30..	9,734	4,139	D. 5,595
Total deduction..	26,690	12,310	D. 14,380
Balance	11,053	18,960	I. 7,907

The balance presumably entered into consumption in the United States.

St. Louis Lead Market—The John Wahl Commission Company reports as follows: Lead is dull and lower. Missouri brands are freely offered at 5.62½ and are unsalable above 5.60, and only in limited quantities at that.

Spelter—The market is rather quiet, and smelters appear to be more anxious for orders than they have been for some time past. As a result there has been a further decline, the close being quoted at 6.35@6.45c., New York and 6.20@6.30c. St. Louis.

The European market is heavy and a further decline has brought the quotation down at the close to £24 5s. for good ordinaries and £24 10s. for specials.

Zinc Sheets—The base price is now $8.60 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 60-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.50c. per 100 pounds.

Antimony—The market continues very weak, with buying of only hand-to-mouth character, and a downward tendency of prices. Quotations are 14½@15c. for Cookson's; 12½@13½c. for Hallett's; and 11@12c. for ordinary brands.

Nickel—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size and terms of order. For small quantities prices are 50@65c., same delivery.

Quicksilver—Current prices in New York are $41 per flask of 75 lb. for large quantities and $42 for smaller orders. San Francisco orders are $38@39 per flask, according to quantities, for domestic orders, and $37@37.50 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

Platinum—There is little to report in the local market further than the belief held by refiners that the downward course of the market has been checked and that prices are at the low point. No change in prices has occurred and quotations remain as follows: Ordinary metal, $26 per oz.; hard metal, $28.50. Scrap is quoted at $20@21 per ounce.

British Metal Imports and Exports

Copper—Imports and exports of copper in Great Britain for the five months ended May 31, were as follows, in long tons; the totals giving the copper contents of all material:

	1906.	1907.	Changes.
Copper ore	38,809	44,457	I. 5,648
Matte and precipitate	31,214	27,679	D. 3,535
Fine copper	30,917	28,372	D. 2,545
Total imp., fine copper.	50,405	46,668	D. 3,737
Exports	18,461	23,002	I. 4,541
Re-exports	8,065	9,890	I. 1,825
Total exports	26,526	32,892	I. 6,366
Balance, imports	23,879	13,776	D. 10,103

Of the imports this year the United States furnished 98 tons of matte and 9185 tons of fine copper; against 1995 and 9286 tons, respectively, last year.

Tin—Imports and exports of tin in Great Britain for the five months ended May 31, were as follows, in long tons:

	1906.	1907.	Changes.
Straits	14,502	13,854	D. 648
Australia	1,711	2,305	I. 594
Other countries	1,212	1,396	I. 184
Total imports	17,425	17,555	I. 130
Exports	3,268	3,892	I. 624
Re-exports	13,456	11,798	D. 1,658
Total exports	16,724	15,690	D. 1,034
Balance, imp	701	1,865	I. 1,164

Imports of tin ore and concentrate were 8839 tons in 1906, and 8340 tons in 1907; a decrease of 499 tons. Of the imports this year 6597 tons were from Bolivia.

Lead—Imports and exports of lead in Great Britain for the five months ended May 31 were, in long tons:

	1906.	1907.	Changes.
United States	8,723	6,467	D. 2,256
Spain	46,110	46,926	I. 816
Australia	21,055	21,361	I. 306
Germany	8,059	2,962	D. 5,097
Other countries	1,685	4,269	I. 2 584
Total imports	85,632	81,985	D. 3,647
Exports	18,487	22,411	I. 3,924
Balance, imports	67,145	59,574	D. 7,571

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spelter—Imports and exports of spelter in Great Britain for the five months ended May 31 were, in long tons:

	1906.	1907.	Changes.
Spelter	35,922	38,590	I. 2,668
Zinc sheets, etc	7,727	9,009	I. 1,282
Total imports	43,649	47,599	I. 3,950
Exports	3,101	2,125	D. 976
Balance, imports	40,548	45,474	I. 4,926

Imports of zinc ore are not reported separately.

Quicksilver—Imports of quicksilver into Great Britain for the five months ended May 31 were 1,559,882 lb. in 1906, and 2,768,636 lb. in 1907; an increase of 1,208,754 lb. Re-exports of imported metal were 922,448 lb. in 1906, and 1,049,251 lb. in 1907; an increase of 126,803 lb. this year.

Missouri Ore Market

Joplin, Mo. June 22—The highest price paid for zinc ore was $51 per ton, on an assay base of $46 to $48 per ton of 60 per cent zinc. The average price was $45.02.

The highest price for lead concentrate was $76 per ton, a decrease of $2, medium grades selling from $71 to $75, per ton, the average was $73.

It developed late tonight that a threatened advance of $1 per ton on all the better grades of zinc ore was averted by one purchasing company turning over to another a large part of its purchases, the occasion being a shortage in the output at the mines from which the company threatening the increase was drawing its supplies. The smelters realize that any movement toward an advance at this time might cause an upward start that would be hard to check, owing to the very susceptible condition of the market. There is little unsold stock in the bins, except a few large lots that are held for a base price of $50 per ton.

The purchasing agents for the lead smelters made little effort to secure ore, all offerings being on a much lower plane than the previous week, consequently there is considerable unsold lead in the bins. Buyers can see no ray of hope ahead for better prices, but some sellers expect a change for the better after the middle of July.

Following are the shipments of zinc and lead from the various camps of the district for the week ending June 22.

	Zinc, lb.	Lead, lb.	Value.
Webb City Carterville	3,336,100	626,840	$101,277
Joplin	2,151,810	206,630	59,185
Duenweg	1,378,790	88,230	35,621
Alba-Neck City	1,407,720	.....	34,489
Galena-Empire	1,162,630	132,500	32,156
Granby	670,000	92,000	13,996
Prosperity	467,270	73,440	13,660
Aurora	865,210	.....	11,196
Badger	364,710	.....	9,100
Oronogo	203,160	21,290	5,324
Spurgeon	168,560	58,670	5,146
Baxter Springs	127,320	.....	2,974
Carthage	112,670	.....	2,760
Sherwood	60,450	15,960	2,003
Sarcoxie	60,930	.....	1,401
Totals	12,537,330	1,315,560	$330,288
25 weeks	303,228,280	46,902,600	$8,986,886
Zinc value, the week, $282,266; 25 weeks,			$7,084,582
Lead value, the week, 48,022; 25 weeks,			1,902,304

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.53
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	45 98	May	78.40	79.56
June	43.83	.....	June	80.96	.....
July	43.25	.....	July	74.31	.....
August	43.56	.....	August	75.36	.....
September	42.58	.....	September	79.64	.....
October	41.55	.....	October	79.84	.....
November	44.13	.....	November	81.98	.....
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

Wisconsin Ore Market

Platteville, Wis., June 22—Zinc prices for the week suffered no material change and 60 per cent. ore was in good demand; the usual brisk market for the lower grades was maintained. The majority of the producers are still confident that 60 per cent. will not go below the $40 mark and many say it will not reach $42. The highly satisfactory returns at these figures assures a continuance of prosperity and increased output for the Platteville district at least. One of the most noticeable things in this zinc field is the steady even

growth of the output, apparently slow but it appears to be permanent. The Enterprise mine, one of the largest producers in the Platteville camp, has been shut down to rebuild the jigs and for a general overhauling, and the output of this therefore, will not show up as well as it would otherwise. The weather conditions were ideal for a large output and the roads were good but a shortage of teams and cars compelled the shippers to leave a great deal of ore in the bins; but it was all reported as sold, consequently it can be said that there is no surplus in the Platteville district.

Lead prices were off, considerable 75 per cent. ore selling at $35. Some producers said that they would not sell on a falling market. The recent opening of one or two good lead mines shows conclusively that the early mines did not get all of the richer deposits. All of the recent strikes have been made in new locations which promises well for the future of the Platteville district.

Shipments of the district, by camps, for week ending June 22, were as follows:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	438 400	.....	.....
Buncombe-Hazel Green	606,750	.....	.....
Benton	574,400	.....	.....
Linden	400,470	.....	.....
Highland	305,800	50,000	.....
Cuba City	221,360	.....	.....
Galena	142,800	.....	.....
Rewey	125,000	.....	.....
Livingston	105,000	.....	.....
Mineral Point	87,700	.....	.....
Harker	63,050	.....	.....
Total for week	3,070,730	50,000	.....
Year to June 22	46 877,005	1,876,440	189,160

Chemicals

New York, June 26—The general chemical trade shows no new developments, business continuing generally good and prices easily maintaining themselves.

Copper Sulphate—There was no change during the week and outside of the regular consuming lines little or no business was done. Prices remain stationary at $7.50 per 100 lb., car load lots, and $7.75 for smaller quantities depending upon terms of sale.

Nitrate of Soda—The market is practically the same as reported last week. The demand is strong and supplies are far from plentiful; hence the price is easily maintained at 2.55c. for 96 per cent., 1907 delivery with 95 per cent. at 2.47c. For next year's delivery for these grades, quotations remain at 2.55½c. and 2.50c. respectively.

Phosphate Rock—J. M. Lang & Co. report shipments of phosphate rock through the port of Savannah, Ga., for May 1907 as follows: To Germany, 10,171 tons; to the Netherlands, 4414; to England, 2140; total, 16,725 tons.

Sulphur—Emil Fog & Son's monthly market report from Messina, Italy, under date of June 1, states that the election of the definite board of directors, to whose management the affairs of the Consorzio will in future be intrusted, has taken place, but the names of those elected are not yet known. It is therefore impossible to say whether or not the party in favor of repudiating the agreement with Mr. Frasch has gained control. The necessity of changing the hitherto inactive methods has, however, become imperative; besides, the large stock begins to press on the market. According to the official bolletino of the school of mines at Caltanisetta, exports during January to April were diminished by 32,000 tons compared with the same period last year. The feeling that Sicily cannot completely surrender the American market gains ground. Of course a reduction of the output might needfully be enforced, but the authorities dread internal troubles and strikes of the mining population, which would certainly ensue. They will therefore resort to similar measures only after everything else may have failed.

As a palliative remedy, and in order to encourage the sulphuric-acid industry in Sicily, the Italian government authorizes the sale of sulphur to Sicilian acid manufacturers at reduced prices. This ordinance may probably call into life a number of acid factories, but whether it will be sufficient to dispose of the increasing stock without necessitaing the remodeling of the agreement with Mr. Frasch remains an open question.

Exports of sulphur from Italy during April were 44,130 tons, against 49,529 tons in the same month of 1906. The total exports from January to April, 1907, inclusive, were 151,062, compared with 182,266 tons during the same period of 1906. Visible stocks in Sicily at the end of April were 495,203 tons. This compares with 425,448 tons in 1906 and 309,481 tons in 1905.

British Chemical Trade—Exports of heavy chemicals from Great Britain for the five months ended May 31, were as follows, in cwt of 112 lb. each:

	1906.	1907.	Changes.
Bleaching powder	419,245	449,911	I. 30,656
Muriate of ammonia	46,348	75,101	I. 28 753
Soda ash	664,197	903.465	I. 239,268
Bicarbonate of soda	144,680	175,039	I. 30,359
Caustic soda	630 973	602 709	D. 28,264
Soda crystals	68,466	61,899	D. 6,567
Soda sulphate	359,529	359.931	I. 402
Sulphuric acid	41,395	33,014	D. 8,381

Exports of copper sulphate were 34,393 tons in 1906, and 35,499 in 1907; an increase of 1106 tons.

Imports of chemicals and raw materials into Great Britain for the five months ended May 31 were, in long tons:

	1906.	1907.	Changes.
Nitrate of potash	4,555	4,813	I. 258
Nitrate of soda	52,499	71,232	I. 18,733
Phosphates	205,559	229.772	I. 24.213
Sulphur	8 223	7,545	D. 678
Pyrites	332,345	342,052	I. 9,707

Estimating sulphur contents of pyrites, the total sulphur imports were 141,283 tons in 1906, and 144,366 tons in 1907; an increase of 3083 tons.

Mining Stocks

New York, June 26—Trading on both the exchange and on the curb shows a slight improvement over last week but business has been lethargic and lacking in interest. There have been heavy exports of gold to Europe and this would ordinarily cause a tightness in the money market and an increase in the rates of interest; but the financial houses have seemed to be indifferent to these exports and money continues easy, by no means reflecting the drain of gold from the market. Mining stocks show a little activity and prices generally are a little in advance of the close a week ago. Amalgamated Copper showed more strength and closed at $84¾. American Smelting common also showed strength and closed $3 higher than last week at $118½. United States Steel strengthened nearly $2 and closed at $34⅜.

At an auction sale, at New York, June 20, 87 shares of the New Jersey Zinc Company sold at $420.50 per share.

The tone of the curb trading was stronger at the close of the week and the Goldfield, the Cobalt and the copper stocks felt the influence of better buying orders and advanced slightly. The Goldfield stocks continued to do the bulk of the curb business and advanced fractionally.

Boston

June 25—Considerable improvement is to be noted in sentiment regarding the market in mining shares. The trend is upward, and the market has broadened materially. The high class of copper stocks have been prominent the past week, although not particularly active. Calumet & Hecla is up $30 to $800; Mohawk, $3 to $78.50; Osceola, $8 to $133; Quincy, $3 to $115; Tamarack, $6 to $107; Wolverine, $5 to $155, and Calumet & Arizona, $3 to $157. Copper Range has spurted $2.25 net to $78.50; North Butte, $2 to $79.25; Old Dominion, $1.75 to $44.75; Boston Consolidated, $2 to $25.25; Butte Coalition, $1.50 to $25; Centennial, $3 to $27; Franklin, $1.25 to $14.25; Utah, $2.75 to $51.87½; and U. S. Smelting, $1.50 to $49.50 ex-dividend.

Isle Royale, Balaklala and Trinity have had marked advances. The first-named is up $5 to $20, on bullish advices from the property. The other two responded to the homecoming of Thomas W. Lawson. Balaklala rose $1.87½ to $10.12½, and Trinity, $3 to $23.25. Amalgamated is up $2.12½ net for the week to $84.50. U. S. Smelting directors have declared the usual quarterly dividends of 87½c. on both classes of stocks. E. N. Foss has resigned from the board. Arizona Commercial made a short advance today, touching $26, against $21.87½ a week ago. Shannon is up to $17.12½. In the latter company the number of stockhold-

ers has doubled since Jan. 1, there now being 3100. Nevada-Utah has been firm and active on the curb.

Colorado Springs

June 21—The trading on the local stock market has been dull and listless. The entire week's sales have amounted to only about 75,000 shares. The most active traders this week have been Dante, Doctor Jack Pot, Work and Pharmacist.

Work has been resumed on the deep drainage tunnel in Cripple Creek by the Tunnel company; the contractors, becoming discouraged, threw up their contract on it. The Tunnel company expects to push the work rapidly to completion.

STOCK QUOTATIONS

NEW YORK June 25	
Name of Comp.	Clg.
Alaska Mine	1
Am.Nev.M.&P.Co.	....
Amalgamated	84¾
Anaconda*	57
Balaklala	....
British Col. Cop.	8⅜
Buffalo Cobalt	2⅛
Butte & London	1⅛
Butte Coalition*	24½
Butte Cop. & Zinc	....
Cobalt Contact	.56
Colonial Silver	2
Cum. Ely Mining	7⅞
Davis Daly	12⅝
Dominion Cop	5¾
El Rayo	5⅛
Foster Cobalt	66
Furnace Creek	½
Giroux Mine	8¾
Gold Hill	2⅛
Granby, New	....
Greene Gold	1⅝
Greene G. & S	1⅜
Greenw'r & D.Val.	75
Guanajuato	3¼
Guggen. Exp.	212½
Hanapah	50
McKinley Dar.	1⅛
Micmac	6¾
Mines Co. of Am.	1⅝
Mitchell Mining	2⅞
Mont.Sho. C.(New)	7½
Nev. Utah M. & S.	5¾
Newhouse M. & S.	....
Nipissing Mines	11½
Old Hundred	2⅝
Silver Queen	1⅛
Stewart	2⅛
Tennessee Copper	....
Union Copper	¾
Utah Apex	6¾
West Columbus	11

N. Y. INDUSTRIAL	
Am. Agri. Chem.	17¾
Am. Smelt. & Ref.	118½
Am. Sm. & Ref., pf.	106¼
Bethlehem Steel	10¾
Colo. Fuel & Iron	31
Federal M.& S., pf.	....
Inter. Salt	16
National Lead	60
National Lead, pf.	....
Pittsburg Coal	....
Republic I. & S.	25⅞
Republic I.& S., pf.	82
Sloss-Sheffield	56½
Standard Oil	502¼
Tenn. C. & I.	....
U. S. Red. & Ref.	....
U. S. Steel	34½
U. S. Steel, pf.	99
Va. Car. Chem.	....
Va. I. Coal & Coke	61

ST. LOUIS June 22		
N. of Com.	High.	Low.
Adams	.40	.30
Am. Nettie	.05	.03
Center Cr'k	2.50	2.30
Cent. C. & C.	67.50	66.50
C.C. & C. pd.	78.50	77.50
Cent. Oil	110.00	105.00
Columbia	7.00	5.00
Con. Coal	26.00	24.00
Doe Run	135.00	125.00
Gra. Bimet.	.23	.20
St. Joe	17.00	16.00

BOSTON June 25	
Name of Comp.	Clg.
Adventure	2¾
Allouez	45
Am. Zinc	35½
Arcadian	4¾
Atlantic	12
Bingham	14½
Boston Con.	25⅜
Calumet & Ariz.	157
Calumet & Hecla*	800
Centennial	27
Con. Mercur	....
Copper Range*	78¼
Daly-West*	15⅝
Franklin	14⅛
Greene—Can	....
Isle Royal	19¾
La Salle	13¾
Mass	5¾
Michigan	12¾
Mohawk*	78½
Mont. C. & C.(new)	3½
Nevada	....
North Butte	79¼
Old Colony	....
Old Dominion	44¾
Osceola	133
Parrot	19
Phoenix	1⅛
Quincy	115
Rhode Island	5
Santa Fe	2¾
Shannon*	17⅛
Tamarack	110
Trinity	22¾
United Cop., com.	62¾
U. S. Oil	10½
U. S. Smg. & Ref.	49½
U.S.Sm.& Re.,pd.	43
Utah Copper	51
Victoria	7
Washington	....
Winona	....
Wolverine	155
Wyandotte	....

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com	....
Black Mt.	....
East Butte	9¾
Hancock Con.	....
Keweenaw	8¾
Majestic	3
Raven	1⅛
Shawmut	.54
Superior	....
Superior & Pitts.	14¾
Troy Man	1¾

LONDON June 26	
Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton'sInd.	0 3 0
Camp Bird	1 10 9
Esperanza	1 19 0
Tomboy	1 15 0
El Oro	1 7 6
Oroville	0 16 0
Somera	.. .. ..
Utah Apex	1 5 0
Ariz.Cop.,pfd.	3 6 6
Ariz.Cop.,def.	3 3 0

Cabled through Hayden, Stone & Co., N. Y.

S. FRANCISCO June 19	
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.25
Best & Belcher	.70
Caledonia	.16
Challar	.07
Con. Cal. & Va.	.64
Crown Point	.22
Exchequer	.30
Gould & Curry	.15
Hale & Norcross	.50
Mexican	.41
Ophir	1.80
Overman	.12
Potosi	.09
Savage	.60
Sierra Nevada	.33
Union	.27
Utah	.05
Yellow Jacket	.75
TONOPAH STOCKS	
Golden Anchor	.20
McNamara	.29
Montana-Pitts.ex.	.10
North Star	.24
Rescue	.17
GOLDFI'D STOCKS	
Black Ants	.05
Blue Bull	.25
Columbia Mt.	.34
Comb. Frac.	2.55
Conquerer	.09
Daisy	1.15
Florence	3.60
Frances-Mohawk	1.00
Goldfield Con.	6.00
Grandma	.13
Great Bend	.51
Red Hills	.36
St. Ives	.94
BULLFROG STOCKS	
Amethyst	.24
Bonnie Claire	.54
Mayflower Con.	.32
Montgomery Mt.	.14
Original	.08
MANHAT'N STOCKS	
Gold Wedge	.05
Manhattan Mg.	.05
Pine Nut	.10
Ruby Wonder	...
Stray Dog	.16
Yellow Horse	.04

NEVADA June 26 (Weir Bros. & Co., New York)	
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	14.37½
Tonopah Exten.	1.70
Montana Tonop'h	3.00
Belmont	4.00
Tonopah Midway	1.25
West End Con.	.87½
Jim Butler	.98
GOLDFI'D STOCKS	
Sandstorm	.40
Kendall	.30
Red Top	2.75
Jumbo	2.75
Goldfield Mining	1.10
Dia'dfield B. B. C.	...
Atlanta	.48
Mohawk	13.00
Silver Pick	.54
Laguna	1.10
BULLFROG STOCKS	
Mont. Shoshone C.	6.00
Tramps Con	.60
Gold Bar	.60
Bullfrog Mining	.16
Bullfrog Nat. B.	.21
Homestake Con.	...
MANHAT'N STOCKS	
Manhattan Con.	.48
Manhat'n Dexter	.13
Jumping Jack	.10
Stray Dog	.16
Indian Camp	.05

COLO. SPRINGS June 22	
Name of Comp.	Clg.
Acacia	9¾
Black Bell	....
C. C. Con	....
Dante	4
Doctor Jack Pot	7½
Elkton	55
El Paso	42
Findlay	....
Gold Dollar	....
Gold Sovereign	4
Isabella	22
Index	....
Jennie Sample	5
Jerry Johnson	....
Mary McKinney	59
Pharmacist	5
Portland	...
Un. Gold Mines	8¼
Vindicator	79
Work	18¼

New Dividends

Company.	Payable.	Rate.	Amt.
Am. Smelting & Ref., com.	July 15	$2.00	$1,000,000
Am. Smelting & Ref., pfd.	July 1	1.75	875,000
Central C. & C., com.	July 15	1.50	76,875
Central C. & C., pfd.	July 15	1.25	23,438
Copper Range	July 1	2.00	767,562
Doe Run	June 15	0.50	29,531
Dominion Coal	July 2	1.00	150,000
Esperanza, Ltd	July 18	1.32	600,600
Gen. Chemical, pfd.	July 1	1.50	150,000
Horn Silver	June 29	0.05	20,000
Inter. Nickel, pfd.	Aug. 1	1.50	131,123
Kerr Lake (Cobalt)	July 1	0.15	90,000
Kendall	June 24	0 03	15,000
Maryland Coal, pfd.	June 29	4.00	75,400
Mines Co. of Am.	June 26	0.02	40,000
New Idria	July 1	0.20	20,000
Nipissing	July 20	0.15	180,000
North Star	June 27	0.20	50,000
Shannon	July 1	0.50	150,000
St. Joseph	June 20	0.15	150,000
St. Mary's Mineral Land	July 1	1.00	150,000
Tezuitlan	July 1	2.00	.....
Tonopah of Nev.	June	0.50	500,000
U. S. Smelting & Ref.	July 15	1.75	656,250

Assessments

Company.	Delinq.	Sale.	Amt.
Bullion, Nev	June 10	July 2	$0.05
Challenge Con., Nev.	June 19	July 10	0.10
E'na King, Cal.	June 8	July 1	0.03
Exchequer, Nev.	July 8	July 30	0.05
Forty-nine G. Pl., U.	June 26	July 15	0.01
Honerine, Utah	June 25	July 20	0.20
Julia Con., Nev.	June 24	July 16	0.03
Mexican, Nev.	July 15	Aug. 5	0.10
Nev. Superior, Utah	June 17	July 5	0.10
Savage, Nev.	June 12	July 1	0.10
St. Joe, Utah	June 13	July 3	0.02
Wasatch, Utah	June 17	July 2	1.25
Yellow Jacket, Nev.	July 3	Aug. 10	0.15

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.852
March	64.597	67.519	29.854	31.325
April	64.765	65.462	29.984	30.253
May	66.976	65.981	30.968	30.471
June	65.394	.....	30.185	.....
July	65.105	.....	30.113	.....
August	65.949	.....	30.529	.....
September	67.927	.....	31.483	.....
October	69.523	.....	32.148	.....
November	70.813	.....	32.671	.....
December	69.050	.....	32.003	.....
Year	66.791	.....	30.868	.....

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

AVERAGE PRICES OF COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.356
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	24.224	18.688	25.260	84.793	98.625
May	18.475	24.048	18.724	25.072	84.867	102.375
June	18.442	.....	18.719	.....	83.994	.....
July	18.190	.....	18.585	.....	81.167	.....
August	18.380	.....	18.706	.....	83.864	.....
September	19.033	.....	19.328	.....	87.831	.....
October	21.203	.....	21.722	.....	97.269	.....
November	21.833	.....	22.398	.....	100.270	.....
December	22.885	.....	23.350	.....	105.226	.....
Year	19.278	.....	19.616	.....	87.282	.....

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

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	.....
February	36.403	42.102	August	40.606	.....
March	36.662	41.313	September	40.516	.....
April	38.900	40.938	October	42.852	.....
May	43.313	43.149	November	42.906	.....
June	39.260	.....	December	42.750	.....
			Av. year	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	6.000	15.959	19.975
May	5.685	6.000	16.725	19.688
June	5.750	.....	16.813	.....
July	5.750	.....	16.525	.....
August	5.750	.....	17.109	.....
September	5.750	.....	18.266	.....
October	5.750	.....	19.350	.....
November	5.750	.....	19.281	.....
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

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

AVERAGE PRICE OF SPELTER

Month.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.078	6.685	5.931	6.535	25.781	25.900
May	5.997	6.441	5.846	6.291	27.000	25.563
June	6.096	.....	6.948	.....	27.728	.....
July	6.006	.....	5.856	.....	26.800	.....
August	6.027	.....	5.878	.....	26.938	.....
September	6.216	.....	6.056	.....	27.563	.....
October	6.222	.....	6.070	.....	28.075	.....
November	6.375	.....	6.225	.....	27.781	.....
December	6.593	.....	6.443	.....	27.938	.....
Year	6.198	.....	6.048	.....	27.020	.....

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

Positions Vacant

Advertisements under this heading, 50 cents for 50 words or less. Additional words, two cents a word. Cash or stamps must accompany order.

Positions vacant—A-1 assayer and chemist, who is also accurate and experienced title surveyor, to take charge of a commercial office to be established in Mexico; must employ own assistant; business already in the camp is worth $1000, Mexican, per month; responsible mining company will guarantee $300 and furnish plant; climate good. Only applications with complete particulars and A-1 references desired. Address "Republica," ENGINEERING AND MINING JOURNAL. 6,29

Wanted — A capable and energetic mine superintendent to take charge of a hematite ore mine in St. Lawrence County, New York; this is at present producing two hundred tons daily and is equipped to mine 600 tons daily. State experience, salary, and submit references. Address Hematite, care the ENGINEERING AND MINING JOURNAL. 6,29

Wanted—Metallurgist to buy interest and take active management of most complete ore-testing plant now in operation; $15,000 required; references to be exchanged. Ore Testing, care ENGINEERING AND MINING JOURNAL. 7,20

Wanted—An accountant to take charge of the office of a custom smelter on the west coast of Mexico; must be thoroughly conversant with all of the details of commercial and metallurgical accounting, the keeping of cost sheets, figuring of settlements and the checking of returns; a working knowledge of Spanish is desirable, though not essential; in reply state age, experience, giving the names and dates of companies with which employed, general condition of health, whether married or single, salary expected in case engaged, and when you could report for duty. Address Pacifico, ENGINEERING AND MINING JOURNAL. 7,6

Wanted — Experienced man who understands the manufacture of solder, babbitt, and all other white metal alloys, capable of making accurate tests, and handling labor economically. Reply, stating experience, age, salary expected; satisfactory references required. Reply to "Smelter," care ENGINEERING AND MINING JOURNAL. 7,6

Wanted—A tunnel foreman for rock work; must have a thorough knowledge of rock drills and air-compressing plant. Apply, stating terms and experience, "N. C. C.," care ENGINEERING AND MINING JOURNAL. 6,13

Wanted—Chemist with experience in smelter laboratories for Western copper smelter; state experience, salary expected and references. Address "Analyst," care ENGINEERING AND MINING JOURNAL. 7,6

Wanted—Master mechanic for lead smelter; one capable of handling steam and electrical (alternating current) machinery and familiar with smelter work preferred. "R. S. C.," ENGINEERING AND MINING JOURNAL. 6,20

Wanted — Coal mine superintendent in Southwest; state experience, salary, references; excellent opportunity for good man; properly equipped with new and modern machinery. Address No. 309, care ENGINEERING AND MINING JOURNAL. 6,29

Situations Wanted

Advertisements under this heading, 50 cents for 50 words or less. Additional words, two cents a word. Cash or stamps must accompany order.

An engineer of five years' field experience; two years as resident manager of mines in southern Mexico; now superintendent in charge of a producing mine and mill with compressors, pumps and hoists in northern Mexico; success in handling Mexican labor and mule and wagon transport; erection of machinery and operation of air drills; familiar with keeping costs and writing reports; Spanish spoken. "Mexican 30," ENGINEERING AND MINING JOURNAL. No. 22,047, TF.

An engineer, technical graduate, thirty years old, unmarried, desires position as superintendent or manager of mining property; has experience in South America, Mexico and United States with low-grade gold-silver mines, Spanish-American labor, stamp milling, amalgamation, concentration, cyaniding and slime treatment; speaks Spanish fluently. Address "Gerente," care ENGINEERING AND MINING JOURNAL. No. 22,198, Aug. 17.

Assayer and chemist—Position wanted with mine or reduction works; two years' experience in Butte, Mont., also Goldfield, Nevada; college graduate, 1899; will take charge of properties. Address "H. F. D.," care ENGINEERING AND MINING JOURNAL. No. 65, July 6.

A thorough, practical mining engineer of ten years' experience in the iron fields of Virginia, North Carolina, Tennessee, Alabama and Pennsylvania, also three years of experience in the Republic of Mexico, will be open for employment July 1. Would desire a position requiring the examining and reporting upon iron ore properties of any magnitude. Is capable of equipping any kind of a proposition warranting it with the requisite machinery and facilities for mining ores on a most modern and economical basis. The very highest references given. Correspondence solicited. Address "A B C," ENGINEERING AND MINING JOURNAL. No. 51, July 20.

A graduate of the Michigan College of Mines, with nine years' experience in mining work, desires a position as chief engineer or superintendent; best of references; good reasons for desiring a change. Address "D. S. E.," ENGINEERING AND MINING JOURNAL. No. 60, July 20.

American—31 years of age, married, reads, writes and speaks Spanish, now employed—desires change. Profession, metallurgical chemist; considerable experience in mine and cost accounting, time keeping, store and warehouse management; competent to take care of all of these departments of a company doing a small volume of business; salary to begin $175, gold, to be increased to $200 in 3 months if services prove satisfactory; references A-1. Address "Metachem," care ENGINEERING AND MINING JOURNAL. No. 49, July 27.

Chemical engineer, thorough experience, electrical, chemical, mechanical; design, erection and superintendence, desires change; at present superintendent chemical works; age 36; married; graduate in chemistry; 16 years' experience. "Chemical Engineer," care ENGINEERING AND MINING JOURNAL. No. 26, June 29.

Cobalt—Young Canadian engineer, graduate of McGill in mining, desires location in Cobalt or vicinity as superintendent or mine foreman of reliable mining company; several years' experience in Montana in the practical work of prospecting, mining, amalgamating and concentrating; sober, industrous and not afraid of hard work; age 27; single. Address "Montana," ENGINEERING AND MINING JOURNAL. No. 42, July 6.

Chemist with good practical experience in technical chemistry and metallurgy desires position; thoroughly qualified in research and analytical work; best of references. Address "Results," care ENGINEERING AND MINING JOURNAL. No. 52, June 29.

Desire position with some coal company in south or southwest States, as underground superintendent; age 36; have mining certificate from Pennsylvania; thoroughly experienced with the handling of air and electricity, also all kinds of foreign labor and colored; twelve years' experience in Pennsylvania, six in West Virginia. Address "Arch," care ENGINEERING AND MINING JOURNAL. No. 47, June 29.

Experienced governess desires position; besides the usual academic branches, applicant is able to teach German, French, Latin, music; no objection to living in a minng town or other isolated place; would assume position now or in fall. Address "College Graduate," ENGINEERING AND MINING JOURNAL. No. 61, June 29.

Mine supply clerk or assistant; energetic young man; 20, of good appearance and habits, quick and accurate at figures, experienced in works' cost system, wants position; speaks German; over three years' references from last employers. Address "O. C. M.," ENGINEERING AND MINING JOURNAL. No. 50, June 29.

Mining engineer—15 years' experience in mining and metallurgical work; 3 years' in Mexico; accustomed to handling men and getting economical results; experienced in construction work and installation of plants; capable engineer and manager—is open to engagement as superintendent or manager of mining or mining and milling operations. Address "W. E. G.," ENGINEERING AND MINING JOURNAL. No. 55, July 20.

Mine superintendent—with practical experience as superintendent, mine foreman, assayer and mine surveyor, good experience reopening old mines in Mexico, speaks and writes Spanish and understands handling Mexican labor—seeks position as superintendent. Address "Minero," Apartado Postal, 1071, Mexico, D. F. No. 62, Sept. 14.

Mining engineer, technical graduate, 35 years of age, now employed in Canada as superintendent of mines, desires to make a change; speaks Spanish fluently; 10 years' practical experience; can furnish best of references. Address "Canada," care ENGINEERING AND MINING JOURNAL. No. 56, June 29.

Mining engineer and metallurgist is open for engagement as mining superintendent or captain; am 50 years old, 30 years of practical experience at Coppe, Tube, iron pyrites; make specialty of copper mining and smelting, especially low-grade ores; am proficient in mine timbering, construction work, pumping, concentrating, etc.; have had the management of each of the above properties and can furnish the best of references. "C. B. J.," ENGINEERING AND MINING JOURNAL. No. 59, June 29.

Mining and metallurgical engineer; European graduate; 35 years old; German; speaks English fluently and some Spanish, would like to become attached as manager to some mining enterprise; thorough professional man with varied experience in mine and mill management and exploration work; at present superintendent of large mining company. Address "Ingeniero," ENGINEERING AND MINING JOURNAL. No. 39, July 6.

Mining engineer—18 years' experience in the States, Mexico and South America, now manager of group of silver and gold mines in Mexico—desires change of position; up in the latest practice in concentration, cyaniding and slime treatment, stamp milling and amalgamation; unexcelled references; speaks and writes English, German and Spanish and thoroughly understands handling of Mexican labor. Address "Success," ENGINEERING AND MINING JOURNAL. No, 43, July 27.

Open to an engagement as manager or examining engineer by mining engineer, graduate, with 20 years' varied and practical experience, working up through from assayer, surveyor, working miner and millman, mine and mill foreman to superintendent, manager and examining engineer; experience in the Western States, Canada, Mexico and South Africa; up in the latest and best practice in mining and milling; well up in the mechanical line, in the designing, erection and general equipment of mining and milling plants; successful in the general business management of affairs at the mine and in handling labor. Address "M. E.," ENGINEERING AND MINING JOURNAL. No. 54, July 20.

Purchasing agent desires engagement; experienced in handling purchases of machinery and supplies for mining, smelting and railroad interests, United States and Mexico; references first class. Address "Purchasing Agent," ENGINEERING AND MINING JOURNAL. No. 46, June 29.

Physician with 3 years' hospital experience wishes a position as doctor in a mining or lumber camp; in answering kindly state salary, location, etc. "S. W. S.," ENGINEERING AND MINING JOURNAL. No. 45, June 29

Practical mine foreman, 31 years old, single, with 12 years' experience, 7 years' in Mexico, experienced in handling Mexican-Indian labor, speaks good Spanish, thorough timberman, can give good references, wants position as foreman with reliable company; will go anywhere, but prefer Mexico, Central or South America. Address "Cornish," ENGINEERING AND MINING JOURNAL. No. 44, July 13.

Position wanted as chemist or assayer at a mine, mineral or metallurgical plant by a graduate mining engineer; 3 years' laboratory work in assaying, qualitative and quantitative analysis; 3 years' practice as miner, foreman, surveyor and assistant superintendent; understands mining and milling machinery; speaks French and German; age 30; single; goes anywhere; best reference for diligence and character; salary moderate. Address "B. W.," ENGINEERING AND MINING JOURNAL. No. 58, July 6.

Superintendent, manager, or examining engineer; 13 years' practical experience in Michigan, British Columbia, Colorado, Alaska and Utah; in iron, copper, gold and leadsilver mines; Michigan College of Mines graduate; have successfully reopened four abandoned mines and cut expenses materially on two; practical miner, millman, bookkeeper, assayer and examining engineer. Address "S. S.," ENGINEERING AND MINING JOURNAL. No. 21,979, TF.

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ASSISTANT ENGINEER, BOARD OF WATER SUPPLY.

The examination will be held on Wednesday, July 31, 1907, at 10 A. M.

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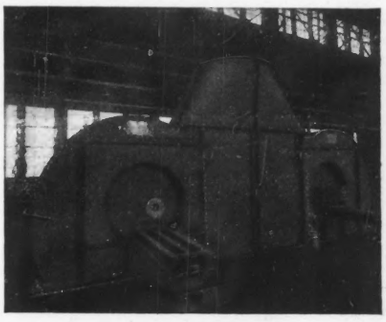

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Vol. 83. 505 Pearl Street, New York. No. 26.