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Early Development of Blast-Furnace Gas Engines.*

BY H. HUBERT.

The first attempts at direct utilization of blast-furnace gas in engines were made in 1895. For a considerable time such gas had been burnt in Cowper stoves for heating blast for the furnace, and under the boilers which supplied steam to the blowing engines, and others serving the furnaces. It was natural, therefore, that the idea of directly employing it in gas engines should have occurred simultaneously to several engineers, notably to Lürmann and to Lencauchez, who had pointed out the blast furnace as a powerful gas producer. Nevertheless, nowhere had any attempt been made to apply it to this purpose up to the end of 1894, when Thwaite proposed it to James Riley, of the Glasgow Iron and Steel Company.

About the same time investigations were being made in Belgium and in Germany, independently of Thwaite's experiments, which were not generally known on the Continent. The industrial world, which up to that time had hardly favored the idea, had thus been gradually prepared to receive it. The gas engine, long restricted to small sizes and dependent upon the use of an expensive fuel obtainable only in large centers, now began to make headway.

At the Paris Exhibition of 1889 two engines of 100 h.p. were shown and these excited much interest among engineers.

*Introductory paragraphs of Professor Hubert's paper before the Iron and Steel Institute, July, 1906.

One had four cylinders, and was made at the celebrated works of the Deutz company, and the other was a single-cylinder engine, exhibited by two French designers, Delamare-Deboutteville and Malandin.

In the meanwhile the design of gas producers had made important progress, completely freeing the new engine from its dependence on gas works, enabling it to be installed anywhere, and to realize to the full extent its economic value by supplying it with a cheaper fuel.

In 1892 Delamare installed at the Moulins Leblanc works at Pantin a four-cycle, single-acting, single-cylinder engine, using producer gas, and developing 220 b.h.p., with a consumption of about 1 lb. of coal per b.h.p. per hour. Despite the difficulties met with in this bold attempt, it showed the possibility of economically producing high power with poor gas.

The time had now arrived for engineers to pay attention to the use of gas from blast furnaces, which, although not of great heating value, was less costly; and was the more suitable on account of the progress which had been made in the design and working of blast furnaces, the proportionally lower consumption of coke, and, as a result, the marked reduction in the relative quantity of combustible gases, which only sufficed, with difficulty, to heat the blast and to produce the steam required about the furnaces. Finally, the progress of the science of heat had brought to light the causes of the low thermal efficiency of the steam engine, and notably of the loss resulting from the employment of boilers.

It is not therefore surprising, that the idea of dispensing with the boiler and burning the blast-furnace gases directly in the engine occurred, nearly simultaneously, in three countries, England, Belgium and Germany, where metallurgical industry had made great progress.

To Bailly and Kraft, of the Cockerill company, belongs the honor of being the first in the field in Belgium. The patent taken out by the Cockerill company for this new application was dated May 15, 1895, and the first trials were made at the end of that year. They were made with a simplex engine of 8 h.p., in which it had only been sought to reduce the clearance space, in order to increase the compression and to facilitate the ignition of the mixture. The gas cleaning was very imperfect, and was carried out simply by passing it through two scrubbers, 4 m. high. This engine displayed perfect elasticity, and adapted itself to the variations of composition, pressure, and temperature of the gases, giving an efficiency of 77 per cent.

The authors, in an article published in the *Annales des Mines de Belgique* early in 1897, described the results of the first trials, and the conditions necessary for the direct use of blast-furnace gases, showing that a plant producing 100 tons of pig per day was able to furnish about 18,000 cu.m. of gas per hour with a calorific value of 1000 calories. Taking into consideration that half this volume is available, and allowing for an efficiency of only 20 per cent. in the engines, the authors showed that it would be possible to obtain from these gases about 3000 horse-power.

The small trial engine consumed about 5 cu.m. per b.h.p., which reduces the preceding figures to 1800 h.p.; but they foresaw at the time that this consumption would be ere long greatly reduced, and that blowing engines driven by gas would be built. They also foresaw that, by disposing of the great surplus motive power, the blast furnace would ultimately become a center for the production of energy for works surrounding, the boilers of which it would gradually supersede.

Canadian Blast-Furnaces.

According to reports made to the American Iron and Steel Association, the Dominion Iron and Steel Company, Ltd., of Sydney, N. S., had three of its four furnaces running on June 30. Its idle furnace is being relined. The company is preparing to erect bessemer converters for the purification of metal for its open-hearth furnaces.

The Algoma Steel Company, Ltd., of Sault Ste. Marie, Ont., has discontinued the manufacture of charcoal pig iron and its two completed furnaces are now using coke alone.

At the experimental electric furnace at Sault Ste. Marie, Ont., 55 tons of pig iron and 125 tons of ferro-nickel pig iron were made during the first half of 1906.

The Hamilton Steel and Iron Company, Ltd., of Hamilton, Ont., had its coke furnace in operation for 180 days in the first half of 1906. The company expects to commence work at once on a new coke furnace, to have a daily capacity of about 300 tons. The new furnace will probably be finished next spring.

The Atikokan Iron Company, Ltd., of Port Arthur, Ont., now expects to have its new coke furnace ready for operation by October.

Tin ore is found in the Hazaribagh of Chota Nagpur and other localities of India proper, but it has been worked to any extent only in southern Burma.

Arizona and Sonora—X.

BY DWIGHT E. WOODBRIDGE.*

THE COPPER QUEEN SMELTER.

Five years ago the Copper Queen Consolidated Mining Company reached the conclusion that its future demanded a larger and more modern reduction works than it then operated at Bisbee, Arizona,

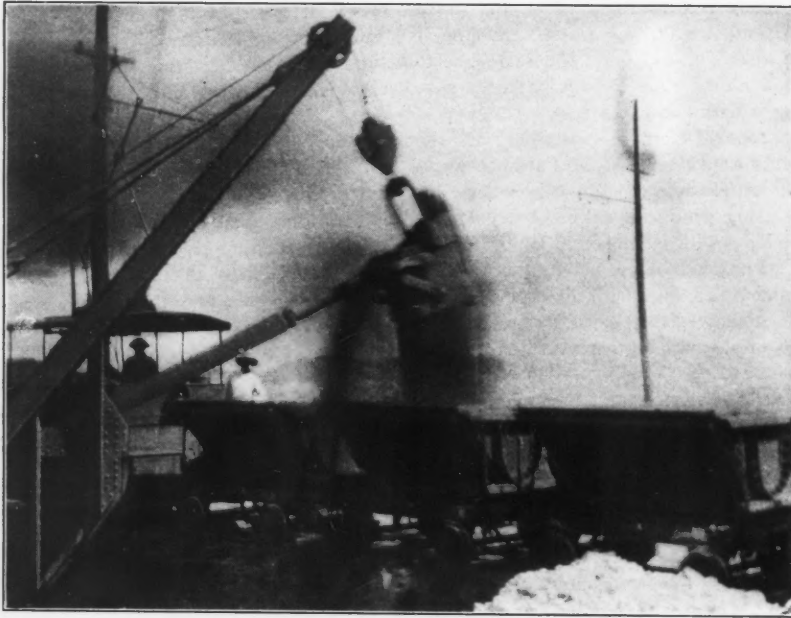
bring a large volume of various ores from Mexico, as facilities for transportation and treatment are increased as the region is developed.

These works occupy a space about 2000x5000 ft., and lie on a grade of about 1.25 per cent. The problems connected with handling ores from the Copper Queen mines were somewhat novel, and called for special arrangements for successful treatment. The ores are of wide range of

they are wet it is next to impossible to handle them in the ordinary bins with chutes. It was therefore necessary to develop, first, some method of bedding or mixing the ores, and secondly, some efficient plan for handling them to the furnace after mixing.

Instead of trying to take up a furnace mixture of separate classes of ore, as they came from the mines, the ores received at this works are all bedded together in pits. The system of bedding employed properly begins at the mine shafts. There all ore is loaded into steel side-dump railway cars from tram cars from the shafts. Six 50-ton cars are loaded at a time, so that they will all be uniform, and with them a 30-ton sample car, into which every tenth tram car is unloaded. At the smelter this car is switched to the sampling works, where it is sampled, the bulk of the ore going back to the pits.

There are four of these pits, the available space in each one being 800 ft. in length, by 40 ft. width and 11 ft. depth. The four have a storage capacity for 70,000 tons. The length of each pit is that of twenty-four 50-ton cars, and for convenience the pits are divided into car lengths, six of which constitute a unit. The pit unit is thus synonymous with the unit of loading at mines, as above. In dumping the ore into its pit use is made of a diagram book showing record of cars of each class and character of ore at each car length section of pit. While the pit is being filled with the various classes of ores, a mechanical spreader is run through it, leveling the ore across the width of the pit and making it ready for the next train from the mines. This spreader is



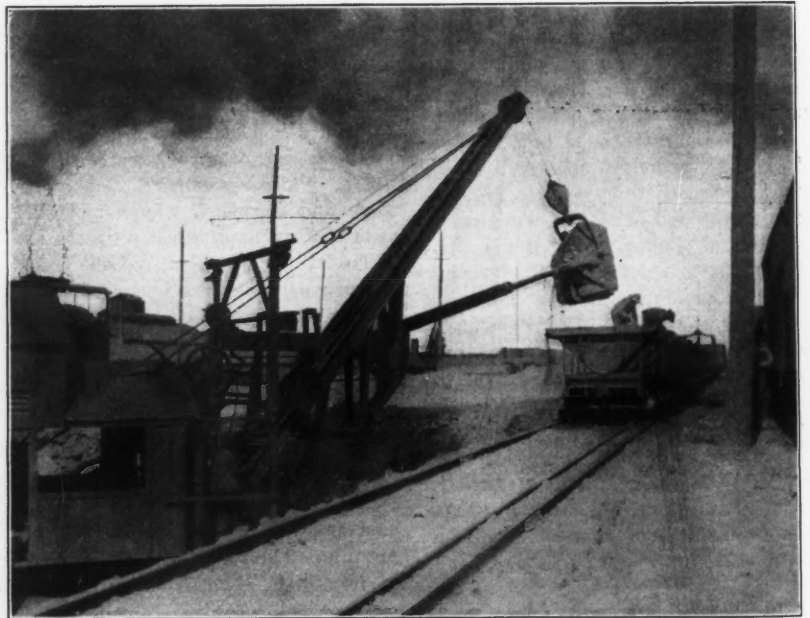
STEAM SHOVEL LOADING INTO CHARGING BUGGIES.

and after careful consideration of various locations and water conditions, decided upon the broad and level Sulphur Springs valley, 31 miles from its mines, as the most available site. This location is on the main line of the El Paso & Southwestern Railway, at the junction of this road with the railway to Nacozari, Sonora, at which point the owners of the Copper Queen also operate large copper mines. The valley is surrounded by ranges of mountains whose slopes afford an ample watershed.

The layout of the works is based, primarily, on a "Y" track system, two wings of which pass on either side of the smelter and power buildings, a third track connecting them through the main smelter house and the shops. A second transverse track passes across the outer end of the smelter house, and connects with the slag yard trackage. As all railway tracks throughout the plant are standard gage, there is thus permitted interchangeability of railway equipment everywhere in the works.

The plant was built to treat the ores from the company's mines at Bisbee, the ores from Nacozari, the silicious ores from the company's mines at Globe, and whatever custom ores might be secured, except those containing lead. Its location, where a railway enters Sonora, will undoubtedly

composition. They vary from 5 to 50 per cent. in silica, from 2 to 35 per cent. in alumina, from 0 to 45 per cent. in sulphur,



STEAM SHOVEL LOADING FROM MIXING BEDS INTO CHARGING BUGGIES.

from 0 to 40 per cent. in iron, and from very low to very high grade in copper. They contain practically no lime. Many of them are of clay character, and when

a plow, set diagonally to the length of the pit, and capable of being lowered horizontally 5 ft. into the pit, and of being set at any point above that elevation. It is

*Mining engineer, Duluth, Minn.

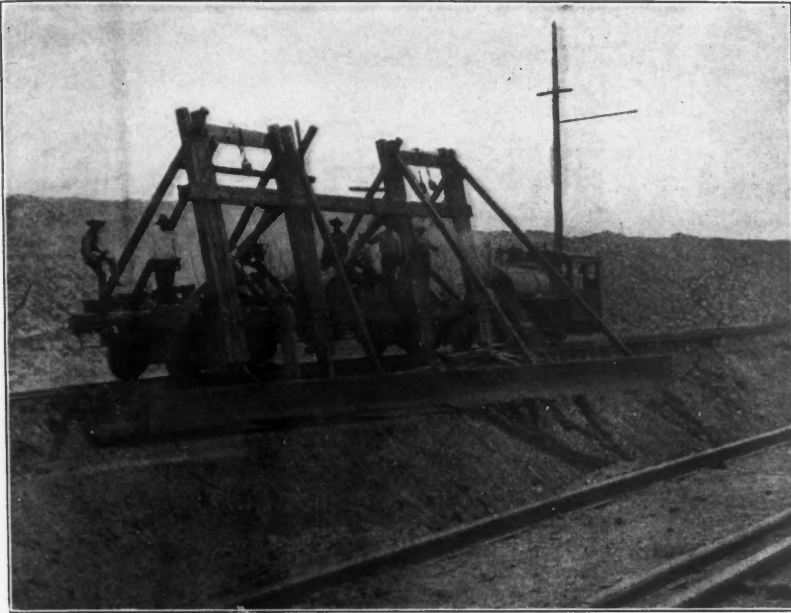
now handled by electric locomotive, running on the tracks alongside the pits, but a heavy plow equipped with motors on axles is to be installed. The spreader has been in use only a short time, but has been found to work satisfactorily, displacing a large number of Mexican laborers. It is possible by use of the spreader to obtain larger storage than formerly, and to mix

The charge cars weigh 3500 lb., and were intended to carry loads of 5000 lb., but this was found to be too heavy a layer of charge for the furnaces, so the weight of each charge has been decreased to 2500 lb. Trains of 20 cars are used, handled by 13-ton electric trolley-locomotives. These trains run from the ore beds to beneath the overhead coke bins, where the

up a 2 per cent. incline to the charge floor.

On this floor the trains are taken by another motor and run to the furnaces, which are charged alternately, first on one side and then on the other, three charges at a time for the 18-ft. furnaces and four for the 20-ft. furnaces. There are at present five of the 18-ft. furnaces and three of the larger size, but two more of the latter are being added. The charging buggies are set on their frames so that when tilting they move forward into the door of the furnace.

The new furnaces permit a drop of charge of 6 ft., and it has been found that with this drop the charge is uniformly distributed over the furnaces. They are built with two tiers of jackets, with $\frac{3}{4}$ -in. bosh to the foot on the sides. From the tuyeres to charge floor is 16 ft., and the height of the charge column varies from 10 to 11 ft. There are 40 tuyeres, 4 in. in diameter for each of the large furnaces, one tuyere pipe serving two tuyeres. The tuyere-pipe valves are of the corliss type, which has been found less bulky than gate valves. The 10 blast furnaces are arranged in one line, 15 ft. apart, with one settler between each pair of furnaces. These settlers are each 10 ft. wide and 23 ft. long, with the lower half laid with chrome brick, the upper with ordinary fire-brick. The settlers overflow through two spouts into slag cars of unusual size, which are one of the features of the works. These cars are of 18 tons capacity each, being a modification of those used



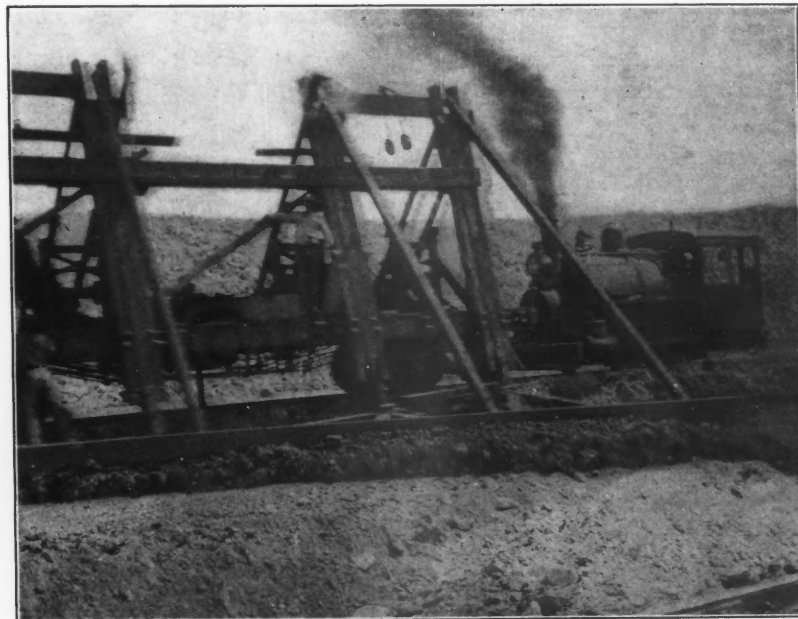
LEE'S PLOW REPLACING 75 MEXICAN LABORERS IN FILLING ORE BEDS.

the ore more uniformly. Ever since these mixing beds were put in there has been much discussion about them, as for a long time they did not work satisfactorily, the slags varying widely and the grade of matte produced fluctuating materially. But now there is little trouble, and it seems that the company is working the system at reasonable cost and quite successfully. The fact that the slags vary but little from day to day and conform closely to the calculations proves the excellence of this method from that standpoint.

It is the practice to have an analysis made of a composite pulp of the ore mixture, and to add the required amount of flux directly to the ore in the beds. In order to give still better control of the smelting process, steps are now being taken to add a weighed amount of lime-rock to each charge car, as it passes the rock bins on the way toward the charging floor, just as coke is now charged.

The charge is loaded into cars by means of steam shovels of the Thew make. These shovels run on permanent tracks on the floor of the pits, 11 ft. below the rails on which run the charge cars. The dipper is of $\frac{3}{4}$ yd. capacity, and the engineer is expected to fill it to overflowing, thus giving charges of nearly equal weight. It has been found in practice that the steam shovel weights of charge going to furnaces do not vary more than 2 per cent. from the actual weight, as shown by car weights from the mines.

weighed amount of coke is added, there being a hopper scale over each car. These are filled between trains and dumped in



ANOTHER VIEW OF THE PLOW.

less than a minute after train arrives. As above stated, arrangements will be made to have flux added in the same way, and at the same place. After the charges have received their coke the train passes

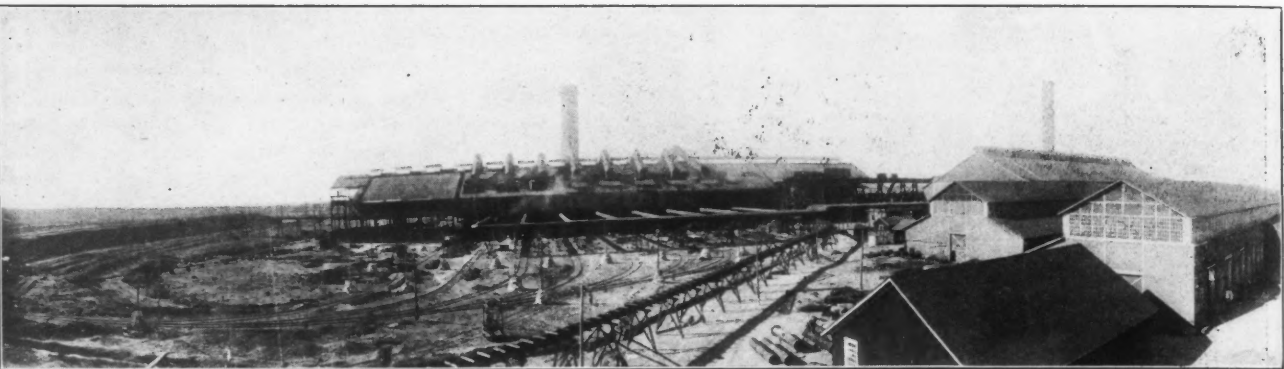
for iron furnace cinder, and are dumped by motor. There are two cars to each settler, one always in position while the other is dumping. Tracks to the settlers are at right angles to the furnace building

and forked at the settler, so there is no interference of cars with each other, each reaching the settler via its own switch-track.

Downtakes are carried over the roof of the furnace house to a dust chamber on the far side. This chamber is built on the principle that a very large area reduces the velocity of the gases, and thus permits the dust to settle. The chamber is a steel frame with brick walls, roofed with reinforced concrete supported by steel trusses. The floor, a series of "V's," is made of the fireproof tiling commonly used in the construction of modern build-

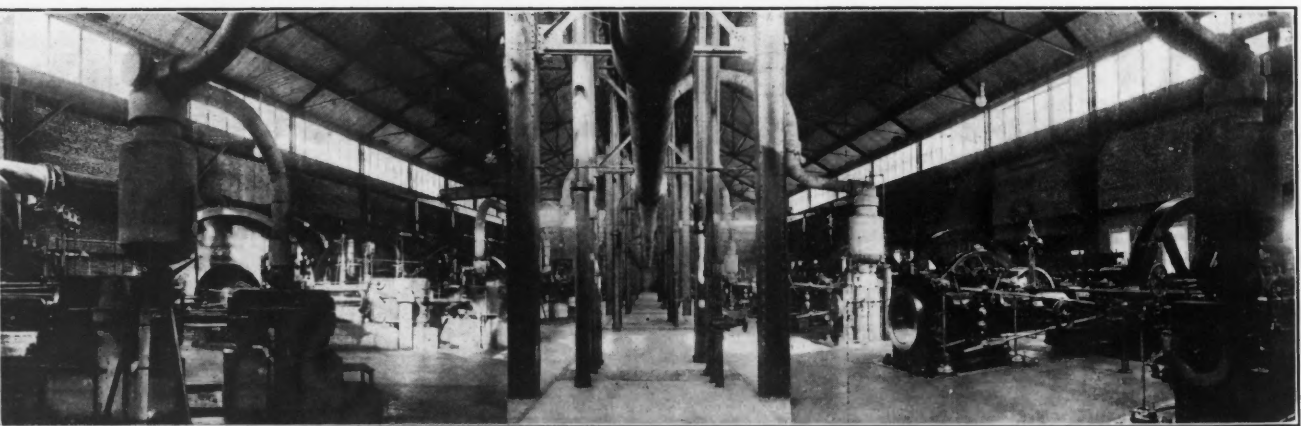
ings. The stack is steel, 25 ft. in diameter and 200 ft. high, self supporting, and is now being extended 60 ft. This extension is under contract to the Wisconsin Bridge and Iron Company, which guar-

anteed to do the work without shutting down the plant for more than one shift. The extension will be erected on a false-work beside the stack and supported in such a way that when completed it will be rolled into position on top of the stack. The region is, by the way, notorious for its high wind velocities.



FURNACE BUILDING AND POWER HOUSE, SHOWING SLAG TRACKS AND DUMP, AND SEPARATE FURNACE BLOWER PIPES.

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LOOKING EAST FROM NEAR THE CENTER OF THE POWER HOUSE, STAGGERED BLOWING ENGINES ON THE LEFT.

The furnace building, which also holds the converters and relining plant, is 648 x 160 ft., with a crane aisle 60 ft. wide. This is equipped with three 60-ton five-motor cranes. These have a travel the full length of the building. Seven stands for converting are in operation, with an

tended to be fired with coal, and provision has been made for coal pockets and stokers. At present they are oil-fired, but it is possible that by development of by-product coke ovens at Douglas, gas may ultimately be used. Each boiler is equipped with an economizer and the boiler plant has a superheater. It is an interesting thing to watch a boiler plant of 4000 h.p. running with one or two men on the boiler floor, and those two doing almost nothing. The stack is of Custodis build, 15 ft. in diameter and 175 ft. high. The steam main is of ring construction, which has the advantage that,

in case of repairs to any part, that section can be cut out by section valves, stopping only the part of the plant affected.

The power house is a steel frame and brick building, 350x110 ft. Several novel features entered into the construction and arrangement. All the engines are compound-condensing, with condensers of the Bulkley type, placed in the middle aisle between two rows of engines, condensing water being supplied, and hot water delivered, to the cooling tower, by rotary and centrifugal pumps. Each blast furnace has its own blower and blast main. This feature has the advantage of

regulating each furnace independently, but it is more costly, and requires more engines and blowers. For the 18-ft. furnaces No. 9, and for the 20-ft. furnaces No. 10 blowers are used. These engines

are set staggered, or herringbone fashion, a novel arrangement, which saves room and puts the blower of one set back of the flywheel of the next. Although there is a separate blast pipe to each furnace, provision is made, by means of a header, to throw everything together and run under usual conditions.

(To be continued.)

The production of gold in Victoria during the first six months of 1906 was 412,242 oz., valued at £1,648,968, this being an increase of 47,523 oz., valued at £190,092 over corresponding period of last year.

Notes on Stamp Mill Practice.*

BY COURTENAY DE KALB,†

This paper may be considered correlative to one on the same subject published in the Journal of the Canadian Mining Institute, six years ago, representing more varied experience, confirmatory of some of the opinions then expressed, and destructive of others.

SCREENS.

The unwisdom of depending too much upon the diameter of screen opening to determine size of pulp must be again insisted upon. Height of discharge and quantity of feed water are the best regulators. The diameter of screen opening is never constant, owing to wear, and the difference of every one-thousandth of an inch is vital. The skilful batteryman will, with a well-mixed (bedded) ore maintain a uniform product throughout the mill, though conditions of weight of stamps and diameter of screen openings may vary widely in the different batteries. Every mill should be provided with at least three testing screens, one having openings equal to the diameter of the maximum size of grain admissible for the ore under treatment, one having an opening equal to the middle-sized product desired, and the third of the finest accurate screen made, which is No. 150 mesh, or about .0762 millimeter diameter of opening. The product from every battery should be tested at frequent intervals by wet screening. When the pulp on the coarsest screen exceeds a half of one per cent. of the total weight of the sample the battery screen in that battery should be changed, or extraction will suffer. The ratio between the middle-coarse and the middle-fine should be nearly constant and uniform throughout the entire mill, and above all a constant ratio by weight between the total oversize and undersize material from the finest screen must be carefully maintained. These ratios should be made the subject of regular reports on the amalgamator's report-sheet to the manager, the same as the daily assays. They are equally as important, for, while the latter indicate values, these ratios have a definite and vital relation to the percentage of extraction which may be anticipated. It is a good plan to throw the responsibility for the screening upon the amalgamator, and for drying, weighing and reporting, upon the assayer.

The perfect screen does not yet exist. Die-cut Russia iron still stands unexcelled for most ores. As a screen should, in the author's opinion, be used as far as practicable chiefly to prevent the escape of grains larger than the pre-deter-

mined maximum which can be economically treated, the larger the ratio of open-space to blank metal in the screen the better, and the openings should be so disposed as to facilitate discharge to the utmost. For limiting discharge, regulate height of drop, height of discharge, and quantity of water. The "herringbone" pattern of diagonal-slot, die-cut Russia iron screen has been found, in my experience, to combine in the highest degree this advantage, coupled with good wearing power. The Tyler rolled wire screen gives a better discharging surface, but the crown of the mesh is the thinnest and weakest portion in this screen, instead of being the heaviest, and its life is correspondingly shortened. If this screen can be made with the crowns electrically welded, it will be a great boon to the millman. The tendency of the woven-wire screen to clog does not apply to any serious extent to the rolled wire screen.

FOUNDATIONS.

My personal experience with concrete mortar foundations has led me to regard them with disfavor. The surface must be very smooth. It is unsafe to compensate for unevenness in the set of the concrete against a "form," by grouting, as this gives a bearing surface of uneven density. The tendency of concrete mortar-blocks to wear rapidly and unevenly seems irremediable, and will so remain until some one can devise a locknut for foundation bolts insuring absolute rigidity. A rubber cushion directly between the mortar and the concrete is a mistake, and in fact merely invites rapid wear, since the inevitable prominences on the concrete surface compress the rubber at those points inducing excessive wear, so that destruction of the cushion soon ensues. Anvil blocks between the mortar and the concrete block increase the difficulty of rigidly anchoring the mortar, and exaggerate enormously the evil tendency of the concrete block to induce breakage of stems. Having had opportunity to compare the behavior of batteries mounted on concrete and on built-up wooden blocks in the same mill, crushing identical ore, and this in two different mills in separate districts, I have in each instance found the ratio of broken stems to be as 1 to 3 in favor of built-up wooden blocks. I have been led to adopt as best a rock or concrete bottom, accurately dressed smooth and level to a straight edge in every direction, as a support for a built-up block of 2x10-in. creosoted white or sugar pine, spiked together, not less than 12 ft., nor more than 14 ft. in height, dressed smooth on top and carrying a ¼-in. best-grade pure Para gum sheet as a cushion against the mortar. Such blocks are good for 8 to 10 years, even where drainage of block-pits is not good. To reduce the wear of concrete

blocks I have employed with marked success a facing of ¼-in. wrought-iron sheet, at least 4 in. wider than the width of the mortar base, and 2 in. longer. This effectually stops the wear of the sharp edge of the mortar on the concrete if any nuts loosen, and it furnishes a suitable surface for the rubber cushion. This comes very near eliminating the disadvantages of the concrete block, but nuts on foundation bolts will loosen quicker than with wooden blocks, and more stems will break on concrete.

STAMP DUTY.

Stamp duty is relative, depending not only on the character of the ore, but on the rate of discharge which has been found to give the most economical results. The metallurgist who has not advanced to the point of tolerating the low crushing efficiency per h.p. of the stamp mill for the sake of the extraction by amalgamation which he can make it yield, is in error at the very foundation of the trade. If you are not getting your large recovery of gold values inside your batteries, there is something wrong with your methods, or else you ought not to be using a stamp mill, and your whole process needs study and revision. It should be borne in mind that it is not necessarily the mill man who can put through the largest tonnage who is earning the most money. As an example, in a recent experience in California I found that I could obtain a recovery of 91.5 per cent. when crushing 0.121 ton per stamp per hour; and that using the same screen (0.028 in. diam. of opening), but readjusting the mill as to drop, discharge, etc., the duty could be run up to 0.188 ton per stamp-hour, with a reduction of the recovery to 77 per cent.

MORTAR LINERS.

A long and trying experience with mortar-liners has led to my abandonment of this attractive adjunct to a mill. Theoretically it should be possible by the use of liners to have at command an adjustment of the width and depth of the mortar, thus giving that flexibility which would enable it to meet changing characters of ore. Practically I have found that such great inequalities of wear of the mortar are induced by liners that ere long it is impossible to hold them in place, and so far as the bottom-liner is concerned it becomes a sort of teeter-board, and throws the whole line of dies to one or the other end of the mortar, inducing cupping, and destruction of the ends of the mortar shell itself. A good hard gray-iron mortar, with a base 9 in. thick, and ends at least 2¼ in. thick to a height of 10 in. above the mortar-lip, is the best that can be had. In order to quote low prices, manufacturers design mortars with scanty metal on base and sides. Insist on plenty of metal; it costs little, while demurrage of your mill later

* A paper read before the Canadian Mining Institute, March, 1906.

† Mining engineer, Los Angeles, California.

on may destroy your profit and ruin your chances of success. In general the narrow mortar of moderate depth (say 14 in. wide and 6 in. deep at the lip) is the most satisfactory, in that it will fit more cases. The chuck blocks will then do the rest.

SHOES AND DIES.

While admitting that no rule may be established for all ores as to the best type of shoe and die, I may set forth as the result of my own practice that I find in the great majority of cases the longest life, highest duty, and most uniform and economical wear are obtained by shoes and dies made as follows: Dies, with one inch thick base, forged steel, made from open-hearth ingots of "80 carbon" (*i.e.*, 0.8 per cent. carbon) forged at dark yellow, bases subsequently annealed; shoes, open-hearth 60-carbon steel, forged at bright cherry, necks annealed. Shoes and dies made according to these specifications year in and year out have worn respectively until the die was $\frac{3}{4}$ to 1 in. thick, and the remnant of the shoe was a plaster of steel $\frac{1}{8}$ to $\frac{1}{16}$ in. thick on the end of the boss-head; cupping being so rare as to arouse the gravest suspicions of inattention to duty on the part of the amalgamators. The die should be more highly elastic than the shoe, because the crushing of the ore particles in stamp milling is done as a result of the reaction from the resilient die, the waves of compression transmitted through the particle from the shoe being reflected from the die, and the strains, set up by the on-coming and the reflected waves, exceed the elastic limit of the particle, and rupture, to the point even of comminution, results. Place two steel bars $\frac{1}{2}$ in. thick on a new die, with a 1-in. fairly round ore particle between, and let a newly shod stamp drop on it. You will find a number of irregular fragments of varying sizes, with a small conical pile of ore-powder resting on the die very highly compressed in the center so as to be often adherent to the die. This experiment not unfairly represents what occurs in practice, where the blow delivered upon the protruding larger masses of ore is checked by the expenditure of work in compression of ore particles, until the momentum is overcome by the increasing resistance of the number of uncrushed particles relatively to the remaining kinetic energy of the falling stamp. The crushing of the finer particles, which can never be reached by the stamp, owing to this masking of its blow, is manifestly due to attrition in the mass of pulp, and to minor blows transmitted from the stamp through ore-particles to smaller pieces between these and the die. It is interesting to observe that the percentage of pulp produced in the above experiment, crushing single particles, which will pass through a 0.0762 m.m. opening is roughly 22 per cent.,

while in ordinary work a mill will produce from 28 to 40 per cent. of pulp of this grade.

INSIDE AMALGAMATION.

In some mills the bulk of the amalgam recovered from the batteries is found in the sands; in the Yellow Aster (Cal.) mill, it tends to form hard balls in the corners of the mortar, but this is a rare though not exceptional case. Ordinarily the "catch" is mainly on the plates. It is always good practice to use a chuck plate, unless it persistently scours to bare copper. What it caught on this plate is so much to the good, and it costs but little to get it. Usually it is very productive plate, and should yield hard amalgam in ridges, often a half inch high. It is easier to secure good work on the back plate. Scour will occur sometimes in spite of careful work, due to unavoidable changes in the mineralogical composition of the ore, rendering the pulp either more or less mobile, and either condition may be a pre-disposing cause. The tappets may be re-set to compensate, and regulate the splash to check the scouring, but if plates have begun to catch, and then start to scour, it is safer to remove them at once, substituting new ones, and then readjust to bring the splash back to proper form. It is unsafe to count on re-catching scoured amalgam on the outside plates. The inside amalgam should be hard and dry, and such amalgam breaks up into thin scales and spicules which float most persistently. The regulation of the splash is all important. Even when, as seen through the screen, the splash appears to be an even oscillation or wave-motion across the mortar, it may in fact be scouring. If the plates show much bare copper it means a loss, for amalgam is certainly forming, and is equally being worn away, much of which is inevitably lost. The inside plates must be coated with amalgam, or else they are a disadvantage. The adjustment of a battery to avoid scour cannot be made in a perfunctory manner, nor can it be done according to rule. It is only in rare cases that every stamp in a battery can be set to the same drop, and good results obtained. After a clean up they must be set that way, with the center stamp having a little higher drop than the others. Then one by one each stamp must be reset until all tendency to scour is overcome. Even then they must be watched, and re-set as the shoes and dies wear, and as the chuck block is dropped, giving a narrower space in which the crushing must be done. If scour is persistent, in spite of such vigilance, it indicates either that the plates are too near or too far from the dies, or that the sands are too mobile ("quick") or too heavy ("dead"). The latter difficulties may be overcome by changing the ore mixtures, which in most mines can be accomplished if enough

stopping ground is blocked out. Sometimes a change in the quantity of feed water is all that is necessary. Another difficulty is the obstinacy of many amalgamators who will not attend to all these details, who expect a mill to run itself, and refuse to be taught better. Such men are too expensive to keep.

CONSTANT ORE MIXTURES.

The bedding of ores, so as to secure proper mixtures, giving the best results in milling is almost as important in amalgamation as in smelting; but as the physical character of the pulp is the important thing, which no analysis can foretell, it will not do to "stock" in the bedding-bins too far in advance of the mill needs. It is better to have ore of different characters broken and ready in the chutes, to be drawn upon as needed.

DRESSING OUTSIDE PLATES.

The experienced amalgamator will never allow discoloration to begin upon the outside plates. The preventive, as well as the remedy, is hard, brisk, rubbing with whisk brooms. Discolored plates indicate laziness, inattention to duty! A dark, crusted deposit, however, indicates antimony, for which there is no effective remedy but to find where the ores carrying it come from, and omit mining those blocks of ore which bring trouble to mill. It is usual to find antimony segregated into chutes or bunches, at least to such an extent that the difficulty may be minimized by intelligent management.

To clean plates, borax soap is altogether the best material to use under modern conditions. It is sufficiently alkaline to clean off any stray animal fats, and it will emulsify the mineral oils, and leave the plates bright and ready to take mercury or catch-gold. Caustic alkalis no longer have any legitimate place in the amalgamator's stock of supplies. They do not touch the mineral oils, and practically all modern lubricants are petroleum derivatives. Cyanide of potash should never be used under any pretext. It hardens the amalgam, and causes it to scale. If bare copper occurs, from any cause, scour with sand, wash with borax soap, rinse, swab with a solution of mercuric chloride (corrosive sublimate), rinse well, and burnish with a dry cloth. A surface so prepared will promptly start to catching amalgam.

If the ores carry copper sulphides, copper sulphate will usually be present also, or will be formed to some extent in the battery. This may be largely decomposed and the copper amalgamated with the gold, by feeding common salt with the ore. This may be due to the normal reaction between the copper sulphate and the metallic iron in the battery, the salt serving merely to facilitate the reactions and amalgamation by increasing the conductivity of the solution. Further chemical phenomena may be involved, but I

have as yet had no opportunity to study the situation critically in the laboratory. This practice is often useful in protecting the future cyanide treatment of the mill sands.

OUTSIDE AMALGAMATION.

The hardness of the amalgamation for good work no man can determine in advance for any ore. The right consistency must be found out by actual trial in each mill. Usually a granular, frosty appearance, with a softness such that the fleshy part of the thumb can just make an impression, is most likely to give the best results. Abundant area of copper plate beyond the battery is important. Most mills are deficient in this regard. It pays to have enough. Forty-eight square feet for each battery may be taken as the minimum and beyond this use as much as pays. There is no advantage in using copper plates plated with more than 1 oz. silver per sq. ft. In fact, more than this is a positive disadvantage. A good amalgamator can build up amalgam on raw copper without difficulty, and keep his plates bright and fresh. The chief advantage in silver plating is to reduce the absorption of gold by the plate. A first dressing on bare copper with dilute silver amalgam will yield a surface more sensitive as an amalgam catcher than a silver-plated copper plate.

The foregoing statements have been made with positiveness of conviction resulting from successes in practice wrung out of trying situations, but with no thought that the final word has been uttered, and the author hopes to stimulate criticism and call forth new confessions of experience, to the betterment of his own and others' metallurgical method.

There has recently been an extraordinary demand for cadmium, which has entirely exhausted the available supplies.

The Southern Pacific Company reports that there have been already large shipments of scrap steel from San Francisco within the last week, and that orders are being placed for a large number of other shipments. Some of the steel is going to points within the State, but most of it is going to Chicago and Pittsburg. Now that many of the property owners are getting their insurance they are having their ruins cleared out, and the steel and iron are being dug out of the ruins and loaded on freight cars. It is probable that a great deal of it will be brought back to the city to serve in the rebuilding. The value of the scrap steel has interested a great many speculators, and some large Eastern concerns have men in the field buying it up. The freight to Chicago is \$12 a ton, but to Pittsburg it runs a little higher. The local price paid for the scrap steel is not high; most of it sells at \$2 to \$4 a ton. Large quantities are being stored to wait for higher prices later on.

A Device Used in Sampling Untimbered Shafts.

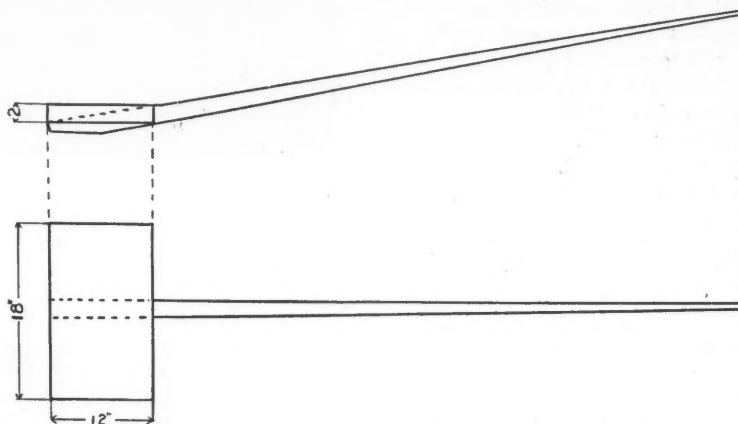
BY C. GODFREY GUNTHER.*

The accurate sampling of untimbered shafts is apt to be a problem difficult of solution by the examining engineer, especially where there is much of the work to be done. Staging and ladders are generally too expensive and require too much time for their installation to be resorted to, and in any case, the hit or miss method of sampling which results from hanging to a ladder with one hand while wielding

hammer and moil, at the same time leaving both hands free to work.

The sample so taken may be caught in a bag held between the feet, or may be allowed to fall on canvas spread at the bottom of the shaft. In the latter case the walls of the shaft should be carefully brushed down before the sample is taken, and boards should be laid on top of the canvas to protect it from the falling rock.

The seat, when fitted with a cushion, is by no means uncomfortable, and being firmly held by the feet and brace, does not swing under the impact of the ham-



SAMPLER'S SEAT.

a prospector's pick with the other, is inaccurate, as well as dangerous to the sampler.

An apparatus used by me gave complete satisfaction while sampling a number of untimbered shafts in hard and tough indurated granite. It consisted of a seat of 2x12 in. plank about 18 in. long, to which was firmly nailed, at a slight upward slant, a tapering strip of wood about 2 in. square at the larger end, and in length about 3 feet longer than the greatest dimension of the cross-section of the shaft. The accompanying sketch will make the construction clear.

In the case mentioned the shafts were equipped with windlass worked by hand; a slip noose was tied in the hoisting rope, and the brace attached to the back of the seat was passed through it, so as to bring the rope well toward the front of the seat. The sampler seated on this contrivance, straddling the rope, may be raised and lowered at will, and held in position to work by the men at the windlass.

While in motion up or down the shaft the brace must be held in one hand, pointing up the shaft. When the point is reached at which it is desired to cut a sample, the brace is let fall against the opposite wall, which wedges upon hoisting a foot or more, and the seat is drawn up close to the face to be sampled. Bracing the feet against the wall the seat is held securely at such distance from the face as is most convenient for sampling with

mer. It permits rapid and accurate work in what would otherwise be an awkward position.

The scale of wages adopted by the Tonopah Mine Operators' Association, which became operative Aug. 1, 1906, is as follows: Miners, \$4; machine men \$4.50; car men, \$4; muckers, \$4; ore sorters, \$4 and \$5; timber men, \$4.50; machine miners, working in shafts, \$5; miners working in shafts, \$4.50. These wages are for an eight-hour shift. The following are for a nine-hour shift; Blacksmiths, \$5 and \$5.50; blacksmith helpers, \$4; carpenters, \$5.50; engineers, \$5; tool sharpeners, \$5; electrician wire men, \$5; machinists, \$5; surface laborers, \$4. When two rates of wages are given, the higher rate applies to foremen only.

With an electric installation, the effect of starting or stopping any motor is carried back to the switchboard, which is connected directly to the prime mover, and machines on the system are not interfered with unless the horse-power thrown on or off represents a large fraction of the total developed in the prime mover; even in this case the effect should not be seriously noticeable if the governing apparatus is properly adjusted. There are many machines where a constant change in speed becomes a serious matter, and at all times such changes impair the running efficiency of the mill.

*Mining engineer, Clifton, Arizona.

The Daly-Judge Mill.

STAFF CORRESPONDENCE.

This mill is of the side-hill type. It is built in Empire cañon, about 500 ft. from the mouth of the Daly-Judge tunnel. The mill consists of four main floors; the bin floor; breaker-roll floor; the jig and Huntington floor; and two table floors. On the top floor are two ore bins, each of 450 tons capacity, having a sloping bottom. Into one is dumped the Quincy ore, from the contact orebodies, while in the other is stored ore from the fissure vein. One kind of ore is treated at a time.

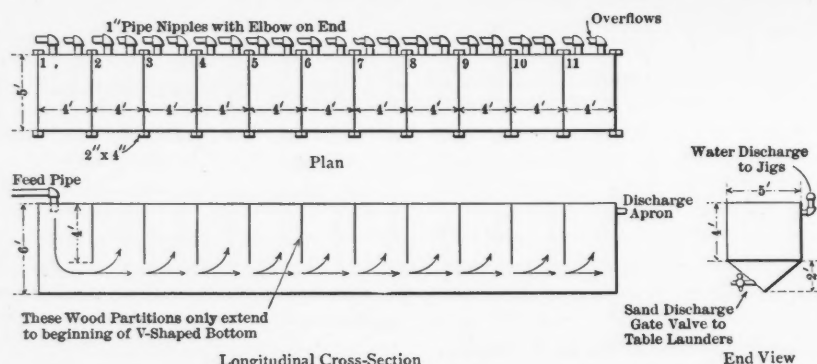
The ore is drawn through rack-and-pinion gates to a car, is weighed on platform scales and is dumped over a grizzly to a Blake crusher. From the crusher it goes to the first rolls. These rolls are fitted with a lever carrying an emery brick, which can be moved so as to grind

opposite direction to the curvature, so that the sands are pushed out of the water instead of being dipped out. The device is well liked and seems to do good

bin and are delivered by plunger feeders to three 5-ft. Huntington mills, which have 16-mesh screens, the necessary water coming from a settling tank to which the



DALY-JUDGE MILL, PARK CITY, UTAH.



SETTLING TANK.

water from the jig-tails has been taken to settle. The Huntington pulp goes to the main settling tank, which has eleven compartments, the details being shown in the accompanying illustration. Owing to the fact that the current is confined principally to the V-shaped bottom and there is only a slight upward current to the discharge pipes near the top of the tank, a very clear water is obtained. This goes back to the jigs and other machines to be used as wash water. The settled and classified sands are drawn off through spigots to eight Wilfley tables placed on the upper table floor.

down any corrugation that is getting too high on the rolls. A sample of the ore is taken by shovel from the roll-product every 15 minutes.

Water having been added, the ore then goes to the coarse and next to the fine rolls, each time the ore finer than 3-mesh being screened out, the final over-size from a two-mesh screen being sent back to the fine rolls. The ore is then elevated and passed through a series of trommels (3-, 4- and 6-mesh). The oversize of each trommel goes to a three-compartment Harz jig, the fines from the 6-mesh going to a settling tank, wherefrom the sands go to two three compartment jigs, while the overflow goes to the main settling tank.

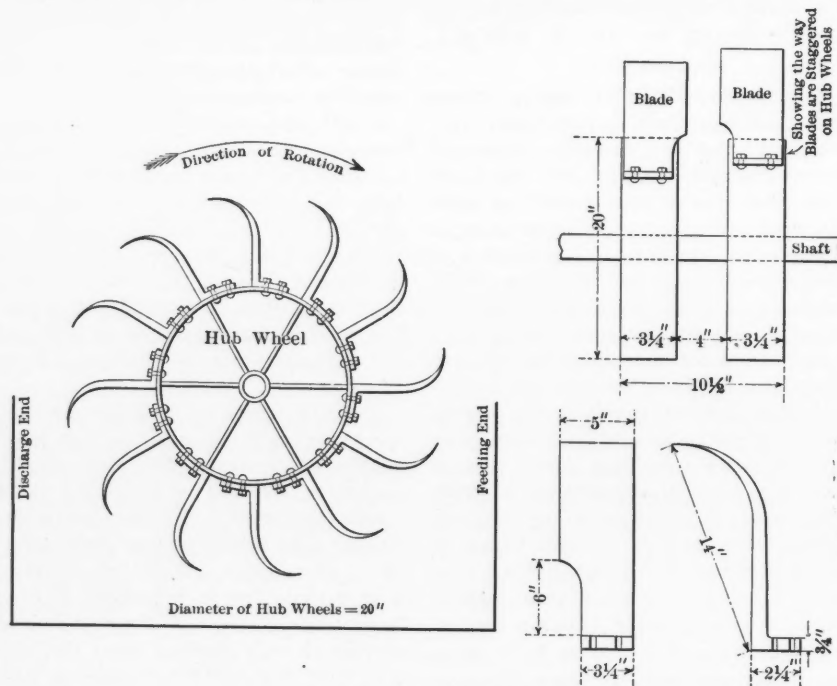
The jigs all make a clean lead product, which discharges into a hopper and is drawn off in cars on the floor below and run to the bins. It is the intention of the company to try treating all the stuff going to the Harz jigs on a three-compartment Wall jig.

The tailings from the jigs go to a cup elevator by which they are elevated to a dewatering wheel, designed by J. D. Fleming. This is shown in one of the accompanying photographs. It is run at 9 r.p.m., such slow running being essential. The Fleming wheel rotates in the

work. An 8-mesh trommel is used as a guard after the de-watering wheel, as some coarse stuff may wash over.

The de-watered sands fall into a 50-ton

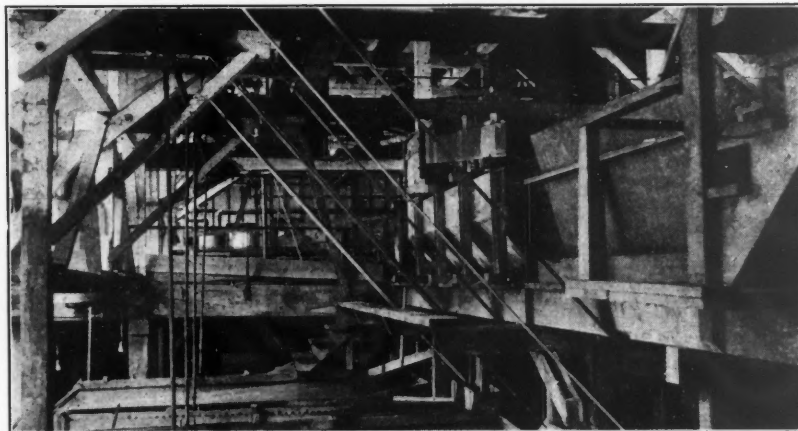
tank, but it has overflow by aprons on the



FLEMING DE-WATERIZER.

side instead of through tin pipes. This overflow water, which is quite clear, is used over again or else let go to waste according to the amount of water required in the mill. The settlings from this tank go to two Wilfley tables and one Wilfley slimer. These make a lead product, a blende-pyrite middling and tails which go to the creek.

The eight Wilfley tables treating sands from the main classifying tank and the two Wilfleys, treating the sands from the jig-water settling tank, all produce a galena-pyrite product, galena-pyrite-blende middling and a tailing. The lead product is received into cars, which are hoisted to the bin tracks, and goes to the bin. The galena-zinc-pyrite middling goes to a Frenier sand pump, which delivers it to a four-compartment settling tank, feeding four Wilfley tables on the lower table floor. These tables give a lead product, a blende-pyrite product and tails. The lead product is elevated in cars and run to the lead bin. The middling is conveyed to the zinc pile, where it is held awaiting favorable market.



SMALL CLASSIFIER FEEDING TABLE MAKING ZINC CONCENTRATES.

The tails from both the re-treating tables and the first 10 tables go to a Frenier sand pump and are elevated to a three-compartment settling-box, which feeds three Wilfley tables on the upper table floor. These Wilfleys give a lead product, a blende-pyrite middling, and tails which go to the creek.

The Frenier sand pumps are well liked, few repairs being required for them.

The mill treats about 200 tons in 24 hours, and produces about 40 tons of zinc product and 40 to 50 tons of lead product. The lead concentrate averages about 33 per cent. lead, 7 zinc, 21 iron, 3 silica, and 18.5 oz. silver and 0.11 oz. gold. The zinc concentrate averages 20-25 zinc, 2-4.5 lead, 15 iron, 12 silica, 9 oz. silver and 0.04 oz. gold.

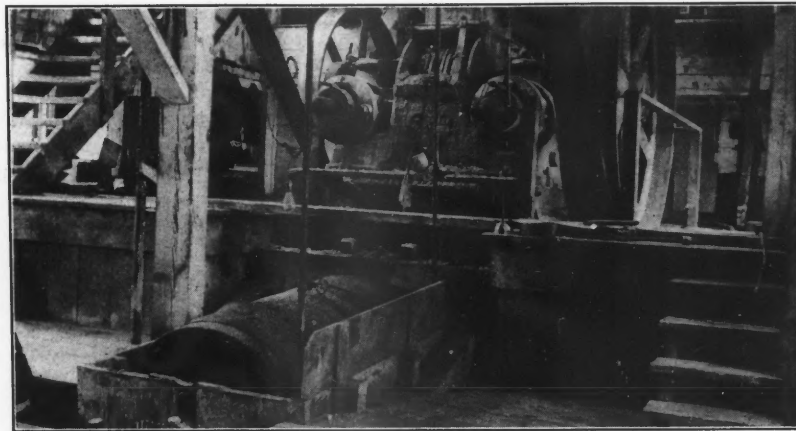
The mill feed averages about 10 per cent. lead, 9 per cent. zinc and 7 oz. silver from the contact deposits, and about 6 per cent. lead, 5 oz. silver and no zinc from the lower fissure deposit. These ores are treated separately, first one and

then, when that bin is empty, the other.

The tails carry 0.7 per cent. lead, 3 per cent. zinc and 1.5 oz. silver.

The mill is run by a 14x36 Fraser &

engine. He gets \$3 for eight hours. Ten men per eight-hour shift run the mill, being distributed as follows: One trammer, \$2.75; one breakerman, \$2.75; one oiler



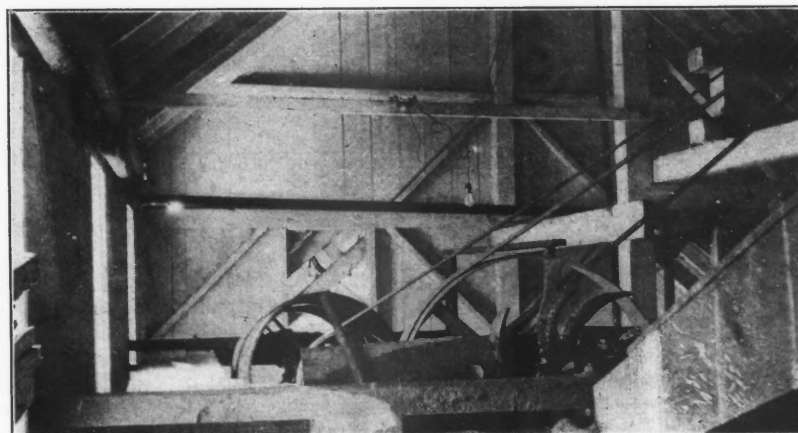
COARSE ROLLS, SHOWING DEVICE FOR GRINDING DOWN CORRUGATIONS.

Chalmers Corliss engine, making 90 r.p.m., using steam at about 120 lb. The steam is furnished by one 150 h.p. marine boiler, two 60 h.p. return tubular boilers

and lookout, \$2.75; one jig man, \$3; one Huntington man, \$3; two table men, \$3; three shovelers, \$2.50.

The ore bins hold 450 tons and are divided into three parts. The concentrate is allowed to stand and drain in these and is then loaded into wagons and hauled to the railway. Each day, at noon, the mill is shut down 30 minutes for repairs.

The report of the Mount Lyell Company of Tasmania, for the six months ending March 31 was the best on record, the profits amounting to £255,648. The bulk of the ore came from the Mount Lyell, where 144,774 tons were broken, averaging 0.99 per cent. copper, 1.92 oz. silver, and 0.081 oz. gold per ton, while from the North Lyell 57,727 tons were obtained, averaging 5.97 per cent. copper, 1.65 oz. silver, and 0.0048 oz. gold per ton. The Lyell Tharsis and other claims produced 11780 tons averaging 1.58 per cent. copper and 0.12 oz. silver per ton. The production of blister copper was 4,621 tons, containing 4,565 tons copper, 374,762 oz. silver, and 12,342 oz. gold.



FLEMING DE-WATERIZING WHEEL.

First Aid in Cases of Electric Shock.

The urgent necessity for prompt and persistent efforts at resuscitation of victims of accidental shocks by electricity is emphasized by the successful results in many instances. Accidental shocks seldom result in absolute death unless the victim is left unaided too long, or efforts at resuscitation are stopped too early. In the majority of instances the shock is only sufficient to suspend animation temporarily, owing to the momentary and imperfect contact of the conductors, and also on account of the resistance of the body submitted to the influence of the current. The body, under the conditions of accidental shocks, seldom receives the full force of the current in the circuit, but only a shunt, which may represent an insignificant part of the whole.

The United Gas Improvement Company, Philadelphia, publishes a booklet, under the title of this article, and has designed the emergency kit described. The illustrations are taken from this booklet, and the method of operating is abstracted from it, together with the supplement of the *Electrical World and Engineer* (Sept. 6, 1902), on the same subject.

When an accident occurs, the body should be at once removed from the circuit by breaking contact with the conductors. This may be accomplished by using a dry stick of wood, or other non-conductor, to roll the body over to one side, or to brush aside a wire, if that is conveying the current. Any dry piece of clothing may be utilized to protect the hand in seizing the body of the victim, if rubber gloves are not convenient. If the body is in contact with the earth, any loose or detached piece of clothing may be

(b) A bottle of ordinary ammonia, with sponge attachment.

(c) A package of bicarbonate of soda (ordinary baking soda).

(d) A tin cup.

(e) A pair of tongue pliers.

(f) A towel.

(g) A package of antiseptic cotton.

(h) A roll of antiseptic bandaging.

(i) A roll of adhesive tape.

In case of electric shock, instantaneous death or only temporary unconsciousness may result. The treatment in both cases is as follows, and it should be car-

ried out in every instance, even though the person is apparently dead, for he might be only temporarily unconscious. Send for a doctor at once, in the meantime acting as follows: Carry the patient immediately into fresh air. Place him on his back on a flat surface, with a coat rolled (not folded) under the shoulders and neck, in such a way as to allow the head to fall backward enough to straighten the windpipe, as shown in Fig. 2; at the same time open the shirt wide at the neck, and loosen the trousers and drawers at

waist, and have an assistant rub his legs hard. The sleeves and trouser legs should be rolled up as far as possible, so that the rubbing may be done on the bare skin, and the shirt and undershirt should be torn down the front so that they may be thrown back, leaving the chest and stomach bare, as shown in Fig. 10. Open his mouth, forcing the jaw if necessary. If the jaw is rigid it can be forced open by placing the forefinger back of the bend in the lower jawbone, and the thumbs of both hands on the chin, pulling forward with the fingers and pressing jaw open with thumbs, as shown in Fig. 3; or the jaws may be forced apart with a stick or the handle of a pocket knife. Place something (a piece of wood is shown in Fig. 2) between the teeth to keep the jaws open, and to prevent the patient biting his tongue, using something large enough to prevent any danger of his swallowing it accidentally; grasp the tongue with the tongue pliers, as shown in



FIG. 2.

Fig. 4, having an assistant hold it out while you are helping the patient to breathe, as described below. In the absence of tongue pliers, the tongue may be grasped between the index and second fingers, after they have been covered with a handkerchief.

Clear froth from the mouth by putting in your forefinger as far as possible, and bringing up the froth with a scooping motion. Have the assistant who is holding the tongue slowly pass the bottle of ammonia, with sponge attachment, under the

patient's nose about once a minute, when the patient is breathing in, and when his arms are extended above his head, as shown in Fig. 10. While you are preparing the patient as just described, an assistant should force the air out of the lungs by pressing the base of the ribs together about once every four seconds, as shown in Fig. 5. Do not press vertically, but press on the patient's side (palms of hands over lower ribs) in



FIG. 1.

seized with impunity to draw it away from the conductor. When this has been accomplished, remember that the object to be attained is to make the subject breathe; if this can be accomplished and continued he can be saved.

To give him proper assistance it is advisable to have on hand the following materials:

(a) A bottle of aromatic spirits of ammonia.

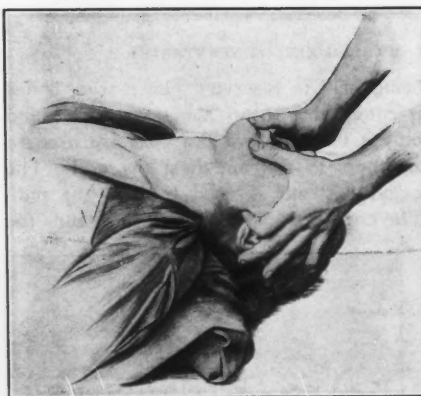


FIG. 3.

patient's nose about once a minute, when the patient is breathing in, and when his arms are extended above his head, as shown in Fig. 10.

While you are preparing the patient as just described, an assistant should force the air out of the lungs by pressing the base of the ribs together about once every four seconds, as shown in Fig. 5. Do not press vertically, but press on the patient's side (palms of hands over lower ribs) in

Open his mouth, forcing the jaw if necessary. If the jaw is rigid it can be



FIG. 4.

such a manner as to force as much air out of the lungs as possible.

After the clothing has been loosened, the jaw forced open, as shown in Fig. 4, the froth cleared from the mouth and the tongue grasped, begin artificial breathing at once as follows: Kneel far enough behind the head of the patient to prevent interference with the man holding the tongue. Bend the patient's arms so that

shown in Fig. 7; then (3) while you have the patient's arms stretched out in line with his body, give them a slow, strong pull, until you have expanded or raised his chest as high as it will go, as shown in Fig. 8; then (4) bring the arms with bent elbows, down against the sides, and press them firmly as before, as shown in Fig. 6.

This action should be continued about fifteen times a minute, until the patient

the arms are again being bent and returned to the sides, as shown in Fig. 9. Do not let your hands on the forearms slip away from the elbows; the best result comes from grasping close to the elbows, as shown in Fig. 9.

The operator must appreciate the fact that this manipulation must be executed with methodical deliberation, just as described, and never hurriedly or half-



FIG. 5.



FIG. 6.



FIG. 7.

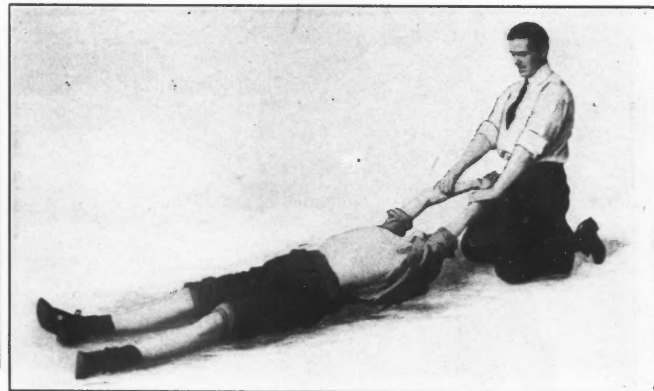


FIG. 8.



FIG. 9.



FIG. 10.

the hands meet on the chest; grasp the patient's forearms firmly, as close as possible to the bent elbow. Then (1) firmly press the patient's elbows against the sides of his body so as to drive the air out of the lungs, as shown in Fig. 6; (2) raise the arms slowly with a sweeping motion until the patient's hands meet above (or behind) the patient's head, as

begins to breathe. You must guard against a tendency to make these motions too fast; they must be done slowly. A good plan is to count four slowly, "one" as the pressure is given on the sides, as shown in Fig. 6; "two" as the arms are being extended above the head, as shown in Fig. 7; "three" as the strong pull is given, as shown in Fig. 8, and "four" when

heartedly. *To grasp the arms and move them rapidly up and down like a pump handle is both absurd and absolutely useless.*

Each time the arms are pulled above the head and the chest expanded, the assistant who is holding the tongue should pull the tongue out and downward, quickly and forcibly, to the limit when it

is permitted to recede; another assistant should, from time to time, slap the chest with a towel or cloth wet with cold water, as shown in Fig. 10.

The dashing of cold water into the face will sometimes produce a gasp and start breathing, which should then be continued as directed above. If this is not successful the spine may be rubbed vigorously with a piece of ice. Alternate applications of heat and cold over the region of the heart will accomplish the same object in some instances. It is both useless and unwise to attempt to administer stimulants to the victim in the usual manner by pouring it down his throat.

When the patient is breathing by himself, the process of artificial breathing can

strengthening to the action of the lungs. Continue this pressing action until the man is conscious and breathing well by himself. The rubbing of the legs and arms should continue as long as the artificial breathing, or pressing action, is necessary, and the holding of the tongue, and the passing of the bottle of ammonia with sponge attachment under the nose, as long as he is unconscious, as shown in Fig. 5.

After he becomes conscious, give him a half teaspoonful of aromatic spirits of ammonia in a third of a glass of water. After you have brought him around, surround him with bottles of hot water. Beer bottles are easily obtained, and should be filled with hot water, and

should be allowed to approach him except those carrying out these instructions. The recovery of a person unconscious from electric shock may be hastened by the use of oxygen, which should be administered at the discretion of the doctor.

Electric shocks are often accompanied by various types of burns, which should be treated as follows: Have the injured attended by a doctor as soon as possible. In the meantime cover the burned surface with cotton, saturated in a strong solution of bicarbonate of soda and water, as much soda as the water will absorb, and then wrap with light bandaging. In the absence of soda, carron oil may be used in the same manner. Even apparently slight burns should be treated by a doctor, as the injuries are likely to prove more serious than those resulting from ordinary burns.

Should the articles contained in the emergency kit for electric-shock cases not be on hand when needed, after sending for a doctor, every effort should be made to revive the patient, by following the course of movements described until the doctor arrives and the necessary articles are secured. The physician, upon his arrival, can best put into practice, should it be necessary, the following: Forcible stretching of the sphincter muscle controlling the lower bowel excites powerful reflex irritation and frequently stimulates a gasp (inspiration), when other measures have failed. For this purpose the subject should be turned on the side, the middle and index fingers inserted into the rectum, and the muscle suddenly and forcibly drawn backward toward the spine. Or, if it is desirable to continue efforts at artificial respiration at the same time, the knees should be drawn up and the thumb inserted for the same purpose, the subject retaining the position on the back.

Oxygen gas, which may be readily obtained at a drug store in cities or large towns, is a powerful stimulant to the heart if it can be made to enter the lungs. A cone may be improvised from a piece of stiff paper and attached to the tube leading from the tank, and placed over the mouth and nose while the gas is turned on during the efforts at artificial respiration.



FIG. 11.

be stopped, but the process of pressing the sides every other time he breathes out, should be started as follows: Do not press vertically, but press on the patient's side (palms of hands over lower ribs) in such a manner as to force as much air out of the lungs as possible, Fig. 5. You can carry out this pressing action most successfully, if on beginning, you move your hands in and out with every breath, pressing very lightly, until you have established a rhythmical motion of your hands in unison with the patient's breathing; then you can begin to press hard at every other outgoing breath. The object of doing this is to strengthen his breathing. By making the pressure every other time he breathes out, you give him an opportunity to take a breath himself, and this natural effort to breathe is in itself

covered with a paper or cloth to prevent burning the flesh. Hot bricks, also covered, or rubber bags filled with hot water will answer as well. Then cover him with a coat, as shown in Fig. 11, and watch him.

In performing artificial breathing, if the patient does not show any signs of coming to life promptly, you should not be discouraged, but should continue the motions regularly for *at least one hour*, summoning such assistance as you may need. Cases are known where patients showing no signs of life after an hour's work have still recovered, and their recovery was due entirely to the faithful persistence of the person in charge. Persons shocked by electricity need fresh air, therefore, bystanders should not be permitted to crowd around a patient, and no one

Engineering (London, May 18, 1906, p. 663) gives data regarding the adoption of superheated steam on 186 locomotives belonging to the Canadian Pacific Railway, the superheaters being for the most part designed and built in the company's own shops. The results are stated to have given great satisfaction. The engines have shown a marked economy of fuel, even as compared with the compound locomotives in use on the same railway. In the case of the latest engines, the boiler pressure is being reduced to 175 lb. in place of 200 lb. per sq.in., hitherto the standard practice; and it is expected that there will be a saving in the wear and tear of the boiler without any reduction on the hauling capacity of the engine.

The Lake Superior Copper District.

BY W. SPENCER HUTCHINSON.*

Extraordinary activity in exploratory work characterizes the Lake Superior copper industry during the summer season of 1906. This has been stimulated by the high price for the metal, and by the remarkable success attending the developments of the last seven years on the Baltic and Kearsarge amygdaloid veins.

At the present time, these mines, together with the Trimountain, which lies between them, have 12 working shafts, proving the lode for a length of nearly four miles, and they produced during 1905, 40,568,572 lb. of refined copper. Explorations are now in progress on the Atlantic, Section 16, and the Superior tracts to the north-east, and on the Globe and Champion lands to the south-east, with the expectation of developing the extension of the Baltic vein. The development of the Kearsarge vein

from this vein and their output for 1906 is expected to exceed 40,000,000 lb. of refined copper. From the Mohawk mine on the north-east to the Calumet & Hecla, Section 19, on the south-west, a distance of more than five miles, there are 20 working shafts, all of which are producing copper rock. Work is now in progress on the Fulton tract on the north-east extension and on the C. & H. Section 23, the Tecumseh and Caldwell mines to the south-west, which will ex-



ROCK HOUSE AND ENGINE HOUSE AT CALUMET, MICH.



STEEL ROCK HOUSE, MOHAWK SHAFT, NO. 4.



DIAMOND DRILL IN THE WOODS ON KEWEE-
NAW POINT.



RUINS AT THE CLIFF MINE.



THE BLOW-OFF OF THE TAYLOR HYDRAULIC
COMPRESSOR, VICTORIA MINE.

The first copper produced from the Baltic vein was by the Baltic mine in 1899. About this time the same vein was discovered at the Champion mine, and in 1902 that property commenced producing.

*Mining engineer, 101 Milk street, Boston, Mass.

has been somewhat slower, but although it was worked to some extent in the Kearsarge and Wolverine mines prior to 1898, it was in that year that the Wolverine mine paid its first dividend. Since then the development of the vein has been rapid until now eight mines are shipping

and are exploring this remarkable vein for a further distance of five miles.

In Keweenaw county, the Keweenaw Central R. R. is in process of construction from Lac La Belle to some point near Calumet, where it will join the other railroads. It parallels the old wagon

road between Calumet and Copper Harbor, passing near the old mines where great waste dumps and ruins of old buildings give evidence of former activity.

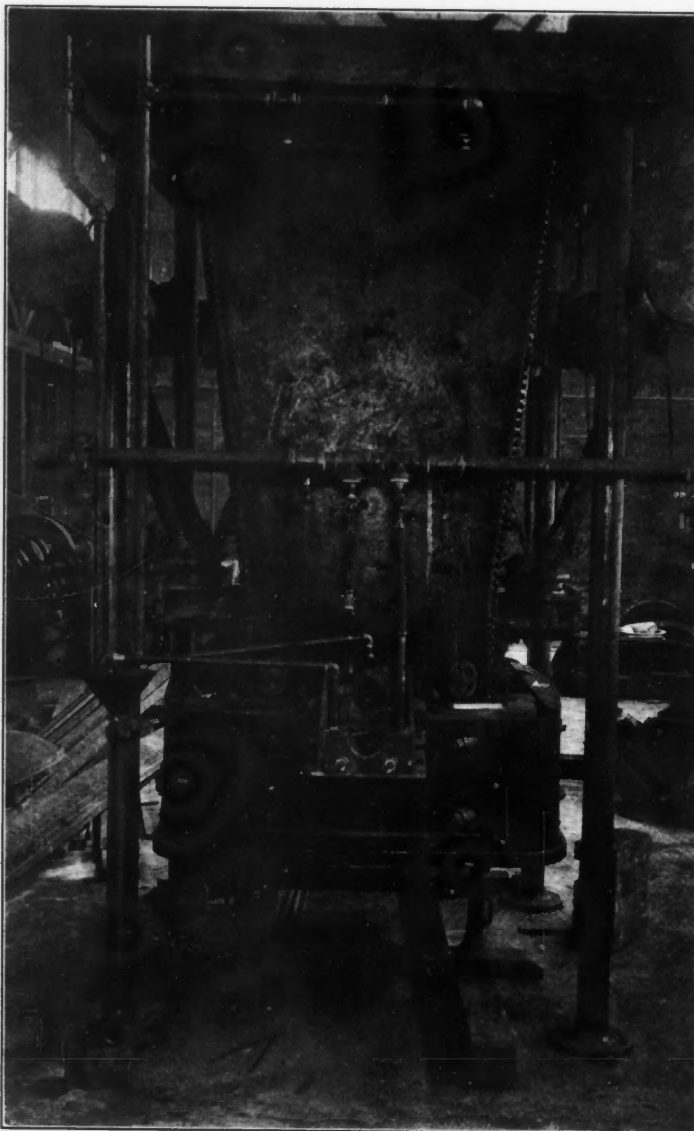
The Calumet & Hecla Mining Company, the Keweenaw Copper Company, and the Tamarack Mining Company now hold large areas on the copper range in this end of the district and all are carrying on extensive explorations. The Cliff and the Central were the best known of the old mines. In these, as in the others, the work was confined to transverse veins crossing the bedded rocks, and although the amygdaloid beds were known to carry copper and were explored to some extent, no producing mines were opened on them. The work now in progress is directed toward the exploration of the bedded deposits which have made the great producing mines on other parts of the district. The first work is by diamond drilling, by which a geological cross-section is obtained, locating the copper-bearing strata. Three shafts are now sinking in the Montreal amygdaloid, and one on the Medora amygdaloid, all with promising prospects.

In Ontonagon county, in the southwestern end of the district, work is progressing at many points. The Victoria mine has just started milling and the results are awaited with much interest. The power plant at this mine is of remarkable novelty. Water power is developed by means of a dam and canal on the west branch of the Ontonagon river, giving a fall of about 70 ft. and yielding more than 4000 h.p., of which only a fraction is now utilized. Three compression pipes of a Taylor hydraulic air compressor are installed, of which one is now operating. The air, at a pressure of 116 lb. per sq.in., is stored in a chamber cut in the solid rock, at a depth of 300 ft., and is delivered by pipes to the mill and mine. It operates the stamp head and is used in engines, hoist, pumps and drills, furnishing all the power required on the property. The air chamber is said to furnish storage sufficient to operate the present plant for a period of five hours, and being sealed by a water column it has the advantage over the receiver of the ordinary compressed air system, that the air is delivered at uniform pressure and the last cubic foot of air at the same pressure as when the chamber is full. Air compressed in excess of the requirements must be allowed to escape and a 12-in. blow-off pipe is provided for this purpose. This operates at intervals, several times an hour, throwing a tremendous stream of water into the air to a height of several hundred feet, and making an artificial geyser of surpassing grandeur and beauty. All this disturbance causes not the slightest quiver of the pressure gage. The Taylor hydraulic compressor furnishes air which is dry and absolutely clean and it is pronounced an unqualified success.

A New Blast Furnace.

A blast furnace, embodying some new features, which appear in the accompanying illustration, has recently been constructed by the Traylor Engineering Company, for the De Lamar's Copper Refining Company, of Chrome, N. J. The furnace, which is 38x60-in. at the tuyere level, is constructed so that no brickwork

is required for the furnaceman to reach in order to feel the temperature of the discharge water. The furnace was designed for smelting carbonate ore to black copper, or for concentrating low grade matte. It can be used strictly as a matting furnace by filling the crucible with fire brick, and separating the product in a forehearth, in which case the furnace can



38x60-IN. FURNACE. FRONT VIEW.

is required between the charging floor and the furnace floor, except for lining the crucible. The air connections to the tuyeres are direct, and with joints constructed so as to permit suitable flexibility to avoid leakage by distortion. Each of the water jackets is fed with cooling water at two points. The jackets are arranged with baffle plates, so that the cold water cannot impinge directly against the fire sheet. The jacket outlets make it impossible to trap steam in the jackets, each outlet being supplied with a vent. The jacket water is discharged into funnels at two diagonally opposite corner columns. The funnels are at a convenient

height for the furnaceman to reach in order to feel the temperature of the discharge water.

The investigation of the black sands of the Pacific Coast, which has been carried on for over a year by the United States Geological Survey, at Portland, Ore., will be continued until after the first of September. After that the plant will be transferred to Chapel Hill, N. C., where a similar work will be carried on in connection with the Geological Survey of the State. It is believed that the sands of the eastern coast will be found as rich in valuable minerals as concentration experiments have shown.

Theory of the Formation of Coalfields.*

BY JAMES FORD.

In dealing with the formation of our coalfields, we may discard any theory necessitating the operation of forces and laws, other than are at present acting, and which are subject to human observation. It has been quite a common thing in attempting to account for the existence of such masses of vegetation necessary to form the great thickness of our coal seams, to imagine some vast forest growth in quite abnormal climates, and the existence of laws and forces other than are at present within the range of man's knowledge; the most prevalent idea being that in a very remote period of the world's history, there flourished large forests, the like of which has never been seen in our day, and that these forests sank under the water just as they stood, and, becoming covered over by sediment brought down by water, became changed into a seam of coal. This is an erroneous idea; there is no evidence whatever of any growing forest ever being changed into a seam of coal.

The supporters of this theory appear to attach great significance to the presence of *stigmara* rootlets said to be found in the underclays of the coal seam, and the existence of trunks of the *sigillaria* tree, and other fossil impressions in close vicinity to the coal; but who has ever discovered any *stigmara* roots or a *sigillaria* trunk in a coal seam? Any traces of roots in the underclays are exceedingly rare, and even then are only grasslike markings which do not in any way affect the distinct parting or parallelism which severs the coal so distinctly from its underclay bed. There is certainly no indication of any plants or trees which may have formed part of the vegetable mass which eventually changed into coal, having roots penetrating into the underclay. I have known of solitary fossil tree trunks with roots attached, and standing erect in or near the coal seam, but these are so rare as to become objects of great interest. They are there by accident, and have had nothing whatever to do with the formation of coal. They are probably the fossilized remains of solitary trees growing in the vicinity of the area in which the coal vegetation was forming, and are merely incidental with the period, but were as foreign to the true origin of coal as the overlying roof material. In fact, the most perfect examples of these fossil trees, and the greater number of them, are found in the beds of strata overlying the coal seam and not in the seam itself.

If it were otherwise, and the vegetation of which the coal is formed consisted of

immense trees having their roots in the underclay, the floor of the seam would necessarily be rough and uneven, because if the trunk of the tree made coal, the butt and the root should do the same, whereas, instead of this added difficulty to mining operations, we have a sharp dividing line with the plane of stratification generally quite smooth. To my mind it is positively certain that the coal vegetation never had roots penetrating into the underclay. The absence of butts or roots in the underclays and the distinct severance of the coal and the underclay is conclusive evidence that no standing timber ever grew there.

All fossil impressions, whether of trunks of trees, or smaller vegetation such as ferns, mosses, etc., and other organic life belonging to the period, are generally found in the strata lying immediately above the coal seam and seem to have been conveyed there by the forces which brought the sediment covering the coal seam, and only serve to indicate the kind of flora and fauna of the period. The structure of the coal itself is also opposed to this theory. If we examine a piece of coal, we find its structure is strictly laminated; that is, composed of regular layers which lie parallel to each other, and this parallelism is uniform throughout the whole section, finishing off completely and distinctly where the roof of the seam begins. The parting between the coal and the roof is, in fact, as clean and distinct as the leaves in a book. This arrangement could not have well taken place with standing timber of a mixed growth and uneven size. There would have been irregularity in the laying out of the roof over an irregular growth. Besides, the mixing of the material which formed the roof (which in most cases seems to have been very fine sediment), with the open tops of the standing trees, would have merged the one into the other, and we could not have had such well-defined partings between the roof and the coal as we are all so familiar with.

There is a further suggestion that forests of trees might have been rooted up by some cyclonic weather conditions, and, together with the attendant undergrowth, might have been carried by water into the basin of a river, or into the sea, or into an inland lake, and there, becoming covered over, have become converted into coal; but this suggestion has insurmountable difficulties, as the forces required to bring such a mass of vegetation into any given position would also bring with it all kinds of debris, and we should have had a mixture of vegetation and earthy matter, with which it would have been impossible to have obtained the various phenomena I have described as being incidental to our coalfields.

All formative forces, all creative agencies, are of slow, silent, but persistent, continuous energy, acting in accordance with ordinary normal laws, laws that are still in

action, and the results of which can be still observed; and in making our inquiry into the forces that have operated in the formation of our vast coalfields, we need not go beyond the ordinary laws of nature and the forces now at work. Nature's laws are fairly constant, and time, as we understand it, does not count in nature. There is infinite time, just as there is infinite space. We may keep our consideration of this matter, therefore, within ordinary known causes.

Microscopic inspection and chemical analysis of coal have given us clear and decisive evidence of its vegetable origin. Traces of vegetable tissue can, in some cases, be clearly made out, and masses of minute seed spores can be readily distinguished by a good microscope, while the chemical composition bears undeniable testimony to its vegetable origin. We may say at once, therefore, that coal has been formed from the accumulation of vegetable matter which has undergone chemical and physical changes, due to heat, pressure and chemical action; with consequent reduction in thickness of the mass, but increased purity of the residue. What we have to consider, therefore, is the manner in which such large accumulations of vegetable or carbonaceous matter could have been formed. Firstly, how it came into being; and secondly, the subsequent changes which have converted it into the product as we now know it, and the embedding of it in its present stratigraphical position in the earth's crust.

Now, in seeking to establish a satisfactory theory to account for the phenomena, which are present in coal deposits, we should keep in mind the significance and meaning attached to each of the facts present.

If thin slices of coal are placed under the microscope, traces of vegetable tissue interlacing each other (similar to a mass of peat), which make up the main body of the coal, can be clearly recognized. Small substances resembling minute seed spores, which contain small rounded bodies of bitumen, can be clearly made out. Professor Morriss has demonstrated that these small bags are simply seed cases derived from a particular kind of vegetation, very similar to our present club mosses, and that the small bituminous bodies are the spores or seeds of the plant. These are generally plentiful in the sections of coal taken from our gas-coal seams or coals giving off much flame.

The microscope also reveals to us the existence of a world of exquisitely small aqueous plants, which are to be found everywhere where there is water, called "Desmines." They grow feeding upon the water alone. They are so infinitely small that in a cubic inch of water there might be 60 millions of them and they would have plenty of room to live out their individual existences. Dr. Dallinger, who has made a special study of the infinitely

*Abstract of a paper read before the North Wales Branch of the Colliery Managers' Association; published in the *Iron and Coal Trades Review*, July 13, 1906.

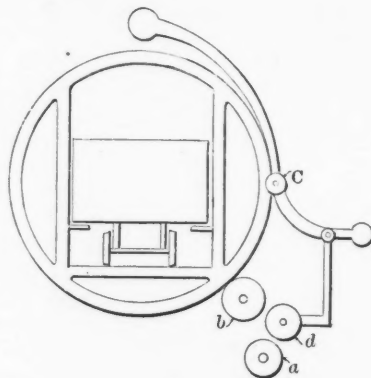
small in nature, has made known to us that these minute vegetable forms are found distributed through the entire globe. The remains of these small plants accumulating at the bottom of ponds and pools soon form a layer of pure vegetable matter quite homogeneous and practically free from foreign substances. The same distinguished scientist has demonstrated that the thick beds of slate, with which we are so familiar in Wales and elsewhere, have been formed largely from the remains of small diatoms, which secrete silica. These creatures are so small that 300,000,000 of them could be accommodated in a cubic inch of water.

Now, if these much smaller creatures can secrete and deposit silica sufficiently to form such vast thicknesses of slate (and they have actually done so), it will not be unreasonable to suggest that the much larger and more prolific vegetable desmides could also secrete pure carbonaceous matter to form or assist in forming in our vast deposits of coal, and it is very likely that we are more indebted to these small specks of vegetable life, which contain all the vital action and physical processes that may be observed in the larger growths of the vegetable kingdom, than to big growing timber.

Next to the action of microscopic vegetable life, our nearest analogy to a coal seam is a peat bog, which we can all examine at first hand for ourselves, and which presents almost precisely the same phenomena as our coal seams. Immense swamps, with bottom heat and a moist, warm atmosphere above, and covering hundreds of miles with a rapidly growing mossy vegetation—not at all dependent on the underlying stratum, except that it should be one that held water, and made it comparatively stagnant, such as our underclays would be—would grow feeding on the water alone, with immense rapidity, and filling with its innumerable tissues every space from top to bottom, thus form a mass of solid vegetation with all the conditions favorable and ready for the subsequent changes necessary for its conversion into coal. These bogs of peat can actually be seen growing and forming today, ranging in thickness from 20 to 40 ft. They are not by any means rare, and their rate of growth in our day has been observed in different situations to vary from less than a foot to about 2 ft. in 10 years. From observations which I was enabled to make on this matter for myself, I found that in a period of from 15 to 20 years a layer of fine vegetable matter, similar to peat, had formed to a thickness of 3 in. from the yearly accumulation of grass seeds alone, in a small depression of the ground, some 60 yards in area. There was a clay bottom, and the sloping sides of the ground were never mown, but were allowed to run wild, and the yearly growth had apparently been washed through the turf in the middle of the hollow and deposited on the clay bed

underneath, where it had formed to the thickness I have stated, a pure vegetable deposit.

From my own observations in this small incident, and the inspection of peat deposits, and from the conclusions of science as to the important part that microscopic creatures have played in piling up vast deposits, I am convinced that the vegetable matter which has gone to the formation of our coal seams has been brought into being in this way. At any rate, the balance of evidence is in favor of this theory, as it will account for all the phenomena we meet with in connection with our coal deposits in a way no other theory will. By this theory we are able to explain satisfactorily the horizontality, the variation in thickness, the existence of the clear, distinct parting at the roof and floor of the mine, and the general uniformity in the structure of the seams. The different thickness of vegetable accumulations would, of course, give a different thickness of



SIDE DUMPING TIPPLE.

coal. The clear partings are accounted for by the fact that the vegetable mass has no roots and no tops, the bottom being simply a material that should hold the water necessary for its growth. The underclays are evidence in support of this. The bands of dirt partings in coal seams are evidences only of a temporary cessation of that particular growth, caused by some terrestrial or geological changes, with a subsequent return to the former conditions. We are able also to understand how it is that coal is so widely distributed in all parts of the world, and in various geological periods, as the only conditions necessary are large sheets of inland water and ordinary atmospheric influences.

The commercial efficiency of a compressor is the ratio of the work of isothermal compression to the actual work done by the steam engine, or other motor, driving the compressor. Tests at the Mont Cenis tunnel, on a compressor delivering air at two atmospheres, showed a loss of 6 per cent. in thermal radiation, while at six atmospheres, the heat lost represented 26 per cent.

Side Tipplers in Coal Dumping.

BY F. W. PARSONS.

In dropping coal from cars upon the chutes or screens after it has been hauled out of the mines, it has been customary to use front tipplers, or run the car against a horn, allowing the center of balance to change by the action of gravity, so that the car pitches forward, causing the coal to slide out of the front end. At several collieries, this method has been abandoned and the side tippler system of dumping installed.

The advocates of side dumping claim that by using their method, the car does not have to leave the tippler by the same path it went in, which occasions a considerable saving of time; also that the discharge of coal takes place from the side of the car, which allows the coal to distribute itself more equally over the surface of the screen.

Tipping is easy, because when the tippler is in its normal position, and the car full, the center of gravity is above the center of rotation; whereas it is below it after the dumping. Equilibrium is unstable when the car is full, but stable when it is empty.

When side tipplers are revolved by hand, the operation is not only slow, but also does not tend to preserve the coal. It is better to have a toothed wheel, keyed upon a constantly revolving shaft, engage one of the rollers supporting the tippler, which will cause the latter to revolve and discharge its contents with a slow regulated movement. This scheme of operation requires the attention of an attendant, who throws the wheels in and out of gear as occasion requires.

The best plan yet devised for operating a side tippler is a friction coupling arrangement, fig. 1, which makes the tipping automatic. In operating this device, a small wheel (a) is attached to a revolving shaft, and a second wheel (b) free to move, is in contact with the outer rim of the circular tippler plate. A lever arrangement, fastened on an axle, is so adjusted that when a counterpoise, on the end of the lever, is raised, a small wheel (c) which fits in a groove in the rim of the tippler plate is lifted out or released, and this causes a parasite roller (d) on the other end of the lever to engage the small revolving wheel (a) and also to press firmly against the wheel (b) which is in contact with the circular plate. The tippler then starts to revolve and continues until the counterpoise on the lever causes the wheel (c) again to fall into the groove on the plate, which completes one revolution.

Tipplers designed on these lines are much employed in Great Britain, and it has been found that the regular motion, which slowly empties the coal, is much to be preferred to a tippler acting through

gravity, which dashes the coal out and causes considerable breakage. Side tippers in America are more commonly used in the iron mines of Michigan than elsewhere.

Conveyor for Handling Coal at the Face.

BY LEON ANDRE.*

In coal faces, where the inclination is not sufficient to cause the coal to slide down under the action of gravity, an arrangement recently designed and now being used has given satisfactory results.

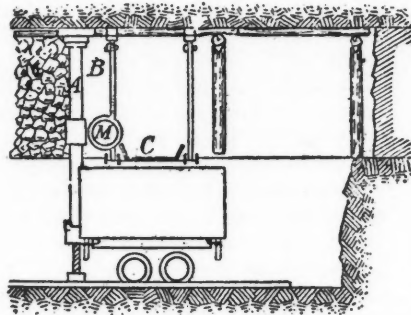


FIG. 1.

The appliance consists of a conveyor (Figs. 1, 2 and 3), made of wrought-iron troughs, about 10 ft. long, fastened together end to end, making a continuous trough, suspended from the crown-trees by means of chains provided with hooks (Fig. 1). The conveyor placed parallel to the working face, is carried far enough into the road to enable the coal to be loaded directly into the tubs (Fig. 2).

One conveyor thus erected, has been

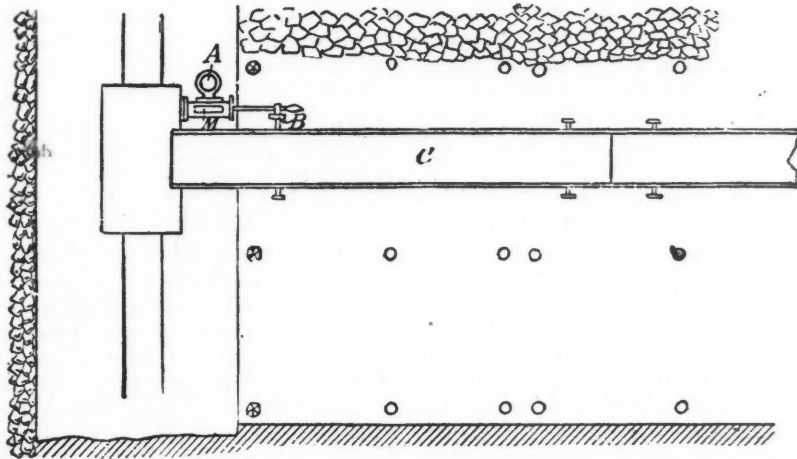


FIG. 3.

worked up to the present time by the hand of the loader, who simply gives it an oscillating movement, the effect of which is to cause the material in it to move in the direction of the inclination.

When the slope is zero, a bumping block is attached to one of the troughs, which at each forward stroke strikes against a spring fixed to the timbers.

*Abstract from *Annales des Mines de Belgique*, 1905, vol. x., p. 903.

The trough is placed as near as possible to the floor in order to enable the hewers to fill it as easily as possible, and in order to diminish the exertion required to work the appliance, this exertion being less for equal outputs in proportion as the suspending chains are longer. A man can work a conveyor from 50 to 70 ft. long, discharging 30 tons of coal per day in a seam 30 in. to 36 in. high, having a inclination of 10 to 15 degrees.

Experiments for working the conveyor by power have given satisfactory results. Each conveyor will in a short time be provided with a motor cylinder *M*, driven by compressed air, fitted upon a drill stand *A*

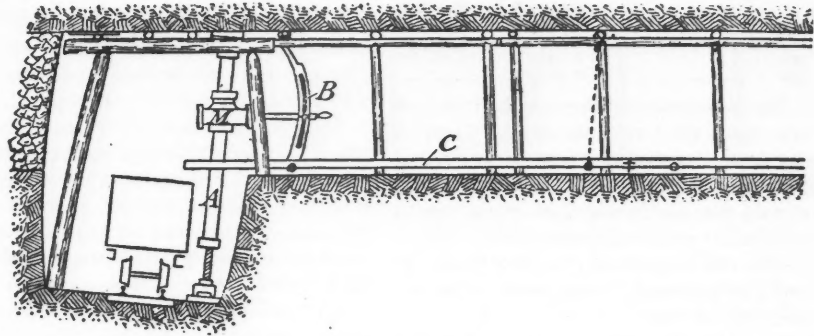


FIG. 2.

(Figs. 1, 2 and 3). The cylinder is oscillating, and the movement is conveyed by means of a link *B*. A crosshead, fixed to the end of the piston rod, works in the link *B* in such a manner as to give to the trough *C* the requisite length of stroke according to circumstances.

The percussive rock drill, being inactive during the time when coal is being taken down, can be utilized to actuate the conveyor to the limit of its capacity.

It is possible, by means of the motor, to obtain a movement of the coal or of the stone in any desired direction, whatever may be the inclination of the trough; thus, the stone cut in making high can, in case of need, be carried up the face for stowing.

The conveyor is placed in position during the night shift, and is ready for work at the commencement of the coal-filling shift.

Rescue Work in Coal Mines.

BY M. VINGOE.

After the Courrières catastrophe, the French Government appointed M. Weiss to make an inquiry concerning the alleged superiority of other nations over France in the matter of life-saving apparatus and exploring means in wrecked mines. M. Weiss has made a report in respect to the apparatus he has found in Germany and Austria. In his conclusions, after giving descriptions of all the various methods employed in these countries, he states that he found in many cases the alleged life-

saving means were dangerous to their users, as they are imperfect; and the German apparatus in particular is denounced as being not practical. He approves the Vanginot casquette, which consists of a compressed-air tank in which air at 150 kg. pressure is stored, with a valve admitting it to the helmet proper. The escape is to the air. It is heavy, but not delicate, and furnishes a natural pressure of air for at least 45 minutes. It is suggested that the Germans with their ready help rather captured French public opinion on the occasion of the Courrières disaster, and that the help done was of small avail. It is pointed out that mortality in mines in Germany is double that in France.

Electric Transmission in France.

It has been suggested that the coal mines at Lens are not too far away for a huge central electric station to be erected on the spot for the generation of electricity for transport to Paris, some 130 miles distant. The idea may take root, for at the present moment the situation in respect to electric lighting in Paris is very acute, the various concessions expiring within a year or so, and no solution of the deadlock appears in sight at the present moment. Efforts of the Paris Municipal Council toward municipalization of the electric services have been rather damped by the new law providing that no profit can be made out of enterprises undertaken by the Municipality of Paris.

The mines of Lens are among the great collieries of France, and are nearer to the city of Paris than any other large mines.

Pig-Iron Production in 1906.

The American Iron and Steel Association has received from the manufacturers complete statistics of the production of pig iron in the United States in the first half of 1906. Complete reports of production have been received from every furnace in the country. The production of pig iron in the first half of 1906 was 12,602,901 gross tons; an increase of 773,696 tons, or 6.5 per cent. over the second half of 1905; and of 1,439,726 tons, or 12.9 per cent. over the first half of last year. The production, by half-years for four years, is shown below:

	1st Half.	2nd Half.
1903.....	9,507,367	8,901,885
1904.....	8,173,438	8,323,195
1905.....	11,163,175	11,829,205
1906.....	12,602,901	

The production in the first half of 1906 was much the largest in any half year in our history and larger than of any whole year prior to 1899. It is now reasonably certain that our production of pig iron in 1906 will exceed 25,000,000 tons.

The classification of the iron is as follows, comparisons being made with the first half of 1905:

	1905.	1906.	Changes.
Foundry & forge..	2,911,883	2,869,592	D. 22,291
Bessemer pig.....	5,985,148	6,899,066	I. 913,918
Basic pig.....	1,966,592	2,449,275	I. 482,683
Charcoal iron.....	170,512	204,135	I. 33,623
Steel pig.....	129,040	160,833	I. 31,793
Total.....	11,163,175	12,602,901	I. 1,439,726

The largest proportional increase was in basic pig iron.

Included in bessemer in the first half of this year is 114,447 tons of low phosphorous iron. Steel pig includes spiegeleisen, ferromanganese, ferrophosphorus and ferrobessmer. In addition there were about 3000 tons of ferrosilicon made in the half year. Included in the charcoal pig are some bessemer and some basic iron.

The classification by fuel used in the first half of 1906 is as follows:

Fuel.	Tons.	Per Ct.
Coke.....	11,631,657	92.3
Anthracite and coke.....	754,743	6.0
Anthracite alone.....	8,779	0.1
Charcoal and coke.....	3,587	...
Charcoal alone.....	204,135	1.6
Total.....	12,602,901	100.0

Nearly all the furnaces classed as anthracite now use some proportion of coke, as will be seen from the table.

The whole number of furnaces in blast on June 30, 1906, was 323, against 313 on Dec. 31, 1905, and 294 on June 30, 1905. The number of furnaces idle on June 30, 1906, was 106, against 111 on Dec. 31, 1905, and 138 on June 30, 1905. The average output per furnace was 39,632 tons for the last half-year.

During the first six months of 1906 the number of furnaces actually in blast during a part or the whole of the period was 361, as compared with 349 during the last half of 1905, and 334 during the first half of that year.

The number of furnaces in blast June 30 and the production of pig iron by

States in the first half of 1906 were as follows:

	Furnaces.	Tons.
Massachusetts.....	1	
Connecticut.....	2	10,218
New York.....	18	746,271
New Jersey.....	8	167,820
Pennsylvania.....	130	5,688,743
Maryland.....	4	194,907
Virginia.....	14	287,806
North Carolina.....	0	
Georgia.....	3	46,865
Texas.....	1	
Alabama.....	26	830,040
West Virginia.....	3	136,662
Kentucky.....	4	35,538
Tennessee.....	14	204,043
Ohio.....	53	2,675,812
Illinois.....	20	1,011,639
Michigan.....	10	180,899
Wisconsin.....	5	190,949
Minnesota.....	1	
Missouri.....	2	
Colorado.....	4	214,694
Total.....	323	12,602,901

Oregon and Washington have one blast furnace each; but these two furnaces were not in blast during the half-year.

On June 30, 1906, there were 16 furnaces in course of construction, of which 15 will use coke for fuel when completed, and one will use mixed anthracite coal and coke. Of the coke furnaces six are being built in Pennsylvania, two in Alabama, three in Ohio, two in Illinois, one in Wisconsin and one in Colorado. The single mixed anthracite coal and coke furnace is being built in the Lehigh Valley. In addition two furnaces were being rebuilt on June 30, of which one furnace was in Western Pennsylvania and one furnace was in Michigan. The last mentioned furnace when last in operation used charcoal, but is to blow in on coke in August.

Electric Lamps as Causes of Coal Ignition.

It has been conclusively proven in many recent experiments, that an incandescent lamp, when kept in contact with some combustible material, will often cause ignition and is, consequently, a cause of danger from fire. This makes the use of such lamps in fiery mines a dangerous practice.

On the morning of May 11 last, a fire was discovered in the bottom of a small coal elevator at a large colliery. After being extinguished, it was found that the fire had been started by an incandescent electric 16 c-p. lamp at 110 volts, which had been laid on a heap of fine coal dust by a workman who was engaged in cleaning out the hole. Another occurrence of a similar nature resulted from a 16 c-p. lamp at 110 volts being laid on a bucket of fine coal dust from the disintegrator. In seven minutes smoke was seen to be rising, the heat increased rapidly, and in half an hour the temperature was 330 deg. F. The lamp was removed after 45 minutes, and at the end of an hour the temperature of the coal was 430 deg., and in an hour and a quarter was found to be on fire.

Mr. Bain, inspector of mines for the Durham district in Great Britain, speaks of several experiments he has witnessed dealing with this same subject. In one in-

stance, a lamp was buried two inches deep in coal; smoke was visible in five minutes; in nine minutes the lamp collapsed, and in an hour the coal caught fire.

Another experiment showed that when a lamp was laid on a piece of ordinary cotton waste, it took five minutes before smoke was visible, and in 15 minutes the waste was on fire. Cotton, when subjected to the same action, smoked in two minutes, and caught fire in half an hour. In the case of a suspended lamp hanging in contact with a piece of timber, the latter was found to be charred at the point of contact, but did not catch fire.

All of this evidence goes to prove that great care should be exercised in the handling of electric incandescent lamps. Under no circumstances should they ever be allowed to remain in contact with any combustible material. It is most probable that several fires, and perhaps explosions, the origin of which has been unknown, might have been traced to this cause.

As a remedy for the evil, it is most essential that the lamps, when not in actual use, should be so suspended as not to come in contact with any material object. It is also necessary to see that each bulb is enclosed in a wire casing, so that when it is laid down, the lamp itself will not touch. Nothing, however, but vigilance will eliminate the danger accruing from coal dust getting around the bulb, and being heated to the point of ignition.

New Blast Furnaces.

The American Iron and Steel Association gives the following list of entirely new furnaces which have been blown in since Jan. 1, 1906. All these furnaces were in course of construction on Dec. 31, 1905:

Furnace.	Place.	Fuel.	Yearly Capacity, Tons.
Burden.....	Troy, N. Y.	Anthracite	90,000
Lack'na No. 6.....	Buffalo, N. Y.	Coke	220,000
Cambria No. 7.....	Johnstown, Pa.	Coke	150,000
Chattanooga.....	Chattanooga.	Coke	55,000
Mingo No. 4.....	Mingo Ju., O.	Coke	145,000
Illinois E.....	Chicago.	Coke	180,000
Cadillac.....	Cadillac, Mich.	Charcoal	40,000

The yearly capacity of these furnaces is 880,000 tons. Four of them—Lackawanna No. 6, Mingo No. 4, Illinois E., and Cadillac—use Lake Superior ores; one, Cambria No. 7, Lake Superior hematite and Pennsylvania magnetite; one, Burden, magnetic concentrates from the Lake Champlain district; and one, Chattanooga, Alabama red and brown ores. The largest, Lackawanna No. 6, is 94 ft. high and 24 ft. diameter.

In every power equipment, the amount of belting, pulleys, hangers and shafting renders the losses in transmission through this complex system large. Actual tests show that these, which are usually termed friction losses, vary from 40 to 60 per cent. of the power delivered at the engine or water-wheel shaft; 50 per cent. is a very fair average.

Colliery Notes.

Coal has been discovered 25 miles south of Lourenço Marques and 2 miles west of the Tembe river in South Africa.

Coke, when intended for use in a blast furnace, should not contain more than 0.03 per cent. phosphorus, though for bessemer-steel making, it is specified under 0.02 per cent.

The tide-water coal trade of India amounts to about 2,000,000 tons per annum, of which 1,500,000 go to Indian ports and the remainder to other British colonies and Sumatra.

Since the only efficacious method of fighting fire in a coal mine is by the isolation and flooding of the burning section, it is necessary to plan previously a system of partitions and a sufficient water supply.

It is difficult to understand why it is necessary to carry 500 or 550 volts into a mine, when not more than 250 would answer the purpose in almost all cases. This question is one certainly open to legislative discussion, that is, if the lives of men are to be carefully safeguarded.

At most collieries, there is considerable exhaust steam escaping into the atmosphere, which steam could be blown into the feed-water tanks, and cause the boiler water to throw down a large proportion of the impurities, as well as sulphates. This simple manner of softening boiler water has often been found effective.

The fact that a certain coal near the outcrop is soft and easily mined, is no evidence that this condition will continue. Three or four hundred feet farther in, the character of the seam may completely change and necessitate the use of machines, high explosives, and a general revision in the method of mining as first proposed.

In considering the essential attributes of a good chain it is well to remember that if the links are long and too much of an oval shape they will stretch and do not recover themselves, but with medium-size links, of the semi-oval pattern, the elasticity is so proportioned as to minimize the severe shocks incident to rapid hoisting and quick stopping.

In the matter of coal-mining accidents, India holds a favorable position. In 1902 the average death-rate per 1000 persons employed in coal mining in all parts of the British Empire, excluding India, was 1.54. In India it was only 0.77. On the other hand, while in the rest of the Empire there were 5.41 deaths for every million tons of coal raised, in India there were 10.23.

In burning soft coal, the fireman should feed the coal gradually to the furnaces, so that only the front part of the furnace will contain green coal. When this method is adopted, the smoke produced must necessarily pass over the incanden-

cent coke which forms a bed at the back of the furnace. In this way, the smoke is consumed, the gases utilized, and greater efficiency results.

After a mine explosion, and the fan is again in operation, the exhaust or return air leaving the fan should be carefully examined to detect, if possible, any signs or odor of fire that might be going on in the workings. Nothing requires more courage and more care than to enter a burning mine where there is a possibility of much gas and after-damp, which may again explode as soon as fresh air reaches it in sufficient quantity to again form an explosive mixture.

The town of Centralia is in mourning, owing to the notice served by the Lehigh Valley Coal Company, that on August 1 it will commence the work of robbing the pillars under the town. This action is taken as a sequence of the famous Madden case, when the Supreme Court decided that the company, which had reserved the mineral rights, could rob the pillars beneath properties where they had sold the surface, the company being relieved of any liability, should the surface sink.

It is advisable in many cases to design the couplings for mine cars, so that when the car is tilted for dumping at the tippie, it is not necessary to break its connection with the preceding or following car, thus allowing the connection of the train with the motor to be unbroken. In one instance this arrangement is accomplished by using couplings consisting of three links and an eye-bolt, which is held on with jam-nuts, and the shank of which passes through the up-turned end of the draw-bar. The other end of the draw-bar is a hook; the eye-bolt acts as a swivel.

Under ordinary conditions of roof and bottom, in a coal seam not more than three feet in thickness it is best, when the coal has to be undercut, and cannot be shot "from the solid," to undercut in the coal and take down roof to secure height, rather than to undercut in the bottom under the seam and not disturb the roof. The latter system causes an uneven bottom and makes track-laying difficult. Moreover, the machine-men keep coming up into the coal, consequently mixing in dirt, and lastly, it is difficult to get the men to cut the bottom at a reasonable and uniform rate of pay.

Recent reports of mine inspectors show a number of fatal accidents resulting from carelessness in handling apparatus, or contact with exposed conductors in electrical plants. Rubber mats should be placed, and rubber gloves or boots worn. The working floor in front of a switchboard should not be constructed of metal plates, even though covered with india-rubber mats. Sectional or isolating switches, working at high pressures, should not be placed so they can be touched or operated by hand. A long insulated pole with a

hook at the end, should be used to operate such switches.

The men in a rescue party when overcome by after-damp, often lose complete control of their legs, and pitch forward on their faces. The after effects are terrible pains in the nape of the neck and head. It is recommended that rescuers engaged in building brattices and other work where they come in contact with gas-laden air, should use antipyrine and anti-febrine extensively. As much as 34 grains have been taken by a man in one day. If rescue apparatus is not at hand, handkerchiefs saturated with cold water and placed as bandages over the mouth and nostrils of the men, are invaluable.

In a large mine where distant areas are worked, and the air has to travel a considerable distance, it is not advisable to depend on a double entry system to supply the necessary ventilation. Three, four and sometimes five entries are no more than are essential to obtain the best results. It is never best to use haulways as intakes or return airways. The passing trips are constantly influencing and tending to disarrange the current of air. Furthermore, where a multiple entry system is used, a fall of roof or mine explosion will not be as likely to kill the ventilation, nor is it necessary to drive the currents with as great a velocity.

The greater part of the coal raised in India comes from mines in Bengal and Peninsular India belonging to the Lower Gondwana formation, and is but slightly younger than that mined in the United Kingdom. The Cretaceous and Tertiary coals, on the other hand, which are found in Sind, Baluchistan, Rajputana and in the foot-hills of the Himalayas, as well as in Assam, Burma and the Andaman and Nicoba islands, belong to a much later period, and contain more moisture and hydrocarbons than the older coals. Some of the Assam coals have a high calorific value, but the total output of these coals from all localities is only about 400,000 tons per year.

At the end of a day's work in many coal mines, it is usually necessary for the miners to walk from their working places to the mouth of the mine, or bottom of the shaft, in order to get out. This is not only a considerable hardship on the miner, but causes him to run no small risk from being caught in a narrow entry by the haulage motor, or from coming in contact with electric wires, often resulting fatally. This condition of things cannot be entirely avoided; but it might be possible to run two or three extra trips from certain parts of the mine at times known to the miners. This would in a way influence the men to quit work at a regular time each day. West Virginia reports three men killed last year from contact with live wires, while Ohio had six fatalities from the same cause.

Metallics.

Ropes will lie closer on a drum if well greased than if no lubrication is used.

In the production of mica, India easily leads the world with a valuation of about half a million dollars.

Experiments made with a titaniferous iron ore containing 17.82 per cent. of titanitic acid show that titaniferous iron ores up to perhaps 5 per cent. titanitic acid can be successfully treated by the electric process.

In South African tube-mill practice, French and Danish pebbles have so far given the best satisfaction, but experiments are now being carried on to determine the usefulness of "banket" pebbles from the conglomerate of the Witwatersrand.

Lining of various kinds—including wood, chilled iron, manganese steel and silex—are being tried, but so far silex has proved the most economical. Concrete blocks made of cement and banket pebbles are being tried as linings, but so far the experiments have not proved economical or satisfactory in working.

Machine-molded pig iron may be used with perfect results provided the chemical analysis of each and every carload is accurately known. If the consumer expects to use this kind of iron in the same manner that sand-molded iron is used he will undoubtedly come to grief.

Ferromanganese is one of the most valuable adjuncts in iron melting. It may be used in lump form in the cupola or as a powder directly in the ladles. If used in the latter manner a paper bag or cornucopia should be thrown into the ladle immediately before filling with iron.

Cleaning gas for engines by passing through ordinary fans with water involves the use of two or more fans in series and the necessity of considerable water and power, with not always satisfactory results. The absorption of moisture by the gas in the fans has made it necessary to supplement the fans by various drying and cleaning devices.

In electrical transmission, distance enters into consideration only in so far as it affects the size of the wire required to transmit a given amount of power. We can make the losses in the wire as low or as high as we please by increasing or decreasing respectively the size of the wire. In practice 5 per cent. is considered a commercial allowance for installations of this character.

British builders of large gas engines are using the four-cycle system, except the builders of Körting and Oechelhäuser engines, who work upon the two-cycle system. Large gas engines are gradually coming into use in Great Britain for general purposes; in addition to blowing and dynamo work, they are being applied to rolling-mills and for general manufactur-

ing purposes, cotton-mills, cement works, and the like.

For ordinary commercial analysis of sulphur in iron, by the volumetric method, where great accuracy is not required, a solution of 1 lb. Babbitt lye in 8 liters of distilled water will give satisfactory results, and the cost is trifling. An occasional blank should be run, and the bottle should always be kept tightly corked. The difference in price between the lye and caustic potash c.p. by alcohol is an item worth saving.

The manganese ore at Nagpur, India, occurs in irregular lens-shaped bodies in quartzites, schists and gneisses. It consists of a mixture of braunite (hydrated sesquioxide of manganese) and psilomelane (the hydrated dioxide), though in some cases the former alone is present. The mode of occurrence in the deposits near Vizianagram is usually similar, but occasionally the ore occurs as nodules in crystalline limestone.

The mineral known as native platinum consists of an alloy of platinum, iridium, palladium, and sometimes osmium, gold, iron and copper. The usual forms of the mineral are nuggets, scales or irregular grains. In color it varies from silvery white to dark gray and it has a metallic luster. The hardness varies from 4 to 6; the fracture is hackly, cleavage none. It is malleable, ductile and sectile, and has a specific gravity of 14 to 18.

One of the many drawbacks to the belt and shaft scheme of transmission lies in the constantly changing speed throughout the system. This is not due so much to variation in speed of the prime mover as it is to the effect of starting and stopping the various shafts or machines comprising the system. A heavy load thrown on or off in this way reacts upon the apparatus nearest to it on the system, instead of upon the prime mover, as it should.

The Bengal Iron and Steel Company has two blast furnaces in operation at Barakar, and a small quantity of ore is employed in the steel furnaces of the East India Railway Company's workshops at Jamalpur. There are also numerous small native furnaces which are still at work in Central Provinces and other parts of India. In the Central Provinces the output is stated to vary from 2400 to 4800 tons per annum. Steel is also manufactured on a small scale.

Over 90 per cent. of the world's output of platinum is obtained from Russia. The metal is known to occur over a wide area, the more important of which are the Nijni-Tagilsk, Goroblagodat and Bisersk districts. The richest deposits of the two latter districts lie along the river Iss. The area is largely composed of peridotites, olivine-gabbros and their serpentinous products. The deposits, which average 4 ft. in thickness, are of the placer type, and extend from 200 to 800 ft. on each side of the river. They have an over-

burden of peat or turf which varies from 5 to 20 ft. in thickness.

Manganese-bronze made its appearance on the market about the year 1876, and soon after aluminum-bronze began to be sold at a price which placed it within the reach of the marine engineer or other designer. For a number of years these two alloys, made by competitive companies and sold for the same purposes, became antagonistic to one another and many heated discussions took place in the trade papers about the relative value of the two alloys. Manganese-bronze finally won, and its use has increased until its name has become almost a household word.

The more complex the system of shafting and belting becomes, and the greater the distance of transmission from the source of power, the more rapidly does the percentage of friction loss increase. In comparison with this we are able, with the electric system, to transmit power from the shaft of prime mover to the shaft of driven machines with an average loss of from 20 to 25 per cent., from 3 to 5 per cent. of this being in the wiring, and the balance in the generators and motors. Moreover, we reduce the loss to this low point regardless of the complexity of the system or the distance of transmission.

The rotating electric steel furnace in the Artillery Construction Works, Turin, was described recently before the Faraday Society by M. Ernesto Stassano. The furnace described and illustrated in the paper is being installed for the Italian war office. It is of the Stassano arc type, and absorbs 140 kw., yielding 2400 kg. of steel in 24 hours. The current is alternating, with 80 volts phase difference. The consumption of electrodes is less than 5 kg. per ton of steel, and the cost of renewing the refractory covering of the furnace is 10f. per ton of metal produced. The furnace is principally used for refining pig iron and smelting scrap. The product ordinarily made is used for artillery projectiles.

It is reported that 61.8 per cent. of the total output of Indian salt is obtained from sea-water, 27 per cent. from sub-soil and lakes, and only 11.2 by mining or quarrying rock-salt. The most important source of salt belonging to the second class in the Sambhar lake in Rajputana, from which 4,000,000 tons have been removed since 1871. In recent years the quality has deteriorated on account of the increased proportion of other substances such as the sulphate and carbonate of soda and sulphate of potassium, which have not been extracted from the brine and have been allowed to flow back to the lake. The principal salt mines in India occur in the Punjab and North-Western Frontier Province and Mandi State. Although over 1,000,000 tons of salt are produced in India a considerable importation occurs, amounting to nearly 500,000 tons per annum.

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Antimony Mining.

The price of antimony continues high, although it is hardly to be expected that it will remain permanently at the present level. The great rise in the price for this metal which occurred during the last year was due primarily to shortage in the supply of ore, together with a strong demand and some boosting of the market by concerns which control the production of antimonial lead, a metallurgical alloy which now commands a handsome premium, whereas formerly it sold at a discount. Such a condition naturally stimulates prospecting for antimonial ore, and the result will be the development of new ore supplies.

This is well illustrated in the case of the United States. Formerly we produced considerable ore, the domestic output in 1895 having amounted to upward of 1000 tons, but during the last 10 years the production has dwindled to nothing, having been unprofitable at the price ruling for the metal, which during this period averaged less than 10c. per pound. Conditions are, of course, radically changed with the price for the metal at considerably more than twice the former level, and various attempts are now being made to re-open some of the old deposits, and also to develop new ones. Judging from the volume of the correspondence which we receive on this subject, there is likely to be a production of antimony ore in the United States this year. We hear of operations which are going on in Washington, Idaho, Nevada and Utah.

The great drawback to successful antimony mining is, or rather has been, the difficulty of enriching the low-grade ores to the market standard. The natural sulphide, to be considered first-class ore, must contain 50 per cent. of antimony or more, which implies a rather high degree of concentration, the pure sulphide containing 71.8 per cent. antimony. Ores with less than 50 per cent. antimony are marketed at a serious discount, while the value is moreover affected by the presence of injurious impurities, such as arsenic, lead, and pyrites.

Low-grade sulphide ore can be concentrated by liquation, either in pots or on the hearth of a reverberatory furnace, the molten sulphide draining out of the ore, and flowing to a suitable receptacle. This process is still employed by producers in Japan and Borneo, who are

very distant from the market, although even in those parts of the world it is not practiced so much as formerly.

The concentration of antimony sulphide by liquation is a wasteful process. Naturally it has been frequently proposed to substitute mechanical dressing for it. However, the latter operation is attended with difficulty, because of the brittleness of the mineral, stibnite, which is usually disseminated in fine needle-like crystals in a hard quartz gangue, wherefore, in crushing it is largely reduced to fines, which, of course, are the hardest to dress. Moreover, the needle-like crystals into which the mineral breaks make it difficult to size the crushed ore properly by screens. The mechanical dressing of antimony ores has been neglected for these reasons.

In this connection it would probably be worth while to consider the applicability of some of the new processes of ore concentration, such as flotation and electrostatic separation, to the solution of this problem. As everyone knows, there have been great advances in the art of mechanical concentration during the last 10 years, and especially in the development of a new class of processes which can accomplish successful results with certain ores that cannot be worked advantageously even by the most improved methods of jiggling and tabling. It would, therefore, be apparently worth while to find out how some of these new processes might work with antimony ores. The renewed interest in antimony mining will naturally stimulate such investigations.

Although the price for antimony may sooner or later, fall back to its former level, or at least near thereto, it is possible that the present high price, in attracting attention to a previously neglected branch of mining, may lead to such improvements in technical methods that the ores which were abandoned as profitless 10 years ago may soon be worked to advantage, even if the price for the metal becomes low. In considering an antimony mining venture, we think that attention should be directed along the lines that we have here suggested. However, the present demand for antimony, both in the form of the pure metal and as antimonial lead is so large, and the producers of antimonial lead are so much interested in keeping up the price for antimony that the outlook appears to be good for high prices for some time to come.

Commercial Considerations in Coal Mining.

The success of a mining property depends entirely on the profit accruing to the owners from its operation, which makes a consideration of the various costs the most important factor deserving attention. Notwithstanding the many years the mining industry has been extensively followed, there is still a remarkable lack of originality, or aggressive initiative in selecting means and methods of operation.

In deciding whether to install electricity, or compressed air for instance, or in determining which of the many methods and devices are best to adopt, there is commonly a neglect to consider and to attach sufficient importance to minor details of cost and economy. Every field has differing conditions of labor and problems of operation, that require special treatment.

The greatest opportunity for a mine manager to rise above his associates and competitors lies in his ability to discriminate between methods entailing greater expense and those securing economy. There should be no items of cost, pertaining either to mining, shipping, or the generation of power, with which the operator is not thoroughly familiar. Where machines are used, it is necessary that the superintendent should know which machine gives the greatest proportion of lump, and the most favorable quantities of nut and slack. Supposing one machine gives 70 per cent. lump, worth \$2.25 per ton, and 30 per cent. nut and slack, worth \$1.25 per ton, if another machine produces 60 per cent. lump and 40 per cent. nut and slack, the use of the first machine would save \$30,000 in 300 days when the average output was 1000 tons per day.

Much has been said concerning the use of electricity and compressed air, and data showing comparative cost and efficiency of the two systems have frequently been published. Accurate tests in most mines are, however, lacking, and the choice between the two systems depends largely on chance. It would undoubtedly be a surprise to most mine managers if they would collect data sufficient to permit the drawing of positive comparisons. It would also be a surprise if any accurate data could be collected of the losses caused by small leaks; as, for instance, the prac-

tice of miners in turning on the compressed air to blow away the smoke more quickly after blasting.

In conclusion we wish to emphasize the fallacy of one point, viz., that of building the mine to fit the cars, as is sometimes the case. In a low seam of coal, there is perhaps no more important consideration than the adoption of a mine car of the proper style and capacity, for where roof must be brushed or bottom taken up to secure hight, there is much expense entailed. High cars cannot get to the room faces, while if low cars are used, they must be broad to get capacity. Where this latter condition prevails, the track must be kept clean in order to prevent derailment, and there is the difficulty in oiling and clumsiness in handling. However, it is cheaper to use a car weighing 2000 lb., holding 6000 lb. of coal, and costing \$45, than to use a 1000-lb. car holding 1000 lb. of coal and costing \$30. In the latter case the dead weight equals the weight of coal, while in the first case, the dead weight is but one-third of the whole.

Such instances might be multiplied indefinitely, but space forbids. The point is that, to secure profitable operation, there should be a much closer adaptation of working methods to local conditions—which involves more care in preliminary studies—than is now usually found. Such adaptation would often make the difference between a debit and a credit in the yearly balance.

The British Meeting of the American Institute.

The joint meeting of the Iron and Steel Institute and the American Institute of Mining Engineers, held in London during the week commencing July 23, has been a great success in every way and the mining and metallurgical fraternity on this side of the Atlantic unites with the American members attending the meetings in thanking their English confreres for their generous reception. We believe that in these days of easy communications and friendliness between nations the holding of joint sessions in various countries is an idea that ought to be elaborated. The Iron and Steel Institute, perhaps more than any other body, has helped in this internationalization of technical societies, and has held a number of meetings outside the British Isles.

Besides meeting in almost every country in Europe the Institute has twice visited the United States. The present joint meeting is in the nature of a return call on the part of their former entertainers, but, aside from our duty in thanking the members of the Iron and Steel Institute for their hospitality, we ought to thank them for inducing our American Institute to hold one of their meetings abroad, and so drive in their end of the wedge of cosmopolitanism in this country. The Mexican meeting, four years ago, was a precedent, which followed the earlier visit to Canada.

Owing to the circumstances surrounding the visit it was natural that the papers discussed and the localities visited should be connected almost entirely with the steel industries, and the visitors from this side did not include many men identified with the mining or treatment of metals other than iron. Some regret may have been expressed that the Institution of Mining and Metallurgy had no part in the proceedings, with the exception of entertaining such guests as took part in the alternative excursion to Fraser & Chalmers' works at Erith. But, on mature thought, it becomes obvious that a visit of engineers interested in so wide a range of subjects would have been unwieldy, and lacking in solidarity. Perhaps at some future date the gold, copper, lead, zinc and tin men may have the opportunity of exchanging international courtesies.

The most interesting paper read at the meetings of the two institutes was undoubtedly that by Mr. Reinhardt on German practice in large gas engines. The application of blast-furnace gases for driving gas engines is in its infancy in the United States and the pioneer work here has been confined to the Lackawanna Steel Company, though it is now being taken up by the United States Steel Corporation. American engineers will find in this paper a mine of information and practical hints which will repay careful study.

THE INDEX to Volume 81 of the ENGINEERING AND MINING JOURNAL accompanies this issue. It is believed that this index is more thorough and more carefully compiled than that of any previous volume, and that it will be a valuable assistant to those who have occasion to refer to their files.

The American Institute of Mining Engineers and the Iron and Steel Institute.

BY OUR LONDON CORRESPONDENT.

The visit of the American Institute of Mining Engineers to London at the invitation of the Iron and Steel Institute, promises to be the most enjoyable of all the meetings of the Institute, and inaugurates a welcome innovation in holding meetings abroad. The visiting members have been received with a kindness and hospitality unbounded, besides which they have been present at a very important discussion on the papers read at the Iron and Steel Institute meeting on the utilization of blast-furnace gases for power purposes. It is permissible in the present state of good feeling between Britishers and Americans to play on one of the characteristic failings of the American character, and to measure the success of the meeting in dollars. It is safe to say that as far as the information obtained at this discussion is concerned, the meeting will be worth millions of money to American metallurgists.

In addition to the hospitality of their co-workers, the American visitors had the exceptional honor of being received at the Mansion House by the lord mayor, and banqueted at the Guildhall, and of visiting the king at Windsor Castle. By a happy coincidence the present lord mayor, Sir Walter Vaughn Morgan, is an iron and steel man, well known as the proprietor of the *Ironmonger* newspaper. That the king should receive the American visitors is due to some extent to the Duke of Devonshire, one of his personal friends, and himself a large ironmaster at Barrow-in-Furness, and a member of the Iron and Steel Institute.

The meeting commenced unofficially on Monday, July 23, when members of the two institutes met at the offices of the Iron and Steel Institute in Westminster to register, arrange attendances at excursions, etc., and to become acquainted with each other as far as opportunity offered. In the evening R. A. Hadfield, president of the Iron and Steel Institute, and Mrs. Hadfield, held a reception at the Grafton Galleries in New Bond street. This function was a success, and the spacious galleries were crowded with a number of notables connected with the iron and steel trades of Great Britain who were present with their wives and daughters to meet American visitors. Among them was the Duke of Norfolk, who owns half of Sheffield, and often served as its mayor.

The formal business of the meetings commenced on Tuesday morning, when members of both institutes met at the Institution of Civil Engineers, in Great George street. American visitors took the opportunity of examining and admiring this handsome building, which is situated just opposite the Houses of Parlia-

ment and Westminster Abbey, and is by far the finest building belonging to a technical society in England.

This meeting was the opening session of the Iron and Steel Institute, and R. A. Hadfield was in the chair. The attendance was such that late comers could not find a seat in the capacious theater. Robert W. Hunt, president of the American Institute, occupied a seat next to Mr. Hadfield, and supporting him were Arthur Keen, Windsor Richards, E. P. Martin, Sir James Kitson and many other leading lights in British steel circles. Among American visitors, Dr. R. W. Raymond, Charles Kirchoff and William Kent were noticeable, and there were many colleagues from France, Belgium, Germany and Austria as well.

Mr. Hadfield, in an eloquent address, welcomed the American visitors, and gave reiterated thanks for the fine time enjoyed by the members of the Iron and Steel Institute when visiting the United States in 1890 and 1904. He referred to John Fritz in loving terms, and announced that the combined meeting should send him a cablegram of united friendly greeting.

Mr. Hadfield was seconded by Sir James Kitson in extending the welcome to the American visitors. It was during his presidency that the 1890 visit was made to America, and he was also a leader of the 1904 visit. He referred in humorous terms to Abram S. Hewitt's description of Yorkshire iron as a fossil product, because it never wore out, and maintained that in spite of the great increase of American production, Great Britain's iron trade was more prosperous than ever. Yorkshire iron, was, in fact, as great a fossil as ever, and he, as a personal specimen of it, was still going strong.

Robert W. Hunt, in well chosen and well spoken words, returned thanks for the many kind expressions of greeting.

The president then announced that the Bessemer medal of the Iron and Steel Institute was to be presented to the king, who would, on the occasion of its presentation, receive a deputation of the American mining engineers. He also announced that Sir Hugh Bell, son of the late Sir Lowthian and himself one of the original members of the Institute, dating from 1868, would be the next president.

The reading of papers was then proceeded with, and three relating to the utilization of blast-furnace gases for power purposes were taken together. These were presented by K. Reinhardt, Dr. Hubert and T. Westgarth and dealt with the progress made in this new departure in Germany, Belgium and England respectively. The most important was that by K. Reinhardt, which dealt in great detail with the development of large gas engines in Germany using blast-furnace gases. It will be remembered that in early days, when these gases were first saved, they were used for firing the boilers of the blowing engines,

and for heating the blast. No doubt almost every metallurgist must have thought of applying the gases in gas engines, but they were discouraged from pursuing the idea for various reasons. In the first place the gas engine was only claimed to be effective for small powers. Secondly, the gases were charged with dust, and the provision of scrubbers and cleaners would be an expensive item. Thirdly, the gases were of low and irregular calorific value, and were not looked on kindly by gas-engine people. It is probable that the first practical suggestion was that made by B. H. Thwaite to the Glasgow Iron and Steel Company in 1894, though Dr Lürmann, in Germany, and Mr. Lencauchez, in Belgium, could not have been far, if at all, behind. Directly it was found that ironmasters were seriously inclined to take up the question, the makers of gas engines set about designing high-power engines. In 1889 a 100-h.p. gas engine was considered the limit for size, but nowadays an engine of less than 500 h.p. cannot be included in the category of large engines. Following on the use of blast-furnace gases for this purpose, came the development of the gas producer and the utilization of coke-oven gases, so that the encouragement given to gas-engine builders was greatly increased. In Great Britain, as instanced in Mr. Westgarth's paper, there are at the present time several examples of engines of over 1000 h.p. The largest is a twin-cylinder Oechelhaeuser, of 2500 h.p., built by Beardmores, of Glasgow. The same author estimates that there are 119 engines aggregating 96,085 h.p. built or building in Great Britain, distributed among six different makers. Of these engines, six are used exclusively on blast-furnace gases, and two on coke-oven gases.

Professor Hubert's paper dealt with large gas engines in Belgium, and gave complete details of the Cockerill type. He described tests with a large engine of this type at full load; the indicated horsepower was 1570, and the brake horsepower 1466. The consumption per horsepower hour was 2.247 cubic meters, and the calories used per hour were 2208 per h.p. As already mentioned, Mr. Reinhardt's paper is by far the most important presented at the meeting. It is full of practical information, and will be of great value to metallurgists in all countries. It is impossible to do justice to it here, and your readers must study it when reproduced in your columns. It may be of interest to note here that the only instance of waste gases from copper-smelting furnaces being used for gas engines is to be found at the Mansfeld company's works in Germany.

In the discussion that followed, Dr. R. W. Raymond and William Kent gave humorous accounts of the comparative ignorance in America of gas engines in general, and of their use in connection with blast-furnace gases in particular. Dr.

Raymond said that Americans were waking up to the necessity for the more economical utilization of their vast natural resources, and Mr. Kent said that for once, in a way, America was allowing other nations to bear the cost of experimenting on new departures, and waiting to step in and reap the benefit of other people's researches. Coming to more serious topics Mr. Kent gave it as his opinion that the most satisfactory method of using blast-furnace gases would be to supplement them with producer gas, so that the irregularity of their constitution might be corrected.

In the afternoon of Tuesday, July 24, there were three alternative excursions. The most attractive was to the National Physical Laboratory, an institution founded under the auspices of the Government a few years ago at Teddington, near Kew. Another was to the London county council's great electricity generating station at Greenwich, now in course of erection. This station is unfortunately situated near Greenwich Observatory and on the actual meridian, a piece of thoughtlessness on the part of the council which will probably cause the removal of the observatory before long to a high point on the Surrey or Kent hills. A third excursion was to the Armourers Hall in the city, where a wonderful collection of old metal work and plate was inspected.

In the evening there was a reception at the Mansion House by the Lord Mayor, and the historical surroundings added to the enjoyment of the occasion.

On the morning of Wednesday, July 25, the session of the American Institute was commenced in the hall of the Institution of Civil Engineers. It was noted in a bantering vein by the English visitors at the meeting that the proceedings were a quarter of an hour late in commencing, a state of things not according to their ideas of American enterprise. R. W. Hunt, the president, however, disarmed criticism by pleading as an excuse the hospitality of the Lord Mayor, whose guest he had been over night. Mr. Hunt at once proceeded to deliver his presidential address, in which he dealt with the history of the bessemer process in the United States. He traced the history and statistics of steel-rail production and pointed out the chief improvements introduced into the process by American metallurgists, making special mention of the method of casting ingots into cars and automatic stripping, in place of the old casting pits; the introduction of the Jones mixer, which enabled iron coming from the blast furnace to be treated direct in the steel furnace without intermediate cooling; the automatic tables for hauling the rails in rolling mills; McKenna's process for re-rolling old rails; automatic handling of materials charged into blast furnaces; and Gayley's proposals for drying the air blast. He also referred to the gradual substitution of steel for iron rails and the subsequent increase in America in

the carbon contents of rails; also to the gradual adoption in America since 1899 of the basic open-hearth process for making rails, a process which he considered must eventually increase to large proportions.

Mr. Hunt concluded by announcing that, in honor of the visit, the American Institute has decided to confer the dignity of honorary membership upon two English metallurgists and had elected J. E. Stead, of Middlesbrough, and R. A. Hadfield, of Sheffield. He said that this honorary membership was jealously guarded and could be considered a real distinction. According to the by-laws of the Institute only 20 could be elected and at the present time there were only eight, a remarkable fact being that no Englishman enjoyed the distinction at present. The Iron and Steel Institute had on four occasions presented its bessemer medal to Americans, John Fritz, Henry M. Howe, Andrew Carnegie, and Alexander Lyman Holley being the recipients, and this conferment of the honorary membership of the American Institute was to some extent a reciprocation of these honors.

After suitable acknowledgment from Mr. Stead and Mr. Hadfield, the meeting proceeded to deal with the papers presented. The paper which occupied practically the whole of the sitting was that entitled: "A Comparison of English and European Rail Specifications," by Albert Ladd Colby. It would be impossible to do justice here to this paper, which constituted a plea for uniformity in specifications, of chemical composition, etc., in all steel-producing countries, but the main points of interest are noted in the discussion.

Windsor Richards, of Dowlais, in opening the discussion said that Mr. Colby's plea for a maximum content of 0.10 or 0.11 per cent. of phosphorus would never be accepted in England by users of steel. The standard maximum in England used to be 0.06 per cent., and for a long time ironmasters tried to induce users to accept 0.08 per cent. as a maximum. Their endeavors were always unsuccessful, and they were only able to obtain 0.07 per cent.

Richard Price Williams said that researches into the strength and durability of steel rails depended far too much on the strength and other characteristics immediately after manufacture and before use. What they really wanted was reliable data as to the actual service of rails, that is to say, the number and nature of failures in practice, and the amount of rate of wear. Unfortunately, manufacturers were quite in the dark on this subject, as users kept no records, or if they did, were not ready to supply the metallurgical world with their information.

F. W. Harbord said he had come to the conclusion that hard and fast figures for carbon contents could not be made, for on many occasions steel rails with as

much as 0.6 per cent. carbon had stood tests perfectly satisfactorily. Mr. Hadfield urged that definite figures for phosphorus should not be demanded, as low carbon and high manganese contents counteracted the effects of high phosphorus contents. James E. York, of New York, said unreliability of rails was, in his opinion, due as much to our present system of rolling as to chemical constitution. In rolling, different parts of the sections went through at different rates, especially in flanged rails, and he was sure that fractures and failures were largely due to the internal strains thus set up.

Dr. Raymond read a written communication from Mr. Kenny, head of the test department of the Pennsylvania Railroad, in which he protested against 0.10 per cent. being adopted as the maximum for phosphorus.

In the afternoon there were three alternative excursions. One was to Thornycroft's, at Chiswick, where torpedo boats, motor omnibuses, etc., were inspected. Another was to J. & E. Hall's at Dartford, an old established firm which nowadays makes a specialty of refrigerating machinery. In view of Gayley's proposals, these works were of interest to blast-furnace men. The third excursion was the most popular of all, and the ladies added to the crowd. This was to the notable places in South Kensington, the Museums, Royal School of Mines, Imperial Institute, Hyde Park, and Kensington Gardens. In the evening, the American visitors and the members of the Iron and Steel Institute and their lady friends were the guests of the chairman and directors of the Imperial Royal Austrian Exhibition at Earls' Court.

On Thursday morning, July 26, the Iron and Steel Institute and the American Institute of Mining Engineers held a joint session, Mr. Hadfield in the chair.

Two papers were discussed. The first was that by James P. Roe, of Pottstown, Penn., in which he describes in great detail the puddling furnace invented by himself.

In the discussion, Dr. Raymond said it was at first a surprise to American metallurgists to find that the mechanical puddling process, long supposed to be defunct, should receive the attention of a distinguished metallurgist like Mr. Roe, but on subsequent investigation it had dawned on them that the new departure was an extremely important one. The speaker gave a number of instances of the failure of steel for wire fencing and corrugated roofs and structures; in fact it was a general complaint that steel was no use in situations exposed to damp. It was necessary therefore to go back to iron for these purposes, and Mr. Roe's invention, which dispenses with manual labor usually associated with puddling, was destined to a great future in the United States.

A number of members of both insti-

tutes joined in the discussion. Professor Turner was inclined to think that Mr. Roe's furnace dealt with such large masses that the eventual shapes into which they were rolled would be lacking in fiber. Mr. Bauerman pointed out that mechanical puddlers were not entirely dead, for the Danks puddler, or at least a modification of it, was at work at Terni, Italy. One of the disadvantages of the Danks furnace was the large balls made, and in the Terni modification, midriff and partitions were used so as to split up the large masses.

The other paper was that by James E. York, of New York, on "Improvements in Rolling Iron and Steel." Mr. York described his efforts to produce sections suitable for use as steel ties, and gave details of his system of rolling unusual sections. In his speech replying to the vote of thanks he relieved the monotony of a discussion on dry technical matters by a humorous account of the way he surmounted his difficulties. His version of the dispute between himself and Mr. Gray, the inventor of rolls similar to his, was greatly enjoyed by his listeners, who laughed and cheered in a way unusual in the sedate precincts of the Institution of Civil Engineers. But his remarks were too personal to be reproduced here.

This concluded the business of the joint meeting. After the usual resolutions and votes of thanks, Bennett H. Brough, the indefatigable secretary of the Iron and Steel Institute was called on for a speech. He got out of the embarrassing situation by rising to his feet and telling his listeners that the special train to Erith on the visit to Fraser & Chalmers left Charing Cross at 12:30, and that if they did not hurry up they would miss it.

As will be seen from the above account, only a few papers were actually read and discussed. A large number of other papers were presented by both institutes, but they were included in the massacre of the innocents and "taken as read."

On the afternoon of July 26, some of the visitors went to the Fraser & Chalmers works at Erith, where they were entertained at luncheon by the Institution of Mining and Metallurgy. Others went to the portland cement works at Northfleet. A third part went to the power station of the underground electric railway at Chelsea, and a fourth to the Ironmongers' hall in Fenchurch street. In the evening the members of both institutes had an informal dinner at the Crystal Palace.

On Friday, July 27, the social festivities in connection with the meeting were at high-water mark. In the morning a deputation representing the two bodies was received by the King at Buckingham Palace. Mr. Hadfield presented the Bessemer medal to the King, and introduced visitors. Those representing the American Institute were R. W. Hunt, R. W. Raymond, T. Dwight, Chas. Kirchhoff, W. P. Ward, B. F. Fackenthal, Oberlin

Smith, and J. Hartshorne. The remainder of the visitors and their hosts journeyed to Windsor where they inspected the castle, Eton College, etc. In the evening the grand banquet was held at the Guildhall. A great number of speeches were made afterward; that of R. B. Haldane, minister for war, being listened to with the greatest interest. Saturday was devoted to two whole-day excursions, one to the Dover Harbor works, and the other to Thomas Butlin & Co.'s foundry at Wellingborough, where the direct system of making steel castings was inspected.

On Sunday, special arrangements were made for the visitors, at St. Paul's, and at the Roman Catholic Cathedral at Westminster, at the Zoological Gardens, Botanical Gardens, and elsewhere.

During the week following a tour was arranged throughout England and Scotland, during which various manufacturing centers, historic remains, and points of rural beauty were visited. Subsequently tours were made in Germany. But it is impossible within the space at command to do justice to this tour.

It only remains for me to add that in every way the joint meeting has been an immense success and that Mr. Hunt was a model president. The members of the Iron and Steel Institute were princely hosts and, if anything, were even more delighted with the results than the visitors

Pig Iron in Canada.

The American Iron and Steel Association has received direct from the manufacturers the statistics of the production of pig iron in Canada in the first six months of 1906. The figures show an increase as compared with either of the two halves of 1905. The figures are:

	Tons.	
First half, 1905.....	210,206	
Second half, 1905.....	257,797	
First half, 1906.....	282,010	

The production in the first six months of 1906 was the greatest in any half year in the history of the Dominion, exceeding by 24,213 tons that of the last half of 1905, the next highest half year. It was also greater than the production of any whole year prior to 1902.

The classification of the iron made in 1905 and 1906 is as follows:

	1905.		1906.
	1st half.	2nd half.	1st half.
Bessemer.....	63,785	85,418	79,051
Basic.....	68,378	103,724	135,298
Foundry, forge, etc....	78,043	68,655	67,661
Total.....	210,206	257,797	282,010

On June 30, 1906, Canada had 15 completed blast furnaces, of which 12 were in blast and three were idle. Of this total 11 were equipped to use coke and four to use charcoal. In addition one coke furnace was being built on June 30. Three coke furnaces were also partly erected on the same date, work on which had been suspended for some time. One

coke furnace was also projected at the close of June, ground for the foundation of which is to be broken at once.

During the first half of 1906 the total number of furnaces in Canada actually in blast for the whole or a part of the period was 13, of which 10 used coke and three used charcoal. The number of furnaces that were idle during the whole period was two, of which one used coke and the other used charcoal when last in blast.

Pyrometry in the Foundry.

BY REGINALD MEEKS.

The thermo-electric pyrometer has been successfully used in many branches of metallurgy, but the manufacture of cast-iron presents almost a virgin field. It has been tried to a limited extent in a few foundries, but little has been written about it. The temperature of molten cast iron plays an important part in the character of the finished product, and the founder who does not have to guess at temperature is in a better position to turn out perfect castings than he who attempts to use his eye to determine "hot" or "cold" iron. Although exceedingly shrewd guesses are made every day, still no man is infallible and "cold shut" is frequently found in castings which should have been given special care.

The Le Chatelier pyrometer is too well known to require description here. In foundry practice the couple, enclosed in a fire-clay tube, is introduced into a hole drilled through the shell and lining of the reservoir ladle, and the junction of the pyrometer comes to within 0.5 in. of the molten metal. In this way the record of each heat may be observed at any time and claims of "cold iron" may be substantiated or denied. In shops working by the piece such a check soon proves its value, because loss through cold iron could not be laid against the company if hot iron was delivered to the operative.

Used in connection with the pouring ladle the correct temperature for pouring may quickly and accurately be determined. In malleable foundries the annealing of castings is of prime importance and here accurate temperature knowledge must be of great value. Annealing pits for car-wheels could readily be equipped and core-ovens would certainly profit by the intelligent use of a thermo-electric pyrometer.

An attempt is being made by the Sociedad Azufrera de Sechura of Lima, to introduce Peruvian sulphur into the American market. The Peruvian deposit is not far from the Bay of Sechura in the north. A railway 45 km. long is nearly completed, with terminus at Bayovar, which will soon be an importation port. The materials to build a jetty at Bayovar to facilitate shipments have been received from Europe.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

Native Oil Concentration in Colombia.

Sir—The discussion of priority in the first application of the oil-concentration process brings to my mind an observation I have never seen in print. The native placer miners in Colombia, who are mostly of Indian descent, reduce their gold concentrates to a small bulk by the usual pan or *batea* process. Then, for the final separation of gold from the black sand, the bark of a tree called *balsa* is macerated, and the gum thus set free is stirred into a pan of water until the water assumes the consistency of very thin paste, when the black sand, carrying the gold, is stirred into the thickened water. The gold settles to the bottom, and the thickened water containing the black sand in suspension is quickly poured off. The settled gold is again stirred up with another dose of prepared water, and the remaining black sand is decanted off as before. Three or four applications are sufficient. The black sand, now containing only the fine or flour gold, is washed in clean water to free it from the mucilaginous bath. At this point the somewhat acid juice, squeezed from the leaves of a tree called *suribio*, is added to a pan of fresh water and the black sand *batead* in this. The fine gold now has the property of adhering to the bottom of the wooden *batea*, and the clean black sand is easily washed off in the usual manner. A pound of gold can thus be cleaned from its accompanying black sand in fifteen minutes.

G. R. SNOVER.

Medellin, Colombia, July 3, 1906.

New Publications.

"A Gazetteer of Colorado." By Henry Gannett. Bulletin No. 291, U. S. Geological Survey. Pp. 185. 6x9 in.; paper. Washington, 1906: Government Printing Office.

"Illogical Geology. The Weakest Point in the Evolution Theory." By George McC. Price. Pp. 93. 6x9 in.; paper, 25c. Los Angeles, 1906: The Modern Heretic Company.

"Elektrolytische Alkalichloridzerlegung mit flüssigen Metallkathoden." By Dr. R. Lucion. Pp. 206; illustrated. 6½x9½ in.; paper, 9 marks. Halle a. S., 1906: Wilhelm Knapp.

"Relazione del Direttore della Carta Geologica (Ing. N. Pellati) sui Lavori Eseguiti nel 1904 e Proposte di quelli da eseguirsi nel 1905." Pp. 54. 6½x9½ in.;

paper. Rome, 1905: Tipografia Nazionale di G. Bertero E. C.

"The Montana Lobe of the Keewatin Ice Sheet." By Fred H. H. Calhoun. Professional Paper No. 50, U. S. Geological Survey. Pp. 62; illustrated. 9x11½ in.; paper. Washington, 1906: Government Printing Office.

"A Century of Copper. Statistical Review of the Nineteenth Century and the First Five Years of the Twentieth Century." By Nicol Brown and Charles C. Turnbull. Second Edition. Pp. 33. 7½x10 in.; paper, 2s. 6d. London, 1906: Effingham Wilson.

"Slate Deposits and Slate Industry of the United States." By T. Nelson Dale, with sections by E. C. Eckel, W. F. Hillebrand and A. T. Coons. Bulletin No. 275. U. S. Geological Survey. Pp. 154; illustrated. 5½x9 in.; paper. Washington, 1906: Government Printing Office.

"The Geology and Mineral Resources of the Norseman District, Dundas Goldfield." By W. D. Campbell. Western Australia Geological Survey, Bulletin No. 21. Pp. 140, with a two-sheet geological map, five plates and 19 figures; illustrated. 5½x8 in.; paper. Perth, 1906: A. Curtis, Acting Government Printer.

"Mineral Resources of Kenai Peninsula, Alaska." U. S. Geological Survey, Bulletin No. 277. Pp. 80; illustrated. 6x9 in.; paper. Washington, 1906: Government Printing Office.

Contents: Gold fields of the Turnagain Arm region, by Fred H. Moffit. Coal Fields of the Kachemak bay region, by Ralph W. Stone.

"Things that are Usually Wrong." By John E. Sweet. Pp. 52; illustrated. 5½x8 in.; boards, 50c. New York, 1906: Hill Publishing Company.

This is mainly a reprint from the *American Machinist* of articles dealing with accepted practice in shop work. The author believes much of this to be wrong, and gives his side of the argument in a practical way.

"Moody's Manual of Railroads and Corporation Securities, 1906." Pp. 2786; with maps; 6½x9; cloth. New York, 1906: The Moody Corporation. Price \$10.

Contents: Section 1, membership lists of the stock exchange of the United States; Section 2, American and Foreign Government and State Securities; Section 3, Steam Railroad Companies of the United States, Canada and Mexico; Section 4, Electric Traction Companies; Section 5, Gas and Electric Light Companies; Section 6, Water Supply Companies; Section 7, Telegraph, Telephone and Miscellaneous Corporations; Section 9, Mining and Oil Companies; Section 10, Financial Institutions of the United States.

This annual volume is out and is being distributed to subscribers. This voluminous work is too well known in financial

circles to require much description and its usefulness is well established. Year by year the number of pages has increased until in this, the seventh volume, we find nearly 2800 pages devoted to the ten sections of the book. Seven of these sections are strictly competitive with other handbooks of a similar nature, and the other three are considered of sufficient importance to warrant their re-publication in a separate volume. It will be seen from the contents that all enterprises of any importance have been covered, and it is worthy of remark that they have been carefully and ably handled.

As a reference book for accurate and concise information on corporate organizations the "Manual" is invaluable to the busy man or to the investor.

A Modification for the Determination of Manganese in Iron.

BY REGINALD MEEKS.

In the Ford-Williams method for determining manganese, filtering is done on an asbestos plug and this is later returned to the original beaker for titration with potassium permanganate. When pig or cast iron is dissolved, the graphite, which stays throughout the determination, soon contaminates the asbestos and the end point must be determined against a gray background. This requires considerably more skill and experience than if the asbestos were pure white. In order to obviate this difficulty the following modification is offered which, I believe, has never been previously described.

Two grams of borings, separated by magnet, are weighed into a No. 3 Griffin beaker. Dissolve in 25 c.c. hydrochloric acid (1.2 sp.gr.) and evaporate to dryness. Take up with 20 c.c. nitric acid (1.20 sp.gr.) and boil. Filter on a small cotton plug (filtering is extremely rapid) and wash with as little water as possible to effect a clean separation from silica and graphite. Boil down to about 10 c.c. and add 20 c.c. concentrated nitric acid, and boil till no red fumes come off. Add 5 grams potassium chlorate and boil 5 minutes. Filter on asbestos.

The asbestos plugs should be of generous proportions and packed tightly into 3-in. funnels connected to the suction by means of suction-flasks. Throw about 20 c.c. concentrated nitric acid on the filter and follow with the precipitated manganese dioxide. Five washings of water will usually free the filter from acid, after which the plug is transferred to the original beaker, ferrous sulphate is added and titration is performed in the usual manner. By this method the asbestos is kept pure white and may be used almost indefinitely. By using suction in filtering, the speed of the operation is greatly enhanced with no loss of accuracy. The total determination may be made in 1 to 1½ hours by a skilful operator.

Mining Notes from the Yukon.

SPECIAL CORRESPONDENCE.

Advices received here from Ottawa are to the effect that the Miners' Lien ordinance has been gazetted. This has been adopted by the Government of Canada in response to a memorial of the Yukon council, requesting the enactment of a law to give wage earners of Yukon Territory adequate and proper security and protection for payment of their wages, and providing for collection of the same as expeditiously as possible. Prior lien against both the products of labor of the wage earner and the mining claim on which his work has been done, is granted under this law.

Changes have been made in the regulations governing the deposits of gold and charges thereon in the Dominion assay office. Among these is the following: On gold on which royalty has been paid: First charge; assaying and stamping charge, 0.125 per cent. on the gross value of the gold and silver contained in the deposits. Second charge; parting and refining charge, 4c. per oz. on the weight after melt. Third charge; toughening the alloy, 2c. per oz. on 1/11 of the standard weight of gold contained in the deposit." On gold on which no royalty has been paid, an additional charge of \$1 is to be exacted.

Chester A. Thomas, manager of the two Guggenheim incorporations recently licensed to transact business in Yukon Territory, and known as the Northwest Hydraulic Mining Company and the Yukon Consolidated Goldfields Company, has been quoted by the *Yukon World* as authority for the following statements: The latter company intends to build this season three dredges, all to be operated on Bonanza creek. Thirty-eight carpenters, for dredge-building work, have been engaged at Vancouver, B. C. Much of the timber to be used in the construction of these dredges, and some of the machinery, had already been received. It is not doubted that these dredges will be ready for operation by the opening of next season. As to the Anglo-Klondike and other groups already having hydraulic plants on them, purchased by the companies above named, work on these will be continued as in the past, until such time as the big ditch to increase the water supply shall be completed, when operations will be on a larger scale. Ditch construction is being pushed as rapidly as practicable under existing conditions, but after receipt of additional equipment that has been ordered, including two steam shovels, greater progress will be made. There are already more than 200 men employed on this work, which is as many as can be employed to advantage at present, and the company will put on more as fast as room can be made for them to work.

It has been announced that, as a result of representations made from Daw-

son, relative to rates charged by the White Pass & Yukon railway, on freight sent over its railway from Skagway to Whitehorse, and thence by water, the chairman of the Canadian Government railway commission, accompanied by a traffic expert, will this summer visit Dawson and other Yukon points affected for the purpose of investigating the charges made that freight rates are excessive.

President S. H. Graves, of the White Pass & Yukon, is expected shortly to reach Dawson on his annual visit of inspection. While in the Yukon he will look into the proposed construction of a branch railway to Windy Arm, where it is believed mineral development will shortly warrant the provision of transportation facilities.

The outlook for the season in the Klunane district, in the southwest part of the Yukon, is reported as more favorable than at any time during three seasons last past. This report relates to Bullion, Sheep, Burwash, Fourth of July and other districts. The Bullion Hydraulic Company is stated to be doing fairly well, but is handicapped by shortage of men. It is claimed that the gravel washed yields gold to the value of \$5 per cu. yd., consequently a good clean-up is looked for.

The development of the Five Fingers coal mine along new lines, is being steadily proceeded with. After George J. Milton took charge, he arranged for the use of the Government diamond drill for prospecting purposes, but, owing to the broken nature of the formation, and the lack of sufficient casings, it was decided to open up the property without first using the drill. Accordingly a prospecting shaft was sunk, and at 30 ft. depth it entered a seam between 5 and 6 ft. in thickness, of better quality coal than any previously found on the property. A slope was then driven into the hillside, connecting with the shaft at 125 ft. and thence in the coal to a distance of about 300 ft. From the entrance to the slope a wharf has been built out 100 ft., and on this have been constructed bunkers, screens and a tippie for placing the coal on steamers and barges. It is stated that fully 1000 tons of merchantable coal from this mine will be delivered in Dawson this summer, and that next year the available supply will be fully equal to all demands.

In the Burma oilfields steps are being taken toward the adoption of the bulk system of transport and distribution. A pipe line has been laid from the oilfield at Yenangyat through the Singu field to Yenangyaung, the principal oil-producing area, a distance of more than 50 miles, and arrangements are now being made to connect the last mentioned field in the same way with the refineries at Rangoon, 275 miles distant. At the same time tank steamers have been purchased and storage tanks have been constructed at the principal Indian ports.

Emerald Mines of Austria.*

BY ARTHUR THOMPSON.†

These mines, which are located in the Salzburg mountains at an altitude of over 8,000 ft. above the sea, and distant seven miles from Habach Station on the narrow-gauge railway from Zell-am-See to Humel, until last year were being worked by some London diamond cutters, but in a dilatory manner, with evident want of methodical mining. They are well known as the most important emerald mines in Europe. In 1902, the last year in which anything like active mining operations were carried on, about 68,000 carats were turned out by six miners in less than four months.

The emerald-bearing matrix (a mica-ceous and steatitic formation) is reached by four levels driven into the steep declivity of the mountain. The emerald-bearing strata are defined on one side by a highly hornblende schist, and a massive, well-marked gneiss formation on the other, while in some parts between these formations large outcrops of serpentinous and other magnesian rocks are observable.

The greatest depth reached in any of the workings of these Salzburg mountain mines is only some 200 ft. from the escarpment of the valley. These mines were thoroughly examined and more or less prospected last year by Spargo & Sons, of Liverpool, for the Northern Mercantile Corporation, Limited, of London and Manchester, which on receipt of report purchased them. Emeralds from these mines may be found in numerous large jewelry establishments in Austria, although the sales of the products of these mines by the late owners were chiefly effected in India.

Bismuth Ore in Colorado.

E. L. White, commissioner of mines, informs us that the output of bismuth ore in Colorado, during the year 1905, amounted to 18,405 lb., containing 1688 lb. of metallic bismuth, an average of 9.17 per cent. About 10 tons of 7-per cent. ore, in addition to the above, remained in bins at the end of the year.

The entire output comes from Leadville. The President mine is the principal source of bismuth ore, some of its product carrying as high as 14 per cent. bismuth, but the majority of it carries only 8 per cent. metal. Gold and silver are also contained in the ore in varying quantities, up to 1 oz. each. The Penn mine is another producer of bismuth ore.

The production of gold in New South Wales in June was 15,208 oz., valued at £56,247. The production during the first six months of 1906 was 160,659 oz., valued at £565,581, as against 131,278 oz., valued at £475,189 during the first half of 1905.

*Abstract of communication in London *Mining Journal*, June 30, 1906.

†22 Imperial Chambers, Liverpool, England.

Origin of the Diamond.

At a meeting of the Royal Society of New South Wales, May 2, 1906, E. F. Pittman exhibited a specimen of diamond in the matrix. It was found at Oakey Creek, near Inverell. The diamond is a small one, weighing about one-third carat. It is embedded in dolerite. The dolerite occurs at Oakey Creek as a pipe or dike, and the specimen is of special interest as throwing light upon the origin of the diamond; for it is a fair assumption that the gem was actually formed in the dolerite when the latter was cooling or solidifying from the molten state.

The origin of diamonds has for many years been a subject of controversy. In South Africa, the stones were at first found in alluvial deposits formed of river gravels, but were ultimately traced back to a bluish-green rock, which proved to be a volcanic agglomerate filling the pipes of old volcanoes. The diamonds were found scattered irregularly through this agglomerate locally known as "blue-ground," and for some time it was thought that this was the actual matrix of the diamond. Fragments of a crystalline rock, known as eclogite, are however, found in the agglomerate, and ultimately Professor Bonney announced that in his opinion the eclogite was the actual matrix of the diamond, but that the eclogite occurred in the volcanic pipes in the form of water-worn pebbles, which had probably been derived from a bed of conglomerate of still greater age, and which had been broken through by the volcano at the time of its eruption. Dolerite as a matrix for the diamond was unknown until the discovery of the specimen near Inverell.

The Kansas-Oklahoma Oil Field.

BY C. N. GOULD.*

This oil field is being steadily developed southward. Drilling began in southern Kansas several years ago and the productive area has been extended until it includes a dozen or more counties in that State. In Oklahoma and the Indian Territory oil has been found chiefly in three areas, at least two of which are along anticlines. There are a number of other anticlinal folds in the carboniferous rocks of the territory where no drilling has yet been done, but where oil and gas will probably be found in considerable quantities.

The anticlinal theory of oil and gas deposits has thus received additional confirmation in Oklahoma. All the oil so far found in that State is from carboniferous rocks, the greater part of it coming from the lower part of the Pennsylvanian.

In Osage, Cherokee and Creek nations, where the greatest development

has taken place, the rocks dip at rather constant angles to the west. In this region, however, there are occasional broad anticlines, the axes of which run approximately parallel to the strike of the rocks. It is along these anticlines that the greater part of the oil has been found. The most extensive field extends from Peru, Kansas, south along the Osage-Cherokee line, past Tulsa and Red Fork, as far as Mounds, a distance of over 50 miles. Another similar field is being developed 25 miles farther east.

The oil industry in the new State of Oklahoma is still in its infancy. The drillers have been slowly working south and have not yet penetrated what appears to be the most prolific oil regions. There are a number of anticlines in regions yet unexploited, which will probably develop into fields more productive than any yet found.

It is reported that an agreement regulating the price of salt and the output in the United Kingdom has been practically completed between the Salt Union, Limited, and every outside salt manufacturer of the United Kingdom. Great prosperity for all concerned, except the consumers, is predicted.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

- Published Week Ended July 24, 1906.*
- 826,557. PROCESS OF REDUCING METALS.—George L. Fogler, Pittsburg, Pa. Filed Aug. 19, 1904.
- 826,568. FLUX FOR EXTRACTING METALS FROM ORES.—Adolf Gutensohn, Southend, England. Filed Nov. 3, 1905.
- 826,569. MINER'S TOOL.—Ole Hanson, Mercur, Utah. Filed Nov. 2, 1905.
- 826,614. PROCESS OF MAKING HYDROCHLORIC ACID AND CALCIUM CARBIDE.—William H. Seamon, El Paso, Tex. Filed March 14, 1906.
- 826,659. APPARATUS FOR AUTOMATICALLY SIGNALING THE PRESENCE OF DELETERIOUS GASES IN THE ATMOSPHERE.—Henri Hauger, Paris, France. Filed April 29, 1905.
- 826,723. PROCESS OF PRODUCING ARTIFICIAL FUEL.—George W. Herbels, Seattle, Wash. Filed Aug. 9, 1905.
- 826,726. STAMP MILL.—John Hunt and Charles A. Hunt, Los Angeles, Cal. Filed Oct. 20, 1904.
- 826,731. SEPARATOR.—Frederick Meyer, Chicago, Ill. Filed April 18, 1902.
- 826,742, 826,743 and 826,744. PROCESS OF REDUCING METALLIC COMPOUNDS AND PRODUCING CARBIDES.—Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y., a corporation of Virginia. Filed Oct. 13, 1903.
- 826,745. APPARATUS FOR REDUCING COMPOUNDS AND PRODUCING CARBIDES.—Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y., a corporation of Virginia. Filed April 4, 1904.
- 826,747. APPARATUS FOR PURIFYING GAS.—Thomas Redman, Bolton, Bradford, England. Filed Aug. 22, 1904.

- 826,763. MANUFACTURE OF REFRACTORY MATERIAL.—Henry A. D. Collins, Abermelle, England. Filed July 20, 1903.
- 826,925. PROCESS OF SULPHATIZING ORES, ETC.—Ernst Enke, Kattowitz, Germany. Filed Nov. 15, 1905.
- 826,931. BALL-BEARING FOR HYDRAULIC GIANTS.—Morris L. Gordon, Selad Valley, Cal. Filed June 19, 1905.
- 826,948. PROCESS OF MAKING AGGLOMERATES AND AGGLUTINANTS.—René A. Le Maitre, Brussels, Belgium. Filed Aug. 14, 1905.
- 827,057. APPARATUS FOR COOLING ORE.—Henry F. Campbell, Melrose, Mass., and David H. Campbell and Thomas H. Smith, Denver, Colo.; said David H. Campbell and Smith assignors to said Henry F. Campbell; Jeannette F. Campbell, executrix of said Henry F. Campbell, deceased. Filed Dec. 11, 1903.

GREAT BRITAIN.

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

- Published Week Ended July 14, 1906.*
- 12,371 and 12,371 A of 1905. N. V. Flitts and R. P. Akins, Denver, Colo., U. S. A. Improvements in vibratory screen mechanism for use in classifying ores.
- 19,400 of 1905. E. A. Hallwood, Morley. Improvements in miners' safety lamps, with the object of preventing unauthorized persons opening them.
- 22,080 of 1905. R. Cellarius, Russia. In sulphuric-acid manufacture, passing the gases before going to the chamber through damp clay walls to remove dust, and through similar chambers afterward to remove surplus nitrous gases.
- 26,076 of 1905. J. L. Babe and A. L. Louvrier, Honfleur, France. A furnace for the direct volatilization of zinc and lead ores, having one longitudinal aperture at the bottom for the entry of the draft.
- 3023 of 1906. F. Hosking and A. Curnow, Mysore, India. Improvements in the mechanism used in ore feeders for stamp mills.
- Published Week Ended July 21, 1906.*
- 5648 of 1905. E. A. Ashcroft, London. Improvements in the inventor's electric furnace for treating fused salts, etc., the object being to obtain, by magnetic means, an efficient circulation of the material treated.
- 12,868 and 12,869 of 1905. K. Goldsmidt and J. Weber, Essen, Germany. Improvements in carrying out the process of de-tinning scrap by means of dry chlorine or an anhydrous compound containing chlorine, such as tetrachloride of tin.
- 13,127 of 1905. J. Hargreaves, Widnes. Removing iron from brine by changing the ferrous salts to ferric by the introduction of gaseous chlorine.
- 13,280 of 1905. W. Morgan, Glamorgan. Improvements in miners' safety lamps so that the glass chimney need not be removed when the gauze is removed.
- 15,375 of 1905. F. C. W. Timm, Hamburg, Germany. A specially designed furnace for mixing lime or other material with blast-furnace slag, the object being that the mixture shall be homogeneous.
- 17,198 of 1905. H. and F. Hurlbutt, Mold. Improved method of forming brick packing for use in acid towers.
- 19,986 of 1905. Chemische Fabrik Griesheim Electron, Frankfort, Germany. Concentrating dilute nitric acid by mixing with a polysulphate, the hydrate of which is subsequently restored to anhydrous form by further heating.
- 4407 of 1906. T. Griffiths and W. H. R. Forsberg, London. Improvements in machines for sharpening miners' drills, actuated by rotating hammers, the object being to prevent the waste of metal usual in this type of sharpener.
- 6122 of 1906. A. Pezzolato and M. T. de Felice, Rome, Italy. The production of separate sulphates of aluminum and potassium from potassium alum by adding potassium sulphide, and the subsequent recovery of the latter.
- 6484 of 1906. A. Tropenas, Montelmar, France. Adding ferrosilicon to metal in converter just after the appearance of the carbon flame, thus obtaining a steel of the required amount of carbon without any excess of silicon or oxide of iron.
- 7598 of 1906. Allmanna Svenska, Elektriska Aktiebolaget, Westeras, Sweden. Improvements in smelting furnaces of the shaft type, using a reservoir of metal at the bottom to act on a resistance in an electric current and so increasing the temperature of the furnace.

*Oklahoma State University, Norman, Oklahoma.

Personal.

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

Carlton H. Hand, a mine operator of Butte, is inspecting properties in Idaho.

Foster Hewett has returned to Pittsburgh from a trip to the Cobalt district in Ontario.

Thomas Edison, the inventor, is prospecting for cobalt ore in Lincoln county, in North Carolina.

E. W. Moore, manager of the Galena Iron Works, Platteville, Wis., was a visitor in New York last week.

Hudson H. Nicholson is visiting Goldfield and the new camps of southern Nevada on professional business.

Col. E. B. C. Hambley, manager of the Whitney mines in North Carolina, is confined to his bed with typhoid fever.

Walter Harvey Weed, of the United States Geological Survey, was in Butte a few days during the latter part of July.

Senator W. A. Clark is looking after his mining interests in Butte. He returned recently from Arizona and Nevada.

H. P. Naylor, late of Winnipeg, has been appointed manager of the Port Arthur (Ont.) Sand Lime Brick Company.

A. S. Harvey, of Leadville, Colo., has returned to the United States after several months in Mexico, looking after his mining and other interests.

R. T. Schraubstadter, of St. Louis, Mo., is in Mexico on professional business, having just completed a six months' examination of the west coast of Mexico.

A. B. W. Hodges, general superintendent for the Granby Consolidated, Grand Forks, B. C., is spending a month's summer vacation at the seaside near Vancouver.

Austin King, of Pennsylvania, is suing the Dominion Coal Company, of Sydney, N. S., for damages for wrongful dismissal from the position of superintendent of mines.

O. F. Westlund, manager of the Oaxaca Smelting Company, and the Michoacan Metallurgical Company, has returned to Mexico from a trip to the United States.

Anthony J. McMillan, general manager of the Le Roi Mining Company, was in Toronto, Ont., the last week of July, on his return journey from London, England, to Rossland.

Gilbert J. Roote, mining engineer, has returned from Nevada, where he has been making prolonged examinations, and has opened an office at 1260 O'Farrell street, San Francisco.

Francis M. Simonds and Elmer L. Burns recently returned to New York after two months spent in examining

mining property, chiefly in the State of Guerrero, Mexico.

Arthur C. Carson, manager of the property of the North Butte and Coalition, in the Butte district, is visiting relatives in California. He is expected in Butte about Aug. 10.

A. P. Low, director of the Dominion Geological Survey, Ottawa, has left for Mexico to attend the triennial geological congress, visiting some of the British Columbia mines on the way.

E. B. Hendrie, president of the Hendrie & Bolthoff Manufacturing and Supply Company, has returned to Denver after several weeks spent at his summer home in Estes Park, Colorado.

John Fulton, mining geologist of Johnstown, Penn., sails for Porto Rico on Aug. 18, to examine some magnetic iron-ore deposits for Eastern capitalists. Mr. Fulton will be absent four or five weeks.

H. W. Hardinge arrived in Denver a few days ago from a professional trip in southwestern Colorado. He is at present constructing a 75-ton concentrating plant at Crystal, Colo., and expects to return to New York early in September.

Samuel James, who recently resigned his position as superintendent of Los Arcos Mining and Smelting Company, in the State of Guerrero, is now in charge of the plant of the National Metallurgical Company, at Matehuala, in the State of San Luis Potosi, Mexico.

C. L. Dignowity has established himself in Reno, Nevada, and has opened an office there. He has also organized the Dignowity Exploration and Exploitation Company for the purpose of opening and developing mining prospects.

C. W. McDougall, late of the Quincy Mining Company, Hancock, Mich., has resigned the position of assistant mining engineer with that company to accept that of chief mining engineer of the Hancock Consolidated Mining Company.

J. Howard Wainwright has retired from the firm of Simonds & Wainwright, mining engineers, New York. The firm will hereafter be Simonds & Burns, the members being Francis M. Simonds and Elmer Z. Burns. The latter has been a member of the firm for several years.

Robert H. Richards has just returned to Boston from a visit to Virginia, where he had been advising in regard to pyrite concentration. Professor Richards will be in or near Denver Aug. 14 to 24, where he can be consulted on concentration of ores. His address is care Denver Engineering Works.

Byron E. Janes, head of the mining department of the University of Idaho, left Moscow on July 22, accompanied by two students, on a six weeks' horseback trip, going through the mining counties of southern Idaho, and on his return journey inspecting mines at Idaho city and in the Cœur d'Alenes.

Wm. A. Pomeroy has recently been reappointed general manager of the Palmarejo & Mexican Goldfields, Ltd., and has also been engaged as consulting engineer to the Oxnam Prospecting Company, No. 1, Ltd. This latter company is building a new mill on its property near Chinipas, Chihuahua, Mexico.

J. Kojima, who is in charge of the Ashio copper mines, Japan, is returning to that country, after having spent six months in inspecting many of the largest and most important mines and metallurgical works in the United States and Canada. He was at the Granby smelting works and mines in the Boundary district of British Columbia on July 18 and 19, and proceeded thence to Seattle, Wash., to take steamer from that port to Japan.

S. S. Fowler, of Nelson, B. C., has been appointed general manager of the Canadian Metal Company, in place of J. J. Constant Fernau, whose retirement from this position took place last month. The company is operating several mining properties in the Ainsworth and Slocan districts of British Columbia, and a zinc smelter at Frank, Alberta. Mr. Fowler has been actively engaged in the management of mines in West Kootenay for years.

Thomas Kiddie has returned to Victoria, Vancouver island, B. C., after a month's stay at the Harrison Hot Springs, where he has been. Mr. Kiddie is under engagement to proceed shortly to Prince of Wales island, Alaska, as manager of the Alaska Smelting and Refining Company's smelter, in place of Paul Johnson, who is returning after having built and successfully operated these works. Mr. Johnson proposes to return to his native land, Sweden, with his family, and to remain there.

A. A. Cole, whose appointment as expert mining engineer to the Timiskaming & Northern Ontario Railway Commission was mentioned in the JOURNAL of July 21, was for several years chief assayer at the War Eagle and Centre Star mines, Rossland, B. C. Later he was engaged as mining engineer and geologist in those mines, in which capacity he was last month succeeded by J. K. Cram. Mr. Cole was secretary to the British Columbia Assayers' Institute during the active life of that organization.

Obituary.

George Jones Atkins, of London, died recently, quite suddenly. Mr. Atkins was a prolific inventor of metallurgical and chemical processes. His dry process for producing acetylene has been a great success, and is used by many railway companies and other large bodies in England. He was the inventor of the "oxychloride" process, for producing hypochlorites, which is used for bleaching flax in Scot-

land and Ireland. Many of our readers will remember him as the inventor of an electrocyanide process for extracting gold from rebellious ores, but we do not think it proved to be of commercial value.

Industrial.

Smith, Emery & Company, chemists and chemical engineers, 83-85 New Montgomery street, San Francisco, are now at their Oakland office, No. 1068 Broadway, corner Twelfth street, Oakland, Cal.

The Crocker-Wheeler Company has now opened an office and warehouse at 208 First street, near Howard, San Francisco, Cal., with H. C. Baker as local manager. It has also opened an office at 447 Pacific Electric Building, Los Angeles, Cal., with L. Cummins as representative, and is arranging to establish an office in Seattle, Washington, in the near future.

The London branch office of the Buffalo Forge Company, and the Buffalo Steam Pump Company, has been changed from 39 Victoria street, East, to Caxton House, Westminster. This change has been made necessary by the constant and rapid growth of the company's business in Great Britain. The new offices afford an extra space and are more conveniently located.

The Carnegie Steel Company has purchased for its Homestead works two 2000-kw. alternating-current generators driven by gas engines. These units are to be furnished by the Allis-Chalmers Company, of Milwaukee, and they complete an order recently given for machinery costing approximately \$1,000,000. It includes three gas-engine driven electric units and four gas blowing engines, the aggregate capacity of these machines being 30,000 h.p., nearly.

The Traylor Engineering Company, and the Traylor Manufacturing and Construction Company, have been consolidated into one corporation, under the name of the Traylor Engineering Company. Under the old arrangement the Engineering company did the dealing with the public while the Manufacturing and Construction company owned the works at Allentown, Penn. The new corporation is organized under the laws of New York, and takes over all the assets and business of the older corporations and assumes their liabilities. The officers of the new corporation are: President and treasurer, Samuel W. Traylor; vice-president, Bruce W. Traylor; assistant treasurer, Frank W. Hopkins; secretary, Joseph S. Buhler. The capital stock authorized is \$600,000. Of this amount \$500,000 is issued to pay for the properties and business taken over, and the balance remains in the treasury for future needs.

The Bay View Works of the Illinois Steel Company, at Milwaukee, are undergoing additions and the entire plant is being improved and renovated. An Allis-

Chalmers gas-engine generating unit of 500 kw. capacity has been ordered as an extension to the present electrical generating plant. This is the first gas-driven unit to be used here, and its application to the Bay View equipment illustrates a peculiar advantage which is inherent in this type of prime mover and unavailable in any other. For years, the waste gases from the blast furnaces have been burned under the steam boilers, with good economy, so that with the old arrangement, the power plant was producing its highest efficiency at minimum expense. Through a proposed change on the steam-blowing engines now in use, however, a great saving of steam is accomplished and by this saving a considerable quantity of gas becomes available for use in operating the new electric generating unit. This unit is composed of a horizontal, tandem, double-acting Allis-Chalmers gas engine direct connected to a 500-kw., direct current, 240-volt generator. The generator, which is to be of standard Allis-Chalmers design, will be built at the company's electrical works in Cincinnati. The output from the new unit is to be used in the rolling mill for general power service.

Trade Catalogs.

Receipt is acknowledged of the following trade catalogs and circulars:

C. W. Hunt Company, West New Brighton, S. I., N. Y. Hunt Industrial Railway; Pp. 44, illustrated; paper, 3x5 in. 1906.

American Locomotive Company, New York City. Large Steam and Electric Locomotives, by J. E. Muhlfeld; Pp. 28; paper, 10x6 in. 1906.

Nernst Lamp Company, Pittsburg, Pa. The Nernst Series Alternating Vertical Glower Street Lighting System. Pp. 11, illustrated; paper, 6x9 in.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin No. 1505, Allis-Chalmers Heavy-Duty Engine; Pp. 20, illustrated; paper, 8x10 in. July, 1906.

Buffalo Forge Company, Buffalo, N. Y. Catalogue No. 97. Buffalo Air Washer and Humidifier. Pp. 36, illustrated; indexed; paper, 6x9 in. 1906.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin No. 1051. Allis-Chalmers Alternating Current Generators. Pp. 16, illustrated; paper, 8x10½ in. May, 1906.

Atlas Engine Works, Indianapolis, Ind. Bulletin No. 131, July, 1906, Throttling and Automatic Single Valve Engines; Pp. 15, illustrated; paper, 8x10 in. 1906.

The Wellman Seaver Morgan Company, Cleveland, Ohio. Circular H O-9, High-Grade First-Motion Winding Engine with Improved Corliss Non-Detaching Valve Gear; Pp. 16, illustrated; paper, 6x9 in. 1906.

Warren Webster & Company, Camden, N. J. The Webster Star Vacuum Feed Water Heater, Purifier, Filter and Receiver; Pp. 32, illustrated; paper, 6x9 in. 1906. Also Some Phases of the Feed Water Heater Problem, by Walter E. Harrington; Pp. 8; paper, 6x9 in. 1906.

Construction News.

Bullfrog, Nevada.—The Mayflower Mining Company is considering the erection of a mill and cyanide plant. The company's address is at Bullfrog, Nevada.

Clarksville, Arkansas.—The Southern Anthracite Coal Company is preparing to open coal mines and will need hoisting and other machinery. R. A. Dowdy, Clarksville, Ark., is president.

Cherry Creek, White Pine County, Nevada.—The Gold Cañon Mining Company, and the Cocomongo Gold Mining Company, have ordered a complete air compressor and drilling plant of the Traylor Engineering Company. The plant will consist of the compressor, and a gasolene engine to drive it, an air receiver, air drills and tunnel columns, with a complete outfit of air hose, drill studs, pipes, valves, fittings and blacksmith's tools. The outfit is to be shipped within 30 days, as the company intends to push forward the development of the property as vigorously as possible.

Cariboo, British Columbia.—The Cariboo Gold Mining Company, and the Bullion Hydraulic Mining Company, two recently incorporated Guggenheim Exploration companies, of which John B. Hobson is resident manager, the former having acquired the big hydraulic gold-mining property long operated by the Consolidated Cariboo Hydraulic Mining Company, under Mr. Hobson's direction, are inaugurating a water-supply system, the main feature of which will be the construction of about 50 miles of canal, 18 ft. wide by 5 ft. deep, with the object of maintaining a continuous supply of about 5000 miners' inches of water to each of three groups of hydraulic claims possessed by these companies. A contract has been let for building 15 miles of this canal system, this instalment being intended to supplement the existing supply available for the hydraulic mines of the first above-named company. The contractors already have two steam shovels on the way in from the East for excavation work, and expect to complete six miles of the canal this season. The mining companies will put in about 8000 ft. of 40-in. steel pipe, this to include inverted siphons where required to connect ditches. A bridge some 200 ft. in length has been constructed across the south fork of Quesnel river at the outlet of Quesnel lake, and the companies have about 250 men employed in construction roads between their mines at Bullion and the canal lines from Spanish creek.

Special Correspondence.**San Francisco.** Aug. 1.

An order from the director of the mint has been received at the United States mint in this city which greatly increases the amount of silver allowable in deposits. It provides for the acceptance of silver in gold deposits and the payment in coin therefor "whenever the amount of silver in such deposits does not exceed in value the proportion of one part silver to 10 parts gold." This means that bullion containing about three-fourths silver and one-fourth gold will be received at the mints and the silver paid for in coin at the current rate, which is fixed by the director of the mint. Heretofore it has been the rule for the mint to pay out money for the silver contained in bullion only when the gold predominated in quantity, not in value. In other words, for a depositor to receive coin for the silver contained in his bullion there had to be over 500 parts silver in 1000; if there was more than 500 parts silver in the 1000 he would receive for the gold contents alone, and the mint would pay coin only for the gold contents, returning to him a fine silver bar for the silver contents. The accommodation of this rule will be appreciated by many miners in the eastern and southeastern parts of California, as well as in Nevada and Arizona, where it is a very common thing for the silver to predominate in the bullion produced. This new rule takes effect August 1.

Mining and manufacturing interests all over the State are just now being hampered by the lack of railroad cars. In the case of oil cars the producers in the McKittrick and Sunset districts in Kern county are in a bad way. The railroads frankly tell the oil men they cannot furnish cars, though production in the county was never so low as it is now. Ordinary freight cars are almost unobtainable. The congestion of freight in loaded cars near this city still continues. The embargo on all classes of local freight has been put in force and, besides transcontinental freight, only crude oil and perishable goods are admitted to the city from coast markets.

A labor famine exists in California, throughout the State. The rehabilitation of San Francisco, the large railway extensions and improvements in the city and the State, unusual heavy crops throughout the country districts, and development work in national and local irrigation projects have united in producing a tremendous demand for labor. The conditions in the city are far from being comfortable. There are numerous instances of sub-contractors in the building trades having to throw up their contracts because they cannot secure enough men.

Patrick Campbell, the well known hydraulic miner of Smartsville, Yuba county, is to work his gravel properties again, this

time using arrastras instead of the nozzle. He was one of the strongest fighters for the hydraulic mining industry, but finally had to give up the idea of hydraulicking his claims. His 28 miles of ditch are to be rehabilitated, and repairs have already begun. George W. Root, of Grass valley, is financing the new arrangement. Campbell owns large tracts of good auriferous gravel and he will now try to get out the gold without the use of the giants.

The Anti-Debris Association attorneys have for some time past been in communication with the California Debris Commission, which was considering a proposition that two mammoth dredges be employed for the purpose of dredging out the Bear and Yuba rivers and afterward working down into the Sacramento. It was estimated that two dredges could be built at a cost of \$150,000 each, and they could be operated for a period of 10 years at a cost of \$200,000. This would be an outlay of \$500,000, and the proposition was for the State to pay one-half and the Federal Government one-half, placing the matter under the charge of the Federal Government.

Prospectors in the Inyo county gold-fields and adjacent desert regions are having a hard time of it this summer, owing to the great heat. A mining engineer recently returned from the Panamint region states that the bodies of eight prospectors were brought in while he was there, the men having died from heat. At Ballarat, he relates, the thermometer registered 135 deg. at noon and at midnight following had dropped to but 116 deg., which was the average for three days. In the desert section, lying south of Redlands, the mercury went up higher.

The Union Hill Mining Company in Trinity county, operating a big hydraulic property between Douglas city and Lewiston, has voluntarily raised the wages of its 100 employees 25c. a day, and at the same time reduced the day from 10 to nine hours.

Charles Keller and John Hood, after working over 15 years to find pay gravel in the Little Grizzly mine near Bunker hill, Sierra county, have finally been successful.

The interest in the gold discoveries made by a number of the land owners in the tule, or marsh, section of Sutter county more than a year ago, has been revived by the report that a mining company has secured options on portions of the John Markley ranch lying in the tule basin several miles west of Yuba county. Judge Shields, of Sacramento, is the authority for this statement, and he states that deposits of free gold have been found in paying quantities on the Markley place.

Owing to the scarcity of white labor in Solano county, the managers of several large quarries in that section recently put Japanese at work. So far the Japanese have given little satisfaction, as they can-

not accomplish the same work as white labor.

Salt Lake City. Aug. 4.

The management of the Utah Copper Company will begin steam-shovel practice in Bingham within the next few days. All preparations have been completed. One shovel will be used at present in stripping the mountain of over burden and the second machine will be placed in commission sometime in September.

The management of the Boston Consolidated has placed an order with the Utah Mining Machinery and Supply Company for over 300 Callow settling tanks to be used in the company's new mill now under construction at Garfield.

William A. Clark, president of the San Pedro, Los Angeles & Salt Lake Railroad, at a luncheon given in his honor in Salt Lake, made the announcement that he had arranged for a survey of a branch line into the Deep Creek district in western Utah on would probably leave the main line near Stockton or Eureka. Salt Lake business men are pulling for a more direct route to Ely, Nevada, than the Nevada Northern, now under construction will afford and one that will tap the several camps of the Deep Creek district in western Utah on the way. The Western Pacific, which is constructing another transcontinental road between Salt Lake and San Francisco, is also keeping in close touch with developments in Deep Creek. Late mine developments at Clifton leave no doubt about it becoming a copper camp of considerable importance.

It is expected that the new Garfield smelters of the American Smelting and Refining Company will begin the active reduction of copper ores within another week.

All things considered, fairly good progress is being made with the task of clearing the Ontario drain tunnel at Park City. The avenue has been opened to a distance in of about 13,000 ft. A parallel tunnel is being driven around a section where the worst caves are believed to be; the old adit has been followed in this manner for 400 ft. and no attempt will be made to break into the channel for another 300 ft. The tunnel has been closed for a year and a half.

The completion of the Nevada Northern railroad to Cherry Creek has started ore shipments from that camp. Among the active mines are the National and Biscuit, both controlled in Salt Lake. The Siegel mine at Siegel, Nevada, is also sending ore over the same route, the distance from the railroad to the mine having been cut down to 23 miles.

A private despatch received from the East conveys the information that the Utah Apex Mining Company, operating in Bingham, has placed \$100,000 of the \$500,000 bond issue recently authorized, the proceeds to be used for development and equipment purposes.

The United States Smelting, Refining and Mining Company is replacing wooden with steel buildings at its principal properties and the campaign has begun in Utah by installing a new hoist and building at the Centennial Eureka mine in the Tintic district.

What appears to be a large copper deposit has been found near Promontory station on the Lucien cut-off of the Southern Pacific west of Ogden. A new town-site, called Tisdale, has been laid out. The find is a mile and a half from the railroad track.

The pool agreement into which the promoters of the Bingham Central Mining Company entered at the time of the incorporation of that company has expired and the 294,000 shares of stock involved have been released.

Denver. Aug. 4.

The Argentine Central Railroad, which carries travelers to an altitude of over 14,000 ft., a line 16 miles long, connecting with the Colorado & Southern system at Silver Plume, was finally opened this week. It is said to be the highest traction road in the world, except the Peruvian Central in the Andes of South America. It was projected and built by E. J. Wilcox, of the Waldorf mines, to carry their ores and supplies, but has also a fine feature as a scenic railroad.

The management of the Colorado Fuel and Iron Company expects to try a new plan for extinguishing fires in their coal mines. They will use carbonic acid gas manufactured on the surface, for the purpose, the same being forced to the fire in iron pipes. It will be tried at Engleville, near Trinidad, where a fire has done a great deal of damage since the latter part of May of this year.

Chief Engineer W. G. Ramsey, of the Dupont Powder Company, of Wilmington, Del., has been here for some time letting contracts for the construction of the large powder factory which that company will build at Toluca, 20 miles south of Denver. The cost will approach a million dollars.

It looks as if the Gilpin county tramway, the property of the Colorado & Southern system, used to haul ores to the latter road, will be extended to Rollinsville, in Boulder county, on the Moffat road. The Gilpin Railroad Company has been incorporated for that purpose, so that they will be able to build in Boulder county.

The Department of the Interior has withdrawn from sale or location over 2,000,000 acres of Government land in Colorado, supposed to contain coal, and the Geological Survey officials have been instructed to examine the land in question, which is located in a number of different land districts.

Scranton. Aug. 6.

The town of Warrior Run, eight miles east of Wilkes-Barre, was the scene of a

disastrous cave-in on Thursday. The town is built over the mine of the Warrior Run Coal Company, and in the afternoon the residents were terrified by rumblings similar to those of an earthquake, followed by crashing of timbers and explosions. A hurried investigation showed that a dozen houses were disappearing and huge fissures were seen in the ground. One man went into his cellar to ascertain the damage, and his candle ignited a body of gas which had come from the workings below. The explosion which followed set the house on fire, his daughter being killed, while he escaped. At the same time the falling of the roof blockaded the workings and caused an accumulation of gas. This also exploded and a miner was killed. The ignited gas shot up through the fissures to the surface. Thousands were attracted to the town to witness the remarkable scenes.

The members of the Eastern and Central New York Retail Coal Dealers' Association will visit Scranton and vicinity on Sept. 5, and the three following days. Upon their arrival in Scranton they will be the guests of the Scranton Coal Company and will be duly entertained.

The Philadelphia & Reading Company will make an effort, this week, to ascertain whether the fire in the old Prendergast colliery, in Heckscherville valley, is still burning. A slope 900 ft. long is to be sunk near the region of the fire, and observations made as to the heat of the rocks as the excavations proceed. The fire broke out about 20 years ago and has been burning continuously.

The two large shafts at the John Veith operations will be finished this month and will be the two largest openings in the anthracite region. The first, or principal opening, is more than 43 ft. wide, contains five compartments and will be 950 ft. deep. The other shaft will be 1050 ft. deep and is slightly smaller in dimension than the first. The two openings are less than 300 ft. apart and will constitute the largest pair of tap holes in the region. Within the next two years there will be a number of tap holes sunk by the Philadelphia & Reading Company, which is making extensive preparations to open up the heavy coal measures in the lower basin.

The Lehigh & Wilkes-Barre Coal Company is sinking test holes on the Saur farm, near Askam. If the results are satisfactory, shafts are to be sunk there.

The men engaged in testing for coal north of the new Buck mountain slope of the Lehigh Valley Coal Company discovered a vein $5\frac{1}{2}$ ft. thick.

Boys' strikes are becoming a great nuisance in the anthracite region. Last week the breaker boys at the Clinton colliery of the Delaware & Hudson Company, in Carbondale, went on strike, because a number had been discharged for absenting themselves from work to attend a picnic. One thousand men and

boys were idle until the management promised to consider the grievances. At No. 20 colliery of the Lehigh Valley Coal Company, the driver boys went out because a patcher had been promoted, instead of the eldest driver boy. At the Washington colliery, Plymouth, the boys quit work because they were not paid the same amount as the boys at an adjoining colliery.

The first grievance settled by the conciliation board since the suspension was in favor of sustaining the demand of the miners employed by Markle & Company, who asked payment for laying sheet iron. The company was ordered to pay for the same, the order being retroactive.

The fire in the William Penn colliery is still burning, and it has been decided to isolate that part of the mine, which will be sealed airtight, thus removing the possibility of a draft. The other part of the mine will then be worked.

The Crystal Ridge breaker of A. Pardee & Co., at Hazelton, was destroyed by fire, last week, resulting in a loss of \$60,000. The fire started in the boiler house and the breaker was quickly in ruins. The breaker was built in 1876 and was one of the oldest in the region.

The Hillside Coal and Iron Company intends to abandon the Glenwood breaker at Jermyn, and haul the coal underground to the Erie breaker, about a mile distant.

The Smith Coal Company, which purchased the Evans colliery, in Beaver Meadow, will reopen the mine, men now being engaged in the preliminary work.

A serious fire is raging in the William Penn mine, being centered in breasts in the Buck Mountain vein. The workmen cannot approach nearer than 100 ft. to the fire owing to the black damp.

Toronto, Ont. Aug. 3.

The grant of mining privileges on the right of way of the Timiskaming & Northern Ontario Railway through the Cobalt area is strongly denounced by newspapers and public men, including many supporters of the Whitney administration, as a piece of political grafting. The concession was given by the Timiskaming & Northern Ontario Railway Commission, a board appointed by the Government to construct and operate that road for the province. Incidentally the commission was empowered to dispose of mining rights on the lands under its control in connection with the building of the road, such as town sites, rights of way, etc., where the latter proved to be rich in minerals. They duly advertised for tenders for four miles of the right of way. The terms upon which a 999-year lease would be given, as stated in the call for tenders, included the payment of a cash bonus of not less than \$50,000, and the royalties on the output to be paid on a sliding scale of 10 per cent. on ore assaying up to \$400 per ton; 25 per cent. on ore from \$400 to \$1000 per ton; and 50

per cent. on ore over \$1000 per ton. There were no tenders received, but shortly after the expiration of the time for receiving bids, it was announced that a lease had been granted to the Right-of-Way Mining Company, of Ottawa. The assumption was that the concession was in accordance with the terms advertised, but on investigation it turned out that an important variation had been made, a royalty at a flat rate of 25 per cent. of the value of all ore mined having been substituted for the sliding scale. Moreover, George P. Murphy, one of the leading promoters of the company, is a son of Dennis Murphy, a member of the commission. The scandal created by the exposure, at a time when the people are extremely sensitive on the subject of political corruption or favoritism, will probably result in the deal being canceled by the Government, as all acts of the commission are subject to approval.

A party of American capitalists, principally from Pittsburg, visited Cobalt this week with a view to making investments. Among the number were A. P. Macauley, Richard McCormack and P. J. McCormack, Pittsburg, H. J. Black and Bernard Volk, McKeesport, Squire Richards, Bradford, Penn., and Karl Decker, New York. They purchased 44 per cent. of the stock of the Eureka Silver Mining Company, capitalized at \$100,000, and a good producer of high-grade ore, and investigated other valuable properties, obtaining numerous samples of ore for assay. Further transactions on a large scale are anticipated as the result of their inspection.

The Provincial Department of Mines has received from Prof. W. G. Miller samples of ore taken from the recently discovered vein on the Gillies timber limit. Two of them were assayed at the provincial assay office. One showed 1936 oz. of silver to the ton; the other ran 2957 oz. to the ton, indicating that the deposit is even richer than had been supposed. About 65 ft. of the vein have so far been uncovered. E. T. Corkill, Provincial mining inspector, has joined the exploration party at work on the limit.

Disquieting reports have lately been in circulation as to the unsanitary conditions prevailing in Cobalt and the outbreak of typhoid. The Provincial Department of Mines has received a report from Health Inspector Scott which emphatically contradicts these statements. He says that, in spite of the drawback on account of an inadequate water supply and defective drainage, Cobalt is the healthiest place in the country. There was not a case of typhoid which originated in the town. There were some suspected cases in the mines, but they had not yet been diagnosed as typhoid.

The provincial government of Ontario, having fully considered the matter of the lease of mining privileges to the Right-of-Way Mining Company, has decided to re-

fuse to ratify the agreement. The commission has been instructed to call for fresh tenders. The company claims compensation for expenses incurred and say they will bring suit if they are not recouped.

Victoria, B. C. Aug. 1.

Boundary—The three larger companies operating in the Boundary district have shortened the hours of labor of all men employed at their mines and not affected by the previously existing rule to work certain classes of labor, chiefly underground men, eight hours a day. Surface men, including mechanics, teamsters, etc., have been working 9½ to 10 hours; now the Granby Consolidated, British Columbia Copper, and Dominion Copper companies, have put into force a rule that all these men shall work nine hours a day, receiving for this time similar pay to that heretofore given for the longer day.

At a recent rock-drilling contest with machine drills, held at Phoenix, ten pairs of drill men entered. It was stipulated that all contestants should use the same make of machine, starting with a 2½-in. drill and decreasing ¼-in. to the foot. The drilling was done above ground, a platform on which to set up the drill having been constructed in advance. A Canadian Rand Drill Company's machine of standard make was used, and air was supplied at 95 lb. pressure. The test consisted of putting together the parts of the machine, mounting and connecting the drills and drilling as deep a hole as practicable, all within the 15 minutes allowed. The first prize, \$150, was won by Matheson and McQuoid, of the Granby Company's Gold Drop mine, who drilled 9 ft. 1½ in.; McDonald and Rankin, of the Dominion Copper Company's Brooklyn mine were second, with 8 ft. 6 in. winning second prize, \$75. Three other teams drilled holes deeper than 8 ft.; the shortest hole of the ten was 7 ft. 4 in. deep. The contest excited general interest among the large numbers of miners in the district. At a double hand-drilling contest at Rossland, Jas. and Geo. Foulds, the champion hand drillers of the Boundary district, lately drilled 35 in. in 15 minutes, beating their Slocan opponents by 3½ inches.

The British Columbia Copper Company has secured under an 18-months' working bond, the Lone Star and Washington group of mineral claims, situated about 10 miles from Greenwood and immediately south of the international boundary line, in Washington State. This property had lot of development work done on it about six years ago, but owing to the absence of transportation facilities at that time operations were discontinued. Now a railway passes within four miles of it, so that the transportation is not now a formidable difficulty.

The Snowshoe mine, situated in the Phoenix camp, is to be operated again after having been idle since the latter part

of 1903. This mine is owned by the Snowshoe Gold and Copper Mines, Ltd., of London, England, with which company the Consolidated Mining and Smelting Company, of Canada, recently concluded arrangements for its acquirement and operation. The managing director of the latter company, W. H. Aldridge, of Trail, B. C., on July 27 met at Phoenix, Geo. S. Waterlow, of London, vice-chairman and attorney of the Snowshoe Company, to examine the property with him as far as could be done, the mine being full of water. It is intended to pump out the water and thereafter employ as many men as can be worked to advantage. The ore will be sent to one of the Boundary smelters, the railway haul to Trail being too long—about 125 miles—for ore of the low average grade of Boundary district copper ores. The Snowshoe mine was first explored underground under the management of J. W. Astley, and afterward large surface quarries were opened in ore, of which about 94,000 tons were shipped to district smelters prior to suspension of work. The power plant on the mine includes the high-pressure half of a 30-drill air compressor, and a 150-h.p. electric hoisting engine. The Phoenix branch of the Canadian Pacific's Columbia & Western railway crosses the property. Chas. Biesel, for some time past at the War Eagle and Center Star mines, Rossland, B. C., will be resident superintendent of the Snowshoe.

Atlin—On July 8 the Northern Mines, Ltd., started its steam shovel at work for the first time this season. Gravel was moved at the rate of about 36 skips per hour. The manager, R. D. Fetherstonhaugh, has since advised the directors of the company, the head office of which is in Vancouver, B. C., that he made a partial clean-up of 300 oz. of gold for eight days' run.

The McKee Amalgamated Hydraulic Mining Company has already recovered 1193 oz. of gold this season valued at \$19,000. It is probable its total results this year will constitute a record year for the company.

London. July 28.

Your readers will probably remember the Spassky copper mine, which was described in your columns in December last. This mine, situated in Siberia, is a phenomenally rich one. It is owned by a London company, and the shareholders are divided equally between England and France. Hitherto, in order to comply with Russian requirements, the property has been held in the name of Mr. Carnot, one of the French directors and shareholders. In order to meet further the requirements of local law, it has been decided to form a new company in Russia and transfer the property from the present English company. As was observed, in the article above mentioned, the mine

is all right, but the political circumstances are unsatisfactory from an investor's point of view. The new move will not increase the security of English and French investors. It is to be hoped that the English company will continue in existence and hold the entire stock of the Russian company. In this way the shareholders will be able to act together, which they certainly cannot do if their shares are to be exchanged for those in a Russian company. The development at the copper mine is going on satisfactorily, and other adjacent properties containing less copper, but supplying a suitable flux, are being opened up. The new smelters are being commenced and should be in operation by the new year. The coal mines belonging to the company are also developing well. Owing to the changing of pumps and the equipping of the new shaft at the Karajandy collieries, the output was restricted and the smelter ran short of fuel, so that during the last two months the copper production has temporarily decreased. The company has altogether nearly 6000 men in its employ.

The South African market continues to be depressed by the political uncertainty. The commissioners appointed to inquire into the question of a constitution for the Transvaal and the Orange River Colony have returned to England and presented their report to the Government. Its nature has not been allowed to leak out, nor has the Government expressed any intention of publishing it.

Among all the schemes for restoring native labor to the mines and for getting rid of the Chinamen and other imported laborers, perhaps that enunciated by Edgar Rathbone is the most interesting. He proposes that the Kafir shall be induced to settle on the land in the neighborhood of the mines by free grants of land now belonging to the mining companies. At the present time these lands, amounting to 200 square miles along the Rand, are valued only for their mineral contents and their surface is neglected. Why should not the companies and the Government combine to irrigate and fertilize these lands and make them inhabitable by Kafir families? The native families would then be united, instead of being broken up by the men leaving them for the mines for months on end. The girls could go as domestic servants and the young boys could do light service of all kinds. The proposal comes from a man who knows South Africa and deserves attention from the companies. From the most utilitarian point of view its trial would be desirable, for it would save great expense in obtaining labor, and it would decrease the cost of living for both black and white. It would cause political security by the banishment of the coolies.

The event of the week among our metallurgical people has been the joint meeting of the Iron and Steel Institute and the American Institute of Mining Engineers.

General Mining News.

Orford Copper Company—This company is extending its nickel refining works at Constable Hook, N. J. It has filed plans for three new buildings to be 350x20 ft., 250x100 ft. and 100x40 ft., respectively; all to be of one story, 25 ft. in height.

ARIZONA.

COCHISE COUNTY.

Paradise Development Company—The youngest company in the district has, within three months, sunk a 240-ft. shaft and from its bottom drifted 20 ft., run a 15-ft. crosscut from this drift and made connection at the 110-ft. level with the old shafts. The shaft was sunk on a low-grade carbonate ore, and sulphides were encountered at the water level. In the crosscut black copper sulphides were tapped, proving the permanency of the property. The company will now install a pumping plant and hoist and will push development.

Savage Gold and Copper Company—This company is continuing development and a few days ago the directors of the company visited the property and decided to at once install a large hoisting plant with pumps and compressor and to sink a 1000-ft. shaft, crosscut the vein and open the ground. The mine has blocked out about 30,000 tons of ore that will average in value \$23 to the ton in gold, silver and copper. It is decided to erect the smelting plant, which has been on the ground some time, and to begin the treatment of the ores.

Duluth & Chiricahua Development Company—This mine is pushing development and expects to cut the ledge in another 150 ft. in the crosscut being driven from the 90-ft. level. This crosscut will tap the ledge at a depth of about 300 ft. The management is figuring on installing a hoisting plant to sink the shaft 500 ft. while crosscutting and blocking out the ore in the upper ground.

King of Lead—This mine has been bonded and work begun. They are building a wagon road around the mountain to connect with the county road and while this is being done they will continue development and the taking out of the ore now in sight.

Copper City—The new town of Copper City, which lies in the geographical center of the mineral zones of the district and 5 miles north of the present town of Paradise, has been started, and the lots will shortly be placed on the market.

ARKANSAS.

JOHNSON COUNTY.

Southern Anthracite Coal Company—This company, recently organized to open and work coal mines at Clarksville, has elected officers as follows: President, R. A. Dowdy; vice-president, J. W. Lem-

ley; secretary, J. A. Dowdy; treasurer, A. N. Rugon.

CALIFORNIA.

AMADOR COUNTY.

Fremont Consolidated—At this mine, Arthur Goodall, manager, large quantities of sulphurets are being produced. The mine is on a paying basis, though the grade of ore is low.

Kennedy—A pipe line is being laid from the reservoir to supply the old works with water. This mine is at Jackson; Webb Smith is superintendent.

BUTTE COUNTY.

Gold Mountain—This new company has been incorporated to operate a mine of the same name at Inskip. The following are directors: A. D. Larzalere, C. F. Clough and G. W. Nolan, of Reno.

CALAVERAS COUNTY.

French Hill—At this mine, Mokelumne hill, they have quit work, having encountered a fault and lost the rich ore.

CONTRA COSTA COUNTY.

Natural Gas—On the Martinez road, near Concord, a heavy flow of natural gas has been struck while digging a well on the ranch of Miss Hollar.

EL DORADO COUNTY.

Mount Pleasant—A strike of importance is reported in this mine at Grizzly Flat. A 7-ft. ledge carrying sulphurets has been found.

Eagle Bar—This hydraulic mine in the American river, below Horseshoe bar, has come into excellent ground.

California Jack—This property, at Georgetown, has been bonded by parties who will at once begin reconstructing the old mill and developing the mine.

KERN COUNTY.

Zenda—The machinery necessary to complete the equipment of the mill of this mine at Amalie. L. W. Morgan, superintendent, is at the station, and the mill will be started up this month.

MODOC COUNTY.

Hoag District—J. M. Layman, manager of the Mines Venture Syndicate of America, is about to buy a small mill for mines in this district, where he has 15 men at work developing mines he has recently purchased. The Kafader and Van Coughnet claims are showing satisfactory values, and others are being worked.

MONO COUNTY.

Masonic District—Men are employed in preparing the foundations for the new 10-stamp mill of the Pittsburg mine, which will be erected at Calavada. The ore will be carried by tramway.

NEVADA COUNTY.

Banner—The shaft at this mine, Grass valley, is now down 860 ft. and will be continued to 1200 ft. The machinery for pumping is now in good shape.

Sultana—Work has commenced on the

new 20-stamp mill of this mine near Grass valley. The mill will be put up at the Prescott hill shaft. The grading out has been finished and the concrete foundations have been laid, so there is nothing to do but put the mill together. A three-compartment shaft is being extended at the Prescott hill, where the largest and highest hoist in the northern part of the State has been erected. The company is now waiting for the mill, having plenty of fine ore in sight. It is operating 15 stamps at present at its other claims, which are included in the Sultana group. About 120 men are at work.

South Yuba Development Company—This company is preparing to make extensive improvements at its property near Omega. The sawmill will be started up shortly and the ditches and flumes are to be placed in the best of condition. Quite a crew of men will be employed and the work will be under the direction of Superintendent John Lawrence.

Delhi—The shaft of this mine at Columbia hill, which has a present depth of 160 ft. below the main tunnel, is to be sunk 200 ft. farther on the 10-ft. vein. The flow of water is heavy in that section, and to handle it a pump with a capacity of raising 700 gal. a minute is to be installed without delay. The orebodies above the tunnel have been worked out with such good results in the past as to warrant the continuation of the development work on an extensive scale. The company has under the present management made important improvements to the property in the way of adding machinery, reconstructing the water system so as to give an abundance of power and doing other work of a permanent character.

PLACER COUNTY.

Golden West—This gravel mine at Iowa hill is about to be opened and extensive development work will be done before fall. E. H. Armstrong, of Grass valley, is the principal owner.

Home Ticket—The company, at Last Chance, is working 20 men and paying well, under superintendency of Frank Tillotson.

Eclipse—This mine is to be sold and an appraisal of its value is now being made.

Rawhide Gold—This quartz mine, near Humbug, paid its first dividend of 5c. a share this month. It is managed by J. T. and George Patrick and John Matram, the original owners and experienced miners. The mine was bonded to the Soldan Gold Mining Company about a year ago, but it failed to make it pay and could not make its payments. The mine fell back to the old owners.

PLUMAS COUNTY.

Kellogg—A. S. McDonald and L. P. Cornell, of Oakland, are arranging to develop this gravel property north of Quincy. The property mentioned lies be-

low what was known as Elizabethtown in early days. The placer mines then worked yielded rich returns, and lower down the deep channel was found to be rich in coarse gold. This channel is believed to continue down through the Kellogg ranch. This section of the lead Mr. MacDonald and associates propose to open up and, if developments justify them, will operate it on a large scale.

COLORADO.

LAKE COUNTY—LEADVILLE.

The output for July amounted to 78,000 tons of all classes of ore. Considering the scarcity of desirable labor at mines and smelter and the shortage of cars, the showing is an excellent one. From now on the tonnage should increase, as the Tucson is hoisting ore and the new Adams mill will be completed by the middle of the month; it will be supplied with ore from the Wolfstone.

Golden Gate—A 4-ft. vein of ore has been opened in the shaft at a depth of 80 ft. The property is located in the east Tennessee pass section and adjoins the Jennie June. The ore assays from 3 to 12 oz. gold per ton and is owned by Hensley & Ovens. It is reported that the Jennie June has been sold, price \$20,000, and that half the purchase price has been paid down.

Star of the West—The property is located on the north side of Iron hill and is started to catch the southern extension of the Crecentia ore shoot from Rock hill. The shaft will be sunk deeper with a drift from the bottom to the ore shoot. The Crecentia is shipping 50 tons daily of an excellent ore, and when the ground is thoroughly opened will be in a position to double the output.

Fitzhugh—This mine, on the southern slope of Fryer hill, is taking out ore from the upper workings that runs \$100 per ton; the bins are now full. The north drift is nearly through the fault.

Ben Burb—A good body of lead-carbonate ore has been opened in a drift to the O'Sullivan claim, Rock hill. In early days the O'Sullivan produced heavily and the ore now caught is supposed to be the same shoot. Two carloads a week are now going to the smelter, and when the ground is opened this will be doubled.

The Helena—The recent orebody caught at the 600-ft. level is now proved to be the main body and shipments are going out steadily. During the week the ore increased in value to 2 oz. gold per ton; this is unusual in this section of Iowa gulch.

Iron Silver Mining Company—The company has decided to start a new three-compartment shaft in the Lime property, Iron hill, and prospect for the ore shoot that was lost in the main incline several years ago. When this shaft reaches the requisite depth the ground will be thor-

oughly prospected. The Tucson shaft is hoisting ore and the ore shoot is now being opened by drifts in different directions. The Moyer continues its usual output of 12,000 tons per month.

Ballard—This has resumed operations and is now shipping 25 tons daily of silicious ore from the second level. The owners may sink the shaft deeper this fall.

Bessie Wilgus—A good body of silicious carbonate ore was opened in the northern portion of the mine near the Reindeer line at the beginning of the week; the extent of the orebody is not known. From the Sequin a steady tonnage is going to the smelter daily.

Felicia Grace—This mine in the Ten Mile district has opened a body of ore at the 110-ft. level that will place the mine on the shippers' list in the near future. From this point a drift was started and after 50 ft. a heavy flow of water was encountered and with it the ore, which runs \$5 gold and 80 oz. silver per ton, and from 20 to 60 per cent. lead. The water drove the men out and work has been temporarily suspended. The shaft will be sunk another lift of 150 ft., so that it will be well under the ore shoot and drain the ground.

Aetna—The shaft is now down 200 ft. and will be sunk another 150 ft. before drifting is begun; three drifts will be started in different directions to locate the orebody.

Little Nell—A body of lead-carbonate ore 4 ft. wide was opened in one of the lower levels during the week and the lessees are now certain that they have caught the main orebody. The ore runs about 100 oz. silver and 60 per cent. lead.

SUMMIT COUNTY.

Orthodox—This mine, on Mineral hill, has been sold by the administrators of the estate of the late owner. This property has a good production record, and has only been opened up to a depth of 200 ft. The property was bought by the Wellington Mines Company, which owns the adjoining territory.

Sallie Barber—This zinc mine, on Bald mountain, has been leased by the owners to E. E. Miller, of Breckenridge.

Square Deal—The main tunnel of this company, at Frisco, is progressing well and indications are favorable. The country rock is highly mineralized with iron and small seams of quartz with splashes of lead are continually coming in. The president of the company is now on the ground with a party of visitors from Illinois and Wisconsin.

Monroe—These mines, adjoining the North American Mines Company's property in Ten Mile cañon, have been leased and bonded to Conrad Hennick by the owners, and are expected to be in operation shortly. This property has a good record

of production. The contents of the ore are mostly gold.

TELLER COUNTY—CRIPPLE CREEK.

Cyanide Mills—The talk of erecting cyanide mills for the treatment of the low-grade ores in the district is still going on. Every few days some new property will begin negotiations for the erection of a cyanide mill to handle its low-grade ore. The Isabella on Bull hill has already commenced the erection of a mill. Tests are being made at the Craig mill near Anaconda for the treatment of ore from the Lexington by the cyanide method. Rumors are also afloat that the Blue Bird will also soon make a deal for a mill. The Little Giant mill in Pony gulch will soon be completed. The Telluride mill at Colorado city, which is to treat the ore from Findley and the Golden Cycle, is also nearing completion. The Homestake mills, both large and small, are treating considerable ore, both custom and from the Ironclad mine. The Wishbone mill on Mineral hill is in process of erection. Small mills on the Santa Rita and Home Run mines are in operation.

Elkton Consolidated—The annual report of this company shows the output of the property for the past year to have been \$807,866 gross, the total receipts being \$810,107. The mining expenses were a little over \$400,000 and the freight and treatment amounted to about \$216,000. Dividends to the amount of \$150,000 were paid. The total expenditures during the year were \$823,058. There is in the treasury \$114,603 in cash besides some State warrants.

Drainage Tunnel—The early commencement of the construction of the drainage tunnel is again being agitated. The present status of opinion seems to be in favor of an intermediate tunnel, which would drain the district about 700 ft. or so below the level of the present tunnel.

MONTANA.

SILVERBOW COUNTY.

Davis-Daly Estates—At a meeting of the directors held in Boston last week J. A. Coram, C. R. Leonard and C. H. Palmer were chosen additional directors. The board then elected the following as officers: President, J. A. Coram; vice-presidents, G. W. Davis and N. W. Bumstead; treasurer, R. A. Cornachan; assistant treasurer, W. J. Freeman; executive committee, F. Augustus Heinze, J. A. Coram, C. H. Palmer, W. J. Wollman and Karl Roebing.

In the property at Butte the crosscut south of the 1800-ft. station of the Original is progressing rapidly, the face being about 70 ft. from the station. Original is doing the work for the company at a fixed price per foot.

New Companies—Butte & Bacorn is sinking two of its three shafts at the rate of more than 100 ft. a month and will change contractors on the third shaft with

a view of accomplishing better work in it. Butte Hill Copper, the property of which lies west of Butte & Bacorn, has struck some good-looking copper ore at a depth of 200 ft.—Butte Copper Exploration has cut a 3-ft. vein of copper ore at a depth of 725 ft.—Bullwhacker reached the 300-ft. mark Aug. 5.—Butte-Milwaukee will have the water out of the Pollock shaft soon and will probably begin raising ore shortly, as it is known that there is a body of silver-gold ore in the bottom, 350 ft. deep.

Anaconda—This company is opening ore reserves in the lower levels of the Anaconda mine. Since it cut the main vein on the 2400 it has been raising to the 2200-ft. level and has the work about finished. This job out of the way, it will develop the main vein on the 2400. Little mining has been done between the 1600 and the bottom, and therefore almost the entire distance is reserve ore. The south openings are to be continued to the Belmont and a raise made to connect with the shaft on the latter, which is 900 ft. deep and is 400 ft. lower than the collar of the Anaconda. As an air channel and auxiliary outlet for Anaconda ore the Belmont shaft will be valuable. The shaft on the High Ore is 2400 ft. deep and a station is cutting at the bottom. Sinking will be resumed as soon as the station is finished and continued until the bottom is 2800 ft. beneath the surface. Connections with adjoining properties will be made on the 2400 as soon as possible.

Boston & Montana—The new 1200-ft. shaft on the Leonard was finished July 30 and will be in use shortly, when the new hoisting engine, air compressors and other machinery will go into commission. The re-timbering of 900 ft. of the Mountain View shaft has been finished, 33 days from the time it was begun. The new engine and skips will be used when the hoisting of ore through this shaft is begun, which will be in about two weeks.

East Butte—The new machinery has begun work. The Dutton shaft, in which it will do duty, is 400 ft. deep and will be sunk to 1000 ft. The tributers shipped from the property during June an average of 45 tons of ore a day.

Pittsburg & Montana—Sinking from the northwest crosscut on the 1200 is progressing in three places and it is the intention of the company to carry these openings to a depth of 800 ft., which will give a total depth of 2000 ft. Drifting west shows that the veins are widening in that direction. Horses will be used for tramping the ore to shaft No. 2. The present output is about 125 tons a day.

Reins Copper—A winze is going down at the point where the north crosscut strikes the vein on the 800 and some ore is coming from it. The company is also driving east and south on the 1200, and will cut north with the former opening after reaching the end of a supposed

“horse” between the shaft and north line of the claim.

Gagnon—Sinking on the vein continues in this property, a depth of 1970 ft. having been attained. The ore in the bottom looks better than it did at any point above and the vein is wide.

NEVADA.

NYE COUNTY—TONOPAH.

West End—Developments in this mine are promising. The large orebody is carrying good average values, and some rich streaks have been opened up. Early last week a shipment of 41 tons of high-grade ore was forwarded to the smelters.

New York—The north crosscut from the 800-ft. level in the New York Tonopah mine, situated about a mile west of the Jim Butler mine, is now out about 90 ft. and the face is in the ore-bearing early andesite. Assays have given appreciable quantities of silver and traces of gold. It is expected that the crosscut will have to be extended some distance yet before picking up the extension of one of the known lodes striking in the direction of this mine.

Jim Butler—The owners of this mine have installed a gasolene hoist at the Stone Cabin shaft. They also propose resuming operations in the Gold Hill shaft, which has been idle since 1903. In a few weeks the company will be operating three shafts full time, and it is expected that its exploratory work will soon result in the opening up of good-grade ore.

Tonopah Extension—John McKane, who developed this property, and who is reported to have disagreed with Schwab and party, who hold a controlling interest, has been supplanted in the presidency by Donald B. Gillies, representing Chas. M. Schwab. The workings in the 600-ft. level are looking well, and regular shipments of high grade-ore are being made.

Tonopah-Kendall—This company has acquired several claims adjoining its property, which is situated on the eastern side of Mount Oddie, and adjoins the Belmont Extension ground. James H. Kendall, the manager, states that active development will be resumed immediately. The shaft is now down 140 ft. and is in a rhyolite formation carrying quartz stringers giving gold and silver values. The shaft will be continued to a depth of 300 ft. in all.

Ore Shipments—The ore shipments over the Tonopah Railroad for the week ending July 26 as reported by the Western Ore Purchasing Company, aggregated 3430 tons, divided as follows: From Tonopah—Tonopah Company, 970 tons; Tonopah Extension, 550 tons; Belmont, 180 tons; Midway, 100 tons; Montana-Tonopah, 145 tons; West End, 75 tons. From Goldfield—1380 tons. From Lone Mountain—Nevada-Alpine, 30 tons.

Miners' Wages—At Tonopah the com-

promise wage scale took effect Aug. 1, and miners now receive \$4 for eight hours.

Goldfield miners object to an order from the operators compelling a change of clothes before leaving the mines to prevent loss of high-grade ore.

Olinghouse miners have demanded a raise in wages from \$3 to \$3.50 per day. It will probably be granted.

NYE COUNTY—MANHATTAN.

Stray Dog—This company is sinking a two-compartment vertical shaft with the object of cutting the orebody opened on the surface at a depth of about 160 ft. At a depth of 135 ft. in the shaft on lease No. 1, the level is in good ore-bearing ground. For a width of about 2 ft. the ledge averages about \$400 per ton. A large area of proved stoping ground has been opened up.

Mustang—At a depth of 130 ft. a new ledge has been cut in this mine, which is different from those worked near the surface. It is about 5 ft. in width and assays from \$35 to \$40 per ton.

Jumping Jack—The main shaft is now over 100 ft. in depth, and the manager expects to cut the ledge at about 150 ft. Shipments from this mine since spring have amounted to 1500 sacks of ore running from \$200 to \$400 per ton. The latest shipment consisted of 247 sacks averaging \$200 per ton.

Wolfstone—The owners of this mine are developing three distinct veins, each of which carries shipping ore. One vein contains a pay-streak 3 ft. in width which is yielding high value.

Little Grey—Ore is showing in this property from the surface to the 155-ft. level. At this point drifts are being run.

NEW MEXICO.

OTERO COUNTY.

Jarilla District—Improvements are going ahead rapidly. The Southwest Smelting and Refining Company owns the Lucky and Iron Mask groups and has a bond on the Nannie Baird. On the latter, two vertical shafts are being sunk, the lower one on the Maggie claim is calculated to be the main working shaft of the company and will soon be equipped with a modern hoist and air drills. Some years ago, this district produced turquoise and gold, but present explorations are to open up smelting ore. Copper was first mined here, 15 years ago, by the Eddy brothers who were the developers of large-scale irrigation in the Pecos valley and built the El Paso & Northeastern Railroad, now owned by the Phelps-Dodge interests.

Oro Grande Smelter—The Southwest company's new 150-ton smelter at Oro Grande is well under roof and the power house is about ready. The pipe line from the Sacramento range has a capacity of 500,000 gal. of water daily, and has turned

this railroad hamlet into the incorporated city of Oro Grande. The Southwest company controls the townsite and has got considerable money for mine development by the sale of town lots. Near Tularosa, the Tularosa Mining Company is now mining and concentrating its ore under the management of George B. Bent.

EDDY COUNTY.

King Kendall—In the Guadalupe mountains the main shaft of the King Kendall Mining Company is being enlarged and new machinery is to be installed.

NORTH CAROLINA.

MONTGOMERY COUNTY.

Beaver Dam—This old gold mine has been equipped with boiler, engine, pumps, and an Erdman washing machine. They are in operation, treating some 25 to 30 tons of auriferous surface daily. The mine is in charge of William Griffith, of Scranton, Pennsylvania.

RANDOLPH COUNTY.

Sawyer—These gold-mining lands, comprising some 900 acres, have been purchased by the Sawyer Gold Mining, Milling and Reduction Company, incorporated under the laws of Delaware, with a capital of \$150,000. The mine is a large belt of gold-bearing slate of a soft decomposed nature and is being equipped under the general management of W. J. Kerr, of Sophia, N. C. This company is composed of Latrobe (Pennsylvania) capitalists.

Sandy Creek—This gold mine, situated near Milboro postoffice, has been purchased by Robert Page and associates, of Philadelphia, Penn., who are putting in a new washing machine to treat 100 tons of the gold-bearing material daily. The machine is the invention of Dr. E. Fahrig, chemist, of 3642 Old York Road, Philadelphia.

OHIO.

MUSKINGUM COUNTY.

Duncan Run Coal Company—This company has bought 694 acres of coal land on Duncan river and will soon begin the development work.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Gilt Edge Maid—The remodeling of the mill is completed and it is in operation. Nine extra tanks were added and the capacity increased from 70 to 200 tons daily. The process was changed from the wet to the dry cyanide. Good results are expected from crushing to a 3/8-in. mesh, as the ore is chiefly porphyritic and the solution can penetrate it without fine crushing. The mine workings have reached a depth of 260 ft., and a body of low-grade ore opened up.

Safe Investment—At the annual meeting of this company, the following of-

ficers were elected: C. M. Woodbridge, Chicago, president; T. E. Ireland, Nebraska City, vice-president; S. Tilton, Firth, treasurer; F. H. Woodbridge, Chicago, secretary; I. A. Webb, Deadwood, superintendent; and R. H. Lanyon and John I. Novak, Chicago, directors.

Globe—The tunnel run to cut the orebody 250 ft. below the surface has gone in 415 ft., and has cut the contact for 15 ft. The rock is quartz-porphry and all carries values.

Ohio-Beaver—This company is preparing to install placer machinery of large capacity to treat the placer deposits which have been developed in the gravel on the three branches of Beaver creek.

TEXAS.

HARDIN COUNTY.

Sour Lake—C. E. Anderson & Son have a new pumper, good for 175 bbl., on the Sour Lake Oil Company land. The well is 1300 ft. deep and the crude is said to be the lightest yet discovered in this field.

JEFFERSON COUNTY.

Beaumont—The Unity Oil Company has taken over the property of the National Oil and Pipe Line Company, which was sold to H. Masterson under the bondholders' foreclosure proceedings. In addition to some real estate, the property includes three producing wells at Humble, leaseholds in Jefferson and Hardin counties, 14 miles of 6-in. pipe line between Spindletop and Port Arthur, besides other equipment for storing and transporting oil.

Two wildcat wells have recently been abandoned—one the Rice Oil Company well, 2 1/2 miles south of Spindletop at 2250 ft., and the other the Stengle & Van Worner well on Pine Island bayou at 1200 feet.

The field report, July 1 to July 15, is as follows:

	Wells Comp'd.	Producers.	Dry.	Drilling.
Humble.....	22	17	5	44
Batson.....	7	7	..	5
Saratoga.....	2	1	1	11
Sour Lake....	4	4	..	6
Spindletop ..	4	4	..	1
Dayton.....	..	..	..	1
Jennings.....	2	2	..	6
	41	35	6	73

The new wells brought in are mainly small producers.

UTAH.

JUAB COUNTY.

Lower Mammoth—The east drift on the 1700 level is believed to be approaching interesting ground; that the orebody opened on the 1400 is about to be encountered again.

Yankee Consolidation—The installation of the new compressor plant at Homansville is in progress. The old plant was destroyed by fire last winter.

Scranton—This company has encountered another important lead orebody in what is known as the Saginaw claim. Shipments are being made at the rate of about 40 tons daily of lead and zinc ore.

Godiva—Steps are being taken to increase the equipment of the mill placed in commission several weeks ago.

Tintic Ore Shipments—There were 105 carloads sent to the Salt Lake smelters during the past week, the shippers being: Mammoth, 9; May Day, 2; Ridge & Valley, 3; Scranton, 4; Swansea, 3; Uncle Sam, 2; Victoria, 3; Yankee, 4; Dragon Iron, 13; Eagle & Blue Bell, 7; Eureka Hill, 4; Gemini, 5; Grand Central, 6; Ajax, 3; Beck Tunnel, 8; Bullion-Beck, 9; Carisa, 4; Centennial Eureka, 6; other mines, 2 cars.

Eagle & Blue Bell—The shaft at this property is to be dropped several hundred feet. It is now down 1000 ft. in all.

SALT LAKE COUNTY.

Columbus Consolidated—The management is endeavoring to make a record in shipments from its Alta mine for July, but is handicapped by lack of teams. About 80 tons are sent to the smelters daily, of the value of about \$45 a ton. A new ore-body was found a few days ago in the main tunnel and in ground recently purchased for \$15,000.

Montezuma—The Bingham property of this company is showing up well under development. A cross-drift run two ways from the shaft on the 200 level has encountered ore of shipping grade.

SUMMIT COUNTY.

Park City Shipments—Last week these amounted to 2041 tons, the contributing mines being: Daly Judge, 675; Daly West, 495; Silver King, 621; Kearns-Keith, 56; Little Bell, 127; New York, 32; other mines, 36 tons.

Daly West—An upraise is being run from the 900 level on the Little Bell fissure with favorable results.

VIRGINIA.

SHENANDOAH COUNTY.

Manganese Ore—The H. P. Binswanger Company of New York has secured the old Powell Fort manganese property between Seven Fountains and Woodstock, and will develop it actively. Fears as to the pockety nature of the deposit have been dispelled by tunnel exploration which has opened up a strong vein. The ore is highly crystallized, and, after hand cobbing only, shows 47 per cent. metallic manganese and 0.25 per cent. phosphorus. The silica in the crude ore can easily be removed by washing, and a concentrating plant is to be erected. A certain shipment of ore analyzed 5.65 silica, 64.66 manganese and 0.047 per cent. phosphorus, but this standard could probably not be maintained.

WASHINGTON.

STEVENS COUNTY.

First Thought—Ore is being steadily shipped from the stopes on the main tunnel level. A large body of ore has been

struck in the shaft workings on the 65-ft. level.

Dominion Hill—Some rich ore has been extracted lately. Streaks are coming in at the face of the tunnel which assay high in gold and silver. The company is shipping regularly now to the Granby smelter.

Morning—This company has purchased 20 more claims which lie adjacent to its own, the purchase money being furnished by the heavy shareholders, leaving the treasury share untouched.

Mammoth—Two shifts are employed. At 22 ft. in from the portal in the main tunnel a vein of high-grade lead ore has been encountered.

Providence—This mine in the Cedar Cañon district is being worked under lease and producing good ore. The main tunnel is in about 550 ft. and has intersected three veins.

Iron Horse—A shaft has been sunk 35 ft. in iron ore of low grade, which carries value in gold and copper. Negotiations are pending for the sale of this property to a local company.

Butte & Chief—A body of gold-copper pay ore has been encountered.

Bonanza—A pumping plant has been installed and the mine is being unwatered.

Ben Venue—This mine has been worked with three shifts. The force has been lately increased. This mine is situated near Meyers Falls post-office.

Tacoma & Kansas City—This company, J. A. Frost, Tacoma, Wash., president, has a vein of silver-lead ore which contains some gold. Work will be started on the Tiger claim.

OKANOGAN COUNTY.

The Mad River, Olentangy, Bluffton and Copper Mountain mining companies and a dozen other companies, operating near Chesaw, are coming together in an effort to establish an electric light and power plant for supplying the mines and the towns of Chesaw and Bolster with electric power and light.

Mountain Sheep—The lower tunnel is in over 450 ft. and has intersected a second vein 7 ft., but not reached the hanging wall. A gasolene engine of 25 h.p., an air compressor and two Rand drills have been installed.

Copper World Mine—The shaft is down 70 ft. The ore brought to the surface carries copper and gold. The management reports that the Dominion Copper Company has offered to smelt it without charge and allow a bonus of \$1.40 per ton on account of its contents of iron and sulphur.

Bluffton Gold and Copper Mining and Smelting Company—This company owns several mines about half a mile from Chesaw. Ore was encountered in a shaft on the Bluffton claim and a tunnel was driven 218 ft., which intersected the vein about 150 ft. deep. The ore at the face carries

gold and copper. A new tunnel is now in 40 ft. which will continue for a total distance of 1800 ft. A compressor plant will be installed to facilitate the work.

WISCONSIN.

GRANT COUNTY.

Scrabble Creek—W. F. Strausser has just about completed the installation of a Byron & Jackson centrifugal mine pump, with which it is intended to beat the water. The Scrabble Creek is owned practically by the officers of the Northern Electrical Manufacturing Company.

Murphy—It is rumored that a contract was let during the week for a 100-ton concentrating plant and a 20-ton magnetic separating plant.

Clark—This company is in the market for a 50-ton mill, to be erected on the property near Highland. It will probably be operated by gasolene power.

Enterprise—The Platteville Lead and Zinc Company paid its regular monthly dividend, in spite of its increased pay-roll. This company has adopted a policy of sharing its prosperity with its employees, which is extremely satisfactory to them.

Lucky Four—The Grant County Mining Company has voted to erect a 100-ton mill, to be so situated as to receive ore from two shafts by inclined tramways. Operations have been suspended in the ground until the mill is completed.

Columbia Mining Company—Incorporation papers are out, the capitalization being 80,000 shares at a par value of \$1. Fred Krog is president, and F. E. Funk, secretary. The mine is on the Funk estate just east of Platteville.

Woodchuck—A big strike is reported on the 80 acres adjacent to the Blockhouse, southeast of Platteville.

Empire—The quality of the ore from the magnetic separating plant continues to improve as the men become more proficient in operation, the last assay showing 63.25 per cent. zinc and 1.85 per cent. iron.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA.

East Kootenay—The output of coal from the Crow's Nest Pass Coal Company's collieries at Coal Creek and Michel during June was as under: Coal Creek, 55,019 tons; Michel, 36,317; total, 91,336 tons. This was 7129 tons in excess of the production in May. The largest daily output ever made by these collieries was that of June 29, when Coal Creek sent out 2184 tons and Michel 2003 tons; together 4187 tons.

Nelson—During June the Hall Mining and Smelting Company received 1494 tons of lead ore at its custom plant, Nelson, the lead product of which was 1,167.074

lb. Of the ore, 551 tons was from the Canadian Metal Company's Blue Bell mine, 206 tons from La Plata, 169 tons from the Cork, 134 tons from the Arlington (Erie), 104 tons from the St. Eugene, and the remainder from 12 smaller shippers.

NOVA SCOTIA.

Dominion Coal Company—Vice-president Wanklyn states that the season's output of the mines at Glace bay will fall short of expectations, owing to the difficulty of getting steady labor. The demand for harvest hands and railroad builders is the principal cause of the difficulty.

ONTARIO.

Laurentian—At this mine, situated in Manitou gold area, some rich ore has been found in working on the upraise from the 85-ft. level. One 2-oz. nugget was found. This ore will undergo the hand-picking process and the richest will be treated in the laboratory, the balance being run through the stamp battery.

Summit Lake Gold Mining Company—Treasurer A. MacLaren and a party of the directors and shareholders visited the properties of the company in the Manitou district recently including the Little Master, Peninsula and Imperial mines.

Iron Ore—W. A. Cockburn, of Sturgeon falls, has discovered a rich iron-ore deposit in Kirkpatrick township, about two miles south of Verner station on the Canadian Pacific Railway. A vein about 25 ft. wide has been exposed.

Nipissing Mines—A shaft is being sunk at a point which is supposed to be at, or near, the junction of three veins. The principal of these, ledge 26, which was opened last fall, has yielded about \$250,000. It has been extended northerly and near it a mass of ore weighing 250 lb. was found. This is an outcropping from another vein, which joins that now being worked. After sinking to about 80 ft. drifting will be carried on.

Gates—A find of pure native silver has been made at a depth of 45 ft. This property lies on Clear lake, some two miles west of Cobalt, and this is the first free silver found in the locality.

Cobalt Mine Owners' Association—Having suspected for some time that extensive thefts of ore were going on among employees, this association engaged the services of a detective, who speedily discovered that their surmises were correct. The men had for some time been in the habit of taking specimens of ore, which they disposed of to jewelers and dealers in souvenirs. Six arrests have been made.

Amalgamated Oil Company—The first annual meeting of the Amalgamated Oil Company, of Canada, was held in London, Eng., July 22. The properties of the company, valued at \$100,000, included over 400 oil wells and 10 pumping plants in Lambton county, Ont., the revenue from

oil netting a profit of 15 per cent, which was largely increased from other assets. The company also owns 200 acres in the Tilbury oilfield, where it will shortly begin drilling. The officers elected were B. V. Hole, president; C. B. Keenley, secretary-treasurer; R. S. Williamson, field manager; J. J. Kelso, Arthur McBean, J. A. Frigon, J. M. Wilkinson and D. S. Robb, directors.

Opastica Lake—The gold discoveries continue to attract prospectors from the Cobalt area and adjoining regions. The occurrence of gold in the mineral deposits near Opastica has for some time been known, but the economic value of the field has yet to be demonstrated. In the absence of development work no definite conclusions can be drawn, but from such information as has so far been obtainable, T. W. Gibson, Deputy Minister of Mines for Ontario, considers it probable that most of the deposits are composed of low-grade ore.

British American Development Company—At this company's pyrites mine near Queensboro, Hastings county, a new double-compartment shaft is being sunk, some 300 ft. west of the first shaft, in a body of high-grade ore, which will yield about 10 tons of iron pyrites per foot of sinking. A promising vein of silver-lead has also been struck on the property, and is being opened up.

Big Dipper—This company, J. A. Jamieson general manager, has opened up a body of gold-bearing quartz on its property in Barry township, Frontenac county. The shaft is down 10 ft. The ore carries sulphides and galena.

Right-of-Way Mining Company, Ltd.—This company has been organized with office at Ottawa; capital, \$500,000. Provisional directors, George P. Murphy, James B. MacLaren, John P. Dickson and Edwin S. Leatham. This company recently secured the mining privileges on the right-of-way of the Timiskaming & Northern Ontario Railway.

QUEBEC.

J. Lauzon, of Sudbury, Ont., has returned from a prospecting trip to the Lake Opastica gold region, where he secured a claim, near the scene of the recent finds. He states that there is plenty of gold and the land is easy to work. Mr. Lauzon intends putting on a force of men to develop his holding.

Arthur J. Lippens, of London, Eng., and H. M. Lippens, of Paris, members of a mining syndicate, who have been prospecting in Quebec, claim to have discovered radium in considerable quantities in the country around Murray bay. Samples have been sent to Paris for analysis. Mr. Fieux, a French mining expert, who accompanies the party, has been making experiments with the material and asserts that the deposits will repay working.

Ironsides Iron—These deposits near

Hull, which have not been worked for about a quarter of a century, are being extensively tested by diamond drilling to a depth of 400 ft., to ascertain their possibilities as a source of supply for electric smelters. American capitalists are interested in the project and may re-open the mines if the result is favorable.

International Portland Cement Company—A very large business is being done in cement this season. This company shipped from their works at Hull, July 25, last, 2909 bbl. The June shipments amounted to 48,008 bbl., and the July business will run over 50,000 barrels.

MEXICO.

DURANGO.

La Perla—This property, located in the rather obscure district of Topia, is under option to M. E. and Bernard MacDonald, who put through the deal for the Real del Monte in Pachuca. They have their engineer at present making examinations of the property, and it is understood that already large quantities of ore have been measured up. If taken by the MacDonalds they will probably put in a lead-smelting plant, shipping out the fine silver bullion and allowing the lead to remain on hand until the arrival of the railroad which is building that way, and which will make Topia a desirable district.

GUERRERO.

Mitchell Mining Company—A meeting of the stockholders has been called for Aug. 16, to vote on the question of issuing \$3,000,000 new stock, making the total authorized \$8,000,000. Of the increased stock \$1,500,000 will be used to retire the bonds of LaDicha & Pacific Railroad.

MICHUACAN.

Trojes—The old smelting plant at this point, which years ago was run by an English company, but which, it is said, never paid under that management, was, with the mines, about a year ago taken under lease and bond by the Metallurgical Company of Michoacan (or Anganguero). The leading directors of that company are E. N. Brown, of the National Railroads of Mexico; M. Elsasser, who controls the antimony production of Mexico; and Ernesto Madero, president of the Torreon Metallurgical Company. Under the management of O. F. Westlund, former manager of the Aguascalientes plant of the American Smelting and Refining Company, the old works were entirely overhauled, a new 300-ton stack erected. On July 14 it was blown in by the superintendent, F. N. Flynn, formerly assistant superintendent of the Torreon smelter and later with the Yampa smelter at Bingham, Utah. The company has had the trouble of all new plants, but everything is now running smoothly and no more hitches are anticipated. This new smelter has cut quite a hole in the sulphide-ore receipts of the Aguascalientes plant, which has

relied on the mines of the Anganguero company for a large part of its sulphides. Its adaptability to smelting is well known, and already the new company is considering the advisability of erecting an additional stack to treat the immense body of low-grade copper-iron sulphides in the mines.

Los Ocotes—This property of the Los Ocotes Mining and Milling Company, near the San Rafael, in Tlalpujahua (El Oro) district, Michoacan, is said to have sold sufficient stock to continue development work. Operations have started under the management of Fred Heller.

SONORA.

American Mine—This property has been attracting the attention of mining people in Mexico for some time, but more particularly has this been true since early in May, when its manager, John H. Talbot, began to open up large bodies of 5 per cent copper ore. It is now stated that it will outrank the Greene Consolidated Copper Company, of Cananea, whose ground it adjoins, the main shaft of the America being only 200 ft. from the Cobre Grande shaft of the Greene. The property embraces 126 pertinencias (300 acres). In May the orebodies had been proved up in three different shafts, several thousand feet apart, and the ore was being blocked out with the intention of later putting in a large smelting plant at Cananea. Arrangements have been made in the meantime for treating at the Greene plant such ores as are taken out in the development work. Since that time the ore has been opened up in three additional shafts, making six in all, and runs in places high in copper, 30 per cent. ore being found in a new shaft at only 150 ft. from the surface. This is said to have led to the sale of the property by L. Lindsay, the president of the company and the principal owner, who in the last four years has spent over \$400,000 in development work. The purchasers are Thomas F. Cole and associates, and the price is reported to have been \$2,500,000 gold.

Arizpe Mining Company—Returns of over \$600 per ton are being received for some ore which is being shipped from the Alacran mine. It is the purpose of the management to ship five carloads of this ore to El Paso and to use the money netted for further development of the mine. The Alacran is a silver mine with a large per cent. of lead. The Palo Seco mine of the same company is a low-grade copper proposition with large bodies of ore. This mine is being developed.

South Cananea Copper Company—The Mitchell Mining Company, of New York, has commenced serious work on its property, which is located within two miles of Cananea. A 125-h.p. hoist and other machinery has been ordered for the property. It is the purpose of the management to sink to a level of 500 ft., and then commence production.

ZACATECAS.

Tajos de Panuco—John P. MacEwen recently assumed personal charge of this property, located 25 miles from Zacatecas City. Drainage began some weeks ago. The equipment used is a 25-h.p. hoist and cylindrical tanks running on wire guide ropes. The water is receding at the rate of 1.5 meters per day. C. A. Bentley, former superintendent, has resigned and will operate the San Carlos mine, nearer Zacatecas.

Norris-Gilbert Copper—A new 150-h.p. steam plant has lately been installed at these mines. Mr. Norris, the principal owner, is absent in London, engaged in studying a new concentration process for utilizing low-grade copper ores. The gross returns last month on ore shipments reached \$45,000. The Torreon smelter still receives the output. The owners are considering the advisability of constructing a spur from the mine to the Mexican Central main line.

El Bote—This famous producer of 60 years' standing is being examined by engineers, headed by a Mr. Carpenter, of Mexico City. New York parties are negotiating for the property. Walter Palmer, of Zacatecas, holds the option. Rumor places the purchase price at \$2,250,000, Mexican. It is questionable whether any considerable quantity of ore is blocked out, for the policy of the owners has rarely been to carry development ahead of extraction. If the purchase is made by either an American or an English company, the new ownership will redound to the benefit of Zacatecas. While 1000 men are now employed, under an energetic regime the working force would certainly be doubled and perhaps trebled. The reason assigned for selling is a desire to wind up the business because of dissensions among the owners. Two London families hold title to the property and for more than a century the ownership has remained the same.

San Roberto y Anexas—The actual owners have succeeded in placing this property with an English company, through William S. Godfrey, of Aguascalientes. The location is good, being in the neighborhood of several copper producers. The Zaragossa lies to the west of the San Roberto, while the Gilbert-Norris and Palmer groups are only a short distance south. A shaft is already sunk in the hanging wall of the ledge, the edge of the vein being exposed in the bottom. It is planned to crosscut the ledge as far as the footwall.

AFRICA.

RHODESIA.

Gold production in June is reported at 47,664 oz. bullion, being 935 oz. more than in May, and 12,004 oz. more than in June, 1905. For the half-year ended June 30 the total was 262,377 oz. bullion, against 198,287 oz. last year; an increase

of 64,090 oz. The bullion reported this year was equal to 233,516 oz. fine gold, or \$5,027,776 in value.

TRANSVAAL.

Before the rainy season starts in October or November, several mills may have to close down through scarcity of water. On the West Rand the rainfall has been especially bad this year. The mines of the Central Rand are quite safe, being well supplied with water. Already some of the outside mines have been forced to put down bore holes in search of water. One mine is relying entirely on this supply. Old shafts and workings which have been full of water for years are now being pumped out, to augment the water supply. Everyone is hoping that the rainy season will commence in September or October, and not be delayed until November or December, as happened last year. From five to six months pass on the Rand without a drop of rainfall.

Next to the labor problem the water question is the biggest one on the Rand. The rainfall seems to come in cycles. Three years ago there was a very wet season, but the last two seasons have been dryer. The "old timers" declare the country does not get anything like the rain that fell twenty years ago. It is stated that when the nakedness of the veldt is clothed with trees, the rainfall of the country will be much improved. It will take a generation to plant sufficient trees to count.

The *Rand Daily Mail* has been investigating poverty on the Rand, and its revelations show the terrible economic state of the place. In 1897 a commission was appointed by Kruger to investigate the depression then prevailing. The suffering is far more acute now than then. No commission, however, could improve matters today. The troubles are well known. The point is to find the remedies.

Meantime the Rand drags on, apparently unaffected by record outputs, and as South Africa takes its step from the pace of this city, the whole country lags behind. It is hard to see where any improvement can come from, for some time yet. The gold is here, and a great industrial expansion is possible, provided a favorable fixed policy is established.

Competition is intense on the Rand just now, and has something to do with the depression among the commercial community.

Were it not for the noble work being done by local charities, hundreds of people would starve to death. They are living on hope and a crust of bread. How to relieve the distress permanently is the question of the hour.

Some of the mines are employing the "hard ups" to do "Kafir work." These men earn from 7s. 6d. to 10s. per day. A few have jumped to the conclusion that it is now possible to employ all white labor. This is a mistake.

NEW CALEDONIA.

Exports of ore for the four months ending April 30 are reported by the *Bulletin du Commerce* of Noumea as follows, in metric tons:

	April.	Four Mos.
Nickel ore.....	15,458	47,213
Cobalt ore.....	112	1,328
Chrome ore.....	10,356	31,970

Of the April exports, 5466 tons of chrome ore were destined for the United States.

The Societe le Chrome has begun the construction of a railroad from Baie Carénage to the Plaine des Lacs.

The railroad to the nickel mine of Kopeto has been finished, and shipments of ore have begun.

NEW ZEALAND.

The Mines Department reports that 44,592 oz. gold and 99,046 oz. silver were exported in April. For the four months ending April 30, the total was, in ounces:

	1905.	1906.	Changes.
Gold	163,059	174,285	I. 11,226
Silver	287,101	431,913	I. 144,812

The gold bullion reported this year was equal to 165,701 oz. fine gold, or \$3,425,223 in value.

SOUTH AMERICA.

BRITISH GUIANA.

Exports of gold from the colony for the half-year ending June 30 were 46,299 oz. bullion, an increase of 120 oz. over last year. The bullion this year was equal to 39,842 oz. fine gold, or \$823,531. Exports of diamonds were 788 karats, valued at \$4889.

Coal Trade Review.

NEW YORK, Aug. 8.

The Western coal trade is active, especially the Lake trade, in which there is a rush of shippers to get coal started. The demand for coal in the Northwest is large, and there will need to be active work for the rest of the season.

In the East trade is quiet, as usual at this season. Business, however, is good for August, and promises more for September.

It is stated that the stock of the Pennsylvania Coal and Coke Company is to be transferred to a new corporation, the Beech Creek & Eastern Company. This will be a holding company which will control the collieries shipping over the New York Central lines. The Pennsylvania Coal and Coke Company controls about 117,000 acres of coal land in Cambria, Blair and Indiana counties in Pennsylvania. It has a number of shipping mines and coke ovens, and does a large business.

In Alabama there is a prospect that the strike which has been nominally in force against the large companies for two years may be declared off. It was practically ended long ago.

COAL TRAFFIC NOTES.

The coal and coke traffic originating on all the lines of the Pennsylvania Railroad east of Pittsburg and Erie, for the year to July 28, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite.....	2,660,984	2,494,066	D. 226,318
Bituminous.....	16,206,756	17,807,632	I. 1,596,876
Coke.....	6,266,667	7,218,488	I. 951,821
Total.....	25,136,407	27,460,786	I. 2,324,379

Notwithstanding the loss in anthracite, the gain in the total tonnage for the seven months to the end of July has been 9.2 per cent. this year.

Shipments of Broad Top coal over the Huntington & Broad Top Railroad for the week ending Aug. 4, were 13,690 tons; for the year to Aug. 4 they were 450,370 tons.

New York. Aug. 8.
ANTHRACITE.

The hard-coal market has just about reached its lowest degree of activity. Coal is still coming forward in large amounts, but it is all disposed of upon old orders promptly upon arrival. New orders have ceased to appear and the old ones are almost all filled, so that, judging from all appearances, the mines will either have to close down or their output will have to be stocked. Up to date, there have been no important shut-downs and not many of the companies have stocked extensively, the comparatively strong demand in the West being the sustaining element in the industry.

Prices throughout August will remain as follows: \$4.65 for broken and \$4.90 for egg, stove and chestnut. Steam sizes remain at their regular prices: \$3 for pea, \$2.25@2.50 for buckwheat, \$1.45@1.50 for rice and \$1.30@1.35 for barley; f.o.b. New York harbor shipping points.

BITUMINOUS.

The dullness of the Atlantic seaboard soft-coal trade continues and yet there are some signs that big holes must have been made in many of the accumulations laid by in the anticipation of a strike, and consumers must shortly be compelled to give their orders. Some consumers who have not been heard from since April are inquiring for coal and giving orders to a limited extent. From the mining districts comes the complaint of a shortage of men, a circumstance which looks bad for the coming fall trade. Some operators who have heretofore used only English, Scotch and native workmen are considering the employment of Italian and Hungarian laborers.

Shipments on contracts at shoal-water ports are well up to monthly proportions but on the deep-water business consumers are behind. Current prices hold very near the bottom, and producers prefer to curtail shipments rather than to have large arrivals on hand to dispose of at less than the prevailing price. It is thought that this curtailment amounts to fully 50 per cent. in the East. The demand for Western shipments of gas coal is large.

Trade in the far East is dull. The Sound is a little better at taking on coal, although not taking its proper amount. New York harbor is not using much coal, although there is no accumulation at the tidewater shipping ports. This arises from the restrictions practised by the producers. Prices range around \$2.60@2.75 for the better grades of steam coal and \$2.40@2.50 for gas coal, f.o.b. New York harbor shipping points.

Car supply is reported short by the railroads, although most producers can get all the cars they need for their present output. Transportation from mines to tide is good, but all-rail traffic is variable.

Vessels in the coastwise market are in fair supply and rates are a little stronger, vessels being inclined to take outside freight, rather than coal at the lowest prices. Current rates from Philadelphia are: To Boston, Salem and Portland, 60 @65c.; to the Sound, 50c.; to Newburyport and Lynn, 80@85c.; to Portsmouth, 70 cents.

Birmingham. Aug. 6.

The Tennessee Coal, Iron and Railroad Company produced at the several mines in the Pratt division on Thursday last nearly 7000 tons of coal, the largest output in one day at these mines in four years. The strike at the furnace companies' mines continues, now starting on its third year. President Ed. Flynn, of the Alabama organization during the past week was summoned to Indianapolis for a conference with President Mitchell, of the national organization. A convention of the miners in Alabama has been called for Aug. 14, and it is believed the strike will be called off. The convention will be held in Birmingham.

The Gray Eagle Coal Company has been incorporated by G. M. Bowers, president, H. W. Perry, vice-president and general manager, and T. B. Perry, secretary and treasurer. The capital stock of the new concern is \$20,000 and mines are to be opened at once.

Chicago. Aug. 6.

The coal market continues dull, with little prospect of revival before the coming of cool weather. Dealers who handle out-of-town business largely report a slight improvement over last week's conditions, but the city market is afflicted with over-abundant shipments from Illinois mines, and low prices to escape demurrage. Shipments from Indiana and other States east of Illinois are fairly well restricted to the needs of the market with the result that sales, though light, are at fair prices.

Contract business is reviving, but is not large, though a few good contracts have been made. The consumer is inclined more and more to buy in the open market, with the resumption of chronic conditions of over-supply. Threshing business continues good.

Illinois and Indiana coals bring \$1.25

@1.60 for screenings; \$1.40@1.70 for run-of-mine, and \$1.70@2.10 for lump. Fine coals continue to be in greatest demand. Of eastern coals smokeless is fairly strong and probably not selling under the standard quotation, \$3.40 for run-of-mine. Hocking is quiet but firm at \$3.15. Youghiogheny is in good demand at \$3.10 for three-quarter.

Anthracite is very dull, and with the coming of August there is only a 10c. discount from the circular price. This can hardly be expected to induce consumers or dealers to buy winter supplies, when discounts of 20@50c. failed to bring any large amount of orders.

Cleveland. Aug. 7.

The coal market in this territory is beginning to get brisk for the fall trade. Some figures have been compiled recently, which make an interesting showing. Contrary to the general belief, the total movement by lake to date is larger than it was a year ago, but the movement by districts shows a marked contrast. The Pennsylvania district, for instance, made a gain of about 50 per cent., while Ohio and West Virginia fell away behind. The Ohio showing is due to the idleness of the mines. The Pennsylvania district did not take the business of the other mines, indicating that the total lake movement would have been the heaviest on record had it not been for the mine difficulties. As it is, the Ohio district will be struggling for the remainder of this year to catch up. The movement during the last week of July was exceptionally heavy. Boat-owners had the call. The shippers who had not provided carrying capacity for their material had to contract for September and August movements at 50c. to Lake Michigan. Small boats were in such demand that to points like Port Washington 80c. has been paid. The lake trade is a scramble to get the coal moved. In the local market the situation is weak. Mine-run steam coal is selling at 90@95c. at the mines, and Ohio slack is selling at 75c. at the mines.

The coke market is getting much stronger than it was, with the best grades of 72-hour foundry selling at \$3.25 at the oven, and furnace selling at \$2.75 at the oven.

Pittsburg. Aug. 7.

Coal—A number of mines are closed this week on account of a scarcity of railroad cars. Some days less than 40 per cent. of the requirements of cars were sent to the mines. As a result, production has fallen off and prices are firmer, \$1.15 a ton for mine-run coal at the mine being the minimum price. Nut coal is held at the same price as mine-run, and slack is quoted at 75@80c. The river mines are still in full operation but will not continue long, as nearly all the empty craft in the pools and harbor are loaded and there is no rise in the rivers in sight.

Connellsville Coke—Prices of furnace coke continue at the highest point of the year, being quoted this week at \$2.60@2.75 and foundry coke ranges \$2.75@2.85 a ton. The demand is good and the car supply is excellent. According to the *Courier* the production for the week amounted to 272,914 tons and the shipments to 14,941 cars distributed as follows: To Pittsburg, 4911 cars; to points west of Pittsburg, 8226 cars; to points east of Connellsville, 1804 cars. The production in the lower Connellsville region amounted to 104,524 tons.

Foreign Coal Trade.

Aug. 11.

Exports of coal and coke from the United States for the six months ending June 30 are reported as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1905.	1906.	Changes.
Anthracite.....	1,207,985	948,403	D. 259,582
Bituminous.....	3,151,079	3,347,406	I. 196,327
Total coal.....	4,359,064	4,295,809	D. 63,255
Coke.....	295,566	376,786	I. 81,220
Total.....	4,654,630	4,672,595	I. 17,965

The coke exported went chiefly to Mexico, though some was taken by Canadian furnaces. The disposition of the coal was as follows:

	1905.	1906.	Changes.
Canada.....	3,179,234	3,054,889	D. 124,345
Mexico.....	491,783	542,531	I. 50,748
Cuba.....	251,556	368,798	I. 117,242
Other W. Indies.....	165,906	170,804	I. 4,898
France.....	651	1,866	I. 1,215
Italy.....	37,962	30,696	D. 7,266
Other Europe.....	13,739	16,139	I. 2,400
Other countries.....	218,239	110,086	D. 108,153
Total.....	4,358,064	4,295,809	D. 63,255

The coal to other countries goes chiefly to South America. Canada took this year 71.1 per cent. of all the coal shipped. The exports to Canada in detail were:

	1905.	1906.	Changes.
Anthracite.....	1,189,673	923,277	D. 266,396
Bituminous.....	1,989,561	2,131,612	I. 142,051
Total.....	3,179,234	3,054,889	D. 124,345

There was a decrease of 22.4 per cent. in anthracite and an increase of 7.1 per cent. in bituminous coal.

Imports of coal and coke into the United States for the six months ending June 30 were as follows:

	1905.	1906.	Changes.
Canada.....	657,359	805,838	I. 148,479
Great Britain.....	24,654	66,564	I. 41,910
Other Europe.....	113	4,036	I. 3,923
Japan.....	33,136	11,726	D. 21,410
Australia.....	63,140	94,714	I. 31,574
Other countries.....	38	64	I. 26
Total coal.....	778,440	982,992	I. 204,552
Coke.....	62,171	62,171	I. 0
Total.....	778,440	1,045,163	I. 266,723

Coke was not reported separately in 1905. It is nearly all from British Columbia, though a little comes from Germany. The coal imports are chiefly on the Pacific coast, but some Nova Scotia coal comes to New England ports. Of the coal imported this year 9256 tons are classed as anthracite.

Iron Trade Review.

NEW YORK, Aug. 8.

The iron and steel trades continue active beyond all precedent for this season of the year. A special point in the last week has been active buying of foundry iron, the foundries having apparently found it necessary to put in new stocks sooner than some of them expected. There has been a general stiffening of prices; Northern furnaces are asking 25 and 50c. a ton more, while Southern makers are holding for the basis of \$14 Birmingham for No. 2 foundry.

In finished material, new orders continue to come in for rails, plates and structural material. The railroads are heavy buyers, and construction work is still active. The main trouble with the latter is the difficulty about arranging for deliveries.

The detailed report of pig-iron production for the first half of 1906 will be found on another page.

Exports and Imports—Exports of iron and steel, including machinery, from the United States for the six months ending June 30 are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1905.	1906.	Changes.
June.....	\$11,821,097	\$14,085,003	I. \$2,263,906
Six months.....	66,169,295	85,224,113	I. 19,054,818

The gain for June was 19.2 per cent.; for the six months, 28.8 per cent. The chief items of the iron and steel exports for the half-year were, in long tons:

	1905.	1906.	Changes.
Pig iron.....	29,459	14,850	I. 14,609
Billets, ingots & blooms.....	93,999	129,433	I. 35,434
Bars.....	29,171	43,042	I. 13,871
Rolls.....	128,926	179,726	I. 50,800
Sheets and plates.....	37,384	50,136	I. 12,752
Structural steel.....	38,976	52,410	I. 13,434
Wire.....	66,889	81,677	I. 14,788
Nails and spikes.....	25,894	34,440	I. 8,546

There were considerable gains in all items.

Imports of iron and steel, including machinery, into the United States for June and the half-year ending June 30 are valued as below:

	1905.	1906.	Changes.
June.....	\$2,646,258	\$2,897,622	I. \$251,364
Six months.....	12,980,391	15,634,271	I. 2,653,880

The gain was 9.5 per cent. in June, and 20.4 per cent. for the six months. The chief items of the iron and steel imports for the six months were, in long tons:

	1905.	1906.	Changes.
Pig iron.....	87,496	147,550	I. 60,054
Scrap.....	7,769	9,848	I. 2,079
Ingots, blooms, etc.....	11,867	10,699	D. 1,168
Bars.....	16,028	16,281	I. 253
Wire-rods.....	8,057	9,038	I. 981
Tin-plates.....	36,027	24,225	D. 11,802

The chief gains were in semi-raw materials, such as pig iron and scrap.

Iron Ore Movement—Exports and imports of iron ore in the United States for the six months ending June 30 were, in long tons:

	1905.	1906.	Changes.
Exports.....	55,423	74,784	I. 19,361
Imports.....	430,886	568,111	I. 137,225

The exports were chiefly to Canada. The imports were largely from Cuba, though some ore came from Spain and Newfoundland, and a little from Greece.

Imports of manganese ore for the six months were 141,122 tons in 1905, and 110,051 tons in 1906; a decrease of 31,071 tons this year.

Birmingham. Aug. 6.

Alabama pig iron, early delivery, is not an easy quantity. Quotations are firm on a basis of \$14 per ton, No. 2 foundry, with an inclination to go higher. Immediate delivery iron, especially in better grades, commands a premium. The furnace companies in this district, the smaller concerns as well as the larger, appear to have sold well ahead and there is no anxiety to book more orders. Some inquiry is being received for iron to be delivered during the first quarter of 1907 and a few sales have been made, though it is the general policy in this district not to sell beyond three months. The turn for the better came on at the turn of the past week. Some large orders were booked at the low prices which have prevailed for several weeks and it became apparent that there was a large aggregate of iron already disposed of. The railroads are furnishing all the cars necessary for a prompt handling of the iron and other products. The home consumption, notwithstanding the rolling mills are not on in full force, is improving right along. The big plant of Payne-Joubert, foundry and machine shops, located at East Birmingham, will shortly be requiring a large tonnage of iron. It is understood that the needs of this plant have been looked after and that there will be no delay.

It is understood that negotiations are on for the purchase by the Southern Steel Company of the furnaces of the Lacey-Buek Iron Company (Trussville, one) and the Chattanooga Iron Company (Chattanooga, one). The Lacey-Buek Company, in addition to the Trussville furnace, owns considerable coal, ore and limestone property. Rumors also prevail that the Tennessee-Republic Company is about to purchase the Woodstock furnaces at Anniston, Ala. This rumor is hardly believed. It is also rumored that the Alabama Consolidated Coal and Iron Company is about to acquire the Woodstock furnaces. This rumor also lacks confirmation.

Chicago. Aug. 6.

The last week has seen exceedingly heavy buying for the first week in August. Melters seem to have come to the conclusion generally that the market is advancing beyond hope of a relapse, and to have set about buying freely for the future. Short-time buying, to cover the needs of only a few weeks ahead, has practically disappeared. Sales are now

mostly for the first half of 1907, running freely into the second quarter of the year, and are for large tonnage to nearly all buyers.

Malleable and foundry irons are both in demand and probably will advance strongly this week. There is much complaint of slow deliveries and immediate needs cause high premiums to be paid for spot lots.

Southern No. 2 is still quoted at \$14 Birmingham, or \$17.90 Chicago, and it is claimed that there is no intention on the part of the furnaces to advance prices unduly. Northern No. 2 is \$19. The demand appears to be greater for Northern than for Southern, but both are more active than the most sanguine sales agent expected a month ago. Northern charcoal iron is much in demand at \$19.50 per ton.

Cleveland. Aug. 7.

Iron Ore—The movement of iron ore down the lakes during the month of July amounted to 5,762,772 tons, compared with 5,224,620 tons for July, 1905; a gain of 538,152 tons. The movement to Aug. 1 was 17,004,368 tons, compared with 16,038,674 tons for the corresponding period a year ago, showing an increase of 965,694 tons. The season is about half over. If the same ratio of increase is shown through the remainder of the year the total season movement will be a little over 36,000,000 tons. This seems entirely out of the question, in view of the complications in the lake trade, which are likely to develop during the next few months. Shippers have given up the idea of trying to move anything like 38,000,000 tons this year, which was the mark set at the beginning of the season. There is likely to be no serious shortage of ore, however, because of the amount left on the docks at the beginning of the season.

Pig Iron—There is a shortage of pig iron of the foundry grade for immediate delivery. One consumer has been trying to place a contract for 1000 tons without avail. The southern Ohio furnaces and those in the Buffalo district have about sold their supply for the time being; even the Southern furnaces have no iron for prompt shipment into this territory. The result has been an advance in price. Northern No. 2 is selling at \$17.50@17.75 in the Valleys for small lots and it would not be difficult to get \$18 in the Valleys for a big lot.

Finished Material—Structural steel is strong, owing to the demand from ship builders. Another order was placed during the week and it is understood there are still a number of contracts which have not been announced. Bar iron is strong at 1.50c. Pittsburg. One new mill went in this week, increasing the supply. Billets are scarce. Sheets are strong, with mills a month behind their orders.

New York. Aug. 8.

Pig Iron—Business is active, and there has been a good deal of buying by local and New England foundries. Northern iron is higher; furnaces are asking more and are not hunting for orders. Southern iron is now firm on a basis of \$14, Birmingham, for No. 2 foundry.

Current quotations for pig iron are, for New York or parallel delivery:

Northern:	
No. 1 X foundry.....	\$19@19.25
No. 2 X foundry.....	18.25@18.75
No. 2 plain.....	17.75@18.25
Forge pig.....	16@16.50
Southern:	
No. 1 foundry.....	18@18.50
No. 2 foundry.....	17.75@18
No. 3 foundry.....	17@17.50
No. 4 foundry.....	16.25@16.75
No. 1 soft.....	18@18.50
No. 2 soft.....	17.75@18
Gray forge.....	15.50@16
Basic pig:	
Northern.....	17.50@17.75
Virginia.....	17.60
Alabama.....	17.75@18.25

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Bars—Bar iron is in demand and prices are better, at 1.645@1.695c., tidewater. Steel bars are quoted at 1.645c. Store trade is fair, at 1.75c. delivered. There are some reports of cutting on common iron.

Plates—Tank plates are quoted at 1.745 @1.825c., tidewater, according to width. Flange and boiler are 1.845, and fire-box 2.045c. Jobbers ask higher prices for small lots. Local trade is improving.

Structural Material—Prices are nominally unchanged. Beams under 15 in. are 1.845c. for large lots; over 15 in., 1.895c.; angle and channels, 1.845c., tidewater delivery. A large lot of the business here is done by jobbers, who are asking 2.50c. for beams and channels out of stock.

Old Material—The scrap market is active, and dealers are holding firm. Heavy steel melting scrap is \$15@15.50; No. 1 railroad wrought, \$18@18.50.

Philadelphia. Aug. 8.

Pig Iron—Extraordinary activity prevails in pig iron, particularly in basic, in which the transactions appear to have reached phenomenal proportions. Prices in consequence have been advanced from 25 to 50c. per ton and it is said today that a great deal of business is hanging fire in consequence of the difficulty furnace managers are encountering in arranging for satisfactory deliveries. This sudden pressure for basic has taken the market by surprise and it has resulted in the offering of premiums over asking prices in a number of instances. The market is unsettled, and for the first time in several months has assumed a speculative appearance. Bessemer pig is also very strong and although not largely handled here at present, it has its indirect influence on other kinds. Both foundry and gray forge are strong but the most of the business done was in special brands or in the very finest

brands of forge, for which premium prices were paid in several instances. The usual quotations, without regard to premiums, may be given at \$19.25 for No. 1 X foundry; \$18.75 for No. 2 X; \$18.25@18.50 for No. 2 plain; \$16.50@17 for gray forge; \$18 for basic; \$20 for bessemer; \$25 for low phosphorus; and \$22 for two or three small lots of Lake Superior charcoal.

Steel Billets—Large transactions have been closed for billets at \$29 and small transactions at \$29.50.

Bars—The bar-iron market is strong so far as prices are concerned and there are occasional evidences of premiums being paid, but only for very best iron and for quick delivery. The average quotations are 1.68½, with an upward tendency.

Sheets—Today's reports from the sheet mills are favorable and since the writing of last report, business which was then hanging fire has assumed the shape of orders. The orders were large and the business was desirable.

Pipes and Tubes—The tube market is strong, but orders are not going to the mills as usual, as contracts placed some time ago were for large lots. The consumption of tubes is even heavier than two or three months ago.

Plates—The reports from the plate mills are to the effect that the smaller buyers are very urgent in placing orders for early delivery but that there are fewer large orders just at present. Quotations for tank and bridge steel in car lots 1.73½; boiler steel 1.83½; fire-box steel 2.23½.

Structural Material—The monotonous rush of buyers continues and the volume of business transacted from week to week is heavy.

Steel Rails—Requirements for electric lines are coming forward and the call for light sections is occupying a good deal of attention.

Scrap—The scrap market is quite active and a good many of the larger consumers have bought heavily. Nearly all kinds of scrap are moving upward. The quotations given are for No. 1 steel \$17; choice railroad \$19.25; No. 1 yard scrap \$17.50; and machinery scrap \$16.50 per ton.

Pittsburg. Aug. 7.

The month just closed was the most remarkable midsummer month in the history of the iron and steel industry. Despite the fact that a number of mills were forced to close for repairs, there has been no accumulation of pig iron. Several finishing mills have recently been shut down because of a lack of steel. One of them was the large tin-plate plant at Steubenville, but it is announced that it will resume on Aug. 20.

Among the features of the iron and steel markets this week were sales of bessemer pig iron aggregating 20,000 tons, some of which went at \$18.25, Valley fur-

naces. The Carnegie Steel Company sold 10,000 tons of steel rails and inquiries from different railroads for rails have been received aggregating 100,000 tons, all for 1907 delivery. It was learned today that steel-car-making concerns have inquiries for 20,000 steel cars for delivery next year and contracts are expected to be closed before the end of this month.

Consumers of steel are urging better deliveries on contracts placed some time ago, and new orders are being rejected. Bessemer steel billets are nominally \$27.50, but it is impossible to buy at that price. Open-hearth billets are equally scarce. But little new business in finished lines has been placed and the markets likely will be quiet this month. All the mills are crowded with orders and will be kept busy in the important lines all year and into 1907. The plate and structural mills are particularly crowded, and when the contracts for 20,000 steel cars are placed it will mean 200,000 tons of plates for next year. Orders for plates for the 11 lake freighters are being allotted. It was announced today that one of the new boats is for the Shenango Steamship Company, one of the interests of W. P. Snyder & Co. It will be 574 ft. long and 32 ft. deep and will carry 11,000 tons. The new boat will be 24 ft. longer than the "W. P. Snyder," owned by the same company and having a carrying capacity of 10,170 tons. There is a good run of small contracts for structural material, but the market is quiet compared with the first half of the year. The American Bridge Company took on about 45,000 tons of new business in July, while in the first six months of the year it averaged about 57,000 tons a month. The contract for the new rail mill at Gary, Ind., was expected to be placed last month, but it did not come in and will certainly be placed this month. Agricultural-implement makers are sending in heavy specifications for steel bars and the mills are kept unusually busy for this season of the year. The sheet and tin-plate trade is not particularly brisk, but all the mills are from two to three months behind on deliveries.

As the United States Steel Corporation was unable to buy bessemer pig iron for August delivery, it came into the market this week for heavy melting scrap, buying 5000 tons. The price was \$16.50 a ton, or an advance of 50c. over the quotation of last week.

Pig Iron—Sales of bessemer pig iron for the week amounted to over 20,000 tons, all for delivery before Nov. 1. Of this tonnage 15,000 tons will go to a Western interest, and it will pay \$18, Valley furnaces. The other sales were in lots of 500 and 1000 tons and the price was \$18.25, Valley, the highest of the year. It is believed these sales will establish a minimum price of \$18 for the rest of this year and for the first quarter of 1907, but the representative of one furnace interest expressed the opinion today that

later in the year bessemer iron can be bought at \$17.75 and possibly \$17.50. He attributes the high prices today to the fact that a number of furnaces are out for repairs, which accounts for the scarcity. Foundry iron cannot be had at any price, the purchase of about 5000 tons by the Union Switch and Signal Company and 6100 tons by the Westinghouse Machine Company having cleaned up all the No. 2 foundry iron until probably October 1. The price is nominally \$17.50, Valley furnaces, and this price is being quoted for fourth-quarter delivery. Gray forge is stronger by about 75c. a ton and \$17.35, Pittsburg, is quoted. Negotiations are on for the sale of from 400 to 5000 tons. Basic iron continues strong and the minimum quotation for the rest of the year is \$17.50, Valley furnaces.

Steel—It is impossible to buy bessemer or open-hearth billets and consumers have difficulty in obtaining deliveries on old contracts. Bessemer billets are nominally \$27.50 and open-hearth billets \$28@29. Sheet bars are scarce and the established price of \$29 is still quoted. Steel bars are firm at 1.50c. and plates at 1.60c.

Sheets—The market is quiet as to new business, but the mills are all active and unable to fill the orders already booked. Prices remain on the basis of 2.50c. for black sheets and 3.55c. for galvanized for No. 28 gage.

Ferro-Manganese—The market is irregular, and it is difficult to give an accurate quotation. Sales for prompt shipment were made this week at \$90, but \$87 is quoted for September and \$85 for October.

Chemicals.

NEW YORK, Aug. 8.

Copper Sulphate—There is no change, prices remaining firm, and demand good. Exports of copper sulphate from the United States in June were 863,282 lb. in 1905, and 1,174,363 lb. in 1906; an increase of 311,081 lb. The exports this year contained, approximately, 131 tons of copper.

Nitrate of Soda—Messrs. Mortimer & Wisner, of New York, give the statistics for this country on Aug. 1 as follows, in long tons:

	1905.	1906.	Changes.
Stock, Jan. 1.....	8,380	13,100	I. 4,720
Imports, Atlantic ports..	146,800	167,680	I. 20,880
Supplies.....	155,180	180,780	I. 25,600
Deliveries, 7 months.....	143,080	179,230	I. 36,150
Stock, Aug. 1.....	12,100	1,550	D. 10,550
Afloat, Aug. 1.....	85,400	81,000	D. 4,400
Visible stocks.....	97,500	82,550	D. 14,950

Stocks afloat include all nitrate cargoes due to arrive at Atlantic ports by Nov. 15. Imports are all from the west coast of South America.

Imports of nitrate into the United States in June were 27,012 tons in 1905, and 46,887 tons in 1906; an increase of 19,875 tons.

Phosphates—Exports of phosphates from the United States in June were 87,961 tons in 1905, and 73,226 tons in 1906; a decrease of 14,735 tons. The chief exports this year were to Germany and Holland, 34,940; Great Britain, 14,319; Belgium, 5480; Italy, 5203 tons.

Sulphur—Imports of brimstone, or sulphur, and of pyrites into the United States in June were, in long tons:

	1905.	1906.	Changes.
Sulphur.....	3,857	9,301	I. 5,444
Pyrites.....	32,707	46,499	I. 13,792

The sulphur equivalent of all imports this year was, approximately, 27,900 tons.

Heavy Chemicals—Imports of heavy chemicals into the United States in June were, in pounds:

	1905.	1906.	Changes.
Bleaching powder 8	46,014	8,423,649	D. 222,365
Potash salts.....	17,339,324	30,696,493	I. 13,357,169
Soda salts.....	1,992,365	1,441,912	D. 550,453

Exports of acetate of lime were 5,929,897 lb. in 1905, and 3,855,044 lb. in 1906; a decrease of 2,074,853 lb. this year.

Metal Market.

New York, Aug. 8.

Gold and Silver Exports and Imports.
At all United States Ports in June and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
June 1906..	\$3,256,392	\$2,374,261	Exp. \$882,331
" 1905..	4,030,882	2,149,051	" 1,881,831
Year 1906..	31,610,714	52,642,959	Imp. 20,932,245
" 1905..	39,831,590	16,609,453	Exp. 23,222,137
Silver:			
June 1906..	4,518,386	3,740,285	" 778,101
" 1905..	4,744,625	2,356,078	" 2,388,547
Year 1906..	33,437,227	23,657,101	" 9,780,126
" 1905..	25,091,266	15,173,423	" 9,897,843

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

Gold and Silver Movement, New York.
For week ending Aug. 4 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$ 22,000	\$2,079,687	\$ 726,770	\$ 49,912
1906.....	5,925,003	48,121,932	36,577,318	1,280,796
1905.....	7,926,943	942,558	19,061,714	2,317,316
1904.....	63,733,202	3,652,656	24,306,579	591,744

Exports of gold for the week were to the West Indies; of silver, to London and Paris. Imports of gold for the week were nearly all from London; of silver, from Cuba and Mexico.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Aug. 4, gives the following totals, comparisons being made with the corresponding week of 1906:

	1905.	1906.
Loans and discounts..	\$1,146,163,700	\$1,077,191,700
Deposits.....	1,197,126,300	1,076,599,300
Circulation.....	49,490,300	46,516,600
Specie.....	222,104,300	195,547,200
Legal tenders.....	89,340,800	87,725,300
Total reserve.....	\$311,445,100	\$283,272,500
Legal requirements....	299,281,875	269,149,825
Surplus reserve.....	\$12,163,225	\$14,122,675

Changes for the week this year were

increases of \$13,776,600 in loans, \$1,096,300 in specie and \$16,482,400 in deposits; decreases of \$1,745,500 in legal tenders, \$527,700 in circulation, and \$4,769,800 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world:

	Gold.	Silver.	Total.
New York.....	.....	.....	\$195,547,200
England.....	\$183,785,060	.....	183,785,060
France.....	582,946,520	\$212,269,515	795,216,035
Germany.....	170,935,000	56,975,000	227,910,000
Spain.....	75,935,000	124,070,000	200,005,000
Netherlands...	27,586,000	28,936,500	56,522,500
Belgium.....	15,853,335	7,926,665	23,780,000
Italy.....	148,540,000	19,504,000	168,044,000
Russia.....	546,335,000	30,030,000	576,365,000
Austria.....	235,100,000	62,795,000	297,895,000
Sweden.....	19,335,000	.....	19,335,000

The returns of the associated banks of New York are of date Aug. 4, and the others Aug. 3. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows for the year to July 26:

	1905.	1906.	Changes.
India.....	£ 3,936,341	£ 10,415,963	I. £ 6,479,621
China.....	749,394	213,700	D. 535,694
Straits.....	2,800	1,750	D. 1,050
Total.....	£ 4,688,535	£ 10,631,413	D. £ 5,942,878

Receipts for the week were £213,000 in bars, and £10,000 in Mexican dollars; a total of £223,000, all from New York. Exports were £529,000 in bars to India, and £97,100 in Mexican dollars to China; £626,100 in all.

There is less demand for Indian exchange, but the rate remains steady, all the Council bills offered in London being taken at 16d. per rupee.

The Treasury Department's estimate of the amount and kinds of money in the United States on Aug. 1 is as follows:

	In Treasury.	In Circul'n.
Gold coin (inc. bullion in Treasury).....	\$255,641,964	\$ 675,979,661
Gold certificates.....	34,671,490	529,313,379
Silver dollars.....	6,266,200	77,115,656
Silver certificates.....	6,844,312	470,792,688
Subsidiary silver.....	5,825,342	111,976,129
Treasury notes of 1890....	17,004	7,214,996
U. S. notes.....	10,221,624	336,459,392
Nat. Bank notes.....	12,983,507	548,497,538
Total.....	\$332,472,443	\$2,757,349,438

Population of the United States, Aug. 1, 1906 estimated at 84,779,000; circulation per capita, \$32.52. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. The statement of money held in the Treasury assets of the Government does not include deposits of public money in national bank depositaries to the credit of the Treasurer of the United States, amounting to \$75,412,764. The amount in circulation on Aug. 1

was \$12,864,608 more than on July 1, and \$154,447,137 more than on Aug. 1 last year.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	\$0.50 1/4	\$0.53
Peruvian soles and Chilean.....	0.46 1/2	0.49 1/2
Victoria sovereigns.....	4.85 1/2	4.87 1/2
Twenty francs.....	3.86	3.89
Spanish 25 pesetas.....	4.78	4.80

SILVER AND STERLING EXCHANGE.

Aug.	Sterling Exchange.	Silver.		Aug.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
2	4.85 1/4	64 1/2	29 1/2	6	4.85 1/4	64 1/2	.....
3	4.85 1/4	64 1/2	29 1/2	7	4.85 1/4	65 1/2	30 1/2
4	4.85 1/4	64 1/2	29 1/2	8	4.85 1/4	65 1/2	30 1/2

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

Other Metals.

Daily Prices of Metals in New York.

Aug.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
2	18 1/2 @ 18 1/2	18 1/2 @ 18 1/2	82	38 1/2	5.75	6.02 1/2	5.87 1/2
3	18 1/2 @ 18 1/2	18 1/2 @ 18 1/2	83 1/2	39 1/2	5.75	6.02 1/2	5.87 1/2
4	18 1/2 @ 18 1/2	18 1/2 @ 18 1/2	.....	40 1/2	5.75	6.02 1/2	5.87 1/2
6	18 1/2 @ 18 1/2	18 1/2 @ 18 1/2	.....	41	5.75	6.02 1/2	5.87 1/2
7	18 1/2 @ 18 1/2	18 1/2 @ 18 1/2	83 1/2	40 1/2	5.75	6.02 1/2	5.87 1/2
8	18 1/2 @ 18 1/2	18 1/2 @ 18 1/2	83 1/2	39 1/2	5.75	6.02 1/2	5.87 1/2

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—There is no material change to be reported in the market, business continuing at a satisfactory rate. Prices have been a little firmer than those of last week and are quoted for Lake copper 18 1/2 @ 18 3/4; electrolytic, 18 5/16 @ 18 1/2; casting copper, ordinary brands, 18 @ 18 1/2 cents.

The London standard market has also been affected by the firmer tone existing for refined sorts and on small transactions advanced gradually, closing steady at £83 5s. for spot and £82 17s. 6d. for three months.

Refined and manufactured sorts are quoted: English tough, £85 @ 85 10s.; best selected, £87 10s.; strong sheets, £93.

Copper Exports and Imports—The exports of copper from the United States

for the six months ending June 30 are reported as follows by the Bureau of Statistics of the Department of Commerce and Labor, in long tons:

To:	1905.	1906.	Changes.
Great Britain.....	14,892	11,491	D. 3,401
Belgium.....	1,059	1,208	I. 149
France.....	16,320	17,847	I. 1,527
Italy.....	5,445	3,480	I. 35
Germany and Holland.....	51,858	56,151	I. 4,293
Russia.....	4,444	1,039	D. 3,405
Other Europe.....	5,858	5,930	I. 72
Canada.....	757	627	D. 130
China.....	26,567	1,402	D. 25,165
Other countries.....	5,470	92	D. 5,378
Total metal.....	130,670	99,267	D. 31,403
In ore and matte.....	2,864	3,473	I. 609
Total.....	133,534	102,740	D. 30,794

The decrease in the total was 23.1 per cent. If the exports to China be omitted the net decrease, however, would be only 5,629 tons, or 5.3 per cent. The actual quantities of ore and matte exported were 15,242 tons in 1905, and 25,689 tons in 1906; contents are estimated chiefly on the basis of values.

Imports of copper and copper material for the six months are reported as follows, the figures giving the contents of all material in long tons of fine copper:

	Metal.	In ore, etc.	Total.
Mexico.....	19,227	7,643	26,870
Canada.....	7,933	1,934	9,867
Great Britain.....	4,647	.....	4,647
Other countries.....	6,360	1,846	8,206
Total imports.....	38,167	11,423	49,590
Re-exports.....	186	.....	186
Net imports.....	37,981	11,423	49,404
Net imports, 1905.....	33,112	8,895	42,007

The total increase in imports this year was 7397 tons, or 17.9 per cent. The actual tonnage of ores and matte from Mexico this year was 60,399; from Canada and Newfoundland, 16,854 tons.

The exports exceeded the net imports by 91,527 tons in 1905, and 53,336 tons in 1906; a decrease of 38,191 tons this year.

Tin—A great deal of excitement prevailed in the London market at the end of last week and the beginning of this, brought about by very large buying orders cabled over from here on Thursday of last week. It then developed that spot supplies were rather limited and well controlled. The market at one time touched £182 5s. for spot and £182 10s. for futures in London, and 41c. for spot tin in this market. At the advancing prices large transactions took place in London, both for spot and future tin; but when the demand from here subsided, the market quickly receded and now closes weak at £178 15s. for spot and £179 for three months in London, while here the closing quotations are 39@39½ cents.

Imports of tin into the United States for the six months ending June 30 are reported as below, in long tons of 2240 lb. each:

	1905.	1906.	Changes.
Straits.....	10,994	7,206	D. 3,788
Australia.....	202	504	I. 302
Great Britain.....	9,289	13,919	I. 4,630
Holland.....	232	249	I. 17
Other Europe.....	437	867	I. 430
Other countries.....	18	33	I. 15
Total.....	21,172	22,778	I. 1,606

The increase in the total imports this year was only 7.6 per cent.

Lead—The market remains steady and satisfactory transactions for this season of the year have taken place at unchanged prices, 5.75c., New York.

London has become somewhat firmer and closes at £16 15s. for Spanish and £16 17s. 3d. for for English lead.

Imports of lead into the United States for the six months ending June 30, with re-exports of foreign metal, are reported as follows, in short tons, of 2000 lb. each:

	1905.	1906.	Changes.
Lead, metallic.....	2,344	8,057	I. 5,713
Lead in ores and base bullion.....	49,941	39,360	D. 10,581
Total imports.....	52,285	47,407	D. 4,878
Re-exports.....	34,066	24,263	D. 9,803
Net imports.....	18,219	23,144	I. 4,925

Of the lead imported this year 37,698 tons were from Mexico and 3070 tons from Canada. There were 4606 tons imported from Europe. The exports of domestic lead were 131 tons in 1905, and 290 tons in 1906; an increase of 159 tons this year.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us on Aug. 8 as follows: Lead is quiet but firm, and is selling at 5.65c. for Missouri brands.

Spelter—Transactions in this metal have fallen off somewhat, but prices are not affected thereby, as spot and nearby supplies are rather scarce. Quotations are 6.02½c., New York, 5.87½c., St. Louis.

Abroad the market is dull but firm and closes at £26 15s. for good ordinaries and £27 for specials.

Exports of spelter from the United States for the six months ending June 30 were 1574 short tons in 1905, and 2546 tons in 1906; an increase of 972 tons. Exports of zinc ore were 11,698 tons in 1905, and 16,110 tons in 1906; an increase of 4412 tons. Exports of zinc dross were 6798 tons in 1906. This article was not separately reported last year.

Zinc Sheets—The price of zinc sheets is \$7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars for Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been \$8 on Jan. 6, the lowest \$7.65 on May 18.

Antimony—There is no change to be reported. Quotations are nominal at 22½@23c. for ordinary grades, 24@25c. for specials.

Imports of antimony into the United States for the six months ending June 30 were, in pounds:

	1905.	1906.	Changes.
Metal and regulus.....	2,509,201	3,862,619	I. 1,353,418
Antimony ore.....	1,100,357	882,958	D. 217,399

This shows an increase of 53.9 per cent.

in metal and regulus, but a decrease of 19.8 per cent. in ore.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 40@45c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Imports of nickel ore and matte into the United States for the six months ending June 30 were 6867 tons in 1905, and 7092 tons in 1906; an increase of 225 tons. Exports of nickel, nickel oxide and nickel matte for the half year were 5,591,537 lb. in 1905, and 5,969,591 lb. in 1906; an increase of 376,054 lb. this year.

Platinum—Demand is strong and steady. Prices are unchanged, \$26 per ounce in New York. From \$20 to \$23 per ounce is paid for scrap platinum.

Imports of platinum into the United States for the six months ending June 30 were 3782 lb. in 1905, and 5926 lb. in 1906; an increase of 2144 lb. this year.

Quicksilver—The metal is firm and New York prices are still \$41 per flask of 75 lb. for lots of 100 flasks or over, and \$42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about \$43 per flask. San Francisco prices are firm at \$39.50 for domestic orders and \$38 for export. The London price is £7 5s. per flask, while jobbers are selling at £7 2s. 6d.

Exports of quicksilver from the United States for the six months ending June 30 were 613,349 lb. in 1905, and 263,207 lb. in 1906; a decrease of 350,142 lb. this year.

Aluminum—The chief producers give list prices, for ton lots and over, as follows: No. 1, over 99 per cent, pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Exports of aluminum from the United States for the six months ending June 30 were valued at \$80,739 in 1905, and \$108,493 in 1906; an increase of \$27,754 this year.

Missouri Ore Market.

JOPLIN, Aug. 4.

The highest price reported paid for zinc was \$48 on an assay basis of \$45, ranging grades down to \$42 per ton of 60 per cent. zinc. The average price was \$43.76.

The highest price reported paid for lead was \$78.50 per ton, with medium grades selling at \$74 to \$75. The average price was \$74.90.

The increased sale of zinc ore was from a demand for medium grades, and while there was no change in the price of select ore, the assay basis was stronger, some ores being advanced on this schedule.

The increased sale of lead ore was occasioned by the sharp competition between the purchasing agents of the St. Louis

Smelting and Refining Company and the Granby Mining and Smelting Company, as the principal rivals, with the Picher Lead Company and the Galena Company taking lower grade ores at the lowest price obtainable.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Cartersville.	2,844,870	823,090	\$93,873
Joplin.....	2,656,840	318,550	71,916
Galena-Empire.....	1,656,300	254,450	45,161
Duenweg.....	623,970	177,870	20,708
Badger-Peacock.....	711,890	4,300	16,890
Neck City.....	655,220	.....	15,397
Prosperity.....	419,100	146,790	14,933
Aurora.....	647,680	75,840	14,325
Granby.....	534,000	18,000	10,400
Alba.....	289,180	31,190	8,123
Carthage.....	246,210	.....	5,785
Oronogo.....	182,320	4,710	4,004
Sherwood.....	128,070	14,780	3,436
Zincite.....	60,720	.....	1,366
Spurgeon.....	74,680	9,690	1,235
Stott City.....	52,820	.....	1,083
Totals.....	11,801,870	1,879,270	\$328,625

31 weeks.....324,176,610 45 413,490 \$8,746,313
 Zinc value, the week, \$258,232; 31 weeks, \$7,018,801.
 Lead value, the week, 70,393; 31 weeks, 1,727,512.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January...	52.00	47.38	January...	61.50	75.20
February...	52.77	47.37	February...	57.62	72.83
March.....	47.40	42.68	March.....	57.20	73.73
April.....	42.88	44.63	April.....	58.00	75.13
May.....	43.31	40.51	May.....	58.27	78.40
June.....	40.75	43.83	June.....	57.80	80.96
July.....	43.00	43.25	July.....	58.00	74.31
August.....	48.83	.....	August.....	58.00	.....
September..	46.75	.....	September..	63.50	.....
October....	47.60	.....	October....	63.86	.....
November..	49.55	.....	November..	68.67	.....
December..	49.00	.....	December..	76.25	.....

Wisconsin Ore Market.

PLATTEVILLE, Aug. 4.

The interest of the buyers for the current week was centered on the Empire ore, owing principally to the fact of there being a considerable amount in the bins not previously sold, and also to the exceptionally high quality, the assay being 63.4 per cent. Zn, and 1.82 per cent. Fe, after magnetic separation. The trend of the general zinc-ore market was upward, although the prices at the close of the week were but little higher than those paid last week. The demand for all grades of ore was strong, and all ore produced was contracted for. The local buyer for Grasselli Brothers secured a large proportion of the higher grades.

Several lots of zinc ore brought 50c. to \$1 per ton more than last week on a \$44.50 basis, for 60 per cent. zinc. One buyer was reported as having paid \$45 per ton. The week as a whole was entirely satisfactory to all concerned.

The camps of the Platteville district loaded ore, as follows for the week ending Aug. 4:

Camps.	Zinc, Lb.	Lead, Sulphur, Lb.
Platteville.....	307,770	.....
Linden.....	363,280	61,320
Cuba City.....	196,515	65,960
Benton.....	120,500	.....
Rewey.....	117,000	66,000
Buncombe & Hazel Green	86,000	.....
Harker.....	62,960	.....
Livingston.....	60,000	.....
Mineral Point.....	46,440	.....
Total for week.....	1,339,485	121,960 61,320
Year to Aug. 4....	39,624,351	2,106,090 3,431,300

The Brown-Croft ore continues to be sold without treatment in its magnetic separating plant for the reason that the buyers of low-grade ore hold the prices up to the point where the margin is so close that it is considered advisable to sell the ore as it comes from the concentrating plant. This shows an excellent state of affairs, for if the smelter people continue to pay present prices for the low-grade ore, it will be the means of enabling a large number of propositions, that lack the capital to erect a magnetic separating plant, to continue operation at a satisfactory profit.

Mining Stocks.

NEW YORK, Aug. 8.

Hot weather has interfered a little with the market, especially with the curb dealings. The general tendency for the week has been upward, and prices have advanced; but the movement is still mainly professional, and the public seems to be occupied rather in keeping cool than in watching Wall street. Amalgamated Copper closes at \$103; United States Steel does not appear to have been helped much by the declaration of a dividend on common; it closes at \$41 for common and \$108 for the preferred.

On the curb mining stocks as well as others, were neglected. The only sensation was a sharp little advance in Green Consolidated Copper, which went up to \$26, closing at that figure.

On the Consolidated Exchange, business was slow in mining stocks. Among the sales made were Horn Silver at \$2; Portland at \$1.40; Jim Butler at \$1.40; Golden Anchor at 55c. In the Comstocks, \$3.55@3.60 was paid for Ophir; 88@89c. for Hale & Norcross.

Boston. Aug. 7.

Copper mining shares have maintained a firm tone, although business has been restricted in Lake coppers, owing to the labor situation in that section. Greene Consolidated has been the marked feature, advancing \$3.62½ to \$26.25, with a slight set-back. The buying has emanated largely from New York. Amalgamated advanced almost \$3 to \$104.12½, closing tonight at \$103. North Butte spurted \$3 to \$93 on active trading, closing \$1 below this tonight. Butte Coalition advanced \$1.62½ to \$34.37½ on dividend talk, reacting to \$32.75. Atlantic broke \$3 to \$11 on news of the abandonment of the old workings. The only hope, apparently, is from the Baltic lode. Copper Range advanced

\$2.12½ to \$76.12½, closing at \$75.50 tonight. Bingham spurted \$3 to \$33 on western buying, and maintained the greater part of the advance.

Shannon mining has held firm up to \$9.87½. Wolverine, which touched \$155, reacted to \$148. The annual report shows total receipts of \$1,673,187, an increase of \$321,307 over the year ended June 30, 1905, and a surplus over all of \$821,365, an increase of \$201,334. Adventure, Michigan and Quincy, which are suffering from strike, are little changed. The former is off half a dollar to \$5.62½, Michigan less than this to \$12.75, and Quincy to \$87.50. Calumet & Hecla is \$10 higher at \$700. Osceola touched \$107.50, which is its highest for some time. Parrot rose \$1.75 to \$28, reacting \$1. Trinity closes fractionally lower at \$8.75. Eagle and Blue Bell is up over \$1 to \$3.62½ on the curb on the reported striking of good ore at depth. Arizona Commercial touched \$41, but is off to \$37.75 tonight. Davis Daly is at \$1 to \$12 on the curb.

Colorado Springs. Aug. 3.

The market for the past week in Cripple Creek shares has been less active than for some time previous, although prices averaged higher later in the week, El Paso and Work scoring good gains. The district production for the month of July exceeded June by about \$30,000, although the tonnage was about 2000 less.

San Francisco. Aug. 2.

Business has been a little better on the exchange, though the Comstocks are still neglected by buyers. Brokers hope that they will be more active when the collection of assessments is over. The greater part of the trading at present is in the Tonopah stocks, in which there is a good deal doing. Prices are strong, and the buying has exceeded expectations. Oil stocks are practically dead for the present.

Mexico. Aug. 2.

The mining stock market has been unusually quiet the last week, Wednesday being the only day on which any activity was shown, promising a return to the life of several weeks ago. The few sales reported during the week were at the following figures: In the State of Guanajuato, Providencia San Juan de La Luz, San Felipe, went from \$1710 to \$1745; Roma, San Felipe, \$20; Luisa, \$16; San Juan de la Chica, \$9; Augustias, \$120. In Michoacan: Borda Antigua, \$53; Maria de Oro, \$18; Equidad, \$8; and of Dos Estrellas one share at \$8800. In Mexico, La Union, \$124; and Germania went from \$10 up to \$24. In San Luis Potosi, Santa Maria de La Paz, \$250, and Barreno \$192. In Hidalgo, Blanco y Anexas, \$520; Santa Gertrudis, \$89; Sorpresa, \$515; Soledad, \$1580; San Rafael, \$965. In Oaxaca, Natividad at \$650, and Norias de Bajan, of Neuva Leon, at \$1070 per share.

STOCK QUOTATIONS.

COLORADO SPRINGS. Aug. 4.

Monthly Average Prices of Metals.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Amalgamated, Anaconda, British Col. Copper, etc.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Acacia, C. C. Con., Doctor Jack Pot, etc.

SAN FRANCISCO. July 26.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Best & Belcher, Caledonia, Chollar, etc.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Am. Smelting & Ref., Am. Smet. & Ref., Bethlehem Steel, etc.

* Ex. div.

BOSTON.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Adventure, Allouez, Atlantic, Bingham, Boston Consolidated, etc.

Tonopah Stocks Aug. 8

(Revised by Weir Bros. & Co., New York.)

Table with columns: Name of Company, High, Low, Last. Includes Tonopah Mine of Nevada, Tonopah Montana, etc.

St. Louis. Aug. 4.

Table with columns: Name of Company, High, Low, Last. Includes Adams, Center Creek, American Nettle, etc.

LONDON. (By Cable.) Aug. 8.

Table with columns: Name of Company, High, Low, Last. Includes Dolores, Stratton's Independence, etc.

New Dividends.

Table with columns: Company, Payable, Rate, Amt. Includes Alaska Mexican, Alaska Treadwell, etc.

Assessments.

Table with columns: Company, Delinq, Sale, Amt. Includes Gold Chest, Con. Imperial, etc.

PHILADELPHIA. Aug. 7.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes American Cement, Cambria Steel, etc.

PITTSBURG. Aug. 7.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Crucible Steel, Crucible Steel, etc.

SILVER.

Table with columns: Month, New York, London. Includes January, February, March, etc.

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

Table with columns: Month, New York, London. Includes Electrolytic, Lake. Includes Jan, Feb, March, etc.

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Table with columns: Month, 1905, 1906. Includes Jan, Feb, March, etc.

Prices are in cents per pound.

LEAD IN NEW YORK.

Table with columns: Month, 1905, 1906. Includes Jan, Feb, March, etc.

Prices are in cents per pound. The London average for January, 1906, was £ 16.860 per long ton; February, £ 16.031; March, £ 15.922; April, £ 15.859; May, £ 16.725; June, £ 16.813; July, £ 16.825.

SPELTER.

Table with columns: Month, New York, St. Louis, London. Includes Jan, Feb, March, etc.

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.