

## THE ENGINEERING AND MINING JOURNAL

### The Louisiana Sulphur Industry.

BY ALFRED J. LOTKA.

In the *Zeitschrift für angewandte Chemie* (No. 26, June 30, 1905, p. 1009) Lunge publishes some notes on the present condition of the sulphur production in Louisiana by Frasch's method. His data are chiefly derived from a direct communication from the Union Sulphur Company, of New York, which is working the process.

Lunge relates how Frasch first spoke to him of the Louisiana deposits in 1893, on the occasion of his visit here. The inventor explained to him the difficulty attending the exploitation of the deposits, owing to their position, beneath a quicksand, and also mentioned his plan of mining the sulphur by fusing it *in situ* by means of superheated water (not steam). Lunge, and many others with him, thought this project somewhat fanciful; and, indeed, though it has now been developed to a full success, the long period which passed before it came to the present stage seems to indicate that there were many difficulties to be overcome. Up to 1898, only 4,500 tons of sulphur had been raised to the surface by this method; in 1902, however, there was produced an average of 100 tons daily.

In Europe little notice was taken of this development until quite recently. Even on October 1, 1904, it was stated (in a circular from the firm Emil Fog & Sons in Messina) that their warning regarding the competition of the Louisiana sulphur was treated with contempt by the Anglo-Sicilian Sulphur Company. It must have been a shock to these European producers, when orders from America suddenly ceased, and a shipment of 3,000 tons of Louisiana sulphur arrived at Marseilles, further shipments to Antwerp and Hamburg being also announced. In 1905 Edward Hart reported (*Jour. Am. Chem. Soc.*) that 1,600 tons of pure sulphur had been produced by the Frasch process during the month of September, 1904, at a cost of \$2.90 per ton f. o. b., with a selling price of \$22 in New York. For November a production of 800 tons was reported.

The Union Sulphur Company, at the present time, has steam-boilers with an aggregate of 13,500 h. p. The sulphur is melted at a depth of 240 meters (787 ft.); from this it rises naturally 120 meters, and is then pumped into immense wooden vats on the earth's surface. The boilers were at first fired with coal, and consumed 1 ton of fuel for 3 tons of sulphur produced. They are now fired with oil, a reservoir of 200,000 barrels capacity (about 350 lb. per bbl.) having recently been installed. Although the use of this fuel entails but little manual labor, yet there are no less than 600 men at

work on the wells, the work being carried on continuously, day and night. The average production now exceeds 1,000 tons a day. There are four batteries of wells, each easily capable of raising 400 tons a day (or in emergency and without strain even 630 tons). A fifth will be put in operation in two months' time, thus giving a possible aggregate daily production of over 3,000 tons.

There are 40,000,000 tons of sulphur on the estate of the company, and the latter expects to furnish the whole world's supply. A daily production of 1,000 tons represents 350,000 tons per year; the export from Sicily in 1902 amounted to 467,319 tons, that of other countries being insignificant in comparison. Hence Louisiana even now produces two-fifths of the world's supply. When we consider that it has risen to this position in only a few years and that the large-scale production dates only from 1902, there seems no reason to doubt that the figure of 450,000 tons per annum (or even 500,000) will be reached.

The effect on the Sicilian sulphur market can be foreseen. A lowering of the price may to some extent increase the consumption, as sulphur may be again used in some instances where pyrite is or has been employed; also the recovery of sulphur from the Le Blanc soda-waste (alkali-waste) will be unprofitable. But even with such conditions, the resulting increase in the production of sulphur will hardly be sufficient to maintain the present prosperity of the Sicilian sulphur industry, and the wages of the workmen—poverty-stricken as they are even now—will suffer in proportion.

The United States is provided by nature with nearly all the raw materials for chemical and other industries more abundantly than the European industrial countries. Potash salts only are entirely wanting. Until recently sulphur was not available in anything like sufficient quantity; but this want has been supplied, and now America will presumably cease, largely if not entirely, to import sulphur and pyrite, and will, at least in part, supply Europe also.

### Producer Gas Versus Gasoline in Mine Hoists.\*

BY W. H. RUNDALL.

At the Guadalupana mine, near Moctezuma, San Luis Potosi, Mexico, a 25-h.p. gasoline-engine was installed to do the pumping and hoisting in a small vertical shaft, 200 ft. deep. The pump was an ordinary bucket-pump, worked by rods from belt-driven gearing at surface, and raising the water in one lift. The plant proved very expensive in operation, the consumption of gasoline (at \$8 per case of 10 gal. delivered) amounting to \$20 for two shifts of 8 hours, 16 hours' work.

\*Abstract of a contribution, May 18, 1905, to Institution of Mining and Metallurgy.

A small suction gas-producer plant was then installed at a cost of \$1,000, and has been running for a couple of weeks watering the mine. A calculation, based on the actual quantity of water raised during a period of 24 hours, gives an average (including all stoppages and making no allowance for friction of working parts, etc.) of 3.20 h.p. per hour for the whole period, with a consumption of charcoal in the producer of 140 kg., *i. e.*, 1.82 kg. of charcoal per h.p.-hour. The charcoal delivered at the mine (and allowing for loss due to pulverization in transit) costs 2½c. per kg. The cost per h.p. per hour is therefore 4.55c. I am unable to make an exact estimate of the economy over gasoline, as no attempt was made to gauge the actual work performed while running with gasoline.

The cost of power per 24-hour day with the gas producer averages: Charcoal, \$3.75; petroleum (extra lubrication of cylinder, inlet and check valves, not required with gasoline), \$1.50; labor (boy stoking and looking after gas producer), \$1.50; total, \$6.75. This compares with an average of \$30 per 24-hour day when running with gasoline, or an economy of over \$20 per day.

Of course the fuel consumption of 1.82 kg. of charcoal per h.p.-hour is much higher than the 2.6 lb. wood and 0.11 lb. coke at Nacozari; but, considering the small size of the plant, its great simplicity and small first cost, it compares favorably with steam under similar conditions. It must be remembered that the actual water delivered has been used as the basis of the calculation; the fuel consumption per b.h.p. probably does not amount to more than two-thirds of the figure given.

The only alteration that was made to the engine, on changing from gasoline to producer-gas, was the insertion of a liner between the crank and the crank-head, thus causing the piston to travel farther back into the cylinder, and thus proportionally increasing the compression of the gases before ignition. The loss of engine-power, when running with producer-gas instead of gasoline, is considerable; and with the engine in question is not less than 30%, the actual power obtainable being barely equal to half the makers' rating.

I quite agree with the general opinion as to the reliability of the steam-engine, especially where a skilled machinist is not available. Where fuel and water are scarce, however, and transport difficult, as in many parts of Mexico and South America, the gas-engine and gas producer for mining purposes have, I believe, a great future before them, especially when one takes into consideration the smaller weight and much greater portability of the different parts of a gas producer, as compared with a steam boiler of similar capacity.

## The Price-Pancoast Colliery—II.

BY GEORGE W. HARRIS.

(Concluded from page 54.)

From the breaker the waste is conveyed by scraper lines to the washery for further treatment. The reclamation of the smaller sizes—pea, No. 1 buckwheat, rice and barley—in the washery completes the coal preparation. The immense pile of culm from which coal is being reclaimed was deposited during former mining operations, when buckwheat could not find a market, but fortunately was stocked and is now yielding a large amount of merchantable coal. The waste from the breaker is deposited near the washery and flushed into troughs

washing the coal, separating it into sizes, removing the slate and re-breaking the large coal and bony. The Pancoast washery occupies a ground space of 53 by 65 ft. at the foundations, and is approximately 80 ft. high. It has a capacity of about 100 tons of coal an hour, depending on the proportion of breaker waste mixed with the culm-bank material. The frame of the building consists of 12 by 12-in. posts, braced by 8 by 8-in. timber; the machinery and coal pockets are supported by 12 by 14-in. oak beams.

The main elevator of the washery delivers the coal to a three-deck shaking screen, the top screen being 20 by 6 ft., and the other two, 30 by 6 ft. in area. The

drops to one chute, and over which egg and larger pass to another chute. The coal in the chutes is hand-picked and then sent to Christ jigs for further removal of slate, after which it goes to rolls to be broken to pea size and under, and then to the main elevator to be sent to the screens again. The chestnut coal dropping through the top screen falls to the second screen of the shaker having  $\frac{7}{8}$ -in. mesh, over which the nut passes and through which pea and everything smaller drop to the third or bottom screen. The nut goes to jigs and then to the rolls. The bottom screen has 3-32-in. mesh, which allows the fine coal dirt to pass through and then by a trough away from the washery. The pea and smaller sizes passing over the bottom screen go to another shaker.

The second shaker has four screens, one over the other, the top one being 30 by 6 ft., the next lower 26 by 6 ft. and the bottom ones 20 by 6 ft. This shaker makes the four sizes of coal shipped from the washery. The top screen has  $\frac{1}{2}$ -in. mesh, allowing pea coal to pass over and everything smaller to drop through; the next screen has  $\frac{3}{8}$ -in. mesh which makes No. 1 buckwheat; the third screen allows rice or No. 1 buckwheat to pass over its  $\frac{1}{4}$ -in. mesh and smaller coal to drop through upon the lowest screen; the bottom screen makes barley or No. 3 buckwheat over a 3-32-in. mesh, through which passes coal dirt which is carried out of the washery with the wash water. The three buckwheat sizes go direct to pockets from this shaker, and the pea coal is sent to a jig for the removal of slate, finally over a Pardee spiral picker for further cleaning and then to pocket. The slate in this washery is loaded into cars and used by the railroad for ballast.

The washery contains two shaking screens, two coal rolls, one Pardee picker and six Christ jigs; of the jigs, three are for pea, two for chestnut and one for stove coal. The Christ jigs measure 11 ft. by 5 ft. 4 in. by 6 ft. 9 in., driven by 7 by 8 in. engines. The pan holding the coal under water receives an up-and-down motion, thus causing the heavy slate to sink and the lighter coal to pass out at the top. The large quantity of water, used for cleaning and sizing the coal and for flushing into conveyors at the culm-bank, is supplied by three No. 10 Knowles pumps. The labor necessary to run the washery consists of 40 to 50 men and boys, a larger force being required in winter than during the summer.

The Emery slate picker was introduced about three years ago and is now so generally used in the new breakers about Scranton as to warrant a detailed description. It is made after the zig-zag pattern (used at the Pancoast), which is shown in Figs. 6 and 7, and the tandem pattern; the former being employed in case height is available in the breaker and

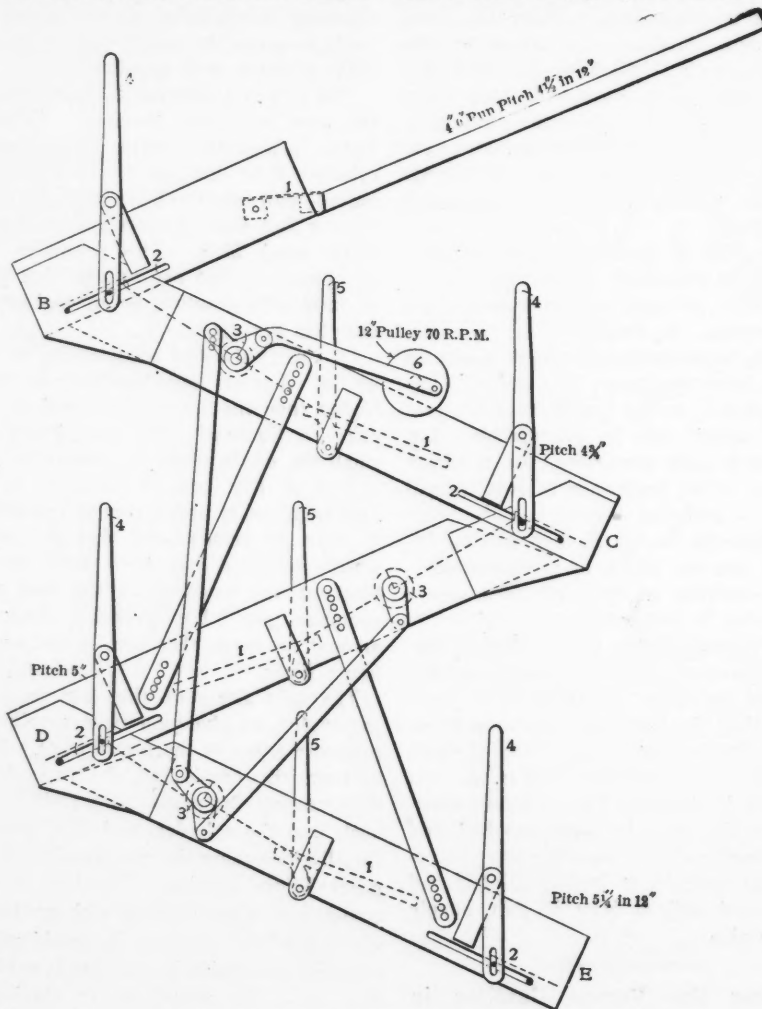


FIG. 6. SECTION OF EMERY SLATE PICKER.

by water from a hose. It is thus carried to an elevator and sent to the top of the washery. From the old culm bank two movable conveyors, each 400 ft. long, feed into a permanent inclined scraper line, which empties into a chute, by which the coal is run by gravity to the boot of the washery elevator.

The washery is in part an annex to the breaker, from which it has decided differences in machinery and methods. Shaking screens are used instead of the revolving circular type, and Christ jigs replace the Emery pickers in the mechanical removal of slate. Washery preparation includes

shaker screens have a pitch of 1 in 12, and receive a reciprocating movement of 5 in. from eccentrics attached at the upper end. As the coal moves down the length of the screen it passes under boxes, from which overflow large quantities of water, cleaning the coal and greatly assisting in its separation into different sizes. The main portion of the top screen has  $1\frac{1}{2}$ -in. mesh, through which passes chestnut size to the screen below. After the  $\frac{1}{2}$ -in. mesh are angle irons, or Fern picker arrangement, for removing flat pieces of slate. The lower end of the top screen has 2-in. mesh, through which stove coal



not length, and the latter under *vice versa* conditions. The zig-zag type is 5 ft. long, 3 to 6 ft. wide and 7 ft. high. The principle of the machine depends on the retarding effect of stone sections, 1, in each chute; below the stone slabs are openings through which the slate drops and over which coal passes. Coal coming from the screen enters the picker at

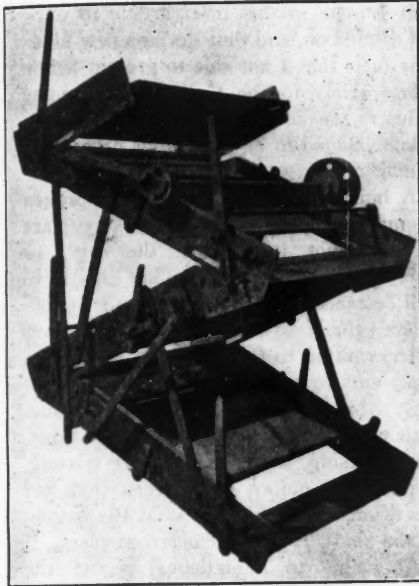


FIG. 7. EMERY SLATE PICKER.

*A* and the first separation gives, at *B*, clean coal, which goes direct to pocket. Slate and a certain percentage of coal dropping through the first opening, are treated the same as above on the second deck. More coal and some slate pass over the second opening to a chute at *C*, and the material dropping through is again treated for further separation on the third deck. Coal coming off the second and third decks, containing more or less slate, is hand-picked. The material coming off the fourth or last deck is a mixture of slate, bony and coal and is sent to the rolls; this material is the "tailing" or "middling" noted in the description of the course of coal through the breaker. Clean slate drops through the fourth opening and goes to slate pocket. Oscillating feeds, 3, check the coal and allow it to pass over the pitches or decks in dashes instead of a continuous stream, making a space between each dash so that the retarding stone, 1, is clear between each dash. The feeds, 3, are connected to each other and to a crank-wheel 6. The bottoms of the chutes can be given different pitches by levers, 5, and the width of the openings can be varied by adjusting levers, 4. The capacity of the Emery picker depends on the proportion of impurities in the coal, but on an average 10 tons of coal per hour are cleaned in a machine.

Among the special features of the Pan-coast plant is the fire protection provided for the breaker, an equipment which is

doubtless the most complete in the anthracite field. The entire breaker is equipped with the dry-pipe open system installed by the Gaylord & Eitapeng Company, of Scranton, Pa. An 18 by 10 by 12 in. Knowles underwriter fire-pump, capable of forcing 1,000 gal. per min. through the pipes, is located in a separate brick house. A 10-in. pipe leads from this pump to two 8-in. columns, one at each of the rear corners of the breaker, which extend to the top of the main building; from these, 4-in. pipes continue to the extreme top. Lateral branches from these columns cover all exposed wood surface throughout the breaker. The main branches are 4-in. pipe and others 2½- and 1¼-in., according to the number of sprays they contain.

Each separate branch line has a valve to close in case that section is not needed in a local fire. The pipe system is arranged under the roof and under each floor, and has openings every 8 ft., set in staggered rows, so as to cover completely the entire surface with water. The openings are termed the open-space sprinkler-head, and the breaker is deluged with water simply by opening a valve in the main columns at a point outside of the breaker. The pump is run slowly all the time; opening the valve increases the speed to fire service at once.

In addition to the sprinkler system, a high-pressure service runs to all parts of the breaker. A 4-in. pipe leads from the 10-in. column referred to, and hose connections are made to this line at 14 points distributed throughout the breaker. Also 100 tube-extinguishers, manufactured by

two connecting tanks, aggregating 105,000 gal. capacity and filled from the city service of Scranton. Another tank, holding 30,000 gal., distributes water to the dry underground workings to put out fires which frequently follow shots in the chambers. Two-inch pipes on the gangways have connections for each working place.

The other buildings about the plant are in keeping with the improvements described. The fans, shown in Fig. 8, are enclosed in brick and sheet steel. The larger fan is 35 ft. in diameter by 11 ft. wide, and when running at 52 r. p. m. aggregates 195,500 cu. ft. of air from the different splits at 2.2 in. water gauge. It was built by the Vulcan Iron Works, of Wilkes-Barre, Pa. The other fan, made by the Finch Manufacturing Co., of Scranton, Pa., is 20 by 6 ft., producing about 92,200 cu. ft. at 82 r. p. m. and 1.5 in. water gauge.

The engine-houses, the shops and the wash-house are built of brick, with corrugated iron roofs supported on steel trusses. The main hoisting engine is 24 by 48 in., with an 8-ft. drum and 1½-in. steel rope, built at the Allis-Chalmers' Scranton plant. In the same house with this engine is a 16 by 18 in., A, Ingersoll-Sergeant air compressor, which runs seven pumps in the mines. The house at the main and supply shaft contains an 18 by 36 in. second-motion engine and an electric lighting plant. A 250-h.p. General Electric dynamo is belted to a 10 by 12 in. Buckeye engine. This plant furnishes light to over 300 incandescent and 22 arc lamps in the breaker, besides lighting all the other surface buildings, and in the

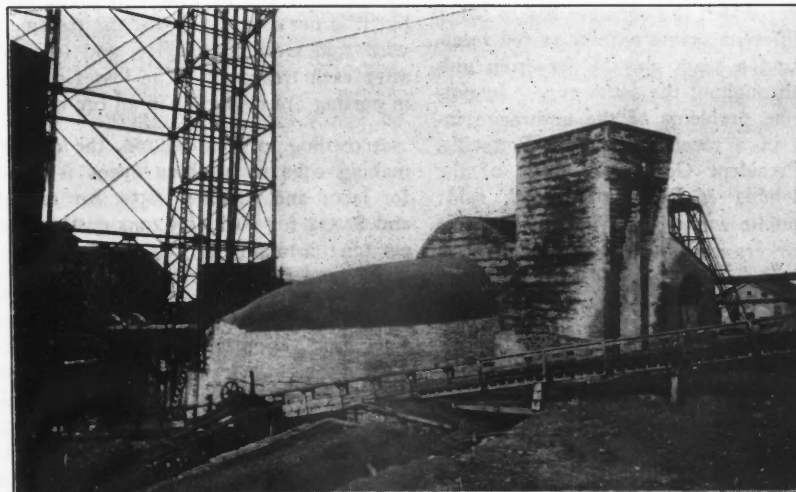


FIG. 8. MINE FANS AND HEAD-FRAME, MAIN SHAFT.

the Nevermyss Fire Extinguisher Company, of Middletown, N. Y., are placed in various parts of the breaker. Furthermore, both the inside and outside of the building are painted with fireproof paint—white in the interior, to assist in illumination. When a fire-fighting force is trained in the use of apparatus, an excellent protection will be afforded.

The fire-pump draws its supply from

mines, the foot of the shaft, barns, engine- and pump-houses, sidings, etc.

The carpenter, blacksmith and machine shops are in one building, about 35 by 150 ft. The carpenter shop contains circular saws and a mortising machine; the smith shop, a steam hammer and four forges; the machine shop has lathes, bolt and pipe cutters and threaders, a planing machine, etc.

The boiler plant at the Pancoast includes nine tubular boilers, built by the American Locomotive Works, of Scranton, Pa. They are equipped with McClave & Brooks shaking grates and aggregate 2,100 h.p. All the buildings are heated by steam; with the exception of the office, exhaust is used. In the case of the breaker, the exhaust from the engines furnishing it with power, heat the building to 62° F. in zero weather.

The Price-Pancoast Coal Company ships over the New York, Ontario & Western and the Delaware, Lackawanna & Western railroads, and each road requires an independent and careful inspection of all coal sent to market over its line. Each railroad furnishes from one to two inspectors and a weighmaster, as the loaded cars are all weighed at the breaker. To pass inspection, grate coal must be entirely clean of slate, but the following percentages of slate are allowed in other sizes: Egg, 2; stove, 4; chestnut, 6; pea, 9. No. 1 buckwheat is permitted to pass with 13% of culm or 20% of No. 2 buckwheat. To determine whether coal has been properly prepared, an inspector collects a 50-lb. sample when a car is being loaded, or he gathers it from different points from the top of a full car. The sample is then spread on canvas and the slate picked out and weighed. If the percentage of slate is greater than allowed, the car of coal is condemned, and it is dumped into a hopper under the breaker pockets, before noted, and sent over the breaker again for further cleaning. Buckwheat is tested by screening it on a sieve.

The mining and preparation of anthracite present some of the most interesting problems which the engineer has to solve. The different seams require varied treatment and a seam may be far from uniform throughout the same mine. In noting some problems of the anthracite industry in a recent lecture at Pottsville, Pa., President George F. Baer, of the Philadelphia & Reading railroad, said: "The public wants cheap fuel; the miners and workers want high wages; the owners want a reasonable profit on their investment." He further remarked that this simple statement at once disclosed an irrepressible conflict—a suggestion which has been amply verified in the past.

The New York City office of the Price-Pancoast Coal Company is at 17 Battery place. Joseph B. Dickson is the president; Jesse L. Eddy, treasurer, and T. R. Cornwall, secretary. Among the officials at Scranton, John R. Bryden is the general manager; F. G. Wolfe, chief engineer; J. V. Birtley, superintendent; J. E. Jones, outside foreman, and Paul Bright and William Reid, mine foremen.

In conclusion I wish to acknowledge the kindness of the Scranton officials of the company, and also G. A. Wescott and F. H. Emery, who courteously placed every means at my disposal for the preparation of this article.

### Assaying Gold Telluride Ore.

In Bulletin No. 253, Series E, Chemistry and Physics, United States Geological Survey, W. F. Hillebrand and E. T. Allen report the result of experiments on gold telluride ores from Cripple Creek, Colo., which show that the crucible fire assay yields results as accurate as those obtained by the wet method, provided corrections be made for losses in cupelling and those due to retention of gold by the slag. The amount of gold retained by the slag is very small and generally negligible if a suitable charge be employed. The best results are obtained with a charge consisting of 1 a. t. of ore, 1 a. t. of sodium bicarbonate, 6 a. t. of litharge, 10 grams of fused borax, and a covering of salt.

The loss in cupelling is more considerable, that due to absorption by the cupel being greater than what is caused by volatilization. If the cupellation be made at a temperature at which 'feather' litharge is abundantly formed, the loss due to volatilization is generally negligible, or perhaps compensated for by the retention of lead by the gold bead. The loss of gold due to absorption by the cupel is very important, and increases with rise of temperature. It is greater with pure gold and alloys poor in silver than with alloys rich in silver.

It is unnecessary to leave gold beads in the muffle for some time after brightening with a view to removing the last trace of lead. Experiments showed that the beads do not decrease in weight, but actually show a very slight tendency to become heavier.

Silver can be completely extracted from quartation alloys by means of nitric acid, but it is necessary to repeat the treatment with acid more than twice, and to wash after each treatment. The losses of gold in parting are negligible in an ore assay.

According to John Fulton, the cost of making coke in bee-hive ovens is 35.2c. for labor and supplies, 1.35c. for repairs and \$1.335 for coal (1.5 tons costing 89c. per ton), a total of \$1.7005 per ton.

While speaking of gob fires, at a recent meeting of the South Staffordshire and East Worcestershire Institute of Mining Engineers (reported in *Colliery Engineer*, June 16, 1905), President Redmayne referred to some samples of coal taken from South Staffordshire and the north of England some years ago. The sample from the former locality had fallen to the consistency of sand, and the structure showed a sponge-like capacity for absorbing oxygen; while that from the north of England was practically unaltered. It was suggested that a microscopic examination of coal structure would assist in solving the problem of spontaneous combustion. Also hygroscopic moisture, greater in some coals than in others, when heated by oxidation, expands the coal, affording greater surface for spontaneous burning.

### Safety Catches for Mine Cages.

BY E. MACKAY HERIOT.

In the present article it is my aim to give a general idea of the risks that are run of the cable breaking while hoisting, and especially the methods adopted for safety. It should be said in advance that no absolute safeguard has yet been devised. The subject is of such importance that I hope in this brief article to draw out discussion, and thus develop new ideas. The facts that I am able to present herein relate solely to the German coal-mining industry, an industry which is, however, acknowledged to be modern as regards its management.

A hoisting cable is liable to be broken at many points. The most likely place is no doubt just above the cage, or a few yards higher up. That this is so will be readily understood, when it is considered that every shock the cage receives is transmitted to the adjoining end of the rope, and of course these shocks are always being repeated. A careless engineer will allow the rope to slack at times, thus causing a jerk when re-starting. Around the pulley, or between that and the drum, when the cage is at the bottom of the shaft, is also a dangerous place.

According to a statistical report, the most ropes broke when beginning to hoist from shaft bottom, or when encountering irregularities in the shaft, such as a narrowing, or when hoisting too high. In descending, ropes seldom seem to break, but such cases have been known, where, by some hindrance, the cage has stuck in the shaft and the cable has been allowed to slack down on the cage; if then the cage becomes free, it falls at a tremendous rate, ultimately jerking the rope and breaking it.

The following calculations as to the rate a ropeless cage travels, when free from any hindrance, were made at the Prosper coal mine. In column 1 the speed of a cage entirely free is given; in column 2 the air pressure is taken into consideration. It will be noticed that at the beginning the two tables are much the same, whereas as the depth increases the difference becomes large. Concerning all the other hindrances a falling cage must meet with, it is not likely that observations have been made, and thus reliable figures cannot be given.

Depth traveled, meters.	I.	II.
	Speed at finish, m. p. s.	Speed at finish, m. p. s.
1	4.4	4.0
4	8.8	8.0
26	22.0	21.0
76	38.3	32.0
127	49.7	40.0
224	68.6	48.0
517	100.1	56.0

A man can jump 4 m. without hurting himself, but a much shorter fall might do him serious harm, because he would be unprepared. With a jump of 4 m. he would reach the earth at the rate of 8 m. per sec. A 1-meter fall must be taken as the highest limit, be-



cause it would always happen unexpectedly.

In the mines of the Dortmund mining department, from years 1872 to 1903, inclusive, 8,266 hoisting ropes were discarded, of which 283, or 3.42%, broke suddenly while working. In the Breslau department, 2,825 hoisting ropes were removed from 1882 to 1903, of which 65, or 2.30%, broke suddenly. During the five years 1899-1903, in the mines of the

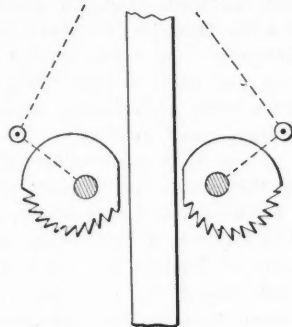


FIG. 1. WHITE & GRANT.

departments of Dortmund and Breslau 3,052 hoisting cables were thrown off, of which 41 had broken suddenly while working. Of these 41 breakages 23, or over 50%, are accounted for as occurring at the joint with or within 50 m. of the cage. This proportion was in fact probably larger, since nine of the breakages were not explained in the record of the cases. Seven breakages happened higher than 50 m. above the cage, and there were two occurring near the drums. As far as information could be obtained, it showed that by far the most of these accidents happened to the rope of the loaded cage when beginning to hoist. Among the 41 accidents, one was caused by overwinding, one by two cages coming into collision and jerking the rope out of the sheave, one

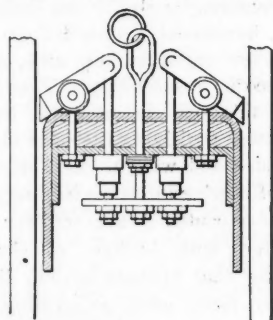


FIG. 2. FONTAINE.

by the safety catches of the descending cage getting into action, one by the cable winding itself irregularly on the drum, one by the sheave breaking, and one by the shaft of the sheave breaking. The age of the cables played an important part. The following table shows how long (in days) the 41 ropes were in use:

Under	100-300	300-500	500-700	700-900	Above 900
1-0	11	7	10	5	3

It has been explained to some extent how and where the hoisting cables are

apt to break. Some of the different devices which have been invented to secure against such accidents will now be reviewed.

The first of these was invented many years ago by Herr Büttenbach, and its principle has remained to this day in one form or another. The cable is indirectly attached to four bolts. If the rope breaks, a spring is relaxed and pushes the four bolts outward, so that they will rest on arms in the shaft. It may be related here, that one night Herr Büttenbach, being awakened by a band of music and torch-light procession, sprang out of bed and rushed to the window, to find that the disturbance was in his honor. At a near-by coal mine the rope had broken, but all the lives had been saved by the Büttenbach safety gear, and the men hastened to honor the inventor.

In the case of a safety catch of the Büttenbach type on a cage weighing, say, 6,000 kg., and descending at the rate of 10 m. per sec., if the rope suddenly breaks the bolt of the catch would have to weigh 25 tons in order to withstand the shock, or one-half as much if the arm was equally heavy.

There is not room in this article to describe anywhere near all the safety catches in use, to say nothing of those invented, whose name is legion. Some authorities divide the safety catches into two classes, namely, those that stop the cage suddenly, and those that aim to stop it gradually. The former class would probably be successful in saving life only where the cage was on its upward journey. Then, if the rope broke and the apparatus went at once into action, under favorable conditions the cage would be held up. Should, however, a short space of time intervene, a stopping would scarcely be possible. Even if it were so the shock would be likely to kill the men, since it would be the same as if the cage were to strike the shaft bottom at the same rate.

A well-known construction is that of White & Grant. It is composed of two or more teething eccentrics, which are kept in place as in Fig. 1 when the spring is held taut. As soon as the spring is relaxed the teeth are turned toward the wooden guides, into which they grip. The Fontaine system, which is common in Germany, is illustrated in Fig. 2. It consists of two catching arms, which, when the spring is caught, do not touch the guides. In the event of the cable breaking, the spring relaxes, thus bringing the arms against the guides. There is a danger of the arms being broken off, wherefore they are made as short as possible.

A practical test was once made with a safety catch of the above type with a cage weighing 2,200 kg. and traveling 2.5 m. per sec. The distance from where the claws began to attack the guides to where the standstill took place was 0.3 m.

A favorite apparatus in Germany is the

Müntzner, which is illustrated in Fig. 3 and 4. In Fig. 3 the cage is seen hanging from the cable under normal conditions. If the rope breaks two knives come into contact with the guides, cutting into them gradually; acting like a brake, they reduce the speed until the motion ceases. It is thus represented in Fig. 4, where the arms are seen to have been driven in as far as possible, in which position they are held. It must, however, be noted that the

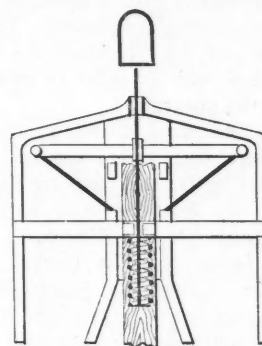


FIG. 3. MUNTZNER.

greatest possible penetration is only 30 mm., and this is no doubt the secret of success. At the Wilhelm shaft, while lowering empty trucks at a speed of 8 m. per sec., the apparatus worked so well that the cage could be used again at once. The distance in which the cage was checked was 1.45 m. In spite of the quickness of the stop, the shock is only slight and perfectly harmless.

Other safety catches, which ought to do well, are those which work on the principle of wedges, like that of Pinno. He applied wedges between the cage and guides. Selbach reckons that if the cage were descending at the rate of 10 m. per sec. the braked distance would be 80 m. With the Pinno method the cage would be stopped without a shock.

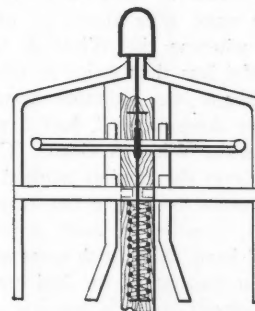


FIG. 4. MUNTZNER.

Borgsmüller and Libotte invented a safety catch to be worked by hand from inside the cage. However, this is not practical, since someone might set it in action when the rope had not been broken, and relaxing it again the cage would fall, causing an accident.

When the rope of an ascending cage is severed, theoretically the catches should at once be set into action; and to stop the motion, it should only be necessary that

the arms hold the weight of the cage. In reality, this is hardly the case. The arms do not hold sufficiently fast at first, and this interruption allows a certain speed to be gained which necessitates the application of a strong force to stop. Assuming, for example, a cage weighing altogether 3,500 kg., descending at the rate of 10 m. per sec., and that in half a second after the rupture the arms hold fast; the ultimate speed would be 15 m. per sec. However, for safety's sake, a speed of 20 to 25 m. per sec. might be reckoned. This gives some idea of the difficulties the inventor has to deal with in order to construct a trustworthy apparatus.

In the Dortmund district nearly all the shafts have such safety catches to their cages, and by far the most use the White & Grant, the Fontaine being a poor second in favor. In this district, as near as can be found out, the catches worked 180 times during the years 1890-1902. This number includes 37 times when the rope was not broken. Altogether success was achieved 125 times, while 54 cases were failures. However, during the hoisting of the men the catches worked 10 times, and only once failed.

The following statement shows how many times the different catches went into action, and with what results, the failures being stated in brackets:

White & Grant, 76 (40); Fontaine, 23 (6); combined White & Grant and Fontaine, 1 (0); Lessing, 10, including 9 times when the rope had not broken; Libotte, 4 (4); Müntzner, 3 (2); Wedge safety catch, 4 (1); Lohmann, 2 (0); Fritz, 3 (0); Mainzhausen, 1 (1); Hyperziel, 1 (0). Total, 128 (54).

If we subtract the 37 times when the cable had not broken, there remain 91 accidents which were presented by safety catches, and 54 times where they proved themselves to be useless. The Fontaine system seems to have done best. It held up the cage four times as often as it failed, whereas the White & Grant was successful less than twice as often as not, but perhaps the Fontaine system would not have done so well, had it worked so often as the White & Grant. Concerning the 37 times the catches worked when the rope was not broken, a few words should be said, because a weak point will be exposed here. Nine such cases were found to be on account of the bad condition of the eccentrics, and six because of irregular winding. Unluckily the causes of 19 cases are unknown. Often the guides were found to have been so much worn that it was not possible for the catches to hold on; at other times the guides were not strong enough.

Summing up, the conclusion is reached that the safety catches are a help in saving life and property, and thus of diminishing the risks in shaft haulage, since it has been shown that out of 143 rope breakages the safety catches prevented accidents 91 times in the Dortmund district alone,

during a dozen years. Had those in charge only taken the necessary care of what was essential to the working of such apparatus, as, for example, the eccentrics and the guides, much more success would have been achieved.

That opinions differ as to the importance of the safety catch may be gathered from the facts that in Belgium there are no laws regarding them, whereas in certain districts of Germany their use is obligatory. In France they are recommended by the State inspectors. An English commission once wrote: "We are not in a position to decide in favor of any of these apparatus, as being a reliable safeguard against accidents."

Mine hoisting is always open to risks, but some of these can certainly be guarded against by using a good rope and a good hoisting engine, by having an experienced engineman, by taking proper care of the safety catch and its adjuncts, and by following such rules as are set down for safety in hoisting. How far improvement has been made, and no doubt by following the above advice, the subjoined table of experience in the Dortmund department will show.

Year.	Ropes discarded.			Year.	Ropes discarded.		
	Total.	Broke.	%		Total.	Broke.	%
1872	114	22	19.3	1899	388	2	0.52
1873	156	22	14.1	1900	414	6	1.45
1874	198	19	9.6	1901	462	5	1.08
1875	226	19	8.4	1902	448	8	1.79
1876	217	15	6.9	1903	481	2	0.42

This certainly shows a decided improvement.

In a series of experiments carried out recently at the Iowa State College on the efficiency of steam-pipe coverings, it was ascertained that, with steam at 20 lb. pressure per square inch, the loss in the bare pipe amounted to 2.405 B.t.u. per hour per square foot per degree of difference of temperature. With steam at 40 lb. per square inch the corresponding figure was 2.589, with 60 lb. pressure 2.686, with 80 lb. pressure 2.752, and with 100 lb. pressure 2.897 B.t.u. per hour per square foot and per degree of temperature difference.

The term 'tough pitch' in copper means that the metal has a good fibrous structure and will probably roll well.

The first blast-furnace gas-engine of large power (500 h.p.) to be shown in public was exhibited by the Cockerill Company at Paris in 1900. According to E. A. Uehling, at a meeting of the New York section of the Society of Chemical Industry (March 24, 1905), there is now on the continent of Europe, especially in Germany, upward of 300,000 h.p. in use and under construction. In America, only one steel company, namely, the Lackawanna Steel Co., has made any serious attempt toward the utilization of blast-furnace gas for power direct. That company has ordered 40,000 h.p. of engines, probably one-half of which is running.

## Dredging—II. Practice and Improvements.

BY J. P. HUTCHINS.

It is well to enumerate some of the mechanical details which involve success or failure in present gold dredging. Excavating apparatus has been much improved since the first installations. Bucket forms have been modified to prevent loss by spilling. This is accomplished by reducing the angle made by the bucket-lip with a line through the centers of the two bucket-pins. The earlier bucket was long, narrow and deep; recent design provides a short, wide and shallow bucket which discharges more perfectly. The use of jets of water, to wash adhering material from the inside and outside of buckets into the hopper and save-alls, is now common and assists in recovering gold. The capacity of buckets has been largely increased, though the economical limit has not been reached; but with greater size, there should be greater strength in design and in material; the best steel-alloys must be used.

The design of upper and lower tumblers has been much modified, and all parts subject to wear are now easily replaceable. Tumblers with more numerous faces are now used. The accompanying cut (Fig. 3) shows the relative size of the respective tumblers, and the deflecting angles presented to the buckets. In early practice the square upper-tumbler was supposed to be capable of holding buckets with less danger of revolving without actuating the bucket chain. The hexagonal upper tumbler is now in operation, and it is safe to predict that heptagonal and, possibly, octagonal, upper tumblers will be used, particularly on small dredges. The wear and tear of bucket-pins and bushings is largely due to deflection in rounding the tumblers. The rounding angles of the square, pentagonal, hexagonal, heptagonal or octagonal forms are approximately 40%, 66%, 86% and 100%, respectively. Tumblers with many sides can be used for both upper and lower positions; the only objection is their size and weight. One dredge manager of much experience has suggested the use of a round lower tumbler of large diameter, with buckets of short pitch, claiming that buckets seldom lie flat on tumbler faces when excavating, but usually ride the corners between the faces; then the buckets are overlooked and spilling occurs. Moreover, it is possible that the use of a round tumbler would help to obviate surging, as there would be no irregular raising and lowering of the buckets.

Until recently it was not regarded as good practice to lower the digging ladder more than 45° from the horizontal. Recent installations provide an idler (at the rear end of the well) to prevent buckets dragging on chutes and save-all gratings when the ladder is lowered more than 45°.



This permits a greater working depth with a given length of ladder.

There is a diversity of opinion as to the relative merits of the trommel and shaking screen. The trommel is a better me-

chanism, probably requires less power for operation, gives much less trouble in maintenance and does cleaner screening, particularly when the material is tenacious; but it has been too small. Amalgamation by impact is now accomplished, and distribution is no longer a difficult problem on dredges where trommels are used. In the recent Oroville practice the trommel is highly in favor.

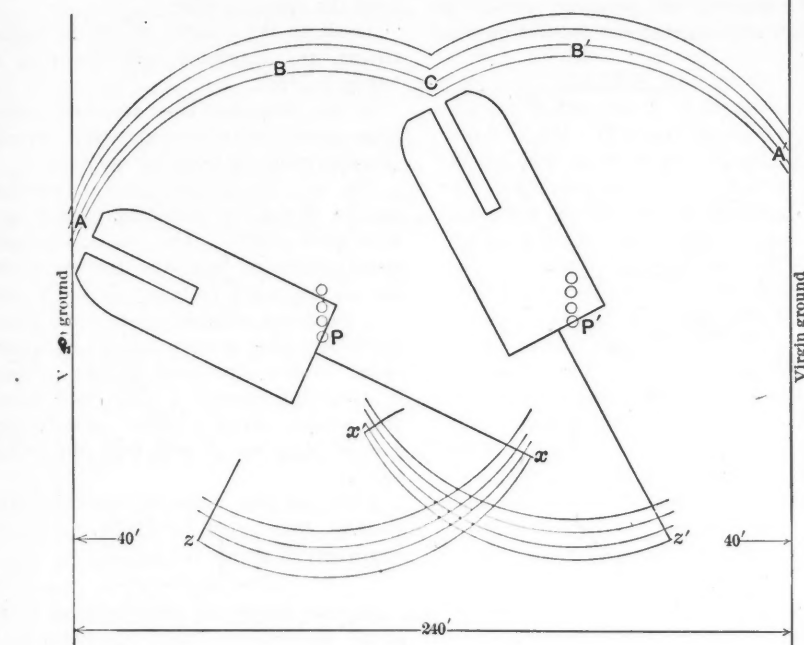


FIG. 1.

Overburdens usually consist of fine loam or sand, which can be run but slowly over the gold-saving devices. A blanking device to handle this material (by not allowing it to pass screen perforations and sending it out over stacker) was used for a time at Oroville and worked well, but required too much time in blanking and unblanking the screen. The use of a device to blank the hopper and shunt material into the well has been tried. These blanking devices permit of rapid handling of barren material. The disposition of an overburden by this method is to be heartily recommended.

Gold-saving apparatus, after many experiments, has come back to the hydraulic-mining undercurrent type, with the mercury riffle. For saving clean gold the mercury riffle is probably best. The use of woven material to enmesh particles of ruty gold is good practice. The superficial area of gold-saving surfaces has been largely increased, and with good results. Steeper grades are now used for gold-saving devices than formerly, and arrangements are such as to allow a better distribution of sluicing water to the various parts of gold-saving areas. An arrange-

ment of gold-saving surfaces, introducing a number of drops, causing material to impinge upon riffles charged with mercury, with resulting amalgamation by impact, is now in general use. Much

thought has been recently given to the perfecting of save-alls, and a surprisingly large amount (sometimes 10%) is recovered by this accessory. A device is now in use for keeping under lock and

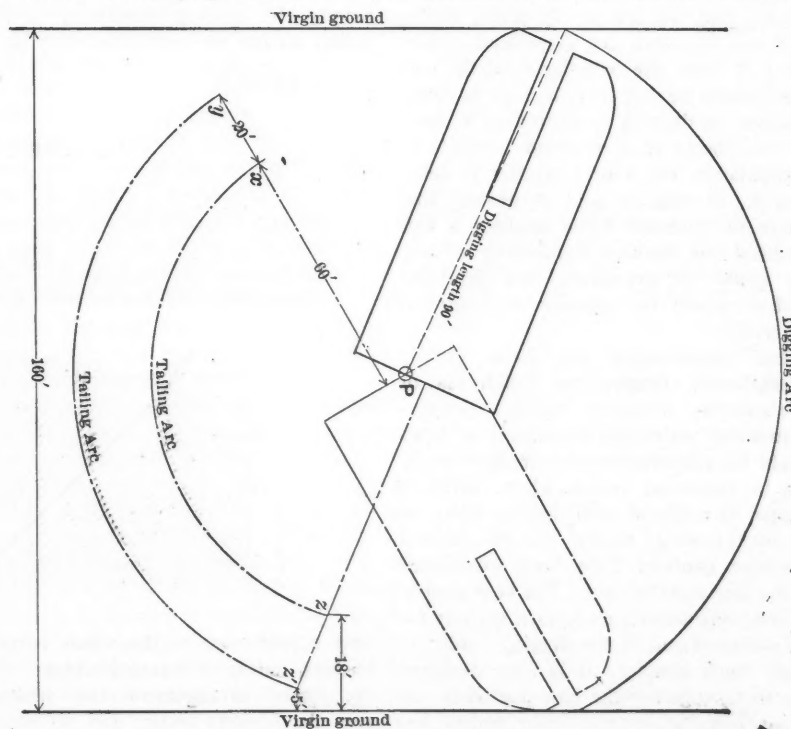


FIG. 2.

key those parts of the gold-saving apparatus where most of the gold is caught. The troughed-belt stacker seems to be generally regarded as superior to the

bucket stacker. Nearly all the recently installed stackers have the driving pulley (and electric dredges have the driving motor also) on the outboard end.

With coarse gold, stacker dredges are used with perforations at the lower end of the trommel to pass material 1.5 in. in diameter; this is run through a sluice, the coarse gold saved and the waste deposited in the stacker buckets; here a troughed-belt stacker could not be used, as it could not handle the water.

It would not be expedient to use a double- or single-lift dredge where ground is deep. It is necessary to keep the pond nearly full to dispose of the tailing. Stackers and tail sluices are now of greater length than formerly. In stacking tailing, care is taken to keep it away from the sides when there is virgin ground. The mode of piling tailing to waste no ground is shown in Fig. 1; while Fig. 2 shows the result of bad stacking. As a general rule, the distance from tailing to side of the cut at water surface should be twice as great as the depth the dredge is digging. The side slope is assumed to be 45°; this would be so only when the ground is free.

In early practice the advantage of a pivotal spud, or a head line, was almost wholly in controlling the excavating end of the dredge; the tailing did not receive consideration. The pivotal spud should be used only by dredges of the double- and single-lift type, having auxiliary scows for sustaining their sluices. In Montana, however, several dredges of

these types use four wire-ropes, anchored ashore and leading to a high A-frame at stern as a substitute for a pivotal spud. The pivotal spud, which introduces prob-

lems of its own, seems to have proved more satisfactory than the head-line for holding the dredge in excavating indurated material. There is the possibility that the introduction of a number of rollers, on the lower side of the bucket-ladder and behind the lower tumbler, would result in holding several buckets firmly

ahead of dredge and to hoist machinery aboard and about the dredge is now common. The use of traveling cranes over driving and other machinery is not as general as it should be. The housing of machinery is now the rule.

The placing of operating levers, controllers and switches is a mooted question.

stacker and the tailing sluices. The objection to the third arrangement, and, in a measure, to the second, is that the winchman is isolated and therefore inaccessible. On the whole, it would seem that the advantages of location are behind the upper tumbler.

Teeth on the buckets, or on the bucket chains, are suggested for excavation in heavy bedrock.

Of late managers have employed rather large crews, though many dredges are still operated with but two men per shift.

The use of variable-speed motors on electric dredges is becoming general, and with good results. The use of constant-speed motors on head-line dredges, working on indurated material, helped to put the head-line method into bad favor. Variable-speed motors allow a certain speed suitable for hard ground. Thus, in tenacious ground a slow chain-speed may actually attain a higher capacity than a rapid chain-speed with high theoretical value.

These are only a few of the many suggestions that might be made relative to improvement in dredging practice.

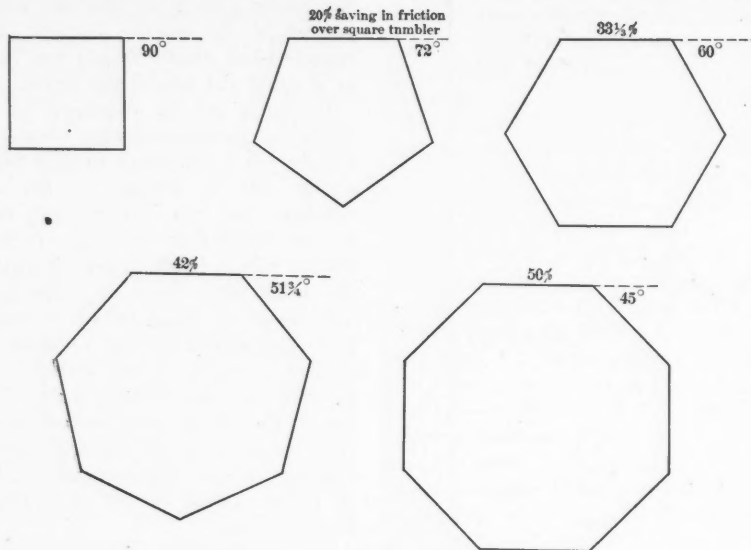


FIG. 3.

against the material being excavated and would prevent surging when digging on a head-line with closely connected buckets. The pivotal spud should be located so as to make the radius of arc, described by the buckets in digging, as long as possible.

It is shown, in Fig. 4, how dredging ground may be wasted by piling tailing at Z and Z', which are, respectively, 18 ft. and 5 ft. from the boundaries of the cut; they should be not less than 40 ft. when dredges are digging in ground 30 ft. deep. It also shows that in some methods of manipulation too long a stacker is detrimental. It may be said in general that where the material to be dredged is free the head-line method is superior; if surging could be prevented, the head-line method would be superior in indurated material.

Hull construction has been greatly strengthened, longitudinal bulkheads or fore-and-aft keelsons being common. Transverse watertight bulkheads at bows would be advantageous in dredges working in torrential rivers where there is danger of collision with floating trees, or in ice-throwing rivers, as in Alaska. Stronger gantries have been introduced in the late installations. The bow gantry, at first considered merely as a support for the outboard end of the digging ladder, is made much heavier; it is now designed also to tie together the bow pontoons. In recent installations the main gantry becomes a post-structure in longitudinal and transverse trusses, preventing hogging.

The introduction of some form of derrick or crane at the bow of the dredge to move stumps or other obstructions from

Some prefer them on the lower deck close to the driving machinery; others prefer them in a 'pilot house' placed on the upper deck, near the forward end of the house; still others would place them in a pilot house just aft of the upper tumbler. With the first arrangement the winchman is among the driving machinery and can watch it; but he sees little else; he gets

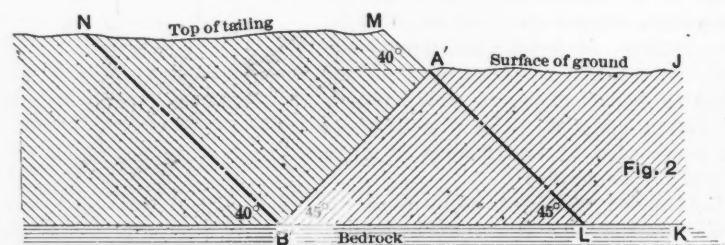
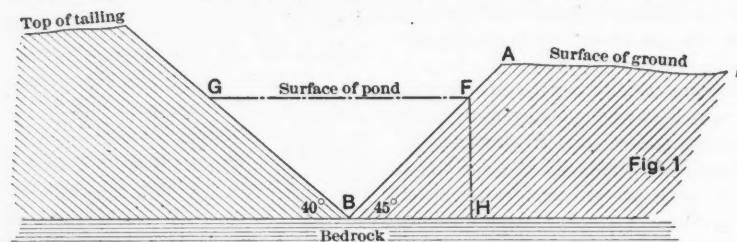


FIG. 4.

only a poor view of the whole length of buckets, unless he leaves his place. With the second arrangement the winchman sees the buckets better, and all the bow lines, and little else. With the third arrangement the winchman sees the buckets and lines at bow and stern, the hopper and screen, and enough of the gold-saving apparatus to know whether the riffles are clear. By the aid of mirrors he can see the

without the expenditure of any additional fuel. (*Power*, July, 1905.)

The limestone ballast of the North-Eastern Railway (England), for two miles near Newcastle, is so clean that it proves a good insulator; and, in dry weather, it is possible for one standing on the ballast to touch the 500-volt live wire without receiving any shock.



**Oxygen Refining of Cyanide Bullion.\***

BY T. KIRKE ROSE.

This is an elaborate examination into the large-scale refining of bullion by air or oxygen. After a short historical resumé of earlier suggestions of Miller and Donald Clark, the author proceeds to the consideration of the following questions:

(1) To what extent can base metals be removed by the passage of a stream of oxygen?

(2) What amounts of gold and silver will be lost in the refining process, (a) by volatilization, (b) in the slag, (c) from mechanical causes such as projection from the vessel?

(3) What influence will various impurities exercise on these losses?

(4) What are the relative effects of pure oxygen gas and of air, and how much of each is required?

(5) What fluxes are required for slagging?

(6) How can value be recovered from the slag?

Questions of practical application and of cost hardly come into a laboratory investigation, except as deductions from the answers to these questions.

The paper is divided into the following sections:

I. The action of oxygen on molten metals.

II. The action of nitrogen on molten metals.

III. The action of oxygen on mixtures of molten metals.

IV. The volatilization of gold, silver, zinc and tellurium.

V. Toughening.

VI. Slags.

VII. General method of making the

VIII. Treatment of South African zinc-box precipitate.

IX. Refining low-grade bullion.

X. Discussion of the results.

The metals considered, in connection with gold and silver, are copper, lead, nickel, iron, zinc, tellurium, selenium, antimony, arsenic, cadmium, bismuth and the platinum group. The material treated comprised retorted gold, zinc-box precipitate, auriferous lead, auriferous copper, and imperfectly refined brittle gold with many impurities; copper and iron predominated as impurities in retorted gold; and zinc and lead, in zinc-box precipitate.

The general method was as follows: The refining experiments were all (excepting one with air) made with the use of compressed oxygen contained in cylinders. The gas was led through 'composition' pipes of about  $\frac{1}{8}$ -in. bore to a clay pipe dipping to the bottom of the pot. The connections were made of rubber tubing, fastened on with rubber solution.

The following three forms of pipe were used: Pipe-stems broken from 'churchwarden' pipes, suitable for small experi-

ments; 24-in. 'chlorine' pipes with  $\frac{1}{8}$ -in. bore, of English make; and 30-in. 'chlorine' pipes with  $\frac{1}{8}$ -in. bore, supplied by a Dutch firm. None of them was found to suitable for the work. The first and second named were made for use in the Miller process at the Australian mints. They would probably stand the action of molten chlorides very well, but were rapidly corroded by the metallic oxides formed at the mouth of the pipe in these experiments. This was especially the case at the beginning of the operations, when the oxidizable metals were in great excess, and the oxygen was absorbed almost before it could issue from the pipe. When air was used, the corrosion of the pipe was not so rapid and the experiment needed no attention. The slag had little or no effect on the pipes.

The stream of gas was regulated by a screw clip just above the crucible. A small stream was turned on, and the pipe slowly heated in the furnace, and then gradually inserted in the metal. The passage of the gas can be felt by the throbbing of the rubber tube. If no pulsation is felt, the gas is escaping through a hole above the level of the slag. The error in reading off the amount of oxygen used was  $\pm 0.2$  cu. foot.

The pot was continued upward by a 'muffle' made by cutting the bottom off an old pot, and the pipe was put through a hole in the lid, which is preferably at the side, so that the lid may be removed without withdrawing the pipe. The pipe was clamped in position and the rubber tube protected by asbestos. The tube was lifted out every now and then to see if it had suffered uneven corrosion and no longer conveyed the gas to the bottom of the metal. This could be seen by raising the pipe until its mouth was just below the surface of the slag and noting if gas bubbled through. Unevenness of corrosion was not observed when air was used. The heating action of the oxidation was very great, especially at the beginning.

At first, when the silica was in large excess, the slag was pasty, and shots of metal were seen to be thrown up to the top of the slag and to remain there. Toward the end, the slag became liquid and all beads sank. No projection of metal through the layer of slag was observed except in one case, when tumultuous bursts of air from the Roots blower threw some metal to the lid, and about 0.6% of the gold recovered was in the form of beads, in spite of the fluidity of the slag. There is no danger of loss from this cause, as the hole in the lid can be practically filled by the pipe, so that no aperture remains through which beads can be projected.

After pouring, the metal and slag were quenched in water and the slag dried and weighed. It was then passed through a 30-mesh sieve and all beads found on the sieve were collected, cupelled and parted. The slag was then sampled, the sample

crushed through an 80-mesh sieve, panned, and the tailing saved and assayed. The loss of weight in panning was about 10%, and the assays were calculated on the weight taken before panning.

The lining of the pots was crushed through 30-mesh, together with the pipes, sampled and assayed. The graphite shells were not treated. The gold in the slag and in the pot scraping was, in all cases, valued by assay. The slag and other materials were not treated in bulk. The gold ingot was cleansed, and two cuts taken from opposite corners. After preliminary assays, proofs were made up of the appropriate composition for the final triplicate assay. In no case did the assays of the two cuts in tough ingots differ from one another. The report of the proportion of silver in the ingot is far less accurate than that of the gold. The weight of the gold, in and out, was taken on a bullion balance readily turning to 0.0001 oz., with a weight of 100 oz. in each pan. The troy weights used were recently checked by the Standards Department and the errors found to be very small.

The preliminary boiling-off of the zinc took place with the crucible lid placed slightly out of position so as to give a narrow aperture through which the volatilized zinc could pass. Under these conditions the atmosphere in the pot was a reducing one, and the zinc oxide was not formed inside the crucible to any great extent. The zinc, lead and copper used in the experiments were assayed for silver and gold. The silver was allowed for in the charges, but the gold did not affect the weights given.

The general results appear, on the whole, to be in favor of the use of air or oxygen in certain refining operations. The use of pure oxygen would probably be confined to small operations in places where compressed oxygen can be easily and cheaply obtained. It seems to have a more intense effect than air, as might be expected, but as far as can be judged from a comparison, air will do everything that oxygen can do, but in a more leisurely way, without such inconvenient robustness of action. If air can be made to remove base metals from gold, it seems a pity not to use it, as it is obviously a cheaper oxidizer than oxygen in any other form.

Air is also cheaper than chlorine gas. The chlorination of 63 oz. of copper in the Miller process requires the use of 20 lb. of sulphuric acid, about 8 lb. of ordinary commercial manganese dioxide and 8 lb. of common salt. The oxidation of 63 oz. of copper requires 16 to 18 oz. of oxygen, or 60 to 70 cu. ft. of air. There is plenty of margin here on the side of air.

Air is used as an oxidizer in cupellation, but in this case a large quantity of lead is used as an oxygen-carrier. The results in this paper would prove, if proof were required, that it is unscientific and

\*Abstracted from the *Proceedings* of the Institution of Mining and Metallurgy, London, April 13, 1905.

wasteful to try to use lead as an oxygen-carrier to copper. The action takes place much more readily in the reverse direction. The composition of the mixture  $PbO$ ,  $Pb$ ,  $Cu$ ,  $Cu_2O$ , and  $CuO$ , when in equilibrium at high temperatures, is unknown, but the percentage of  $PbO$  would certainly be far higher than that of  $Cu_2O$  or  $CuO$ . The use of litharge is, of course, mainly to flux the other oxides and so produce a fusible mixture. It is probable that sand and borax will prove to be cheaper fluxes, especially if the borax can be reduced to a small percentage.

Lead will certainly act as an effective oxygen-carrier to zinc and some other metals; but it would be better to make use of any metal that happens to be already in the bullion to do the work of carrying, instead of adding more base metal and then oxidizing them all together. If large quantities of lead containing precious metals are available, it seems tempting to add low-grade bullion or precipitate to it and cupel the mixture, but it would probably be better to treat the bullion separately and to purify the lead by means of zinc, instead of adopting the apparently unscientific course of destroying all the lead as such to get at the small percentage of valuable material contained in it. This is not intended as an attack on Tavenor's excellent process, which is so successful in practice. The argument is quite general.

The losses in the cupellation process depend on the same facts, and are apparently of the same order as those in the process described in this paper. The losses of silver at first are small, so long as large quantities of base metals protect it from oxidation. This initial loss is the greater in cupellation, because silver is partly carried away mechanically. Later, when the percentage of silver is high, it is freely oxidized in both processes, and the oxidation is at its maximum when the silver is practically pure. At this point the loss in the cupellation process ceases, for the oxide of silver is not removed after the litharge has ceased to flow. The loss in the air-blowing process would still be at its height unless the blowing were stopped. For this reason the production of pure silver by bessemerization does not appear to be practicable. The advantages of the process are more obvious if the refining is stopped when the impurities in the silver have been reduced to some 5 or 10%, or, say, metal of the same composition as ordinary *bleich-silber*.

The losses of gold are never likely to be high, as the metal is difficult to oxidize, and adequate protection is given by the never-failing presence of silver.

It may be interesting to note that a calculation, based on the heat generated in the course of raising bullion from 670 fine to 925 fine, shows that a converter of one-third the size of those used in making steel would maintain its temperature during blowing, if the blow lasted 30 minutes.

Calculation also shows that if the sand required for fluxing were blown in with the air-blast, then it would probably be better to heat the blast. The smallest steel converters take a charge of about three tons of pig iron, and the corresponding charge of bullion would therefore be one ton, or 30,000 oz. The same amount of zinc-gold precipitate could also, according to calculation, be refined without the aid of any external heat.

Whether this can be regarded as practicable or not, at any rate the possibility of refining gold and silver by forcing air or oxygen through the molten metals is established by the experiments. The most difficult metal to remove is copper. It has been shown to resist oxidation more obstinately even than tellurium when gold is present. The analyses given by James Douglas<sup>1</sup> support this statement. There is here an indication of the cause of the losses of gold and silver in cupellation in the assay of tellurides. The oxidation of the tellurium in cupellation takes place *pari passu* with the oxidation and slagging off of the gold and silver. The remedy is obvious, and my colleague, S. W. Smith, is now engaged in an investigation on the subject. The case of silver and tellurium appears anomalous; and further investigations are in progress on mixtures of silver and the less easily oxidized metals.

The treatment of zinc-box precipitate is a special application of the method which appears to promise good results. The volatilization of zinc from the auriferous material, already adopted long ago at Deloro, has the advantage of saving fluxes. If it pays to retort the scum from Parke's process and to save the zinc, there seems no reason why it should not pay to do the same thing in the cyanide process. Nevertheless, it is simpler to let the zinc escape and burn, and the furnaces in present use on the goldfields would then do the work without alteration.

It is to be noted that the zinc-box precipitate, although it may be of the same composition as the charges treated in certain experiments, is in a different physical condition, and no doubt it would be necessary to determine the precautions to be observed in order to prevent loss by dusting during the volatilization stage. There seems no reason to suppose, however, that any insuperable difficulties would be encountered.

The treatment of slags requires some consideration. If bullion only 900 fine in gold and silver is produced, there is no reason to fear much formation of silicate of silver, and in that case most of the value could be extracted by panning, or still better by treatment on a small Harz jig after fine crushing. Fusion with carbon and iron is shown to concentrate the gold and silver in the reduced lead, which would be fairly pure if most of the cop-

<sup>1</sup>The Treatment of Copper Mattes in the Bessemer Converter, *Trans. A. I. M. E.*, October, 1899, p. 29.

per and nickel were left in the bullion. The treatment of auriferous and argentiferous lead would naturally depend on the local conditions.

The questions put at the beginning of this paper can now be answered with some degree of confidence.

(1) It has been shown that base metals can be removed from gold and silver bullion by means of a current of oxygen passed through them.

(2) The losses due to volatilization and projection are insignificant, and those in the slag are moderate and can be kept low by stopping the process before the refining is complete. The initial losses in the slag, etc., including all beads, varied from 0.03 to 1.70% of the value, when the slag is pasty, the mean being 0.73%. Most of this could be brought to account at once by crushing and sieving.

(3) The various impurities are equally harmless, provided that some readily oxidizable metal is left in the bullion to protect the silver. It is probable that copper, tellurium and bismuth have little action in protecting silver from oxidation.

(4) Pure oxygen gas and air have the same effect, and there is little doubt that, if a deep body of metal were used, their efficiency would be, at the lowest, 80 or 90 per cent.

(5) The fluxes required for fusion are borax and silica, and these are sufficient. The slag formula  $\frac{2}{3}(Na_2O B_2O_3) + 6RO\frac{2}{3}(B_2O_3) + 3SiO_2$  appears to fulfil all requirements, except that of cheapness. The cost of the fluxes in such a slag would be about  $\frac{1}{2}$ d. per oz. of fine gold recovered. The proportions indicated by the formula may undergo considerable variations without any disadvantage. On the other hand, when 20% of both the borax and the silica are omitted, the slag becomes somewhat pasty. The replacement of even 90% of the borax by sand appears to be more than a possibility, and would greatly reduce the cost of the fluxes. The addition of iron oxide or lime may be useful if borax is omitted.

(6) The gold can in great part be recovered from the slag by concentration, but the silver cannot be recovered in that way. Almost all the value can be recovered by fusion with carbon and iron, the lead and copper being reduced and carrying down the gold and silver.

The following additional conclusions may also be drawn:

(7) In the treatment of zinc-box precipitate from the cyanide process, it is convenient to drive off part of the zinc by volatilization in order to save fluxes, and to avoid pasty slags.

(8) The metals are oxidized in succession, each in turn partially protecting the metals which are less easily oxidized than itself. Owing to mass-action, this protection is not absolute. Silver is not easily oxidized, and gold is protected by all other commonly occurring metals.

(9) There is *prima facie* evidence that



the cost of treatment by air is less than that of other refining processes. The relative losses are more doubtful, and cannot be determined in the laboratory. The total losses observed in the experiments, including the value left in the slag tailing, varied from 0.008d. to 2.4d. per oz. of fine gold recovered, the mean loss being 1.36d. On a large scale these should be much less.

### Timbering in Tasmania.\*

BY MARK IRELAND.

The orebody being worked at the Mount Rex tin mine, Ben Lomond, Tasmania, is about 100 ft. in length by 70 ft. in width. A face of 15 ft. is stoped over the whole level at one operation, this height standing without any timber.

Double lines of logs, 20 ft. in length, and from 10 in. to one foot thick at the small end, are laid longitudinally, butt to butt, and breaking joint from end to end of the orebody; they are at 10 ft. centers from wall to wall. The starting logs are single for the first 10 ft., and their ends are hitched into the solid rock. These are called 'runners,' and are the logs which are picked up as the level underneath is worked up. The double layer gives a better chance of picking up. Logs are then laid from the center of the orebody and at right angles to the runners, the ends being hitched into the walls.

A space, 7 ft. wide, is left open right through the center of the orebody, and a similar space through from the crosscut leading to the shaft. The cross logs are spiked down, 4 ft. apart, to the runners. Decking, of small spars from 3 to 6 in. thick, is then laid down. Timber cribs, or 'pig-styes,' are next built up, 4 ft. wide, on each side of the open spaces previously referred to, forming a skeleton drive.

The pig-styes are constructed as follows: Two logs are laid parallel, 4 ft. apart, and upon them, in notches at the ends and the middle, three cross-sills are laid, two more logs are laid upon them in turn, and so on until 7 ft. high in the clear is obtained. In the spaces between the logs, waste rock is filled in as fast as built. Strong caps, 12- to 14-in. timber, are then laid 4 ft. apart across from pig-stye to pig-stye. Decking is laid over these caps as on the level. Shoots and traveling ways are then built, and the level is ready for filling with waste, which is sent down from the surface.

This method is strong, and very cheap as compared with square sets. But little dressing is required, only an axe, saw and auger being required; any rough, but fairly straight, timber will do. An additional advantage is that no blasting, however heavy, can injure it.

The second Simplon tunnel through the Alps was pierced July 6. The first tunnel was completed last February.

\*Abstracted from *Trans. Austral. Inst. Min. Eng.*, 1905, Vol. X.

### Ore Dressing at Broken Hill.\*

BY V. F. STANLEY LOW.

This paper applies, in general, to the concentration of the silver-lead ores at Broken Hill, New South Wales, but more particularly to the process as applied at the Block 10 mine. The plan herein described is similar to that prepared recently for the Block 10 Company.

Generally speaking, the daily consumption of water for steam and ore-dressing purposes may be taken at 100 to 120 gal. per ton of ore treated. Much of the water is used over again several times, but there is considerable loss owing to what goes away in the tailing, slime, concentrate, etc.

On Broken Hill field, the crude ore is generally broken underground to such a size (about 10 by 8 in.) as can be fed into a No. 5 Gates breaker. The breaker is sometimes placed at or near the brace, but is often contained in the mill building itself. When the mill is situated at a considerable distance from the shaft, the first reduction should take place at the brace. By tipping directly from the landing brace into the first bin, the Gates breaker is, to a great extent, independent of any temporary stoppage in the hauling arrangement, and the hauling need not necessarily stop on account of any slight derangement of the Gates breaker. At the foot of these bins (which should hold at least eight hours' ore supply), there should be at least one spare breaker.

After the ore has been reduced (by passing through the Gates breakers) to a size sufficiently small to go to the rolls, it should pass into small bins of a few tons capacity, from which it is taken to storage bins at the top of the mill building. The mill bins should be capable of storing 16 hours of ore supply at the least.

Many different classes of Gates breakers are now in the market, some of which are of good and others of inferior design. The main requirements to be observed when ordering a Gates breaker are: (1) That the bearings are well protected from dust; (2) that the bottom plate may be lowered, and the eccentric removed, without having to pull the cone and gyratory shaft out through the top of the breaker; (3) that, where hard material (such as rhodonite) has to be crushed, it is best to use a solid brass eccentric. The eccentric usually supplied is made of steel or cast iron, with babbitted wearing faces, and is unsuitable for crushing the hardest material.

An up-to-date mill will be so arranged in sections that each is totally independent of the others. By this means it is possible for the whole process of concentration to go on in one part of the mill while the rest is idle. In the older form of mill, in which this used not to be the case, much loss was sustained, as an interruption to

\*Abstracted from *Trans. Austral. Inst. Min. Eng.*, Vol. X.

one part of the mill often meant the stopping of all, and perhaps for a considerable period.

On leaving the bins, the ore for each section passes through a conical trommel about 6 ft. long (3 ft. in diameter at the large end, and 2 ft. in diameter at the small), having a cover made of 14-gauge iron punched with round holes one-eighth in. diameter. The trommel, supported on external rollers, makes 12 r.p.m., and about 0.5 h.p. is required to drive it. The oversize from the trommel is fed to the rolls, the trommeled material going to the jigs.

Many kinds of rolls are in use at the different mills, but those constructed for the present plant are of the Cornish type, driven by gear wheels, the gear being 7 to 1. The shells for these rolls are 30 in. in external diameter and have coned centers, bolted together in such a way that the shells when worn may be expeditiously removed. Each pair consists of a plain roll and a flanged roll into which the plain one fits. Either manganese or toughened steel is used for making these shells, which work at the rate of 15 r.p.m., are capable of crushing 1,000 tons per week from 1½-in. to ⅛-in. mesh for average material, and require 25 horsepower. Such material as has passed through each set of rolls goes to two parallel trommels 6 ft. in length and 22 in. diameter. These trommels made 20 r.p.m., are set at an inclination of 1 in. in 1 ft., and have screens of 14-gauge iron punched with round holes 2½ mm. in diameter. Such material as is too large to pass through the mesh of the screen is returned again to the same set of rolls, while the trommeled material, meeting the trommeling from the conical machine, passes to the hydraulic classifier at the head of the coarse jig.

The hydraulic classifier (which is a cone-shaped hollow casting of iron ⅝ in. thick) is 2 ft. in diameter at the base and 2 ft. 6 in. deep. The apex of this cone is placed downward, and is perforated by two holes ⅝ in. diameter for water inlet, and by one discharge hole, the stream entering by the inlets being so regulated that there is always a slight overflow at the upper edge of the cone. The feed then coming in at the top of the classifier meets the rising flow of water from the inlets; the slime is then carried away with the overflow water, the heavier particles falling into the bottom and finding their way, through the discharge opening, to the coarse jig.

The jigs (which are of May Bros.' patent) are divided into two classes—coarse and fine. Each coarse jig consists of eight working and two tailing compartments (five on each side), and each working compartment consists of a hopper with a hutch and separate plunger at the top. Each hutch is 3 ft. 6 in. by 2 ft. 6 in. and has a sieve of 6-mesh brass-wire screening, which rests on cross-bars of iron, and

is kept in position by iron grids placed on top and bolted through to the cross-bars. Each plunger is 3 ft. 6 in. long and 14 in. wide, and has a clack opening in it 2 ft. 6 in. by 6 in.

The object in having a clack and clack-way in the plunger, instead of making the plunger solid, is that there shall be as little downward suction in the hutches as possible, and that the water shall have, as far as possible, a quick upward motion and slow return. The clack is a pine board loosely bolted to the bottom of the plunger, from which it has a clearance of  $\frac{5}{8}$  in. on the upward stroke. The use of a clack on the plunger does away with much of the classification which would otherwise be necessary before jigging. Each plunger of the coarse jigs makes 180 strokes per min.; each jig requires 2 h.p. driving force and is capable of treating 6 or 7 tons of ore per hour. The discharge of products from the hoppers goes on continuously; material from No. 1 and 2 is carried away to bins for final shipping to the smelters; that from No. 3 and 4 undergoes further crushing and re-treatment in the fine jigs; No. 5 is taken to the tailing dump.

The re-crushing of material from the last two hutches of the coarse jigs (to 20- or 25-mesh) is done in Krupp ball-mills, which make 30 r. p. m. and require 8 to 10 h.p. The material leaving the ball-mill passes through a system of classification at the head of the fine jigs similar to that which took place at the head of the coarse jigs.

The fine jigs are the same in principle as the coarse, but are run at a speed of 200 strokes per min. The hutches and plungers are smaller (3 ft. 4 in. by 24 in. and 3 ft. 4 in. by 12 in., respectively), but their number is the same (five of each on each side of the jig). About  $1\frac{1}{2}$  h.p. is required to drive the jig having a capacity of about 4.5 tons per hour. Each fine jig has to deal with about 60% of the crude material (which, in the first place, had been sent to the coarse jigs). The material discharged from the first two hoppers of the fine jigs (from hutches 1 and 2 on each side) is sent to the shipping product bins, while that from hoppers 3 and 4 is returned to the jig, after having again passed through the ball-mills. The material from the fifth compartment is sent to the zinc-middling dump.

The fine and slime from the classifiers at the heads of the coarse and fine jigs are settled in spitzkasten, the coarser material being treated on Wilfley tables, the finer flowing away, and, after further classification, being treated on belt vanners.

In the mill under consideration, no middle product is returned to any table over which it has already passed, and therefore the return launder and elevator on the Wilfley table have been dispensed with. The Wilfley is run at 220 to 240 vibrations per min., and has a capacity of about 1

ton per hour for material up to 30 mesh. If, however, the material is from 30 mesh down to slime, the capacity is lessened to about half a ton per hour. About  $\frac{3}{4}$  h.p. is required for driving a fully loaded Wilfley table. Krupp tables, very similar in action to the Wilfleys, are also to be used; but all the finer slime work is to be done on Warren belt vanners.

The spitzkasten used for classifying the slime are generally made of plank 2 in. thick, and have dimensions as follows: Length, top 15 ft., bottom 10 ft.; depth, 2 ft. 1 in. at head, sloping to 4 ft. 8 in.; breadth, 2 ft. 8 in. at top, widening out to 7 ft. 1 in. at the end.

Two kinds of elevators are used for lifting returned material, raff wheels and elevators. The raff wheels are 14 ft. in diameter and make 15 r.p.m. A good form of elevator is one having buckets (7 in by 5 in. by 5 in.) bolted to a belt 8 in. wide at a distance of 15 in. from each other. The driving is done, from above, by cog wheels geared at 3 to 1, the bucket-belt passing around drums 2 ft. in diameter, top and bottom, and having a speed of 250 ft. per min. A good slope for elevators is about 80 degrees.

It is estimated that, for every ton of ore undergoing treatment, 1,500 gal. of water are in use in the mill at the same time. The loss of water is estimated at 100 to 200 gal. per ton of ore treated.

For a mill capable of treating 4,000 tons per week, laid out in four independent sections, the following power would be required: 2 Gates breakers, 40 h.p. each, 80 h.p.; 4 feed rolls, 4 Cornish rolls, 4 trommels and 8 parallel trommels, 120 h.p.; 4 coarse jigs, 8 h.p.; 4 fine jigs, 6 h.p.; 4 Wilfley tables, 3 h.p.; 4 ball-mills, 40 h.p.; 2 Krupp tables and 24 Warren vanners, 15 h.p.; 4 elevators, 20 h.p.; 5 slime pumps, 10 h.p.; 3 water-circulating pumps, 36 h.p.

The list (just given) corresponds closely, in most respects, with that of the machinery to be installed in the new Block 10 ore-dressing mill; the motive power will be electricity throughout, thus making a new departure, as far as the Broken Hill field is concerned.

The mill, arranged as described, will probably give (from each ton of crude ore) 20% of concentrate, 20% of jig tailing, 7% of fine slime, 7% of vanner tailing and 45% of zinc middling.

A new radio-active substance extracted from residue of thorianite is named emanium; it is said, on the authority of O. Hahn, to emit the beta-rays abundantly.

Under normal conditions the cost of a bee-hive-coke-oven is \$250@-\$350. Its estimated life is 16 years, during which the cost of maintenance will amount to \$150. Taking the average annual product at 700 tons, the cost of repairs will be \$0.0133 per ton of coke.

### Fan Capacity.\*

The actual volumetric capacity of a given fan, operating under practical conditions, is naturally to be sought as a means of measuring it relatively to another fan. But manifestly such capacity is somewhat difficult of pre-determination. In the case of a steam-engine, its nominal rating—that by which one engine may be measured relatively to another—is based upon the diameter and stroke of the cylinder, the number of revolutions and the mean effective pressure. But the power thus calculated by no means represents the amount which may be delivered to a given machine, for the sole purpose of operating which the engine is employed. This latter amount will be less than that calculated, to the extent that power is absorbed in the internal friction of the engine and by the intermediate mechanism of transmission. So in the case of a fan wheel, its theoretical volumetric capacity will depend upon its dimensions and the speed at which it is operated. But in practice the actual amount of air delivered will also be largely dependent upon the fact of the wheel being encased, the character and dimensions of the case, and the size and resistances of the passages through which the air is conducted. The equivalent of such resistances is, in boiler practice, usually represented by the grates, the fuel, tubes, etc., and may evidently be so great at times as to very seriously reduce the theoretical air discharge of the fan.

Evidently, it is improper to compare fans when operating under such conditions that these resistances cannot be definitely determined. The simplest and most natural condition is that in which the fan is operated without other resistance than that of the case; that is, with open inlet and outlet. But for proper comparison of different fans, the areas through which the air is discharged should bear some constant relation to the dimensions of the wheels themselves.

It has been determined experimentally that a peripheral discharge fan, if enclosed in a case, has the ability, if driven to a certain speed, to maintain the pressure corresponding to its tip velocity over an effective area which is usually denominated the 'square inches of blast.' This area is the limit of its capacity to maintain the given pressure. If it be increased the pressure will be reduced, but if decreased the pressure will remain the same. As fan housings are usually constructed, this area is considerably less than that of either the regular inlet or outlet. It, therefore, becomes necessary, in comparing fans upon this basis, to provide either the inlet or the outlet with a special temporary orifice of the requisite area and proper shape, and make proper correction for the contraction.

\*Extract from *Mechanical Draft*, published by B. F. Sturtevant Co.



The fan is thus, in a sense, placed in a condition of restriction of discharge, which it approaches in practice only in so far as the resistances of pipes, passages and material through which the air must pass have the effect of reducing the free inlet or outlet of the fan.

### Oils for Safety-Lamps.\*

BY G. P. LISHMAN.

Patent safety-lamp oils are mixtures of fatty oils with varying proportions of the distillate from petroleum which passes over just before the lubricating oil. This distillate is termed 'mineral colza.' It has a flashing point of 240 to 260° F. (Pensky-Martens' close test) and a specific gravity of 0.830. The flashing-points of patent safety-lamp oils range from 250 to 290° F., and are very frequently about 270° F.

In testing the burning qualities of different oils, 50 grams of the respective samples were placed in the bottoms of safety-lamps and burnt in a photometer, the wicks being regulated so as to give a constant light of 0.4 candle power. After six hours, the residual oil was weighed, the difference between the weight and the original 50 grams giving the quantity of oil consumed. In six determinations with a patent safety-lamp oil, 20.7 to 21.7 grams of oil were consumed, the average being 20.96. Colza oil burned very badly, and the weight consumed was 22.8 grams. Cotton-seed oil had a tendency to lead to charring of the wick at the top; the amount consumed was 22.3 grams. Seal and whale oil were no better, though Niger-seed oil gave slightly more satisfactory results. Speaking generally, no one fatty oil showed any pronounced superiority in illuminating power, and price must therefore be the chief factor in the selection.

As regards the mineral oils, the American petroleum distillate was found to be the best, showing a consumption of 18.7 grams, while the light burnt steadily with a low wick, and for most of the time was above 0.4 candle-power. There are many pits where a safety-lamp oil with a flashing-point of 270° F. might be safely replaced by 'mineral colza' flashing at 250 to 252° F.; and when a higher flashing-point is essential it should be obtained by the addition of fatty oils.

Experiments were also made with mixtures of cotton-seed oil and the petroleum distillate. A mixture of cotton-seed oil and petroleum distillate containing 75% of the latter was very satisfactory. It flashed at 256° F., and showed a consumption of 19.1 grams in the burning test. The drawbacks of cotton-seed oil, viz., slight charring of the wick and separation of stearin in cold weather, can be avoided by the use of some rape-seed oil if the price permit.

\*Abstract of an article in *Trans. North Eng. Inst. Mining and Mech. Engineers*, 1905, Vol. I.V. pp. 136-138; *Journal Society of Chemical Industry*, May 31, 1905, p. 538.

### Cyanidation of Argentiferous Concentrate.

BY HUGH G. ELWES.

The local treatment of concentrate and 'shipping ore,' in order to avoid the excessive freight and treatment-charges incurred either from the circumstance of great distance from a smelter or from the rebellious nature of the product, is an old problem. Writers of books on the cyanide process show little confidence in the treatment of silver ore, and on that account I hope that the data given in this article may be of service.

Bosqui, in 'Practical Notes on the Cyanide Process,' published in 1901, page 9, with reference to the treatment of concentrate, says that, "A preliminary roasting of sulphurets has been found to facilitate their subsequent treatment by cyanide, and to reduce the consumption of the chemical." He refers to simple roasting without salt, of essentially gold concentrate. Later, in the same book (p. 145), Bosqui qualifies the above statement by saying that "the consensus of opinion among metallurgists seems to be that close concentration is a failure, especially with low-grade ores, except where the pyrite is shown to be unaffected by cyanide." I have endeavored to show, by the tests described in this paper, that by means of a preliminary chloridizing-roast rich silver ores, even when rebellious, can be successfully treated by cyanidation. The cost has been found to be such as to make the method worthy of adoption from an economical standpoint. Since the cost of roasting the bulk of the mill product would be prohibitive, the experiments tend to show that close concentration may be the best practice when it is possible to extract a high percentage of the value from the concentrate, the vaner tailing being generally suitable either for cyanidation raw, or by some other ordinary method. Louis Janin, Jr., has pointed out ('The Mineral Industry,' Vol. I, p. 239) that the cost of cyaniding raw pyrite ores will be high, owing to the decomposition of the solution by salts which are always present in partially decomposed pyritic ore. Bosqui says, with reference to this opinion of Janin, that "the difficulty with pyritic ore has, in some instances, been overcome by roasting the material before cyaniding." Auriferous concentrates have been treated for many years by roasting and chlorination; and, as shown by the recent correspondence in this JOURNAL, there is not a complete agreement among metallurgists as to the advantage, or otherwise, of the cyanide process over chlorination for this class of material. But silver-bearing concentrate belongs to a different class.

In order, however, to make this series of tests more complete, the following experiments on a gold ore were carried out, with the result given herewith.

Test No. 1. The ore consisted of arsenical pyrite carrying gold and some silver,

the vein material being an altered slate.

It was crushed to pass a 60-mesh screen. A preliminary roast, with 5% salt for 30 minutes, was given, the muffle being kept at a cherry red. An assay of the ore after roasting showed that there was no loss of value, the decrease in weight being compensated by the increase of assay value. After cooling, the roasted ore was transferred to an agitator where cyanide solution (0.5% KCN) and a little NaOH were added. Agitation was kept up for 48 hours and the tailing then washed with water and assayed, the result being as follows: Head—gold, \$17.40; silver, \$4.07; tailing—gold, \$0.60; silver, \$0.74 per long ton. (Throughout this article the values are given in United States currency.) These assays show an extraction as follows: Of the gold, 96%; silver, 81%; total values, 93%. The consumption of cyanide per ton of ore treated in the above test was 1.3 lb. The cost of roasting may be estimated as follows: 1/3 cord of wood per ton of ore roasted; one man's daily wage. This calculation of costs of roasting is that used by Julian & Smart ('Cyaniding Gold and Silver Ores,' page 369). The ore in question gave a poor result when treated raw, the consumption of cyanide being absolutely prohibitive. It serves as an example of what may be done with rebellious auriferous and arsenical pyrites by roasting.

Test No. 2. The material treated in this case was an argentiferous pyrite concentrate from a New Standard concentrator running on pulp from an Elspass mill. It contained 40% sulphur, 0.5% copper, over 3% antimony as stibnite, and some zinc-blende. Treated raw it gave a useless result. A preliminary roast, of 30 minutes with 8% salt, was given in a muffle at a cherry-red heat, the material being constantly stirred. There was no loss of value in roasting as shown by assays. The material was cooled and transferred to an agitator where cyanide solution (0.6% KCN) and a little NaOH were added. Agitation was continued for 15 hours. The result of this treatment is shown as follows: Head—gold, none; silver, \$28.50; tailing—gold, none; silver, \$3 per long ton. The extraction was 89%. The consumption of cyanide was 5 lb. per ton of ore treated.

The cost of treatment was as follows: Roasting, \$1.75 per ton; labor, \$0.50; cyanide, \$1.05; total, \$3.30. The net return from the treatment of one ton of concentrate by this method is found thus: Value of silver extracted, \$25.50; cost of treatment, \$3.30; net return, \$22.20. This compares favorably with the return obtainable by shipping the concentrate in question to the nearest smelter, where the net product worked out only \$18 per ton. The advantage in favor of cyanidation in this case is thus seen to be \$4.20 per ton.

In connection with the estimates quoted of costs of roasting, it should be noted that the cost in Mexico would be a good

deal more than that in the United States; but, that it need not by any means be prohibitive, even there, is shown by T. Kirke Rose ('Gold,' page 302), who gives figures for costs taken from actual practice where roasting furnaces of the revolving type are used. He gives the details of the cost of roasting 40 tons in White-Howell furnaces at the Rapid City mill in Dakota as follows:

2 men attending White-Howells @ \$3..	\$6.00
2 men helping at White-Howells @ \$2.	4.00
2 men cooling ore, White-Howells, @ \$2.	4.00
4 men wheeling ore, White-Howells, @ \$2.	8.00
2 men getting wood, White-Howells, @ \$2.	4.00
6 1/4 cords wood @ \$3.50.	22.75
Oil, including lights.	1.05
1-16 of whole engine- and boiler-power.	1.96
Total cost of roasting 40 tons.	\$51.76
Per ton.	1.294

At the Golden Reward mill, Rose mentions (p. 298) that the cost of roasting in Brückner cylinders varied between \$1.53 and \$1.35, but that the cost had been reduced in 1894 to \$0.74 per ton by the introduction of the White-Howell furnaces.

Test No. 3. The material tested was an antimonial and pyritic ore, containing 0.5% copper and a little arsenic. It was crushed to pass a 60-mesh screen and given a preliminary roast, with 5% salt, for 30 minutes in a muffle at a cherry-red heat. There was no loss of value, as shown by the assays. After cooling, the ore was transferred to an agitator with cyanide solution containing 0.6% KCN and 0.5% NaOH. Agitation was kept up for 36 hours, at the end of which time the tailing was washed and assayed. The results of this treatment are shown below: Head—silver, \$76.22; tailing—silver, \$8.32 per long ton. These assays indicate an extraction of 89%. The cyanide consumed per ton of ore treated amounted to 6.5 lb. There was an estimated milling cost of \$0.50 per ton, taken from the actual practice in the 100-ton mill where the ore is being treated by concentration only. The total cost of treatment was estimated as follows: Milling, \$0.50; roasting, \$2; cyanide, etc., \$1.36; labor, \$0.50; total, \$4.36 per long ton. The net yield from one ton of the ore in question by this method was found as follows: Value of silver extracted, \$67.90; cost of milling and cyaniding, \$4.36; net product per ton, \$63.54. This same ore, when shipped to the nearest smelter, yielded only \$59.60 per ton, owing to its rebellious nature and the heavy fines imposed on that account.

Test No. 4 was made in two parts, one for the treatment of poor-grade ore from a certain mine, and the other part on high-grade stuff from the same place. The ore is found as a conglomerate composed of pyrolusite and other oxides of manganese carrying silver. The form and appearance of the deposit are similar to those of the blanket of the Rand; the dip also being similar, that is, only 15° from the horizontal, the vein apparently being of the blanket variety. The mine is

known as the California and is situated at a distance of about 35 miles from the nearest railway in the State of Zacatecas, Mexico. The owner, Don Manuel Villegas, had tried many methods of treatment without success until the writer tested the ore with the cyanide process, which proved the solution of the problem. The ore represents an extreme case, no doubt, but it serves as an example of the very diverse materials which can be extracted by the cyanide process if a suitable preliminary treatment be given. The ore was given a light roast for 15 minutes with 5% of salt at a dull-red heat in a muffle, and after cooling was transferred to an agitator where cyanide solution was added (0.5% KCN) and agitation continued for 24 hours.

Test No. 4a. Low-grade manganiferous ore. Head—silver, \$9.62; tailing—silver, \$1.48 per long ton. These assays show an extraction of 84%. The amount of cyanide consumed per ton of ore treated was 4.4 pounds.

Test No. 4b. High-grade manganiferous ore. A roast was given exactly under the same conditions as those prevailing in the test on the low-grade, and, as in the latter case, no loss of value could be found by assay. After cooling the ore was agitated with a cyanide solution (containing 0.6% KCN) for 24 hours and the tailing was then washed and assayed. The result was as given herewith: Head—silver, \$65.12; tailing—silver, \$8.33 per long ton. The extraction indicated by these assays is 87%. The consumption of cyanide per ton of ore treated was 4.8 pounds.

Referring to my former article (this JOURNAL, March 16, 1905) in a case there mentioned of a test made on a ton of concentrate, the result showed that such a material assaying \$100 in silver per long ton could be treated by roasting with salt, and subsequent cyanidation, at a cost of \$2.49 per ton. This represented a saving of over \$20 more net product from each ton of concentrate than could be obtained by shipping to the nearest smelter.

The writer hopes that this article may serve to call forth comment or criticism so that the treatment of rich silver ores by the cyanide process may be fully discussed.

A. O. Hamilton, of Dundee, Scotland, proposes (British patent 2,210, Feb. 4, 1905) the composition consisting of 50 to 200 lb. of caustic soda, and 1 to 20 gal. of glycerin mixed with 40 gal. of water for removing the scale from boilers.

R. A. Hadfield states (U. S. patent 786,561, April 4, 1905) that steel containing 0.3 to 0.6% carbon, up to 0.3% manganese, 2 to 5% nickel, and 1 to 3% chromium, possesses a high elastic limit and tenacity, with great ductility and toughness.

### Coal-Dust Firing in Reverberatory Furnaces.

Coal-dust firing as applied to the annealing of iron, steel and copper, has recently been brought to a high state of efficiency at the works of Messrs. Richard Johnson & Nephew, Ltd., Bradford Iron Works, Manchester, according to the *Iron and Coal Trades Review*, June 23, 1905. The system should be adaptable in the same manner to the reverberatory furnace in general.

The system employed is the Schwartzkopff. The general arrangement of the furnace, with pots containing the articles to be annealed, is shown in the accompanying illustration. In starting up this furnace, a piece of waste is dipped in petroleum, placed in front of the coal-dust feeder, and lighted. The feeder then delivers a fine spray of coal-dust over the burning waste, the firebrick combustion chamber soon becomes sufficiently heated to support combustion, and in a few minutes becomes incandescent. The products of combustion pass around, between, and through, the center funnel of the pots as indicated by the arrow heads, and thus a uniform temperature is secured throughout each pot. When working on full output, there are 24 pots in constant use. Every one to four hours, according to the material, eight pots, each containing about one ton, are drawn from the furnace. The extra pots are required so that the furnace may be constantly charged with a full batch.

This furnace has now been sufficiently long at work to show considerable saving in the fuel bill, and with absolute uniformity of product. Coal-dust firing should experience an extensive development in annealing furnaces of every description, as well as in re-heating furnaces and steam boilers.

The supply of coal-dust and air is regulated so that the feeder can be adjusted to burn any quantity of fuel, and any desired temperature can be obtained in the furnace, and maintained without variation. The well-known benefits of uniform temperature during annealing are conditions seldom obtained by hand-firing upon ordinary grates, as, during the processes of clinkering and stoking, an excess of air must be admitted, causing cooling down which often produces irregularity in the material under treatment. With the Schwartzkopff system of firing, there is no opening of doors for clinkering or stoking. Among other advantages, is the use of coal which is too small or too dirty to be burned upon the ordinary grate. After being pulverized, coal can be burned with a much higher efficiency than the original large coal can give. This is due to the fuel being in the best form to combine with oxygen. In this furnace, a given quantity of carbon combines with a given quantity of oxygen in less time than by



ordinary methods of combustion, and a higher temperature results.

The Schwartzkopff combustion chamber retains the heat and imparts it to the particles of carbon and to the air, the result being a near approach to perfect combustion, which means an absence of smoke.

A report of a test on one of the Schwartzkopff furnaces, taken by the Manchester Steam Users' Association, confirms the foregoing, and also comments as follows:

"The high percentage of carbonic acid in the waste gases indicates a small amount of excess air admitted to the furnaces. On two different occasions, this

**Electric Power for Goldfield.\***

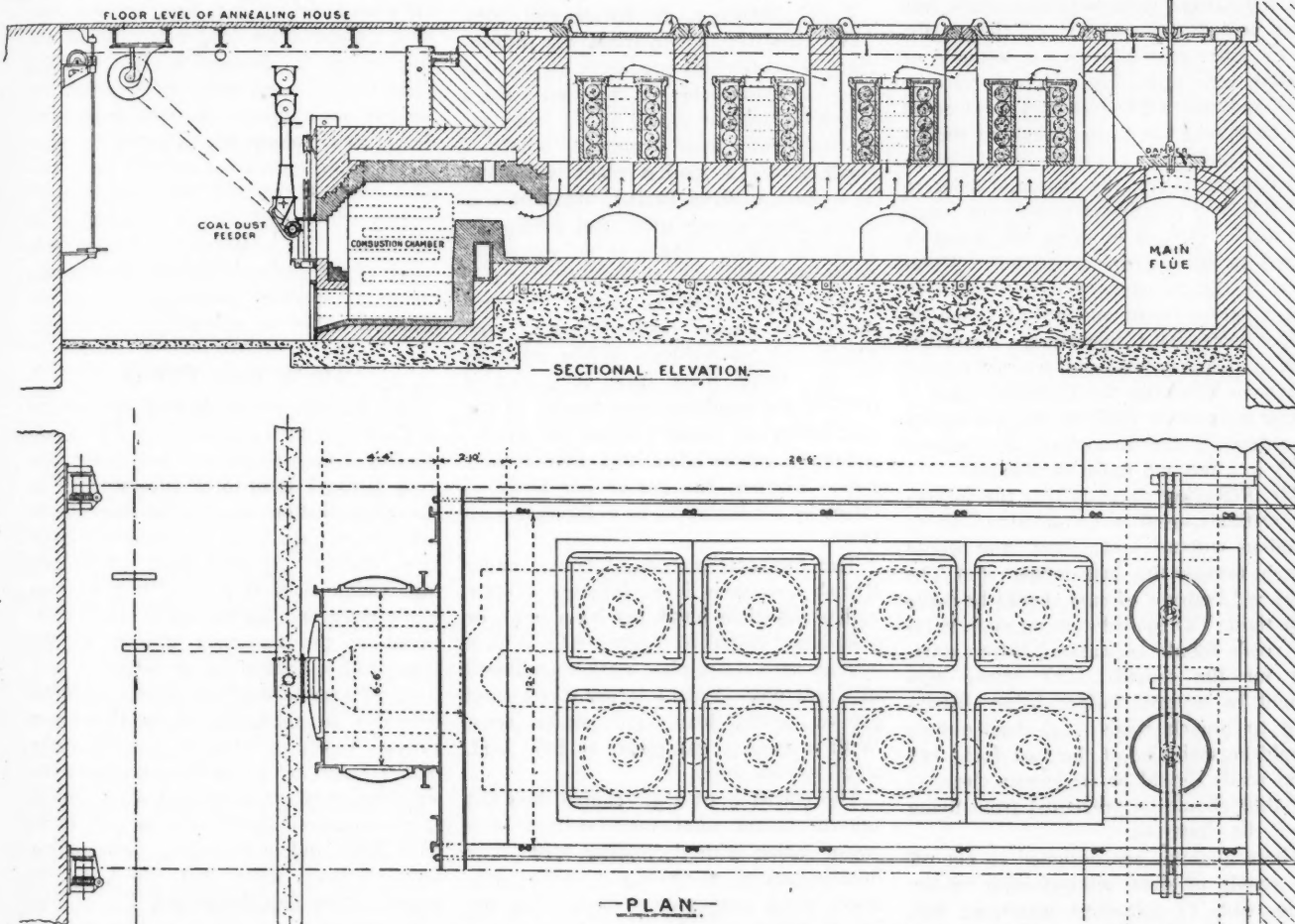
BY E. PRINCE.

The Nevada Power, Mining & Milling Co. was organized in 1904 to develop the power of Bishop creek, in Inyo county, California, and deliver it by electric transmission to the Goldfield and Tonopah districts of Nevada.

The company secured by appropriation and purchase exclusive rights to the water of Bishop creek at the only point of the stream where a large amount of power can be developed within permissible cost. Reliable data as to measurements show the minimum flow of steam to be 34 cu. ft. per second. The maximum flow is 500 cu. ft. per sec. The following data are

tance to the former by the route taken by the pole line will be 90 miles, and the branch to Tonopah will make a total of 120 miles. The estimated cost of construction is \$350,000. The company has announced that power will be ready for delivery in Tonopah and Goldfield by September, 1905.

The physical features comprise a diverting dam on Bishop creek, from which the water, estimated at 30 cu. ft. per sec. flows into 6,700 ft. of 42-in. wood pipe, thence into 2,210 ft. of 30-in. wood pipe, and thence into 3,240 ft. of 24-in. steel pipe to the power-house, in which are contained two 750-kw. generators, with excitors, transformers, switchboard, etc. The three-



was about 28 and 30%, respectively; whereas, in ordinary furnaces burning soft coal, smokelessness is rarely obtained with less than 100% excess air, and sometimes even 200% is necessary. In consequence, the heat carried up the chimney with the waste gases amounted to only 11.2 and 8.2 per cent."

The subjoined table gives particulars as to the results of the tests referred to:

Duration,	Tests.	
	6 Hrs. Pr. Ct.	4 1/2 Hrs. Pr. Ct.
Mean air burnt to carbon dioxide.....	14.34	14.47
Mean oxygen remaining.....	4.25	3.49
Mean carb-n monoxide.....	0.27	0.44
Mean nitrogen.....	81.14	81.60
Total.....	100.00	100.00
Excess air over theoretical.....	29.6%	26.9%
Mean weight of gas per lb. of fuel.....	11.74 lb.	11.58 lb.
Mean temp. of waste gas over atmosphere.....	463° F.	332° F.

from the company's surveys and estimates:

Length of flow line.....	6,700 ft.
Length of pressure pipe.....	5,353 ft.
Hydrostatic head.....	1,604 ft.
30 sec.-ft. of water under 1,024 ft. effective will give.....	3,466 h.p.
Efficiency of water-wheels 80%, power delivered to generators...	2,772 h.p.
Efficiency of generators 94%, delivered to transformers.....	2,605 h.p.
Efficiency of step-up transformers 97%, delivered to line.....	2,526 h.p.
Efficiency of line, No. 0, aluminum wire, 90%, delivered to step-down transformers.....	2,273 h.p.
Efficiency of step-down transformers 97%, delivered to distributing system.....	2,205 h.p.
Efficiency of distributing system 95%, delivered to customer.....	2,095 h.p.

From the power-house the electric transmission line will run in almost a direct course to Goldfield and Tonopah, the dis-

phase alternating current is conducted at 60,000 volts on aluminum cables across the White Mountains, and thence to a sub-station, one pole line then leading to Goldfield and the other to Tonopah, at both of which places will be transformer stations, from which the electric energy will be delivered to customers, at probably 15,000 volts.

The water-wheels for the two units, excitors, etc., are to be furnished by the Pelton Wheel Co. The 24-in. steel pipe is 5-16 in., 1/4 in. and 1/2 in. in thickness, lap-welded, and is made up in 30-ft. lengths. The pipe is made in Germany. The fall obtainable is 1,074 ft. It is believed the company will be able to deliver, without too much of an overload, 2,500 h.p. in Tonopah and Goldfield.

\*Abstract of article in *Engineering News*, July 6, 1905.

### The Dust Danger in Coal Mines.

The number of coal-mine explosions which are attributed to the ignition of dust gives an importance to real information bearing on the subject. W. H. Pickering (in a paper published in the *Transactions* of the Institution of Mining Engineers, Vol. 29, Pt. 2) treats the dust danger as follows:

In Great Britain the practical result of agitation along this line has been the governmental regulation of the use of explosives in dry and dusty places. In a few mines, dust is systematically laid by watering, but no widespread effort has been made to strike at the root of the danger. The only radical way of remedying the danger is to keep the mines free from coal dust by cutting off the supply, or by other means. Among methods of dealing with dust, that which waters the floor and sprays the roof and sides could not be adopted in many mines, as such a liberal application of water would cause the floor to heave, the roof and sides to crumble, and the timber to fall out. Saturation of the air in deep, hot mines is stated to have grave objections. However, in the Simplon tunnel construction water sprays were successfully used to reduce excessive temperature. Nevertheless, a governmental act has prohibited excessive humidity in factories; and it would seem to be futile to sacrifice health to safety by recommending that miners work in a hot and moist atmosphere.

Mr. Pickering suggests that the following methods, used in conjunction, can be installed without undue cost, and would largely remedy the dust danger: (1) The sides and bottoms of cars should be made dust tight; (2) loaded cars on main haulage roads should be watered before starting for the outside; (3) empty cars should be watered before being distributed to branch roads; (4) loaded cars should be sprinkled at the coal face; (5) main roads should be frequently cleaned; (6) dust should be prevented from flying about the shaft top.

These methods are designed to cut off the supply of dust without injuring the mine roads by excessive watering; but, where the roads will stand it, they should be sprinkled as well.

In the discussion of this paper, the following comments were made: While the dustiness of a seam depends upon the structure as well as on the hardness of the coal, yet as shafts become deeper there is more grinding of the coal than in shallow mines. The dust question is of the greatest importance, especially now that shafts are so deep, and temperatures so high in comparison with what they were in former times. In South Wales there is a long list of collieries where coal dust is being considered. At more than 40 collieries pipes are laid in the roadways; at several the total length established amounts to more than 60,000 ft; and much

has been done in Durham and Northumberland.

At some mines, as a preventive against the spread of an explosion, lengths of brick arching have been built at variable distances apart, kept clear from dust, and watered. This method tends to prevent an explosion from passing over the wet part, which should be of sufficient length. As to watering loaded cars before they leave the face, the cost is not considered serious. A small watering-can might be provided, and the dust once watered would cake and would not be easily swept off, even when dried by evaporation.

### Suction-Gas Plants.

F. H. Bowman, in *Electrician*, 1905, LIV, 1005-1007, summarizes the advantages of suction-gas producers as follows: They are reasonable in cost and yield a cheap and regular supply of gas; they are perfectly safe from explosion, occupy a small space (a 500-h.p. plant will stand in a space of 6 by 10 ft.), are simple in design and in operation, and need only unskilled labor. There is no escape of poisonous gas, and the gas production ceases when the engine stops. The producers are always ready for work, and require no gas-holder. While with an average steam plant there is a loss of 28% of the available heat energy of the fuel before the steam reaches the engine, with a producer plant this loss is only 13%. Further, the gas is not liable to losses by condensation, as is the case with steam.

The comparative cost of power under British conditions is as follows: With a 12-h.p. gas plant 0.15d. per b.h.p.-hour, or 0.704d. per Board of Trade unit. With a similar-sized steam plant 1.415d. per Board of Trade unit. With a larger steam plant 270 kw., at 80% load, 0.51d. per kw.-hour. With a 130-h.p. gas plant, at 80% load, 0.45d. per kw.-hour.

The efficiency of a gas-engine does not fall off in the same ratio as that of a steam-engine with decreasing load. For installations up to 500 h.p. a suction producer using anthracite is best. But for installations larger than 1,000 h.p., a pressure producer using bituminous coal, with recovery of residuals is able to produce on full load a brake horsepower for 0.2d. per hour.

A. L. Walker has patented (U. S. 788,862, May 2, 1905) the process of making copper sulphate, wherein open frames (containing 'shot copper') are suspended over a vat (into which sulphuric acid flows continuously) in such a manner that they can be successively immersed and withdrawn, at frequent intervals, by mechanical means. The vat is heated, and, as the heavy crystallizable solution of the sulphate accumulates in the lower part, it is allowed to run off in proportion as acid is admitted at the top of the tank.

### Zinc Gray in Pipe Mastic.

The use of a paste composed of red lead, oil, etc. (with or without a filler, as hemp or asbestos), as a cement for tightening the threads and flanges of pipe fittings, is too common, in itself considered, to be worthy of comment. But there are several disadvantages exhibited by the old red-lead mixture, which it seems desirable to overcome. In the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, it is stated that France uses annually for pipe mastic alone in the national marine, from 80,000 to 100,000 kg. (176,000 to 220,000 lb.) of the red-lead cement. The unpleasant features are the tendency of the mixture to harden in the cans in which it is kept and the constant danger from lead poisoning of the men using it. Bonneville & Co. (of Saint-Denis) have prepared a substitute for this in a mixture of zinc gray (zinc dust) and wood oil. This new pipe-thread cement does not possess these disadvantages of red-lead, and hardens more quickly when in place. It is moreover of less cost. The explanation of the hardening of the zinc-gray mastic is not given, but it is explicitly stated that it does not increase either in volume or in weight.

### Tin in Cape Colony:

The reports of the finding of tinstone in Cape Colony (according to *The South African Mines, Commerce and Industries*, June 3, 1905) seem to be substantiated by the identification of alluvial deposits 12 miles from Cape Town and near the Kuils river station. At this point a long and high ridge rises from the flats between Kuils river and Stellenbosch. It is composed of the basement granite of the Cape, and is flanked by an extensive covering of granite detritus, which gradually increases in thickness along the lower slopes. Coursing with the general strike of the ridge are a series of quartz veins and leaders of varying thickness; one of these measured 30 ft. across. It is in these lodes and in the gravel surrounding and overlying them that the Cape tin deposits were first discovered.

Calcium nitrate may become a new fertilizing material, since experiments reported by E. S. Bellenoux (*Comptes Rendus*, 1905, CXL, 1190) have shown it to be decidedly superior to sodium nitrate, for certain crops at least. It is made from calcium chloride and sodium nitrate.

A. G. Le Chatelier states (French patent, 348,925, Dec. 14, 1904) that an alloy of zinc and cadmium, containing about 20% zinc, constitutes the best solder for aluminum, nickel, german silver, copper, iron and steel; but that as little as 15%, or as much as 30%, of zinc may be suitable in special cases. The alloys are prepared by adding the zinc to the cadmium while fused in a crucible.



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## EDITORIAL.

THERE is an increasing tendency on the part of some writers toward the employment of the word marmatite to designate blende containing combined iron. The term is sanctioned by Dana; but, even in mineralogy, it is not one of precision, there being no good rule to determine what is marmatite and what is not, nearly all blende containing some iron. This is sufficient reason for avoiding a name which is unnecessary in technical work.

REPORTS OF NEW discoveries of tin in Mexico are in circulation. The well-known existence of the ore in numerous parts of that Republic make it not improbable that a profitable deposit may some day be found; but as yet there has been nothing discovered which could be operated economically, although numerous attempts, some of them ambitious, have been made. The principal occurrences have been small and irregular deposits, which have furnished excellent samples, but no large quantity of the ore. A great deal of money has been lost in Mexican tin ventures, and intending investors should investigate new projects with proper caution.

### Monazite.

Elsewhere in this issue we publish an interesting communication respecting the monazite industry in North and South Carolina. It is well known in the trade that there is a greater demand for monazite from this country than can be supplied at present. There are three domestic consumers of the mineral. Their requirements recently have been such that there has been no surplus of the mineral available for export, although there have been some urgent inquiries in our markets from European sources. Monazite is, therefore, a mineral which should be carefully sought by prospectors in the South, in regions where it is known to exist, and elsewhere, if there are indications of its occurrence.

### Oil Refining in Kansas.

THE LAW passed by the Kansas Legislature last winter, appropriating \$410,000 to build an independent oil refinery at Peru, was declared unconstitutional by the State Supreme Court, in an opinion rendered July 7 by Associate Justice Greene. The project was manifestly improper and des-

igned to failure. The citizens outside of the oil counties did not want it, looking upon it as for the benefit of the oil counties only. The anti-populistic party of the State was against it. The independent refiners who are preparing to begin business regarded it as a serious competitor to their private enterprises. Effective laws for their protection are all they want.

The opening of the pipe line from Kansas City to Whiting, Ind., which was reported July 17, and the ability of the Standard Oil Company to take all the crude oil that is offered, will do much to ameliorate the situation which has disturbed the producers.

### The Lungwitz Process.

Experiments of more than usual interest are now in progress at Warren, N. H., where the Lungwitz process for smelting zinc ore in the blast-furnace is being tried under actual commercial conditions. The continuous reduction of zinc oxide by blast-furnace smelting has been the subject of great study and numerous experiments during the last 50 years, but with so little promise of success as to be abandoned as almost hopeless. The Lungwitz process, consisting essentially of smelting under such pressure as to raise the boiling point of zinc above the reduction-temperature of the oxide, is quite different from anything that has previously been tried, and is based on rational theory. Its application, however, involves many factors, both mechanical and metallurgical, which may act disturbingly; the commercial practicability of the process can be determined only by such a trial as it is now having.

### Ore-Dressing at Broken Hill.

The paper on ore-dressing at Broken Hill, published elsewhere in this issue, is particularly interesting as outlining the latest Australian practice in that art, which American mill-men have learned to respect highly. It is said that a mining engineer, formerly at Broken Hill, who was inquiring at a large engineering works in the United States for the latest thing in jigging practice, was met with the unexpected, but complimentary, reply: "Well, we look to Broken Hill for that!" This may have been by way of pleasant exaggeration; but it is certainly true that the mill-men of Broken Hill, confronted as they were by a very difficult problem in ore-dressing, solved it admirably and

developed a practice which is worthy of study in connection with the treatment of similar ore elsewhere. American millmen have been fully alive to the advances in ore-dressing which have been made in Australia and have adopted more than one of its good features.

#### New Uses for Zinc.

According to statistics reported by the Santa Fé Railway, 111,503 ties (sleepers) were treated chemically in the United States in 1885; 1,281,331 in 1895; and 13,772,246 in 1904. The growth of this industry was naturally slow at first, pending demonstration of the efficiency of the treatment, which required the lapse of 12 years; since then it has been remarkably rapid, especially in the last two years.

The matter is of interest to metallurgy, inasmuch as zinc chloride is the preservative commonly employed, and this constitutes a new use for spelter and one that promises to attain a good deal of importance. About 1 lb. of zinc chloride per tie is required on the average.

Another new use for zinc is in the preparation of pipe-joint compound, for which zinc gray (zinc dust) ground in oil is employed in the same manner as white lead or red lead. The zinc compound is being extensively used in France and has been found to possess certain advantages over the lead compounds, which have gained for it the approval of the Société d'Encouragement Pour l'Industrie.

#### Louisiana Sulphur.

In the last New Year's issue of this JOURNAL, we published a timely paper giving a résumé of the recent growth of the American sulphur industry, and particularly that of the Louisiana field. In this issue, we publish a translation-abstract of a paper on the same subject, by Lunge, the dean of the sulphuric-acid industry. Both papers agree substantially in recognizing that American sulphur production is of extraordinary importance, and that it must play an influential part in the world's supply. It is especially interesting to note, from the present paper, how the matter is regarded from a European standpoint, and by the leading authority. The engineering skill, stimulated by the necessity of exploiting an apparently inaccessible bed beneath quicksand, and the ingenuity of the process, finally developed to a successful issue, are alike accorded the high

praise which they deserve. Irrespective of whether the Louisiana deposits are as huge as they are supposed to be, and whether the Frasch process will succeed in extracting a satisfactory percentage of what there really is, this new sulphur supply is certain to be a great factor, perhaps the dominant factor, in the world's trade in that substance.

#### Safety Catches for Cages.

In another column we print an article by Mr. Mackay-Heriot, which directs attention to an old but ever-engaging problem, namely, the safeguarding of hoisting cages against cable breakage. The safety devices which he mentions are used in America in one form or another, and in shop-tests work admirably, even under adverse conditions as to state of the guides, etc., but in practice they often fail to work. This is in many cases due to the bad condition of the apparatus itself, because of neglect. Such apparatus, like numerous other forms of automatic mechanism, must be kept in proper order to insure working correctly when required, and this can be guaranteed only by constant attention.

We consider, however, that the prime safeguard against accident in hoisting is the constant care and thorough, periodical inspection of the cable and the proper maintenance of the hoistway. It will be remarked in Mr. Mackay-Heriot's statistics how important a factor was the age of the cable in the record of those which broke. There is no accident more distressing to the mining engineer than the dropping of a cage, skip or bucket, and there is no kind of accident which in most cases is more easily preventable. The fundamental rule is to take no chances on a bad rope.

#### Lixiviation of Silver Ore.

The extraction of silver by means of the cyanide process is a subject which is now attracting a good deal of attention. The solubility of some silver minerals in cyanide solution has long been known; moreover, it was early reckoned one of the advantages of this method of treating gold ore that at least a portion of any silver content would be extracted along with the gold, which is not the case in chlorination. Indeed, the cyanide process was applied, commercially, on a small scale, in the United States, as early as 10 years ago, to the treatment of silver

ore, pure and simple. The present efforts are merely directed toward widening the field of application and discovering its limitations.

In this connection, it is worth while to pay some attention to the old process of lixiviation with hyposulphite solution, which has practically gone out of use in the United States, and has considerably waned in Mexico, where its chief field has been. This excellent process received a high development, chemically and metallurgically; but it fell out of prime consideration before the modern mechanical methods in ore crushing and the handling of material (including slime treatment), which have done so much toward cheapening the cost and increasing the efficiency of the cyanide process, came into use.

The possible increase in efficiency in hyposulphite lixiviation, by giving it the same kind of study and development that cyanide lixiviation has enjoyed, is worthy of attention, especially in connection with the ores that are well adapted to it. A promising subject for investigation, moreover, is the combination of hyposulphite and cyanide lixiviation; for example, leaching the ore first with hyposulphite, and subsequently treating the tailing with cyanide.

#### Roasting Furnaces in Copper Metallurgy.

Modern practice in the treatment of sulphide ores that have to be roasted has decided, unmistakably, in favor of the McDougall type of furnace, which was first introduced on a large scale at Butte, Montana, the idea having been borrowed from the sulphuric-acid works of the East.

Furnaces of this type, in one modification or another, have been in regular operation at Keswick and Bully Hill, California; Salt Lake City, Utah; and Sault Ste. Marie, Ontario. We understand also that this type has been adopted for the new Garfield plant of the American Smelting & Refining Company, near Salt Lake City; and that it is to be introduced at the Argo Works of the Boston & Colorado Smelting Company.

Meanwhile a further modification of this type of furnace, as exemplified in the Edwards and Merton designs, is making headway. These furnaces, which are Australian inventions and are extensively used in Australia, are combinations of the McDougall, or turret, type of stirring



mechanism, with the long hearth of the conventional reverberatory furnace. Furnaces of this type are in use at the Yampa works, near Salt Lake City, and have also met with extensive application at Swansea, Wales. They are to be tried at the new Val Verde smelting works near Prescott, Arizona.

The relative merit of these types of furnaces is one of the interesting questions to be solved in practical metallurgy in the near future. The McDougall type has been heretofore the most efficient development of the roasting furnace, at least for the desulphurization of pyrite, both in mechanical construction and economy of labor and fuel. There appears to be no reason why the straight-line type should not be equally economical in those respects, possibly more economical; but the advantage of its mechanical construction remains to be demonstrated. It appears, however, that these furnaces have an advantage in their requirement of less height, enabling the superstructure for ore hoppers, etc., to be somewhat lightened, at the expense of increased floor space, and enabling the railway inclines and trestles, connecting with the tramways over the furnaces, to be shortened because of the less elevation that has to be attained.

**The Value of Engineering.**

The value of engineering service in the construction of industrial works is nowadays appreciated to a far greater extent than it was even within the memory of the younger men of the profession; but the public has yet a good deal to learn in this direction. The argument, why it pays to employ a competent engineer, was presented so concisely in a pamphlet recently issued by a well-known engineering firm in Cleveland, Ohio, that it seems to us worth while to reproduce it.

It pays to employ a competent engineer, because of:

"1. Reduction of first cost, including the avoidance of 'extras.'

"2. Reduction of operating expenses because: (a) The desired results are obtained with maximum economy of labor, fuel and supplies. (b) Repairs are a minimum. (c) Depreciation is a minimum.

"To what extent will it pay?

"On first cost it will probably save from one to three times the cost, possibly more.

"On operation, including repairs and de-

preciation, the result of the best design and supervision of construction, as compared with haphazard or mediocre engineering, is a saving of 20% to 30%, or more, of the amount paid the engineer. This is the direct saving, but, because of the greater reliability, the direct gain is incalculable.

"Therefore, upon basis No. 1, if the engineer saves in first cost an amount equal to his charges, his employment is justified; a greater saving is profit; and, upon basis No. 2, he will also directly save annually 20% to 30%, or more, interest on his charges besides the indirect saving stated above.

"The net result is a dividend on the engineer's charges of 100% or more, at the start; and 30% or more, annually, during operation.

"What other investment pays at such a rate?"

Although this argument was not presented with especial view to mining and metallurgical plants, it is directly applicable to them with as much force as to the construction of electric railway, lighting and power plants, to the erection of a cotton mill, or the building of a bridge. It is a short-sighted policy which disregards the immediate commercial value of the services of the engineer, and in nothing is it more so than with respect to mining, milling and smelting plants. The plants that have been built and abandoned after one brief, inglorious campaign, which stand all over the West, as monuments to ignorance, bear silent testimony to the absence of competent engineering; but greater is the number of those which are operating at less than proper efficiency, because of defective design, whose troubles are known only to the wise.

**The Steel Corporation's Share.**

The statistics of production published by the American Iron & Steel Association include a statement of the proportion of the iron and steel output controlled by the United States Steel Corporation; this deserves some comment. In the following tables we give the percentages of total production by the Steel Corporation for the three full years of its existence.

The percentage of iron ore produced by the Steel Corporation was as follows:

	1902.	1903.	1904.
Lake Superior.....	60.4	58.8	53.8
Total.....	45.1	43.8	38.0
Coke.....	37.4	34.2	36.6

The decrease of the Steel Corporation's

proportion last year does not indicate a decline in its productive capacity, as might be supposed. Shipments of Lake ore were reduced on account of a decision to carry less ore in furnace yards, most of which were heavily stocked at the beginning of 1904. It is now understood that this policy has been reversed, after trial, and the yards will be again filled, requiring heavy shipments this season.

The percentages of the Steel Corporation for pig iron and steel ingots were as follows:

	1902.	1903.	1904.
Pig iron.....	44.3	39.9	44.3
Spiegel and ferro.....	81.0	81.0	70.5
Bessemer.....	73.9	72.0	69.0
Open-hearth.....	52.4	51.0	50.4
Total steel.....	65.7	63.5	61.0

The Steel Corporation is weaker in pig iron than in any other department, and is not able to supply the requirements of its steel mills. Purchases of iron from outsiders have been a feature of the trade in all periods of activity during the three years. Even with the Union and Clairton purchases and the re-building of several other stacks, it did not prove possible to do more last year than to recover the ground lost in 1903.

The loss in the corporation's percentage of steel was due to the completion of the great plant of the Lackawanna company at Buffalo; to the increasing make of basic open-hearth steel in the smaller plants; and to the entry of the large Southern companies into steel manufacture.

In finished material the percentages of the Steel Corporation were as follows:

	1902.	1903.	1904.
Bessemer steel rails....	65.4	65.6	57.2
Structural steel.....	57.9	60.3	55.1
Plates and sheets.....	59.4	59.9	58.0
Iron-rods.....	71.5	73.1	71.3
Miscellaneous.....	31.1	29.8	28.6
Total rolled.....	50.8	57.2	47.8
Wire nails.....	64.8	70.6	67.0

In examining this statement, it must be remembered that the first half of 1904 was a period of depression in trade; and that the year showed a decrease in total production, as compared with 1903. That the Steel Corporation failed to hold its own, in the department in which it is generally supposed to be strongest, was due only in small part to the opening of new works. It shows that in a time of depression the outside producers were able to hold a larger share of the trade than the big combination. They were more ready, and apparently, better able, to meet changing conditions, as our reports indicated during the year.

## DISCUSSION.

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 THE ENGINEERING AND MINING JOURNAL.

### THE MINING LAW.

*The Editor:*

Sir—Most of us will agree with Secretary Wilson, that "all land should be devoted to its most productive use for the whole people, and not to the temporary benefit of individuals or companies."

In proposing changes to the mining law, most of those who have discussed the subject seem to have had in mind the interest of the prospector or that of the mining company; they have paid but little attention to the interest of the public at large or to that of the people who live in mining camps and who are, directly or indirectly, connected with the mining industry. This latter class outnumbers prospectors and mining companies a hundred to one.

The more men employed in mining and in prospecting, the better for the mining camp or district. The mine employing 100 men is better for the camp than the high-grade shipper employing but 10 men, although the latter may pay more money in dividends to the stockholders. Also the camp with 10 paying mines is better off than with but one mine paying the same profit and working the same number of men. If the ground is divided into small groups and single claims, more non-dividend payers will be worked and prospected, and more men will be employed than if the whole camp is controlled by one company. The company with large holdings confines its prospecting to development on the best veins, and but little money is spent in prospecting. For this reason it is good public policy to prevent the holding of large areas by one company or by individuals.

One person should not be allowed to locate more than two or three claims at one time, and he should not be allowed to locate more ground until the first claims are recorded and the assessment work done, with a description of the work done on record in the recorder's office. A lot of mining can be done on one claim—more than most men can afford to do.

The location of large groups of claims by individuals forces prospectors out of a district, or compels them to pay for prospecting by taking leases on the groups already located. In Nevada today, there are men who have located, and held individually, over one hundred claims in one district. The writer was told of one man who located a group of 275 claims. The man who makes only 10 locations in a new district is considered modest. Men in eastern California are now putting up location notices by the wholesale, to hold large areas of mineral land for speculation. The majority of these locators have

no intention of mining the ground located.

The claims in California can be held without work until January, 1907. To stop this wholesale land-grabbing the number of locations should be limited and work required to be done within 60 days to hold the ground. To prevent law suits, mining companies, under the present law, try to protect themselves by taking up all the ground adjacent to the veins they wish to work. If the extralateral right were abolished, this would not be necessary, and much unproductive ground, now held by companies, would be open for location.

In Nevada, in the boom districts, locations are made in most cases before pay ore has been found. The locator puts up his stakes and afterward digs for ore. More often he digs a hole in the wash or cuts a trench showing 240 cu. ft. of excavation, and he has complied with the State requirements. There should be no requirement of discovery of pay ore in place to hold the ground.

This week one of the best strikes made in Goldfield was made on the February claim by sinking 70 ft. through gravel and wash. A ledge of \$600 gold ore was encountered.

The man who jumps a claim in Nevada, because the original locator has not found pay ore, is likely to meet trouble. If he is shot, he gets no sympathy from the public. In the new camps not one location in fifty is on a genuine discovery showing pay at the location monument. We all take as much as the law allows.

Companies would not attempt to hold large areas, if the \$100-yearly assessment work were required on each claim, and no patents issued. The issuing of patents allows good mineral land to lie idle for years and discourages prospecting.

A district with many old patented claims, some of them with boundaries unmarked and notices gone, is like parts of Southern California which are covered by old Spanish land grants—a good place for the prospector to avoid. Any mining engineer in the West knows of patented mines which he believes to be good, but which have not been worked for years, and perhaps will never be operated again. Many of these patented properties would be working today if no patent had been issued.

When patented mineral ground is not worked, it should be heavily taxed. In Nevada the question has been raised as to whether the State can or cannot tax patented mines.

The locator should be allowed all valuable minerals and metals beneath his claim within vertical planes from side- and end-lines. But he should be compelled to prospect and work his claim in order to hold it.

A mine owner should be allowed to tunnel through neighboring ground to

exploit his own mine, but all ore extracted should belong to the claim from which it comes and not to the owner of the tunnel. The right to search for blind leads in the ground of other persons causes trouble.

There should be a better law for townsite location. Most townsites are taken up by lode and placer location, often on ground where no lode or pay gravel exists. The surface rights are then given to a townsite company and town lots are sold. Questions of title arise, lots are jumped, and men are killed. To perfect title to lots on such a location by getting a patent requires good swearing. In the main I am heartily in accord with Mr. E. B. True in his letter which appeared in the JOURNAL of April 27.

ALBION S. HOWE.

Goldfield, Nev., June 29, 1905.

### THE SUBBURY DISTRICT.

*The Editor:*

Sir—In addition to the theory advanced in the JOURNAL (June 29, 1905), accounting for volcanoes and earthquakes by the escape of steam from the igneous core of the earth, I wish to show the application of the same principles to the formation of orebodies.

It does not seem reasonable that such large volumes of meteoric waters could be heated for so long a time and caused to circulate in the manner shown by hot springs, geysers, etc., if we are to assume that all the heat is received by the waters coming in direct contact with the hot rocks. Such action would quickly cease, due to the cooling of the rocks in the immediate channel of circulation. If, however, we assume that jets of steam from the igneous magma, seeking an outlet along fracture zones, come into contact with meteoric waters, it will supply the heat, the motive power for circulation and a great part of the soluble minerals. These dissolved mineral salts will later be deposited near the surface when the waters shall have cooled sufficiently, and given off the acids and gases by release of pressure and contact with rocks which act on them as precipitating agents.

It is probable that a large part of the circulating waters (issuing from hot springs, geysers, fumaroles, etc.) is surface water. But when we remember that such springs continue their action through thousands of years, it becomes evident that such channels as they would probably have could not continue through their life to supply the heat in the discharged waters. The power of dissolving and retaining mineral salts in solution is much increased by temperature, and it is, therefore, evident that the escape of combined water from the igneous magma of the earth could bring away in solution such minerals and salts in large quantities.

The logical conclusion, following such



a course of reasoning, is that all the mines of the metals on the face of the earth are simply leachings from the igneous core deposited from circulating waters. The common experience that mines become poorer with depth (instead of richer, according to the writers of mining fiction) bears out this theory.

The most recent investigation of the Sudbury nickel deposits has furnished the strongest possible evidence that they are due solely to hydro-chemical action. The Victoria mine is on a contact between greenstone and quartzite, instead of in the center of a greenstone intrusion, as shown by the Canadian Geological Survey. Extended observation has shown that the slate and quartzite were deposited on the greenstone, and that the latter has been folded with them and exposed as an anticlinal core band by glaciation. This fact precludes the possibility of the greenstone being fused when exposed, and as sulphides could not separate from a magma unless molten, it gives the *coup de grace* to the magmatic-segregation theory.

If anything further is necessary to disprove that theory, I call attention to the familiar separation occurring in a pot of slag and matte. It is well known to all metallurgists (if not to geologists) that the line of separation is a flat surface and horizontal until cold. If, therefore, these pyrrhotite deposits were formed in that way by gravimetric separation, they should have one flat surface, no matter how much they may have been tilted since. The fact that they do not have a plane surface side is proof that they were not formed in that manner.

Mr. C. V. Corless, mine superintendent for the Mond Nickel Company, has made a geological reconnaissance on a small portion of the district adjacent to Victoria mine; and, as a tonic for the nerves of the Canadian geologists, I quote from his report:

"Probably the general structure can be best explained by considering the southern half, south of the main contact, as a small geosyncline (composed of two synclinal folds), joined by an anticlinal, with the narrow band of greenstone (north of the smelter) lying about the axis of the anticlinal; and by considering the northern half as part of one leg of a somewhat larger (but still small) ge-anticline with a considerable number of small secondary folds, the apex and other leg of the ge-anticlinal lying clear beyond (to the north of) the region mapped; and by considering further that erosion and subsequent glaciation have planed these structures down to their present surface, exposing the upturned edges of the sediments and the greenstone cores of the anticlines. This view implies that the greenstone formed the basement (probably very uneven at the time of sedimentation) on which the sediments were laid down.

"The writer is aware that this view is not in accord with that of the geologists

who have examined the district, and is also aware of the danger of generalizing from too small a field of observation, but considers that some important facts are not accounted for by the hypothesis that the greenstone is intrusive and not fundamental. Among these are the following:

"1. *The contacts of the greenstone and sediments follow the bedding planes of the latter, wherever the bedding planes near the contact can be clearly observed.*

"2. Tongues and dike-like offshoots from the main masses of greenstone are not found cutting the sediments, as would almost certainly be the case if intruded. Instances of this are, however, to be found in the case of the dikes mentioned.

"3. Such enormous intrusive masses must surely have broken up and disturbed the sediments near the contacts to a much greater extent than appears to be the case. Speaking generally, the sediments look almost as undisturbed 10 ft. away from the contact as 100 or 500 ft. away. Indeed, at the main contact above alluded to, where the greatest disturbance might be expected, the beds are practically as unbroken as they are at any other point on the property. This can be well seen a little southeast of the roastery.

"4. While no petrographical microscope was at hand, yet the metamorphism as seen in hand specimens, the 'baking' of slates and 'hardening' of quartzites, did not seem to be sufficient for the action of such large intrusive masses.

"5. The chilling effect along the contact of the intrusive was not observed, though looked for.

"6. The sediments lie not only *against*, but also, in some cases, *on* the greenstone, as seen by walking first along the tram line and then along Fairbank creek. We would be obliged, therefore, to consider that the sediments were not only broken into, but lifted up by, the greenstone Quartzite outliers, resting on the greenstone, however, have practically the same strike, dip and general appearance as the main mass of sediments.

"The zone of fracture and movement alluded to above (really a narrow shear-zone) has the general strike of a line drawn through No. 3, No. 1 and No. 4 mines. This has undoubtedly been the principal means of ingress of mineralizing solutions, and, considered in connection with the quartzite-greenstone contact extending eastward from No. 1 mine, accounts for the ore deposition along the zone.

"If the above views, *re* the general geology, are correct, the formation of these orebodies from mineralizing solutions is a foregone conclusion.

"It also follows that, since the bed of quartzite is very narrow, the ore will probably not continue to a very great depth as a *contact* deposit, though it may continue downward along the main fissure."

The above extract from the report of

Mr. Corless is interesting as a reply to the criticism of Mr. A. P. Coleman.

HIRAM W. HIXON.

Victoria Mines, Ontario, Canada,  
July 8, 1905.

#### SLAG CALCULATION.

*The Editor:*

Sir—In his article on this subject, published in the JOURNAL of June 29, 1905, Mr. Palmer refers to the mystery with which the calculation of a furnace-charge to make a slag of desired composition was formerly veiled. This is correct. I remember in my early experience how the metallurgists of certain works sought to preserve secrecy as to their methods, letting out scraps of data to their juniors only as a great favor, and I presume the attitude was general. It was, of course, quite absurd, since the combination of three or more ingredients in such proportion as to make a mixture of a desired composition is a simple arithmetical or algebraic problem, which any school-boy could figure out. The real mystery, however, was as to the allowances for matte-fall, loss of metal, etc., which the metallurgist based on his experience and that of the guild; and as to those, he himself was probably none too sure. At that time the art of calculating slags was less than 10 years old. The great work of Eilers, Hahn and their confrères had been not in the mere computation of charges, but in the determination of what were the right kinds of slag to make.

The computation presented by Mr. Palmer is very good. Substantially the same will be found in the early editions of Peters' "Modern Copper Smelting." Mr. Palmer remarks, incidentally, that the percentage of sulphur burned off in the furnace is variable according to the furnace and its conditions of operation. I believe that, in the Butte practice, the oxidation is a little over the 70% assumed, but elsewhere it may be different.

It is to be remarked, moreover, that the method outlined only shows what the composition of a slag resulting from a certain charge will be and it does not indicate how the components of a charge are to be put together to make a slag of desired composition. This has been very well explained in H. Van F. Furman's treatise on "Assaying," which has never impressed me as being unduly involved. The algebraic method of computing the requisite quantity of two ingredients,  $x$  and  $y$ , to be added to a unit quantity of a third, is very simple and works out exactly.

• The lead smelter is obliged to figure his slags much more carefully than the copper smelter, this being one of the limitations of smelting on the lead basis as compared with the copper basis. He is obliged not only to proportion his silica, iron and lime, but he must also regard the percentages of zinc, alumina, barium sul-

phate and other substances that go into the charge. This is done in bedding the ore, which practically gives a composite ore for smelting, requiring only to be fluxed with iron and lime. W. R.

New York, July 6, 1905.

#### CONCENTRATION OF MOLYBDENITE ORES.

*The Editor:*

Sir—The statement on page 1037 of the JOURNAL of June 1, as follows: "It is interesting to note that no successful machine for milling molybdenite on the large scale has yet been devised, unless it be the Blake-Morscher electrostatic separator," seems to indicate the necessity of making it known that the Elmore process of concentration by means of oil has been proved on a large scale to be eminently suited to the treatment of these difficult ores. At this company's testing works in London a full size two-unit plant of normal capacity of 50 tons a day is installed, where trials on bulk parcels of ore can be carried out under actual working conditions.

I enclose you a small sample of the molybdenite concentrate produced in a recent test; this product leaves nothing to be desired, as it is practically pure  $\text{MoS}_2$ , assaying 97.8% of the sulphide.

The Ore Concentration Syndicate, Ltd.  
A. STANLEY ELMORE.

London, June 13, 1905.

#### PYRITE SMELTING.

*The Editor:*

Sir—In your issue of June 22, Mr. J. Parke Channing has contributed much valuable information on the subject of pyrite smelting. Speaking of the future, he says, "The fact is, my colleagues and I believe the time is not distant when we, perhaps, will be able to make from our ore, on one operation, a matte that can be directly converted." It is fortunate that he said *perhaps*; for we have only to compare the slag assays of the first and second smelting to see a difference of 0.4% in copper content; even if he should succeed in producing a converting grade of matte at one operation, the copper content of the slag will correspond to the assay for the matte concentration. The loss will be 8 lb. more copper per ton of slag on all the slag produced, in excess of what the matte concentration produces. This will probably represent about an average of 5 lb. on all the slag, as against the two-stage operation. When it comes to the question of tonnage, the capacity of the furnaces will be so reduced that, considered in connection with the time necessary to dig them out and re-start them, I doubt if 25% as much ore can be smelted. I mean that only one-quarter as much ore can be smelted when producing 40% matte as when producing a 12 to 15% matte; the reason being that, by increasing the grade of the matte, very

much less matte is produced, and as a consequence the furnace quickly gets filled up in the bottom by accretions of slag which is chilled in encountering the cold blast; moreover, the matte is not sufficient to cut this out. This is one of the most serious problems encountered in pyrite smelting, that as the matte production decreases, the difficulties multiply very rapidly. Slag alone, no matter of what composition, will not run in a furnace without filling up the bottom. The drops of slag falling against the rising blast are partly solidified against the walls, and quickly fill up that section of the furnace. By increasing the matte production and decreasing the grade, the difficulty is removed and the furnace will operate at a greater tonnage.

In Mr. Channing's article, mention is made of the fact that, when the matte was up to converting grade, the tonnage fell off rapidly. There is nothing that will put a furnace in bad condition so quickly as a stoppage of the matte production; and, on the other hand, there is nothing that will restore it so quickly to its proper condition as re-smelting matte with, say, 12% of fuel.

HIRAM W. HIXON.

Victoria Mines, Ontario, Canada.

July 10, 1905.

#### Correspondence.

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

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

#### Monazite.

Sir—The readers of, and advertisers in, this JOURNAL are interested in the source of the materials entering into the manufacture of incandescent gas-mantles. This paper considers monazite, the places where it is found in paying quantity, how the price of the raw mineral is fixed, and the present situation here.

Monazite, as its name indicates, is of rare occurrence. While it has been discovered in several localities, it is found in paying quantities only in Brazil (on the seacoast south of the Amazon river) and in the South mountain section of North Carolina. It has also been noticed in the sands of one river of South Carolina, which flows from the South mountains. It is found in connection with zircon, white and green sands, magnetite and titanite iron grains on the south side of the South mountains; and with the same accessories (with gold added) on the north side of the same range. It occurs both in placer deposits and in veins, the latter being the rarer, only one mine, near Shelby, N. C., being worked on vein matter. Monazite is a composite mineral, and the constituent in it, which gives it its value, is thorium. Just what this is

worth is unknown here, as none will give that information. For a long time, the Carolinas Monazite Company, of Shelby, N. C., had the monopoly of the market, as it had the only cleaner. Later a cleaner was started at Ellenboro, N. C., by some Germans. Then the English entered the field with a cleaner at Hildebran, N. C., and they have another in Shelby. The best cleaner of all is located at White Oaks, N. C., and is run by Germans. The three parties in the field are the Welsbach people (who own the Carolinas Monazite Company), the English company and the German company. All the cleaners use electricity to remove the worthless material from the monazite. It might be supposed that, with three companies operating in this field, there would be competition for the monazite, but all the different companies have an actual (or tacit) agreement to pay the same price. This spring there was a flurry in the market, and, for a while, raw monazite reached a price of from 15 to 20c. per lb.; but it is back to a price not much, if any, above 5c. per lb.; the different interests do not bid against each other. In Shelby, the Carolinas people claim to pay the highest price; and in Hildebran, the local company (which represents the English company) says it pays the highest price; but the seller of monazite finds no difference in price between these places.

North Carolina has the only available mercantile supply of monazite in, and for, the United States. The market price of this monazite is not governed by supply and demand, but by secret agreements fixing the price low. This causes loss in several ways. Independent producers get less than their product is worth, and lessors (who have leased to these three companies) get less royalty than they are entitled to. Labor also gets less reward; and, in the face of all this, the three companies want monazite. The simple facts are these: Thorium comes practically from monazite; monazite is found in paying quantities only in North Carolina; thorium is in great demand; monazite is limited in quantity; monazite is low in price, because of unlawful combinations in restraint of trade. I give you these facts that users of thorium and monazite may be made wiser. We want a better price for our monazite, and 5c. per lb. is far below its value.

J. ARTHUR WAINWRIGHT.

Shelby, N. C., June 26, 1905.

According to a paper (read at the meeting of the Concrete Block Machine Manufacturers' Association, at Chicago, June 28), Mr. Hotchkiss has built the flues of brass furnaces of concrete blocks. The temperature reaches 3,700° F.; and the furnaces are shut down at night, and from Saturday to Monday; yet, after eight weeks, there was no damage that was perceptible. The blocks were made of crushed limestone.



## New Books.

*Procédés Métallurgiques et Etude des Métaux.* By U. Le Verrier. Paris, France; Gauthier-Villars. Pages, 403; illustrated.

This treatise is a part of the series on General Metallurgy, which in turn is a part of the *Encyclopédie Industrielle* outlined by C. Lechalas. The volume is written by an *Ingénieur en Chef* of mines and a professor in the Conservatoire des Arts et Métiers. The quality of a book may be judged by its scope; this aims to cover the whole subject of the sampling, preparation, calcination, dry reduction, furnace work, thermo-chemistry, mechanical tests, alloys, and even metallography, of a range over iron, lead, copper, zinc (silver and gold). Yet, in spite of this rather sweeping ambition, the treatise is neither superficial nor elementary in a trifling way. The more obvious phases, of mineral reduction to matte and metal, are fairly well covered in a judicious selection of paragraphs, headed with bold-faced catch words. Further, the illustrations are fairly generous and appropriate, and the practice described savors somewhat of the cosmopolitan, an Anaconda furnace serving at one time, at another, a word on the oil process of concentration. The book represents a good course for college boys. The chapter on metallography is relatively fuller than the wide scope would require; but this is particularly a French phase of the science. The careless ignoring of an index is partially compensated by a full table of contents. The footnotes are few, and the reference to authorities still fewer, but the style of presentation is clear and fitted to the introductory purpose of the treatise.

*Twenty-fifth Annual Report of the Director of the United States Geological Survey.* 1903-1904. Charles D. Walcott, Director. Washington; Government Printing Office. Pages, 388; with maps.

This volume, like those of the past few years, contains no technical nor special papers, but merely an administrative syllabus of the work as prosecuted. The content enumerates 25 page-maps relating to topography, and two to underground waters. Topography is a basis for good geological work, and the steady advance of the surface-survey promises the geological study yet to follow. Hydrography, or the study of surface water, with a view to assisting in the reclamation of land, is assisted by hydrology, or the geological study of underground water.

In the special geologic field, the chief sections, and the associate heads of these respective sections, are as follows: Areal geology, Bailey Willis; Pleistocene geology, T. C. Chamberlain; physiographic and glacial geology, G. K. Gilbert; pre-Cambrian and metamorphic geology, C. R. Van Hise; petrology, Whitman Cross;

economic geology of metalliferous ores, S. F. Emmons; economic geology of non-metalliferous minerals, C. W. Hayes; paleontology, T. W. Stanton.

In the prosecution of the various phases of the geological work 54 'parties' were officially organized and dispatched. As is well known, the personnel of the associates of the survey includes many of the best geological specialists of the various leading educational institutions of the country.

The special work in Alaska, under the general direction of Alfred H. Brooks, recognizes the following regions: Southeastern; southern and southwestern; Copper River; Yukon-Tanana; Yukon; and the Seward peninsula.

The division of mining and mineral resources, in charge of David T. Day, reports for the year 1903, an annual total of \$1,418,387,863; the record, above the billion mark, having been first attained in 1900.

The publication branch takes note of manuscript edited: Professional papers (17); bulletins (28); water-supply papers (29); folios (14); with other incidental issues. Of proof read and corrected, one annual report; 17 bulletins; 14 water-supply papers; 17 geological folios, with other matter.

The work of the Geological Survey is great, in travel, study and publication; but it would be refreshing to the busy public if the director would take the time personally to write a brief letter, telling in plain talk the main points of progress of the year.

*Coke.* By John Fulton. 498 pages and 20 two-page inserts of working drawings. Published by the International Text-Book Co., Scranton Pa. Price, \$5.00.

Chapter I, The coalfields of North America. II, The formation and chemical properties of coal. III, Preparation of coal for the manufacture of coke. IV, History and development of the coke industry, with statistics of output and the amount of coal required to make a ton of coke. V, Manufacture of coke. This is devoted to the manufacture of coke in the bee-hive oven. The use of silica brick and machine coke-drawers is also discussed. VI, The retort and by-product-saving coke ovens. This includes descriptions of well-known plants, as that of the Otto-Hoffman, at Lebanon, Pa., and the Semet-Solvay at Dunbar, Pa. It gives also a description of the improved five-flue Semet-Solvay oven. VII, Physical properties of charcoal, anthracite and coke, and a comparison of bee-hive and by-product coke. VIII, Laboratory methods of obtaining the relative calorific values of metallurgical fuels. IX, Locating of plants for the manufacture of coke. X, General conclusions on the work, costs and products of several types of coke-ovens. XI, The fuel-briquetting industry; this chapter is entirely new.

For its second edition, this well-known

work has been, to a large extent, rewritten and greatly expanded. This has been necessary because of the great advance in the coke industry, during the last 10 years, in the use of by-product ovens, and in the mechanical cleansing of coals for coking. Those subjects, together with most of the others pertaining to the manufacture of coke, are treated thoroughly in the new edition, which also treats comprehensively of fuel-briquetting. The book is highly useful and will be valuable for reference. The large number of illustrations and working drawings add greatly to the value of the statistical and descriptive matter contained in the text.

*Cours d'Exploitation des Mines.* By Haton de la Goupillière. Revised and enlarged by Jean Bès de Berc. Vol. I. Pages, 1002, with 663 illustrations. Vve. Ch. Dunod, 49 Quai des Grands-Augustins, Paris. Price of series (which will comprise three volumes), 90 francs.

Contents—I, Discovery of mineral deposits. II, Prospecting rich parts of veins. III, Faults. IV, Methods of drilling. V, Applications of drilling. VI, Breaking ground by hand, by water and by fire. VII, Explosives. VIII, Breaking ground by explosives. IX, Boring. X, Machine-drilling. XI, Timbering in general. XII, Driving and timbering galleries. XIII, Masonry and steel supports. XIV, Tunneling. XV-XVII, Shaft-sinking.

The second volume will describe methods of mine exploitation and ore extraction. The third will treat of drainage, ventilation and ore-dressing.

This (the third) edition of a famous work has been entirely revised, and materially enlarged. The chief new features of the first volume are the descriptions of magnetic surveying for iron ore; the modern methods of percussion- and diamond-drilling; the extraction of salt by pumping; the properties and use of explosives; shot-firing and the methods of safety in gassy mines; machine-drills; and modern methods of tunneling, shaft sinking and timbering.

This work is one of the classics of mining. The profession will be grateful to have this new edition, which has been thoroughly modernized and brought as nearly up to date as is possible in a treatise of its magnitude. It is naturally more complete in its descriptions of European methods than of American and Colonial; but, as a treatise on the principles of mining, its value is not limited by nationality. The engineers of middle age who used the first edition in their student days, will be pleased to see the well-remembered work in its latest form,

The trolley used on some of the large electric locomotives has a cross-piece which slides under the supplying wire and transverse to it. The cross-piece is supported on the car top, by an extensible 'lazy-tongs' frame.

### Kjellin Process of Steel Making.

V. Engelhardt, in *Stahl u. Eisen*, 1905, XXV, pp. 148 to 152, 205 to 212, 272 to 278, describes the Kjellin electric furnace, the method of working it and the results which have been obtained. For the production of steel of special quality the Kjellin process is as efficient as the crucible method, and is cheaper, the cost of melting and of crucibles being at least 20 to 40 marks per 1,000 kg. of steel by the crucible method as compared with 18 to 22 marks by the Kjellin process (the cost of electric energy being taken as 2 pfg. per kw.-hour).

Also the Kjellin process appears to be quite capable of competing with the Siemens-Martin furnace in the production of Martin steel. The cost with the Martin furnace is from 75 to 80 marks per ton of steel by the basic process and 85 to 88 marks by the acid process. With a Kjellin furnace of 736 kw. capacity, the cost per 1,000 kg. is shown in the following table:

	cold cold 30 tons	molten cold 30 tons
	M.	M.
Pig iron.....		
Scrap iron.....		
Daily production.....		
Electric energy, reckoning at 2 pfg. per kw.-hour, with a consumption of 0.6 kw.-hour per kg. when cold pig iron is used, and of 0.5 kw.-hour with molten iron.....	12.00	10.00
250 kg. pig iron at 55 M. per ton....	13.75	13.75
790 kg. iron scrap at 45 M. per ton....	35.55	35.55
12 kg. ferro-silicon at 115 M. per ton	1.38	1.38
Wages.....	1.48	1.23
Heating.....	0.18	0.15
Furnace lining.....	0.43	0.36
Various materials.....	1.14	1.14
Molds.....	1.30	1.00
Interest and amortization.....	1.21	1.00
General.....	3.00	2.50
Total.....	71.42	68.06

### Mineral Production of the United Kingdom in 1904.

Complete returns of the mineral output of the United Kingdom, including quarries and small workings, in addition to the mines under the coal and the metalliferous mines acts, statistics of which latter were published in our issue of March 16, are now available. The figures for the most important substances are as follows, in long tons:

	1903	1904
Chalk.....	4,469,974	4,438,728
Clay and shale.....	16,201,305	15,955,447
Coal.....	230,334,469	222,428,272
Gypsum.....	219,897	234,005
Iron Ore, incl. bog.....	13,719,735	13,778,825
Oil Shale.....	2,009,602	2,333,062
Salt.....	1,886,992	1,891,633
Granite.....	5,425,538	5,988,821
Limestone.....	19,222,971	12,043,135
Sandstone.....	5,409,502	5,303,260
Strontium Sulphate.....	22,842	18,169

The number of workings in operation, and the number of persons employed during 1904 were:

	Workings	Employees
Coal mines act.....	3,333	847,553
Metalliferous mines act..	673	29,504
Quarries act.....	7,507	97,577

Deaths numbered 1,055 in coal mines, 35 in metal mines and 112 in quarries, a slight increase over the previous year.

### Firebrick and Dinas Brick.

F. Leisse (in *Journal für Gasbeleuchtung*, 1905, XLVIII, 257-261) remarks that the great drawback to the use of firebrick in the construction of certain kinds of furnace, especially retort furnaces (in which tight walls are requisite) is its high coefficient of contraction when exposed to high temperatures, the shrinkage being 5 to 7% at 1,300° C. This and the tendency to soften when heated, quickly lead to deformation of the retorts. The same defect of shrinkage also attaches to clay shales with a large percentage of clay (Rakonitz and Neurode shales). Bauxite contains too large a proportion of iron and titanite acid to be suitable for the purpose. On the other hand, Dinas brick, which consists of about 95% of silica, 2 to 3% of alumina and iron oxide, and 1 to 2% of lime, withstands a higher temperature than firebrick, and increases slightly in volume, the linear expansion in good samples being 0.9 to 3.4% at 1,700° C. (14 days' exposure).

Furnaces built of Dinas brick at Cologne are found to bear fluctuations of temperature very well; and as the walls can be built thinner than when firebrick is used, the larger combustion chambers thus possible facilitate the utilization of heat, pyrometric tests showing a superiority of 70° C. Though Dinas brick is more porous than firebrick, it is less corroded by flying ash and chemical agents, and there is no cracking of the pillars as with firebrick, the heat being more uniformly distributed through the mass, although the granular structure and porous character of the material have given rise to the belief that it is a bad conductor of heat. As a matter of fact, its conductivity is about 20% higher than that of the best firebrick, this quality being apparently due rather to the relative percentage of silica and alumina than to the structure. To secure these results, however, it is essential that the Dinas brick should be of the highest possible quality, and the furnaces constructed with the greatest care.

### Technical Dictionary of the Society of German Engineers.

The compilation of this universal dictionary in English, German and French, was commenced in 1901; about 2,000 firms and individual collaborators at home and abroad are assisting at present. Up to the present 2,700,000 word-cards have been collected. To these will be added thousands from the working out of original contributions not yet taken in hand.

The editor-in-chief is Dr. Hubert Jansen; address Technolexicon, Berlin (N.W. 7), Dorotheenstrasse 49.

Alumina and alkali, from such silicates as leucite, by the Levi process, are extracted with a hot alkaline or alkaline-earth solution, from which the alkali and alumina are recovered (Brit. pat. 13,875).

### Cleaning of Blast-Furnace Gas.\*

BY AXEL SAHLIN.

The dust in blast-furnace gas has been the great obstacle to its successful use in large gas-engines. The removal of the last 0.1 gram per cu. m., though expensive, will pay for itself in longer life and decreased cost of repairs. The cleaning should be effected in two stages: (1) The ordinary dry-cleaning by means of dust chambers and dust-catchers. (2) Wet-cleaning by means of (a) stationary cleaners or 'scrubbers,' as the Zschocke cleaner; (b) rapidly revolving machines or 'atomizers,' such as the Theisen apparatus; or (c) slowly revolving 'fresh-contact cleaners.'

The Bian apparatus, the earliest form of fresh-contact cleaner, has proved very effective. It consists of a horizontal cylindrical casing through which the gas is passed from end to end. In its axis is a slowly revolving shaft to which a number of circular perforated disks of a diameter but little less than the inside diameter of the casing are bolted, while between these are annular deflecting plates, attached to the casing. The gas being drawn through the machine is thus compelled to approach the center after each passage of the perforated disks. The outer shell is filled with water up to the bottom of the center shaft; the disks and their perforations are, therefore, washed at every revolution of the apparatus, and ascend from the bath covered with thin films of water. The dust which settles to the bottom of the bath is drawn off from time to time by means of sludge valves.

The Sahlin cleaner is an improvement on the Bian apparatus, designed with a view of securing larger capacity, a better wetting of the perforated surfaces and a more automatic and constant removal of the dust. The gas is drawn through the apparatus by a ventilator, and a safety device to prevent the drawing in of air in case of interruption to the flow of gas and possible formation of explosive mixtures is provided. This consists of a small gasometer having a diameter of 8 ft. with a lift of 6 in., and so balanced that it will drop when the pressure falls to a quarter of an inch column. Finally, the gas is forced through a coke drier, whence it passes through a mushroom valve into the general gas-main. Gas for the power-plant is drawn from this main by electrically driven fans, sprayed with water, and discharged into a second small drier, whence it is sent to the engines. The total power required is as follows: To pass 40,000 cu. ft. of gas per minute to pump cooling water, 8 h.p.; to finally clean 10,000 cu. ft. of gas per minute, using 8,000 gal. of spraying water per hour, 65 h.p. This quantity will supply gas-engines of from 5,000 to 6,000 h.p.

\*Abstract of paper read before Iron and Steel Institute, May, 1905; *Journal Society of Chemical Industry*, June 15, 1905.



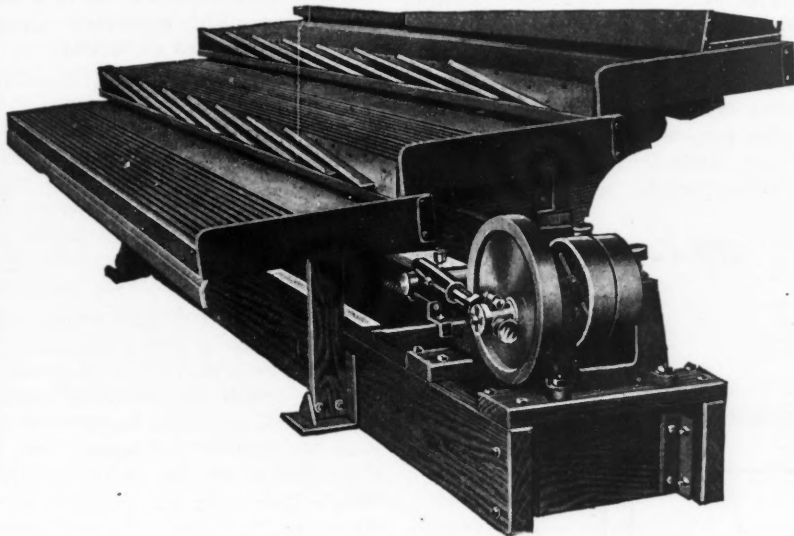
**The Bartlett Simplex Concentrator.**

The new Bartlett simplex concentrating table, now manufactured by the Colorado Iron Works Company, of Denver, Colo., should not be confounded with the old, original, three-deck table, which has been on the market many years. The new simplex, as shown in the accompanying cut, is just what the name indicates—a simple table, and it is the outcome of many years of experience in ascertaining the wants and requirements of the mill and operator.

The superiority of the simplex is so great that the building of the old table has been discontinued. The simplex is set up and vibrates on four broad hickory strips, which gives the table remarkable

in. apart,  $\frac{1}{2}$  in. high at the feed end, gradually tapering to the extreme discharge end. These riffles are banked on the lower edge of the deck, having a smooth blank space 9 in. wide where the ore discharges. This blank space is important, as it allows fine ore and slime a chance to settle and stratify.

Another feature is the fact that the ore travels faster on the first deck than on the second, and slower on the third than on the second. As the concentrates are largely removed on the first deck, less movement is required for the second and third, thus giving the material more time to settle and stratify. This is a point that any intelligent millman will appreciate.



BARTLETT ORE CONCENTRATOR.

resiliency and quick action, while its alignment is perfect, with no parts subject to wear. Each deck is an independent concentrator, and each can be removed in five minutes by taking out three hinge-bolts. Its construction is of the armored wood pattern, containing no mortises or tenons. It is put together with bolts, and is easily taken apart into pieces which weigh 100 lb. or less.

The movement is simple and independent of the table proper, has no toggles, slides, guides or springs, and is of the quick-forward and quick-return pattern, giving two impulses to the ore at each stroke. It also runs noiselessly and requires very little attention. This table is protected by five patents, with two more pending.

Each deck is covered with a single piece of solid rubber, riffled, the riffles being molded on when the plate is made at the rubber factory, and therefore integral. This special rubber top is covered by patents. Rubber not only wears better than any other substance, under the action of ore and water, but is the best substance for catching and retaining fine ore. It is also proof against acid water, and neither shrinks nor swells. Each top or deck is provided with 13 riffles, 1

Another feature is the ease of operation. The operator can make all necessary adjustments by simply manipulating the water-supply valves and the hand crank which raises and lowers each deck. These are all together in the front, or discharge, end of the table; consequently, the operator does not need to pass around the table. One operator, it is claimed, can easily attend to a number of tables.

The feed-box is metallic and is simple, cannot be clogged and needs no adjustment. The wash-water pipes are independent of the table. They discharge into open launders; hence are not easily clogged by dirt. The simplex weighs only 900 lb., and requires only 1-6 actual h.p. to operate. The builders state that three separate classes of concentrates can be made on the table, and the capacity is very large. It is claimed that this table saves slime so closely that no after-treatment is required.

M. Dittrich and A. Reise determine lead by precipitation from its solution as nitrate with a 10% solution of ammonium persulphate (*Berichte der deutsch. Chem. Gesell.*, 1905, XXXVIII, 1829-1831). This is more rapid than the precipitation by sulphuric acid and alcohol.

**Erasing Machine.\***

BY GEORGE S. HESSENBRUCH.

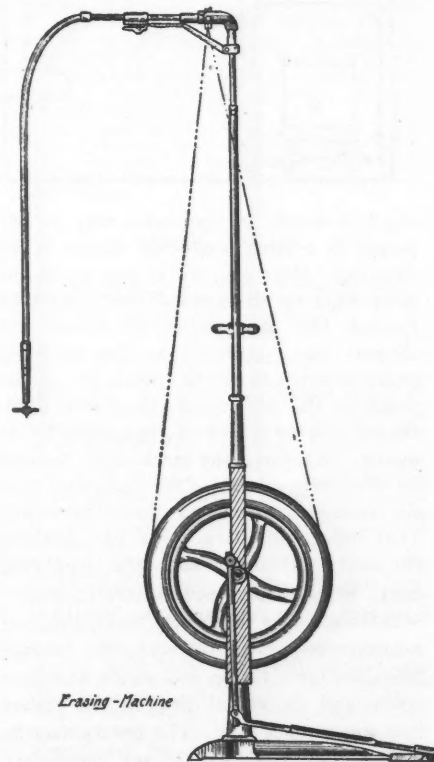
In a drafting room where certain records have to be kept, such as street records, plat books, insurance books, main records, etc., and where these records continuously change on account of new pipes being laid in place of the old ones, there will undoubtedly be a great deal of erasing done.

To eliminate the large amount of time and work necessitated in erasing by hand and to do this work carefully a scheme was devised to do this erasing mechanically. The scheme is as follows:

An ordinary dental engine or machine that is used by dentists for drilling teeth was procured and a circular ink eraser set in the mandrel by means of a small screw instead of the regular drill used by the dentist. Everybody is familiar enough with the working of a dental engine without going into a general description of the same. Foot power is used, as is now mostly used by dentists, but a small electric motor could be easily attached to drive the machine without much cost. The flexible shaft to which the eraser and handle are attached allows considerable movement and all the draftsman has to do is to guide the eraser by means of the handle.

Anyone trying this machine will have to watch the following points:

Keep the machine at a good speed and do not press the eraser too hard on to the paper, as the machine erases very rapidly. It will be found that a good



Erasing Machine

paper will take on a hard surface at the erased place and that the erasing will hardly be noticeable.

\*From *Progressive Age*, July 1, 1905.

Erasing can be done by the machine in about one-tenth of the time it would take to do it by hand; besides it is not tiring to the draftsman. It will be found that the draftsman becomes very expert with it and can erase very fast and when coming to a fine cross-line can neatly jump this line without touching it, at the same time erasing completely the line he is working on.

**Blast-Furnace Filling Apparatus.**

John W. Seaver, assignor to Wellman-Seaver-Morgan Company, Cleveland, O., has patented (U. S. 792,735) the method of charging furnaces here outlined, which is valuable principally because of its flexibility, and because the ore may be run in at any convenient level below or above the furnace top. A combination of two traveling covers is placed over the furnace, the edges of the covers extending down into troughs to form a water seal, and a traveling lorry being arranged to run over the auxiliary cover, which is normally out of use. Among the several

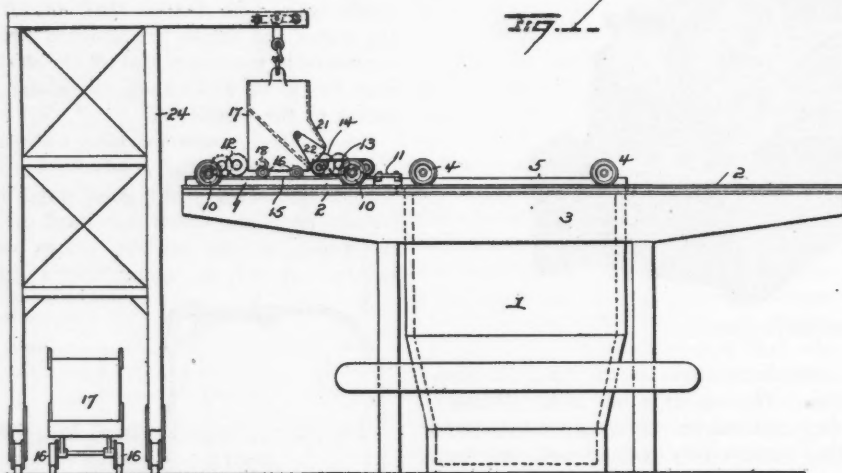
passing over scale-beams. If it is desired to deposit the coke on the edges of the furnace, the lorry can be provided with side partitions for the coke, the ore being carried in the center.

**Questions and Answers.**

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

*Mica.*—What are the chief industrial uses, and what are the prices for the various grades?—G. A. T.

*Answer.*—In electrical industry for insulation of circuits, armatures, etc.; mica for this purpose must be free from iron, but large sheets are not essential, as built-up pieces may be used for the larger



ways in which the apparatus may be employed in a plant is the one shown in the drawing. Here the ore is run in on the lorry (17) on the ground level, and then hoisted (by any convenient means not shown) to a position on the traveling crane at the left of the drawing. At the point in the illustration the lorry (17), shown now in side view, is moved by its motor (18) along the track (15), so that its discharge nozzle (21) projects over the endless conveyor (13). The motor (12) moves auxiliary cover (9), pushing the cover (5) in advance, the depending edges being then raised out of the water-seal trough. As the covers move, the conveyor apron (13) conveys the charge from the lorry to the end of the auxiliary cover and dumps it between the covers into the furnace (1). The covers may be moved back and forth at any convenient speed to distribute the charge as desired. By extending the lorry's track, several kinds of ore may be received from different points and separately weighed by

shapes required. The Canadian brown mica is extensively used for this purpose. Large sheets are in less demand than formerly for stove doors, etc., but are still used for lamp chimneys, etc., and all sorts of novelties. Scrap mica is ground to various degrees of fineness; coarse for boiler and steam-pipe lagging, fire-proof paint; fine for lubricants, decorative wall papers and paints.

\* Prices (New York market): Ground coarse, \$33 to \$38 per short ton; ground fine, \$0.07½ to \$0.02 per lb.; sheets sold as to size and quantity. Also see this JOURNAL, January 12, 1905, p. 105.

*Placer Mining.*—What is the smallest quantity of gold per cubic yard that can be worked profitably hydraulicked?—J. B. B.

*Answer.*—Under favorable conditions gravel can be hydraulicked at cost as low as 3c. per cu. yd., possibly a little lower. Large quantities of gravel yielding only 4c. per cu. yd. have been worked profitably in California.

**Abstracts of Official Reports.**

*Dolcoath Mine, Ltd.*

This is the most productive of the Cornwall tin mines, and under its present management has been steadily increasing its output of ore for the past ten years, although the constantly diminishing richness of the vein material has been regularly cutting down the net earnings. The report covers the half-year ending December 31, 1904.

Development has been active and has comprised 1,654 ft. of drifts and cross-cuts, and 678 ft. of winzes and arises. Only two of the three lodes appear to be workable, the main lode carrying 58 and the north lode upward of 60 lb. of black tin to the ton. The half-year's operations may be summarized as follows:

Tin ore crushed, tons.....	50,353
Black tin sold, tons.....	894.4
Product per ton of ore, lb.....	39.8
Average price per ton of ore.....	£1 7s. 6d.
Average price per ton of black tin.....	77 5 5
Gross receipts.....	£69,699
Working costs.....	53,675
Gross profits.....	£16,024
Lord's royalties.....	2,304
Net profits.....	£13,720

From this, £3,379 was written off to cover depreciation and a dividend of 6d. per share, or at the rate of 5% per annum, absorbed £7,128, the rest being carried to reserve. As an innovation with this half-year, the cost of development was carried directly to the working account, thereby decreasing the net profit for the six months by £4,341. The company's authorized capital is £350,000, of which £311,791 has been paid up.

*Ferreira Gold Mining Company, Limited.*

The report of this Witwatersrand company covers the year 1904, and is a model for completeness and detail.

Development comprised 1,616 ft. of drifts, 708 ft. of raises and winzes and 106 ft. of crosscuts; total, 2,430 ft., only 6 per cent of which was outside the reef formation. The average width and value of the reefs, together with the ore blocked out in each, at the end of the year, were:

	Width, In.	Assay, Oz.	Reserves, Tons.
Main reef and leader.....	55.86	0.644	864,928
Main reef leader.....	17.05	1.464	
South reef.....	27.00	1.195	305,536
			1,170,464

Reserves are computed on the basis of average stoping widths (73 and 64 in., respectively). In stoping, it was the policy during the year to draw a larger proportion of ore from the main reef and leader, diminishing the quantity from the south reef. This change caused a decrease of .043 oz. in the average value of the year's output from the mine, as compared with that of 1903, but this was compensated by the increase of 68,973 tons in its bulk, resulting in a gain of £63,855 in



working profits over the previous year. The total ore raised was 270,988 tons, of which the main reef and leader contributed about three-quarters and the south reef less than one-quarter; sweepings from old stopes added 3,832 tons.

Ore was delivered to the breaker at a working cost of \$2.58 per ton, made up as follows:

	Cost per Ton Stopped.
General, including maintenance.....	\$0.137
Stopeing.....	1.409
Shoveling in stopes.....	0.352
Tramming.....	0.376
Holting.....	0.231
Pumping.....	0.078
	<b>\$2.583</b>

Development redemption..... 0.404  
Total mining..... \$2.987

The cost, per ton of ore raised, for development done during the year was only 125 cents; but the larger amount was charged with a view to reducing the debit balance of the development-redemption account; in the future, a fixed charge of 36 cents per ton of ore milled will be made against working costs.

Ore treatment consists of stamp-milling, concentration and cyanidation. To the stoped ore was added 15,273 tons from development faces, and 152 tons from dumps; 65,605 tons of waste (or 22.61%) was sorted out, and 220,804 tons were milled. The batteries numbered 120 stamps, which ran 347 days, showing a duty per stamp of 5,306 tons per 24 hours. The ore fed to the stamps had an average value of 0.687 oz. (as determined by mill yield plus assay value of pulp leaving the mill); nearly 60% of this value was recovered in the mill, leaving fine material, carrying 0.286 oz., to be concentrated, classified and cyanided.

The milling of the 220,804 tons was at a cost per ton made up as follows:

	Cost per Ton Milled
General.....	\$0.031
Sorting.....	0.209
Crushing.....	0.086
Transport.....	0.059
Milling.....	0.516
Retorting, smelting and assaying.....	0.014
	<b>\$0.915</b>

Data as to the work of the cyanide plant may be conveniently condensed thus:

	Concentrate.	Sand.	Slime
Tonnage treated.....	14,000	142,135	57,676
Percentage of mill pulp.....	6.340	64.372	26.121
Original assay value, oz.....	0.692	0.289	0.148
Residual assay value, oz.....	0.125	0.056	0.028
Theoretical extraction, %.....	81.495	80.423	80.749
Actual extraction, %.....	75.576	75.527	76.791

In addition to the slime tabulated above, 5,938 tons of slime (that had been previously accumulated, and which contained 0.318 oz. per ton) was treated, with an actual extraction of 87.953%. The cost of cyanidation per ton of material was distributed as follows:

	Concentrate.	Sand.	Slime.
	14,000	142,135	57,676
	Tons.	Tons.	Tons.
Filling and discharging.....	\$0.391	\$0.385	\$0.275
Leaching and precipitating.....	0.736	0.355	0.598
Smelting and assaying.....	0.102	0.041	0.047
	<b>\$1.229</b>	<b>\$0.781</b>	<b>\$0.920</b>

The 5,938 tons of slime, from old accumulations, was treated at a cost of \$1.265 per ton.

The yield from the various sources, in fine ounces, was:

	Total.	Per Ton.	Actual Extraction.
Mill.....	88,650	0.401	57.690
Concentrate.....	7,415	.034	4.825
Sand.....	31,003	.140	20.175
Slime.....	6,567	.030	4.274
	133,635	0.605	86.964
Accumulated slime.....	1,661	.008	1.081
	135,296	0.613	88.045

Below the regular amalgam tables in the mill, shaking tables have been placed, in the same way as they are used in connection with the tube-mills. Over 9,000 oz. of amalgam was caught on these tables during the year, part of which would otherwise have been lost. The Stark process will be applied to the re-treatment of the dump, with a further economy.

The revenue, expense, and profit-and-loss accounts may be combined thus in sterling:

Sale of bullion.....	£570,184
Sundry revenue.....	12,418
<b>Total receipts.....</b>	<b>£582,602</b>
Mining.....	£169,225
Milling.....	42,083
Cyaniding.....	39,322
General, mine and office.....	21,387
Additional plant.....	21,800
<b>Total expenses.....</b>	<b>£293,817</b>
<b>Profit for the year.....</b>	<b>£288,785</b>
Balance brought forward.....	153,062
	<b>£441,847</b>

Depreciation.....	£ 21,694
Taxes.....	23,816
Bonus.....	1,000
Dividends.....	237,500
<b>Total charges.....</b>	<b>£284,010</b>
Balance to carry forward.....	£157,837

The company is capitalized at £95,000, although at the end of the year its shares were valued at £301,664. The two dividends, declared during 1904, were at the rate of 112½ and 137½%, respectively. The mine development account shows a balance of £55,867, which, at the present scale of operation, and with the recently fixed charge per ton, should be retired in a little more than three years.

W. Maddern reports that a couple of Wilfley tables in Western Australia were laid on a timber framing, while others were built on stone foundations. Those on timber gave poor results, the cause being attributed to synchronous vibration. However, as Wilfleys are generally put on timber, the case is evidently not of frequent occurrence.

### 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.

Week ending July 11, 1905.

794,168, 794,169, 794,704 and 794,705. METHOD OF REMOVING SUPERFLU-

OUS METALLIC COATING FROM SHEET METAL.—Olin S. Fellows and Archibald E. Hopkins, Middletown, N. Y.

794,198. PROCESS OF REMOVING OR RECOVERING ZINC FROM ORES.—William Stewart, Mount Florida, Glasgow, Scotland.

794,201. CENTRIFUGAL GAS-PURIFYING APPARATUS.—Edward Theisen, Baden-Baden, Germany.

794,207. WATER-SEALED REGENERATOR.—Gregor Waizel, Newark, N. J., assignor to Edward Zusi, Newark, N. J.

794,212. METALLURGICAL FURNACE.—George H. Benjamin, New York, N. Y.

794,255. ELECTRIC FURNACE.—Cecll L. Saunders, Cleveland, Ohio.

794,248. ENGINE FOR COAL-CUTTING MACHINES.—John G. Patterson, Manchester, England.

794,272. METHOD OF PRODUCING COPPER MATES, WHITE-METAL, AND BLISTER-COPPER IN A SINGLE FURNACE.—Ralph Baggaley, Pittsburg, Pa.

794,346. EXCAVATING-MACHINE.—Albert N. Cross, Tomah, Wis.

794,373. PROCESS OF CHEMICALLY MODIFYING OILS.—Eduard Meusel, Liegnitz, Germany.

794,384. MINE VENTILATION.—Frederick C. Weber, Pittsburg, Pa.

794,386. FURNACE-CHARGING APPARATUS.—Ralph Baggaley, Pittsburg, Pa.

794,391. FURNACE-CHARGING DEVICE.—John J. Boax, McKeesport, Pa., assignor to National Tube Company, Pittsburg, Pa., a corporation of New Jersey.

794,410. EXCAVATING-MACHINE.—Charles C. Jacobs, Amboy, Ill., assignor to the Jacobs Steel Excavator Company, Amboy, Ill.

794,413. PROCESS OF MAKING ALUMINIUM COMPOUNDS.—Lucius R. Keogh, Hamilton, Canada.

794,498. GAS-GENERATING APPARATUS.—Louis Guenot Fils, Paris, France.

794,512. CATALYTIC SUBSTANCE AND PROCESS OF MAKING SAME.—Rudolf Knietzsch, Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik, Ludwigshafen-on-the-Rhine, Germany.

794,552. ART OF TREATING ORE AND GATHERING GOLD OR PRECIOUS METAL DIFFUSED IN THE EMPLOYED MERCURY.—George M. Rice, Worcester, Mass.

794,555. ORE-CONCENTRATOR.—Hannibal Scovell, Harle B. Scovell, Leslie E. Scovell and Wilsle E. Scovell, Galena, Kan.

794,647. ELECTROSTATIC MAGNETIC SEPARATOR.—Henry M. Sutton, Walter L. Steele and Edwin G. Steele, Dallas, Tex.

794,662. COKE-OVEN.—Eveence Coppeé, Brussels, Belgium.

794,703. CRUSHING APPARATUS.—Malcolm Dickerson, Newark, N. J., assignor of eighty one-hundredths to Freid Engineering Company, Orange, N. J., a corporation of New Jersey.

#### GREAT BRITAIN.

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

Week ending July 1, 1905.

12,178 of 1904. PROCESS OF TREATING MICA.—C. W. Jefferson, Schenectady, U. S. A. Treating mica scales with shellac so that they may be used as insulating material without any additional cement.

12,347 of 1904. PULVERIZING MACHINE.—D. S. S. Steuart, London. Improvements in the inventor's pulverizing machine, where rapidly rotating hammers break up the ore, for the purpose of obtaining a more even product.

16,417 of 1904. SHAFT SINKING IN UNSTABLE SOIL.—A. Raky, Erkelenz, Germany. A method of sinking shafts, having two small shafts side by side, especially suitable for unstable ground.

411 of 1905. SMELTING IRON ORE.—J. Gayley, New York. In smelting iron ores with a dried-air blast, using much less coke than is theoretically required, the explanation of this economy not being quite clear.

1,160 of 1905. MINE TIMBERING.—W. Hinseimann, Homburg, Germany. A wooden prop for mines, made in two parts held together by a clamp which will give way when the pressure becomes greater than it can bear.

4,080 of 1905. ROCK DRILL.—Siemens Schuckert Werke, Berlin. In rotary rock drills, mechanism for preserving a constant pressure of the tool against the rock.

### Personal.

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

Mr. R. W. Gordon was in Denver last week, on his way to Goldfield, Nev.

Mr. John Van Nostrand Dorr, of Lead, S. D., has been a visitor in New York.

Mr. Percy A. Babb, of San Luis Potosi, Mexico, was a recent visitor in New York.

Mr. Fred. G. Farish has gone to Parral, Chihuahua, Mexico, on professional business.

Mr. Frank H. Probert, of Los Angeles, Cal., is examining mines in Lower California.

Mr. C. W. Kempton has returned to New York from a professional trip to Alaska.

Mr. Frederick Grundy is at present making mining examinations near Tombstone, Arizona.

Prof. H. A. Wheeler has been examining properties in the Joplin zinc district for Chicago parties.

Mr. Arthur Thacher, of St. Louis, has gone to New York to consult some of his Eastern clients.

Mr. Francis A. Thomson has returned to Goldfield, Nev., after a professional trip to British Columbia.

Mr. O. B. Amsden, superintendent Clover Leaf mine, has returned to Roubaix, S. D., from an Eastern trip.

Mr. Frank Smith has been appointed manager of the East Helena plant of the American Smelting & Refining Co.

Mr. Gus R. Johnston has resigned his position as blast-furnace manager at the South works of the Illinois Steel Company.

Mr. W. E. Corey, president of the United States Steel Corporation, arrived in New York, July 15, on his return from a trip to Europe.

Col. H. M. Pellatt, of Toronto, has been elected a director of the Dominion Iron & Steel Co., as successor to B. F. Pearson, of Halifax.

Mr. A. Chester Beatty stopped over in St. Louis last week, to look after the Federal Lead Co.'s properties on his way to Colorado.

Mr. J. H. Means, of London, has been in New York. He left July 15, on his way to examine mining properties in Peru and Bolivia.

Mr. W. Elliston Farrell has resigned as general manager of the Birdsboro Steel Foundry & Machine Co., at Birdsboro, Pennsylvania.

Mr. Wm. A. Farish came to Denver last week from New Mexico and left there for New York on professional business, shortly afterward.

Mr. Wm. Davey, formerly superintendent Yampa mines, near Bingham, Utah,

is practicing as mining engineer at Salt Lake City, Utah.

Col. Geoffrey Porter, Master of the Mint at Calcutta, India, is now in Canada. He has been visiting the nickel mines in the Sudbury district.

Mr. John C. Treadwell, of Sahuayacan, Chihuahua, Mexico, was a visitor in New York this week. He expects to return to Mexico in about a month.

M. A. de Romen, of Paris, France, a writer on mineralogical subjects, was in Toronto this week, in the course of a Canadian tour of investigation.

Major A. V. Bohn, manager of the Brattleboro Mining Co., of Leadville, Colo., is east on business in Brattleboro, New York, St. Louis and other points.

Mr. T. A. Rickard leaves New York this week for Denver, where he will remain for several weeks. He will probably extend his trip to the Pacific Coast.

Mr. John Treweeke, late of Salt Lake, has been appointed general superintendent of the Belle of Thunder Mountain and the Sunnyside mines at Roosevelt, Idaho.

Mr. W. P. Snyder, president of the Shenango Furnace Co., Pittsburg, has gone to the Lake Superior region to inspect mining properties owned by the company.

Mr. Gustave Loeb, of the firm of Kuhn, Loeb & Co., of New York, has been in the Boundary district to examine the properties of the British Columbia Copper Company.

Mr. R. A. Broomfield, of Pittsburg, Pa., secretary of the Dominion Natural Gas Co., was in Toronto July 11, looking over the ground, having in view the introduction of natural gas.

Mr. Hermann A. Keller, of New York, who has been engaged in professional work in South America, and has recently been visiting in Europe, arrived home on the *Cedric*, July 13.

Mr. Cecil B. Smith, chairman of the Timiskaming & Northern Ontario Railway Commission, has been appointed chief engineer of the Hydro-Electric Power Commission of Ontario.

Mr. George M. Summers, formerly superintendent of the Valley Works of the Republic Iron & Steel Co., Youngstown, Ohio, has been made general superintendent of the Sligo Iron & Steel Co., Connelville, Pa.

Mr. Eugene B. Braden, for several years manager of the East Helena plant of the American Smelting & Refining Co., has been promoted to be a member of the executive committee, and will make his residence on the Pacific Coast.

M. Adolphe Chalas, of London, England, is in Toronto. He has had a wide experience in connection with the nickel and cobalt industries of New Caledonia,

and will make exhaustive investigations regarding the mineral products of Ontario.

Mr. Charles M. Pepper, of Washington, one of the special commissioners appointed by the Department of Commerce and Labor to study commercial and industrial conditions in other countries with a view to increasing the export trade of the United States, is now studying iron and steel manufacture and consumption in Canada.

In the JOURNAL of June 29, we mentioned that Mr. Ernest Levy had retired from the management of Le Roi No. 2, at Rossland, B. C. We are now informed that Mr. Levy resigned the office of manager of this property to accept a superior position under the consulting engineers to the company, Messrs. Alexander Hill & Stewart, of London.

Prof. Henry M. Howe received the degree of LL.D. from Lafayette College on June 21, and Harvard University conferred the same degree on June 28. President Eliot's words in conferring the Harvard degree were the following: "Henry Marion Howe, a Boston Latin School boy, Harvard bachelor of arts, and Institute of Technology bachelor of science, an author on copper, iron and steel, distinguished for scientific imagination and a good English style, professor of metallurgy at Columbia University, consulting metallurgist honored by the profession in England, France, Germany, Russia and his native land."

Mr. Joseph Hunter, of Victoria, Vancouver Island, B. C., retired from the management of the Esquimalt & Nanaimo Railway on July 1, on which date that system was formally taken over by its recent purchaser, the Canadian Pacific Railway Co. Mr. Hunter arrived in British Columbia in 1864, and thereafter for eight years followed mining in Cariboo. In 1872 he joined the engineering staff of the Canadian Pacific. It is understood he will continue to be connected with the Dunsmuir interests, which include the important collieries of the Wellington Colliery Co., at Extension and Cumberland, Vancouver Island, the operation of which has heretofore been closely associated with that of the railway.

### Obituary.

William W. McKee, who died in Catauqua, Pa., July 5, was born in Jersey City, N. J., educated in Philadelphia and at the Freiberg Bergakademie in Germany. After practicing as a mining engineer, chiefly in Eastern Pennsylvania, for several years he joined the McKee-Fuller Co., iron manufacturers, at Fullerton, near Catauqua. He remained with this company until a few years ago, when he sold out his interests. He leaves a widow and three children.



### Societies and Technical Schools.

*South Dakota State School of Mines.*—We have the 1905 catalogue and the 1905-6 announcement of this excellent school. The illustrations show laboratory equipment and buildings, and a synopsis of the curriculum is given.

### Trade Catalogues.

We have the new catalogue of the Wood Drill Works, of Paterson, N. J. It is of the standard 6 by 9 in. size.

'Sturtevant Products' is the title of the Sturtevant Mill Co.'s (Boston, Mass.) flier devoted to their crushing, grinding and screening machinery.

'Metals Free from Carbon' is a reprint by the Goldschmidt Thermit Co., No. 43 Exchange place, New York, of Dr. Goldschmidt's papers in *Electro-chemical Industry*.

'The Applications of Nickel Steel' is an alphabetical list of the various uses to which this material may be put. It is published by the International Nickel Co., of New York.

A new edition of 'Gold Milling in the Black Hills' is fresh from the press of the Allis-Chalmers Co., Milwaukee, Wis. It represents a departure from their usual 6 by 9 in. standard in size.

'Bulletin No. 10,' of the De Laval Steam Turbine Co., New York, is at hand and gives interesting details of the special machinery and practice used in the manufacture of their turbine. It is of the standard 6 by 9 in. size, and will interest the mechanic as well as the engineer.

'The Mitchell Economic Hot-Blast Furnace' is the title of the pamphlet issued by the company of the same name. It contains notes regarding operation, and an excellent dimension drawing of the 42 by 120 in. size furnace. The company's offices are at Los Angeles, Cal., and at 52 Wall street, New York.

The B. F. Sturtevant Co., of Boston, Mass., has just issued a second edition of their 'Bulletin No. 63,' showing generating sets in a full line of 36 sizes, ranging from 3 to 100 kw., and equipped with vertical simple, vertical compound or horizontal engines, according to size. All of these engines are equipped with forced lubrication, water-shed partitions and oil-tight cases.

### Industrial.

The Jones & Laughlin Steel Co, Pittsburgh, has started the manufacture of spiral bars for reinforced concrete work

A steel frame trestle approach 200 ft. long is being erected at Frankstown, Pa., for the American Lime & Stone Co., by the Wm. B. Scaife & Sons Co., Pittsburgh.

The Schlieper Engineering & Contracting Co., of Pittsburgh, has just completed the work of setting the engines and boil-

ers in the new plant of the Pittsburgh Bridge & Iron Co., Rochester, Pa., also all the concrete work around the works.

The Dayton Hydraulic Machinery Co. has opened a New York branch office at No. 133 Liberty street. They will carry a line of Brooks' centrifugal pumps, of which they are exclusive manufacturers. Mr. R. E. Spencer Geare is in charge of the office as sales manager.

Heyl & Patterson, Pittsburg, have received a contract for the building of a new coal tippie for the Canadian Northern Railway Co. at Fernie, B. C. The structure will be entirely of steel, fitted in the factory, and the material will weigh over 800 tons. It will be 30 ft. wide, will extend across a valley a distance of 900 ft., and will have a capacity of 4,000 tons a day. It will be fitted with tippie machinery furnished by the Phillips Mill Supply Co., Pittsburg.

The Pennsylvania Steel Co. has filed at Harrisburg, Pa., a mortgage for \$1,500,000 in favor of the Girard Trust Co., Philadelphia, to cover the new coke-oven plant and a tract of land adjoining its plant in the lower end of Steelton. The mortgage bears interest at the rate of 4½%, and the money will be used to carry out the construction of the coke-oven plant. The ovens will be of the Semet-Solvay type; the number is not announced. They will be placed not far from the company's new building; the product will be used for the Steelton furnaces.

### Construction News.

Readers of the JOURNAL are requested to inform this Department of pending contracts, or of new work projected, giving name and address of the person in charge of the work or project.

*Jimenez, Mexico.*—F. S. Johnson, of Parral, will erect a smelter near this place.

*Stemple, Montana.*—John Rowand will erect a mill and cyanide plant in the Big Blackfoot, near this place.

*Morrisburg, Canada.*—A plant of 28 mills is projected by the Canadian Tin Plate & Sheet Steel Co at this place

*Muldoon, Idaho.*—The Idaho-Muldoon Co. will build a 50-ton concentrating plant at this place. John Peterson is managing owner.

*Isabella, Tenn.*—The Tennessee Copper Co. will spend \$625,000 on smelter improvements and development. Its New York office is at 11 Broadway.

*San Rafael, Mexico.*—The San Rafael Copper Mining Co. has been organized with a capital of \$1,500,000, and will erect two reverberatory furnaces here.

*Chihuahua, Mexico.*—The American Smelting & Refining Co. will acquire lands for the site of a smelter at Tabalopa, three miles south of Chihuahua.

*Bellingham, Washington.*—Electrical machinery, flume and smelting equipment will be installed for the Chancellor Gold Mining Co. in the Slate Creek district.

*Reno, Nevada.*—The H. L. Frank Co., of Montana, has been awarded the contract for the new Goldfield stamp mill. Plans and specifications are now under way.

*Black Butte Mine, Lane Co., Oregon.*—Plans and specifications are being prepared for the erection of a large mercury furnace at this mine. W. B. Dennis is manager.

*Baker City, Oregon.*—The Oregon Mining Co., F. E. Corbus, superintendent, will build a 10-stamp mill and a wagon road 4 miles long. Its mines are on the Summit Flat.

*Bingham, Utah.*—The Utah Copper Co.'s new mill will be erected near the shore of Great Salt Lake and is to have a capacity of 2,500 tons per day. The principal office is at Salt Lake City.

*Parral, Mexico.*—Eugene Davis, of Washington, D. C., and the Stallworths, of Parral, will erect a custom mill, and a smelter is to be built in the vicinity by the Evans and associated interests.

*Duluth, Minn.*—It is reported that an electrical hoist will be installed at one of the new mines under development near Hibbing, and a large underground electric haulage system put into another there.

*Jarilla, N. M.*—The Southwest Smelting & Refining Co., with headquarters at St. Joseph, Mo., has just let a contract for the erection of a copper smelter. It will have a capacity of 1,000 tons of ore daily.

*Alamo, Sonora, Mexico.*—The Zambona Development Co. is to instal a high-pressure electric pump and electric hoist at the Minas Nuevas, near this place. They will also light the camp and mine by electricity.

*Durango, Mexico.*—The smelter to be built here will have a daily capacity of 800 tons and will include both lead and copper furnaces. Charcoal will be used as fuel. C. G. Codman, of Durango, can give information.

*Naco, Arizona.*—The Naco Smelting & Refining Co. will build a 250-ton copper smelter, costing in the neighborhood of \$60,000. Its offices are in the Bradbury Building, Los Angeles. Robert Mitchell is president and treasurer; Robert E. Morrison, of Prescott, vice-president; Chas. B. Lewis, secretary. In addition, the board of directors includes H. J. Stevens and N. M. Edwards.

*Ely, Nevada.*—The Nevada Consolidated Copper Co., of Ely, Nev., and Boston, contemplates the erection of a 1,000-ton plant to be completed by the latter part of 1906. They are to acquire a line of standard gauge railroad 150 miles long from Copper Flat via Ely, to a connection with the Southern Pacific. James Philips, Jr., is president of the new company, Homer Loring, vice-president, and George B. Beals, secretary and treasurer.

**Special Correspondence.****Denver.** July 12.

For the first time in its history, the Jerry Johnson Co. has entered the ranks of dividend payers and declared a dividend of 1c. per share, aggregating \$25,000. For some time past, it was in litigation with the Damon Co., which troubles are settled now.

At a meeting, held in this city, the Vindicator Consolidated Gold Mining Co. declared an extra dividend of 1c., amounting to \$44,000, payable July 25, which makes a total of \$1,346,000 paid by this company.

The reported sale of the Cripple Creek Central railroad to the Colorado & Southern system, will give that corporation control of all the railroad traffic in the Cripple Creek district. No increase in either freight or passenger rates is intended. For a while the general offices of the Short line will be moved to Cripple Creek, but it is the intention to have all the offices concentrated in this city. Since, by this consolidation, the Denver & Rio Grande system would be virtually shut out, there are already rumors that that company will build an independent line. The Colorado & Southern officers deny that there has been a merger, either in ownership or otherwise; there is merely a joint operating arrangement of the different lines. Under the present laws of this State, no railroad company can buy up or consolidate with a parallel or competing line. There does not seem to be any doubt that the Colorado & Southern will before long secure the Colorado & Northwestern railway, on which it is understood they have secured an option.

A deal of importance has just been closed by the transfer of more than 900,000 acres of coal land, formerly the property of the Maxwell land grant, to the St. Louis, Rocky Mountain & Pacific Co., which has lately been organized with a capital of \$11,000,000. The company expects to build about 100 miles of railroad and to reach the mining districts around Elizabethtown in Northern New Mexico, which until now have been about 70 miles distant from the Santa Fé Railroad.

It looks as if satisfactory arrangements are about to be made with the Santa Fé system, to enable the lately organized American Fuel Co., to ship Colorado coal to the Pacific coast, especially to California, which is at present supplied mainly from British Columbia and Australia. The company owns coal land in Colorado and New Mexico.

Contracts have been let by the Denver, Northwestern & Pacific railroad, better known as the Moffat line, for 10 miles of grading, west of Hot Sulphur Springs; until the Gore cañon matter, to which previous reference has been made, is definitely settled, no further new operations will be commenced.

Robert H. Latta, receiver of the Aspen Mining & Smelting Co., has commenced suit in the district court against Fred Dorr for \$189,509, as the result of litigation begun about ten years ago.

**San Francisco.** July 12.

The recent codification of the statutes relating to mining laws in this State is causing concern among corporations and their officers. These are really not new laws, for they have been in the statute books for years, but have been overlooked or ignored. All the Legislature did was to codify the laws. The particular clauses relating to mining corporations which occasioned such alarm among and inquiry from mining men, are parts of Section 588 and read thus:

"It is the duty of the superintendent, on the first Monday of each month, to file with the secretary an itemized account, verified under oath, showing all receipts and disbursements made by him for the previous month, and for what said disbursements were made. Such account must also contain a verified statement showing the number of men employed under him, and for what purpose, and the rate of wages paid to each. He must attach to such account a full and complete report, under oath, of the work done in said mine, the amount of ore extracted, from what part of the mine taken, its assay value, the amount of bullion received, the amount of bullion shipped to the office of the company or elsewhere and the amount, if any, retained by the superintendent. It is his duty to forward to the office of the company a full report, under oath, of all discoveries of ores or mineral-bearing quartz made in said mine, whether by boring, drifting, sinking or otherwise, together with the assay value thereof, and all accounts, reports and correspondence from the superintendent must be kept in some conspicuous place in the office of said company, open to the inspection of all stockholders."

Section 589 is changed to allow a stockholder to bring with him an expert to examine the reports and books of the company and Section 587a is changed only by substituting the word 'corporations' for 'companies,' while there is omitted the former clause limiting the provisions to corporations "whose stock is listed and offered for sale at public exchanges."

When the law was originally passed in 1880 there were many Comstock mining companies in operation and it was essentially necessary for the protection of stockholders to have such a law enacted, as the secrecy of the officers as to operations enabled them to manipulate the stocks as they pleased. There were many abuses prevalent in connection with the stock market and mining corporations. The only substantial change in the law is in the omission of the proviso limiting the Section 589 to mining companies whose stock is listed and publicly offered

for sale, and this limitation was left out because the same had been declared unconstitutional by the Supreme Court. The other changes are unimportant and consist merely in the substitution of the word 'must' and 'shall' in a number of places. Now all mining companies, foreign or domestic, listed or unlisted in stock exchanges, come under these provisions and there is much kicking on the part of the officers. There will be little or none on the part of the stockholders. Section 589 provides that any stockholder of a corporation formed under the laws of this State for the purpose of mining is entitled to visit, accompanied by his expert, and examine the mine or mines owned by the corporation, and every part thereof, at any time he may see fit, and when such stockholder applies to the president of such corporation he must immediately cause the secretary thereof to issue and deliver to such applicant an order under seal of the corporation, directed to the superintendent, commanding him to show such parts of said mine or mines as the party named in said order may desire to visit and examine. It is the duty of the superintendent on receiving said order to furnish a stockholder every facility for making a full and complete inspection of said mine or mines, and of the workings therein, and to accompany said stockholder in person, or to furnish some person familiar with said mine, to accompany him on his visit to and through such mine, and every part thereof. If the superintendent fails to obey such order, such stockholder is entitled to recover, in any court of competent jurisdiction against the corporation the sum of \$1,000 and traveling expenses to and from the mine and liquidated damages, together with costs of suit. In case of such refusal it is the duty of the directors of the corporation forthwith to remove the officer so refusing, and thereafter he must not be employed, directly or indirectly, by the corporation, nor must any salary be paid to him.

These laws are framed in the direct interest of all stockholders, particularly the minority, in mining companies. While more or less trouble will be given to the officials, the enforcement of the law will be a good thing for the mining industry in general. A man obtaining control of the stock may not prevent minor owners from seeing the mine or the books, all of which will tend to give more confidence to buyers of mining stock, that they will be treated fairly. If not, the remedy is in their hands.

**Scranton.** July 17.

There have been a number of gas explosions in the Oxford mine of the People's Coal Co., which indicates that the indiscriminate use of naked lamps in that colliery is not safe. On Saturday morning two men were burned very severely. As usual, the explosion was caused by a



miner's naked lamp coming in contact with a pocket of gas.

The strike at the Spencer colliery, in Dunmore, has been settled. On Monday morning the men and boys employed there went back to work. The strike arose from the dismissal of three drivers. It was contended by the other drivers that these boys were being discriminated against because of a previous strike which had occurred at the mine. An effort was made to have the men employed at the mine do the driving after the boys quit, and this resulted in a general strike, involving all the men. Several times committees visited the officials of the company with the purpose of arranging a settlement, but no satisfactory conclusions were reached till Saturday, when it was agreed that the boys who were discharged would be reinstated.

Indian Ridge breaker, the oldest in the Shenandoah district, has shut down, after operating more than 30 years. Employees are making alterations at the top of the shaft for the removal of the coal to the Knickerbocker breaker, where it will be prepared for market. The inside working will resume in about 10 days. The shutting down of the breaker will throw 200 men and boys temporarily out of employment, but a great many will find work at the Knickerbocker to take care of the Indian Ridge output, which is 600 to 800 tons daily.

The ash conveyors, recently installed at the Shenandoah colliery boiler-house, are now in use, and prove a success. The conveyors are operated by cable. There are three large steel buckets which, when filled, hold almost half a ton each; they are run on the cable to the ash bank, where they dump automatically. These conveyors replace three small scraper lines. The conveyors are operated by a 12 by 18-in. steam-engine.

The Carson washery, at Macadoo, has been dismantled. The machinery has been shipped by Superintendent Rissinger to his new colliery in Plymouth. The Carson washery has been in use for a number of years, but ceased operations during the strike of 1902. After this the company opened the new plant in the upper end, taking many of the employees there.

What is considered a very dangerous and damaging fire was discovered at an early hour on Tuesday in No. 3 slope at Plymouth, west of the Nottingham colliery. Every effort is being made to hold the fire in check. The officials expect to extinguish it without flooding the mine, though they are deeply concerned. The Nottingham colliery is one of the best in the section of the country in which it is located. It gives employment to nearly 1,500 men and boys. This is the third time that serious fires have raged in the inner workings. It appears, according to the officials and the miners, that the fire was due to an employee walking unconsciously

in a small body of gas. He attempted to brush it out of the chamber, but the flames got the better of him. They soon reached the brattices, ignited the wood, and later reached the coal. A gang of workmen were sent into the mine to subdue the flames. Their efforts have been so far satisfactory. The great danger is that the fire may burst into flame again unexpectedly and make the work of subduing it hazardous and difficult, owing to the fumes that arise from the burning coal. However, at this writing the officials say that if the fire is not extinguished by ordinary means, that part of the mine will be flooded.

The miners of the anthracite region are entitled to an increase of 1% in their wages for June, according to the report of the sliding-scale commissioner, C. P. Neill, received on Monday at United Mine Workers' headquarters. The average price of white ash coal of sizes above pea coal, sold at or near New York, between Perth Amboy and Edgewater, and reported to the Bureau of Anthracite Coal Statistics for the month of June, 1905, was \$4.85 per ton, f. o. b. shipping point.

#### Salt Lake City. July 17.

The Ontario drain tunnel at Park City, which has been out of commission for several months on account of a series of caves, has been cleared to a distance of about 11,000 ft. There are some other caves ahead, the size of which is yet to be determined. Until all the obstructions from the adit are moved, the Ontario mine cannot be operated, except on the upper levels, nor can anything be done toward extending the tunnel into the territory of the Daly West Co., through which means it has been designed to open up the ore-bodies of this company's property several hundred feet below the present deepest workings.

The negotiations that have been pending for some time for the sale of the Balaklala copper mine in Shasta county, California, to the White Knob Copper Co. were concluded in Salt Lake City during the present week, Clarence K. McCornick, representing the purchaser and officials of the Western Exploration Co., the vendors. The sale price is said to be \$2,000,000. The White Knob Co., which expended as much as \$3,000,000 in the development and equipment of its property at Mackay, Idaho, has abandoned the latter and has acquired the California property, with the hope of making good what has been lost in the Idaho venture.

Considerable interest is being manifested in a comparatively new mining region in Washington county. The country is what is known as the Bull Valley district. Some gold ledges containing encouraging values have been opened there.

The Ohio Copper Co. at Bingham broke some records in June. A total of 17 cars of concentrate was produced and

marketed; also two cars of crude ore. The grade of concentrate turned out at the mill has improved from 20 to a little better than 30% copper, with small values in gold and silver. The mill is reducing 200 tons of ore into concentrate daily on a basis of about 6 into 1. The development of the porphyry belt under the direction of D. C. Jackling, manager of the Utah Copper Co., for the holders of the option on the property, which expires in September, is reported to be progressing favorably. The consideration named in the option is \$1,000,000.

The second expert examination of the Utah Copper Co.'s mine at Bingham in behalf of parties representing the American Smelters Securities Co., is being brought to a close. The first examination was conducted personally by A. Chester Beatty, and the last one is in charge of Mr. S. W. Mudd.

The directors of the Butler Liberal Mining Co., of Bingham, called an assessment of 2c. a share, which if all paid in will bring \$10,000. Including the June pay-roll, the company has obligations aggregating a little more than \$17,000. A new hoisting plant, also an air compressor, were recently installed at an expense of \$11,000. Driving for a ledge from which much ore was taken on the upper levels is now in progress.

#### Leadville. July 14.

Molybdenum is found in paying quantities in Boulder county, Colo., and several years ago the same metal was found in the Maid of Erin mine here, but it was never separated, simply being shipped as lead with the balance of the ore from the mine. Since that time several properties in the camp have produced small bunches of the mineral, but no effort was ever made to find any extensive bodies. During the week Dr. F. E. Neres, of New York, visited the camp to locate bodies of molybdenum, and near the Climax, at the head of Big Evans gulch, secured a property that had the desired mineral. He says that the body contains high- and low-grade ore, both in sufficient quantities to work successfully; arrangements are being made to get the stuff out. The doctor was also of the opinion that Leadville contained large bodies of tungsten ore and said that when he returned here in about three weeks he would give the matter his attention.

Prospect work with the diamond drill has been carried on at the Ollie Reed property, South Evans, for the past few weeks and the results have been so encouraging at No. 1 shaft that the drill this week will be taken to No. 2 shaft, and that portion of the ground thoroughly prospected. It is reported that a good body of ore has been located 100 ft. below the present depth of No. 1 shaft and that in the course of a few days sinking will be started to the new orebody.

A great deal of activity is being shown:

at present in South Evans gulch, and the strike in the Favorite has given mining an impetus, going to prove that the hill contains large bodies of ore that only wait development. The Favorite is shipping about 40 tons daily of ore that will net \$30 per ton. The Silent Friend people have completed the last lift on the shaft, making it now 425 ft. deep, and are drifting in both directions; in the west drift it is expected that only 10 ft. further have to be driven before the ore-shoot that was lost in the upper workings will be opened. From the 150-ft. level of the Izard, a drift is started to catch the ore-shoot from the Favorite. On the Little Ellen two drifts are being run, north and south, to catch the Silent Friend shoot. The New Monarch Co. is shipping from its three shafts, the Winnie, Cleveland and New Monarch, the tonnage being in the neighborhood of 350 tons daily.

At the Little Jonny, a mine that was supposed to be played out, 250 lessees are at work and all are doing fairly well. The output from the mine is in the neighborhood of 6,000 tons per month, nearly all silicious ore, coming from No. 2 shaft. Some work is being done at No. 4 shaft, at the bottom, 1,300 ft. down, and some good copper is being shipped. At No. 2 shaft several lessees have opened up pockets of rich gold ore, and have taken out ore valued at to \$30,000 in a few days. This rich ore is found in the large bodies of low-grade silicious ore. Considerable oxide is also being shipped.

The Parson shaft, lower Rock hill, is down 225 ft., and is entering the lake bedding, and making 200 gallons of water per minute. The water is giving a little trouble, on account of the sand that filters into the valves of the pump. The other two shafts in this section, the Mike and Frank, are still in the wash, but gradually getting toward the lake bedding.

At the Penrose, the water will be down sufficiently in a few days to permit the large station to be cut for the accommodation of the compound pumps; when they are installed drifting toward the Coronado will commence. From the Coronado, about 300 tons of silicious lead is being shipped daily, and from the Northern, which belongs to the same company, a good grade of iron is being sent out.

Last month the Ballard, Breece hill, did considerable dead-work, but was able to ship 800 tons of a good grade of silicious ore. Some dead-work has yet to be done, but the manager expects to have it finished this week. The shipments for the month will reach 1,200 tons. An effort will be made to locate another body of bismuth in the property, similar to the one that was found in the upper workings.

#### Calumet, Mich. July 15.

Articles of incorporation of the Frontenac and Manitou mining companies have been filed with the clerk of Houghton

county. Each corporation has a capital stock of \$500,000, divided into 20,000 shares of a par value of \$25 each, and both are believed to be controlled by interests identified with the Eastern management of the Calumet & Hecla Mining Co. The incorporators are James MacNaughton, Edward S. Grierson, E. D. Johnson and W. M. Gibson, of Calumet, and Allen F. Rees, of Houghton. Mr. MacNaughton holds 19,500 shares of the capitalization of each company as trustee. As he is general manager of the Calumet & Hecla, and Mr. Grierson, Mr. Johnson and Mr. Gibson are, respectively, chief engineer, purchasing agent and assistant superintendent of that corporation, it is evident that the Calumet & Hecla is closely identified with them. It is generally understood that the two new companies will take over the 40,000 acres of mining lands in Keweenaw county, which were taken under option by Charles A. Wright, of Hancock, some months ago and assigned by him to the City Trust Co., of Boston. The lands are adjacent to the route of the Keweenaw Central railroad, now under course of construction. During the last few days two diamond drills were taken to the old Delaware mine, which is included in the purchases, and it is presumed that exploration work will be started within a very short time.

Exploratory work by the Keweenaw Copper Co. was begun this week, a diamond drill being taken to the Medora property and put in service on that tract. As soon as the necessary preparations can be made, another drill will be placed in operation on the Mandan property, another old mine owned by the Keweenaw Co. It is the present purpose of the management to confine its exploratory work to diamond drilling. A geological map of its properties will be made, and this will guide the extensive development planned for the following months.

The Keweenaw Central railroad has 10 miles of its line graded between Lac La Belle and the Phoenix mine. The contract for grading the route between Phoenix and Calumet has not been awarded, as some minor specifications need to be supplied before bids are made.

Dredging in the old canal which connects Lac La Belle with Lake Superior was started July 1. The channel will be dredged to a depth of 14 ft. this fall, but next spring further work will be done, so that boats of 20 ft. draft may enter. Docking facilities are being provided near the old stamp mill. A merchandise dock, which was used by the Delaware Co. during its active career many years ago, is being put in repair.

Another hole is being bored with the diamond drill on the property of the Tecumseh Mining Co. The site of the present hole, No. 2, is quite close to the southerly boundary of the Laurium Mining Co.'s land, and in the immediate vi-

cinity of the point where the latter company is understood to have secured a favorable core some time ago. The Kearsarge lode was encountered in the Tecumseh's No. 1 hole at a depth of 265 ft. The core revealed the characteristic Kearsarge lode rock. No. 2 hole is being put down on the incline of the lode, and will probably be continued to the maximum depth of the outfit, 500 feet.

Shipments of mineral from the Wolverine, Mohawk and Atlantic mines are now being forwarded to the Michigan Smelting Co.'s plant, in which they are part owners. During several months past mineral from these mines was handled by the Calumet & Hecla smelter at Lake Linden.

The June production of the Lake Superior copper district slightly exceeded 18,250,000 lb. of refined copper, a decrease from the May output. There should be a substantial gain over those figures this month.

The Michigan Co. has started unwatering the old Rockland shaft on the Minnesota conglomerate bed. This work will take a few weeks. Mining operations at that point will be resumed as soon as the property is dry.

#### Spokane. July 13.

The Chemung Mining Co., which recently failed in its efforts to have a receiver appointed for Kennedy J. Hanley, to accept the judgment of \$420,000 which he has secured from the Empire State-Idaho Co., is appealing the case to the Supreme Court of Idaho. The Chemung Co. asserts that Mr. Hanley, in buying his eighth interest in the celebrated Skookum mine, acted as trustee for the Chemung. It is accordingly setting up the claim for the amount of the judgment which he secured from the Skookum interest.

The Monarch Mining Co., operating in the Cœur d'Alenes, has acquired from Mrs. Elizabeth Darling title to the Monarch group for \$15,000.

Systematic work will be commenced immediately on the Humming Bird, which has been idle for 18 months, while patents were pending. The group is near Burke, Idaho, and machine drills will be worked with power supplied from the Tiger-Poorman mine.

The Atlas Mining Co., a Spokane corporation operating in the Buffalo Hump district of Idaho, is in the throes of reorganization. The mine put in a 10-stamp mill several months ago, but the saving on the plates was so small that there was no profit. The company carries a debt of \$40,000, due James G. Berryhill, a lawyer of Des Moines, Ia., who is one of the large stockholders. To protect the loan the company plans to reincorporate with the same capital, \$1,000,000, in \$1 shares, assessable for 10c. each. All the Spokane stockholders have assented to the plan, but it is not certain whether the reorganization



can be completed, as a single shareholder can block the project.

The Jumbo Mining Co., of Buffalo Hump, Idaho, has levied an assessment of 3c. a share. It comes as a surprise, for the Jumbo has been working its 24-stamp mill steadily. It is reported, however, that the saving on the plates is only about 35%, and while a chlorination plant was recently erected to treat the concentrate or the tailing, it has not been out in successful operation.

#### Goldfield. July 13.

At Rhyolite, in the Bullfrog mining district, the latest sensation is the report just received of the returns from the Reno smelter of the last 60 tons of ore shipped from the Montgomery-Shoshone mine. The total figure for the shipment is \$43,500, or an average of \$725 for the whole 60 tons; 30 tons reached an average value of \$1,150 while the other 30 averaged \$300. In the selection of this ore for shipment, the company has thrown out on its dump ore that will run high, which will be reserved in bulk until such time as there are better facilities for transportation, or until the company has its own mill. The men are now working in the drifts and in the winze that has been sunk from the main tunnel. In the latter operations have ceased for the present, all hands being engaged in taking out ore. The face of the tunnel, which is now 160 ft. in the mountain, is in the same rich talc which the company encountered when ore was first struck. The bottom of the winze, which is now 100 ft. deep, is in talc, mixed with quartz carrying values in gold and silver. It was from the winze that the ore for the recent shipments was taken.

The Goldfield-Belmont (in which Keith & Brock, of Tonopah, are interested) is being developed near Diamondville, and is in charge of W. H. Blackburn. The ore here is in, and adjacent to, rhyolite dikes.

The Quartzite mine, belonging to the Diamondfield Mining Co., is situated at Black Buttes, and has shipped a considerable tonnage of ore of high grade. John McKane and associates, of Tonopah, are concerned in the company. In the same locality is the property of the Black Butte Mining Co., in which Patrick Bros. are interested.

The H. L. Frank Co., of Butte, Montana, has a mill for ore testing near Columbia, in Goldfield district, and plans to erect a mill of large capacity after preliminary determinations have been shown.

The January mine belongs to the Goldfield Mining Co., of Nevada. It adjoins the Combination, and has been operating since February, 1904. It has a series of veins, having a general north and south strike, but with numerous stringers running in other directions. Its vein structure is quite similar to that of the Combi-

nation, with a similarity in the ore. Here, as elsewhere, the semi-sulphide zone contains much free gold. Solid sulphide ore was obtained in a drift on the 230-ft. level. Over 1,000 ton of ore has been shipped, averaging \$170 per ton. Of the mill ore on the dump, 900 tons will show \$65 per ton; 4,000 tons, \$42; and 3,000 tons, \$20 per ton. H. T. Bragdon is manager of the property.

The Jumbo, lying north of the combination, has a vein parallel to those of the latter. C. D. and H. L. Taylor are in charge. The deepest working has reached 250 ft. Sulphide was encountered at 200 ft.

The American Milling & Water Co., A. E. Doran manager, is erecting a mill at Goldfield, having three Nissen stamps with concentrators and cyanide vats. The work is superintended by A. Hamilton, late of Johannesburg, South Africa.

The Florence-Goldfield Mining Co. (operating the Florence mine) has a 330-ft. shaft, with five levels running therefrom, 50 ft. apart. Sinking to the 350-ft. level is in progress. Stopes have been opened on the 50, 100, 150, 200 and 250-ft. levels. This work shows an interesting vein formation, with good value (18 ft. of ore on the 100-ft. level). Frank Oliver is superintendent.

#### Bisbee. July 15.

At Wolverine, which is drifting toward the big series of faults that cut it off from the rest of the camp, and in which it is hoped there is an ore concentration, great progress is being made. The drifts are already quite long and rather difficult of ventilation, but last week on the 500-ft. drift an advance of 44 ft. was made. On the 300 ft. drift the advance was 41 ft. The face of the lower drift is now more than 900 ft. from the shaft—within, say, 200 ft. of where there are supposed to be fault planes cutting deep into the mountain. On the 300-ft drift they are now 500 ft. in from the shaft, and are rapidly reaching the faults. On account of the steep rise of the mountain, the 500-ft. drift is now more than 1,000 ft. below surface and is rapidly getting into deeper formation. The sides of the mountain here are practically vertical.

Operations are stopped at the Bisbee-Arizona, on account of a shortage of funds, and just how soon it can resume is a matter of doubt.

According to reports from the north, especially from Minneapolis, Minn., where the property is owned, the Copper Buttes mine, near Globe, is, temporarily at least, unable to do any work at the prospect. It has a shaft down more than 450 ft. and has a most encouraging surface showing, but there is a large amount of stock out, which is quoted at very low prices, and it is difficult to raise any more money. The Wallace Contracting Co., of Duluth,

Minn., sunk this shaft and took pay in stock.

The Denn drill strike of ore was some 30 ft. of carbonates and oxide ores, fairly high in copper, at the depth of 950 ft., and is a most encouraging event. It adds to the information as to the course of the porphyry contact and strengthens the theories of those who have of late contended that in these was the promising field for new development in the Warren district.

With the enlargement of the Copper Queen smelter now under way, the furnace building will be 600 ft. long. Already the flue chambers have been completed, the foundations completed for three large furnaces, and the flues for them run on the roof. The present steel power-house, which is 200 by 80 ft. is being lengthened 100 ft., and will be filled with new blowers, blowing engines and dynamos. This power-house is the model of its kind for the Southwest. An extension of 40 ft. is going up on the boiler-house, where are the Stirling boilers. A large cooling reservoir has been constructed near the plant to store and re-cool water used in the plant. The former cooling towers with fans were good enough, but for this immense plant would be too cumbersome and costly. A new and larger pumping station has been built and thoroughly equipped.

#### Butte. July 11.

The Pittsburg & Montana Copper Co. started its smelter yesterday, and so far it has done good work. The machinery is in perfect order. All of the ore-bins are full of ore and there are several thousand tons outside of the bins. The plant will not reach its capacity for several days. The process in use is the one devised by Ralph Baggaley, manager of the property. The ore treated is a mixture of that taken from the company's Butte mines and some taken from its outside mines, the object in mixing them being to obtain the requisite natural fuels which the ores contain. There is no concentrating; the ore is going through the converters in its crude state, the melting being accomplished by means of a heavy air-blast.

The Raven Co. has opened up two of the veins crosscut recently at a depth of 800 and 1,200 ft. One is 5 ft. wide and carries 6% copper, and the other is 7 ft. Its mineral value has not been thoroughly tested.

The fire in the St. Lawrence mine, which broke out about 12 years ago, is still burning, but is kept well under control. It occasionally breaks out in a new place, but the Amalgamated fire department checks it without trouble.

According to figures submitted by mining companies to the county assessor for the purpose of taxation, the net output of mines in Silver Bow county during the year ending June 1 aggregated \$9,956,430.

The American Gold Field Co., of which Miss Sallie Kirk is president, expects to be sluicing its ground in Goodrich gulch, 50 miles southeast of Butte, in about three weeks. It is installing hydraulic machinery and excavating a ditch for water.

Dr. Peter Mussigbrod is shipping \$8,000 of gold ore per month from his mines in the Garnet district. Last month Samuel I. Ritchey, owner of the Nancy Hanks and Tiger claims, shipped one carload to East Helena that yielded \$20,000. Ritchey is loading two more cars with a similar class of ore, taken from the Tiger.

The Pittsburg Co. is preparing to sink another shaft on its Butte property. It is now drilling for a suitable spot. The shaft will be sunk 1,200 ft. and connected with the two others at the bottom.

A vein of gold ore 60 ft. wide has been struck in the Hannah claim, 48 miles west of Butte. Its average value is \$5.50 per ton. The owners are opening it up and are figuring on building a mill in which to treat it, for it is not rich enough to ship.

The vein of the Anaconda has been crosscut at the 2,400-ft. level and found to be richer and larger than at any other place above.

The Montana Zinc Co. is installing additional machinery for saving the mineral in the Alice ore and expects to have the plant in full operation by the last of next week. United Copper is removing the old hoisting engine from its Cora mine, preparatory to planting it on the Lexington, a portion of which is under lease and bond to F. A. Heinze. The last payment on the property is due next April, and Mr. Heinze is negotiating with Louis Girard, of Paris, France, for an extension on the bond. He is being assisted by Fred J. Rowlands, of Butte, who worked up the deal in the name of Adolph Vietor, of New York. Mr. Rowlands is now in Paris, having been sent there by Mr. Heinze two months ago to consult Mr. Girard in connection with the proposed extension. Mr. Heinze is now on the way to Paris to see Girard.

#### Toronto.

July 13.

Hon. W. S. Fielding, Finance Minister of Canada, announced in his budget speech last week that the tariff regulation under which alluvial gold-mining machinery is admitted free of duty will be continued for another year. Some changes have been made in the lead duties. The duty on dry white lead has been advanced from 5 to 30%. Pig lead, refined outside of Canada from lead bullion produced from Canadian lead ores smelted in Canada, hitherto admitted on payment of duty on the cost of refining only, must pay full duty. Orange mineral, dried white lead and dried lead, corroded

outside Canada from pig lead produced from ores mined and smelted in Canada, previously admitted on payment of duty on the cost of corroding only, must pay full duty. The reason for these changes is that pig lead is now produced in Canada from lead bullion obtained from silver-lead ores smelted here, and that corroding works are in operation in Montreal.

The Canadian Government has appropriated \$5,000 as a contribution toward the entertainment of the members of the American Institute of Engineers during their visit to Dawson. Acting Governor Wood, of the Yukon Territory, will have discretionary power in its expenditure.

Favorable reports as to gold mining operations in the Eastern Ontario region have been received, showing some revival of activity. The Craig Gold Mining & Reduction Co., the stock of which is principally held in New York State, has 80 men employed in the mine at Bannockburn, in Hastings county, in development and production work. The ore, which is of a low grade, averaging about \$3.50 per ton, is abundant, and there are five shafts, from 150 to 200 ft. deep, on the main vein. The company has put in a Merralls mill. By Sept. 1 it expects to mill from 125 to 150 tons per 24-hour day. The Star of the East mine, Barrie township, in Frontenac county, is being steadily operated, with modern plant, and is yielding satisfactory results. The Richardson property, at Eldorado, in Hastings county, famous as the spot where gold was first discovered in Eastern Ontario in the sixties, has been in litigation for many years; it has now been secured by W. A. Hungerford, manager of the Craig Gold Mining & Reduction Co., who will make a thorough examination. The Big Dipper Mining Co. has obtained a large tract in Barrie township, assays from which are promising. The plants of the Cordova Exploration Co., in Belmont township and the Canadian Gold Fields at Deloro have been closed for some time. Mr. Kirkegaard, formerly manager of the Deloro concern, is trying to effect a consolidation of interests, under which they can be worked economically with modern equipment.

The first Portland cement made in the Maritime Provinces was turned out July 11 by the Sydney Cement Co., Sydney, Cape Breton. Tests of the output were considered highly successful by the officials.

By a decision of Judge Meredith, Rinaldo McConnell, a prominent mining man of Ottawa, obtains a tract of mining land in Thunder Bay district, which he agreed to purchase from Henry Lye, of Vancouver, B. C., for \$3,600. A dispute having arisen, McConnell brought action for the performance of the contract, which has resulted in his favor.

#### Victoria, B. C. July 10.

The revised statistics of the production of lead in the Kootenay districts of British Columbia during the fiscal year ended June 30, 1904, show the quantity to have been rather larger than the approximate total given last week. The actual production was 55,752,019 lb., or 27,876 tons, of which nearly 17,000 tons were from lead ores smelted in the province, and the balance, of a little less than 11,000 tons, from ore shipped to Europe by the St. Eugene mine, East Kootenay. As indicating the stimulating influence of the bounty paid on lead from ores mined in the province, it is noteworthy that the production of metallic lead during the fiscal year under notice was within 7,606,000 lb. of the maximum quantity produced in any one year, and was more than three times that of the calendar year 1903. The Lead Bounty Act came into operation on Oct. 24, 1903, but no money was disbursed under its provisions until April, 1904. The comparatively high production in 1900 and 1901 was due to the fact that the United States lead market was open to British Columbian lead in those years, which has not since been the case. Official statistics covering 10 calendar years show the lead production of the province to have been as follows, in pounds:

1895.....	16,475,464	1900.....	63,358,621
1896.....	24,199,977	1901.....	51,582,906
1897.....	38,841,135	1902.....	22,536,381
1898.....	31,693,559	1903.....	18,089,283
1899.....	21,862,436	1904.....	36,646,244

*East Kootenay.*—The Crow's Nest Pass Co., has commenced the shipment from its Coal Creek colliery to Seattle, on Puget sound, by Great Northern railway, of 2,000 tons of steam coal for test purposes on the new steamer *Dakota*, which will shortly make her maiden trip on the Orient line, recently established by the Great Northern Railway Co. It is stated that if this test prove the superiority of the Crow's Nest coal over other available steam fuel, arrangements will be entered into for obtaining from Coal creek regular supplies for this important line of ocean-going steamships, and a large bunker will be erected on the wharves of the Great Northern Co. at Seattle. Further, the use of this coal by other steamers plying in Pacific waters may be expected.

*Boundary.*—The new main shaft at the Granby mines is to be double compartment and on the incline down to 500-ft. depth, below which it is not intended to sink for the time being. Crosscuts from each existing level in the mine will admit of simultaneous sinking and raising at several points and thus greatly facilitate the completion of this work. The shaft will be large enough to allow 3,000 tons of ore to be hoisted in two eight-hour shifts. Balanced 3- to 4-ton skips will be used, and the electric hoist, specifications of which are now at the manufactory, will be operated by a 200-h.p. motor. At the com-



pany's smelter, at Grand Forks, the installation of the seventh and eighth furnaces is in progress. These are the largest yet built for British Columbia—48 by 210 in., inside measurement, at the tuyeres, of which there are 24 on each side. A large Connersville blower, having a capacity of 30,000 cu. ft. per min., as against the 12,000 limit of those now in use here, and to be run by a 300-h.p. electric motor, is part of the additional equipment rendered necessary by the enlargement of the treatment capacity of the works. The new double-cylinder blowing engine for the copper converters, with a capacity of 6,000 cu. ft. per min., will also have a 300-h.p. motor for driving power. This will give, with the engine now in use, a total of 10,000 cu. ft. per min. for the converting operations. Another addition to the labor-saving appliances at these works is an automatic slag conveyor, similar to that in use at the Washoe smelter, Anaconda, Mont., and which provides the most modern and economical method of handling converter slag. All through the Granby Co.'s works the plant and equipment are being brought up to a daily treatment capacity of from 2,700 to 3,000 tons of ore, which capacity will be reached in August.

*Coast.*—The struggle between the Nanaimo branches of the Western Federation of Miners and the United Mine Workers of America, respectively, recently, assumed a new phase. The latter declared work at the Western Fuel Co.'s Northfield No. 4 (or Brechin) mine 'unfair' and called out the men. The Western Federation men took the position "that it is absolutely unnecessary to interfere with Brechin, the trouble between the men and the Western Fuel Co. being confined to No. 1 mine," so a secret ballot was taken upon the question of whether work should be continued or not, with the result that 41 voted to continue work as against 7 to stop it. The United Mine Workers claim that few, if any, miners voted, and that the number in favor of work was made up almost altogether of bosses, topmen and boys. No interference had been sought by the United Mine Workers with mechanics, fire-bosses, timbermen, and those engaged in the important construction work the company is doing, but only with those actually engaged in producing coal. The outcome of the want of unanimity among the men has been that the company has closed the mine and discharged all but a few men who are required to complete some construction.

Mexico.

July 12.

Mining and smelting people in the Republic, especially those associated with the two companies, are considerably interested in the negotiations which it is known are pending between the American Smelting & Refining Co. and the Torreon

Metallurgical Co. for the sale of the latter's plant in Torreon to the former company. Had the trust gone after the Torreon people at the start with the wisdom with which it is usually credited, it could have easily driven them to the wall; but now they have enough mines to be independent and can laugh at the trust's efforts, and can hold out for a stiff figure in the present deal. Late last year the American Smelting Co. made an offer for the Torreon smelter, but it was not considered. Recently, however, during the trip of Ernesto Madero, president of the Torreon Metallurgical Co., to New York, another offer was made, and it is being considered. As yet, though, it is not believed any agreement has been reached, for it is understood that \$5,000,000 Mexican is being asked, which is about half a million or so more than the trust feels willing to pay. That the trust intends to get it, however, is shown to be almost certain by the fact that considerable work and a number of moves in connection with the new plant, now in course of construction at Velardeña, near Torreon, have come to a complete halt. It is probable, if the sale goes through, that the Velardeña plant will not be made as large as at first intended, and that one may be devoted to copper and the other to lead. It is also most probable that the deal will delay matters in connection with the American Smelting Co.'s new plant in Chihuahua. It is understood that the little smelting plant at San Lorenzo, near Velardeña, of the American-Mexico Mining & Development Co., of Chicago, is having financial difficulties, which may force it to close down. There are also rumors regarding the stock dealings of this company at the Chicago end.

London.

July 7.

At a recent special meeting of shareholders of the Arizona Copper Co., Ltd., held in Edinburgh, some interesting information was given by John Gill, a director, who had recently visited the property. Within a short time the amount of ore treated will be 1,750 tons a day, which on an average content of 3% should produce 17,000 tons of copper per annum. Arrangements are also in hand for erecting another concentrator to treat an additional 700 tons a day, so that eventually the consumption will be 850,000 tons of ore per annum and the product 21,000 tons of copper. It is estimated that there are 10,000,000 tons of ore ready for extraction, a supply which will last for 12 years. In addition to this ore, there is every indication that the Coronado vein, now being developed, will provide very large supplies of ore, but it is impossible to give any exact estimate of it. The half-yearly report of the company for the period ended March 31 last, is not yet published. The directors announce that the profits for the period, subject to final audit, are £155,000.

A good deal of attention has recently been paid by the investing public in England to the position of the Anglo-Sicilian Sulphur Co., and in view of the recent developments of American sulphur production, the future of this company will be followed with interest in the United States. It will be remembered that the company was formed about 10 years ago for the purpose of regulating the market for sulphur, which had just previously been very much disorganized by the discovery of the Chance process. The company was in effect a trust, not a combination of producers. Agreements to last 10 years were made with the producers of native sulphur in Sicily and with the chemical manufacturers in England, by means of which the marketing was effected in a steady and systematic manner. There was no outrageous advance in price, nor were small people frozen out. The bulk of the capital of the company is in 6% preference shares, and there is only a small amount of common stock. Dividends have been paid with regularity and large sums put to capital guarantee fund and reserve. There is also a large stock of sulphur on hand. The company is in a critical time, because the 10 years' contracts are running out shortly, and arrangements have already been made to postpone the financial status of the company as required by its articles of association. The preference shareholders do not share in surplus assets in case of winding up, and the present assets would enable the ordinary shareholders to buy out the preference. In any case, unless the contracts with the producers can be renewed on favorable terms, the company could not continue in business, and considerable disorganization would take place in the sulphur trade in case the company liquidated. Altogether the present time is an anxious one for both the shareholders and the sulphur producers.

The prospectus of the Copper Cliff Mines of Montana, Ltd., an English company, has been published this week. The capital is £200,000, divided into £135,000 in vendors' shares and £65,000 in priority shares. The latter are being offered to the public. As £35,000 of them have been underwritten, the flotation of the company will be completed whether the public subscribes or not. From the prospectus, there does not appear to be any great attraction. The properties are in Powell county, Mont., 11 miles from Bonita, and the present vendors took a hand in introducing them in England nearly three years ago. The only report which accompanies the prospectus is by Harold Wilson. It is dated two years ago, and was made for K. H. James, of James & Shakespeare, the metal merchants, who, however, apparently did not take any further steps in connection with the matter, nor is he interested in any way in the present flotation.

### General Mining News.

**Petroleum Exports.**—Exports of mineral oils from the United States, for June and the fiscal year ending June 30, are reported as below, in gallons:

	June.	Year.
Crude.....	10,871,069	100,661,199
Naphthas.....	2,375,044	29,117,361
Illuminating.....	79,701,776	805,783,488
Lubricating and paraffin..	7,399,439	94,600,144
Residuum.....	2,230,874	46,778,192

Total.....102,078,202 1,076,940,384

The total for the year shows an increase of 120,252,979 gal., or 12.6%, over the previous year. The total values reported were \$76,819,216 in 1903-4, and \$77,073,296 in 1904-5; an increase of \$254,080, or 0.3% only, indicating a lower range of values.

### ALABAMA.

**Central Railroad Co. of Georgia.**—At a special meeting held in Macon, July 15, it was voted to issue \$500,000 in bonds for the purpose of buying coal lands in Alabama. The mines on these lands will be open and operated by the railroad company, chiefly for the purpose of supplying fuel to the railroad.

### ARIZONA.

#### GRAHAM COUNTY.

**Arizona Copper Co., Ltd.**—This company reports that the production of its mines at Clifton for the month of June was 1,239 short tons of copper. Alterations and repairs in progress affected the production.

### CALIFORNIA.

#### EL DORADO COUNTY.

**Rosecranz.**—Work has been commenced on this mine under the supervision of W. J. Holland. A new shaft is to be sunk and levels run at each 100 feet.

#### INYO COUNTY.

**Pleasant Cañon.**—This cañon begins at Ballarat, in the Panamint range, and extends 10 miles east. The miners are working a series of small, but rich, veins and crushing with pestle and mortar and two or three small mills.

#### KERN COUNTY.

**Zenda Mining and Milling Company.**—At this property, Amalie, a stamp mill is to take the place of the roller mill now in use, and the concentrators will also be changed. The plans are to instal 30 stamps.

#### MARIPOSA COUNTY.

**Ferguson.**—L. and E. Mason have leased and started work on this old mine, near Hites Cove. It has been idle some years.

**Dredging Ground.**—Oroville men have bonded several tracts of ground between Snelling and Merced Falls and are about to test them for dredging, with Keystone drills.

**Le Grande Mining Co.**—A proposition has been accepted from Messrs. Dibbler & Cochrane, of Oakland, to bond this property. They propose to put up ma-

chinery, increase the force of men, and vigorously develop the mine. The milling capacity is also to be increased.

#### NEVADA COUNTY.

**Redding Gold & Copper Co.**—This company is about to begin work on the dam in Clear creek, where the water is to be taken to generate power and to make it possible to work the creek bed.

**Placers.**—W. F. Beeler, after working for years on Oregon Gulch, four miles from Redding, has struck a bed of rich gravel at a depth of 9 feet.

#### SIERRA COUNTY.

**Empire Gold Mines, Ltd.**—In the Empire mine of this company, in Gold Valley, south of Mohawk, and 12 miles north-east of Downieville, a new body of pay ore has been found to the west of the pay shoot worked years ago. From the 500-ft. level drifts will be run both east and west. The shaft will be continued down to 1,000 ft. This is an old mine, having been located in the early fifties.

#### SISKIYOU COUNTY.

**Spring Gulch Mining Co.**—At this property near Yreka, men are running tunnels to open up the ledges more thoroughly.

**Headwater Mining Co.**—At this property, Humbug, J. H. Tibbetts, superintendent, operations are about to be started again.

**Jenny Lind Group.**—This group in Humbug is being prospected and developed by Mr. Wardner, of the Mono Mining Co. The latter company is about to put up a cyanide plant.

#### TRINITY COUNTY.

**Cleveland Consolidated Mining Co.**—The properties of this company have been sold at sheriff's sale to C. F. Foster, of Tehama county, and he will do considerable prospecting and development work. The ores thus far found are rebellious.

**Potello.**—F. Potello and I. Barkla have commenced to run a tunnel on this mine, near Weaverville. The ledge was found some years ago but was never developed.

**La Grange Mining Co.**—At this extensive hydraulic mine, the largest in the State, they have installed an air-compressor to furnish power for drilling the large boulders, which are to be blasted into smaller pieces. It is a new idea to use power drills for this purpose in a hydraulic mine, but a large saving is expected in labor and powder.

#### TUOLUMNE COUNTY.

**Gladys Mining & Milling Co.**—This company, owning a group of claims near Chinese Camp, will resume work next week. H. S. Weaver is president, and A. W. McQueen secretary.

**Blue Bell, Turnback and Rosella.**—These mines have been bonded by S. R. Pennington and wife to W. P. Cunningham.

**Hazel.**—This mine is being opened by Frank McPherson, who is cleaning out

the 200-ft. shaft. A hoist has been put in the property.

**Clio.**—A slate vein on the hanging wall of this mine showed such values that the mill has been running night and day on this material.

#### TUOLUMNE COUNTY.

**Mountain Lily.**—At this mine Charles Grimm, the superintendent, has commenced active operations and will thoroughly develop the property.

**Jumper Gold Syndicate.**—Development work continues at this mine at Stent and 20 stamps of the mill are kept crushing the ore.

**Water Lily.**—Charles Durgen, Lyons Bros. and others have commenced exploration work on this mine on the Stanislaus river.

#### YUBA COUNTY.

**Marysville Gold Dredging Co.**—The Marion Steam Shovel Co. is building two mining dredges for this company on the Yuba river, and has 30 men employed in their construction.

**Peerless Gold & Silver Mining Co.**—This company has been organized to work the Peerless quartz mine in the sand hills near Smartsville. Incorporators are John Byrne and John Peardon, of Smartsville, and R. P. and N. L. McKay and Chas. Metter, of Marysville.

### COLORADO.

#### CLEAR CREEK COUNTY.

**Freighter.**—Jones & Co. have received returns from a lot of smelting ores which gave them values of \$56.21 per ton, mostly in silver and lead.

**Wyandotte.**—A run of ores at the Boneita mill from this property showed values as high as \$150 per ton for the concentrate, the average being nearly \$100 per ton.

**Smelter Project.**—Eastern parties have been visiting the Empire section and have been taking samples of the ores which are suitable for pyrite-smelting. It is reported that there is a probability of a McDonald furnace and smelter being erected, the initial plant to be of 50 tons capacity.

**Sunburst.**—Arthur Roberts, a lessee, has shipped ores to the sampling works giving values of 250 oz. silver for first-class and 170 oz. silver for second-class ores.

**Lebanon.**—It is reported that Eastern parties are being interested in this property on Republican mountain by Maxton Bros., of Idaho Springs.

**Treasure Vault.**—A shipment of smelting ores brought values of 3.44 oz. gold, or \$58.18 net values, two lessees taking out 26 tons inside of three weeks.

**Silver King.**—Denver parties are the owners, and some ores carrying gold and



silver are also reported to be carrying tin values. Several pieces have been analyzed, showing tin values of from 2 to 7.11%. Henry Bolthoff, of the Hendrie & Bolthoff Machinery and Supply Co., of Denver, who is the owner, is going to erect a concentrating mill of his own designing, with special reference to the saving of the tin content.

*Commodore Mining Co.*—After a delay of several months operations have been resumed in the tunnel at Lawson, and it is to be driven at least 1,000 ft. further into Red Elephant mountain. The Tabor vein is being opened up.

*Frostburg.*—Operations are in full swing again at this property, with B. J. O'Connell, of Georgetown, in charge of operations.

*Silver Glance.*—This property, credited with a large past production, has been started up by Clark & Co., of Georgetown, under lease, and they have already opened up a 6-in. streak carrying high values in silver.

*Waldorf Mining & Milling Co.*—This company, operating near Georgetown, is going to spend \$75,000 on construction of a mill and new power plant buildings, during the next six months. The mill will be of 50 tons capacity, but it will be built and equipped with power capable of operating a 200 ton-plant.

*Hoosac Tunnel & Mining Co.*—A four-drill air compressor and 80-h.p. boiler are being installed at the mouth of the Hoosac tunnel, near Fall river, above Idaho Springs, and new buildings have been completed. The manager is E. D. Quigley, Idaho Springs.

#### BOLDER COUNTY.

*Coney Island.*—C. O. Nelson, of Eldora, Colo., has opened up a body of ore running through which there is a small streak of sylvanite carrying extraordinary value. Omaha, Neb., parties are the owners and Denver parties are interested with Mr. Nelson in the lease.

*Caribou.*—R. W. Bigger & Son have taken a lease on this property at Caribou, and dead work has been completed to the 400 ft. workings. The dump is being systematically worked and shipments of screenings and picked ores will be made to the Denver smelters.

*Colorado Tungsten Co.*—Pittsburg, Pa., parties interested in tungsten mining near Nederland, have been inspecting their interests and have decided to install new machinery and will decide later upon the advisability of needs in the shape of a larger mill for handling their ores. They also arranged with the Colorado & Northwestern road for the building of a spur to their property. V. G. Hillis, formerly of Cripple Creek, is consulting engineer and general manager; D. J. Badger, recently of the Standard mill at Colorado City, is superintendent of mills;

Charles P. Oliver, late of Cripple Creek, is superintendent of the mine.

#### GRAND COUNTY.

*Eureka Consolidated Mining Co.*—At strike is reported in the main tunnel of this property in the Bowen & Campbell district, near Grand Lake, a large vein showing values in gold and silver. The company is figuring on installing machinery. John A. Burns, Grand Lake, Colo., is superintendent.

*Williams Fork Mining Co.*—Eastern and Denver parties are interested and they have started up their mill and are running on ores from the Bobtail mine, 35 miles southwest of Hot Sulphur Springs. Frank Straub, Exchange Building, Denver, is manager.

#### IDAHO.

##### SHOSHONE COUNTY.

*Finch & Campbell.*—The Alhambra near Wardner, on the same zone as Bunker Hill & Sullivan, has been developed by 2,500 ft. of adits and crosscuts, all in the quartzite. The Bell group, near Gem, on Cañon creek, has 4,000 ft. of development, the upper workings being in ore. A lower crosscut is being driven that will give 800 ft. depth. The Star group adjourns the Morning mine of Larson & Greenough, at Mullan, having the same ore characteristics, and is being developed. E. H. Moffitt, of Wallace, represents those interests.

*Federal Mills.*—Mace mills No. 1 and 2, at Wallace, concentrate 1,050 tons daily; the Tiger-Poorman mill at Burke handles 360 tons per day and the Sweeney mill, below Wardner, takes 500 tons per day. G. W. Ruggles superintends the Mace and Tiger-Poorman mills, and E. S. Wiard the one at Wardner.

*Pittsburg.*—This property is on Nine-Mile creek, 2 miles from Wallace, and belongs to the Pittsburg Lead Mining Co., of which J. H. McClarren is president and manager. The company is composed of Pittsburg people. The property has a wide vein of galena and lead carbonate in the quartzite.

#### ILLINOIS.

As noted last week, work has been resumed in the coal mines, under the arbitration decision. The summing up of that decision was as follows: "On the whole, it seems to me equitable and just that until experience is acquired in the matter of the employment of shot-firers, provided for by the act, one-half of the expense necessary to their employment should be reimbursed to the operators by the miners.

"I therefore judge and award that the miners in each mine, covered by the contract of the Illinois State agreement of April 4, 1904, reimburse the operator or operators of such mine for one-half of the expense and outlay necessary to the employment of inspectors under the act

of the legislature of Illinois in that behalf."

The executive boards of the Illinois Coal Operators' Association and the United Mine Workers of Illinois met in joint session at Springfield, Ill., to determine the wages of the shot-firers and the conditions of their employment, prior to opening Judge Gray's decision. A subcommittee of two from each body was appointed, and after several sessions reported the following supplemental agreement, which was adopted, and which will be in force until the present contract expires, April 4, 1906:

"1. The shot-firer shall go into the mine a sufficient length of time, not less than three hours before the regular quitting time of the mine, to satisfy himself by examinations and inspection of the shots he is to fire, that they have been properly placed and prepared. When examining shots the shot-firers shall work single; when firing shots they shall work double.

"2. The rate of wages to be paid shot-firers shall be \$4 per day of eight hours.

"3. The question as to whether squibs or fuse shall be used is left to the discretion of the mine manager and the shot-firers in the respective mines where shot-firers are employed. Wherever a dispute arises relative to the advisability of using fuse or squibs, the same shall be settled by the State mine inspector for that district, after having made a personal investigation to satisfy himself as to which would be safer.

"4. Where but few miners are employed, the operator shall have the right to designate two practical miners as shot-firers at an hour rate equivalent to the day rate above mentioned."

#### INDIANA.

*Vandalia Coal Co.*—The largest deal in the history of the Indiana coal fields was consummated during the week, at Trenton, N. J., by the incorporating of the Vandalia Coal Co., with a capital of \$7,000,000. A. M. Ogle, of Indianapolis, president of the Island Coal Co., is president of the new company. Mr. Ogle says the object in forming one big company is two-fold—to protect the operators along the lines of the Vandalia railroad in Indiana against the encroachments of the big concerns, and to make it possible to operate the mines at a profit. "Under present conditions," Mr. Ogle said, "a number of the 27 mines that are to be taken over by the new company have been operated at a disadvantage. They have been unable to obtain a sufficient number of cars and this has limited their output. Our plan will make necessary the closing of some of the mines and increasing the output of the remainder. By lessening the cost of production we shall be able to sell coal cheaper." Among the 27 companies that have been bought up by the Vandalia Coal Co. are: Island Coal Co., Johnson Coal Mining Co., South

Linton Coal Co., Island Valley Coal Co., White Rose Coal Co., Enterprise Coal Co., Indiana & Chicago Coal Co., Zeller & McClellan Coal Co., Seeleyville Coal Co., Minshall Coal Co., Raccoon Valley Coal Co., Greenfield Coal Co. and the Asher-ville Coal Co. These properties are in Clay, Vigo, Green, Sullivan and Knox counties, and embrace, beside the operating plants, about 30,000 acres of coal land. The Union Trust Co., of Pittsburg, Pa., is financing the deal, which has been engineered entirely by Mr. Ogle. The officers are: A. M. Ogle, Indianapolis, president; J. McFadden, Pittsburg, vice-president; F. L. Powell, Indianapolis, treasurer and chairman of the finance committee. W. J. Snider heads the board of directors. The offices of the new company will be situated in the State Life building, Indianapolis. Mr. McFadden, vice-president, will move from Pittsburg to Indianapolis.

This coal mine merger will affect the Bicknell field to the extent of over \$400,000. The purchase price of the Bicknell & Freeman mines is \$175,000, the Big Muddy, \$100,000, the Lynn & Knox mines, \$50,000 each, and the Enterprise, \$28,000. James Driver has lease: 9,000 acres of coal land in the Bicknell field, and thousands of acres have been bought outright when the owners refused to lease.

#### PARK COUNTY.

Chicago capitalists, who are backing the Covington & Rockville electric freight and passenger line, have secured options on 2,500 acres of coal land in Park county, and propose to open up mines and carry coal to market by trolley.

#### VIGO COUNTY.

*Lower Vein Coal Co.*—This company has been organized at Terre Haute, with \$50,000 capital. The incorporators are F. C. Fishback, James Luther and George C. Richards.

#### INDIAN TERRITORY.

The mines and coke ovens of the Mexican Gulf & Transportation Co. were sold recently under foreclosure of mortgage, and were purchased by the Degnan-McConnell Coal & Coke Co., for \$80,000 cash. The property consists of two shaft openings, with buildings, and 200 coke ovens near South McAlester.

#### LOUISIANA.

##### CADDO PARISH.

*Shreveport.*—The Shreveport Petroleum Co. has a new well 300 ft. distant from well No. 1. It is 950 ft. deep; capacity not yet known. The big gasser is still burning, and the railways are running excursions from outside points to enable people to visit the miniature volcano, whose cavity is now 70 ft. in diameter and of unknown depth.

#### MISSOURI.

##### ST. FRANCOIS COUNTY.

*Doe Run Lead Co.*—A central power plant is being installed at No. 2 shaft.

There will be a 300-kw. unit to furnish power for operating the rock breakers, the hoisting engines and some of the mine pumps. If found satisfactory, additional units will be added.

*Mine La Motte.*—A judgment for \$20,322 has been obtained by C. H. Stevens, the former superintendent, against Samuel H. Leathe, the owner in Mr. Steven's time for back salary.

*National Lead Co.*—The strike of the underground shovelers for an increase in wages, after lasting a week, was broken by the men returning to work at the old rates. The property is now running on full time. While this strike has been settled, there is much unrest in the Lead Belt among the union men, who threaten to call a strike for an increase of 10% in wages, and for the expulsion of all non-union men from the mine.

*St. Joe Lead Co.*—This company has taken an option on several thousand acres of land on which it has 18 diamond drills at work prospecting.

#### NEVADA.

##### ESMERALDA COUNTY.

*Diamondfield Gold Mining Co.*—This company has elected the following officers: President, John McKane; vice-president and treasurer, A. G. Raycraft; secretary, Albert S. Watson; directors, Jack Davis and Fred W. Durfer, Jr.

##### HUMBOLDT COUNTY.

*Bonanza King.*—Makeever Brothers, of New York, have secured a controlling interest in these mines, located in Spring Valley gulch. At present there are 23 miners employed and the ores are being run through a small Huntington mill. A new milling plant is now being erected and is expected to be in working order during August, when the working force of the mine will be largely increased.

#### NEW YORK.

##### ERIE COUNTY.

A deposit of gypsum is being opened on the Wickwire property, near Akron. A shaft has been sunk to the gypsum bed, and shipments will soon be made.

#### OREGON.

##### BAKER COUNTY.

*Bonanza.*—E. P. Torrey, the assayer, and Ed. Rea are preparing a cyanide plant at this property to treat the tailing. New orebodies in the Bonanza have been opened by lessee Albert Geiser and 25 stamps of the mill are running.

*Mayflower.*—President S. R. Balkwell, and Treasurer L. C. Dennis, of the Stampede Mining Co., owning the Mayflower in the Cornucopia district, have just completed an examination of the property. They have let contracts for the balance of the machinery necessary for the erection of the 10-stamp mill and cyanide plant. George R. Boggs, of Baker City, is manager.

*Mary Ainsworth.*—Col. John Younger, George Willson and John Ferris, who are well known prospectors in the Sparta district, 30 miles east of Baker City, have just discovered in the old Mary Ainsworth mine, a new ledge of ore. Development work will be undertaken once more in this mine.

*Snake River.*—Edward Butz, of Baker City, and E. P. Johnston, of Anderson, Ind., have just come in from the Snake river, 60 miles east from here, where they have opened 11 copper claims. The claims adjoin the Iron Dike and McDougall properties. The discovery has created considerable excitement.

#### PENNSYLVANIA.

##### BITUMINOUS COAL.

*Berwind-White Coal & Coke Co.*—This company has arranged for the purchase of land in East Hollidaysburg, adjoining the Pennsylvania railroad tracks. It is said that the company will put up a large plant for building its own cars there.

The Indian Creek tract, the only large tract of undeveloped coal land in the neighborhood of the Connellsville region, is now under negotiation. It is owned by various parties who have given options to some people resident in Somerset. They have organized the Indian Creek Coal & Coke Co., and will, it is reported, soon begin operations. A spur will be run from the Baltimore & Ohio railroad through this tract.

##### LEHIGH COUNTY.

Philadelphia parties have taken hold of the property at Shimersville, which was formerly worked for iron ore, and propose to develop a corundum deposit which has been discovered on the property.

#### TEXAS.

##### HARDIN COUNTY.

*Saratoga.*—New wells opened are: Producers' Oil Co. No. 1 on the Little Jap lease, flowing 500 bbl.; Cole Oil Co. No. 1, flowing 800 bbl.; Santa Fe No. 12, a gasser—no oil. The Rio Bravo Oil Co. is laying an 8-in. pipe-line from Saratoga to Sour lake; there is over 300,000 bbl. of crude in steel tankage, and a present daily production of about 1,500 barrels.

##### HARRIS COUNTY.

*Humble.*—Moonshine Producers' Oil Co. gusher, which came in recently, extends the field half a mile easterly; this field, however, has dusters in the midst of producers. While the additional area is taken out of the wild-cat class, it is by no means all proven territory. The Landslide Oil Co. owns most of the neighboring property, and is in no hurry to develop gushers, with crude selling at 14c. The north and south limits of the field appear to be defined, but further development will be necessary to define the other boundaries. In the opinion of operators, the field has passed its most productive period; extremely wet weather has re-



tarded operations and damaged earthen tankage. The Texas Co. and the International & Great Northern Railway Co. have occasioned a storm of protests by appearing before the State Railway Commission asking the approval of an agreement, the terms of which, stripped of legal verbiage, are as follows: The railway (which has a line between Humble and Houston) will receive oil at Houston from the pipe-line of the Texas Co. and bill it to destination, not from Houston, but from Humble, absorbing the 3½c. charge from Humble to Houston, as provided by the rate sheet, and then pay the Texas Co. 2c. per 100 lb. out of that rate. By this arrangement, the Texas Co. gets the usual pipe-line charges, plus 2c. per 100 lb., from the railway, and the railway gets 1½c. per 100 lb. for oil it does not carry between Humble and Houston. The contract has all the marks of a rebate scheme and will probably not be approved.

## JEFFERSON COUNTY.

**Beaumont.**—The Heywood Oil Co. is drilling a well to the first stratum of oil-sand, and will not pierce the cap-rock below which all the gushers were located. They expect to get at least a 50-bbl. pumper and to have no salt water. The United Fruit Co. lost the suit against the Louisiana Petroleum Co. for breach of contract. The contract to supply crude oil was made in gusher times, and wisely provided for modifications to be mutually agreed upon, in case the existing conditions of the Spindletop field were altered. The gushers became pumpers, and the parties failed to agree as to new terms and prices, and defendant ceased to deliver oil. The court held, as the parties themselves could not modify their agreement, it could not make a new contract for them. The Gulf Refining Co., of Port Arthur, has filed a petition with the Interstate Commerce Commission against the Illinois Central and other railways, alleging that rates are given on south-bound oil products of the Standard Oil Co., ranging from 10 to 25% lower than the rates given complainant on similar goods shipped north, thereby enabling the Standard Oil Co. to prevent all shipments by the Gulf Refining Co. to Northern and Mississippi valley points, and confining the sale of its products to Texas and Mexico and points reached by water.

## WEST VIRGINIA.

## MCDOWELL COUNTY.

An explosion in the Tidewater mine, at Vivian, occurred July 5, killing nine miners, and injuring five others seriously. The day shift was just entering the mine, and only a portion of them had reached the workings when the explosion occurred. A portion of the men were engaged in robbing pillars in the old part of the mine, which is to be abandoned. The supposition is that the explosion was caused by a heavy shot fired in one of these pillars, which ignited the coal

dust in the mine, but the examination by the inspectors will be needed before the cause is fully determined.

## HARRISON COUNTY.

The property of the Bijou Coal Co., including a considerable area in this county, and also some tracts of land on Elk creek, in Barbour county, has been sold to the Ivory Hill Coal & Coke Co., a new concern owned chiefly in Philadelphia. The sale was made through Edward Thompson, Clarksburg, W. Va. The president of the Ivory Hill Coal & Coke Co. is John Madill, of Pittsburg.

**New River & Pocahontas Consolidated Coal Co.**—This company has filed articles of incorporation in New Jersey. The authorized capital stock is \$10,000,000; incorporators, Harry A. Berwind, John E. Berwind, P. J. Strain, E. B. Chase and H. C. Middleton.

## NEW RIVER DISTRICT.

**New River Fuel Co.**—This company has filed articles of incorporation to operate coal mines in the New River district. Among the incorporators are John P. Tincher and Theodore Plimpton, Boston, Mass.; Samuel Dixon, McDonald, W. Va.; Joseph H. Gaines, W. G. Mathews, T. W. Adams, Staige Davis and C. C. Watts, of Charleston, W. Va.

## PHILIPPINE ISLANDS.

Antonio de Yribar, of Manila, has been granted by the Insular government a patent to a tract of coal land, located in the municipality of Bulalacao, Province of Mindoro.

**Philippine Mining Co.**—This company is assembling dredges in its placer property on the Island of Masbate. An exhaustive examination of the property by several mining engineers is said to have given a general average of 40c. per cubic yard, after deducting all bonanza streaks, some of which ran into dollars.

## Foreign Mining News.

## ASIA.

## INDIA—MYSORE.

**Kolar Goldfield.**—The production of the mines in June is reported at 52,717 oz. bullion, the highest monthly figure yet reached. For the six months ending June 30 the total was 313,320 oz. bullion, an increase of 6,690 oz. over the first half of 1904. The bullion reported this year was equal to 281,988 oz. fine gold, or \$5,828,692 in value.

## AUSTRALIA.

## WESTERN AUSTRALIA.

Gold production in June is reported at 155,150 oz. fine. For the six months ending June 30, the total was 965,374 oz. fine gold.

## MEXICO.

## SONORA.

**Greene Consolidated Copper Co.**—At a meeting of the board in New York last

week, the resignation of Mr. Tustin as treasurer was accepted by unanimous vote. Alfred Romer, former president of the Produce Exchange, was elected treasurer, to succeed E. B. Tustin.

**Greene Consolidated Gold Co.**—At a meeting of the board in New York last week J. B. Showalter, of Washington, and ex-Governor U. A. Woodbury, of Burlington, Vt., were elected to succeed Philip Berolzheimer and Henry Ollesheimer as directors. Resolutions were adopted expressing the fullest confidence in Colonel Greene's ability and integrity. Col. Myron M. Parker, W. E. D. Stokes and M. L. Sperry were appointed a committee of investigation. President Greene read the report of the mining engineers and Mexican officials on the placer property, and the committee was authorized to print it. It was decided to defer the ordering of a dividend. The directors adopted resolutions indorsing Colonel Greene's management of the company.

## Coal Trade Review.

NEW YORK, July 19.

## ANTHRACITE.

The hard coal market is more than usually dull; in most of the offices the greatest quietness prevails, with little business apparently being transacted. The steam sizes are particularly slow, although their prices have not yet been affected.

Prices f.o.b. New York harbor shipping ports during July will remain as follows: Domestic sizes, \$4.55 for broken and \$4.80 for egg, stove and chestnut. Steam sizes remain at the same figures as last week: \$3 for pea; \$2.25@2.50 for buckwheat; \$1.45@1.50 for rice, and \$1.30@1.35 for barley.

## BITUMINOUS.

Although the Atlantic seaboard soft-coal trade is dull, we hear of brief spells of improvement and of a few operators who have large tonnages moving on current business. This is due to individual effort on the part of those who hold large season contracts. All grades of coal show the result of the midsummer dullness. The low prevailing freights on ocean transportation are helping the trade to dispose of part of its tonnage, since some shrewd consumers are taking advantage of the low rates and are saving probably 25c. per ton under the charges that will prevail later in the fall. Most of the offices in the city are showing the effect of hot weather and the vacation season.

Trade in the Far East is showing an inclination to take on a fair tonnage, and many of the shoal-water and out-of-the-way points are cleaning up a large proportion of their contracts at considerably reduced freights, vessels and coal being now in abundant supply. Trade along the Sound is quiet; this territory, as usual, is postponing its heavy shipments and losing many advantages and good margins

of profit. Trade in New York harbor is quiet; the shipping ports, however, have no accumulations that could affect transient prices and the current quotations prevail at \$2.30@2.40 f. o. b. New York harbor shipping points. All-rail trade seems to be fairly strong; shipments continue practically unchanged in volume and prices remain firm, with possibly a reduction of 5c. here and there in order to take business. Car supply is up to demands, but transportation is a little slow, though not behind schedule. Shippers make no objection to this, in view of their depleted order books.

The coastwise vessel market shows a good supply of craft, larger, indeed, than the coast trade is able to absorb, so that many of them are taking outside business at remunerative figures. Philadelphia quotes as follows: To Boston, Salem and Portland, 60c.; to Lynn, 75@80c.; to Newburyport, 80c.; to Portsmouth, 65c.; to Bath, 70c.; to Saco and Gardner, 90c. and towages; to the Sound, 50c. New York harbor charges 50c. to around the capes.

COAL TRAFFIC NOTES.

The Chesapeake & Ohio railroad carried in May 702,173 short tons of coal and 28,340 tons of coke; showing increases of 190,683 tons of coal and 7,655 tons of coke, as compared with May, 1904. For the 11 months of the fiscal year from July 1 to May 31, the statement shows coal carried as follows, in short tons; the origin of the shipments being given:

	1904.	1905.	Changes.
New River.....	3,433,085	4,689,144	I. 1,256,059
Kanawha.....	1,831,218	2,188,547	I. 357,329
Kentucky.....	130,107	89,946	D. 40,161
Total C. & O.....	5,394,410	6,967,637	I. 1,573,227
Connecting lines....	160,977	191,278	I. 30,301
Total carried.....	5,555,387	7,158,915	I. 1,603,528

Deliveries of coal originating on Chesapeake & Ohio lines were as follows:

	1904.	1905.	Changes.
Tidewater points....	2,290,272	2,966,586	I. 676,314
Eastern.....	826,376	1,109,875	I. 283,499
Western.....	2,277,762	2,891,176	I. 613,414
Total.....	5,394,410	6,967,637	I. 1,573,227

This shows that the coal carried to tidewater was 42.6% of the total; deliveries to points eastward from the mines being 16.0%, and westward, 41.4% of the total.

Coke traffic for the 11 months was as follows: New River, 235,008; Kanawha, 51,796; connecting lines, 633; total, 287,467 short tons, a decrease of 20,324 tons from the previous year. Of the Chesapeake & Ohio coke, 119,907 tons, or 41.8%, were carried eastward, and 166,897 tons, or 58.2%, westward.

Birmingham. July 17.

The coal production in Alabama is more extensive right now than it has been in twelve months. Work has resumed at the commercial company mines, which took a lay-off for 10 days in order to make repairs, pasture the mules and give the mi-

ners a little rest. The furnace company mines are getting out more coal than at any time since the strike of the union miners began last July. The imported labor and the negroes placed in the mines from around the furnaces and other places are getting used to the work of digging coal, and the output is almost normal.

The Pratt division mines of the Tennessee Coal, Iron & Railroad Co. have all been equipped with electric haulage machinery and other improvements, and when a full complement of laborers has been put to work, the output will be very large. The Blocton-Cahaba Coal Co. is putting electric cutting machines in the mines at Coleanor, in Bibb county.

Several new mines are being opened in the State. A new mine is well under way at Scottsville, Bibb county. The Star-Cahaba Coal Co. has been organized by Bessemer parties and considerable headway has already been made in a mine near Parkwood, on the line of Jefferson and Shelby counties. The coal is said to be first class and the seam large. Much progress is being made at the Montevallo mines, which were recently unionized, and miners are being given employment right along.

A reduction of 2.5c. per ton in the wages of miners for the month of July was announced the past week and it is now 55c. The mining wage is based on the average iron selling prices.

There is a better production of coke. The demand is steady and good prices obtain. The furnace needs are heavy.

Cleveland. July 18.

The coal situation in this territory has hardly improved during the past week. There has been some heavier buying of Lake three-quarter coal, for movement to the Northwest. It has been found, however, that a good percentage of the material which has been bought of the Lake coal producers during the past, has shifted to the western fields, some of the northwestern railroads being free buyers in Illinois. The demand has been such as to stiffen the price, although it had held at \$1.90 f.o.b. Lake Erie ports.

The steam coal situation in this immediate territory is still dragging. There is hardly any increase in the demand and the prices have not changed, holding at 90@95c. a ton at the mine for run-of-mine quality. The demand for slack is still strong, as is indicated by the price, which is holding up well, regardless of the increased supply. The market is therefore steady at 50c. for Pennsylvania slack at the mines and 60@65c. at the mines for Ohio slack, the quality regulating the price.

The coke situation is also unchanged, the market being fairly strong, but the supply good and shipments easy. The best grades of 72-hour foundry coke are

selling at \$2.50 at the oven, with furnace coke selling at \$2 at the oven.

Pittsburg. July 18.

Coal.—There was a slight rise in the rivers, which was promptly taken advantage of by shippers and nearly 1,000,000 bush. of coal were sent to lower ports. The mines in this district are operating satisfactorily and there is no change in prices, run-of-mine still being quoted at \$1@1.10 at the mine, but it is reported that sales are being made at a lower rate. The Carnegie Coal Co. has absorbed the Chartiers Coal & Coke Co. and the company was reorganized with a capital of \$500,000. The company has three mines in this district with a capacity of 1,000,000 tons a year. Some large combinations of bituminous coal interests in the five principal mining States have been formed within the past few months and several leading operators here say that plans are being considered for merging them all into one great bituminous coal combination. The railroads are interested in most of the new companies, but only for the purpose of insuring the tonnage.

Connellsville Coke.—Prices are firmer this week and for third-quarter shipment furnace coke is quoted at \$1.85@2 and about 10c. higher for the fourth quarter. Foundry coke remains at \$2.35@2.50. The production for the week was 230,809 tons, a decrease of over 15,000 tons compared with the previous week. The shipments aggregated 9,617 cars distributed as follows: To Pittsburg and river points, 3,659 cars; to points west of Pittsburg, 4,840 cars; to points east of Everson, 1,118 cars. This was a decrease of 1,225 cars compared with the shipments of the previous week.

Foreign Coal Trade.

July 19.

Imports of fuel into Germany for the five months ending May 31 were as follows, in metric tons:

	1904.	1905.	Changes.
Coal.....	2,526,818	4,169,945	I. 1,643,127
Brown coal.....	3,239,001	3,330,330	I. 91,329
Coke.....	218,575	310,198	I. 91,683
Total.....	5,984,394	7,810,473	I. 1,826,139

The most important imports of coal were from Great Britain. The large increase was the result of the miners' strike. The brown coal, or lignite, is all from Austria.

Exports of fuel from Germany for the five months are reported as follows:

	1904.	1905.	Changes.
Coal.....	7,277,840	6,833,477	D. 444,363
Brown coal.....	9,073	8,639	D. 434
Coke.....	1,092,572	1,032,089	D. 60,483
Total....	8,379,485	7,874,205	D. 505,280

The chief exports of coal were to Austria, Holland, Belgium, Russia and Switzerland; of coke to France, Austria and Belgium. There were 8,245 tons of coke shipped to the United States this year.



The production of coal in Germany for the five months ending May 31 was, in metric tons:

Coal.....	49,216,861	47,288,218	D.	1,928,643
Brown coal.....	19,509,148	21,308,086	I.	1,798,938
Total mined..	68,726,009	68,596,304	D.	129,705
Coke made.....	4,981,379	5,197,463	I.	216,084
Briquettes made	4,634,225	5,122,911	I.	588,686

There were gains in coke and briquettes, notwithstanding the decrease in coal. The mines of Prussia furnished 43,894,196 tons of the coal mined this year; and 18,029,108 tons of the brown coal, or lignite.

#### San Francisco. July 13.

There is no change in the market. There is considerable discussion going on over the price of fuel oil.

For Coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, \$8; Roslyn, \$7; Seattle and Bryant, \$6.50; Beaver Hill and Coos Bay, \$5.50; White Ash, \$5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, \$14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, \$8.50. Eastern coals are nominal at \$14 for Pennsylvania anthracite, and \$13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, \$13; cannel, \$8.50; Wallsend and Brymbo, \$7.50 per ton.

#### Iron Trade Review.

NEW YORK, July 19.

There are some signs that the iron market is approaching a turning point. It can hardly be said that the turn has come, but there is a halt in the decline of prices, and makers generally are unwilling to take orders at the present range. This is especially the case with pig iron. Buying of bessemer and basic has been small, but some large contracts for foundry iron have turned up, and furnaces are declining fourth-quarter business until a better adjustment of prices can be secured. The Southern furnaces have about cleared out their accumulations of stock on a basis of \$11 Birmingham for No. 2 foundry, and are now asking \$11.25 and \$11.50. The buying movement was started by the cast-iron pipe makers, who are generally well supplied with fall contracts, and who have been taking some large quantities of No. 3 foundry, with a little gray forge. Foundrymen in the East are not saying much, but seem to be generally well provided with orders.

In finished material, the situation continues to improve. Structural steel is in very heavy demand, and new contracts continue to come in. The structural mills are declining fourth-quarter business on the ground that they have no room for it, and late buyers are obliged to go to the smaller mills and to jobbers, paying a premium to get anything like early deliveries. Buying of bars has also been active, especially by the agricultural implement makers. In some other lines, however,

business is still rather slow. Large contracts continue to be noted; among those mentioned in our local letters being a number of buildings in Eastern cities and the contract for the reconstruction of the Poughkeepsie bridge, which, alone, will take some 15,000 tons of material.

The structural, bar and plate pools are meeting in New York this week, but the result of their deliberations will not be known until the end of the week. The rail makers will also hold a conference during the week. All the pools decided to continue the present prices, no reason being shown for a change. No formal rail meeting was held, and therefore no change was made.

It is reported that negotiations are on foot for the sale of a controlling interest in the Dominion Steel Co. to the United States Steel Corporation, or to parties interested. It is hardly possible that the sale would be made directly to the Steel Corporation in view of the Canada situation. Such a transfer would arouse a lot of opposition and indignation among our Northern neighbors. It is impossible to ascertain anything regarding the rumors from the parties in interest.

*Pig-Iron Production.*—The capacity of the coke and anthracite furnaces in blast on July 1 was 408,600 tons weekly, a decrease of 34,500 tons from June 1; and a decrease of 43,900 tons from the maximum output reached in May. *The Iron Age* estimates the production of coke and anthracite pig for the six months ending June 30 at 10,994,500 tons; allowing for the output of the charcoal furnaces, brings the total up to 11,200,000 tons, which compares with 8,173,438 tons in the first half of 1904, and 8,323,595 tons in the second half. The estimate further gives 7,048,786 tons, or 64% of the total as the product of the furnaces owned by the steel companies. The unsold stocks reported on hand July 1 were 470,233 tons; an increase of 70,084 tons during June, and an increase of 150,976 tons as compared with March 1, when stocks were at their lowest point. These figures do not include stocks held by steel companies for their own use.

Birmingham. July 17.

There is some improvement in the Southern pig-iron market. A little better buying is announced, and prices are picking up. Furnace companies appear to be more positive of the need of iron on the part of the consumers, and, during the past week at least, two of the manufacturing companies in this district announced that they were not willing to book business at the prices which have prevailed. A good-sized order from the United States Cast Iron Pipe & Foundry Co. is reported to have been accepted by a Birmingham concern, the price being under \$21 per ton for No. 2 foundry. A positive statement was made by two companies the latter part of the week that

they were not after any business under \$11.25@ \$11.50, one of these concerns announcing that its lowest price was \$11.50 for No. 2. Buying has started in with small lots, the one above mentioned excepted, but immediate delivery is stipulated. Inquiries are coming in fast as to quotations, and also as to conditions for early delivery.

There is still some accumulation of iron in this section of the country. The production is heavier right now than it has been in months. The Tennessee Coal, Iron & Railroad Co. has four furnaces in operation at Bessemer, manufacturing foundry iron. The five furnaces at Ensley are making basic iron, which is being used mostly in the steel plant, the surplus stock going on the market. The new furnace at Ensley, No. 6, during the past week made 401 tons of iron in one day. The Sloss-Sheffield Steel & Iron Co. has five furnaces in operation, with a sixth one ready for the torch. The Republic Iron & Steel Co., the Alabama Consolidated Coal & Iron Co., the Tutweiler Coal & Iron Co., the Lacey-Buek Iron Co., the Woodward Iron Co., the Alabama Steel & Wire Co., the Shelby Iron Co., the Sheffield Coal & Iron Co., are all making a steady amount of iron.

The following quotations are given: No. 1 foundry, \$11.50; No. 2 foundry, \$11.25@ \$11.50; No. 3 foundry, \$11@ \$11.25; No. 4 foundry, \$10.50@ \$10.75; gray forge, \$10@ \$10.50; No. 1 soft, \$11.50; No. 2 soft, \$11.25@ \$11.50.

There is no change in conditions at the Alabama steel plants. The various mills and plants are all working steadily, though the hot weather has some effect on the production. Good prices still obtain, and a wide market has been found for the different steel products.

In cast-iron pipe, much activity is also noted. Labor is being sought by some of the pipe makers. The Dimmick Pipe Co. during the past week brought down a number of experienced men from Pennsylvania.

Cleveland. July 18.

*Iron Ore.*—The shippers have been withdrawing wild cargoes from the market. They give as their reason that the docks cannot handle any more ore. The situation, appearing so suddenly when all things were moving smoothly, indicates clearly that there is some subterfuge in this size-up of the situation. The inwardness of it is the inception of a fight against the lake vessel interests for a reduction of the rates of carriage. The old rates still apply; 75c. from Duluth, with other rates proportionately lower.

*Pig Iron.*—A story has appeared in an endeavor to explain the lack of buying of pig iron, that the consumers have formed an agreement among themselves to curtail the buying until the price is satisfactorily low and then to place their or-

der through a pool, which shall make distribution to the users of the material. This is said to be an offset to the various pools which have been formed in the iron and steel trade. The market has eased under the pressure on prices, and No. 2 foundry is now quotable at \$14, flat, with possibilities of buying a good lot under that price. Bessemer and basic are also being heared, with some producers willing to sell at \$14 and some expecting to buy as low as \$13.

*Finished Material.*—The market has been strengthened during the week by enormous buying of bar steel, the aggregate tonnage placed being estimated at 150,000 tons. In this territory the most important movement has been the covering of their needs by the agricultural implement works, the smaller ones having been liberal buyers. The larger concerns have not yet come in to cover their needs. The difficulties are increasing in the structural trade. Consumers are getting no material from the big mills on new orders, and will not be able to get shipments until the third quarter. Mills have refused to make sales for the first quarter of next year, although buyers have been urgent. Current needs are supplied from small mills, which have been buying at premiums running from \$2 to \$5 a ton over the association price.

#### New York. July 19.

Signs of improvement are noted in the letting of some large contracts. The American Bridge Co. has taken the contract to re-build the Poughkeepsie bridge over the Hudson, which will require from 15,000 to 17,000 tons of steel. Several large building contracts have also been let.

*Pig Iron.*—Some heavy contracts for Southern have been placed on the low prices, generally on the basis of \$11, Birmingham, for No. 2 foundry. The buyers include large foundry interests and some cast-iron pipe people. The movement shows the good policy of the Southern interests, and will clear off accumulations of iron at furnaces. One result is that iron is now more firmly held, though quotations are nominally lower.

For Northern iron in large lots we quote: No. 1 X foundry, \$16.25@16.75; No. 2 X, \$15.75@16.25; No. 2 plain, \$15.25@15.75; gray forge, \$14.25@14.75. Virginia foundry is \$16.90 for No. 1 and \$16.40 for No. 2. Southern is selling on a basis of \$11, Birmingham, for No. 2. For large lots here on dock we quote: No. 1 foundry, \$15.50@16; No. 2, \$15@15.50; No. 3, \$14.50@15; No. 4, \$14@14.50; No. 1 soft, \$15.50@16; No. 2 soft, \$15@15.50; gray forge, \$13.75@14.25.

Trading in warrants on the Produce Exchange has been a trifle better. For August and September quotations are \$14.50 bid, \$14.90 asked, for regular war-

rants; \$14.75 bid, \$15.25 asked, for foundry warrants.

*Bars.*—Bar iron is selling better, but still in a small way only. Quotations are the same, 1.595@1.645c., large lots on dock. Steel bars are 1.645c. Store trade is fair, with quotations 1.75@2c. delivered.

*Cast Iron Pipe.*—Orders indicate a good fall trade and the pipe-makers are taking good lots of iron.

*Structural Material.*—Considerable business is noted. Most of the local trade is small orders coming to jobbers. There is no quotable change. Beams under 15-in. are 1.745c. for large lots; over 15-in. 1.845c.; angles and channels, 1.745c., tide-water delivery. Large orders are going, but are negotiated directly with mills.

*Plates.*—Plates are in demand in small lots. Tank plates are 1.745@1.795c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.645c. up, according to width.

*Steel Rails.*—No change in standard sections. More orders for trolley rails are noted. Light rails are more active, prices ranging from \$20.50 for 35-lb., up to \$24.50 for 12-lb. rails.

*Old Material.*—The market is more active, but prices are still weak, under large offerings. No. 1 railroad wrought can be had for \$15.50@16; No. 1 yard wrought, \$14@14.50; machinery cast, \$13@13.50. There is some demand for heavy steel melting scrap, and sales are made at \$13.50@14. These prices are on cars, Jersey City, or other terminal delivery.

#### Philadelphia. July 18.

*Pig Iron.*—The reports received to-day from the larger pig-iron offices are something in the nature of a surprise, when measured by conditions and prospects as they were shown two weeks ago. The comparative dullness then existing has been followed by a brisk buying movement, in some cases showing an advance of 25c. per ton on small orders from outsiders. The inquiries that are coming into this market are from large as well as small consumers, and many of them are from people who have no need of iron for immediate use. The particular significant demand is, according to one of our leading authorities, that material is now under negotiation for delivery during the last quarter of the year. The pipe-iron makers, after being out of the market a long time, are once more buying, and in one notable instance closed for a very large amount of material. Other pipe-iron buyers are in the market for large lots, aggregating as high as 40,000 or 50,000 tons, though this is only an estimate. There are quite a number of inquiries in today for special brands of pig iron. Car builders are also showing a willingness to purchase. The general quotations are for No. 1 X foundry, \$17.25@17.50; No. 2 X, \$16.50; No. 2

plain, \$16; standard forge, \$14.75; low phosphorus, \$20.50; Southern No. 2, by rail, \$15.50.

*Billets.*—A large amount of business is now hanging fire for billets, and an advance in prices is virtually made to new buyers.

*Bars.*—The bar-iron market, after a short period of quiet, is again active, from the store standpoint at least.

*Sheets.*—Some business is in sight, but the buyers are inclined to hold back in anticipation of better terms.

*Pipes and Tubes.*—Conditions remain substantially as they were, and tubes are very active, all mills being behind in deliveries. Pipe is strong, and a good deal of business will be placed in the mills early in August.

*Plates.*—A large volume of business has suddenly appeared, some of it for tank work, some for ship work and for various purposes.

*Structural Material.*—The demand for structural material is extremely active. Within two weeks some 45,000 tons of material have been contracted for, and a number of small orders will be closed within a few days for bridge and general construction work.

*Steel Rails.*—The week has been quite an exciting one. There are inquiries today, the aggregate amount of which is placed at 60,000 tons.

*Scrap.*—There is a general movement on the part of users of scrap, and some important business has been closed, particularly in steel scrap, machinery and railroad. There is also a fair movement in other kinds, and the holders are very exacting as to prices. Steel scrap has sold at \$15 this week; car wheels, \$14.50; one lot, choice railroad scrap, is held firmly at \$15.50, and No. 1 forge fire scrap at \$12.25 per ton.

#### Pittsburg. July 18.

There is a decided improvement in the tone of the iron and steel markets this week. Buying has not materially increased, but some large orders are likely to be placed within a few days. While actual quotations for pig iron are lower, the market is much firmer. The minimum price of \$14.50, Valley furnaces, for bessemer iron cannot be shaded for small lots, but it is understood furnaces have agreed to accept as low as \$14 and \$14.25 on several large tonnages aggregating from 40,000 to 50,000 tons from Western steel mills. There are no indications of a further decline in pig-iron prices and it seems probable that much higher prices will prevail before Sept. 1. Three furnaces of the Carnegie Steel Co., that had been banked for over a month, were put in operation this week. Inquiries are unusually heavy for a number of important lines of finished products, and mills that



have been idle for repairs are rapidly being put in shape for resumption. All manufacturers in this district express confidence in the future and the prediction is made that the production in the last quarter and the first quarter of next year will break all records. According to the monthly report of J. G. Butler, Jr., chairman of the Bessemer Pig Iron Association, despite the dullness in the pig-iron market in June, the active capacity of the furnaces using Lake Superior ore was only decreased about 5%. The total capacity in blast on July 1 was 87%. The United States Steel Corporation had 84% in blast, the Republic Iron & Steel Co. 100%, the Bessemer Pig Iron Association, 98% and the outside interests 87%. The second half of the year opened with furnaces making at the rate of 21,550,000 tons of pig iron annually, which, if continued, will bring the production for the year to the highest point ever reached, and will exceed the record of 1902 and 1903 by nearly 4,000,000 tons.

Large orders for structural material and plates continue to be placed, and the mills will not be able to fill all of the contracts this year. The Beam Association will meet in New York tomorrow and an advance in prices is anticipated. A meeting of the plate pool is scheduled for Thursday, but it is not likely that prices will be disturbed. The American Bridge Co. in June booked orders for fabricated work aggregating 71,000 tons and since July 1 has added 25,000 tons. The independent fabricating interests also are booking new business and the specifications to structural mills are very heavy. Two Western railroads are making inquiries for 8,000 steel freight cars. The orders are likely to be placed and will mean an addition of about 80,000 tons to the orders for steel plates now on the books of the plate mills. The steel-rail tonnage for the last half of the year promises to be greater than the first half. The new rail mill of the Republic Iron & Steel Co. has just been started, and will be operated steadily through the year. Billets and sheet-bars are much firmer this week and the demand is heavier owing to the starting of a number of idle sheet and tin-plate mills. The Ohio works of the Carnegie Steel Co. have been changed from billets to sheet-bars. A meeting of independent sheet and tin-plate interests was held here on Friday to discuss prices and hold a conference with the Amalgamated Association of Iron, Steel & Tin Workers on the wage scales. Nothing was done, however, as the attendance was small. An effort is being made to get the independents together on prices. The demand for sheets shows an improvement since the first of the month, and the established price is being maintained. The union plants of the independents have not been started since the shutdown for repairs, and resumption may be delayed until it is definitely known how many of the

plants of the American Sheet & Tin Plate Co. are to be operated on a union basis. The only concerns that have signed the Amalgamated Association scale for the sheet mills are Zug & Co. and the Youngstown Sheet & Tube Co., and they are not operating the sheet mills. The American Co. started the second tin-plate plant at New Kensington on a non-union basis this morning. All of its union mills are still idle, but it is likely that some will be put in operation next week.

The bi-monthly examination of the bar-iron sales sheets of the Republic Iron & Steel Co. was made last Friday and showed the average price for May and June was 1.4c. compared with 1.5c. the previous two months. The wages of the skilled workmen are based on the average selling price of bar iron, but the rate of the puddlers was advanced from \$5.37½ a ton to \$5.50 a ton, owing to the change made in the scale which went into effect on July 1. The scale of the finishers was not changed and their pay was reduced about 2%, owing to the decline in prices.

**Pig Iron.**—A large tonnage of bessemer and basic iron is expected to be placed in a few days and the price will be probably \$14@14.25, Valley furnaces. On several small lots of bessemer iron sold lately the minimum price was \$14.50, Valley. Foundry No. 2 is quoted at \$15.10@15.35, Pittsburg, and gray forge at \$14.60@14.85, Pittsburg.

**Steel.**—The steel billet and sheet-bar market is much firmer and premiums of \$1 and \$1.50 still rule. The pool prices are unchanged at \$21 for bessemer and open-hearth billets and \$23 for sheet-bars. Plates remain at 1.60c. and merchant steel bars at 1.50c.

**Sheets.**—There is a marked improvement in the market and all shading of prices seems to have stopped. Sales have been made at the established price of 2.40c. for black and 3.45c. for galvanized sheets No. 28 gauge. Stocks in jobbers' hands are reported to be low.

**Ferro-manganese.**—Domestic 80% continues to be quoted at \$49@50 per ton.

**Dusseldorf, Germany. July 6.**

**Exports and Imports.**—Exports of iron and steel, and of machinery, from Germany, for the five months ending May 31 are reported as follows, in metric tons:

	1904.	1905.	Changes.
Pig iron.....	309,923	369,184	I. 59,261
Finished iron and steel.....	866,006	880,280	I. 14,274
Machinery.....	105,125	116,325	I. 11,200
Total.....	1,281,054	1,365,789	I. 84,735

Exports of iron ore for the five months were 1,424,087 tons in 1904, and 1,504,543 tons in 1905; an increase of 80,456 tons. These exports were chiefly minette ores from Luxemburg, shipped to Belgium and France: Among the exports also were 8,770 tons of slag and slag-wool; and 58,863 tons of basic slag, for use in making fertilizers.

Imports into Germany for the five months are reported as below, also in metric tons:

	1904.	1905.	Changes.
Pig iron.....	103,671	74,766	D. 28,905
Finished iron and steel.....	40,260	47,136	I. 6,876
Machinery.....	29,226	32,072	I. 2,846
Total.....	173,157	153,974	D. 19,183

Imports of iron ore were 2,191,177 tons in 1904, and 2,057,942 tons in 1905, a decrease of 133,235 tons. These ores were chiefly from Spain and Sweden. Imports of cinder, slag and slag products this year were 363,137 tons; of basic slag (for fertilizers), 70,115 tons.

**Pig-Iron Production.**—The output of the German blast furnaces in May was 951,431 tons of pig iron, being 57,038 tons more than in April, and 83,954 tons more than in May, 1904. For the five months ending May 31 the production was as follows, in metric tons:

	1904.	1905.	Changes.
Foundry iron.....	742,534	704,920	D. 37,614
Forge iron.....	344,257	328,972	D. 15,285
Steel pig.....	245,755	266,782	I. 21,027
Bessemer pig.....	193,559	155,021	D. 38,538
Thomas (basic) pig.....	2,636,523	2,724,719	I. 88,196
Total.....	4,162,628	4,180,414	I. 17,786

The large production in May has made up the shortage caused by the coal strike. Steel pig includes spigeleisen, ferromanganese, ferrosilicon and all similar alloys.

**Cartagena, Spain. July 1.**

**Iron and Manganiferous Ores.**—Messrs. Barrington & Holt report that the local iron-ore market continues steady, and there is just now a special demand for prompt cargoes. There is also a better demand for manganiferous ore. Shipments for the week were two cargoes, 5,500 tons dry ore, and one cargo 2,200 tons manganiferous ore, all to Great Britain. Freight rates continue unchanged.

Quotation are unchanged: Ordinary 50% ore is 6s. 4d.@6s. 7d.; special low phosphorus, 6s. 6d.@7s. 6d.; specular ore, 58%, 9s. 6d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port.

**Pyrites.**—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

**Chemicals and Minerals.**

NEW YORK, July 19.

(For other prices of chemicals and minerals, see large table on page 144.)

**Copper Sulphate.**—Price remains at \$4.80 for large lots, with slightly more for smaller quantities.

**Acids.**—The market continues strong.

Nitric acid, 36°, 100 lb.....	\$4.75
38°, 100 lb.....	5.25
40°, 100 lb.....	5.50
42°, 100 lb.....	5.75
Oxalic acid, com'l, 100 lb.....	\$5.00@5.25
Sulphuric acid, 60°, bulk, ton.....	13.50@14.50
60°, 100 lb. in carboys.....	1.05
60°, bulk, ton.....	18.00@20.00
66°, 100 lb. in carboys.....	1.20
66°, bulk, ton.....	21.00@23.00

**Sulphur and Pyrite.**—Prime sulphur is quoted in New York, Boston and Portland at \$20.50; in Philadelphia and Balti-

more at \$20.75. Pyrite continues unchanged at 10@11c. per unit of sulphur for lump ore, with 25c. additional for breaking to furnace size; 9.5@10.5c. for fines f.o.b. Atlantic ports. Domestic pyrite sells at 11c. per unit for furnace size, and 10c. for fines, f.o.b. shipping point.

Messrs. Emil Fog & Sons report the shipments of Sicilian brimstone in May as follows, in long tons:

	1904.	1905.	Changes.
Great Britain.....	17,409	17,507	I. 98
Other Europe.....	30,373	22,594	D. 7,779
United States.....	13,178	4,248	D. 8,930
Other Countries.....	1,838	1,035	D. 803
Total.....	62,798	45,384	D. 17,414

The total shipments for the five months ending May 31 were 273,561 tons in 1904, and 265,234 tons in 1905; a decrease of 8,327 tons. Stocks on hand in Sicily on June 1 were 309,084 tons. It is reported that negotiations are in progress with the American producers for an agreement of some kind.

Nitrate of Soda.—Spot is quoted at \$2.22½@2.17½ for this year's; and at \$2.07½@2.12½ for next year. The market in general is firmer.

Sulphate of Ammonia.—Gas liquor is quoted at \$3.10@3.15 per 100 lb., with slightly less for large orders.

Phosphates.—Prices hold about the same, with a suggestion of strength, in anticipation of better foreign demand.

Phosphates.	F. o. b.	C. I. F. or Europe.
*Fla., hard rock.....	\$7.25@7.50	\$10.67@11.85
land pebble.....	3.75@4.00	7.70@ 8.40
†Tenn., 78%.....	4.35@4.40	10.27@10.67
78%.....	3.75@4.00	.....
75%.....	3.40@3.50	.....
68@72%.....	3.00@3.25	.....
‡So. Car. land rock.....	3.75@4.00	.....
river rock.....	3.50@3.75	6.33@ 6.61
Algerian, 63@70%.....	.....	7.04@ 7.71
58@63%.....	.....	6.15@ 6.60
Tunis (Gafsa).....	.....	6.00@ 6.60
Christmas Isle.....	.....	13.28@14.11
Ocean Isle.....	.....	13.60@14.45
Somme, Fr.....	.....	11.39

\*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Exports of phosphate rock through the port of Savannah in June are reported by J. M. Lang & Co. as follows: To Germany 10,265 tons; Holland, 2,601; Italy, 549; total, 13,415 tons.

**Metal Market.**

New York, July 19.

**Gold and Silver Exports and Imports.**

At all United States Ports in June and Year.

Metal.	June.	Year.
Gold	1904.	1905.
Exp	\$1,522,544	\$4,030,882
Imp	4,886,233	2,187,952
Silver	1904.	1905.
Exp	\$3,363,689	\$1,892,930
Imp	4,410,684	4,744,625
Total	\$11,658,233	\$12,448,029

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

**Gold and Silver Exports and Imports, N.Y.**

For the week ending July 15, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....		\$14,912	\$774,114	\$40,247
1905.....	37,912,098	649,997	17,432,438	1,943,180
1904.....	63,686,960	3,573,844	22,163,114	473,971
1903.....	31,811,480	3,564,944	10,424,970	1,167,967

Exports of silver went chiefly to London. There were no exports of gold. Imports, both of gold and silver, were from the West Indies and Mexico.

The foreign merchandise trade of the United States for the half-year ending June 30 is valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1904.	1905.
Exports.....	\$673,726,097	\$740,870,190
Imports.....	508,337,553	5e9,935,863
Excess, exports.....	\$165,388,544	\$150,934,327
Add excess of exports, silver.....		9,962,325
gold.....		23,233,236
Total export balance.....		\$184,129,888

The gold and silver movement in detail is given in the table at the head of this column.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending July 15 gives the following totals, comparison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discount.....	\$1,087,518,700	\$1,107,308,100
Deposits.....	1,179,169,400	1,159,018,200
Circulation.....	59,156,200	49,107,100
Specie.....	255,238,900	220,162,100
Legal tenders.....	83,056,800	89,115,700
Total reserve.....	\$339,955,700	\$309,277,800
Legal requirements.....	294,792,350	289,754,550
Balance surplus.....	\$44,563,350	\$19,523,250

Changes for the week this year were increases of \$9,190,800 in specie, \$2,552,900 in legal tenders, \$713,100 in deposits, \$297,200 in circulation and \$11,565,425 in surplus reserve; a decrease of \$9,150,400 in loans.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated.....	\$220,162,100	.....
England.....	191,017,925	.....
France.....	580,549,240	\$222,077,230
Germany.....	177,395,000	59,130,000
Spain.....	74,275,000	111,165,000
Netherland.....	31,917,000	30,990,000
Belgium.....	16,303,335	8,156,665
Italy.....	111,490,000	18,290,000
Russia.....	540,995,000	30,735,000
Austria.....	234,280,000	65,040,000

The returns of the Associated Banks of New York are of date July 15 and the others July 13. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to July 6 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India.....	£5,386,423	£3,789,741	D. £1,596,682
China.....	343,091	638,396	I. 295,305
Straits.....	58,103	2,800	D. 55,303
Totals.....	£5,787,617	£4,430,937	D. £1,356,680

Receipts for the week were £115,000 from New York. Exports were £150,000 to India.

Indian exchange has been a little lower, and the Council bills offered in London were taken at an average of 16d. per rupee. The exchange banks have been buying a considerable amount of gold in Australia for shipment to India.

The silver market continues firm on buying for the India mint; closing at 27¼d. in London.

**Prices of Foreign Coins.**

	Bid.	Asked.
Mexican dollars.....	\$0.45½	\$0.47½
Peruvian soles and Chilean pesos..	.42	.45
Victoria sovereigns.....	4.86	4.87½
Twenty francs.....	3.87	3.90
Spanish 25 pesetas.....	4.78	4.82

**SILVER AND STERLING EXCHANGE.**

July.	Sterling Exchange.	Silver.		July.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
13	4.86½	59¼	27½	17	4.8665	58¾	27½
14	4.86½	59¼	27½	18	4.8660	59½	27½
15	4.8665	59	27½	19	4.86½	59½	27½

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine

**Other Metals.**

**Daily Prices of Metals in New York.**

July.	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.
13	14½	14½	66½	31½	4.50	5.30	5.15
14	14½	14½	66½	31½	4.50	5.32½	5.17½
15	14½	14½	.....	31½	4.50	5.32½	5.17½
17	15	14½	66½	31½	4.50	5.35	5.20
18	15	14½	67	31½	4.50	5.37½	5.22½
19	15	14½	67	31½	4.50	5.37½	5.22½

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. Cathodes are usually 0.25c. below the price of electrolytic copper.

Copper.—The market continues active and a good business is reported both for home trade and for export. It is noteworthy that contracts are being made for the balance of the year. It is recognized that the stocks of copper are unusually low, that the consumption is good and there is a general confidence in the maintenance, if not the improvement, of pres-



ent prices. These prices appear to satisfy both consumers and producers. During the week under review they have advanced a little, and we quote 15@15½c. for lake; 14⅞@15c. for electrolytic in cakes, wirebars or ingots; 14⅝@14¾c. for cathodes and 14½@14⅝c. for casting copper.

The standard market has advanced steadily from £66 2s. 6d. @ £67 7s. 6d., and transactions have been large. Refined and manufactured sorts we quote the same as last week: English tough, £69@£69 10s.; best selected, £71 15s.; strong sheets, £78 10s.; India sheets, £74 10s.; yellow metal, 6½d.

The statistics for the first half of July show a decrease of 300 tons.

Exports of copper from the United States in June were 22,143 tons, this figure being subject to correction by the official returns. This is an increase of nearly 6,000 tons over June of last year. Exports for the two weeks ending July 15 were 8,163 tons, from New York, Philadelphia and Baltimore.

**Tin.**—The London market continues to advance, and has improved in all about £4 7s. 6d., closing at £145 for spot and £144 for three months. Our market has been active, and business has been done at 31½@31¾ cents.

**Lead.**—The market is active, and present prices are 4.42½c. for St. Louis and 4.50c. for New York.

The London market has advanced to £13 15s. for Spanish and £13 17s. 6d. for English, and the scarcity of early deliveries continues.

**St. Louis Lead Market.**—The John Wahl Commission Co. telegraphs us as follows: Lead is firm, but quiet. Missouri brands are selling at 4.50@4.55c., according to brand and delivery.

**Spanish Lead Market.**—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 1, that silver has been 14.25 reales per ounce. Exchange is 33.25 pesetas to £1. The local price for pig lead has been 71 reales per quintal, which, on current exchange, is equal to £11 18s. 8d. per long ton f.o.b. Cartagena. Exports for the week were 50 tons desilverized and 224 tons argenteriferous lead, all to Marseilles.

**Spelter.**—The market is more active, and a large business is reported to have been done at advancing prices, being quoted at 5.25c. for St. Louis and 5.37½c. for New York.

The London market is quoted at £24 for ordinary and £24 5s. for special brands.

**St. Louis Spelter Market.**—The John Wahl Commission Co. telegraphs us as follows: Spelter is strong and advancing. The latest sales here are on a basis of 5.25c. East St. Louis. Holders anticipate a further advance, and are offering the metal in a limited way only.

**Spanish Zinc Ore Market.**—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 1, that the demand continues strong, but buyers are rather holding back, hoping to secure better terms. Miners continue to hold at the old prices, 75 fr. for blende, 35% zinc, and 55 fr. for calamine, 30% zinc. Shipments for the week were 2,150 tons of blende, and 155 tons of calamine, all to Antwerp.

**Silesian Spelter Market.**—Paul Speier writes from Breslau, under date of July 1, that there is a somewhat better feeling in the market. Prices are about 24 marks per 50 kg., f.o.b. cars Breslau. This is equal to 5.09c. per lb. Zinc dust is heavy, and prices a shade lower. Exports and imports in Germany for the five months ending May 31 were as follows, in metric tons:

	1904.	1905.	Changes
Spelter.....	27,529	24,861	D. 2,668
Zinc sheets.....	6,822	7,136	I. 314
Scrap, etc.....	1,663	1,724	I. 61
Total exports.....	36,014	33,721	D. 2,293
Imports.....	8,685	11,100	I. 2,415
Net exports.....	27,329	22,621	D. 4,708

Exports of zinc-white were 7,104 tons in 1904, and 7,107 tons in 1905. Imports of zinc ores were 25,820 tons in 1904, and 51,081 tons in 1905; an increase of 25,261 tons.

**Antimony.**—The market remains firm. Last prices are 12½@13c., depending upon the brands and delivery.

**Nickel.**—The large producers quote nickel at 40@47c. per lb., for lots of one ton or over, according to size and conditions of order. For small quantities as high as 60c. is named.

**Platinum.**—Quotations are firm at \$20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to \$1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated ware, 90c.; and cones, \$1 per gram.

**Quicksilver.**—Quicksilver is selling at \$41.50 per flask—75 lb.—for large orders; while small quantities bring \$42. San Francisco prices are unchanged, \$39 being asked for domestic orders. Export business can be placed at \$37.50@38 per flask. The London price is steady at £7 7s. 6d. per flask, from both first hands and jobbers.

**Cadmium.**—Metallic cadmium, guaranteed 99.5%, in lots of 100 kg. or over, brings 7.10 marks per kg., net cash, f.o.b. Hamburg, in shipping packages. This is equal to 76.65c. per pound.

**Thallium.**—Thallium is quoted at 60@65 marks per kg.—equal to 64.8@70c. per lb.—at Breslau, Germany.

**Manganese Alloys.**—Prices for manga-

nese alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kg.: Manganese copper, No. 1, guaranteed 30% manganese, 265 marks; No. 2, 28 to 30% manganese, for bronze, etc., 175 marks; No. 3, 25 to 20% manganese with 2 to 4% iron, 165 marks. Manganese tin, No. 1, free of iron and guaranteed 55% manganese, 365 marks; No. 2, 55% manganese, with some iron, 225 marks. Manganese nickel, No. 1, free of iron, 450 marks; No. 2, carrying some iron, 270 marks.

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

**Minor Metals.**—For minor metals and their alloys, wholesale prices are f.o.b. works:

	Per lb.
Aluminum.....	
No. 1 90% ingots.....	33@37c.
No. 2, 99% ingots.....	31@34c.
Rolled Sheets.....	4c. up.
Aluminum-Bronze.....	20@23c.
Nickel-alum.....	33@39c.
Bismuth.....	\$2.10
Chromium, pure (N. Y.).....	80c.
Copper, red oxide.....	50c.
Ferro-Molybdenum (50%).....	\$1.00
Ferro-Titanium (20@25% N. Y.)...	75c.
Ferro-Chrom. (74%).....	12½c.
Ferro-Tungsten (37%).....	45c.
Magnesium, pure (N. Y.).....	\$1.60
Manganese (98@99% N. Y.).....	75c.
Manganese Cu. (30@70% N. Y.)...	40c.
Molybdenum (98@99% N. Y.).....	\$2.75
Tantalite acid (N. Y.).....	50c.
Phosphorus, foreign.....	45c.
Phosphorus, American.....	70c.
Tungsten (best).....	\$1.25

Variations in prices depend chiefly upon the size and conditions of orders.

#### Missouri Ore Market.

JOPLIN, July 15.

The highest price paid for zinc ore was \$47.50 per ton, an advance of \$1.50 over the previous week. Nearly all sales of 60% grades were made at this advance, while lower grades, which were advanced the previous week, were advanced generally \$1 per ton, the assay basis price ranging from \$42 to \$45 per ton of 60% zinc. The holiday restriction affected the week more than the previous week, the shipments being 231 tons less, and 500 tons less than an average of the weekly shipments of this year. They were fully 1,000 tons less than the average shipments of June, when the output was very large. It will take another week to restore conditions to a normal output of ore, as many mills were closed for two weeks while midsummer repairs were looked after. The restriction in output was greater in proportion on lead than on zinc, the shipment being 100 tons less than the previous week. Lead prices continued to rule strong, and as high as \$61 per ton was paid for a few choice bins, and 70% grades were strong at \$60 per ton.

Following are the shipments of zinc and lead from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin.....	2,248,510	262,690	\$68,460
Cartersville-Webb City.....	1,870,970	517,540	55,590
Galena-Empire.....	809,220	115,800	20,500
Alba.....	675,300	.....	14,910
Duenweg.....	600,000	29,820	14,090
Badger.....	482,150	.....	10,850
Prosperity.....	206,310	87,940	7,180
Aurora.....	336,000	.....	6,380
Oronogo.....	279,180	6,170	6,210
Granby.....	400,000	28,000	5,850
Carthage.....	175,290	.....	3,900
Zincite.....	159,390	.....	3,500
Neck City.....	147,310	.....	3,300
Sourgeon.....	153,510	2,780	3,300
Beef Branch.....	118,830	10,900	1,510
Sherwood.....	57,240	3,860	1,345
Central City.....	60,940	.....	1,310
Baxter Springs.....	54,880	.....	880
<b>Totals.....</b>	<b>8,724,890</b>	<b>1,065,500</b>	<b>\$229,085</b>
<b>27 weeks.....</b>	<b>269,582,750</b>	<b>32,344,240</b>	<b>\$6,909,165</b>

Zinc value, the week, \$197,130; 28 weeks, \$5,979,165.  
Lead value, the week, \$31,955; 28 weeks, \$929,175.

The average price for the zinc ore sold for the week was \$45.19; for the year, \$44.37 per ton. For lead ore, the average value of that sold for the week was \$59.95; for the year, \$57.46 per ton.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January.....	57.005	60.690	26.423	27.930
February.....	57.592	61.023	26.665	28.047
March.....	56.741	58.046	26.164	26.794
April.....	54.202	56.600	24.974	26.108
May.....	55.430	57.832	25.578	26.664
June.....	55.673	58.428	25.644	26.910
July.....	58.095	.....	26.760	.....
August.....	57.806	.....	26.591	.....
September.....	57.120	.....	26.349	.....
October.....	57.923	.....	26.760	.....
November.....	58.453	.....	26.952	.....
December.....	60.563	.....	27.930	.....
<b>Year.....</b>	<b>57.221</b>	<b>.....</b>	<b>26.399</b>	<b>.....</b>

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.		1904.	1905.
	1904.	1905.	1904.	1905.		
Jan. ....	12 410	15 008	12 553	15 128	57.500	68.262
Feb. ....	12 063	15 011	12 245	15 136	56.500	67.963
March....	12 299	15 125	12 551	15 250	57.321	68.174
April....	12 923	14 920	13 120	15 045	58.247	67.017
May....	12 758	14 627	13 000	14 820	57.321	64.875
June....	12 269	14 673	12 399	14 813	56.398	65.881
July....	12 380	.....	12 505	.....	57.256	.....
Aug....	12 343	.....	12 468	.....	56.952	.....
Sept....	12 495	.....	12 620	.....	57.645	.....
Oct....	12 993	.....	13 118	.....	60.012	.....
Nov....	14 284	.....	14 456	.....	65.085	.....
Dec....	14 661	.....	14 849	.....	66.384	.....
<b>Year..</b>	<b>12.823</b>	<b>.....</b>	<b>12.990</b>	<b>.....</b>	<b>58.587</b>	<b>.....</b>

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.		1905.	
	1904.	1905.	1904.	1905.
Jan.....	28.845	29.325	.....	.....
Feb.....	28.087	29.262	.....	.....
Mar.....	28.317	29.523	.....	.....
April.....	28.132	30.525	.....	.....
May.....	27.718	30.049	.....	.....
June.....	26.325	30.329	.....	.....
July.....	.....	.....	26.573	.....
August.....	.....	.....	27.012	.....
Sept.....	.....	.....	27.780	.....
Oct.....	.....	.....	28.596	.....
Nov.....	.....	.....	29.185	.....
Dec.....	.....	.....	29.286	.....
<b>Av. year.</b>	<b>.....</b>	<b>.....</b>	<b>27.986</b>	<b>.....</b>

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.		1905.	
	1904.	1905.	1904.	1905.
Jan.....	4.347	4.552	.....	.....
Feb.....	4.375	4.450	4.192	.....
Mar.....	4.475	4.470	4.111	.....
April.....	4.475	4.500	4.200	.....
May.....	4.423	4.500	4.200	.....
June.....	4.496	4.500	4.200	.....
July.....	.....	.....	4.192	.....
Aug.....	.....	.....	4.111	.....
Sept.....	.....	.....	4.200	.....
Oct.....	.....	.....	4.200	.....
Nov.....	.....	.....	4.200	.....
Dec.....	.....	.....	4.600	.....
<b>Av., year.</b>	<b>.....</b>	<b>.....</b>	<b>4.309</b>	<b>.....</b>

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	
January.....	4.863	6.190	4.673	6.032	25.063
February.....	4.916	6.139	4.717	5.989	24.594
March.....	5.057	6.067	4.841	5.917	23.825
April.....	5.219	5.817	5.038	5.667	23.813
May.....	5.031	5.434	4.853	5.284	23.594
June.....	4.760	5.190	4.596	5.040	23.875
July.....	4.873	.....	4.723	.....	.....
August.....	4.866	.....	4.716	.....	.....
September.....	5.046	.....	4.896	.....	.....
October.....	5.181	.....	5.033	.....	.....
November.....	5.513	.....	5.363	.....	.....
December.....	5.872	.....	5.720	.....	.....
<b>Year.....</b>	<b>5.100</b>	<b>.....</b>	<b>4.931</b>	<b>.....</b>	<b>.....</b>

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.

Mining Stocks.

(See quotations on page 143.)

New York. July 19.

The stock market has been affected by the extreme heat and the consequent disinclination to do more business than necessary. Outsiders have been conspicuously out of the Exchange, and trading has been mainly professional, and moderate at that. The industrials are generally a little lower, but without any startling break. Amalgamated Copper closes at \$83.25; Steel at \$34.50 for the common and \$102.25 for preferred.

The curb market tried another drive at Greene Gold, but did not work up much excitement over it. The break was from \$4 to \$3.25 per share.

Boston. July 18.

It begins to look as if there might be a boom in copper-mining shares. The market has been gradually broadening for some time, but within a week there has been a noticeable tendency to pick up stocks and a broader market has resulted. That is, a great many different issues have been quoted, although necessarily there has not been so much activity as those who believe in higher prices would like to see. However, the tone is good and the courage of the makers confident, so that, if the weather will allow, Boston will have a midsummer copper boom. The Lake people have been constant buyers of certain stocks, and it is known that certain New York people are favorably disposed toward the local list. Conditions certainly were never better. Centennial spurted \$2 to \$22 on the announcement that a three years' contract has been made to treat about 250 tons of Allouez

ore per day at a cost of 40c. per ton. This will give Centennial a revenue of about \$2,500 per month.

Isle Royale is up \$2 to \$22, on what is termed good buying. Old Dominion rose \$2.25 to \$26.75. The management of the latter is now paying off the company's floating debt, incurred during the construction period. Lately, \$100,000 was paid, leaving about \$300,000 out. Allouez has held strong at and better than \$27 per share, and Atlantic is up \$1.50 to \$15.75. Copper Range has been strong, advancing \$2.50 to \$72, and Mohawk rose \$2.50 to \$51.50. United States mining rights expired last Saturday, after selling as high as \$1.05. The stock touched \$32.75, but subsequently fell to \$31.25. Granby is selling at its best price at \$6.50. Even old Arcadian has been in demand, touching \$2.25. The close a week ago was \$1.50.

A story is told here that J. D. Rockefeller has lately bought a block of Amalgamated, said to be 100,000 shares.

Colorado Springs. July 14.

There has been little change on the local market, the past week witnessing prices very close to the previous week, and the volume of trading remaining about the same.

The majority of the stockholders of the Doctor-Jack Pot Co. have ratified the re-organization of that company, whereby the indebtedness is wiped out, \$10,000 placed in the treasury and the stock sold to the old stockholders. The annual meeting of the Elkton Co. was held last Monday, and the old officers re-elected. The report shows the gross value of year's output to be \$717,280, with net smelter returns of \$496,284. El Paso sold as low as \$1.13 1/2 during the week, but on today's market sold at \$1.25. Findley has declined several cents, selling today for 59 3/4c. Elkton remains close to 40c. C. K. & N. sold for 6 1/2. Portland is selling for \$2.15. Gold Sovereign sold as low as 9/4, but recovered to 10 1/2c. per share.

Salt Lake City. July 15.

The sales of stocks on the Salt Lake Stock & Mining Exchange during the past week did not aggregate quite \$250,000. The dullness of summer is on in earnest and the mountain resorts or the seashore are more of an attraction than the stock pit to the investor. However, there was considerable trading done in Tintic stocks this week, but they were mostly of the low-priced class. May Day, which has been assessed to the amount of 2 1/2c. a share, aggregating \$10,000, the proceeds from which are to be used in the sinking of the mine shaft deeper, was conspicuous in the trading and closed stronger. Uncle Sam Consolidated, Yankee Consolidated, Grand Central, Star Consolidated and Carisa were others which displayed activity.



Of the Park City stocks that were in demand were Daly Judge, which found buyers around \$6.75 and New York Bonanza, which softened, coming down to around 52c. Consolidated Mercur has stiffened. Reports from the mine indicate that if the present record is kept up the output of gold bullion for the month will considerably exceed that of June.

**San Francisco. July 13.**

The market for the Comstocks shows some animation, notwithstanding the season. Ophir was stronger and the rest of the list generally firm. The Tonopahs have been active, with good buying demand all round. The higher-priced stocks are called for, as well as the small fry. In oil stocks there is nothing doing, worth speaking about.

The sworn statements of the mining companies, as filed in their offices this week, in pursuance of law, show cash on hand July 1 as below, with all expenses paid, unless otherwise noted: Alpha Consolidated, \$2,148; Alta, \$1,306, with bills payable of \$1,842; Andes, \$412, with indebtedness of \$1,000; Belcher, \$2,180; Bullion, \$2,432; Best & Belcher, \$741, with indebtedness of \$1,000; Caledonia, \$169, with June expenses unpaid; Crown Point, \$6,859; Confidence, \$4,578, with June expenses unpaid; Consolidated California & Virginia, \$6,466; Consolidated Imperial, \$2,493; Challenge Consolidated, \$2,493; Exchequer, \$2,271; Gould & Curry, \$4,792, with bills receivable of \$300; Hale & Norcross, \$772, with liabilities of \$2,200; Justice, \$819, with bills payable of \$107; Julia Consolidated, \$622; Mexican \$5,198, with June expenses at mine unpaid; New York, \$1,149; Overman, \$10,041, with June expenses at mine unpaid; Ophir, \$3,842, with six railroad carloads of ore in transit; Potosi, \$6,440.32; Savage, \$1,416.98; Sierra Nevada, \$2,806.14; Silver Hill, \$23,591.15, with June expenses at mine unpaid; Syndicate, \$15; Standard Consolidated, \$29,983, with June expenses and June clean-up to be accounted for; Union Consolidated, \$3,946; Utah Consolidated, \$3,455. Segregated Belcher reports no cash on hand, and \$43 indebtedness.

**Dividends.**

Company.	Payable.	Rate.	Amount.
Bunker Hill & Sullivan.....	July 5	.50	150,000
El Paso.....		.03	75,000
Greene Con. Gold.....	July 15	.20	100,000
Hunt. & Broad Top, pfd.....	July 26	1.50	60,000
Jerry Johnson.....		.01	25,000
Kendall Gold.....	July 22	.05	25,000
Osceola.....	July 25	2.00	192,300
Portland.....	July 15	.10	300,000
Tamarack.....	July 29	2.00	120,000
†Tennessee C. & I. pfd.....	Aug. 1	2.00	4,960
†Tennessee C. I. & R. pfd.....	July 1	3.00	8,520
†Tennessee C. I. & R. com.....	Aug. 1	1.00	225,536
United Copper.....	July 31	1.00	450,000
Vindicator.....		.001	44,000

\*Monthly. †Bi-monthly. ‡Quarterly. †Semi-Annually.

**STOCK QUOTATIONS.**

**NEW YORK.**

Week July 18.

Name of Company.	High	Low	Clg.	Sales	Name of Company.	High	Low	Clg.	Sales
Amalgamated.....	84½	82½	83½	137,890	La France Copper.....				
Anaconda.....	110½	106½	108½	13,350	Mitchell.....	6½	6½	6½	6,700
Arizona Consolidated..	30½	30	30	1,300	Montreal & Boston.....				200
British Col. Copper.....	7	6½	6	550	Tennessee Copper.....	32½	26	30	2,925
Federal Min. & Smelt...	109	109	109	2,700	Union Copper.....	1			500
Federal Preferred.....	96	92	92	13,820	United Copper.....	30½	25	30	50,800
Greene Copper.....	22½	21½	21½	48,950	United Copper, Pref....	73½	72	73½	2,550
Greene Gold.....	5½	3½	3	300	White Knob Cop.....				300
Douglas Copper.....	7½	7½	7½		White Knob, Pref.....				

Total Sales, 316,649.

**BOSTON.**

Week July 18.

Name of Company.	High	Low	Clg.	Sales	Name of Company.	High	Low	Clg.	Sales
Allouez.....	27½	26½	27½	2,905	Mayflower.....	.75	.75	.75	100
Amalgamated.....	84½	82½	83½	10,525	Michigan.....	14	13½	13½	1,225
Atlantic.....	16	14	15½	4,667	Mohawk.....	51½	49½	51½	2,107
Bingham.....	29½	28½	29½	3,010	Old Dominion.....	26½	24	26	4,400
Bonanza.....	.55	.55	.55	200	*Osceola.....	93½	90½	93	1,511
Boston Consolidated...	8½	8½	8½	2,841	Parrot.....	24	23	23½	1,471
Calumet & Hecla.....	646	642	645	73	Phoenix.....				
†Centennial.....	22	20	21½	4,632	Quincy.....	105½	103	105	91
Mercur.....	.55	.55	.55	1,100	Shannon.....	7½	7½	7½	1,677
Copper Range.....	72	69½	71½	6,815	*Tamarack.....	121½	116	118	261
Daly-West.....	14½	13½	14	540	Tecumseh.....	4	3½	3½	615
Elm River.....	2½	2½	2½	60	Tennessee.....				
Franklin.....	10½	9½	10½	855	United Copper, com...	30½	25½	30	2,705
Granby.....	6½	6	6½	2,460	*United States.....	32½	31½	31½	12,556
Green Con. Copper.....	22½	21½	21½	5,469	United States Coal & Oil	10½	10½	10½	1,341
Guanajuato.....	4½	4½	4½	700	*Utah.....	44½	43	43½	3,365
Isle Royale.....	29½	20½	21	2,845	Wolverine.....	117½	111½	116	380
†Mass.....	8½	7½	8½	1,448					

Total Sales, 82,018 shares.

\* Ex-dividend. † 1st Installment Paid. ‡ Assessment Paid. § Ex. Rights.

**LONDON.**

July 7.

Company.	Buyers.	Sellers.	Company.	Buyers.	Sellers.
American:	£ s. d.	£ s. d.	Indian:	£ s. d.	£ s. d.
*Alaska Treadwell.....	6 13 9	6 16 3	Champion Reef.....	1 11 3	1 12 6
Anaconda.....	5 7 6	5 10 0	Mysore.....	6 17 6	7 0 0
Camp Bird.....	1 12 6	1 15 0	Nundydroog.....	1 11 10½	1 13 1½
El Oro.....	1 0 0	1 2 6	South African:		
Le Roi.....	16 3	18 9	Angelo.....	5 10 0	5 15 0
Le Roi No. 2.....	13 9	16 3	British So. Africa.....	1 14 4½	1 15 7½
Montana.....	1 0	1 6	City & Suburban.....	5 5 0	5 10 0
Stratton's Ind.....	9 0	9 6	Consol. Gold-Fields.....	6 6 3	6 6 3
Tomboy.....	1 2 6	1 2 6	*Crown Reef.....	12 15 0	13 5 1
Tyee.....	1 1 3	1 3 9	De Beers, preferred.....	17 8 9	17 11 3
Utah Con.....	8 15 0	9 0 0	De Beers, deferred.....	16 3 9	16 6 3
Ymir.....	1 3	3 9	East Rand.....	7 2 6	7 5 0
European:			Ferreira.....	19 0 0	20 0 0
Linars.....	3 15 0	4 5 0	Goldenhuis.....	4 1 0	4 12 6
*Mason & Barry.....	2 17 6	3 2 6	Geduld.....	6 0 0	6 2 6
Rio Tinto.....	62 15 0	63 0 0	Henry Nourse.....	7 2 6	7 7 6
Rio Tinto, pf.....	6 2 6	6 7 6	Knights.....	4 5 0	4 7 6
*Tharsis.....	5 15 0	6 0 0	Langlaagte.....	3 1 3	3 3 9
West Australian:			Modderfontein.....	8 17 6	9 0 0
Associated.....	2 1 3	2 2 6	New Kleinfontein.....	1 18 9	2 1 3
Golden Horseshoe.....	6 15 0	6 17 6	New Primrose.....	2 7 6	2 10 0
Great Boulder.....	2 3 3	2 3 9	Premier, def.....	12 8 9	12 11 3
Gt. Bldr. Perseverance.....	11 3	11 9	Premier, pf.....	8 16 3	8 18 9
Great Fingall.....	7 0 0	7 2 6	Rand.....	9 16 3	8 17 6
Ivanhoe.....	7 12 6	7 15 0	Randfontein.....	1 16 3	1 18 9
Kalgurli.....	7 10 0	7 12 6	Robinson.....	8 15 0	9 0 0
Lake View.....	19 6	1 0 0	Robinson Deep.....	5 0 0	5 2 6
Oroya-Brownhill.....	3 110½	3 2 6	Rose Deep.....	6 15 0	7 0 0
Miscellaneous:			Simmer & Jack.....	1 10 0	1 11 3
Broken Hill Prop.....	2 11 0	2 12 0	Village Main Reef.....	5 2 6	5 7 6
Mt. Lyell.....	17 6	18 6	Wemmer.....	5 15 0	6 5 0
Mt. Morgan.....	2 18 9	3 1 3			
Waihi.....	5 13 9	5 16 3			

\* Ex-dividend.

**LONDON (By Cable\*).**

Company.	July 18.	Company.	July 18.
Camp Bird.....	£ s. d.	Esperanza.....	£ s. d.
Consolidated Gold Fields.....	1 15 0	Modderfontein.....	9 2 6
De Beers.....	6 6 3	Rand Mines.....	9 6 3
Dokores.....	1 9 0	Rio Tinto.....	65 0 0
East Rand.....	7 10 7½	Simmer and Jack.....	1 12 6
El Oro.....	1 1 3	Tomboy.....	1 2 6

\* Furnished by Wm. P. Boubricht & Co., 24 Broad St., New York.

## CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

<b>ABRASIVES—</b>		<b>COPPERAS—Bulk</b> .....100 lb.	\$0.47½	<b>POTASSIUM—</b>	
Bort as to size.....carat	\$10.00@18.00	In bbls.....	.52½	Bicarbonate crystal..... lb.	\$0.08½
Carborundum, f.o.b. Niagara Falls, powd..... lb.	.08			Powdered or granulated.. "	.14
Grains.....	.10	<b>CRYOLITE</b> ..... lb.	.06½	Bichromate, Am..... "	.08½@.084
Corundum, N. C.....	.07@.10			Scotch..... "	.08½@.08½
Chester, Mass.....	.04½@.05	<b>EXPLOSIVES—</b>		Bromide..... "	.15
Craigmont, Ont.....	.05½@.06	Blasting powder, A..... 25-lb. keg	.65	Carbonate (80@85%)..... "	3.50@4.00
Mont. f.o.b. Chicago.....	.07@.07½	Blasting powder, B..... "	1.40	Caustic, ordinary..... "	.04½
Crushed Steel, f.o.b. Pittsburgh.....	.05½	" "Rackarock," A..... lb.	.25	Elect. (90%)..... "	.06½
Emery, in kegs: Turkish flour.....	.03½	" "Rackarock," B..... "	.18	Chlorate, powder..... "	.08½@.08½
Grains.....	.05@.05½	Judson R.R. powder..... "	.10	Crystals..... "	.08½@.08½
Naxos flour.....	.03½	Dynamite (20% nitro-glycerine)..... "	.13	Cyanide (98@99%)..... "	.18@.19
Grains.....	.05@.05½	(30% nitro-glycerine)..... "	.14	Kainit (bulk)..... g. ton	8.50
Chester flour.....	.03½	(40% nitro-glycerine)..... "	.15	Manure salt 20%..... "	14.75@15.75
Grains.....	.05@.05½	(50% nitro-glycerine)..... "	.16½	Double Manure Salt. 48@53%..... 100 lb.	1.16½@1.19½
Peekskill, f.o.b. Easton, Pa., flour.....	.01½	(60% nitro-glycerine)..... "	.18	Muriate..... "	1.90@1.95
Grains.....	.04½	(75% nitro-glycerine)..... "	.21	Permanganate..... lb.	.09½@.09½
Garnet, per quality,..... sh. ton	25.00@35.00	Glycerine for nitro..... "	.11@.11½	Prussiate, yellow..... "	.13½@.13½
Pumice Stone, Am. Powd..... lb.	.01 3-5@.02			Red..... "	.35
Italian, powdered.....	.01½@.01½	<b>FELDSPAR—Ground</b> ..... sh. ton.	9.75@10.00	Sulphate..... 100 lb.	2.18½@2.21½
Lump, per quality.....	.02½@.04			<b>SALT—N. Y. com. fine 280 lb. bbl.</b>	.72@1.18
Rottenstone, ground.....	.02½@.04	<b>FLUORSPAR—</b>		N. Y. agricultural..... sh. t. n.	4.40
Lump, per quality.....	.06@.20	Domestic f.o.b. shipping port:		<b>SALTPETER—Crude</b> ..... 100 lb.	4.00@4.25
Rouge, per quality.....	.10@.30	Lump..... sh. ton.	8.00@10.00	Refined..... "	4.25@4.75
Steel Emery, f.o.b. Pittsburgh.....	.07	Ground.....	11.50@13.50		
		Gravel.....	4.25@4.50	<b>SILICA—</b>	
				Ground quartz, ord'ry..... sh. ton	9.00@10.00
<b>ACIDS—</b>		<b>FULLER'S EARTH—Lump</b> ..... 100 lb.	.80	Best..... "	12.00@13.00
Boric, crystals..... "	.10	Powdered..... "	.85	Lump Quartz..... "	2.50@4.00
Powdered..... "	.10½			Glass sand..... "	2.75
Carbonic, liquid gas..... "	.12½	<b>GRAPHITE—</b>		<b>SILVER—Nitrate, crystals</b> ..... oz.	.36½
Hydrofluoric, 30%..... "	.03	Am. pulverized..... "	45.00		
48%..... "	.05	Best flake..... "	150.00	<b>SODIUM—</b>	
60%..... "	.11	Ceylon, common pulv..... "	.02½@.03½	Acetate..... lb.	0.04½
		Best, pulverized..... "	.04@.08	Bicarb. ord., bulk, f.o.b. works..... 100 lb.	3.50
<b>ALCOHOL—Grain</b> ..... gal.	2.38	German, c.m. pu v..... "	.01½@.01½	Extra domes, f.o.b. works..... lb.	.06½
Refined wood, 95@97%..... "	.70@.75	Best, pulverized..... "	.01½@.02	Bichr mate..... "	.20
Purified..... "	1.25@1.30	Italian, pulverized..... "	.01½	Bromide..... "	
				Carbonated ash, high test. in bags, f.o.b. works..... 100 lb.	.75@.77½
<b>ALUM—Lump</b> ..... 100 lb.	1.75	<b>GYPSUM—Ground</b> ..... sh. ton.	8.00@8.50	Foreign, f.o.b. N. Y..... "	.85@.87½
Ground..... "	1.85	Fertilizer..... "	7.00	Caustic, 60@78% f.o.b. works..... "	1.75@1.85
<b>ALUMINUM—Sulphate, com'l.</b> "	75@1.25	Rock..... g. ton.	4.00	Foreign, f.o.b. N. Y..... "	1.90@1.95
		English and French..... "	14.00@16.00	Chlorate, com'l..... "	.08½@.08½
<b>AMMONIUM—</b>		<b>INFUSORIAL EARTH—</b>		Hyposulphite, Am..... "	1.50@1.60
Bromide..... lb.	.22	Ground Am. best..... "	20.00	German..... "	1.75@2.00
Carbonate..... "	.08	French..... "	37.50	Phosphate..... lb.	.02½@.02½
Muriate grain..... "	.05½@.05½	German..... "	40.00	Prussiate..... "	.09½@.09½
Lump..... "	.09½			Sal soda, f.o.b. works..... 100 lb.	.60
<b>ARSENIC—White</b> ..... "	.02½@.03	<b>LEAD—Acetate, white</b> ..... lb.	.09@.09½	Foreign, f.o.b. N. Y..... "	.85
Red..... "	.06½@.06½	Brown..... "	.07@.07½	Silicate, concentrated..... lb.	.05
		Nitrate, com'l..... "	.06½	Com'l..... "	.01
<b>ASPHALTUM—</b>		" granular..... "	.08½	Sulphate, com'l..... 100 lb.	.65
Barbadoes..... "	.02½@.03	<b>MAGNESITE—Greece.</b>		<b>SULPHUR—Best seconds, per ton.</b>	21.00
Cuban..... "	.01½@.03½	Crude (95%)..... lg. ton.	6.50@7.00	Roll..... lb.	1.85
Egyptian, crude..... "	.06@.07	Calcined..... sh. ton.	16.50@17.00	Flour..... "	1.90
Gilsonite, Utah ordinary..... "	.03@.03½	Bricks, domes, per qual. f.o.b. Pittsburgh..... M.	160@200	Flowers, sublimed..... "	2.20
Trinidad..... "	35.00			<b>TALC—North Carolina</b> ..... sh. ton.	15.50@23.50
<b>BARIUM—</b>		<b>MAGNESIUM—</b>		N. Y. Fibrous best..... "	10.25
Carb. Lump, 80@90%..... sh. ton.	25.00@27.00	Chloride, com'l..... lb.	.01½	French, best..... "	20.00
92@98%..... "	28.00@29.00	Sulphate..... 100 lb.	.50@1.25	Italian, best..... "	30.00
Powdered 80@90%..... lb.	.01½@.02	<b>MANGANESE—</b>		<b>TAR—Oil bbl. (50 gal.)</b> ..... bbl.	5.40
Chloride com'l..... 100 lb.	1.35@1.50	Crude powdered:		<b>TIN—Crystals</b> ..... lb.	.22
Chem. pure cryst..... lb.	.05	70@75% binoxide..... lb.	.01½@.01½	<b>URANIUM—Oxide</b> ..... "	2.25@3.00
Nitrite, powdered..... "	.05	75@85% binoxide..... "	.01½@.02		
Sulphate (Blanc Fixe)..... "	.02	85@90% binoxide..... "	.02½@.03	<b>ZINC—Metallic ch. pure</b> ..... "	.07@.09½
		90@95% binoxide..... "	.03½@.05	Chloride solution, com'l..... "	.02
<b>BARYTES—</b>		Ore..... unit.	.18@.20	Chloride, granular..... "	.04½@.04½
Am. Crude No 1..... sh. ton.	9.75	<b>MARBLE—Flour</b> ..... sh. ton.	6.00@7.00	Dust..... "	.05½@.05½
Crude No. 2..... "	8.00	<b>MINERAL WOOL—</b>		Sulphate..... "	.02@.02½
Crude No. 3..... "	7.00	Slag, ordinary..... "	19.00		
Floated..... "	16.75@18.00	Selected..... "	25.00	<b>BORON—Nitrate</b> ..... lb.	\$1.50
Foreign floated..... "	18.75@20.50	Rock, ordinary..... "	32.00	<b>CERIUM—Nitrate</b> ..... "	12.00
Snow-white..... "	17.25@18.75	Selected..... "	40.00	<b>DIDYMIUM—Nitrate</b> ..... "	45.00
<b>BAUXITE—Ga. or Ala. Mines:</b>		<b>OZOKERITE</b> ..... lb.	11½	<b>ERBIUM—Nitrate</b> ..... "	67.50
First grade..... lg. ton.	5.25@5.50			<b>GLUCINIUM—Nitrate</b> ..... "	13.50
Second grade..... "	4.50@4.75	<b>PAINTS AND COLORS—</b>		<b>LANTHANUM—Nitrate</b> ..... "	56.00
Arkansas, first grade..... g.	5.00@5.50	Litharge, Am. powdered..... "	.05½@.06½	<b>LITHIUM—Carbonate</b> ..... "	1.50
Second grade..... "	4.50@4.75	English glassmakers'..... "	.08½@.08½	<b>LITHIUM—Nitrate</b> ..... oz.	.60
Washed ore..... "	6.00@7.00	Lithophone..... "	.03½@.06½	<b>STRONTIUM—Nitrate</b> ..... lb.	.07@.07½
<b>BONE ASH</b> ..... 100 lb.	.02½@.02½	Metallic, brown..... sh. ton.	19.00	<b>THORIUM—Nit.</b> 49@50%..... "	4.50
<b>BORAX</b> ..... "	.07½@.07½	Red..... "	16.00	<b>URANIUM—Nitrate</b> ..... oz.	.25
<b>CADMIUM—Metallic</b> ..... "	1.40	Ocher, Am. common..... "	8.50@9.00	<b>ZIRCONIUM—Nitrate</b> ..... lb.	10.00
<b>CALCIUM—Acetate, gray</b> ..... "	2.30	Best..... "	16.00		
Acetate, brown..... "	1.55	Dutch, washed..... lb.	.02½		
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J..... sh. ton.	65.00	French, washed..... "	.01½@.01½		
Chloride, f.o.b. worae..... "	9.00@10.00	Paris green, pure, bulk..... "	.12		
<b>CEMENT—</b>		Red lead American..... "	.06½@.06½		
Portland, Am. 400 lb..... bbl.	.90@1.25	Foreign..... "	.07@.08½		
Foreign..... "	1.25@1.75	Turpentine, spirits..... gal.	.64		
"Rosendal," 300 lb..... "	.80	White lead, Am., dry..... lb.	.05½@.05½		
Slag cement..... "	.75@1.25	American, in oil..... "	.06½@.06½		
<b>CHLORINE—Liquid</b> ..... "	.30	Foreign, in oil..... "	.09@.09½		
Water..... "	.10	Zinc white, Am. extra dry..... "	.04½@.04½		
<b>CHROME ORE—</b>		Foreign, red seal, dry..... "	.06@.08½		
(50%) ex-ship N. Y..... lg. ton.	18.50@19.00	Green seal, dry..... "	.06½@.09½		
Bricks, f.o.b. Pittsburgh, M..... "	175.00				
<b>CLAY, CHINA—Am. common</b>					
ex-dock, N. Y..... "	7.75@8.00				
Am. best ex-dock, N. Y..... "	9.00@9.25				
English, common..... "	11.00@11.25				
Best..... "	16.75				

## The Rare Earths.

<b>BORON—Nitrate</b> ..... lb.	\$1.50
<b>CERIUM—Nitrate</b> ..... "	12.00
<b>DIDYMIUM—Nitrate</b> ..... "	45.00
<b>ERBIUM—Nitrate</b> ..... "	67.50
<b>GLUCINIUM—Nitrate</b> ..... "	13.50
<b>LANTHANUM—Nitrate</b> ..... "	56.00
<b>LITHIUM—Carbonate</b> ..... "	1.50
<b>LITHIUM—Nitrate</b> ..... oz.	.60
<b>STRONTIUM—Nitrate</b> ..... lb.	.07@.07½
<b>THORIUM—Nit.</b> 49@50%..... "	4.50
<b>URANIUM—Nitrate</b> ..... oz.	.25
<b>ZIRCONIUM—Nitrate</b> ..... lb.	10.00

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.