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FROZEN GOLD GRAVEL

Phenomena Observed in the Frozen Ground of the Far North—Methods Used in Breaking and Thawing it Preparatory to Recovering its Gold Contents—Suggested Improvements

BY J. P. HUTCHINS*

This unique feature of large earth-work in the far north, and particularly mining operations, is interesting. It seems difficult to understand the reason for perennially frozen ground in a region where, during a part of the year, the sun shines for more than 20 hours a day, and temperatures over 90 deg. F. in the shade are sometimes noted. The average monthly Fahrenheit temperatures for 1904, a normal year, were those shown in the following table:

January	— 22.4°	July	+ 56.1°
February	— 25.8°	August	+ 52.1°
March	— 4.5°	September	+ 36.0°
April	+ 32.5°	October	+ 27.7°
May	+ 42.9°	November	0.0°
June	+ 53 5°	December	+ 2.0°

The average for six winter months gives about 35.8 deg. below the freezing point, or about 3.8 deg. F. below zero. For the other half of the year the average was 13.5 deg. above freezing, or 45.5 deg. F. It will thus appear that where an average temperature of 35.8 deg. below the freezing point is registered for half the year, and only 13.5 deg. above the freezing point for the remaining six months, perennial frost will be encountered where no particular conditions cause thawing, as on southern hillsides, where the sun strikes almost perpendicularly during a large part of the summer.

THAWED AREAS

These occur irregularly, and, though their presence can be predicted in some instances with a degree of certainty, it often happens that frozen ground is met where, under seemingly similar circumstances, thawed material had been encountered. R. G. McConnell says: "The thickness of the frozen stratum varies considerably, and is less on ridges than in valleys, and on southern than northern exposures. A shaft sunk on the ridge south of El Dorado creek reached unfrozen ground at a depth of 60 ft., while one in the Valley of El Dorado creek was stopped by running water at a depth a little over 200 ft. Another shaft sunk through gravel on the plateau between Bonanza creek and the Klondike river passed through the frost line at a depth of 175 ft."[1].

C. W. Purington says: "In a small island, in the interior Yukon country, a shaft sunk through rolled stream gravel to a depth of 40 ft. in winter penetrated perpetually frozen ground until near the limit of its depth."[2] Also, "A curious condition exists on the treeless areas of Seward Peninsula. Wherever a growth of stunted willows occurs, the ground beneath is found to be thawed, and wherever the willows are replaced by moss, the ground is frozen solid. This rule is not without exceptions, but has been found to have rather general application. The distribution of the willows and moss-covered patches in the creek bottoms and along the low valleys, appears to be entirely irregular."[3] Fred H. Moffit says: "The greatest depth of frost on Seward Peninsula is not known. Near Nome, the frozen gravels have in one of two cases been passed at a depth of about 90 ft., while other shafts of greater depth did not reach thawed ground. On Chicago creek, near Kugruk river, a depth considerably greater was reached without discovering the limit of frost, which seems to depend largely on the efficiency of the drainage."[4] A well sunk near the mouth of the Yenessei river, Siberia, in an attempt to develop running water, found layers of ice and frozen gravel to a depth of 382 feet.

FIG. 1. HYDRAULIC PIT SHOWING OLD DRIFT TIMBERS

FIG. 2. BLOCKS OF FROZEN GRAVEL

FOSSIL ICE

"Fossil ice" of various thickness, notably on Seward Peninsula where it is overlain by clay, containing remains of Pleistocene mammals, occurs in the far north. Crystophenes (more or less horizontal sheets of ice, though often approximating the slope of the surface of the ground under which they lie) occur on the slopes as well as in the creek valleys of the far north. They are usually found 2 to 4 ft. below the surface, and are 25 to 150 ft. in diameter. In flood plains and in river val-

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[1]Report on the Klondike Gold Fields, 1905, page 8 B, Geological Survey of Canada.

[2]Methods and Costs of Placer Mining in Alaska, *Bulletin* 263, U. S. G. S., page 158.

[3]*Ibid*, pages 88-89.

[4]*Bulletin* 247, U. S. G. S., page 40.

leys they have formed during the winter and then been covered with muck, which prevented subsequent thawing. Slides, also, sometimes cover ice on creek margins in a way to cause it preservation.

FACTORS INFLUENCING THAWING

Dredging in the Klondike river, having a minimum flow of about 2000 sec. ft., was carried on, during 1903-1904, without meeting frozen gravel; similar operations on Bonanza creek, with a minimum of about 1 sec. ft., encountered no frost in virgin ground without muck overburden, but in another claim which had been drifted and extensively open-cut, found much frozen area. Open-cutting with steam shovels on the flats of the Klondike flood plain adjacent to the river had little frozen material to handle, even in drifted ground with a muck overburden several feet thick, but similar work on El Dorado creek found the previously drifted ground frozen almost through its entire section. It seemed that where gravel in the valleys, without muck overburden, had not been disturbed by drifting or open-cutting, or where there was a heavy sub-surface flow, as is usually the case in large river valleys, there is less frozen alluvion. Heavy overburdens of muck or moss are an almost infallible index to underlying frozen ground. They act as non-conductors of heat, preventing even seasonal thawing. Usually there is a thinner section of such material on sunny timbered exposures; while if there is no timber or undergrowth, no moss nor muck is found. Muck is a mixture of semi-decomposed vegetable matter, sand, soil and water in varying proportions, but usually with over 75 per cent. water. It thaws very slowly and possesses many of the characteristics of ice. Pure muck is like peat and has a large content of ice. When considerable quantities are exposed to sun and air, causing it to thaw, decomposition sets in and an odor as of brewery grain may be noted.

Where flood-plain gravel is solidly frozen it is difficult to thaw below a depth of 5 ft. because of the impossibility of driving points in alluvion containing large rounded boulders. Slightly cemented flood-plain gravel has been encountered in drifting on the "White Channel." It was extremely difficult to thaw and even after thawing, powder was needed to break it down; the hole made by the thawing point was used in placing the charge. Fortunately, gravel greatly indurated, such as requires milling for complete extraction, has not been encountered in the far North, probably because the frozen condition has prevented the circulation of ascending water containing cementing materials or descending water containing organic matter that would precipitate the former and thus bind the gravel, as has occurred in California. Where tight gravel is found, pressure and time have been the responsible agents.

It is interesting to note that water, running out of some of the old drifts on the White Channel, where superficial thawing is induced by air currents, has such a large content of sulphuric acid as to prevent its use in boilers. This is probably formed by the oxidation of the pyritic contents of the gravel induced by water containing carbonic acid. Decay of mine timbers and other organic matter incidental to mining forms this gas, though it may have other sources. The conditions maintained by thawing where steam and hot water come in contact with pyrite, would conduce to the formation of sulphuric acid without the participation of carbonic acid.

Surprise has been expressed that, even after thawing, gravel is still slightly indurated, it being supposed that thawing

FIG. 3. OPEN CUT ON EL DORADO CREEK

would cause a change parallel to slacking. It is possible that such a change does take place, but that the original excessive hardness obscures the amount of softening.

DEPTH OF THE FROZEN STRATUM

No general conclusions as to the depth of the frozen section are deducible, for many factors such as condition and contour of the surface, exposure to sun, interstitial water flowing from depths sufficient to be warm, and the character of the ground affect it. A perpetually thawed condition is due, not so much to the sun's heat, for the average temperature in the shade is below freezing, but more to springs of deep-running warm water, many of which are known to flow throughout the winter.

STREAMS AND LAKES

During the summer these show no noteworthy peculiarities except the excessively low temperature of the water. With the advent of cold weather, ice forms on their margins and where there is still water. Anchor ice seems to form on the bottom of streams, but is really only an aggregation of ice crystals, adhering to the bottom, after having been formed on the surface of the moving water and carried to the bottom by the force of the stream. After accumulating in sufficient mass, its buoyancy will pick up pebbles and sand, and transport them long distances. Anchor ice does not seem to form in the still water of lakes.

BLASTING FROZEN GROUND

This is not generally done and is advisable only when an isolated mass of frost, thawing unusually slowly, delays work. It has been found that frozen gravel, earth and muck do not break well, and considerable care must be exercised to avoid difficulty with frozen powder. In blasting frozen gravel, earth and muck, a mass having the form of a cone is shattered, the apex being the bottom of the drill hole.

One attempt was made to blast frozen alluvion, 15 ft. thick, to prepare it for dredging. Holes were sunk with a Keystone driller and 50 lb. of 40 per cent. powder was put into each hole. It was hoped that shattering the frozen mass would permit a flow of water through the fractures, with a thawing effect. It was found ineffective, as the material reunited by regelation along the lines of fracture.

PLACER MINING

In all mining of frozen alluvion, it is necessary to have the material in a thawed condition before a satisfactory gold extraction can be obtained. It is possible to excavate the material if powerful steam shovels having small dippers are used. Thawing can be accomplished by exposure to air, sun or water, or by steam, by hot water, by wood fires, or by heated stones. Open cutting is ordinarily practised because no artificial thawing is necessary, the overburden being scraped and the pay dirt shoveled as they thaw by exposure to air and sun. In drifting, steam is introduced into the frozen mass by "points," which are heavy pointed pipes with driving heads, connected by hose to a supply of steam. These are driven into the gravel (sometimes 12 ft. in thawing for dredging) and left wth the steam issuing from the buried ends long enough to thaw all ground within a radius of 1.5 to 3 ft. This time varies considerably; 6 to 14 hours are sometimes necessary. Loose gravel, with so called "dry frost," thaws much more rapidly than does sand or soil which has a larger content of ice. Best results are had when the ground so treated is left for some time before breaking down, so as to allow a complete diffusion of heat. For hot-water thawing, a small plunger pump, exhausting into

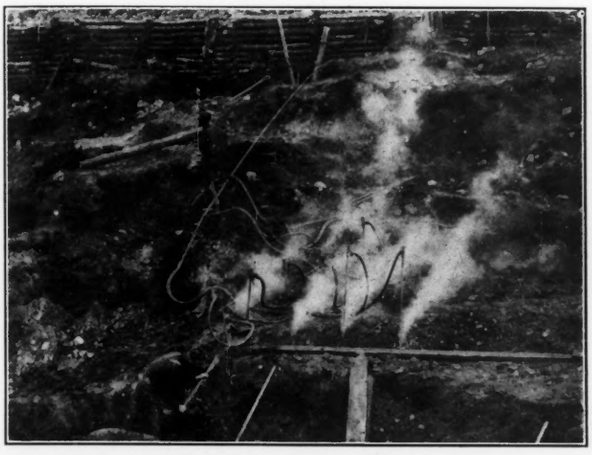


FIG. 4. A BATTERY OF STEAM POINTS IN OPERATION

FIG. 5. SO CALLED "GLACIER" OF CREEK ICE

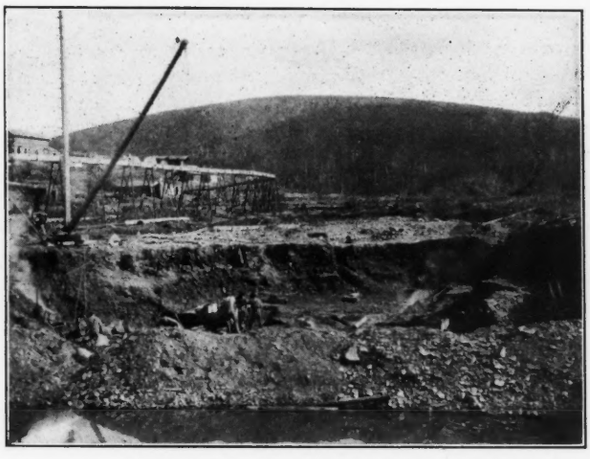


FIG. 6. OPEN CUT WITH HOISTING DERRICK

FIG. 7. HYDRAULICKING FROZEN GRAVEL

its own suction, discharges the water thus heated against the gravel breast through a hose and nozzle. It would be better to use a centrifugal to avoid wear of plungers, packing, valves and valve seats. The same water is used repeatedly.

The efficiency of the hot-water method in drifting is 5 to 6 cu.yd. thawed in 24 hours per horse-power generated at the boiler, as against 3 cu.yd. by steam. Thawing by the hot-water method costs about 25c.; by steam, generally about 40c. per cu.yd.; though thawing gravel about 15 ft. deep with steam, for dredging, costs about 25c. per cu.yd. Thawing by wood fire and hot stones is not generally practised, except in operations so small as not to warrant the installation of a steam thawer.

DREDGING

For dredging it has been suggested that, where electricity could be cheaply generated by water power, a device to heat water and discharge it against the face, where dredge buckets are excavating, would result well. Possibly warming the water of the pond in which the dredge floats, with electrical heaters, would be effective. Although not impracticable, the use of sub-aqueous jets on dredge-bucket ladders introduces numerous complications, and it is likely that the power consumed in operating a pump to get heavy pressure, such as would be necessary in sub-aqueous hydraulicking, could be more efficiently used in heating the ponds. Either method would work only in paddock or inland dredging; but, fortunately, the beds of rivers are rarely frozen. There is an opening for a device that will thaw frozen material for about 10c. per cu.yd. to prepare it for dredging. Millions of yards of material would then be available for extremely profitable exploitation during a working season of about 150 days per year.

PROSPECTING

A judicious use of hot water is necessary in prospecting. It has often been noted that the value of gravel as ascertained by prospecting was less than what subsequent mining showed. This unique circumstance is seemingly ascribable to the frozen condition of gravel at the time of investigation. Anyone who has examined frozen material realizes that extreme care is necessary to prevent loss of gold, and that there is a tendency to pan such material too rapidly. An easy method of heating water for panning or rocking is with stones heated in a wood fire. Not only is more accurate work accomplished, by a complete thawing of the material and more perfect amalgamation, quicksilver being more active in moderate temperatures, but the actual discomfort of the hands is avoided.

FIG. 8. KLONDIKE TOPOGRAPHY

FIG. 9. SUMMER SURFACE CONDITIONS

FIG. 10. DOG TEAM AND SLEIGH

MACHINERY AND METHODS

It can be urged upon all, whether miner or investor, that in the far North as well as in other regions of inimical environment, simple reliable methods and machinery must be used. Hostile conditions, elemental obstacles, isolation and the "cussedness of inanimate objects" combine to make the operation of experimental machinery an unsuccessful venture.

ILLUSTRATIONS

In the illustrations reproduced herewith, Figs. 1 and 2 show hydraulic banks of frozen gravel. The drift timbers, which are usually embedded in solid ice, are a constant impediment to mining. Fig. 3 shows the method of open cutting generally practised where the alluvion is not too deep; no artificial thawing is necessary, the overburden being scraped and pay shoveled as it thaws by exposure to

sun and air. This creek produced in places over $1,000,000 per 500 linear ft. Fig. 4 depicts the method of steam thawing. Fig. 5 illustrates the phenomenon described under paragraph on "Fossil Ice." Fig. 6 indicates a method of handling pay dirt, having many advantages. Fig. 7 shows a hydraulic stream at work in frozen gravel where a low duty is attained. Fig. 8 illustrates the low round-top hills of the Klondike district. It is the divide between Hunker and Bonanza creeks. Fig. 9 depicts surface conditions during the summer; the moss and "muck" are always wet and soggy. About 500 lb. per animal is being hauled. Fig. 10 shows winter conditions and the method of traveling and transportation generally used in remote districts. The Administration building of the Yukon territorial government is shown in the background. Fig. 11 indicates an unsuccessful attempt to hydraulic frozen gravel with pumped water. In the background on the left of the hydraulic tailing dump can be seen the end of a dredge stacker. This dredge has been at work in Klondike for several years.

Mining in Portugal

Le Revue Minéralurgique reports that, although mineral occurrences are frequent in Portugal, the country remains devoted to agriculture, and that only a few mines of copper and iron show any activity. Practically the whole mineral output is exported in its crude form.

COPPER

Ores of this metal form the largest part of the mining yield. The largest mine is the San Domingos, at Mertola, near the Spanish boundary. The ore is carried to Pomarao, on the Guadiana river, and thence to England. The cupriferous pyrites mines, Aljustrel, are owned by a Belgian company of Anvers. Most of the ore is sent by railroad to Barreiro, on the bank of the Tagus, opposite Lisbon, but part of it is leached at the mine, and cement copper recovered.

IRON

Iron ores are widely distributed and would warrant the erection of blast furnaces, but for lack of railroads and the insufficiency of smelting fuel. One interesting group of mines is in Alemtejo, close to the Mira river, which is navigable to this point. The ore carries 57 per cent. iron, between 3 and 7.5 per cent. manganese, 0.10 to 0.16 per cent. phosphorus, 0.10 to 0.20 of sulphur, and 4 to 5 per cent. silica. The orebody is susceptible of easy working, and the ore can be delivered at Villanova de Milfontes for 7 francs per ton. These mines were first worked for manganese. Larger and richer bodies of manganese ore are now found in the Beja district.

LEAD

Argentiferous lead ores, associated with zinc, prevail in the Aviero and Vizen districts. Native silver is found at the Varzea de Trévoès mine in the former district, but the principal output of this mine is galena and blende. The Terramonte mine of Douro has sent important amounts of lead sulphide ore to Germany.

FIG. 11. HYDRAULICKING WITH PUMPED WATER

Sir Humphrey Davy invented the safety lamp in 1816; at some mines instruments nearly identical with those used 90 years ago, when the coal production was less than one-fifteenth of what it is at present, are still used.

DAVIS PYRITES MINE, MASSACHUSETTS

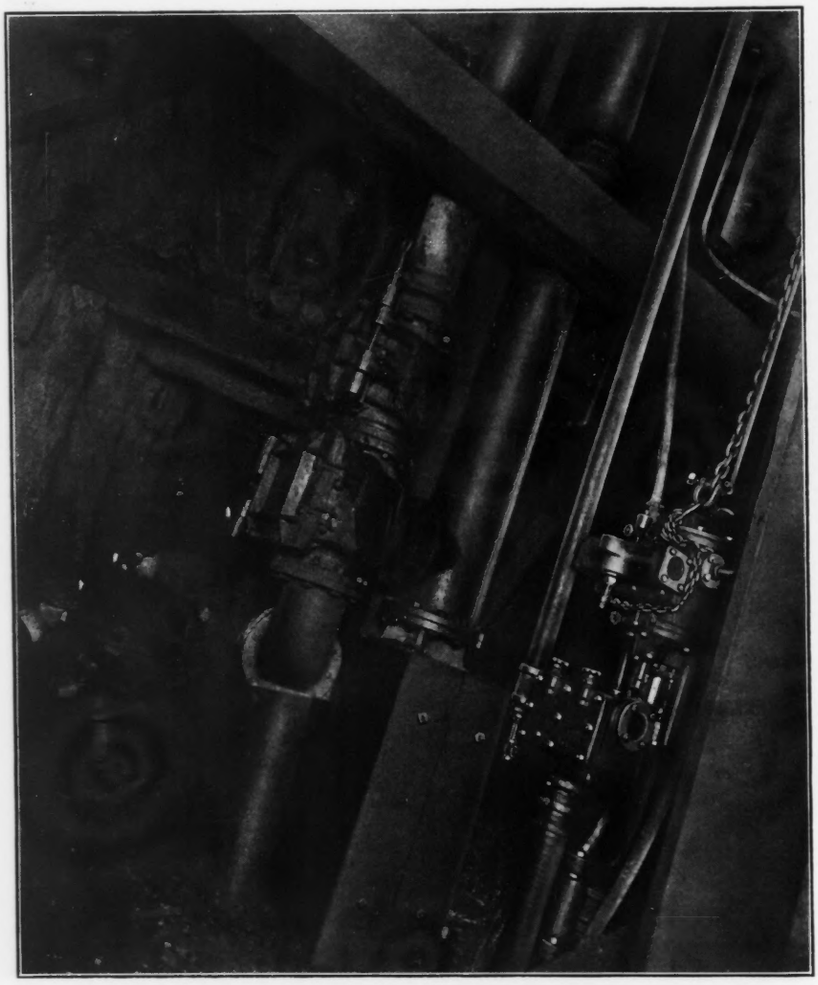
Details of Practice in Stoping and Pumping

BY J. J. RUTLEDGE*

Continued from page 676.)

MACHINE DRILLS.

In the stopes the Rand "Little Giant" No. 2 is used for stoping. This drill is easily hoisted up and down the stopes by means of the cargo winch before mentioned. Rand drills are also used in the drifts and "Little Giant" No. 3 are used in the sinking. The only trouble I have found with these drills is the great cost for repairs, due to broken pistons, worn out feed-nuts, chuck-bolts, etc.



CORNISH AND SINKING PUMPS

McKiernan drills have been used in the stopes and also in the drifts and in shafts and winze work. They do not readily throw the mud out of a deep hole in shafts or on the stopes, probably due to the fact that the moisture in the air freezes in them. In drifts, rises, and in all dry holes the McKiernan gave far bettre results than the Rand. A Leyner water drill has been used in drifting with good results when in the hands of a careful runner. On account of the difficulty in carrying water to the Leyner in the stopes, it did not give very satisfactory results. However, if water could be brought from the shaft column pipe (Davis mine water is extremely acid, and generally eats metal surfaces very rapidly) by using Leyners in stoping, one helper could be dispensed with; as the two drills are usually side by side, two runners and one helper could easily operate two drills. Most of the helper's duty at present on the Leyner consists in carrying water to the tanks and assisting in jacking bar, setting tripod, or changing bits. Another good feature of this drill is that dry holes never result from its use. This drill creates no dust when used in rising or drifting and removes a very disagreeable accompaniment of such work when performed with other drills. Among the disadvantages connected with the use of the water Leyner are the complicated nature of the machine, and the necessity for the employment of a competent, skilled runner, the greater skill necessary to sharpen the drills, the necessity for having a uniformly high air pressure in order to obtain the best results, and frequent breakage of chucks.

Little Wonder air hammer drills and Little Jap hammer drills are used for block holing, and where the foot wall is soft enough, for hitch cutting. For the latter purpose a special hitch-cutting tool is employed. Both these drills give considerable annoyance at times, through the sticking of the hammer. The Little Wonder gave most satisfactory results. At one time the stopes were kept going two weeks by the use of the Little Wonder drills alone by drilling 4-ft. holes, while the Rand stope-drills were being overhauled. Both the Little Wonder and the Little Jap drill the pyrites easily and cheaply, but refuse to cut the hard foot or hanging. They do not work well in wet ground. Generally the greatest source of trouble connected with their use, aside from the sticking of the hammer, was the bending or breaking of the hollow bits at the point where the steel shank or point was welded or brazed to the stay-bolt iron constituting the body of the drill. This difficulty has been lessened through the employment of a solid bit of hexagonal steel, which has a ⅜-in. hole drilled lengthwise through it. These bits will not bend, do not require tempering of shank or points, and can be sharpened like the steel used in the large drills, and do not require careful handling. Their use is a decided improvement over the soldered or brazed bits. Although the dust from the small air drills is annoying, their use results in such a great saving over hand drills that they are generally used for block holing and trimming ore on foot and hanging. A 1-in. air pipe is run along behind the muckers, and they can use the hand drills themselves whenever necessary. The use of the respirators, before mentioned, also relieves the operator of the hand drill from the dust annoyance. The hand drills cannot drill wet ground.

CHARACTER OF THE ORE.

The ore is very hard and yields about 70 per cent. of broken, which probably is a greater percentage than any other pyrites mine in this country. It has a strong brassy appearance and is not at all gray in color as is the ore in some other mines. The individual crystals of iron pyrites often measure ⅛ in. in diameter, and the crystals are firmly bound together, so that there is only a small percentage of fines made in mining the ore.

In occurrence the orebody seems to be

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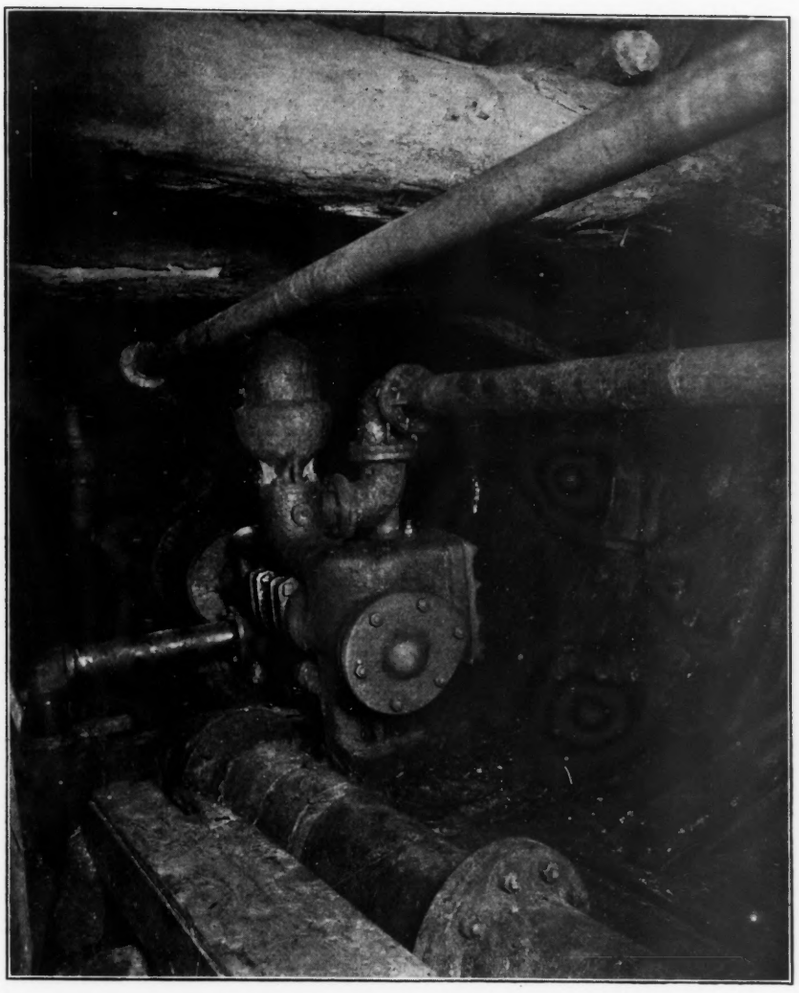
a fissure vein. The walls are everywhere well defined with the orebody alternately thickening and thinning in much the same manner as peas swell the pod. At no point has the vein been lost entirely. It may thin out to a few inches, but it always persists. Five feet has been found to be the economical limit for the working of the ore. When the ore thins to that extent the level is usually abandoned.

A few of the observations made by the miners may be mentioned as follows: "When the crystals in the ore are large the vein will be found to thicken and, conversely, when the crystals are very small and the ore fine-grained, the vein may be expected to thin very rapidly. The presence of zinc blende interspersed among the crystals of iron pyrites indicates the approach of a large body of ore."

Chalcopyrite is also found in the Davis mine. Garnets and other minerals indicative of metamorphic activity are also found. The chalcopyrite occurs in two ways; (1), as masses in the iron pyrites and (2), in veins. These veins usually carry quartz when they occur on the foot wall. When they occur on the hanging they are generally free from the clear glassy quartz, and together with the associated wall rock are much contorted, indicating probably that the formation of the copper was contemporaneous with the crumpling and metamorphism of the schist. Occasionally large quantities of the chalcopyrite have been found and some engineers who have examined the mine have predicted that with increased depth the ore would change to chalcopyrite. It is a fact that very much more copper is now found than formerly. During last July, three carloads of excellent copper rock was mined and sent to the smelter. At Davis no attempt is made to precipitate copper from the mine water as it does not seem to carry an appreciable amount. True veins of chalcopyrite are found in the vicinity of the Davis mine, and at some distance from the foot wall of the pyrites deposits, and one such vein is at present being worked.



CAMERON PUMP ON THE 600-FT. LEVEL

CORNISH PUMPING SYSTEM.

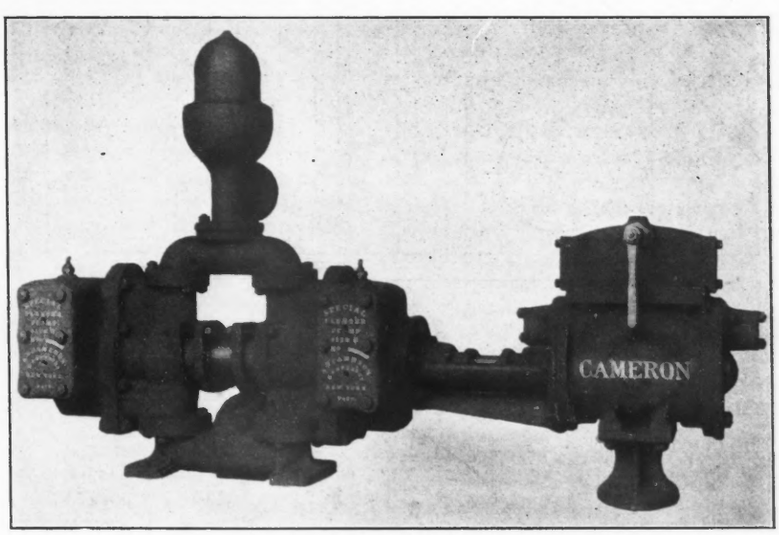
As the stopes are not filled, there is considerable water in the mine, above a certain point. In March and April when the "break up" or spring thaw occurs, the mine makes as high as 100,000 gal. of water in 24 hours. To handle this great body of water a Cornish pumping system was installed.

Below the distance to which surface waters reach the mine is dry and free from water. All the water found in the lower levels comes from the surface, and none is apparently made in the rocks of the lower levels. However, at times past, small local streams have been found in the hanging.

The column pipe is 10 in. in diameter, and there are two bobs in the shaft, one at No. 1 level, the other at No. 8 level. The sumps are located at No. 4, No. 9 and No. 13, the last being the largest. A solid pillar of ore, 30 ft. in thickness, was left between No. 14 and No. 15 levels, and all the water is caught at this point and carried into the large sump at No. 13, south.

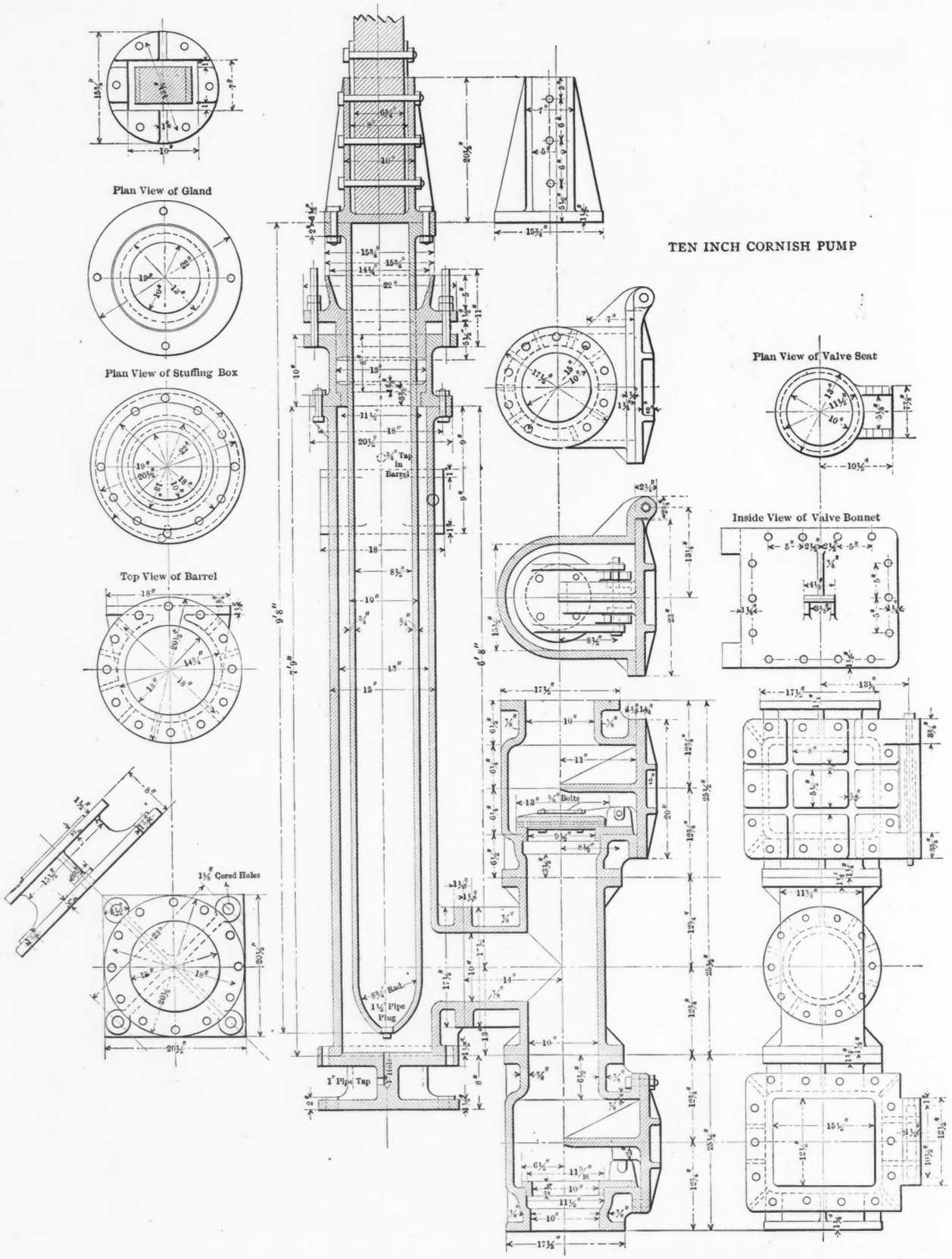
Cast-iron column pipe in 8-ft. and 10-ft. lengths, ¾ in. thick, and having flanges with 8 and 10 holes for bolts, are used over most of the line.

Part of the suction chambers are open



SPECIAL CAMERON PUMP

back, and part are closed backs; they are all lined by the Wakefield Lead Lined Pipe Company, of Wakefield, Mass., and the lead lining adds greatly to the life of the chambers. The lead lining is ⅛ in. thick. Generally the chambers last about one year. The clacks and clack seats are of brass. An improvement has been made in bolting on the suction-chamber doors. Formerly when a door held on by ordinary bolts and nuts was removed to clean or repair the chamber, there was always trouble over lost nuts or bolts when the time to replace the door came. Now the bolts are pivoted fast to the suction chamber, as



DETAILS OF CORNISH PUMP

in the water end of the Cameron sinking pump, and the nut is quickly loosened and the bolt swung out of the slotted bolt-hole in the door so that the latter can be removed; when the repairs are completed it is only necessary to replace the door, swing the pivoted bolts back in place, tighten the nuts, and the chamber is ready for service. The system is so planned that all the chambers are interchangeable. The Cornish pump engine is 18x30 in., and second motion. The door plates are now made with seven bolt holes instead of 14, as shown in the accompanying drawing, and the holes are slotted outward to permit of the bolts which hold the door in place being swung out from the door. The Cornish pump has a stroke of 3 ft. 9 in. Acid-proof plungers are 10 in. in diameter.

AUXILIARY OR "DONKEY" PUMPING SYSTEM.

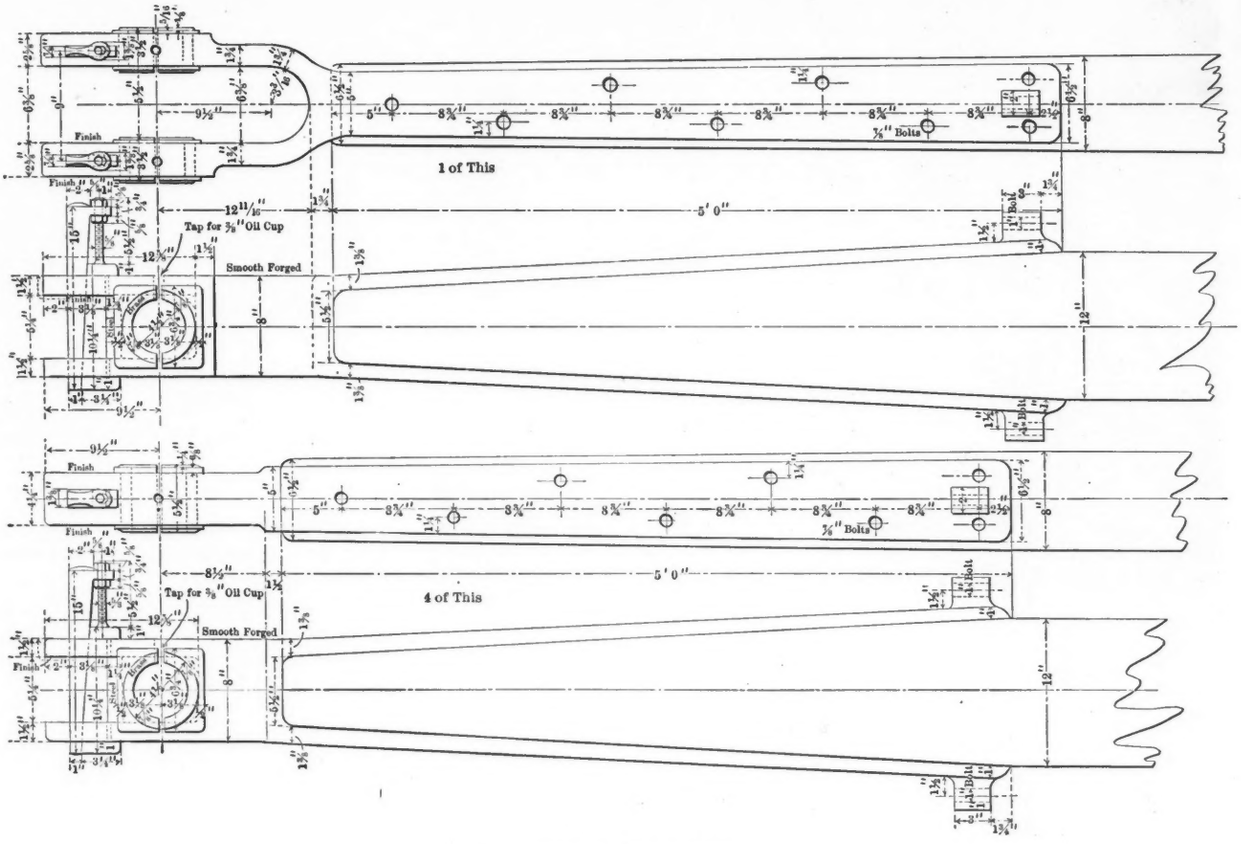
In order to provide means for handling the water while the Cornish pumps are being repaired or assist the latter in the "break-up" season, station or "donkey" pumps are installed at No. 4, No. 9 and No. 13, and also at No. 14 and 17 levels. These are all Cameron pumps and are all operated by steam except the one in No. 14 level, which is run by air.

The No. 14 pump delivers the water from a small sump in No. 14 north, to the large sump in No. 13 south. The No. 13 south "donkey" delivers the water to the sump in No. 9 south. No. 9 delivers the water to a large box sump in the pumpway at No. 4, and No. 4 delivers the water to the surface. Most of these Cameron station or "donkey" pumps have sectionalized water ends, which greatly facilitate their repair. They have acid-proof pistons and piston-rods. The mine water renders frequent repairs necessary. Cameron sinking pumps are used at the shaft bottom. These pumps, of which there are two, one being used as a reserve, have acid-proof metal water ends.

SHAFT SINKING.

Rand "Little Giants" No. 3 are used in sinking. When the shaft is wholly in ore, good progress is made, as the pyrites drills easily; but horses of country rock in the ore retard drilling. A small Bacon hoist, or winch, operated by compressed air, is used to hoist the muck and drills from the shaft bottom to the station plat. Here the muck is shoveled into the skip. A bulkhead of stout timbers, resting on the 2-ft. bearing pieces and fine ore, on the whole, is carried under the skipway. No attempt is made to muck directly into the skip, as it is too dangerous. Sometimes a pentice is left under the skip in sinking.

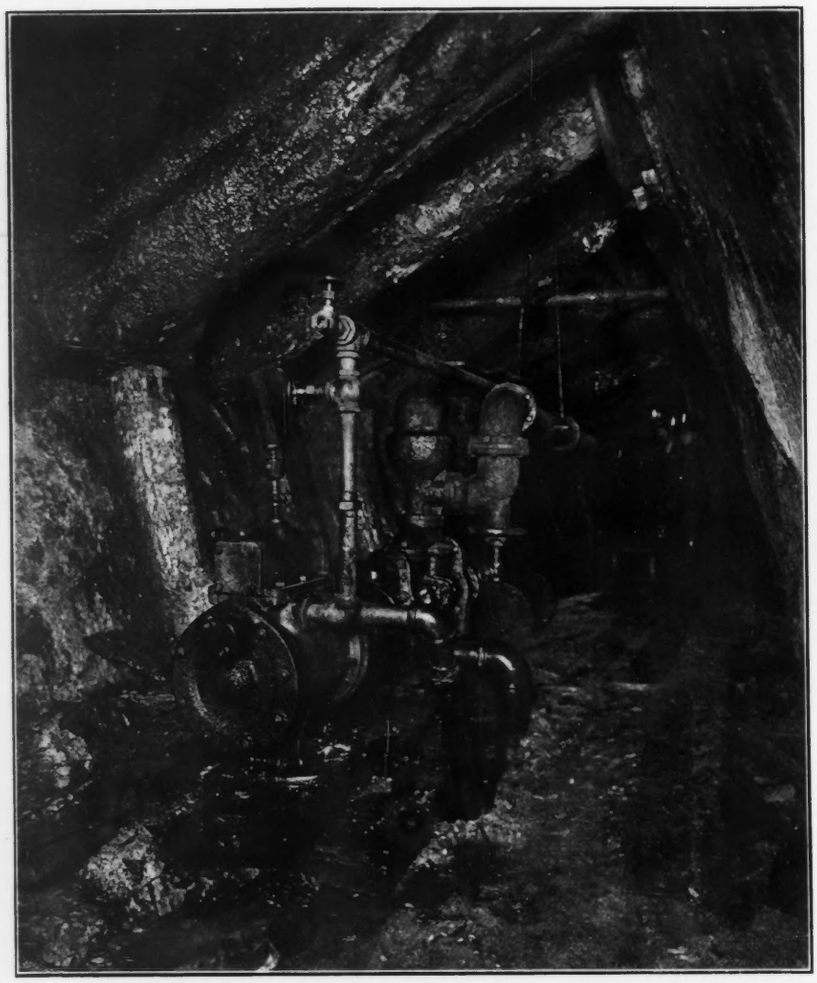
Two shifts of four men each (two drillers and two helpers), each working ten hours, are employed in sinking. They do their own mucking, hoisting and loading of skip. From 25 to 30 ft. of holes is a fair shift's work in drilling. Usually four cuts are taken out per month. These cuts vary in depth from 5 to 7 ft. The shaft is 9x18 ft. outside the timbers. Experience has shown that the V-cut gives the best results when placed as shown in the accompanying drawing. A No. 5 Cameron sinking pump is used to keep the shaft free from water. In the upper levels a "jack-head" was formerly used to keep the shaft free from water. Bearing timbers are set in deep hitches, and are at distances varying from 10 to 12 ft. apart vertically. A side-heading is usually cut for the bearing timbers, to prevent their being blown out by the shots in the shaft bottom. An iron pin 1 in. in diameter is driven into the hanging wall directly over the head of each bearing timber. Shaft bars are used exclusively in sinking.



DETAILS OF ROD ENDS

Sometimes it is necessary only to drill four holes in a round, but usually five holes are required to pull the ground. A 60 per cent. powder is used to pull the V-cut (No. 1 and No. 2 rounds), and 40 per cent. powder is used on No. 3 and No. 4, as it has been found that the shaft is more quickly mucked when lumps are made, rather than fine ore. No. 3 and No. 4 on one end are fired and entirely mucked before the No. 3 and No. 4 of the other end are fired; and if No. 1 and No. 2 break well, No. 3 and No. 4 on each end merely break like stope holes and yield large lumps with consequent easy mucking and rapid hoisting. An average rate of progress is about 20 to 30 ft. per month.

(To be continued.)



HORIZONTAL PLUNGER STATION PUMP, 250-FT. LEVEL

Indiana Geological Work

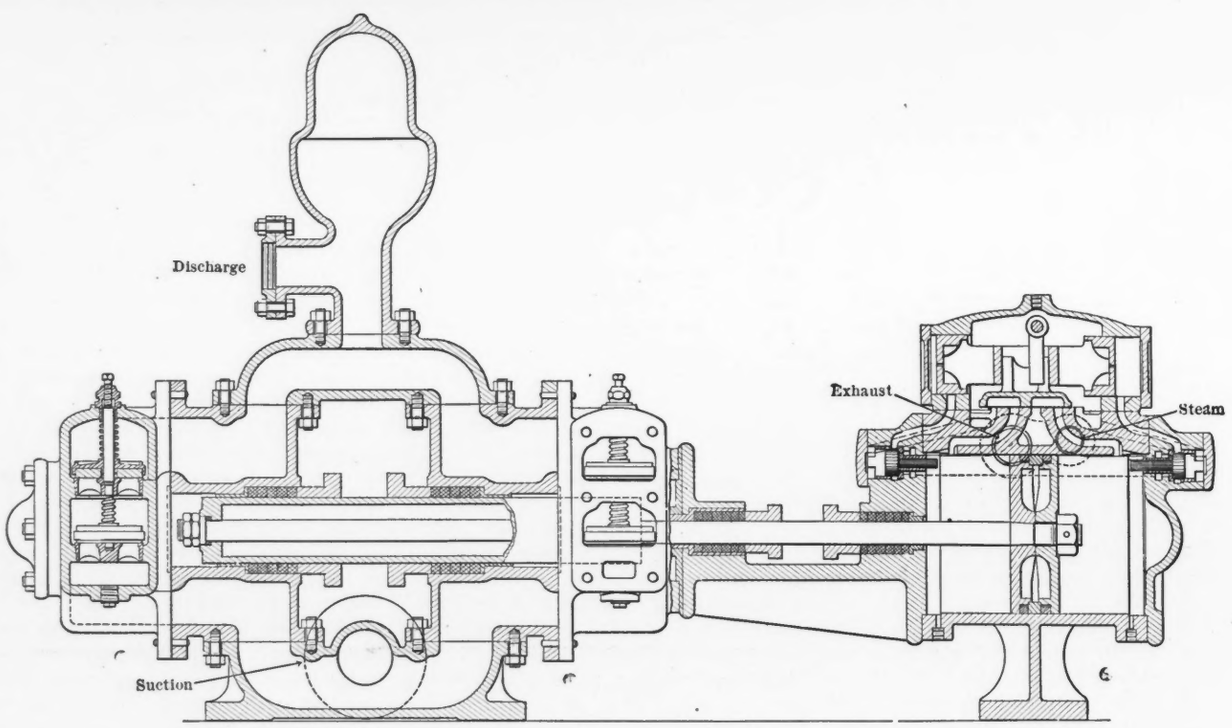
W. S. Blatchley, Indiana State geologist, has already outlined his next annual report and has competent men in the field working on each of the divisions into which it will fall.

Mr. Blatchley says that his next report will first deal with the collection of special data of the Indiana oilfields. The geologist himself will take up the main oilfield in the northern and eastern part of the State. He has done a great deal of field work in this territory recently. He will next give attention to the lesser oilfields of Gibson and Hamilton counties.

For the first time the peat bogs of northern Indiana will be considered in the forthcoming report. The whole northern third of the State is concerned with this report on the peat investigation, according to Mr. Blatchley. People in Indiana have no idea of the extent of the peat in the northern part of the State.

The iron ores of Greene and Martin counties will come in for an exhaustive investigation in the report also. Mr. Blatchley says that the iron deposits in these and adjacent counties amount to more than is realized, and there need be no surprise if iron mining becomes one of the leading industries in the State. This investigation will be in charge of Charles W. Shannon, an iron expert.

According to Prof. A. E. Outerbridge there were produced 276,000 tons of pig iron by the Gayley dry-air-blast process in 1905, and several large plants are now in course of construction.



12X5X3 HORIZONTAL SECTIONALIZED PLUNGER PUMP

GOLD AND SILVER AT FAIRVIEW, NEV.

Prospects of a New Camp Discovered This Year

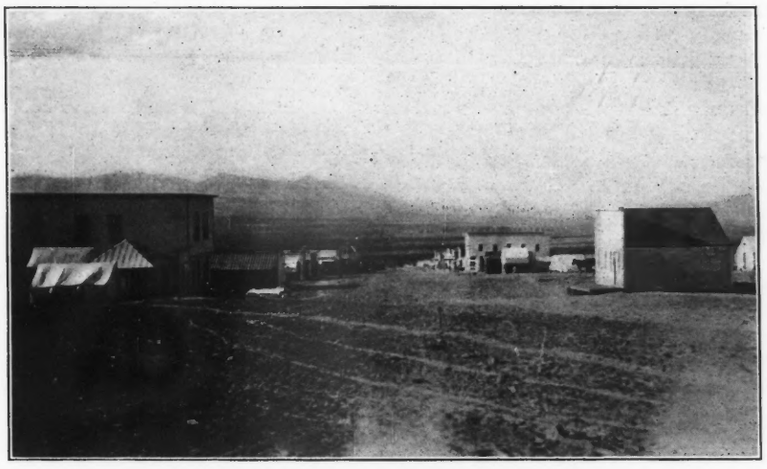
BY CLAUDE T. RICE

This camp, 60 miles southeast of Hazen, is reached by stage or automobile from that town. The automobile fare is at present $20 each way, while the stage fare is $8. The run from Hazen to Fairview is made by stage in from 9 to 10 hours, while the automobile makes the trip in 4½ to 5 hours. These automobiles run on the same road as wagons and not on a special toll road made for their exclusive use as is the case farther south. The trip from Hazen to Fairview is not an unpleasant one. After a few miles of desert and bad roads cut up by the graders who are working on the railroad into Fallon, one travels for several miles through a region made fertile by Government irrigation. This proximity to an agricultural district is one of the blessings of Fairview.

FAIRVIEW PEAK

HISTORY

Rumors of rich mines in this vicinity have been in the air for years. To the north a few miles on the other side of the valley, is the old silver mine, La Plata, which flourished to some extent in the old boom days of Nevada. In August, 1905, F. O. Norton and C. S. Wilson discovered ore in place on what they located later as the Cyclone group. On Jan. 4, 1906, Langdell located the Boulder group, and later on George Bertschy located the Dromedary Hump. Langdell, becoming disgusted, left the camp without prospecting his claims thoroughly. Webber & Hodson obtained a three-day option on them, and, March 13, uncovered a rich surface showing. Since then the camp has grown rapidly.



MAIN STREET OF FAIRVIEW

SAND WELLS STATION ON ROAD

GEOLOGY

The ores at Fairview resemble those from both Virginia City and Tonopah. Fairview peak, like Mt. Davidson, is a granite core rising above the later flows of lava which form its base. These flows at Fairview are andesites, but a flow of darker, later andesite caps part of the region, as in the small hill between the Nevada Hills and the Pyramid group. Cutting across this region is a series of later north and south rhyolite dikes. Some of these displace the veins, others only cut through them. At the Nevada Hills, the rich ore at the surface is cut off by these dikes.

The main series of veins has a nearly parallel east and west strike with a dip to the south. Several of these seem to converge toward the west in the Ida M. ground. There is also a series of apparently less important north and south veins, such as the Cyclone group and the Pyramid.

The main veins consist of a nearly pure quartz shading off into silicified country rock on the sides. The high-grade ore at the Nevada Hills mine apparently follows the foot-wall, but at the Eagle group the best ore appears to follow the hanging wall. The mineral is sulphide of silver, stephanite or brittle-silver and, as at Virginia City, the sulphide appears right at surface. In many points on the Nevada Hills property one only has to break away the dark desert coating of the rock to see the shining brittle-silver particles in the solid, whitish quartz.

The mines are in a rough country, at an altitude of 5500 ft., to the south of Fairview, whose altitude is 4600 ft. This rough topography permits some development by adit tunnels, but these will give not over 300 ft. of depth at the most. The veins are characterized by damp seams of clay, surprisingly damp for such a dry climate.

MINING CONDITIONS

There is no water in the immediate vicinity of Fairview and water sells for $2.50 per bbl. (50 gal.), while at Wonder, 18 miles to the northeast of Fairview, water costs $5 per bbl. The latter camp was discovered about June 1. Strong outcrops of stephanite ore are reported to have been discovered there, causing a considerable rush thither.

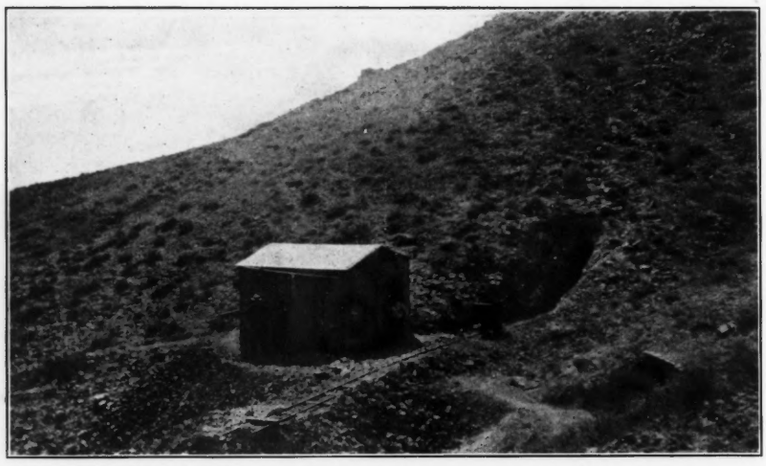
Wages at Fairview are as follows: Miners and surface men, $4.50 per eight hours; miners in shafts or raises or working on windlass, $5; freight costs 1¼c. per lb. from Fallon, and 1½c. from Hazen, so that supplies are about the same price as at Manhattan. Ore shipments cost $12.50 a ton from the mines to Hazen. The cost of a 5x7-ft. drift in the country rock at the Nevada Hills property was $8 per ft. For a raise following a rhyolite dike, with one compartment about 5x5 ft., the cost was from $3 to $4 a foot.

NEVADA HILLS MINE

The owners of the Nevada Hills property recently had a survey made for a water line from Horse creek, about 28 miles northeast of Fairview and about eight or nine miles beyond Wonder. On June 14, 1906, there were 100 miner's inches of water available in Horse creek. This pipe line would be a gravity system, the greatest pressure being 600 lb. per sq.in. at the deepest point in Lebu valley.

THE NEVADA HILLS MINE

Of all the mines at Fairview, the Nevada Hills is the best. The Nevada Hills ledge strikes N. 68 deg. W. and dips at a high angle to south. The vein has a well defined outcrop of rich ore in shoots from 1 to 6 ft. wide along the foot-wall of the ledge matter which is, in places, 100 ft. wide. This rich ore is highly silicious, in most instances, and fades off into a good grade of milling ore and then into barren silicified andesite. In the pay shoot there is a peculiar dark ore which is very rich, and varies from a blackish blue through blueish grades to a greenish cast. It contains some copper as well as gold and silver. It occurs in seams which swell and contract, sometimes being 18 in. wide. This ore assays from $1000 to $4000 per ton. Apparently it consists of a dark gangue impregnated with a network of horn-silver. Sometimes metallic gold can be seen in it. The sulphides crop right at surface. The high-grade ore outcrops along a distance of 1000 ft., but ceases where the vein has been cut both at the east and west end by north and south dikes of rhyolite.



DROMEDARY HUMP MINE

The present workings on the property consist of the Eagle tunnel, 80 ft. long, whence most of the ore that has been shipped has come. A raise has been run to surface, almost the whole of which was in shipping ore. Another drift has been run on the vein near the blacksmith-shop fault. It is only about 30 ft. long, but considerable shipping ore has been taken out. An additional 400 ft. farther east is down 50 ft. and drifts about 25 ft. long have been driven each way on the vein. In the east drift there is a good grade of milling ore across the entire face, while the face of the west drift is in good ore, 18 in. of which is of shipping grade. The bottom of the shaft is in good milling ore, with 1 ft. of it going about $200 a ton. A little farther east is an open cut where

NEVADA HILLS VEIN

the vein is again exposed, about 5 ft. of it going $100 a ton.

The first shipment of 31.5 tons went over $200 a ton. A second shipment of 30 tons was expected to go about $500 a ton. The highest assay from the property is 28.72 oz. gold, 14,079 oz. silver. The highest gold was from a talcose mud seam 6 in. wide, which went 91.68 oz. gold, 4298.5 oz. silver. The proportion of gold to silver in the ore is generally about 7 oz. gold to 100 oz. silver. Thirty men are working at present at the property.

THE DROMEDARY HUMP CLAIM

The next best surface showing is that on the Dromedary Hump claim. In this property a strong quartz vein outcrops with a general east and west strike, and dip to the south. Scattered along it are shoots of rich ore where, just under the black desert glaze, are particles of brittle-silver ore. Some surface work has been done along the outcrop, while the vein has recently been met in a crosscut. This vein also extends into the Boulder company's ground where some surface work has been done and a crosscut is being driven to catch the vein in depth.

OTHER PROSPECTS

At the Fairview Eagle, several outcropping veins are being worked. These have a general east and west course, although in places some of them run more nearly north and south. Especially is this noticeable where one of them approaches the north and south dike on the west end of the property, the same dike that cuts off the Nevada Hills surface ore shoot. Several drifts and crosscuts have been started on the property, while the company has sunk a shaft 60 ft. deep, from the bottom of which a drift has been driven to the west. A small streak of high-grade ore and some milling ore have been found here. Some surface work has been done along this outcrop and a small amount of rich ore sacked. Lessees have sunk a shaft on the property, but have not met with much success.

The Seymour fraction is sinking a shaft on its ground which lies within the Eagle ground. Both properties are to be equipped with gasolene hoists. The Cyclone is doing some work on its north and south vein. At the Lookout group, to the east of the Nevada Hills, they are sinking two shafts through a shallow capping of later andesite, to find the continuation of the Nevada Hills vein beyond the rhyolite dike which cuts off the ore shoot on the east. On the Pyramid group a drift is being driven along a north and south vein which is nearly vertical. This has a lime gangue along one wall, while, near the other, the ore is more silicious. The value is principally in silver.

The "black sand" excitement has found its way to Custer county, South Dakota, in the southern part of the Black Hills region. There is much talk of high values in gold and platinum, but no actual results as yet.

THE COONEY DISTRICT, NEW MEXICO

Geology and Mining Developments

BY BLAKELY GRAHAM*

This district is on the west slope of the Mogollon mountains, in southwestern Socorro county, N. M. It is connected with Silver City, the railroad and supply point, by a good wagon road 80 miles long. The towns of Cooney and Mogollon, two miles apart, are situated in the district.

The Mogollon range is about 100 miles long, and 10 to 20 miles wide; several of its peaks are from 12,000 to 13,000 ft. above sea level, the mining district being at 6500 ft. The mountains are rugged though not generally precipitous; good wagon roads are readily built to requisite points. Superb timber reserves abound.

GEOLOGY AND HISTORY

The geological formation of the district, and generally of the main range also, is entirely volcanic, consisting chiefly of trachytes and rhyolites. Within the confines of the district the trachytes exist as overflows, which have been cut later by rhyolite dikes. This formation has been exposed by development and erosion for depths of 1700 ft. without discovering any other than the same igneous country rocks.

The main veins are generally found upon the rhyolite-trachyte contacts, though there are at least two noteworthy exceptions, where proved mines exist on fissures cutting all the formations. The ore has thus far been found to occur in large bodies, from 4 to 12 ft. wide, yielding from 5000 to 40,000 tons each. The value of the ore has ranged from $8 per ton upward, the Cooney mine having produced for a long period $50 to $60 ore.

The records of production are incomplete, but the gross production has been approximately $7,850,000; this has come from the following mines: Cooney, $1,500,000; Last Chance, $1,000,000; Litle Fannie, $1,000,000; Confidence, $1,000,000; Maud S., $1,250,000; miscellaneous, $2,000,000. Nearly all of this production has come from within 400 ft. of surface; today the measurable ore reserves in the mines mentioned will almost amount to the aggregate of the past output.

Former methods of working were wasteful and expensive; with the exception of the Cooney mine, practically the entire output of the district came from the gold-silver veins, and was produced in pan-amalgamation mills, in which bullion recoveries were low and at an expense of from $2.25 to $5 per ton. Within the last year, however, this has been changed, as the Last Chance mine has made an unqualified success of its cyanide plant, and demonstrated the feasibility of effecting a high bullion recovery at a largely reduced cost. It is but lately, also, that machine drills have been introduced in the mine; this is a necessary improvement as the ores average quite hard.

MOGOLLON GOLD AND COPPER COMPANY

The Mogollon Gold and Copper Company, owning the Cooney mine, has the most complete equipment and extensive acreage of any company in the district. The Cooney vein has had a general northwest and southeast strike, and is upon a rhyolite-trachyte contact. It produces copper-silver ores carrying only small quantities of gold; though in its early history, from above water-level it produced an ore that was concentrated into a high-grade gold-copper product, numerous shipments being made which ran as high as $1100 per ton. Below water-level the ore is chiefly a bornite, carrying silver; this occurs as a replacement in the hanging wall of trachyte. The principal work below water-level has been confined to one orebody, which has been explored 650 ft. deep, is from 200 to 250 ft. long, and has an average width of 12 ft.; though at times it widens to over 30 ft. At places this orebody was rich, for months producing 15 tons per day of $50 to $60 ore. This was run through the original five-stamp mill, which was replaced two years ago with a modern 100-ton mill, when the entire vein content was handled and averaged satisfactorily. The total development upon the mine is about 5000 ft., covering an extreme area of 1000 by 650 ft.

The equipment of this mine consists of a hoist, a compressor, two crushers, two pairs of rolls, two Huntingtons, Wilfley tables, Frue vanners, etc. The total working costs of mine and mill are $4.12 per ton; being $2.34 for mining, and $1.78 for milling. About 30 per cent. of these costs are properly chargeable to development and improvement.

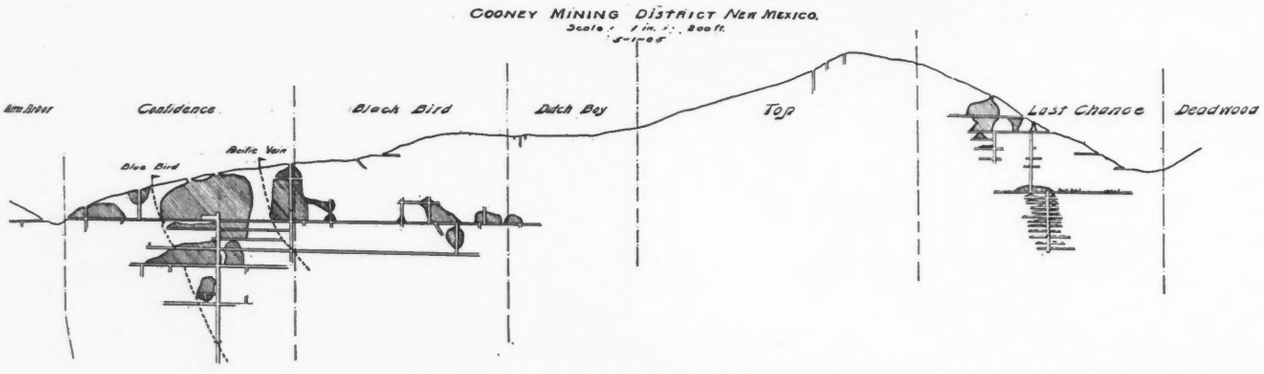
LAST CHANCE—CONFIDENCE VEIN

The Last Chance-Confidence vein is the largest producer, being the most extensively developed in the district. West of the Confidence mine, the vein is located for 3000 ft; east of the Last Chance, it is located for 9000 ft. and is traceable for a long distance farther. This vein is on a rhyolite-trachyte contact, with a general east-and-west strike, and a dip of 70 deg. to the north. The ore value is solely in gold and silver, the gold constituting 40 per cent. of the value, and the silver 60 per cent. The principal workings upon the vein are confined to the Last Chance and Confidence mines, and total over 30,000 ft. These workings explore an area 5500 ft. laterally, by from 720 to 985 vertically.

*Mining engineer, Cooney, Socorro county, New Mexico.

For the last two years the development work upon the Last Chance mine (owned by the Ernestine Mining Company), has been encouraging, and this property today ranks well. During this time the management has been occupied with the problem of changing the mill from pan-amalgamation to concentration and cyanidation; it is now completing the final changes necessary to perfect the plant.

The upper workings are from 6 to 30 ft. wide, and produce $8 to $10 ore. Two years ago the mill adit encountered the first ore-shoot, which proved to be 250 ft. long by 7 ft. wide; at this depth the ore had increased in value to $18 per ton. The winze from this adit now 320 ft. deep, proves a further increase of value as additional depth is gained, the bottom level exposing 16 ft. of $25 ore. The bottom of the winze, 720 ft. below surface, shows 18 ft. of ore, assaying over $40 per ton. The face of the adit is now



going through another ore shoot, and depth here shows the same persistent increase in value, from $8 to nearly $20 in less than 250 ft. additional depth.

The 50-ton mill (running largely experimentally) produced $258,000 in bullion last year, and operated on ore running from $14 to $30 per ton. The production this year will be largely increased, as the mill is nearly perfected.

THE CONFIDENCE MINE

The Confidence mine (owned by the Treasury Mining and Reduction Company) is operated under conditions similar to these in the Last Chance. The ores are milled on White Water creek, three miles distant, in a 30-stamp pan-amalgamation mill. The equipment at the mill is complete; it made the best record of any pan mill in the district, in late years effecting a bullion saving of over 80 per cent. of the assay value of the ore, and at a cost of $2.25 per ton. The mining when done entirely by hand work cost $3.10 per ton; of which about one-third covered development charges. This property has extensive ore reserves, and is preparing to remove and rebuild the mill at the mine as a cyanide plant, and also to equip the mine with heavier machinery.

THE QUEEN VEIN

The Queen vein, which marks the eastern boundary of the district, is a remarkably strong fissure, being from 5 to 50 ft. wide, and of great length. The most highly mineralized portion of the vein, however, lies in what is known as the Consolidated group of three claims. At this place it is on a rhyolite-trachyte contact, with a north-and-south strike, and an 80 deg. dip to the east. Particularly within the limits of the Consolidated claim, the croppings and exposures are good. For 1000 ft. at this place, the vein croppings average 12 ft. wide, and give an average assay of about $6 per ton. At one point the croppings stand up as a bluff, 40 ft. high by 100 ft. long. Numerous shallow cuts and shafts, together with one shaft 140 ft. deep, indicate an increase of value as depth in attained, which bears out the precedents established elsewhere in the camp.

OTHER MINES

The Little Fanny mine produced an average grade of ore of $20 per ton in the past; the mine has good reserves of ore at present. The Mogollon Mountains Investment Company (which acquired the mine last year) is preparing to re-open the property upon a systematic basis. A three-compartment vertical shaft is now being sunk; when this work has been sufficiently advanced the construction of a 200-ton cyanide plant will be undertaken. The vein is upon a rhyolite-trachyte contact, has a general east-and-west strike, with a dip to the south of 70 deg.; it will average 8 ft. wide. About 3500 ft. of development work has been done. The past production came from within 230 ft. of the surface, and the present reserves are within 400 ft. of surface. Conditions here are favorable for economical work.

The Enterprise mine, operated by the Enterprise Mining Company, is upon one of the north-and-south fissures. This company is now developing and equipping the mine, and is constructing a 25-ton mill, which will be in operation shortly. There are a number of other proved properties in the district that deserve mention, did space permit.

Undoubtedly, future developments will be rapid, as the milling difficulties, which for a long time appeared insurmountable, have been satisfactorily overcome, thus greatly encouraging all operators. Today the operator can depend upon the working of a mine at a reduced cost. Bullion recoveries of ore values can approximate 90 per cent. and at a cost for milling of about $2 per ton. Thus, operating under present conditions, 90 per cent. of the value can be recovered at a total cost of not exceeding $5 per ton; this is a contrast to conditions obtaining two years ago, when a 70 per cent. recovery was made at from $6 to $9 per ton.

Tin Production in the Malay States

According to D. A. Wilbur, American consul-general at Singapore, the output of all the tin-bearing States of the Malay peninsula was 23,985 long tons in the first six months of 1906, against 24,940 during the corresponding period of 1905. Shipments of tin direct to the United States have fallen off greatly during the last three years, showing a growing tendency on the part of American buyers to purchase what is known as London optional shipments, i.e., tin shipped to London, optional rate, by payment of 1s. per ton in addition to the English or continental rate of 27s. 6d. per ton. Goods shipped by this optional rate can be unloaded in England, put in store, held, and shipped to America without extra cost, when it suits the seller's convenience. The rate of freight on tin to New York direct, by way of the Suez Canal, is 20s., or 8s. 6d. less than the optional rate per ton.

Mr. Wilbur expresses the opinion that it would be advisable for American buyers of tin to break away from the influence of London, and ship directly to the United States, thus saving in freight, middleman's profit, etc., and at the same time eliminating from the London market the influence of heavy American orders. All orders from London or elsewhere are filled by agents at Singapore, who buy from the Straits Trading Company, the agent who can pay the highest price securing the product on an open market.

A new oilfield is being tested by boring between Beulah and Sundance in Wyoming. Oil sand is reported at 400 ft. depth.

The Dolores Mines, Chihuahua, Mexico

In a report to directors of the Dolores Mines Company, of New York, under date of Aug. 1, 1906, which covers the period from the organization of the company until the close of the fiscal year on June 30, 1906, John B. Farish, the consulting engineer, who visited the property between June 16 and July 10, 1906, describes the great difficulties as to transportation and labor under which this property has been developed, and the really remarkable results that have been achieved. The mine is situated about 100 miles southwest from San Isidro, a station on a branch from the Chihuahua al Pacifico Railroad, the riding time from San Isidro being 33 hours, or 3½ to 4 days. The trail is very rough, and the mule trains with freight are generally on the road, in favorable weather, from 10 to 12 days. The difficulties in bringing in heavy parts of machinery, in securing lumber from the timber lands in the vicinity of the property, and finally in securing an adequate supply of labor to do the required work, are similar to those which obtain in many of the remote parts of the Cordilleras of Mexico, but were enhanced by the present scarcity of labor in northern Mexico and the increased wages which have been brought about by the strong competition for it, together with the inherent difficulties in the establishment of a new community and enterprise many miles across rugged mountains from the nearest settlement.

Notwithstanding these difficulties, a 15-stamp mill, of 50 to 60 tons daily capacity, part of which was fitted for pan-amalgamation, was erected between May, 1904, and May, 1905 (a good record for time in such a location), and from the beginning of operations in May, 1905, up to June 30, 1906, this had treated by pan-amalgamation 9793 tons of ore, yielding $488,021 in bullion, besides $309,066 worth of tailings held for further treatment in a cyanide plant (which was finished and put in operation in May. 1906). Much of the credit for this very satisfactory achievement is given by the consulting engineers to J. Gordon Hardy, the manager at the mine.

The country rock of the Dolores district is diabase, which is cut by dikes, more or less silicified, accompanied at greater or less distance (often in connection with and generally parallel to them) by zones of shearing. The mineralization of these zones constitutes the veins of the district. Considerable leaching has taken place and the outcroppings of the zones show a reddish coloration. The surface oxidation appears to extend, in some instances, to a depth of over 400 ft. The principal workings of the company are on the Alma de Maria vein, the outcrop of which is easily traced for more than a mile. The main ore shoot developed in this vein has a length of about 600 ft., and has been opened to a depth of somewhat more than 400 ft. below the outcrop.

At the time the property was taken over by interests connected with the Venture Corporation, George A. Schroter reported that there were 40,311 tons of ore developed, of $2,228,109 gross value. Since then there has been treated ore to the amount of 9793 tons, of $797,087 gross value, leaving 30,518 tons, of $1,431,021 gross value remaining in the mine and on the dumps. To this must be added the tailings remaining after amalgamation, which are awaiting further treatment. These can be safely estimated at 9500 tons, with a gross value of $309,066. This gives a total remaining of Mr. Schroter's estimate, June 30, 1906, in ore and tailings of 40,018 tons, having a gross value of $1,740,088. The additional ore reserves due to the development since the purchase are difficult to estimate, because they have not been blocked out, but it seems conservative to estimate the additional available ore in the mine as equal in tonnage and value to the ore treated since the mill was put in operation. This being the case, it will be seen that the ore reserves have suffered no diminution since the purchase of the property.

The Dolores ore is of high grade in gold and silver, the value being in the ratio of 40.6 per cent. in gold to 59.5 per cent. in silver, reckoning silver at 65c. per oz. The ore is treated by amalgamation, followed by cyanidation, a combination process which has proved highly efficient. However, it is probable that the amalgamation part of the process will be superseded by concentration, it having been found that the ores can be treated as well by the latter process in combination with cyanidation of the tailings as by the present one, and the concentrates will furnish a return freight to the railway, which is desired for reasons connected with the transportation problem.

The 9793 tons of ore treated between July 1, 1905, and June 30, 1906, yielded $488,021 in bullion, of which $454,257 was shipped. Store profit and sundry receipts brought the total income up to $467,064.97. The mining expense was $36,648; milling expense, $64,356; cyaniding expense, $9241; bullion expense, $36,143; general expense, exchange, etc., $50,953. There was consequently a balance to profit and loss account of $269,724, and after deducting interest accounts, legal expenses, and other minor expenses, the net profit was $267,621. All of this was used in the payment of outstanding contracts, equipment, etc., the company having provided originally only $145,000 for working capital, an amount which was known at the time to be inadequate. Rather than attempt to raise more money, however, it was decided to provide the necessary funds by borrowing upon the company's credit, and paying when the mill was in operation. On June 30, 1906, the company still owed $173,374.94. In order to make the population of the Dolores comfortable and contented, which is necessary to insure adequate labor, to increase the milling capacity to 1500 to 1600 tons of ore per month, and to carry out plans for insuring prompt movement of freight between the railroad and the mine, a further outlay of $78,500 is estimated by Mr. Farish.

As a mining proposition, the Dolores has been successful. The failure of the mine to pay dividends has been due to the inadequate provision of working capital. Furthermore, the company will have to take care of a remaining indebtedness of $173,374.94, besides which the improvements and extension above noted should be provided for. If these recommendations are carried out, Mr. Farish sees no reason why the company should not make the gross monthly production estimated by Mr. Schroter in his report, and be placed upon an immediate dividend basis. It is evident from the report that the rate of dividends will depend upon the solution of the labor and transportation troubles of the past. Mr. Farish recommends to the directors an increase in the capital stock of a sufficient number of shares, which underwritten at the market price, will produce a fund to meet the obligations.

Notes from Broken Hill, N. S. W.

SPECIAL CORRESPONDENCE

The shareholders of the Broken Hill Proprietary Company are to be congratulated on the eminently satisfactory balance sheet laid before them for the half year ended May 31. Despite the restriction of operations by the fire in Block 11, a net profit of £232,332 is shown, or an increase of £35,373 over the previous half year. The shareholders were in a measure prepared for a decrease in the profits, as the working costs were largely increased by the outbreak of fire; but the sustained advance in the prices of silver and lead, taken with the augmented output of zinc concentrate, has more than made up for the outlay from this cause. Good headway is being made by this company with the equipment of the plant for the manufacture of spelter, and everything seems to be in order for the commencement of operations. The quantity of zinc concentrate produced by the retreatment of the residue heaps during the half year amounted to 28,276 tons. The company is still engaged in litigation respecting the rights to the Delprat process which is in use, and no information is consequently available respecting the returns obtained from the sale of the zinc concentrate, but it is evident that this is a very profitable source of revenue. The dividends paid during the half year totaled £192,000.

A REVOLVABLE CAR DUMP

A New Device for Unloading Trains of Mine Cars at One Operation

BY ERSKINE RAMSAY*

The first dump of the kind herein described, was installed in the early part of 1901, on Red mountain, near Birmingham, Ala., at the Smythe Slope Red Ore mine of the Tennessee Coal, Iron and Railroad Company by me, who was then chief engineer of the company. The main object sought in the design and introduction of the dump, which is rather "revolutionary" in its conception and operation, to say the least, was to eliminate, to a great extent, the cost of handling and dumping the mine cars individually, as is the practice on the usual tipple at most mines.

To illustrate the construction and mode of operation fully, the following cuts are given—Fig. 1, being end and side views of the dump designed for electric power, and showing bin arrangement. Fig. 2, being end view designed for steam or air power and showing bin arrangement. Fig. 3, being side and plan views of dump arranged to hold five cars and showing conveyor arrangement. Fig. 4, showing dump at Smythe mine with empty trip passing from dump to mine. Fig. 5, showing trip in dump and dump revolved and cars inverted.

What may be called the dumping cylinder, or frame, into which the cars are propelled, was made of such dimensions as to take in and dump a whole trip of five 2-ton tramcars at one operation or revolution. The ore is dropped directly from the tramcars as they are revolved sideways into the bin, located immediately underneath, which in the case in question, has a total length somewhat in excess of a five-car trip. From the bin the ore is fed by gravity into a crusher, which discharges, also by gravity, the crushed material into the railroad cars, after which it is ready for shipment to the company's blast furnaces.

REVOLVABLE DUMP COMPARED WITH SKIP-CAR

Near Smythe is the Spring Gap mine which is equipped with the self-dumping skip or gunboat common to mines in various parts of the country. The Spring Gap plant was installed several years prior to the opening of the Smythe mines, and so far as the dumping of the material is concerned, could not well be improved upon. Where the revolvable dump system, herein described, is in operation, the mine cars are hoisted, several in a trip, from the various landings, and the entire trip is dumped in one operation at the tipple on the outside, but with the skip-car plan the mine cars are dumped in the mine at the various landings, either directly into the skip car itself, or into a bin from which the skip is loaded. The skip car and the revolvable dump may be said to be the best devices of the two plans of dumping the mine cars in the mines on the one hand, or on the other of bringing

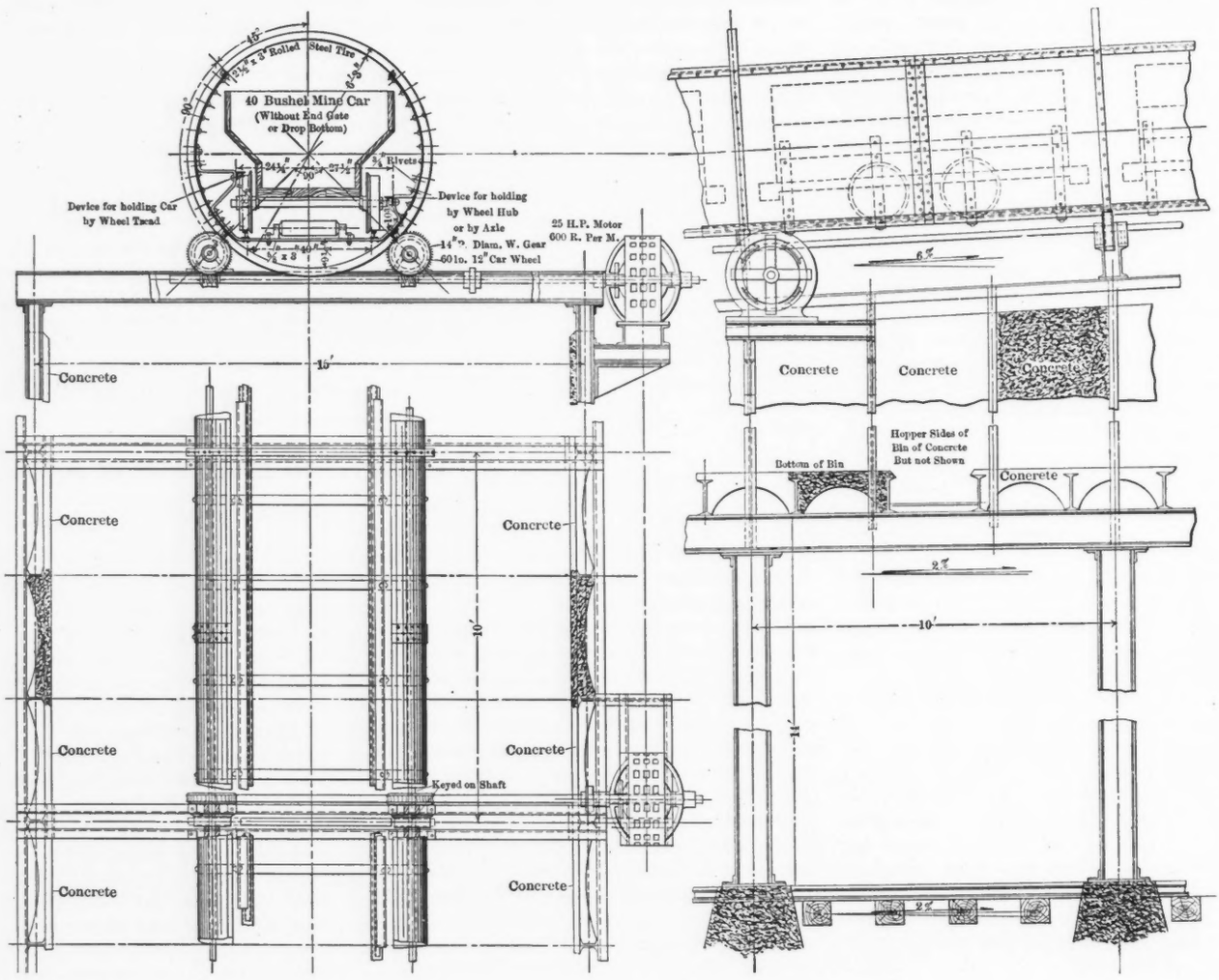


FIG. 1

*Mining engineer, Birmingham, Ala.

them to daylight before dumping. By dumping the cars in the revolvable dump at the tipple, they come under the eye and supervision of one man, who has an opportunity of examining each one of them, and of seeing that they are properly loaded both as to quantity and quality. When dumped in the mines into a skip car, at a number of widely separated places, no adequate inspection is possible, and a miner neglecting his duty cannot be easily detected. This is an important consideration, where mineral mined is paid for by the car, and requires close and constant supervision.

OPERATION OF REVOLVABLE DUMP

Only one man is required to operate the dump and take off the miner's checks, and he is preferably stationed at the lower or entrance end of the machine, in order that he may readily command a full view of the entire apparatus and its operation. Where steam or air power is used, the valve lever, with which he operates the cylinder, is located conveniently, as is also the controlling mechanism when an electric motor revolves the dump. After the dump has made a complete revolution, which in its course inverts the cars and drops the ore by gravity into the bin beneath, and as the empty cars emerge from the dump by gravity on their return trip to the mines, the miners' checks, if not removed in the mines at the various landings are easily taken off without stopping the trip. In many places it would be en-

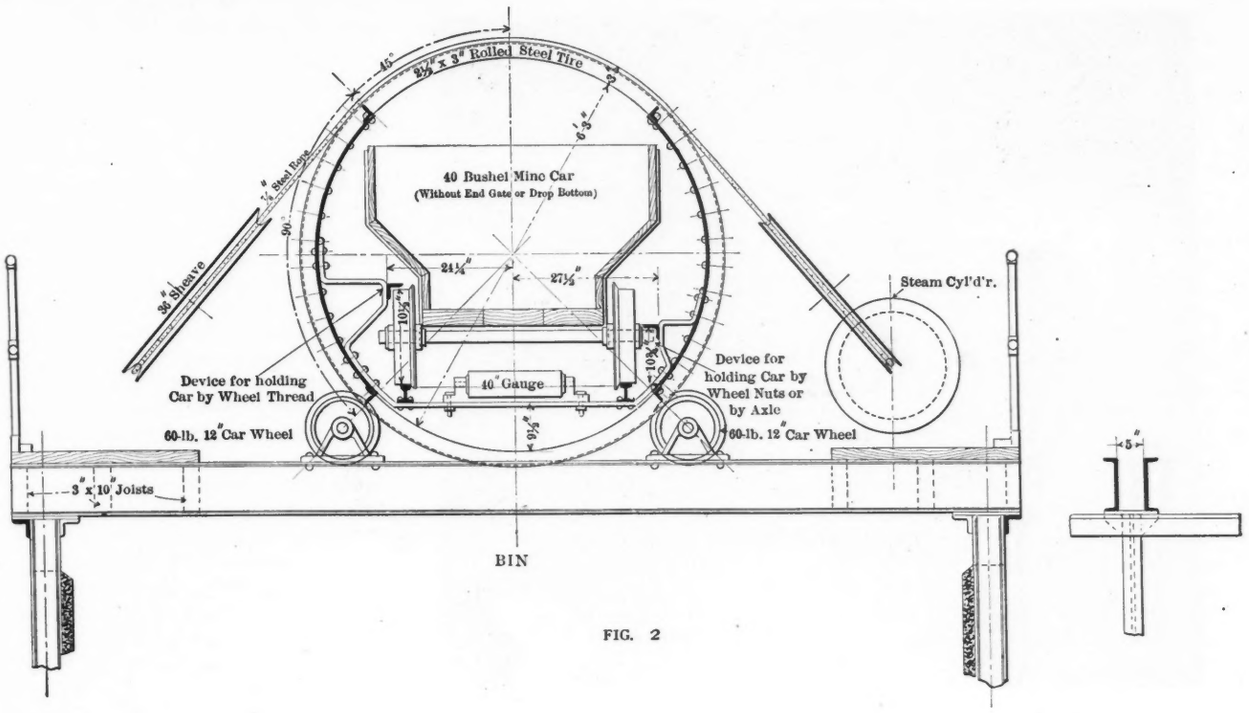


FIG. 2

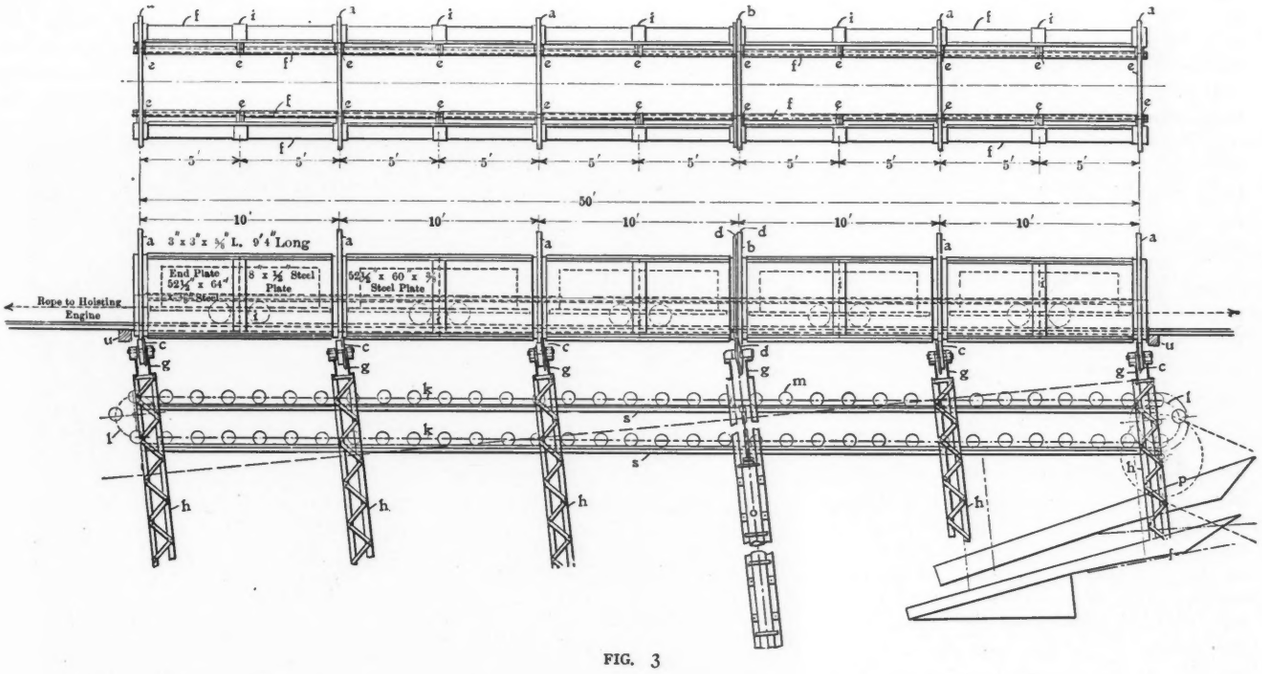


FIG. 3

tirely feasible and practicable to locate the slope hoisting engineer at the dump, in which position he could do the hoisting as well as operate the dump.

In the case of a slope mine the longitudinal axis of the dump has sufficient inclination to cause the empty cars to run promptly out of the dump and on into the slope by gravity, and at the same time pull the hoisting rope after them. Where the tail- or endless-rope systems of haulage or locomotives, electric or otherwise, are in use, the dump may be so placed, if desired, as to bring the axis of rotation to a level, in which case the cars are propelled into as well as out of it by the haulage power.

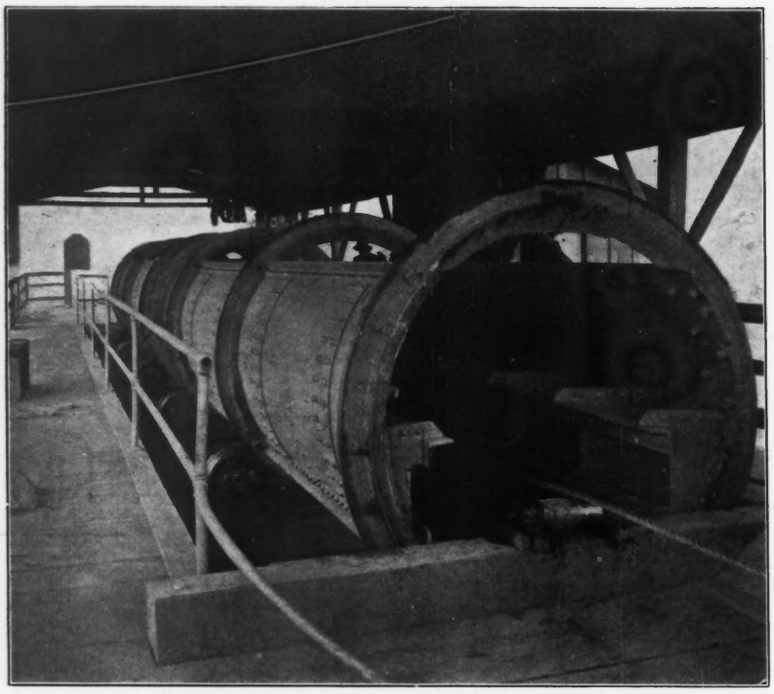


FIG. 4

CONSTRUCTION OF THE DUMP

With particular reference to the cuts illustrating the apparatus accompanying this description, the dump may be described as consisting of a number of cast-iron, cast- or rolled-steel rings (and one sheave ring where a rope is used) all bound together by steel-plate housing, on the inside of which the tracks or rails are held in place by the brackets as shown. The housing does not extend around the entire circumference of the rings, but only 90 deg. on either side, thus leaving an opening of 90 deg. on both top and bottom, the entire length of the dump, for the passage of the ore from the cars to the bin. It will be noted that a rail or angle is placed over the mine-car wheels or hubs on both sides of the cars so as to keep them in place during their revolution. This rail may be so located as to engage the hubs of the wheels, if the plan shown would interfere with the brakes on the cars. The rings rest and revolve on the supporting wheels, which are ordinary tramcar wheels pressed on axles.

While the vertical center line of the mine cars themselves may be located to one side of the vertical center line and axis of rotation of the dump, so as to bring the center of gravity of the loaded cars above and to one side of the axis of rotation, but below it when empty, thus giving at least a tendency for the dump to revolve automatically, it was thought best, for the particular plant in question, to make use of a steam cylinder as a convenient means of furnishing a positive and easily regulated power. These cars were not placed therefore with any regard to their turning the dump automatically. Either one or two cylinders may be used for turning the dump.

The sheave ring is provided with two rope grooves, one for each of the ropes which are attached to the piston rod or rods of the steam operating cylinders. The ropes pass from a connection with the piston rods around the sheave wheels to their own particular grooves in the ring. By this arrangement the dump is given a complete revolution for each stroke of the piston and each revolution is made in the opposite or alternate direction. If desired, the dumping may be accomplished by revolving the dump say one-half of a revolution, which would turn the cars upside down, allowing the ore to drop out, and then by bringing it back to its original upright position the empty cars would be ready to move out and the dump would be in position for another loaded trip to pass in.

APPLICATION OF CONVEYOR BELT

Fig. 3 shows the apparatus provided with a conveyor belt, which is designed to be used at plants where it is desirable to deliver the product of the mine directly to one screening or crushing plant without discharging into a bin. When a conveyor is so used its speed can be so regulated as to give it a travel approximately equal to the distance from one end of the conveyor to the other in a time equal to that ordinarily elapsing between the dumping of one trip and that of another, thus giv-

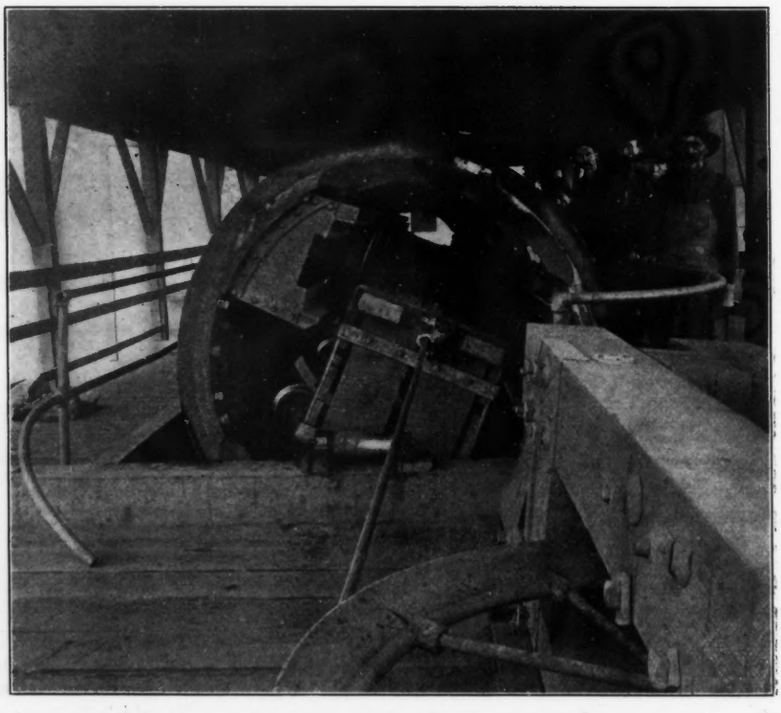


FIG. 5

ing a comparatively steady and even feed to the crusher or screen, which is a desirable consideration in getting the best and most work out of the crushers and screens. The conveyor was not installed at the plant in question and it is here shown only for the purpose of indicating what may be conveniently done in that direction.

NOVELTY OF THE SYSTEM

There is no special novelty in the mere dumping of a tram or railroad car sideways, by giving it a complete revolution, as that is being done in many places; but it is something entirely novel to dump a whole or any part of a trip in the way and manner here described and illustrated, and without uncoupling cars or motive power.

There are two prominent and almost universal ways of emptying tramcars as they come from the mines. In one case drop-bottom cars are provided and they are dumped singly with or without individual uncoupling on the tipple; and in the other, the whole trip is landed and the cars, after being detached from the hoisting rope, uncoupled and switched singly, are dumped one at a time. After dumping they are again made up into trips or trains and return empty to the mines. Where drop-bottom cars are employed it entails the use of a more or less complicated, costly and heavy car construction, which means high first cost, and the additional labor to dump (as well as that for maintenance) is high.

RESULTS FROM EXPERIENCE

Taking everything into consideration it may be said, in view of the five years' actual working experience of the revolvable dump system, that it has these, as well as other points of advantage: (1) A car without drop bottom or end gates (the cars being inverted in dumping require none), and therefore (2) a car with fewer parts, and cheaper to build, and, having fewer parts, therefore (3) a stronger and more substantial car, and therefore (4) a cheaper car to keep in repair; (5) a lighter car, and therefore the important advantage of (6) less dead weight to transport in proportion to coal hauled; and, having no doors or gates, (7) less spilling of coal on the tracks, and therefore (8) less expense in keeping the tracks clean and in good condition; (9) no accidental opening of drop bottoms or end gates (because there are none), thus doing away, to a large extent, with wrecks on the haulage-ways and the consequent knocking out and disarranging of rope rollers, trolley wires, etc.; (10) an easier car for the miner to load, because it is lower for a given capacity, and also a lighter car for him to handle in his room, all of which means less manual labor; (11) no time lost at the tipple by the hoisting-plant waiting on cars to be switched, dumped and re-switched, and in changing the rope from the loaded to the empty trip; (12) capacity to handle large outputs expeditiously and economically; (13) less wear and tear on cars in the dumping operations, as compared with the effects of the jar and shock incident to the old-fashioned "horn," or the more modern cross-over dump; (14) ability to dump very slowly, when desired, thus furnishing an opportunity carefully to examine the quality of the contents of the cars as they are being dumped, which is an important consideration; (15) a lower cost of handling the product of a mine at the tipple, because one man easily handles and looks after the entire dumping operation no matter how large the output.

As to the time consumed in handling the product of a mine equipped with the revolvable dump, attention is called to the fact that trips or trains are landed in and move out of such a dump with greater rapidity than trips of the same size are handled on the best tipples of the old styles. Not more than five seconds are consumed, from actual observation, in dumping a whole trip of five 2-ton cars, counting from the time the trip is landed to the time it is ready to pass out, but, of course, this time may be increased several times, and still be inconsiderable. No matter how large the trip may be, it is dumped in as small a time as the smaller one, a trip of twenty-five cars requiring no more time than a trip of five.

In some instances it might not be desirable to have a dump or bin long enough for a whole trip, but when this is true, it can be dumped in sections by providing swivel couplings for the cars. Indeed, if desired, the dump may be made only long enough for one car, as is done in some places, in which case they are dumped singly and without uncoupling, but this plan is necessarily slower. A plant of this kind is in operation at a coal mine at Brilliant, Alabama, at the present time and has been for several years.

Sunday Work in France

An important law, which will have a far-reaching effect in France on the mining and engineering as in most other industries, is that recently passed relating to the Sunday rest. There has been no legislation on this matter before the present law, passed July 14 last, and people did much as they wished regarding trading and employing labor seven days of the week. The new law restricts trading to six days and imposes a rest on Sunday wherever possible. The result will probably be a Saturday half-holiday and the reduction of the week's working hours, which have hitherto been long in France, as on the Continent generally, averaging 10 and 11 hours daily. Among those trades where workmen are paid by the hour the new law has not found favor, and in fact has occasioned riots in a few places.

Tunnel Projects in France

SPECIAL CORRESPONDENCE

M. Monod, whose project for the Mont Blanc tunnel has been in abeyance for some time, is attempting to obtain financial aid to carry the scheme through. He estimates that $12,000,000 would suffice for the piercing of the tunnel, and of this sum he hopes to obtain $2,000,000 from the city of Geneva, and the remainder from French financiers. He is at present presenting the matter to Italian financiers in Turin.

Another tunneling scheme, which comes up periodically for discussion, is the Channel tunnel, to connect France and England. M. Albert Sartiaux, Chef d'Exploitation of the Northern Railway Company, of France, has recently published a complete study of the problem, in which he sets forth that the recent progress made in this branch of engineering since the suspension of work on the tunnel some 25 years ago, especially the application of electric traction to the workings of such a tunnel, would reduce the estimated time for its completion to seven or eight years, and the cost to a much lower figure than originally estimated. He gives the opinion that such a tunnel is not only relatively easy of accomplishment, but that it may now be executed with confidence in the final success.

Coal Mining in Indiana

The railroad situation in Indiana is showing some improvement. Since the Railroad Commission met at Terre Haute last week, and issued peremptory orders against discrimination in service to Indiana mines, a good deal has been done to break the blockade of freight and to furnish cars to mines.

The new wage contract was thought to have been made so plain and satisfactory that there would be few annoying disputes at mines. However, the executive board is receiving calls almost daily to come to certain mines to assist in settling a grievance. These seem to arise from many new causes for which no precedent ruling can be found.

There are apparent indications of trouble sooner or later between the miners' and operators' associations. The operators are restive under the demoralizing effect of strikes on their trade and the miners are beginning to complain that the penalizing clauses, new in this year's contract, are not being enforced against operators. On the other hand, the operators say that the clause in the contract providing that a miner may be fined $1 a day when striking in violation of a contract has only been enforced in one instance. Nothwithstanding these annoyances, the situation in Indiana is improving, and a large amount of coal will be moved during the balance of the year.

Colliery Notes

The only practicable method of dealing with a gob fire in longwall work is to dig out and entirely remove the burning material.

The haulage system of the largest mine in the world is entirely regulated by men stationed at telephones along the main haulway. This road is nearly two miles long.

In tail-rope haulage, the length of the pulling rope is equal to the length of the haulage road, while the length of the tail rope must be double that of the pulling rope.

For each man employed underground in the Georges creek coalfield, there are about 3⅛ tons of coal produced each day. There is on an average one mule or horse used for every 15 men employed.

Squeezes once started are almost uncontrollable. The most successful method, perhaps, is to build wooden shanties of heavy timber. The structure should be built square and very closely resemble the old-fashioned log cabin.

When robbing is started, it is necessary to keep the pillars in line as they are drawn back. Any pillars out of line receive an unequal and greater share of pressure, causing them to be so crushed that they cannot be taken out.

Where the workings of a mine approach an area near the outcrop, and hard to ventilate, it is often advisable to erect a stack, built of wood and containing a crude furnace, which can be utilized temporarily for ventilating such territories of limited extent.

As a general rule, the coal produced in driving entries and rooms is secured in better blocks and larger lumps than the coal obtained in drawing pillars. The weight upon the pillars crushes the coal in robbing. Following this rule it is also true that mines having light cover produce a larger proportion of lump than mines where the cover is heavy.

At some mines where gravity planes are used, it is the practice to build the tipple structure out of line with the plane so that any cars breaking away on the incline will jump the track at the bottom of the plane and not injure the tipple. As a further preventative, safety latches are often used. These devices are generally operated by wires worked by levers either at the top or bottom of the incline.

In drawing pillars, care should be used to take out all the coal possible. Not only is this commercially important, but also it insures a more even breaking and settling of the covering strata. If portions of pillars are left, the pressure from the overburden instead of causing the cover to break and fall, rides over upon the pillars and frequently causes a serious squeeze that almost nothing will stop when it is started.

In mines where natural ventilation is used, the greatest impairment to the system is caused by the temperature of air outside equaling the underground temperature. At such times practically no air flows. In the early morning and at sunset in the evening during the spring and fall are the times when natural ventilation is most likely to prove ineffective.

In Pennsylvania, one mine has entirely worked out four hills and is now carrying on operations in the fifth hill. The coal is still hauled out through hill number one, a distance of almost five miles, and lowered on a self-acting plane to the original tipple. The haulage is accomplished by a trolley system using electric motors. The trips are run about 20 miles an hour, and pass into daylight on leaving each hill.

In the Georges creek coalfield of Maryland, where to each foot in hight of coal mined, the production per acre is greater than in any other region, the experiments carried on have shown that when panels do not contain more than 14 rooms the greatest production is secured. This may not properly apply to all other fields; however, it is being generally acknowledged that only in exceptional cases should a panel contain more than 20 rooms.

In mines where the roof is weak and subject to frequent falls, the rooms are usually driven narrow and large pillars are left. Another reason for leaving wide pillars, not generally considered, is the fact that when a fall occurs in a room, it is expensive to attempt to remove the débris. In such cases it is more economical to drive a new room through the center of the pillar and rob from both sides. This condition should be a factor in determining how wide pillars are to be.

There is a divergency of opinion as to whether mules or horses are better for haulage purposes in mines. In one district where the roof is high, horses are employed by a large operating company; in the same district, a rival corporation uses mules entirely. Mules can stand more rough usage and are less liable to disease of the hoofs and feet. On the other hand, it is claimed the horse can pull considerably more. Ponies have been successfully introduced into mines where the roof is low.

Ashes are now generally removed from boiler houses by one of two methods; either by washing them away in an inclined trough running in front of the boilers, or by having the ash trough under the boilers concreted and kept full of water from a nearby hose. The ashes dropping into the water are cooled, then raked out into an opening in front of the boiler where they drop upon a flight or pan conveyor and are carried to a bin from which an aërial tram or railway car carries them to some convenient dumping place.

The calorific value of a coal may be computed by the following formula suggested by Goutal: $P = 82C + AV$, in which P represents the calorific value; C, the percentage of fixed carbon; V, the percentage of volatile carbon; and A is a factor depending upon the proportion of volatile carbon in the coal. For a coal containing 5 per cent. volatile carbon, the value of A in calories is 145. If the volatile carbon is 15 per cent., A is 117; if 25 per cent., A is 103; if 35 per cent., A is 94. By substituting these values in the formula, a fairly reliable result can be obtained.

It is not correct to determine the steam qualities of a coal solely by the total heat units set free during combustion. In burning a bituminous coal much heat is lost, due to a part of the volatile matter passing off as smoke and unburned hydrocarbon gases. It is also true that highly bituminous coals cause a deposit of soot which reduces the efficiency of the heating surfaces. In consequence of these considerations, it has been proved that when highly bituminous coal is used for making steam, the loss of heat will often reach 45 per cent., while when anthracite is used, this loss does not exceed 20 per cent.

Because of the danger and accidents resulting from spragging mine cars on slight grades, the larger mining companies are having all their cars built with brakes attached. The brake lever, or handle, should generally be placed on the left hand, facing the end gate of the car, so that the attendant can handle the brake with his right hand. Wooden brake handles have more elasticity and are usually preferred by operators. An effective brake-block may be made of wood, sort of V shape and built to fit between the wheels on each side of the car, and to engage the two wheels on that side instead of one.

In determining the calorific or heating value of a coal, the general method is to burn a weighed amount of the prepared sample in a strong closed vessel, called a "bomb," the latter being completely submerged in water. The heat produced by the burning of the coal is transferred to the water, whose temperature before and after the burning of the coal is determined. The increase in temperature measures the heat-producing power of the coal. The bomb is made of aluminum bronze to withstand high pressures and is lined on the inside with gold to prevent corrosion. In igniting the coal, a fine platinum wire through which an electric current is sent, is used. The amount of change in degrees multiplied by the quantity of water used plus the "water equivalent" of the instrument, a constant already determined, gives the calorific value of the coal when exactly one gram of coal is burned.

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Contents

**Illustrated.*

The Iron-Ore Situation

We referred last week at some length to the deal by which the Hill iron-ore lands in Minnesota are transferred to the United States Steel Corporation. Some further comment on the situation seems, however, to be needed. As was then said, the terms seem rather onerous; Mr. Hill undoubtedly made a good bargain for his side. His position was a strong one, however, for he held the key to the future of the iron trade, and the Steel Corporation had no choice if its managers wished it to retain its present position, and to prevent future attacks. A few figures may help to understand the situation, as it stands at present.

The Mesabi iron range was first opened in 1892, but the shipments that year were only a few thousand tons. The following year saw the first serious mining, 520,565 tons of Mesabi ore being sent to market; this total being 8.6 per cent. of the entire Lake shipment. That was a year of depression in the iron trade, the pig-iron output being less than it had been in 1892 or 1891; but as it was the opening year of the new range, we may take it as a start, and compare its production with that of 1905, as follows:

	1893.	1905.	Changes.
Pig iron produ'n	7,124,502	22,992,380	I. 15,867,878
Iron ore:			
Old ranges.....	5,538,390	14,199,757	I. 8,661,367
Mesabi.....	520,565	20,153,699	I. 19,633,134
Total Lake....	6,058,955	34,353,456	I. 28,294,501
Total U. S.....	12,114,580	44,578,456	I. 32,463,876

In 1893 the Lake Superior region had attained a commanding position, for approximately 47 per cent. of the pig-iron output was made from its ores; but in 1905 this proportion had risen to 75 per cent. In 1893 the Mesabi range furnished 8.6 per cent. of the Lake ores, and 4.3 per cent. of all the iron mined in the United States; in 1905 the proportions were 58.7 and 45.2 per cent., respectively. For the current year pig-iron production will run over 25,000,000 tons, and the Lake ore shipments will be at least 36,500,000 tons, of which 22,000,000 tons will be supplied by the Mesabi mines.

The older ranges of the Lake country have shown a capacity for expansion and increase, which was not anticipated twelve years ago by those most familiar with them; but they could not possibly have supplied the demands of the iron industry for a production of pig iron which is more than three times greater than it was twelve years ago. In other words, the figures abundantly prove, not only that the growth of Mesabi ore production has been coincident with the enormous increase in iron and steel production; but also that, without the Mesabi, that growth could not have taken place.

The importance of the Lake region to the iron and steel industry requires no argument; it is universally admitted. While there is no mineral region in the world that has been so closely explored, there is still room for difference in estimates as to its future. Good authority puts the available reserves of the region, which may be mined in the future, at 2,500,000,000 tons; and these will probably be increased by some extension of the present limits by new discoveries, and by the inclusion of small orebodies and of leaner ores, which will undoubtedly be brought into use at a later date. Taking the present rate of consumption, and allowing for a fair rate of increase, there is about 70 years' supply provided, and beyond that we need not look at present. The important point is that, taking its recent acquisition, the United States Steel Corporation now controls reserves amounting to probably 2,000,000,000 tons. This is 80 per cent. of the total, or a much greater proportion than that of the finished iron and steel production which the corporation makes. It is, therefore, not only better provided for the future than any other concern; it has shut off the probability of any new competition on a scale at all comparable with its own operations. Whether such a position is desirable, is a question on which there are widely differing opinions; but it is too large a subject is to be discussed at the present time.

The only great bodies of iron ore, which can be at all compared with those of Lake Superior, are found in the South. The Alabama ores are of lower tenor in iron than the Lake ore; but compensation for this is found in the fact that they are close to an abundant supply of fuel, while Lake ores are carried a thousand miles to the furnaces. The iron ores of Wyoming, of southern Utah and northern Texas are too remote from transportation as yet to be considered. Undoubtedly they will be utilized in time, as will the titaniferous ores of the Adirondacks. In time, also, a large supply may be drawn from Canadian mines. At present, however, there is nothing in sight to dispute the commanding position of the Lake Superior country.

The control of its ores means the control of the iron and steel trade for many years to come. That power rests now with the United States Steel Corporation.

Are Present Ventilation Laws Sufficient?

The numerous explosions and mine accidents that have recently occurred in our coal mines have drawn the attention of engineers and mining men in general to the enactment of more stringent laws to govern our methods of working, and if possible reduce the number of accidents that happen each year.

There is a considerable difference between enacting laws, and seeing that they are enforced. However, so far as the laws governing ventilation in our coal States are concerned, it is only fair to say that mine superintendents are, as a general rule, supplying considerably more air to the workers in their mines than is stipulated as necessary by these enactments. Nearly all States have laws which specify that 100 cu.ft. of air per min. be furnished each man underground, while no regard is paid to the air required by miners' lights, and in most cases no allowance is made for mine mules or horses.

It is true that the laws of all States say that sufficient air shall be circulated through a mine to render harmless all noxious and poisonous gases and to expel such gases. So far as the effectiveness of our mine laws is concerned, they might be made to briefly state that "ample means for ventilation be supplied each mine, and sufficient air be sent in to dilute and carry off all quantities of gas generated." Such a statement would technically cover all points that are provided for by our present laws.

We are aware that every mule or horse in a mine requires 1000 cu.ft. of air per min., and we are also told that an ordinary miners' naked light consumes nearly 100 cu.ft. per min.; however, were these facts embodied in our mine laws and then multiplied several times, the provisions made would not be adequate. If, in addition to our present requirements, we would add a clause requiring the air that finally comes from the mine to be of a certain specified purity, the problem would be more effectively dealt with.

After all things are considered, is it not the quality of the air coming from a mine that is of importance, rather than the quantity of air that enters the workings?

We cannot properly ventilate our mines if we endeavor to regulate the air supply according to the number of men employed. One mine employing 100 men may generate a considerable quantity of gas; while another operation employing an equal number of men may be entirely free from gas. No one would suggest that these two mines be furnished the same quantity of air.

It would not be difficult to determine what standard of purity the exhaust air should reach, and without any considerable expense, some outfit could be installed at the chief inspector's office, and arrangements made so that samples of mine air from every mine could be analyzed at stated intervals of time. Many mining companies would undoubtedly examine and analyze their own mine air. Not least among the benefits that might accrue from this system, when perfected, would be the increased knowledge and enlightenment such examinations would furnish the mining profession, concerning a subject about which little is known.

Iron in California

While deposits of iron ore have been found in California, very little has so far been done in the way of their utilization. The principal known deposits are those of Clipper Gap in Placer county, and on the McCloud river in Shasta county. At Clipper Gap some mining was done, and plant for preparing the ores was erected at considerable cost; but a few years ago the buildings were destroyed by fire, and have never been rebuilt; presumably because the enterprise was not a profitable one. The principal reason for this is that in California there is no supply of fuel available for metallurgical purposes, and all the coke necessary for making iron would have to be imported at a considerable cost; high enough in fact to be prohibitive. The McCloud river deposits which were discovered some time ago gradually passed into the hands of a concern known as the Shasta Iron Company, but that company has done nothing beyond a little development. At the time oil was discovered in California, there was considerable talk about its use for metallurgical purposes, and several patents were taken out. While some use has been made of this liquid fuel in smelting lead and other ores, no plan has been devised which would be successful in making iron.

Now, however, it is proposed to try in an experimental way whether the water power of northern California cannot be applied to the making of iron or steel, in the same way as Dr. Haanel is trying to do in Canada. H. H. Noble, president of the Northern California Power Company, has bonded the property of the Shasta Iron Company, and has made arrangements to put up an experimental plant using the Heroult process. He has secured the services of M. Petinot, a French engineer who has been assistant to Dr. Heroult, to supervise the erection of a furnace and to conduct the experiments. Power will be furnished by Mr. Noble's company. The plant will be established on Pitt river at its junction with the McCloud. The success, or otherwise, of this experiment will be watched with great interest on the Pacific coast.

British Steel Production

The total production of steel in Great Britain for the first half of the year has now been reported by the British Iron Trade Association. The figures are given below, in long tons:

	1905.	1906.	Changes.
Open-hearth	1,980,095	2,196 853	I. 216,758
Bessemer	1,019 887	919,620	D. 100,267
Total	2,999,982	3,116,473	I. 116,491

The total gain was 3.9 per cent. only, owing to a rather unexpected drop in the make of bessemer-steel ingots. The figures show in a marked way the increasing preference in British practice for open-hearth steel. In the first half of 1905, converter steel was 34 per cent. of the total, and open-hearth 66 per cent.; in 1906, the proportions changed to 29.5 and 70.5 per cent., respectively.

The division according to the acid and basic processes in the first half of the current year was as follows:

	Acid.		Basic.	
	Tons.	Per Ct.	Tons.	Per Ct.
Open-hearth	1,638,667	52.5	558,186	18.0
Bessemer	634,838	20.4	284,782	9.1
Total	2,273,505	72.9	842,968	27.1

The marked changes from the first half of 1905 were the falling off in bessemer steel, and a large increase in basic open-hearth metal, the acid open-hearth make being nearly stationary. The proportion of the total steel to pig-iron production was 63.5 for the half year.

SHAFT SINKING AT THE WOLVERINE MINE

Details of a Method of Advancing a Slope Shaft without Interfering with the Regular Mining Operations

BY W. R. CRANE*

At the Wolverine mine, on the Kearsarge lode, Lake Superior, the shafts have an average dip of about 38 deg., some of which are sunk in the vein, while others are, for part of their depth at least, in the foot wall. The method of sinking them is the same, however, although considerable difference in handling mineral underground results. Furthermore, the amount of development work is greater in the latter case, although that is largely offset by an ultimately higher percentage of extraction and greater safety to the shaft itself.

Shaft sinking is continuous, i.e., work is being done in at least one of the working shafts while the upper portion of the shaft is occupied with handling of rock. The usual time required for sinking 100 ft. of shaft (size of shaft, 9 ft. high by 17 ft. wide), or sinking from the last level opened to the point where a new level is to be started, is about five months, two weeks more being allowed for timbering the extension and making connection with the finished shaft above. The usual rate of advance, for two men working two shifts per day, is from 20 to 25 ft. per month. As a rule no extension of shaft is begun until one or both of the levels, at the last station opened, have been driven to the adjacent shafts, if such exist, or anyway for several hundred feet, in order that a sufficient quantity of rock shall be available for transference to and through that portion of the shaft.

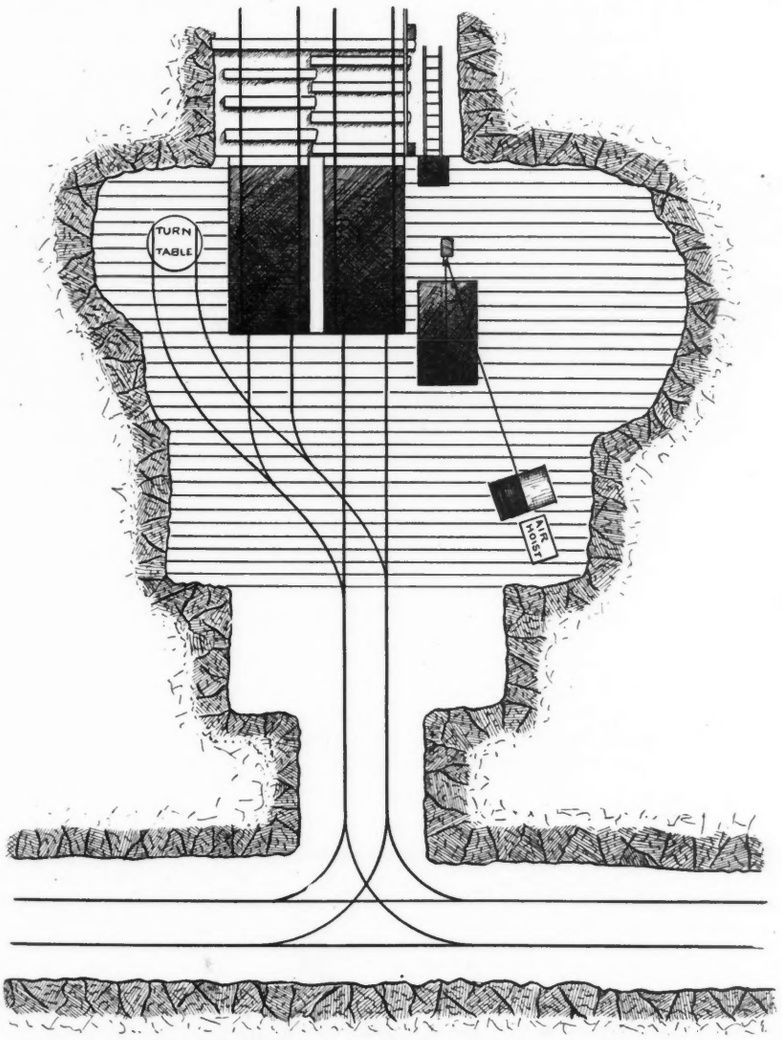


FIG. 1. PLAN OF STATION AND ARRANGEMENT OF TRACKS IN CROSSCUT AND LEVEL

The usual practice is to advance each shaft located in the productive portion of the deposit at least one level a year. At the rate of working given above, only one crew of two shifts per day is employed in two shafts. If more than two shafts are to be kept in operation, either the sinking crew will have to be increased or more than one crew employed, in the latter case work will be carried on in two or more shafts at the same time.

PRELIMINARY WORK

The work preliminary to shaft sinking consists in preparing the last station, at the foot of the shaft to be extended, in a manner shown in Fig. 1, i.e., the station is floored up to the level of the drift, unless this has already been done preparatory to the handling of rock at that point. A small sinking shaft, often of a size of only 5½x5½ ft., but usually 5½ ft. wide by 9 ft. long, is begun in line with the manway portion of the finished shaft above. It is usually driven for a distance of 6 to 7 ft., after which it is abruptly enlarged to the full size of the main hoisting shaft and in exact alinement with it. The enlargement must then, of necessity, be all on one side, which is to the right of that of the initial opening. A block of undisturbed rock is thus left directly below the hoisting compartments of the shaft above, insuring absolute safety to the operations conducted below. The block of unmined ground is called a pentice and is shown in Figs. 2 and 3.

SINKING THE SHAFT OF FULL SIZE

The sinking of the shaft, after the full section has been attained by the enlargement of the small opening through the pentice, is accomplished by one drilling crew, as stated above, and there is, therefore, but one drill employed, which is mounted upon a column. The holes are usually placed as shown in Fig. 4, i.e., they are arranged to take advantage of the shape and condition of the working face. A depression or re-entrant angle in the face indicates the point of attack; if at one end of the shaft section, the holes are drilled as shown, but if at, or near, the middle, the holes are drilled on both ends of the section and slope toward the middle. A small depression in the face may be enlarged by drilling short holes nearly parallel with it, but extending to a greater depth. The arrangement of holes is practically the center or draw-cut system, which is modified largely by character of rock and local conditions.

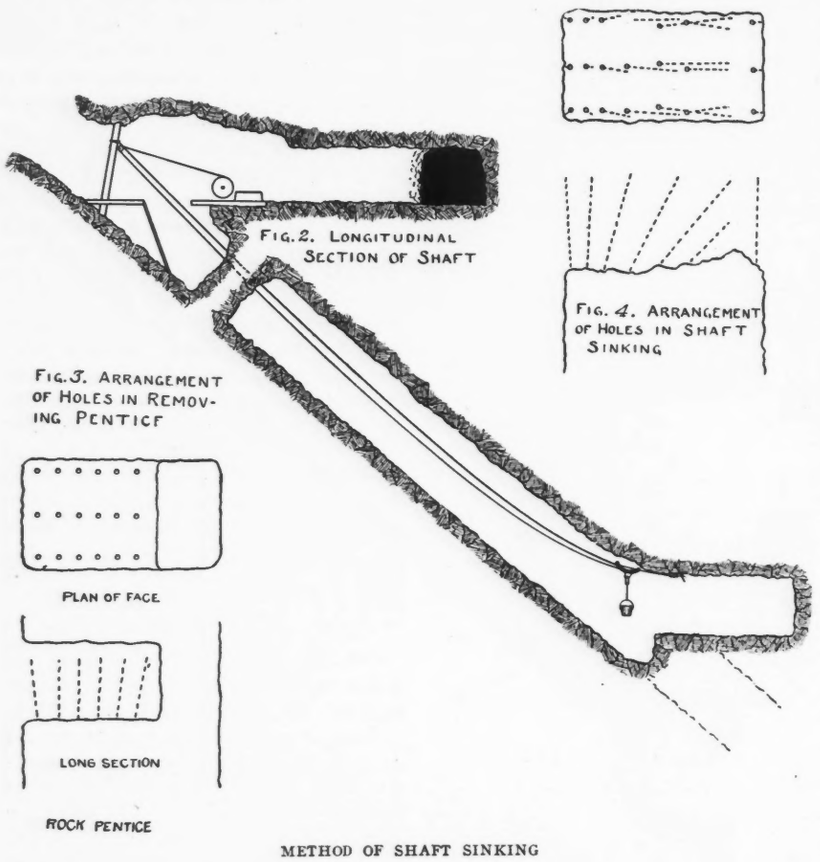
The rock, as loosened by the drilling and blasting operations, is shoveled into a small sheet-iron bucket, having a capacity of about one-third of a ton, which is first skidded on inclined timbers and later, in the sinking operations, and after a greater depth has been reached, is hoisted and skidded to the station above, where it is dumped into the skip standing on the main hoisting track adjacent to that side of the shaft.

METHOD OF HOISTING

As the shafts are inclined it is impos-

*Assistant professor of mining, School of Mines, Columbia University, New York City.

sible to hoist the bucket for any long distance without dragging it on the foot wall, which is, of course, out of the question. Further, owing to the moderate pitch of the shaft, skidding on timbers is rendered impracticable also, as only a small part of the contents of a bucket could be hoisted, even at moderate speed. A simple and effective solution of this problem has been arrived at by the installation of a gravity system of haulage and hoisting on a rope track (see Fig. 2). It consists of a wire rope (of 1 in. diameter) fastened to a stubbing bar fixed at the lowest point in the shaft excavation, which is on the manway side, being carried somewhat in advance of the main body of the shaft excavation, while the other end of the rope is, after being drawn taut, securely attached to a post set in between the hanging and foot walls at the station above (see Fig. 2). Below the point of attachment of the rope to the post is mounted a small sheave, to and over which, and thence to the crescent-shaped carrier operating on the span of rope which serves as a track, a rope passes from the winding engine. The bucket is supported on a block and is raised and lowered by the engine. The weight of the bucket is such that the carrier remains in the position at which it was stopped in the shaft, and does not begin to travel upon the track cable until the bucket has been raised as high as it will go, which is when the block supporting the bucket strikes the carrier. Continued hoisting draws the bucket, supported by the carrier, up the shaft, free from contact with any point until the inclined timbers are reached, upon which it skids and on clearing them rises above the station floor, when it can readily be dumped into the skip standing in the hoisting shaft. The bucket is returned to the foot of the shaft by gravity, its movement being regulated by a brake on the winding drum. On reaching the lowest point that the carrier can go, further lowering permits the bucket to be dropped to the bottom of the shaft.



METHOD OF SHAFT SINKING

Details of the carrier are given in Fig. 5.

The enlarging operation furnishes sufficient material to occupy the system for a number of days, often a week or so, without change. When, however, the enlargement has been brought up to the lowest point at which the bucket can reach, it must be extended for another 20 to 30 ft. There is, however, no necessity of much delay, as the extension of the hoisting way can be carried on as a sump, or opening, for the cutting-out or side-stoping operation employed in sinking the shaft. The upper part of the shaft excavation is largely cleared by gravity, thus permitting the placing of the track cable; in fact, no special excavation need be made, for on the firing of a round of holes (making a complete advance) the hoisting system can be extended. Too frequent taking down and setting up of the track cable is not advisable, both from the standpoint of time consumed and wear and tear of cable.

The shaft having been sunk to the point where the next level is to be formed, drifting is begun, if the shaft is in the lode, or if not a crosscut is driven to the lode from the shaft in the foot wall. However, it is the usual practice to complete the shaft as soon as possible after the required depth has been reached, in order that the rock excavated in drifting and crosscutting can be handled in the skips.

REMOVAL OF THE PENTICE

Beginning at the bottom, hitches are cut and the cross timbers, or sleepers, are put in place up to the back of the pentice, when a platform is built across the shaft below the pentice, but close enough to it for the drillers to stand upon and operate a drill. The arrangement of holes employed in removing the pentice is shown in Fig. 3, and does not differ materially from that employed in shaft sinking; no sump holes are, however, necessary in this case. A further important use of the platform, or scaffolding, is to prevent the fall of rock into the finished shaft below. When the pentice has been removed, and that portion of the shaft previously occupied by it squared up, the remaining timbers, necessary to the completion of the timbering and the connecting of the upper and lower portions, are put in place, and another 100 ft. of shaft, together with

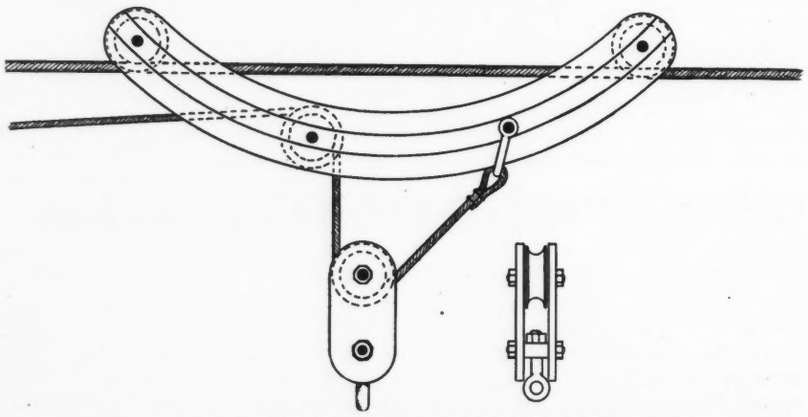


FIG. 5. CARRIER FOR AERIAL ROPE HOISTING IN SHAFT SINKING

the beginning of another level, have been added to the development of the mine and its working assets.

COST OF SINKING

Shaft sinking is let on contract, as is practically all work connected with development and extraction in the mines of this district. The contract price for shaft sinking ranges from $16 to $19 per linear foot of advance. All supplies are furnished by the men, except steel and drills which are provided by the company. The cost of sinking 100 ft. of shaft (9 ft.x17 ft.) means an expenditure of $1600 to $1900, to which must be added the cost of cutting hitches and placing the long sleepers, placing ties and rails, erecting divings between hoisting compartments and manway, and lastly building dams to hold back the fine mine dirt used to fill the spaces between and under the ties and sleepers. As no regular crews were detailed to do this particular work, but the mine timbermen and tracklayers, who were employed irregularly, it was found extremely difficult to differentiate the cost from the other operations and to arrive at even an approximate estimate of the cost of this special work.

The particular method of shaft sinking described above is but one of many employed in the Lake copper mines. It will, however, serve as an illustration of the practice in the large, well equipped mines of this district.

Removal of Wood in Ore Dressing

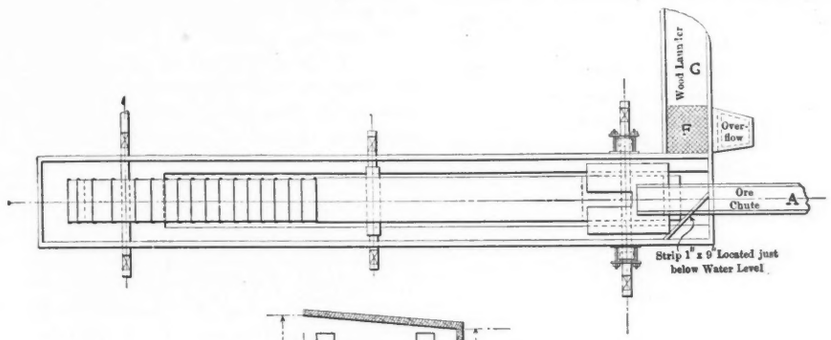
BY A. H. WETHEY.*

Undoubtedly many readers of the JOURNAL, who are engaged in the handling of ore that requires crushing and concentrating, have had experience with the trouble caused by the presence of wood mixed with the ore.

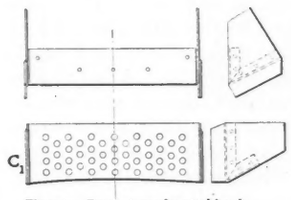
From actual experience we have found, at the Butte Reduction Works, that an ordinary mine wedge, which is 8 in. long, 4 in. wide and 2 in. thick at the large end, when caught in a 9x15-in. crusher, will take as long to work its way through the crusher as a ton of ore. Sometimes a block of wood will get jammed in a crusher of this size and work its way down until it can go no farther, and hold the crusher solid, burning the driving belt, and melting the babbit in the bearings on account of the heat generated by the friction.

At the concentrator at the Butte Reduction Works the ore is delivered into bins from the mine from self-dumping cars; the ore is taken from these bins on to a conveyor by the man feeding a 15x24-in. Blake crusher. The man who feeds the ore to the conveyor removes all the large pieces of wood that he notices, but frequently wood comes on to the conveyor so covered with fine ore and dirt that it passes by the feeder without his noticing it.

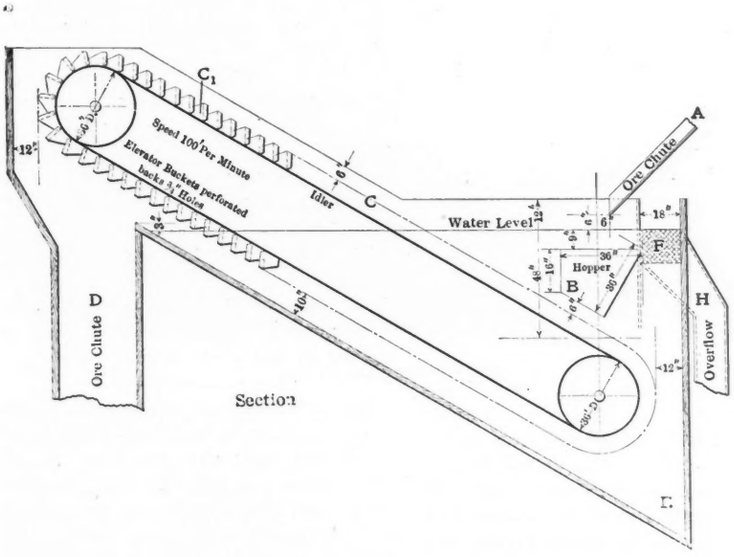
The jaws in the 15x24-in. crusher are set so as to crush down to a minimum of about 2½ in. No trouble is caused at this crusher by the presence of wood, as all ordinary blocks and wedges will pass through it readily.

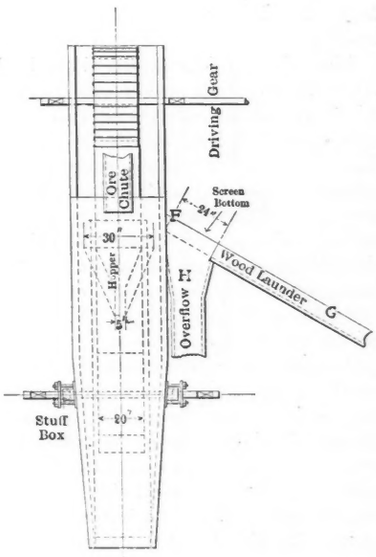


Section through Tank. Make of 2" T & G



Elevator Bucket perforated back ¾" Holes 1½" x 1 foot





SEPARATOR FOR REMOVING WOOD

*General manager, W. A. Clark's mines, Butte, Mont.

The ore from the traveling conveyor drops on to a magnet which catches any iron or steel that may be present in the ore. The number of hammer heads, ends of drill steel, etc., that are caught at this point is surprising. From the magnet the ore passes over grizzly bars which screen out all the fine material, and only the large pieces go to the 15x24-in. crusher.

In this connection I may mention that a fire occurred in our concentrating plant Jan. 30, 1906, which destroyed all the coarse-crushing part of the plant, with all the coarse trommels, jigs, etc. We installed a temporary plant and had it running within 60 days from the date of the fire, but in putting this temporary plant into operation the large crusher was installed without grizzly bars, and all the fine ore, as well as the coarse ore, went to it. The fine ore contained more or less talc and moisture and would often pack in the crusher. I have known it to pack so tight that it was impossible to drive a bar through it, and it would choke down and crush and bend the pitman shaft, which was 6 in. in diameter. Two or three of our shafts were bent in this way before our men realized what caused the bending (and, sometimes, the breaking of the shaft); they attributed it to the presence of a large piece of iron or steel, rather than to the packing of the ore. The crusher that was installed before the fire occurred was provided with grizzly bars, but in the hurry of getting the temporary plant in operation, these were omitted. Since they have been installed again the bending of the pitman shaft has ceased.

After the ore has passed through the large crusher, it passes through trommels which screen out everything that would pass through a hole 1½ in. in diameter. The oversize goes to two 9x15-in. Blake crushers. It is in these crushers that the greatest difficulty was met with from the presence of pieces of wood. To overcome this difficulty we installed a wood-separating device. The accompanying illustration shows this device, which may be briefly explained as follows:

A is the ore chute bringing the ore and wood together into the tank. *B* is a hopper which is under water. The ore passes through this hopper on to the conveyor *C* and is conveyed to the ore chute *D*. The tank *E* is kept full of water, and when the ore and wood are discharged into the hopper *B*, which is below the water level, the wood floats to the top of the water. The elevator buckets *C-1* on the conveyor have perforated backs through which the water rushes as the elevator lifts the ore out of the water. The water runs back into the tank *E* with sufficient force to wash the wood (which of course floats) to the screen *F*, which removes the water while the wood itself falls down the launder *G*, the water itself passing down the overflow *H*.

From actual experience we find that from 20,000 tons of ore we remove 40 tons of wood with this device, and we estimate that by removing the wood we increase the capacity of our crushing plant by 15 per cent.

The idea of removing wood from the ore in this way occurred to the foreman, Fred Pratt, of our concentrating plant, who discussed it with me, and in pursuance of the policy I have always followed of encouraging any of our employees who have bright ideas, I had an experimental device installed, and was so much encouraged by the results that the working device, as shown, was put in. I also intended to obtain a United States patent on the device for his benefit. On investigation, however, I found a patent had been granted for an apparatus to remove knot-wood chips from clear-wood chips by sinking the same in a body of water; the clear-wood chips being of less specific gravity floated to the surface of the water and were carried off by suitable means.

Another patent had been granted on an apparatus for separating town refuse into animal and vegetable matters of less specific gravity than water, vegetable matter of greater specific gravity and mineral matters of still greater specific gravity, the refuse passing into a tank of water at the surface of which the lightest material floats, and from which it is carried off, the heavier substances sinking in the water and being carried off by suitable means.

The principle involved therefore in the construction of this wood-separating device being old, we concluded that it was not worth while to attempt to secure a patent. Any of your readers, therefore, who are interested in the device may make use of it as freely as ourselves.

Infusorial Earth

In certain portions of the United States, especially in Nevada, Oregon and California, there are large deposits of infusorial earth. These deposits consist of a vast number of minute, and for the most part microscopic remains of organisms, and frequently are found under peat beds.

Probably the principal use is as an absorbent for nitro-glycerine, in which form it is marketed as dynamite. About 10 parts of earth and 20 parts of wood pulp in 250 parts by weight are frequently used in this industry.

Other uses for infusorial earth are: As a polishing abrasive, used extensively among jewelers, and also marketed under the trade name of electro-silicon; as a filler in the paint industry; and as an addition to vulcanized rubber.

The market is somewhat limited and inactive. Common absorbent grades bring about 1¾c. per lb., while for better grades, used for polishing, as high as 3c. is frequently obtained. It is very light, and a few tons would present a large bulk.

The American Mining Congress

BY TELEGRAPH

The ninth annual meeting of the American Mining Congress opened at Denver, Colo., Oct. 16. The session was well attended, particularly by representatives of the Western mining industry. The Brown Palace hotel served as headquarters for the visiting members.

The morning session, at the Broadway theater, was opened with addresses of welcome by Governor McDonald, of Colorado, and Mayor Speer, of Denver. These were responded to by several prominent mining men and by Governors Pardee, of California; Cutter, of Utah; and Brooks, of Wyoming.

The serious business of the congress was taken up at the afternoon session, also held in the Broadway theater. The first paper was by E. W. Parker, of the United States Geological Survey, who argued the necessity of vigorous action toward reducing the high accident rate that prevails in American coal mining. J. A. Holmes then outlined the ways of some of the European governments in safeguarding, by official action, the lives and health of their mine workers. T. A. Rickard, editor of the *Mining and Scientific Press*, then discussed the geological distribution of gold, and John Dern described the mineral resources of Utah.

At the evening session, which was held in the Brown Palace hotel, J. H. Richards outlined the aims and objects of the Mining Congress. D. W. Brunton opened a discussion on "Mine Drainage Districts," which then became one of the leading topics of the congress. It had for its object the approval of a proposed mine drainage district law, drawn up by a committee, of which Mr. Brunton was chairman, for submission to the meeting.

The delegates to the congress displayed marked eagerness in their attention to the business of the congress, and a deep sincerity in their purpose to advance the welfare of the whole mining industry.

No word of praise can be said for the train service along the Rand, which is not much improved over the Boer régime. The railroads of the Transvaal are State owned and State controlled and offer a good argument against the State's running a railroad. Both passenger and freight charges are high. The inefficiency of the passenger service has made for the increased use of motor cars and motor cycles. Most men who do a lot of traveling along the Rand use those machines.

Natural draft depends upon the difference in temperature between the gases inside and outside of a chimney, and is greater as the smoke from the furnace passes out more highly heated. But this entails a loss of heat which might be used to better advantage.

The Magdalena Smelter, Oaxaca, Mexico

BY C. L. LOGUE.

The first modern smelter of the State of Oaxaca was blown in on July 29. This State is fast coming to the front; the development and production of its mines has increased to such an extent as to warrant the erection of a second and larger smelter, which will be in operation some time in November, and will have a capacity of 300 or 400 tons per day.

The completed plant is called the Magdalena smelter. It is the property of L. R. Hamer, of the City of Mexico. The blowing in was attended by men prominent in official circles of the State, the guest of honor being Governor Pimental. They manifested great interest in the inspection of the plant, which is complete in every detail, being equipped with sampling, smelting, cupelling, and refining departments, clerical and assay offices, and is electric lighted throughout.

COPPER SMELTER IN OAXACA

The smelter is situated in a beautiful location about 20 miles from the city of Oaxaca. It is intended to treat the ores of the Magdalena, Santa Catarina, Guadalupe, Natividad, Providencia, Plomosa, and La Defensa mines. The ore from these mines is principally carbonates of lead, carrying a high percentage of iron. They are ideal fluxing ores. It is the intention to treat custom dry silicious ores. The smelter is turning out about 200 bars of bullion per day. The plant was furnished by the Colorado Iron Works of Denver, Colorado.

*Metallurgical engineer, Butte, Mont.

The Price of Platinum

In a recent interview published in the *Torgovo Promishlennaia Gazeta,* which has been translated by the London *Mining Journal,* S. I. Gulishambarov, a high official of the Russian Ministry of Commerce and Industry, expressed the opinion that the rise in price of platinum was brought about by the fact that, while the demand is increasing, the supply has lately diminished. The Compagnie Industrielle du Platine, of Paris, which is the largest producer of crude platinum on the Urals, and is also owner of large platinum-refining works in Paris, forms at the same time also the connecting link between the remaining independent platinum producers and the combine of platinum buyers headed by Johnson, Matthey, & Co., of London. This French company is making every possible effort to keep the prices at the highest level possible. Last year it offered the following terms for purchase of platinum: On delivery of the platinum the company pays as an advance 12,000 rubles per pood of crude platinum containing 83 per cent. of pure metal. After the platinum has been refined and sold, the whole of the difference between the amount advanced and the sum realized is handed over to the seller. The company's profit is represented by the interest at the rate of 5 per cent. per annum on the money advanced, and ¼ per cent. commission for every three months. Moreover, the valuable metals of the platinum group which occur in the crude platinum, become the property of the company as compensation for the cost of refining, etc.

The combination of platinum users pays to the company 3 fr. per gram of refined platinum, the company also receiving 50 per cent. of the profits derived from the sale of the articles made out of the platinum. This price of 3 fr. per gram fluctuates in accordance with the conditions of demand and supply. Last year, for instance, when the largest platinum producers reduced their output, it was found possible to pay 3.30 fr. per gram, with the same 50 per cent. participation in profits. Since then the French company further reduced the output, and in consequence of this the price rose further. It is therefore clear that the present high price of platinum can be quite easily explained by the natural conditions of supply and demand, without reference to any rumors about intended Government action.

Statistics show that Great Britain, France, the United States, Germany, and Russia, together require annually about 647 poods of platinum. Of this quantity the United States takes approximately 200 poods, Great Britain 186 poods, Germany 132 poods, France 121 poods, and Russia 8 poods. If we admit, according to the experience gained in America, that in the total quantity of platinum used there is 35 per cent. of old metal worked up again, we find that the markets of the above mentioned five countries alone require every year a supply of 419 poods of fresh platinum, while the available output of the product is only about 300 poods. A considerable part of the platinum output in Russia being concentrated in the hands of the French platinum company, mentioned above, the latter at the present moment is absolutely master of the market, and can regulate prices at will. There is therefore no need whatever to look for the cause of the high price of platinum in the rumor about an export duty.

It is true that at former conferences of Russian gold producers, when speaking of the needs of the platinum industry, views were expressed in favor of the establishment of a stricter control over the export of crude platinum abroad, and the Government was petitioned to impose an export duty. This petition was, however, refused by the Government, as it was found exceedingly difficult to demand that platinum, which is usually exported from Russia in the form of postal packets, shall be declared in the consignment notes, and to establish a custom inspection of postal packets containing platinum. In 1904 the committee of the conference again made representations to the Government to the same effect, but without success; and the question of an export duty on platinum can now be considered as finally decided in the negative.

Aluminum silver is now quite extensively used for the parts of typewriters most exposed to corrosion. The properties of the alloy are extreme stiffness together with a white color and sound casting qualities. It has replaced steel forgings or malleable iron castings which were formerly used for the purpose.

CORRESPONDENCE

Discussions by Our Readers of Various Topics of Interest

Electric vs. Air Drills

In attempting to write upon the subject of Electric vs. Air Drills in answer to your kind request, I hope that I shall be able to do so more as an engineer than as the inventor of an electric drill who seeks to use your valuable paper as a means of advertising his own wares. The great increase in use of electric power for all purposes about a mine except drilling rock, and the willingness of mine managers to give any new drill a trial is ample proof of the desirability of having such a machine developed.

Drilling holes in hard rock can be best accomplished by hitting the rock as many blows per minute as possible with as much force as possible, providing the force does not bend the steel. Hard rock may be chipped off by the first few blows of a sharp drill, but the bit soon becomes dull, and then the rock is simply crushed, so that the drillings are as fine as flour, and one can hardly feel any grit in them. The difficult problem with the electric drill is, however, to convert rotary motion into reciprocating motion; the usual method followed in the Siemens-Halske, the Gardner or Adams, the Durkee, the Dietz and Box drills is by means of a crank shaft. This is the method used so successfully with the power hammers for forging, and the hammer die will often weigh no more than the piston of an electric drill; but the crank shaft, the boxes and the whole machine will weigh many times more than any of these rock drills, and hence are much stronger. There are three great strains upon the crank pin, shaft, boxes and body of a machine that reciprocates as fast as an electric drill. First, on the pull-back; second, when the crank passes the back center, there is a decided blow; third, when the crank starts to push the piston forward from momentary rest; the fourth period is when the drill strikes the rock.

It has always been my belief that no portable mechanism can be built on these lines that will stand such hard hammering within itself. In drills of the hammer type, like the Leyner and the Box, and the small pneumatic drills lately so much in use, a part of the energy must be used up in moving the drill rod forward at each blow, and in the case of a deep hole with long steel the loss must be considerable. A practical proof of this loss of power is evident from observing the drillers of former times, when putting down deep holes for railroad or quarry excavations, dropping their heavy hammers after the hole is down 10 or 12 ft., and then all turning in and churning the drill to the depth required. Another objection to this style of drill is the fact that in hard rock the hole thus made is very nearly the exact size of the drill, so that the drill will often become stuck in the hole; whereas, with a reciprocating drill the hole is always a little larger than the bit, from three causes: (1) the wearing of the rock by the sides of the drill; (2) by the bit striking with some little irregularity of direction, due to the kick-back on the cylinder and its tendency to raise the bit, but not always the same amount; and (3) probably a slight throwing of the dip to one side by the uneven sharpening of the beveled edges of the bit.

A short-stroke drill is better than the usual 6-in. stroke of the air machine, as the sides of the drill will be worn down less in the former case, and thus a larger hole can be drilled and more powder can be placed at the bottom of the hole; but a short stroke will not mud well, and therefore some means must be employed to free the hole from mud. This can be accomplished by using hollow steel and forcing water to the place where the mud is thickest, or by forcing air through the drill and pouring water into the top of the hole. The air will force the mud out of the hole, but a large part of the mud produced in drilling rock always sticks along the sides of the hole and does no harm if only the powder readily drops to the bottom of the hole; but if the powder must be forced down, then the hole has not been properly cleaned and some of the mud will be forced back into the bottom of the hole.

The system of water feed through the drill follows the very old practice of forcing oil through a drill to the cutting point in iron machine work, and was first used experimentally by the Rand Drill Company in 1885 at Hell Gate, with the result that it was able to drill rock about twice as fast as with its other drills; but the experiment was never followed up. The Leyner drill has used this system very successfully, and the small pneumatic hammer drills, now used in many mines for short holes, also follow this practice, but use air and make much objectionable dust. The objection to using this high-priced hollow steel, the cost being about 20c. per lb., does not appear very important when we consider that the waste per drill per month is only about 10 pounds.

The proper method of connecting the motor to the drill is to have the axis of the motor parallel to the axis of the drill, and then the vibration of the machine will not throw the brushes off the commutator, thus causing the motor to spark, and the commutator to be corroded; and the motor should be firmly attached to the base of the drill, so that when the base is firmly clamped into the saddle of the column, the vibration on the motor is reduced to a minimum. With a telescope shaft the power can be transmitted to the drill itself as the latter is fed forward toward the rock. Drills of this design have been used for over 15 months in Colorado, and no damage has been suffered by loosening of the field coils, or abrasion of the insulation, and therefore I must dispute Mr. Palmer's statement in the JOURNAL of Aug. 18, that "No form of insulation has yet been devised that will stand up under the continued jar of the drill bodies for any appreciable length of time."

The use of a spring in a drill is not objectionable if the construction is such that the spring cannot be overcompressed, and this should not be over one-third its length. I know of springs being in service for over six months on a drill making 420 blows per minute, and the drill being in use always one shift, and sometimes two during that period.

There are few fields of mechanical art that present such advantages as mining by electricity, especially where the power is purchased from some district supply company, or is generated from some near-by water power by the mining company itself. The electric hoist, both at the surface, and for underground winzes is an assured success; the electric pump has been proved efficient; electric haulage has been thoroughly tested, and electric ventilation by blowing or by exhaust fans has been amply approved; electric lighting of mines makes all work easier and better done, and therefore I have no hesitation in saying that electric drilling will come to pass as sure as the rising sun, and I believe at no distant day.

The less cost of installation of much smaller generator sets as compared with air-plants; the less cost of electric wires as compared with air pipes, and greater ease of putting in place; the less cost of power, being only about one-tenth of that required for air drills, certainly are incentives enough to lead to the develop-

ment and appreciation of a perfect electric drilling machine.

At no distant day I may be able to give your many readers a full description with comparative tests of a drill which I naturally think will meet these requirements. B. H. LOCKE.

New York, Oct. 7, 1906.

Diamantina, Brazil

In your issue of Sept. 29, page 597, you reply to a correspondent that highly reliable sources state that Diamantina, Brazil, "is a good place to avoid." Having lived in Brazil for eight years, one of which was spent in the vicinity of Diamantina, I venture to say that such a sweeping statement is misleading, to say the least.

In the first place there are two places in Brazil often mistaken the one for the other: One of which is Diamantina in the State of Matto Grosso, at the head waters of the Paraguay; the other is Diamantina in the State of Minas Geraes, north of Ouro Preto, and near the head waters of the Rio Jequitinhonha. I have been to both of these places and am well acquainted with the geology, the climate, the people and the circumstances that affect mining prospects in the two regions.

Diamantina in Minas Geraes was for many years the center of diamond mining not only of Brazil, but also of the world. The surrounding district has produced about one hundred million dollars worth of diamonds, among which are some of the finest stones ever found. The region is high, the climate is one of the most healthful and delightful I have ever known, and the people are without any exception the most charming and hospitable I have ever met in any part of the world. It is true, however, that there may be more or less overestimation of the opportunities for mining around Diamantina in the wake of the old Portuguese miners of the eighteenth century. I have known a good many smart Americans to proceed to the gold and diamond regions of Minas Geraes on the theory that those old-time miners, with their crude methods and slave labor, did not understand their business, and that they left behind them large quantities of gold and diamonds to be gathered by us modern up-to-date Americans. It is true that the methods employed in the ancient Brazilian mines were crude, but they were none the less effective, and the man who buys a washed gravel bank in the expectation of finding a lot of gold and diamonds is apt to come away under the impression that the Diamantina district is overestimated. There should be no mistake, however, about who is responsible for this overestimation.

If it is Diamantina in the State of Matto Grosso that is referred to, the statement also deserves some modification. A good many diamonds have been found in the vicinity of that town, especially in the low lands along the upper Paraguay. The diamonds occur in gold-bearing gravels and many of the mines are below water level where modern dredging might be done. The region, however, is low and malarial; it is thinly populated, and dredging can be done only under the disadvantages of great distance from centers of supplies, and from the skilled labor required to operate modern gold dredges successfully.

If your correspondent wishes to go to Diamantina in Minas Geraes, the former head of the diamond district of Brazil, he should go by steamer to Rio de Janeiro, where he can take the railway to the end of the line north of Sete Lagoas on Rio das Velhas. He will still have a couple of days' horseback riding beyond the railway in order to reach the city of Diamantina.

If he wishes to go to Diamantina in Matto Grosso he should take a steamer to Buenos Aires in the Argentine Republic. There he will find steamers running up the Rio Paraguay as far as Cuyabá. Diamantino is two days' ride north of Cuyabá. J. C. BRANNER.

Stanford University, Cal., Oct. 3, 1906.

Abstracts of Official Reports

Granby Consolidated Mining, Smelting and Power Company, Ltd.—The report of this British Columbia company for the year ending June 30, 1906, has just been issued. The balance sheet shows $15,000,000 stock authorized and $13,500,000 issued. The surplus on June 30 was $2,547,739 in all.

The mine development for the year was 8698 linear feet; the diamond drill work, 11,505 ft. There were 796,188 dry tons of Granby ore and 36,158 tons foreign ore smelted, a total of 832,346 tons. The yield was 19,939,004 lb. fine copper, 316,947 oz. silver and 50,020 oz. gold; the average prices realized being 17.78c. for copper and 64.68c. for silver. The average cost per ton, including all expenses, was $3.2988; the net cost of copper, after deducting value of gold and silver, was 8.35c. per pound. The income account for the year, condensed, is as follows:

Receipts from sale of product	$4,751,059
Working expenses of all kinds	$2,697,165
Foreign ores purchased	230,277
Total expenses	$2,927,442
Net earnings	$1,823,617
Exploration expenses	$ 20,754
Dividends paid	810,000
Total deductions	$ 830,754
Surplus for the year	$ 992,863
Balance forward from 1905	1,554,875
Total surplus	$2,547,738

There was expended in new construction, equipment at the mines, smelter and converter plants, $105,975; for additional mining properties, $350,485; a total of $456,460 for additions to property.

President Langeloth's report says: "The business of the company has been largely increased. The total tonnage smelted amounts to 832,346 tons, resulting in a production of 19,939,004 lb. of fine copper, or an increase of over 40 per cent. against the previous year. Two of the new, large blast furnaces, which became operative last fall, are working so successfully that it has been decided successively to reconstruct the six old smaller furnaces, which work is now in progress. Unfortunately, great delays were experienced on account of the difficulty in procuring the necessary materials and accessory machinery. The probability, however, is that this work will be completed early next year and the smelting capacity will then again be largely increased. In November last, a fire destroyed a large ore crusher, which for a few months greatly hampered shipments of ore to the smelter, as tunnel No. 1 was laid practically idle for a time, during which all shipments had to be made from tunnel No. 3. The local management deserves great credit for the efficient manner in which it met this emergency, without largely curtailing the current production. Since the completion of the new crusher, shipments have been made without any interruption.

"In view of the high prices for copper ruling since last fall, it has been deemed wise to mine large quantities of ore carrying a smaller percentage of copper than the average run of the mines. Active development work has been going on continually, and diamond drills have opened up large orebodies in the Victoria and Aetna mines, where a new shaft is now being sunk and the necessary improvements installed for crushing and shipping this output; the first shipment will, likely be made by the end of this year. Development of the Gold Drop claims, which were purchased last summer, proved satisfactory, and for some months past shipments averaged over 200 tons of ore daily. A tunnel is being pushed toward the Monarch property, opening up satisfactory orebodies. The length and width is not yet fully determined, but indications point to large bodies of ore, a considerable portion of which will soon be available for hoisting. These developments have largely increased the tonnage of ore in sight over that extracted in the year.

"Further economies have been effected in practically all departments, again resulting in great savings. Under the circumstances, the board felt justified in paying two dividends, of 3 per cent. each, on Jan. 15 and May 15, respectively, amounting together to $810,000. In addition, the available cash assets of the company were largely increased. Another dividend of 3 per cent. has meanwhile been paid, on Sept. 15 last."

Questions and Answers

Pumping Acid Mine Water

We are pumping mine water to a hight of 800 ft. This water is charged with sulphuric acid, strong enough to eat out the ordinary black-iron pipe in two weeks. We should like to know what is the standard practice for preserving the pump-column under such condition.

SULPHURIC.

Guanajuato, Mex., Sept. 25, 1906.

Answer—The economical handling of acid water is one of the unsolved problems of mining. There are plenty of ways of preventing the corrosion of the pipes of the column, but generally they add greatly to the expense of the installation. For example, lead-lined pipe is thoroughly resistant to the action of dilute acid, but it is very much more costly than unlined pipe.

Among the means for preserving the water column the following may be mentioned: Lead-lined pipe, the thickness of the lead inside of the iron being usually ⅛ in. The lead may be put in as sheet lead on a wooden backing, or what is better, the lead may be forced in directly against the iron by means of hydraulic pressure. However, pipe of the latter type is, we believe, made by only one concern in this country, and is costly. The same principle is employed in the lining of the cylinders and parts of pumps, which in this way are used very successfully at certain mines, as described by J. J. Rutledge, in his article on the Davis mine, in the JOURNAL of Oct. 13 and Oct. 20.

In the mines of Butte, Mont., both lead-lined and wood-lined pipe are used. In wood-lined pipe, the inner surface of the iron pipe is coated with a good asphaltum paint, the wood staves are then driven in, and the inside surface of the wood is also coated with asphaltum paint. Sometimes the inner surface of the wood is lined with sheet lead.

Another type of pipe that has been successfully used for acid water is wooden pipe, the staves of which are bound together with hoops of phosphor-bronze. The trouble that has been experienced with that kind of pipe is the external corrosion of the hoops, weakening them to the extent that they burst.

The general practice when acid water is to be pumped is to use iron pipes, allow them to corrode, and replace them as often as necessary. In that practice there is great advantage in using cast-iron pipe rather than wrought-iron pipe, because cast iron is far less subject to acid corrosion than is wrought iron. It has been found in certain mines, where the water is very acid, that cast-iron pipes last from one to two years, whereas ordinary wrought-iron pipes would last only a month.

In the Joplin district, Missouri, the pipes have been protected by conducting a small stream of milk of lime down to the mouth of the suction pipe of the pump. The sulphate of lime thus formed coats the pipes with a protective film of gypsum, which preserves the iron, although the acid in the water is not completely neutralized.

[It will be interesting if our readers will contribute accounts of their experience in the pumping of acid water—EDITOR.]

The Zinc Corporation

The Zinc Corporation is actively proceeding with the work of erecting the necessary plant near the South Blocks mine, Broken Hill, for the treatment of the large quantity of zinc tailing which has been purchased. The Potter plant in the British mine, controlled by this corporation, has been subjected to some alterations which it is expected will materially improve the quality of the concentrate. Hitherto the concentrate produced averaged 42 per cent. zinc.; it is now expected that an average of 46 per cent. will be obtained. The corporation has definitely decided to exercise the option granted by the Broken Hill Block 10 Company over the 520,000 tons of tailing at 5s. a ton. Payments are to be made quarterly in equal instalments, extending over a period of five years. The average assay value of the tailing is: Silver 9.5 oz. per ton; lead 6 per cent.; zinc 22 per cent. On behalf of the corporation, A. L. Queneau is now investigating the question of the production of spelter, and is at present engaged in fixing on a suitable site for the works. Interviewed on the general subject, Mr. Queneau stated that he did not care to offer any opinion at present beyond stating that in respect to Broken Hill there could be no doubt as to the magnitude of its resources. He added that the solution of the successful treatment of the zinc residue was beset with certain difficulties, but he thought he saw his way ahead in respect to the matter.

Patents Relating to Mining and Metallurgy

UNITED STATES

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

Published Week Ended Oct. 9, 1906

EXCAVATING MACHINE — Charles C. Jacobs, Amboy, Ill., assignor to Jacobs Steel Excavator Company, Amboy, Ill. No. 832,609. Filed Jan. 12, 1906.

PROCESS FOR DETERMINING THE HEATING POWER OF COMBUSTIBLES—Hugo Junkers, Aix-la-Chapelle, Germany. No. 832,611. Filed Aug. 10, 1904.

MAGNETIC ORE SEPARATOR — Henry H. Wait, Chicago, Ill., assignor to International Separator Company, Chicago, Ill. Nos. 832,642, 832,821, 832,823, 832,824, 832,825, 832,826, 832,827, 832,828, 832,829. Filed March 20, 1905.

TURN TABLE—Heinrich Bandmann, Oberdistein, Germany. No. 832,650. Filed June 25, 1906.

APPARATUS FOR CONVERTING MATTES AND SPEISSES AND OTHER METALLIC COMPOUNDS—Herbert Haas, San Francisco, Cal. No. 832,665. Filed Sept. 22, 1905.

PARALLEL FILTER—Jos. Kostalek, Prague, Austria-Hungary. No. 832,678. Filed April 1, 1904.

COKE-QUENCHING APPARATUS — Donald McDonald, Louisville, Ky. No. 832,693. Filed March 9, 1906.

ART OF PRODUCING MASTIC — Herbert Paschke, New York, N. Y. No. 832,697. Filed Oct. 6, 1904.

MEANS FOR DISTRIBUTING MINE RESIDUES, ETC.—August L. E. Bergert, Johannesburg, Transvaal. No. 832,714. Filed Feb. 27, 1906.

MIXING MACHINE—Roy N. Cunningham and John W. McPherson, Columbus, Ohio, assignors to The American Concrete Machinery Company, Columbus, O. No. 832,722. Filed Oct. 20, 1905.

ROLL—David L. Eynon and Samuel Sheriff, Pittsburg, Pa., assignors of one-half to Joseph S. Seaman, Pittsburg, Pa. No. 832,725. Filed Aug. 23, 1905.

PROCESS OF SMELTING COPPER MATTE. William Kemp, Tucson, Ariz., assignor, by direct and mesne assignments, to The Kemp Hydro-Carbon Furnace Company, No. 832,738. Filed Oct. 3, 1903.

HOISTING APPARATUS—Almon E. Norris, Cambridge, Mass. No. 832,744. Filed Jan. 14, 1905.

INGOT-STRIPPING APPARATUS—Clarence L. Taylor, Alliance, Ohio, assignor to The Morgan Engineering Company, Alliance, O. No. 832,758. Filed March 25, 1905.

ART OF HARDENING AND TOUGHENING STEEL—James Churchward, New York, N. Y. No. 832,770. Filed July 13, 1905.

QUENCHING BATH FOR TREATING STEEL AND IRON—James Churchward, New York, N. Y. No. 832,771. Filed Dec. 6, 1905.

ART OF HARDENING AND TOUGHENING METALS—James Churchward, New York, N. Y. No. 832,772. Filed Dec. 7, 1905.

SELF-HARDENING ALLOY OF IRON AND STEEL — James Churchward, New York, N. Y. No. 832,773. Filed May 17, 1906.

ROCK DRILLING MACHINE OR ENGINE—Henry Heilman and Lewis C. Bayles, Johannesburg, Transvaal. No. 832,791. Filed July 12, 1905.

ORE-PULVERIZING MACHINE — Albert J. Millross, Los Angeles, Cal., assignor of one-fifth to L. E. Knoles, Los Angeles, Cal. No. 832,801. Filed Dec. 8, 1902; renewed March 14, 1906.

MAGNETIC SEPARATOR—Frederick T. Snyder, Oak Park, Ill., assignor to International Separator Company, Chicago, Ill. No. 832,820. Filed Dec. 20, 1902.

MAGNETIC ORE SEPARATOR — Henry H. Wait, Chicago, and Frederick T. Snyder, Oak Park, Ill. No. 832,822. Filed March, 9, 1905.

METHOD OF EXTRACTING METAL VALUES FROM ORES—Ralph Baggaley, Pittsburg, Pa. No. 832,833. Filed Dec. 4, 1905.

ART OF PRECIPITATING METALS FROM CYANIDE SOLUTIONS—William J. Sharwood, Berkeley, Cal., assignor of one-half to Charles W. Merrill, Lead, S. D. No. 832,880. Filed Feb. 24, 1904.

METHOD OF LINING CONVERTERS—Henry L. Charles, Butte, Mont., assignor of one-half to F. Aug. Heinze, Butte, Mont. No. 832,895. Filed Nov. 21, 1905.

FISHING TOOL FOR WELLS—John H. Morrow, Chicago, Ill. No. 832,920. Filed March 28, 1904.

METHOD OF RECOVERING IRON AND STEEL FROM SLAGS—Ralph Baggaley, Pittsburg, Pa. No. 832,948. Filed Feb. 8, 1906.

COMBINED SAND DRIER AND SCREEN—Laurence Elkus, Indianapolis, Ind. No. 832,961. Filed May 17, 1906.

ORE CONCENTRATOR — Penton A. Hardwick, Colorado City, Colo., assignor to The Acme Gold Saver Manufacturing and Mining Company, Colorado Springs, Colo. No. 832,971. Filed May 22, 1905.

ORE SEPARATOR — Penton A. Hardwick, Colorado City, Colo., assignor to The Acme Gold Saver Manufacturing and Mining Company, Colorado Springs, Colo. No. 832,972. Filed May 23, 1905.

PROCESS OF MANUFACTURING BRIQUETS OF ORE, ETC.—Hugo Schulte-Steinberg, Düren bei Stockum, Kreis Bochum, Germany. No. 833,005. Filed Feb. 25, 1904.

COAL CONVEYER—Edwin C. Van Nouhuys, Rensselaer, N. Y., assignor of one-half to Emanuel B. Toedt, Albany, N. Y. No. 833,141. Filed March 23, 1906.

Personal.

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

C. L. Blackmar, of Denver, is in Silver City, N. M., on mining business.

Louis G. Hester, Houston, Tex. has been investigating the marble resources of the State.

B. B. Thayer, assistant to President H. H. Rogers, of the Amalgamated Copper Company, is in Butte.

David H. Lawrance, of Denver, is making mine examinations in the Cripple creek and Silverton districts.

George Hibbs, of Pennsylvania, is in Frisco, Colo., looking over the Victoria mine on Royal mountain.

J. W. Searles, Cleveland, O., and John R. Searles, Berwick, Penn., have purchased mining properties in Cobalt.

James W. Neill, consulting engineer for the East Butte Company, has returned from Butte to his home in Los Angeles.

H. V. Winchell, mining geologist for the Great Northern Railway Company, St. Paul, Minn., has been visiting New York.

James Ross, president of the Dominion Coal Company, has returned to Montreal, after a lengthened visit to Sydney, Cape Breton.

Frank Nicholson, of Joplin, Mo., has been visiting New York in connection with business relating to his extensive zinc interests.

J. Parke Channing, president of the Tennessee Copper Company, is visiting the mines and works of the company at Isabella, Tennessee.

Frank E. Wire, of Libertyville, Ill., president of the Square Deal Mining Company, is now in Frisco, Colo., inspecting the property of the company.

Edward Steindler, president of the Kerr Lake, Nova Scotia, and Peterson Lake companies, after spending some days in Toronto, has gone to Cobalt.

H. S. Clark, Western manager for the Lanyon Zinc Company, and Wm. Rogers, managing director, were in Breckenridge, Colo., recently, inspecting the Country Boy mine.

Prof. Henry M. Howe, of Columbia University, has received from Russia, the order of Knighthood of St. Stanislas, in recognition of his work in metallurgical research.

Robert B. Stanton is in Cananea, seeking a market for the electrical energy that will be developed by the proposed power plant on the Aros river. He is also examining mines in the district.

A. N. Spencer, technical engineer of the Harbison-Walker Refractories Company, Pittsburg, Pa., has just returned from a six months' trip among the smelters in Mexico, the Southwest, and West and British Columbia.

A. F. Beattie, president of the Argentenil Iron Mining Company, of Jackfish, Ont., has gone to New York in connection with the development of his lately acquired gold and sulphur property on the north shore of Lake Superior.

W. R. Ingalls, editor of the ENGINEERING AND MINING JOURNAL, has been attending the meeting of the American Mining Congress at Denver, Colo., and is now visiting the zinc mining and smelting districts of Missouri and Kansas.

Charles H. Hall, of Baltimore, Md., L. H. Hall, C. C. Roberts and Col. McTurk, of Philadelphia, recently inspected the property of the Hazle Mountain Coal Company at Black Ridge, in the anthracite region of Pennsylvania.

W. N. Burke, for the past three years mill superintendent for the Fernando Mining Company, Mazatlan, Mex., has accepted a similar position at the new mill of the Braden Copper Company, at La Junta, Chile, and left for Valparaiso, Oct. 12.

William C. Thomas, superintendent of the Dominion Copper Company's smelter in British Columbia, is spending a week in Butte, Mon. Mr. Thomas was superintendent of the Butte & Boston smelter 12 years and held a similar position at the Highland Boy in Utah before going to the Dominion.

Cecil B. Smith, of Toronto, has resigned his position as chairman of the Timiskaming & Northern Ontario Railway Commission to take charge of the municipal hydraulic power scheme of the city of Winnipeg. His services as consulting engineer will be retained by the Railway Commission.

Francis C. Lincoln, mining geologist, has recently returned from Durango, Mexico, where he has been employed all summer upon professional business. He will take up investigation at Columbia University, New York city, where he has been appointed a fellow in geology for the ensuing year.

C. C. Douglas, of Houghton, Mich., is in New York this week. Mr. Douglas has been identified with Lake and Boston interests for the past 18 years, and is one of the owners of the land which is now being explored and developed by the Calumet & Hecla Mining Company, and is known as the Superior Copper Company.

John B. Farish and Geo. J. McCarty who have been connected with the Mines Company of America and the Dolores Mines Company, as consulting engineers, since the organization of these companies, retired from their engagements Oct. 1 and will devote their time to the Mines Finance Company, which has recently acquired valuable mining properties in Mexico.

Obituary

James H. Dalliba, for 30 years prominent in the Lake Superior iron-ore trade, died in New York, Oct. 8, aged 55 years. About 1873, when a young man, he was employed by the Cleveland Iron Company —now a part of the Cleveland Cliffs Iron Company—at Marquette. In 1880 he removed to Cleveland, forming a partnership with C. F. Stewart, and a few years later became a member of the firm of Dalliba, Corrigan & Co. After a few years in this connection, he joined the force of Pickands, Mather & Co., Cleveland, leaving it in turn to go with the Lackawanna Iron and Steel Company. Ten years ago he returned to Pickands, Mather & Co., in which firm he became a partner and continued in that connection until ill health forced him to abandon business duties about two years ago. For a time after his removal from Cleveland he continued as New York consulting representative of the firm. He was a man of high character, and was much esteemed by his associates.

Societies and Technical Schools

Colorado School of Mines—The new Simon Guggenheim hall, at Golden, will be formally opened and dedicated on Oct. 17, with appropriate ceremonies.

Purdue University—This institution, at Lafayette, Ind., on Sept. 12 entered upon its thirty-third year. At the end of the second week, 1588 students had been enrolled. Out of this number, 1379, or 86 per cent., were registered in the schools of engineering. The facilities of the engineering department have been increased by the completion of a building containing three floors, each 75x130 ft., for the department of civil engineering, and by an addition to the electrical laboratory 68x90 ft. There have been added to the materials-testing laboratory and to the steam-engine laboratory a number of important machines, including a 100,000-lb. Olsen testing machine, a Fairbanks-Morse 50-h.p. gas producer and gas engine, a 16 and 10x14 air and 11 and 18x14 steam Ingersoll-Rand air compressor, an Abner Doble water motor, and an Allis-Chalmers 8x24 Corliss engine direct-connected with a centrifugal pump.

Michigan College of Mines—This institution offers four years' courses leading to the degree of Engineer of Mines and Bachelor of Science; it also affords facilities for graduate work leading to the degree of Doctor of Philosophy. The engineering department is fully equipped to give courses in all the branches of engineering in which a mining engineer needs to be proficient. Besides the faculty of eight professors, there is a staff numbering 31 assistant professors and instructors. The college year is divided into four terms, the

out-door practical work being confined mainly to the summer term. The total enrolment during the current year is 225 students, 138 of whom are residents of Michigan. The tuition fee for a resident of Michigan is $25 per year, and for a non-resident student it is $150 per year. The matriculation fee of the former is $10 and of the latter $25. The laboratory fees range from $1 to $15 each, according to the courses pursued.

Industrial

The John A. Traylor Machinery Company, Denver, Colorado, is building a two-story brick extension to the shop, and is installing machine-tool equipment.

The Atlas Engine Works has just received an order from the United States Steel Corporation for a number of Atlas water-tube boilers which are to be installed in two of the constituent companies of the steel trust.

The Pittsburg Reduction Company has bought the controlling interest in three companies owning the large water power at Massena, N. Y., derived from the St. Lawrence river. This is taken to mean the establishment at Massena of new works for the separation and manufacture of aluminum; possibly hereafter the removal of present works to that point.

Some recent sales by the Crocker-Wheeler Company, Ampere, N. J., to metallurgical companies are the following: Orford Copper Company, Bayonne, N. J., four 300-kw. direct-current generators, 125 volts, 150 r.p.m., driven by a Mesta engine; American Smelting and Refining Company, Pueblo plant, Pueblo, Colo., one 20-h.p. direct-current motor, 500 volts, 820 r.p.m.; one 45-h.p. direct-current motor, 500 volts, 820 r.p.m.; Arkansas Valley plant, Leadville, Colo., one 45 h.p. direct-current motor, 220 volts, 925 r.p.m.; Eilers plant, Pueblo, Colo., one 45-h.p. direct-current motor, 230 volts, 925 r.p.m.; Globe plant, Denver, Colo., two 20-h.p. direct-current motors, 500 volts, 820 r.p.m.; one 45-h.p. direct-current motor, 500 volts, 100 r.p.m.

The Cleveland Cliffs Iron Company, of Ishpeming, Mich., will install at the Maas mine, Marquette, a 14x24-in. Reliance Corliss duplex geared hoist recently purchased from the Allis-Chalmers Company. The new outfit will have a capacity of 8½ tons at a speed of 700 ft. per minute, with a steam pressure of 140 lb. This hoisting engine, although comparatively small in size, combines many improvements. The Reynolds-Corliss valve gear insures increased steam economy and reliable service in mine operation. The engine will be fitted with automatic Corliss cut-off and governor. The shaft will carry a cast-iron drum of new design, 7 ft. diameter, 8 ft. 8 in. face, keyed on and grooved for 1¼-in. rope. The crank shaft will carry a cast-steel pinion with cut teeth which will drive a gear on the drum shaft, the ratio being 3.66:1. At the opposite end from the gear a wide brake spider will be furnished to which the wood blocks will be fastened. Each cylinder will be fitted with relief valves and indicator piping, and have a quick throttle valve, all valve operations being controlled from a central raised platform on which the controller levers are conveniently grouped.

Trade Catalogs

Receipt is acknowledged of the following catalogs and circulars:

Hendrie & Bolthoff Manufacturing and Supply Company, Denver, Colo. *Equipment News*, September, 1906; Pp. 32, illustrated; paper, 10x12 in.

J. Geo. Leyner Engineering Works Company, Denver, Colo. Ore Handling Apparatus; Catalog No. 9; Pp. 84, illustrated; paper, 8x4 in. 1906.

Ingersoll-Rand Company, 11 Broadway, New York. Ingersoll-Sergeant Rock Drills; Catalog No. 45B; Pp. 96, illustrated; paper, 5x8 in. 1906.

Crocker-Wheeler Company, Ampere, N. J. Bulletin No. 69, Small Generators Arranged for Direct Connection; Pp. 4, illustrated; paper, 8x10 in. September, 1906.

Allis-Chalmers Company, Chicago, Ill. Huntington Mills, Catalog No. 10, Seventh Edition; Pp. 44, illustrated; paper, 5x8 in. 1906. Also Catalog No. 17, Sixth Edition. Mining and Quarry Cars, Skips and Buckets; Pp. 12, illustrated; paper, 5x8 in. 1906. Also Bulletin No. 1507, Allis-Chalmers Air Compressors; Pp. 40, illustrated; paper, 8x10 in. August, 1906.

Construction News

Platteville, Wisconsin—The O. P. David Mining Company is arranging to put in a concentrating plant. The address is at Platteville.

Alba, Missouri—A concentrating mill is to be erected on the Aylos land by the lessees. Walter Koontz, Webb City, Mo., has charge.

Tishomingo, Indian Territory—Arrangements are being made to open a granite quarry on a large scale. Hoists and quarrying machinery will be needed. Peter Schual, Ardmore, I. T., is manager.

Palmyra, Fluvanna County, Virginia—The Old Dominion Slate and Cement Company is about to develop slate lands and open a quarry. Machinery will be needed. N. P. Johnson, Youngstown, O., is president, and Thomas Sand, Palmyra, Va., manager.

Dawson, New Mexico—The coal mines at this place are to be extensively developed, and much new equipment provided. A branch of the El Paso & Southwestern Railroad is under construction to the mines. The property is controlled by Phelps, Dodge & Co., of New York.

Special Correspondence

San Francisco Oct. 10

The Trinity Copper Company, owning the Shasta King copper mines, adjoining the Iron mountains and Balaklala holdings, and also a town and smelter site at Copley, Shasta county, is about to start up its properties. The mines have been examined and an agreement has been reached by which 300 tons per day will be taken by the smelters.

The resumption of work on the property of the California-Nevada Copper Company, near Daulton, Madera county, has caused renewed development in that vicinity and at Coarse Gold. The advent of two railroads in that county gives promise of the opening up of a number of iron-copper and silver deposits.

The Tightner mine, Alleghany, Sierra county, keeps up a brilliant record of productiveness. It is owned by H. L. Johnson. The former owners thought the mine worked out. In the ore now taken out there is much crystallized gold and some platinum.

There is much activity just now in the available gold-dredging lands in Sacramento county. The combined interests which sold the Oroville dredging fields and started in on those in Yuba county above Marysville, are now acquiring large interests near Folsom, Sacramento county, where several dredges have been at work for three or four years. The Natoma Vineyard Company has sold 1700 acres for $600,000; R. E. Shields, 100 acres for $100,000; Mrs. Margaret O'Toole, 47 acres for $25,000; and H. O. Studarus, 75 acres on the same basis. These are the transactions of one week. This Folsom dredging field yielded last year between $550,000 and $600,000, and this annual output will be doubled shortly as the new tracts are opened by new machines. The dredging men in some instances pay $1000 an acre for land which, for vineyard purposes, pays interest on only about $200 an acre.

The "Borax Smith Railroad," being built from Ludlow, San Bernardino county, through Inyo county and into Nevada as far as Bullfrog, commences this month to handle freight and passenger business to the present terminals. This Tonopah & Tidewater Railroad is intended mainly to tap the borax mines of Death Valley owned by the Pacific Coal Borax Company. In that region the company owns many borax deposits, but its main one is the Lila C., which is a very extensive body of colemanite on which development work has been proceeding steadily for three years or more. The ore there can be handled cheaper than that from the famous colemanite deposit near Daggett, for many years the source of nine-tenths of the borax of the United States. The high-grade ore in this mine

is nearly exhausted and the Lila C. will become the principal producer.

The Coast Oil Transport Company has been organized in this city to construct pipe lines for petroleum and gas in Santa Barbara and San Luis Obispo counties. The proposed lines will be about 50 miles long commencing at Harris station on the Pacific Coast Railway in Santa Barbara and extending northward to Port Harford on San Luis Obispo bay, and westward to Casmalia on the Southern Pacific in Santa Barbara county. The incorporators are Adolf Phillips of Arroyo Grande and B. Lieber, C. H. Lamberton, H. P. Coles and M. Casey, of San Francisco.

The old Meadow lake district in Nevada county is just now attracting more or less attention and within a week over fifty mining claims have been relocated there. The district is a very old one, but the ores were "rebellious." More prospecting for gold and copper is now going on in Siskiyou county than for many years. On Siskiyou mountain some hundreds of copper claims have been located, and numbers of gold-bearing ledges have been discovered in its Salmon river country.

Bisbee, Arizona Oct. 12

The Calumet & Arizona Mining Company has secured two new mining properties in Arizona. These will be paid for out of the company's treasury surplus, which on Oct. 1 amounted to $4,280,000; in this surplus copper on hand amounting to about a third of the year's production, was figured at 14c. It is interesting to note that the earnings since Nov. 15, 1902, when the first 300-ton furnace was blown in, have been sufficient to pay $5,000,000 dividends and accumulate this surplus, as well as to make betterments that have cost at least $1,000,000 more.

One of the properties that has been under bond by the Calumet & Arizona is the Mammoth, of Clark & Scanlon, about 60 miles north of Benson and 30 miles from the present terminus of the Florence & Eastern railway. This road is to be extended to connect Benson and Phœnix At Benson the road will connect with the El Paso & Southwestern and at Phœnix with the Santa Fe, which is, indeed, owner of the new line. The examination of these new properties has been under way for some time.

Calumet & Arizona is to add largely to its smelter plant. It now has five 300-ton furnaces and three converter stands, while at the end of the smelter house are two power-houses, in which the machinery is located. These will be torn down and replaced by a larger building further to the west, while the machine shop will be moved to the south. Railway tracks will be run through this latter and the power-house will be fitted with a large electric traveling crane, covering the entire building. The machinery plant will be much increased and at least two additional furnaces, probably larger than those now in use, will be erected in the space now occupied by the power-houses. These seven furnaces will be supplied with ore from the Calumet & Arizona, and the Superior & Pittsburg, probably in the proportion of three to four. General manager L. W. Powell has been at Duluth the past two weeks conferring with the directors and has been given authority to make the changes he outlined, which include these referred to, and others of similar importance. With seven furnaces the works will have capacity for from 2200 to 2500 tons of charge daily, and as there is no flux charged, the ore consumption will be very large.

There has been a slight shortage of coke at the Copper Queen furnaces, and the production of September was only about 8,250,000 lb., which was a slight decline from the preceding month. The year will show as has been intimated, fully 100,000,000 lb. from these works, which copper comes not only from the Queen, but from the Silver Bell, the Shattuck, the Phelps-Dodge works at Nacosari, and a few other small properties in the southern part of Arizona.

Alexander Veitch, who has been manager of the Arizona Copper Company's operations for some years, and who recently resigned, has become manager for the New England & Arizona, a Worcester, Mass., concern, which is developing mines in the Clifton field. Mr. Veitch is a competent man and his acceptance of such a position indicates that the New England is a coming proposition.

A decline in receipt of sulphide ores from Cananea and Nacosari at the Old Dominion smelter has caused a decline in production there from the high record of early September. These concentrates have been necessary for these works on account of their sulphur, and they carry from 8 to 15 per cent. copper.

El Tordillo properties, recently bought by the Shattuck crowd, are to be developed at once, and L. C. Shattuck has gone there to start operations. Early work will be by diamond drill and shaft sinking.

The Imperial Copper Company at Silver Bell is working on the 900-ft. level, and is to install a 130-drill compressor that will enable both sinking and drifting to go on rapidly. It is now asserted that the company will develop its claims to a great depth, if the ore holds out.

Salt Lake City Oct. 12

The ore and bullion settlements reported in Salt Lake this week amounted to $125,000.

The Western Utah Copper company has been organized to operate the Gold Hill copper mine in the Clifton section of the Deep Creek district, with a capital of 500,000 shares of $5 par value. The controlling interests are in the hands of those who direct the affairs of the Bingham Consolidated Mining and Smelting Company. The officers are: W. S. McCornick, president; Duncan MacVichie, vice-president; H. H. Green, secretary and treasurer. These, with F. Augustus Heinze, Henry N. Sweet and John A. Street, are directors. The company has acquired 364 acres of ground, and has developed a large tonnage of marketable copper ore. The mine is about 30 miles from the main line of the Western Pacific railroad, now building to San Francisco.

A representative of the Davis-Daly Estate Company, of Butte, has tied up under an option a large acreage of attractive ground at Gold Springs, Iron county, and other property just over the Utah-Nevada State line in Nevada, and not far from Gold Springs.

The management of the Jennie Gold Mining Company has practically concluded arrangements for the construction of a mill, the initial plant to handle from 25 to 30 tons per day. This company, which is operating at Gold Springs, has recently developed some large bodies of gold-silver ore.

The special meeting of shareholders of the Lower Mammoth Mining Company, to vote on increasing the capital stock, has been postponed to November 8.

The directors of the Mammoth Mining Company have posted a dividend of $20,000 for payment October 20.

The annual meeting of the shareholders of the Bingham & New Haven Mining Company will be held this week. It is understood the management will make a very favorable showing. This company is operating at Bingham, and made its initial appearance in the dividend column during the present year. A Salt Lake firm, the General Engineering Company, has been making some tests of the ore to arrive at the best method for the treatment of the extensive bodies of low-grade ore which the property contains. C. H. Doolittle, of Salt Lake, is manager of the Bingham-New Haven Company.

Denver Oct. 12

The Colorado Fuel and Iron Company is reported to have purchased some iron deposits near Mineral point, Cache county, Utah, after having had a bond on the same, during investigation. These properties are about 12 miles from the Oregon Short line. The company is also investigating some discoveries in northwestern Colorado.

A disastrous explosion took place on Oct. 5 in the Dutchman coal mine, near Blossburg, N. M., owned and operated by the St. Louis, Rocky Mountain and Pacific Coal Company, when a number of men lost their lives.

It is gratifying to hear that $350,000, being one-half of the estimated cost of the deep drainage tunel of the Cripple Creek district, has been definitely pledged by the signing of contracts. This amount will be paid by the El Paso, Portland,

Elkton and Mary McKinney companies, while contracts with the Golden Cycle, Granite, Findley and Vindicator companies will probably be closed shortly.

The plant of the Metal Volatilization Company, controlled by E. N. Hawkins, and situated in the southern part of Denver, was damaged to the extent of about $7000, by what is supposed to have been an incendiary fire.

Duluth, Minn. Oct. 14

The highest royalty ever paid for Mesabi ores, aside from the Great Northern sale, has just been involved in the sale of about 2,000,000 tons in the ground in section 9-58-16, belonging to the Tesora Mining Company, to the New York State Steel Company, which is erecting works at Buffalo. The price is $1 per ton, and a substantial advance royalty is to be paid down as soon as the property is checked by engineers, who are now on the ground. This ore runs about 61 per cent. iron and 0.039 per cent. phosphorus, and must be mined underground; it will cost, delivered at Lake Erie port, about $3.50 per ton. Such an ore now commands, there, at least, $1 more.

The lack of information among financial writers of the East on the Mesabi range, and the Steel Corporation's ores, has been displayed this week in comments on the Great Northern deal. It has been stated that the largest deal ever made for ore by the corporation prior to this purchase was that of the properties of the Union Steel Company, of Pittsburg, which had about 55,000,000 to 60,000,000 tons on the Mesabi. In point of fact, this does not rank with at least two previous deals made with Duluth parties, the Chemung and the Canisteo ore purchases, the first closed some three years ago, the second last year. There is on these two tracts not far from 200,000,000 tons of ore, and further development may disclose even greater tonnage. They are the largest purchases made by the corporation since its original investments. It is not at all certain that these two deals do not contain as much ore as the Great Northern purchase, at least so far as that purchase is now known by actual exploration.

Several groups of small properties are being arranged for sale to Eastern steel-making interests. Although small mines, they aggregate a respectable tonnage. The Mayas Iron Company, which has been mining a tract of 200,000 tons on the east end of the Mesabi, has gathered in some other developed orebodies, some of which are of from 200,000 to 300,000 tons, and is placing the group in the East. The Republic Iron and Steel Company has just taken over a piece of land in the center of 15-19, where the Steel Corporation had developed 300,000 tons, on a basis that makes the royalty 35c. per ton. There is considerable shifting about of leases and operating ownerships, and more activity on the part of those not well supplied with ore than in the past.

The Oliver Iron Mining Company is placing electrical machinery at its Mesabi mines for use as soon as the Duluth works of the Great Northern Power Company shall be in position to deliver power, possibly within three months. Large compressors, to supply air to all the Oliver company mines at Eveleth, have just been installed, and in these the air cylinders have been placed between steam cylinders and cranks, so that, to use electricity, the steam cylinders may be uncoupled and the compressors driven from motors.

The annual report of the mine inspector for Iron county, Mich., for the year ending Oct. 1, 1906, has been published. It shows a gain of 500,000 tons, or 33 per cent. over 1905 in production of the county, with 26 mines and explorations, and 1996 men at work. Crystal Falls is the chief center of the county, with a production for the year of about 1,500,000 tons. There were 15 fatal accidents at mines during the year.

Scranton Oct. 15

After persistent prospecting, E. S. Stackhouse has found a new vein of coal in Shickshinny, the lower end of the Wyoming basin. The borings were carried on in Rocky mountain. The present find is below the measures worked by the Salem Coal Company and is believed to be the Red Ash vein. A slope is being driven from the outcrop which shows 4½ ft. of clean coal, which thickens as it gets under cover. The new vein lies altogether above water level, and can be more economically worked than most coal properties in the Wyoming valley. Mr. Stackhouse holds 3000 acres.

An investigation is sought by the Lehigh Coal and Navigation Company by the Interstate Commerce Commission with reference to influence alleged to be exercised over its property, which it is claimed restricts its coal production to less than one-twentieth of the total of anthracite output.

A remarkable scarcity of labor continues in the anthracite region, which is felt among that class known as company hands. Intelligent men are needed to perform the odd jobs, such as track-laying, and other duties, where a foreman need not supervise each detail. These are difficult to find, and extra hands, men who have had some experience, have to be assigned to break in the new ones, at considerable expense to the companies.

A charter has been granted in Harrisburg to the Ridgeway Coal Company, which will operate a colliery in Plymouth, Penn. The president is Matthew Stipp, of Scranton.

London Oct. 8

Those who have followed the recent history of the Great Fingall mine in West Australia will not be surprised to hear that the managers have decided to reduce the rate of output to some extent, until more definite knowledge can be obtained as to the value of the mine in depth. I ought to say that people who know the managers will not be surprised. Bewick, Moreing & Co. look a long way ahead when considering their policy. Many mining men with reserves on hand, such as there are at Great Fingall, would let the future take care of itself and continue to work their mills on pay ore at full pressure. At the present time the reserves are estimated at over 650,000 tons, say three years' supply, averaging $11 per ton. In studying the records of outputs and estimates it is clear that for some time now the grade of the ore treated has been slowly decreasing. Six months ago the reserves were estimated to contain $13 per ton. The developments at the lower levels are estimated to average only $8 per ton, and the veins are irregular into the bargain. The working costs at this mine are only $5 a ton, inclusive of everything, which is low, considering its situation. The proposed reduced output will be about two-thirds of the average of the last three years. With the above facts and figures, your readers can form their own individual judgments as to the necessity or advisability of reducing the output.

While writing of West Australia mines it is interesting to note the present position of Great Boulder Perseverance. Two years ago the mine was working on high-grade ore and was in an apparently flourishing condition; but, as your readers will remember, it was suddenly found that the estimates of reserves were all wrong. Since then, under different management, the mine has been pulled together and has since worked at a profit on lower-grade ores, running about $12 a ton. The average contents at this mine are now decreasing in the same way as at Great Fingall, for the first-class reserves are estimated now to contain only $9 a ton, as compared with $10 six months ago. These amount to about 300,000 tons, as compared with 336,000 tons six months ago. In addition, there are estimated second-class reserves amounting to 185,000 tons, averaging $6, as compared with 140,000 tons, averaging the same amount, six months ago. It is obvious from these figures that the reserves of first-class ore have decreased, and those of second class ore have increased during the last half year, a circumstance which gives directors and shareholders no little anxiety.

Perth, W. A. Aug. 31.

The first report sent by the State geologist, W. Woodward, on his arrival at Narlarla Hills, West Kimberley, does not bear out the glowing accounts sent by the prospectors. Still there can be no doubt of some promising finds. Mr. Woodward reports passing through a promising belt of gold-bearing country near the Robinson river in the Mondooma district.

General Mining News

Sault Ste. Marie Canals—The official report shows that the freight passing through the Sault canals in September was 7,250,159 tons; being only 93,568 tons less than in August. The daily average for September, indeed, was greater than in August, the figures being 241,672 and 236,894 tons, respectively. For the season to Oct. 1 the total tonnage carried through the canals was, in net tons:

	1905.	1906.	Changes.
East-bound.....	26,445,515	30,069,562	I. 3,624,047
West-bound.....	5,502,228	7,134,875	I. 1,632,647
Total.....	31,947,743	37,204,437	I. 5,256,694

The number of vessel passages this year was 16,603, showing an average cargo of 2241 tons. The mineral freight included in the total was as follows, in net tons, except salt, which is in barrels:

	1905.	1906.	Changes
Anthracite.....	662,804	661,873	D. 931
Bituminous.....	4,196,459	5,482,914	I. 1,286,455
Total coal.....	4,859,263	6,144,787	I. 1,285,524
Iron ore.....	23,788,904	26,485,982	I. 2,697,078
Pig & manuf. iron	142,201	264,066	I. 121,865
Copper..	75,378	77,045	I. 1,667
Building stone....	7,963	4,472	D. 3,491
Salt, bbl.....	317,780	297,879	I. 19,901

The increase of 26.5 per cent. in coal is greater than had been supposed. On the other hand, the gain in iron ore was less than was anticipated early in the season.

Mines Company of America—This company was organized in November, 1902, with a capital of $2,00,000 and purchased, on the recommendation of John B. Farish, the shares of the Creston Colorado Company, operating mines near Torres, Sonora, Mexico. Since its organization the Mines Company of America has paid dividends equal to $2,325,000 and on Oct. 1, of this year had readily available assets as follows: Cash, $184,971; bills receivable, $96,500; bullion in transit, $150,471; accounts receivable, $5448; supplies on hand, paid for, $113,009; total, $550,399. In another column of this issue wil be found an abstract of Mr. Farish's report on the Dolores mine.

ALABAMA

JEFFERSON COUNTY

Bessie Mines—The most important work now in progress in Alabama is that being done by the Sloss-Sheffield Steel and Iron Company at its Bessie mines, in the western part of the county. These mines and the improvement thereof will cost $200,000 and it is intended to work up the daily production to 1500 tons. Already something like 500 tons of coal per day is received.

Pratt Consolidated Coal Company—This company is making much progress in development at several points in the western part of the county. The Louisville & Nashville railroad will shortly be in position to give service to the new field. A commission has fixed the price to be charged for the crossing over the tracks of the Southern Railway in the new coal field.

ARIZONA.

GILA COUNTY.

Old Dominion—It is expected that by the end of this year this company will be in a position to produce copper at the rate of 60,000,000 lb. per annum, at cost of considerably less than 10c. per lb. At present the company is building a reverberatory furnace at a cost of about $75,000, is installing a pumping plant at C shaft at a cost of $150,000, and is building an electric power plant at a cost of $50,000, besides which considerable underground development work is being done. The ore-dressing and smelting plants, when completed, will represent an expenditure of over $2,500,000, most of which has come from current earnings. It is expected that most of this construction work will have been completed by the end of 1906, and that in 1907 the company will be on a sound dividend-paying basis.

GRAHAM COUNTY.

Shannon—N. L. Amster stated in a recent interview that the earnings of this company for the last fiscal year will not be above $1 per share, but expressed the opinion that the consummation of plans which will be inaugurated after he and his friends take control, will result in the production of 18,000,000 to 20,000,000 lb. of copper per annum, and a profit of $3 to $4 per share on the basis of 15c. for copper.

Arizona Copper Company, Ltd.—This company reports that the output of its mines at Clifton for the month of September was 1036 short tons of copper.

MOHAVE COUNTY

Chloride Gold Mining Company—J. H. Hoffman, secretary of this company, writes us as follows, under date of Oct. 4: "The Arizona-Birmingham Gold Mining Company, of Birmingham, Ala., secured a lease a little over a year ago on a group of claims belonging to the Chloride Gold Mining Company at Chloride, and since that time has been diligently engaged in driving a cross-cut tunnel into Schrums mountain, with the expectation of opening up the Lucky Boy vein at considerable depth. This vein is an extension from an adjoining property. The tunnel is now over 1050 ft. in, 700 ft. of which has been driven by the leasing company, and there is about 60 ft. farther to go before reaching the Lucky Boy vein. Several veins have been cut by this tunnel, all of which contained pay ore. About 10 days ago a ledge of soft porphyry was cut which showed considerable mineralization. No attention was paid to this, as they knew the vein they were desirous of cutting was still farther ahead. A few days later, some of the soft material, having been exposed to the air, crumbled off, exposing a material that resembled ore, samples of which assayed high in value. No drifting has been done on the new discovery, but it has every appearance of opening up into a large body of ore. This ore was cut at a perpendicular depth of 550 ft. The tunnel will be continued until it reaches the objective point. The leasing company has a long lease and is well equipped for development of the group of claims held. The Chloride Gold Mining Company shipped 150 tons of ore from the workings last month."

CALIFORNIA

BUTTE COUNTY

Butte Creek Gold Dredging Company—This Los Angeles company has let a contract for a gold-mining dredge to be set at work on Butte creek near the town of John Adams. This will be a shovel dredge, different from those with a series of buckets.

CALAVERAS COUNTY

Boston—This old mine at Mokelumne hill has ben placed under bond and is to be pumped out within 90 days so that development work may commence. The ore is of low-grade, but there is an abundance of it.

DEL NORTE COUNTY

Del Norte Mining and Development Company—This new company has been organized to work an extensive deposit of gravel in the south fork of Smith river, where the black sand carried not only gold, but some platinum. The company has bonded the ground formerly held by the Cant Hook Gold and Platinum Company. The president of the new company is L. A. Maxwell, and the secretary is S. O. Christensen. The head office is at Crescent City.

INYO COUNTY

There is a boom on at Greenwater. Tons of machinery are on the way and every available team for miles around has been pressed into service; people are rushing in as fast as the stage lines can convey them. Five hundred people are now on the scene and a town is growing up with wonderful rapidity. The iron gossan on one of the properties is being stripped from the copper ore for a distance of 3500 ft., revealing copper that assays from 10 to 30 per cent.

Nevada-Fontenac Company—The mines near Rock creek recently purchased by this company, Walter Wilson, superintendent, are about to be reopened. Most of them were worked in a small way over 30 years ago and then given up, but the old workings are being cleaned out.

Greenwater Red Boy—This company owns some of the best located land in this section. D. MacKenzie & Co. are developing the property.

Nevada-California Prospecting Company—This company has just let a contract for the sinking of a shaft on its Mollie Malone group at Tule cañon. The company has also started men at work on the Idaho, a property near Luning, Nevada. The surface showings on both of these properties are excellent.

KERN COUNTY

Havilah—At this old camp mining is again quite active and considerable prospecting is being done. The Confidence company is developing the President and Golden Horn mines; and the Golden Eagle company is doing considerable work on the Homer claim. A tunnel is being run on the Headlight, and another one on the Big Four. It is expected that a 10-stamp mill will be erected in the Latham mine.

MADERA COUNTY

Shepherd—G. W. Shepherd and C. A. Ewing are opening new gold and copper claims which Shepherd has located on the Wide Awake ranch and J. R. White ranch.

Texas Flat—At this mine, Coarse Gold, extensive development is being done. The 10-stamp mill is, however, idle.

MONO COUNTY.

Standard Consolidated—Based on the results obtained from the operation of an experimental plant of half a ton capacity at Bodie, the managers ordered a plant in which all the tailings from the mill might be treated in accordance with the Moore method. The new plant, which was placed in regular operation in 1905, has fulfilled expectations of those responsible. The ore consists of quartz, iron oxides and clay. The gold is partly coarse and partly very fine, which amalgamates badly. The ore is difficult to treat, in spite of the absence of all minerals ordinarily classed as deleterious. An Allis-Chalmers 5x22 ft. tube-mill does the regrinding. The underflow of two cone separators furnishes the feed. It contains the coarse stuff and a certain proportion of adhering slime, and passes to the tube-mill mixed with sand from the settling ponds fed into the stream automatically. The outflow from the mill is returned to the cones. The tube-mill, which makes 25 revolutions per minute, is charged with 12 tons Greenland flint pebbles. Wrought-iron plates are used for liners. They are 7/8x8 in., and cut into 7-ft. and 15-ft. lengths, bolted through the shell. The power for the mill is approximately 50 h.p. when running, and 100 h.p. at starting. The grinding capacity is placed at 60 tons of sand per 24 hours.

NEVADA COUNTY

Ozalli—Shebley & Ozalli have encountered some good ore on this property and have bought a five-stamp mill from J. Schillinger of You Bet, which will be operated by a 10-h.p. gasolene engine. The mine is in Chicago Park district.

Dutchman's Flat—E. B. Whitehead & Co. have purchased 600 acres of mineral ground on Deadman's Flat, and will start a shaft on the Vulcan and Gray Eagle claims. Another company is also starting work on the Flat.

PLACER COUNTY

Golden West—The blacksmith shop, powder-house and other buildings of this mine, E. H. Armstrong owner, have been destroyed by an accidental fire.

PLUMAS COUNTY

Five Bears—At the end of the 1100-ft. tunnel, 800 ft. below the surface, a chimney of rich ore, 9 ft. wide, has been broken into. Development work has been going on for three years; the mine was formerly known as the Centennial.

RIVERSIDE COUNTY

Pacific Tourmaline Group—Lubo Brothers have located in this name 80 acres of gem-bearing land in the Cahuilla district.

SAN LUIS OBISPO COUNTY

Copper—A number of new copper claims have recently been found in Paradise valley, about 12 miles from San Luis Obispo.

COLORADO

TELLER COUNTY—CRIPPLE CREEK

Work Mining and Milling Company—The dividend of 1c. per share, recently declared by this company, will be paid in a few days. The amount distributed will be $15,000. No work is being done at present on company account, but the greater part of the property is being worked under lease. A number of lessees are shipping ore, the principal one, however, being the Marsh & Hodges lease, on the Little Clara claim, which is being operated through the Gold Exploration Company's tunnel. After the payment of this dividend the company will still have considerable cash in its treasury.

United Gold Mines—It is understood that considerable portion of the property of this company will soon be leased on favorable terms. The control of the company recently passed from the Woods Investment Company to J. T. Milliken and associates, who control the Golden Cycle Company. The property of the United Gold Mines Company consists of some very well situated ground on Bull hill, Battle mountain and Ironclad hill.

Portland—The directors of this company have just declared the regular quarterly dividend of 5c. per share, which will amount to $150,000. The Portland is maintaining its usual heavy shipments.

Findley Consolidated—It is reliably reported that work will soon be recommenced on this property. For a number of months the property has not been worked extensively, until a few weeks ago, when it closed down entirely. The principal work done for some time has been development, as the management has been awaiting the completion of the new mill at Colorado City. This will not be much before the first of the year

Pharmacist—The directors are expected to meet in a few days and consider, among other things, the granting of a lease on the south end of the property. Quite a number of applications have been made for this ground. The recent strike on the south end of the Burns claim of the Acacia has stimulated prospecting in this vicinity.

Wishbone Mill—This new cyanide mill, situated on the north slope of Mineral hill, is now about ready for business, and it is understood that it will solicit custom ores from the mines in the vicinity. The company has also been advertisng for bids to sink its main shaft 100 ft. deeper. It is reported that a considerable amount of low-grade ore is exposed in the workings.

LAKE COUNTY—LEADVILLE

Monthly Output—In May, 1900, the tonnage for the month was 98,250, which is the record. During the month of September, 1906, the tonnage amounted to 89,231 tons of all classes of ore, the heaviest tonnage for any month since 1900. If the conditions had been normal the tonnage for September would have reached close to 100,000 tons. At the beginning of the month a number of the large producers had to curtail shipments and one or two of them closed down for 10 days on account of the smelter being unable to handle the ore. Scarcity of labor at the smelter demanded the curtailing of shipments, as, instead of being able to run 10 furnaces, only eight and sometimes seven were in blast. The labor market is improving and it is probable that the smelter during October will be able to run full blast. The outlook for the future of Leadville was never brighter and with the new enterprises under way and many of the old mines resuming, the output for the present month should reach the 100,000 ton mark.

Winnie—Belonging to the New Monarch Mining Company, Big Evans is turning out some exceedingly rich ore. The rich streak of ore found two months ago in one of the stopes, running very high gold, still holds out and it has been opened for 500 ft.; to the west of this a body of sulphide 4 ft. wide has been opened. In the main body of ore quite frequently small pockets of free gold are found.

Crecentia—For two weeks this property, on the north side of Rock hill, has been closed down to permit of the placing of improved machinery. A skip has now been installed at the 600-ft. level and from now on the output from the mine will be doubled.

Yak Tunnel—Has secured control of the Sentry property on Breece hill which includes the Ollie Reed. At present the Yak people are outputting 10,000 tons a month from the different properties worked by them. The mill is turning out 20 tons daily of first-class concentrates.

Aetna—This shaft on Carbonate hill is now down 300 ft., and still in the quartzite, and probably another 50 ft. will have to be sunk before the lime is encountered. This is the first shaft on the hill to go to the second contact; therefore the formation is unknown.

Holy Cross District—The French Mountain Mining Company, working the Grand

Trunk claim in this district, has accomplished considerable during the summer months. Sufficient ore is now on the dumps to keep the cyanide mill running for several months. From the two upper tunnels about 10 tons daily are being broken that will run $20 per ton; this is sent to the mill. A rich streak of ore is found in both tunnels; this is sacked and sent to the smelter. The crosscut tunnel at the foot of the mountain is now in 2,900 ft., and has another 100 ft. to go before the main vein is cut.

Miller Group—The shaft on the main claim in Lackawanna gulch is down 85 ft., and drifting has started north and south; the vein is 12 ft. wide; 10 ft. of it being milling ore and the balance smelting. It is owned by Harrison & Robinson.

Long & Derry—A contract has been let to drive a tunnel 10 ft., first lift, into the hill from the base of the mountain; the tunnel will be 4x6 ft. in the clear.

SUMMIT COUNTY

Wellington—Some years ago this property got into litigation, and for over 12 years lay idle. The property has now gone into the hands of the Wellington Mines Company, which already holds a very large area of valuable property.

Bemrose—The management of this mine has laid out a plan of active operation for the immediate future. A new boiler is being installed and many other improvements are under way.

Wire Patch—The company's mill is now running night and day and with the addition of two new Huntington mills will make the capacity of the plant 60 tons per day. At present two Lane mills are doing the work. Mark G. Evans, of Denver, is general manager.

Banner Placer—The pit is showing some excellent dirt. The coarse rock has all been run off and the fine material that remains can easily be washed off even with the present limited water supply.

Mary Verna and North American—These companies have been reconstructed and operations will be resumed at Frisco under the management of former superintendent McAlister on Nov. 1. Both tunnels will be pushed ahead into the Ten-Mile range.

Nettie B.—This is one of the old-time producers which had been idle now for years. It is owned by St. Louis parties, with Peter Neve in charge of the work which is being prosecuted by a force of 10 men. New machinery is to be installed in a new shaft-house.

Wilfley—Two good strikes have just been made, opening up two new orebodies which carry good value. This is being shipped direct to the smelters, while the lower-grade ores are being treated at the company's mill. The new roaster, recently installed, is doing good work and materially increases the quantity handled.

Breene—The mill on this property is nearing completion.

La Plata—This mine, in California gulch, is now shipping regularly and averaging 50 tons per day of oxidized ore from the upper workings. Development of the lower or sulphide zone is being carried on.

Michigan—George T. McDonald is working this mine under lease. The property shows up some sulphide orebodies which carry considerable lead.

Selma—This mine, on Jacque mountain, contains high percentages of zinc and is being put into good shape for production. Air drills are being installed and a hoisting plant erected.

INDIAN TERRITORY

The senatorial committee appointed to investigate the Indian Territory coal lands will meet at Kansas City, Mo., on Nov. 12, and at South McAlester, I. T., on Nov. 20. The coal operators of the Indian Territory will meet in South McAlester on Oct. 9, to arrange a program to place fully before this committee the conditions existing in the Indian Territory coalfields. W. P. Hailey, of South McAlester is president, and T. W. Clelland, of South McAlester, is secretary of the association.

MICHIGAN

HOUGHTON COUNTY—COPPER.

Quincy Mine—It is reported that a cave-in has occurred at the Quincy mine on the old Pewabic property. It is not thought that the damage will be serious. One man, an attendant at the dry house, was entombed.

MINNESOTA

IRON—MESABI RANGE

The following table shows the ore which must be mined and the payments required, under the lease of Hill lands to the United States Steel Corporation, for 11 years to come:

	Minimum.	Royalty.	Freight.	Total.
1907	750,000	$0.850	$0.80	$1.650
1908	1,500,000	0.884	0.80	1.684
1909	2,250,000	0.918	0.80	1.718
1910	3,000,000	0.952	0.80	1.752
1911	3,750,000	0.986	0.80	1.786
1912	4,500,000	1.020	0.80	1.820
1913	5,250,000	1.054	0.80	1.854
1914	6,000,000	1.088	0.80	1.888
1915	6,750,000	1.122	0.80	1.922
1916	7,500,000	1.156	0.80	1.956
1917	8,250,000	1.190	0.80	1.990

After 1917, the minimum ore to be mined will remain the same as in that year, 8,250,000 tons. The yearly increase of 3.4c. in the royalty will continue. All the ore will be transported from the mines over the Great Northern road.

MISSOURI

JASPER COUNTY

Carter Land—The Carter land, situated about two miles northwest of Webb City, is just now attracting attention and several good prospects have been discovered. Geo. H. Davis, superintendent and part owner of a lease of 160 acres, has been drilling, and has just finished the tenth hole, which is encouraging. Ore-bearing ground has been found in all of the holes at about 170 ft., but on this last hole the upper run of stuff was encountered at a depth of 176 ft., which continued down to 190 ft. At 192 ft., the drill again went into ore and continued to 202 ft., thus showing about 24 ft. of ore-bearing ground.

Aylor Land—Walter Koontz, of Webb City, Elliott Aylor, of Carterville, and Joe Crabtree, of Alba, have made a discovery of ore in their mine at Alba at a depth of 180 ft. The company will erect a complete and modern concentrating plant on the property in the near future.

Guinn Land—The Rogers Mining Company's new mill on its lease of the Guinn land has been completed except for the air compressor, which has not yet arrived, everything being ready for operation when that is installed. This new mill is built on the site of the one that was destroyed by fire about six months ago. The burned mill was modern in every respect and was just ready to start up; the gas had just been turned on under the boilers, testing it. It was finally decided to rebuild as there is a rich property and the result is that a better mill than the other one is now about ready.

Continental Tract—The Little Pearl Mining Company, under the management of T. C. Malloy, of Joplin, which has a lease of 14 lots on the Continental tract, just west of Joplin, promises to open up one of a rich property. In the drill hole now being put down near the center of the lease, at a depth of 50 ft. a run of lead ore was found and continued down to 70 ft. At 85 ft. a run of zinc ore was found and continued to a depth of 164 ft. in all.

MONTANA

BUTTE DISTRICT

The copper production for Butte in September was not so great as it was in August, or as it will be in October, as three of the large mines were shut down nearly the entire month. These mines are the Mountain Consolidated, West Colusa and Minnie Healey, owned by different companies. Even the Clark mines were not so productive in September, the average daily output of ore being about 700 tons. The West Steward, Clark, is not yielding its customary quantity of ore now, 300 tons a day being about the limit. The quantity received at the reduction plant is not sufficient to keep the concentrator running continuously. Clark is rushing work on the Elm Orlu claim, in order to secure an additional ore supply, but is not yet near the ore zone. He is building at his plant concrete bins that will hold 100,000 tons of concentrates.

Boston & Montana—This company has resumed the use of water power at its smelter and is shipping an average of 3000 tons of ore a day to the plant. The falling off is due to the temporary suspension of the West Colusa mine, which has an output of about 1100 tons a day.

North Butte—This company is mining between 1000 and 1100 tons a day, the larger part of which is first class, 6 per cent. or better. An increase will not be made until about Nov. 1, when the skip pockets in the various levels will be finished. It is crosscutting territory north of its present workings from the 1600-ft. level of the Jessie.

La France—The company is raising about 200 tons of ore a day from the Lexington and says it could hoist more if it could secure cars. This mine yielded an average of about 94 tons a day last year. It is owned by United Copper and is the only property this company is working in the Butte district. The workings of the Lexington are not yet free of water.

Smaller Companies—East Butte is cut a 3-ft. vein of ore 110 ft. north of its main shaft. This vein is in ground operated above by lessees and is the only one that produced much ore last month. The company is extracting an average of 60 tons a day from all of its shafts. Its concentrator, containing two tables, is in operation.—East Butte Extension, which is working virgin ground, is mining more ore than East Butte and has paid one dividend from its earnings.—Reins Copper is mining a little ore on the 1200 and 800.—Bullwhacker is driving east on the 400 for the vein of silicate of copper cut in the discovery shaft.—Lewisohn General Development is preparing to sink a 1000-ft. shaft on the Granite mountain, which lies between the Miners' Union and Edith May, of North Butte. It owns the property.—Butte & Bacorn have two of their shafts down 400 ft. each and are making better headway than formerly.

NEVADA

ESMERALDA COUNTY—GOLDFIELD

The amount of ore shipped from this camp is increasing at a rapid rate and it is conservatively estimated that during the current month the shipments will aggregate $3,000,000. The production has averaged over $110,000 daily to date. The Mohawk is heading the list and is now shipping about $70,000 worth of ore per day.

Hayes-Monnette Lease—This lease is now shipping ore at the rate of $50,000 per day; shipments are averaging $300 per car. Special transportation arrangements have been made to bring improved machinery with despatch, and in a short time this lease will greatly increase its shipping ability. A new eight-drill air compressor with its appurtenances forms a part of this shipment. In the workings of the lease there is an orebody 60 ft. wide. This lease now employs 140 men and additional help is being added daily.

Frances-Mohawk Lease—On the 280-ft. level of this property the richest ore in the history of the lease has been encountered; even with the machinery that they have installed they find they have more high-grade ore in sight than they can take out during the life of the lease. A new 50-h.p. electric hoist has been ordered. During the past week four carloads of high-grade ore have been shipped per day.

Jumbo Extension—The first shipment from this lease was made this week, same averaging $150 per ton. This was made from the Higginson lease.

Atlanta—The Bismarck Mining and Leasing Company has secured a lease on four blocks of the Atlanta ground and has ordered a plant of machinery. The company will commence to sink a shaft to a depth of 300 ft. at once.

C. O. D.—Leases are in great demand. The Goldfield Fargo Mining Company has ordered a 30-h.p. hoist and intends sinking 500 ft., running off crosscuts at each 100-ft. level. The C.O.D. Mining and Leasing Company has just finished a gallows frame and has ordered machinery. The Durst-Degan lease on this ground is drifting at the 150-ft. level and some good assays have been secured. The showing on the Detch-Brewer lease at the 200-ft. level is good and the management is determined to sink to a greater depth. The Kansas City Leasing Company has a shaft down 80 ft. and is continuing.

Gold Bar—Ore values at the 200-ft. run from $8 to $15 and a new ore-shoot has been encountered. At this point they struck a ledge 47 ft. wide, assaying $10. A new hoist has been ordered for the 65-ft. level, from which level several carloads of high-grade ore have already been shipped.

Silver Pick—The various lessees on this property feel confident. In the past 30 days two double-compartment shafts have been sunk to a depth of 80 ft. and a good grade of ore has been discovered on the lease of the Nevada & Eastern Leasing Company, and the working force has been doubled. The management of this property has declined to extend any more leasing privileges.

Great Bend—This property made a shipment of 25 tons a few days ago, the ore coming from the 150-ft. level. A new pump has been installed and is raising 10,000 gal. water daily. It is expected that the water will be utilized later for milling purposes. The shaft is now down 240 ft. and will be pushed to 300-ft. depth.

Lou Dillon—A sale has been made of some 20 acres of property, to be known as the Lou Dillon, the sale price being $100,000. This ground adjoins the Silver Pick on the west and lies within 600 ft. of the Mohawk. Shallow workings on the Lou Dillon have disclosed veins that carry values from $4 to $25. Development work is being pushed.

NYE COUNTY—TONOPAH

Tonopah Mining Company—This company has just declared another dividend of 35c. per share, payable Oct. 20. It has just completed its 100-stamp mill at Miller's siding. It has a concentrating plant and is equipped with all modern devices.

Montana-Tonopah—An 8-ft. body of rich ore has been struck on the 300-ft. level. The main shaft is now down 845 ft. and good ore still continues. A contract has been let for a mill and work on the same will be commenced immediately.

Jim Butler—A gasolene hoist has been placed in position on the Stone Cabin shaft, and sinking to the 700-ft. level will be proceeded with. Some fine-looking ore is being raised from the Wandering Boy shaft.

North Star—The shaft has been sunk to a depth of 1200 ft. Sinking will be continued 50 ft. farther, when a station will be cut, and crosscuts started to cut the ledges occurring in the upper workings.

MacNamara—Stoping and drifting on the vein is progressing satisfactorily in the 200-ft. level. About 100 tons of good grade ore are being shipped weekly; shipments will be increased as soon as improved appliances for handling the ore, which are now being placed in position, are in working condition.

Golden Anchor—The ledge in this mine has improved in depth, and the management is enthusiastic over the prospects. A favorable announcement will be published by Mr. Schwab regarding the mine shortly. The ledge in the 800-ft. level is over 30 ft. in width.

Midway—The north crosscut from the 835-ft. level is out 150 ft. Another crosscut from the 550-ft. level is being run to cut the Brougher vein which carried high-grade ore in the upper ground. Regular weekly ore shipments continue to be made to Salt Lake.

Belmont—The Desert Queen shaft has been enlarged, and is now divided into three compartments. A set of eight power drills is now employed below, and thus equipped the management will be enabled largely to increase the weekly output.

Ore Shipments—The ore shipments over the Tonopah railroad for the week ending Sept. 27, as reported by the Western Ore Purchasing Company, aggregated 4719 tons, divided as follows: From Tonopah—Tonopah Company, 1400 tons; Tonopah Extension, 385 tons; Belmont, 522 tons; Midway, 100 tons; Montana-Tonopah, 94 tons; West End, 24 tons; MacNamara, 92 tons. From Goldfield—2012 tons. From Lone Mountain—Nevada-Alpine, 90 tons.

NYE COUNTY—MANHATTAN

Broncho—Some fine specimen ore has been found showing free gold and the

crosscut from the 100-ft. level is being run with all speed to cut the vein which is believed to carry high-grade ore. News of a strike may be expected at any time.

Big Pine—The ledge is rapidly improving in value, and recent assays have gone as high as $100 per ton. The ledge is over 5 ft. in width, and is all milling ore with a 10-inch streak along the hanging wall.

WHITE PINE COUNTY

Nevada Consolidated—It was stated recently in our columns that the Cumberland-Ely Copper Company had passed under control of the Guggenheim interests, which own the Nevada Consolidated also. It is now announced that the Nevada Consolidated and Cumberland-Ely Copper companies have made arrangements to build a joint concentrating and smelting plant, owned one-half by each company, for their mines at Ely. The Cumberland-Ely Copper Company has arranged to purchase one-half interest in the Nevada Northern Railway, owned by the Nevada Consolidated, running from Cobre, a station on the Southern Pacific Railroad, to Ely. Several months ago eight square miles of territory and water enough to treat at least 25,000 tons of ore without re-pumping were secured at McGill, about 20 miles from the mines at Ely and on the line of the railroad to Cobre. All the ranches and water in the vicinity have been purchased, which will obviate any future trouble arising from suits growing out of smoke damage or pollution to water. It is proposed to organize a smelting company capitalized at $10,000,000 and to build a concentrating and smelting plant, not only for Nevada Consolidated and Cumberland-Ely ores, but to handle custom ores in the district as well. Financial arrangements have already been completed to take care of a 10,000-ton plant and to finish the railroad.

NEW MEXICO

LINCOLN COUNTY.

Iowa & New Mexico Mining Company—This company has patented several claims at Parsons, and Manager Stevens has made test runs of ore in the mill.

Nogal Peak Company—This company, at Nogales, has been driving a shaft and tunnel and has cut an 18-in. lead in the latter, some 120 ft. from the portal.

Eagle—This company is planning to build a cyanide plant to treat tailings from its stamp mill.

SANTA FE COUNTY.

Gold Coin—Ten tons of ore from this mine yielded recently $1600 in the mill, but the rich streak is only 1 to 3 in. wide.

Albuquerque & Cerrillos Coal Company—This company has been incorporated with $5000 capital to work the anthracite mines of the Colorado Fuel and Iron Company at Madrid.

COLFAX COUNTY.

Gold and Copper Deep Mining Company—This company, with $200,000 capital, raised locally, has advanced its tunnel 2000 ft., on the west side of Old Baldy and though, at this vertical depth of 1800 ft., it has met some rich ore stringers it will push in 1500 ft. farther. The mine of McIntyre Bros. & Carrington has a vein 70 ft. wide, showing well of copper, gold and silver values in spots.

Placers—The placer mines at Morena, Ponil and Ute creek have been worked full force this summer, owing to the copious rains. The Rocky Mountain & St. Louis Railroad is now at the Ute creek, only 19 miles from its intended terminal, Elizabethtown.

TAOS COUNTY.

The machinery for the Las Vegas marble works is being put in the quarry.

Rhyolite—This company on Placer creek has ores assaying well in gold and silver and is planning to sink a 400-ft. shaft.

Independence—This mine is being equipped with a two-drill compressor.

SOCORRO COUNTY.

Mogollons—In this region the Cooney mine was recently sampled and showed copper oxides and bornite of high average value. On the Confidence mine the Helen Company has driven 2000 ft. and developed considerable low-grade ore, which it is believed, can be profitably milled. The Mogollon Mountain Investment Company, owner of the Champion and Little Fannie on Silver creek, is sinking a new 800-ft. shaft.

PENNSYLVANIA

ANTHRACITE COAL

Stanton—This colliery, of the Wilkes-Barre Coal Company in Wilkes-Barre, resumed operations last week, after an idleness of six months, caused by an accident.

Delaware & Hudson—At the No. 5 colliery of this company, in Wilkes-Barre, an experiment is being carried out in the formation of a fire-fighting brigade composed of the breaker boys employed at the colliery.

Lehigh & Wilkes-Barre Coal Company—This company is sinking a new shaft in Hanover township, near Wilkes-Barre. The new colliery will be connected with the Central Railroad of New Jersey.

Alaska Colliery—A Janesville compound-condensing pump is to be installed at this colliery, of the Dodson Coal Company, at Kaska, near Middleport, in the Schuylkill valley. It will cost $30,000, including installation, and will have a capacity of 3000 gal. per minute. The new pump will drain all the workings and will do the work of the four pumps now in service. It is said that the Susquehanna Coal Company, a subsidiary interest of the Pennsylvania Railroad, is negotiating for the purchase of this colliery, which has an annual capacity of 1,000,000 tons, and employs about 500 men and boys.

Richards—The lives of 50 men were in danger at the Richards colliery, Mt. Carmel, Oct. 13. When a shot was fired it broke through into an abandoned working filled with water. The water rushed out upon the men employed in the slope, who ran into a heading, which the company had provided for just such an emergency.

SOUTH CAROLINA

RICHLAND COUNTY

Saxe-Gotha Mining Company—This company has been incorporated with a capital stock of $100,000 to mine and market silex, quartz, earths, fossils, clays and minerals. Incorporators of the company are W. S. Monteith and E. McC. Clarkson, of Columbia.

SOUTH DAKOTA

LAWRENCE COUNTY

Reliance—The annual meeting has been held in Deadwood, and the following officers elected for the ensuing year: President, S. E. Olsen, Minneapolis, Minn.; vice-president, Edgar Humphrey, Cordova, Ill.; treasurer, E. E. Bennett, Lincoln, Neb.; secretary and general manager, Captain F. W. Medbery, Deadwood. Some very good milling ore in great quantities has just been opened up in the lower tunnel. Nearly all the machinery for the 150-ton cyanide plant on Annie creek is on hand, and the following men in charge of the work: James Hartgering, superintendent of mill construction; R. Chapman, mine superintendent; Milton Leydig, mill superintendent.

Golden Reward—Work is about to begin on a drift to be run easterly on the quartzite from the Mikado shaft to exploit an entirely new territory. The work of installing electric power by the Consolidated Power and Light Company is progressing satisfactorily. The pole line to the mill is complete. At the mine, both the hoist and the air compressor will be run by electricity.

Anaconda—The 585 acres of land belonging to this company have just been patented and the company is preparing to resume operations. A small stamp mill will be erected for testing the ore, which is a free-milling quartzite. The main shaft is 285 ft. deep, with crosscuts on the 100- and 200-ft. levels. The following officers have just been elected: President, F. H. Herhold, Chicago; Treasurer, F. Herhold, Chicago; secretary, Dan Lynch.

Glover—At the annual meeting of this company, officers were elected for the coming year as follows: President, George W. Glover; vice-president, G. G. Bennett; secretary and treasurer, W. S. Schell. A call has been issued for a special meeting of the stockholders to consider a proposition for bonding the property for $35,000.

Iron Hill—Dr. Mead, of Denver, has taken a lease on the old slag dump at the Iron Hill smelter, and will proceed to treat

the slag. He will crush and concentrate the material, treating the concentrates in the smelter which he is repairing and remodeling.

CUSTER COUNTY

Saginaw—At the annual meeting of this company, 663,000 out of 750,000 shares were represented. The number of directors was changed from five to seven, and the following elected for the ensuing year: I. W. Herber, Elkton, Mich.; Lewis Hahn, New Hamburg, Ont.; Benj. Eilber, Uhly, Mich.; John A. Tolman, Chicago; George S. Thompson, Columbus, O.; and L. P. Woodbury, Custer, S. D. There remains one director to be elected at a subsequent meeting.

UTAH

BEAVER COUNTY

Revenue—This company has been conducting exploration for several years and has not only acquired a large acreage of ground, about 2000 acres, but has also developed a large amount of ore and built a small mill which will soon be ready for operation. The mine is situated about 18 miles south of Newhouse and L. G. Burton, of Salt Lake, is consulting engineer.

Cactus—This property, operated by the Newhouse Mines and Smelters Corporation, has come to the front with some important developments. Recently, Superintendent Moffatt broke into what previously had been supposed to be the foot-wall and opened a body of ore of much better grade than any exposed in other parts of the mine. On the 600 level, the new orebody was crosscut for 60 ft., or more.

Cedar—The recent developments in this property are more important than was first supposed. About 7 ft. of ore has been disclosed in a crosscut run from the 125-ft. level of the incline shaft. The vein contains high-grade silver-gold ore, much of it showing the presence of horn silver.

JUAB COUNTY

Lower Mammoth—The management has stopped work on the 1700 level pending the sinking of the shaft from the 1500 and the driving of a crosscut to connect with the orebodies which were opened through a winze sunk from the 1500 level.

Eagle & Blue Bell—The management has announced that a strike has occurred on the 1000-ft. level about 400 ft. north of the shaft. While the extent of the orebody is not yet known, it has been opened sufficiently to consider it important. The mine is at Tintic.

Tintic Ore Shipments—Shipments last week amounted to 142 carloads, or almost 5000 tons, the shippers and amounts being; Ajax, 6; Beck Tunnel, 10; Black Jack, 1; Bullion Beck, 8; Carisa, 8; Centennial-Eureka, 38; Dragon, Iron, 5; Eagle & Blue Bell, 6; Eureka Hill & Gemini, 10; Grand Central, 3; La Clede, 1; Lower Mammoth, 2; Mammoth, 23; May Day, 2; Scranton, 4; Star Consolidated, 2; Sunbeam, 2; Swansea, 2; Uncle Sam, 1; Victoria, 6; Yankee Consolidated, 4 carloads.

SUMMIT COUNTY

Daly West—The management of this Park City company has announced that the Little Bell contact vein has been cut through an upraise from the 900 level where a body of ore has been opened. This is the most important development noted in this mine for several years.

Ontario Tunnel—The task of opening this adit, which has been closed for several years on account of caves, is not concluded. A point has been reached where work must proceed cautiously owing to the dangerous character of it. The flow of water coming through the adit is steadily increasing and it is reported that the water is gradually sinking in the flooded mines.

TOOELE COUNTY

Honerine Mill—A third shift has been put on and this plant is now being operated about up to capacity. The output of the mine has been correspondingly increased.

Buckhorn Ore Company—This corporation, operating the Buckhorn mine at Ophir, is constructing a gravity tramway between the mine and the town of Ophir. It is said on reliable authority that W. A. Clark, president of the San Pedro, Los Angeles & Salt Lake railroad has given assurance that a branch line of road—to be about nine miles long—will be built into the camp next year. Mr. Clark is owner of the Ophir Hill mine at Ophir.

WASHINGTON

FERRY COUNTY

In August, 1905, W. A. Potter, of Peoria, Ill., brought from St. Louis, Mo., Prof. William B. Potter to examine the Phil Sheridan mine, near Republic. He conceived the idea that a method could be found for treating the low-grade ore in connection with a system for developing the mines. The system employed in working the mines consisted in breaking down small deposits of the higher grades of ore and leaving the poorer material in place. That was naturally expensive. Prof. Potter's idea was to break down the ore as it came, irrespective of quality, and, by mining it extensively, reduce the cost. E. L. Tate, of Spokane, manager of the Quilp Gold Mining Company, operating in Republic camp, was taken in consultation. Mr. Tate took an active interest in the matter and secured a number of samples from the various mines, which were tested by Prof. Potter at the St. Louis Sampling and Testing Works. They also went to Ottawa and Montreal and met the owners of the Republic and Mountain Lion mines and of one-half of the Quilp mine. Professor Potter, after tests extending over several months, satisfied himself that he could treat them successfully by a milling process, to come within reasonable cost; and by mining the ore cheaply he figured that $6 ore could be handled with a small margin of profit on the ground. To enable that to be done the mines would have to be worked by the most modern methods and the ore handled in very large quantities. A plan has been proposed for a consolidation of the mines and equipping them with modern and more powerful machinery, also to erect a plant to treat 500 tons of ore per day.

Gwinn Mine—The first payment of $1000 has been made on a bond for $40,000 on this mine at Covada. The shaft is down 150 ft. The vein is faulted at the 100-ft. level, but was found in place on the 150-ft. level by crosscutting east 67 ft. A drift thence south 70 ft. on the vein shows ore of excellent value in gold and silver. A winze was started, but stopped on account of bad air. A tunnel is planned to be driven about 400 ft., which would tap the vein at a depth of 290 ft. below the collar of the shaft and 550 ft. below the apex of the vein.

WEST VIRGINIA

Advices from Charleston, W. Va., Oct. 15, say: After having been out several hours on the Detroit mine explosion case the jury in the Circuit Court brought in a verdict in favor of the plaintiff, Mrs. Sarah Miskell, for $5,000 damages against the Paint Creek Collieries Company, for the death of her son, Willis Miskell, who was employed in the mine at the time of the disaster. For several days past legal interest in this city, and in fact in the mining circles of West Virginia, has been centered on this case against the Paint Creek Collieries Company for $10,000 damages, and the verdict has been eagerly awaited by miners and operators alike. There are 15 suits being brought against the company, aggregating a sum of about $250,000, and this is a test case.

KANAWHA COUNTY

Wyatt Coal Company—This company has been organized to open up a coal mine in the Cabin Creek district. Work is to be begun at once. The incorporators are J. B. Lewis, of Handley, W. Va.; M. F. Davis, L Prichard and H A Robson, of Charleston, and John Lang, of Rush Run.

POCAHONTAS DISTRICT

The demand for labor and miners in the Pocahontas coal region is unprecedented in the history of the field. The new mines being started by the Pocahontas Collieries Company and the United States Coal and Coke Company are in part responsible for the scarcity of labor. However, the real cause is due to the building of the Deepwater Railroad, which has taken hundreds of men from the mining camps. It is believed that with the coming of winter and the nearer completion of the road, many of the men will return to the mines. Laborers and miners are receiving higher wages in this field now than ever before.

Foreign Mining News

CANADA

ONTARIO

The Canadian Northern Railway and associated interests, who control the Moose mountain iron deposits some 296 miles north of Toronto, which will be tapped next year by the continuation of the James Bay Railway from Parry sound northward, have in contemplation the establishment of blast furnaces, rail mills, and other industries on a large scale in Toronto. They have applied to the city to ascertain if a site suitable for this purpose of about 50 acres in extent is obtainable on Ashbridge bay, in the eastern section of Toronto, which will be convenient to the terminal of the James bay road.

ONTARIO—HASTINGS COUNTY

A large plant for the manufacture of sulphuric acid is being erected at Tweed, which will furnish a market for the pyritic ores of the district which have hitherto been shipped abroad.

Eldorado Copper Mine—The first shipment of copper matte amounting to 21 tons has been made from the smelter recently installed at the Eldorado copper mine, Hastings county. The vein is yielding a large amount of ore carrying 12 per cent. of copper.

Moira Lake—An order for 700 tons of talc has recently been filed by Stephen Wellington from his mine at Moir lake.

MEXICO

ZACATECAS

Zacatecas City District—The Bote is undergoing an examination upon an option for several millions of Mexican pesos, The owners of the Norris-Gilbert copper mines have been sounded as to a selling price, finally refusing to consider less than $2,000,000 gold. The Veta Grande, owned profitably by a Mexican family for 50 years, is seriously considered by W. A. Pritchard, who requests the unwatering of the mine to determine the possible existence of zinc. The Tajos de Panuco, operated by John McEwen, of New York, and a recent purchase, is sought for by others, ready to pay an advance over the McEwen purchase price. The Australia, idle for many years, is stirring, in consequence of the efforts of its first president, Mr. Dennison, of Richmond, Ind. Many small organizations, hailing from various sections, including Texas and Colorado, are carrying on exploration work in promising sections of the district. The depression, covering several years, appears to have ended.

San Roberto y Anexas—On unwatering this property, located immediately west of the Mala Noche, a crosscut was found, driven several meters into the vein. The ground is promising, assaying fairly well in silver and copper. The management has ordered the cutting of a large station at the bottom of the shaft and the opening of a sump, 5 m. deep; upon completion of these improvements the crosscut will be continued for the purpose of exposing the whole vein width. The Zacatecas whim, equipped with four horses, has proven itself economical and effective. The costs of unwatering to a depth of 50 m. and subsequently maintaining drainage, compares favorably with steam equipment. The first outlay for the Mexican plant did not exceed 10 per cent. of that of a machinery installation. A high rate of speed is maintained, the horses circling at a gallop. Changes of animals are effected every six hours.

ASIA

INDIA—MYSORE

Kolar Goldfield—Gold production in September is reported at 46,638 oz. bullion, which is 179 oz. less than in August, and 5395 oz. less than in September, 1905. For the nine months ending Sept. 30 the total was 469,302 oz. bullion in 1905, and 432,718 oz. in 1906; a decrease of 36,584 oz. The bullion reported this year was equal to 389,446 oz. fine gold, or $8,049,849 in value.

EUROPE

SPAIN

Exports of minerals from Spain for the seven months ending July 31 are reported by the *Revista Minera* as follows, in metric tons:

	1905.	1906.	Changes.
Iron ore	4,626,821	5,868,283	I. 1,241,461
Copper ore	571,698	681,836	I. 110,138
Zinc ore	79,308	93,313	I. 14,005
Lead ore	3,514	2,802	D. 712
Manganese ore	30,539	57,477	I. 26,938
Pyrites	406,120	621,386	I. 215,266
Salt	255,352	306,693	I. 51 341

Nearly all showed heavy gains. The exports of metals for the seven months were, also in metric tons:

	1905.	1906.	Changes.
Pig iron	34,691	21,203	D. 13,488
Manufactured iron	2,626	11,322	I 8,696
Copper	3,335	5,161	I. 1,826
Copper precipitate	9,908	13,507	I. 3,599
Zinc	686	680	D. 6
Lead	95,047	103,352	D. 8,305

Imports of chemicals for the seven months were: Alkaline carbonates, etc., 7694 tons; caustic soda and potash, 10,110; sulphate of soda, 2103; phosphates, 5289; mineral fertilizers, 126,807 tons.

NEW CALEDONIA

Exports of minerals in July and the seven months ending July 31 are reported by the *Bulletin du Commerce*, of Noumea, as follows, in metric tons:

	July.	Seven Mos.
Nickel ore	8,509	71,599
Cobalt ore	....	1,363
Chrome ore	5,087	37,257

There were also two small shipments made to France for testing purposes, one ton of iron ore, and 23 tons of copper ore.

Coal Trade Review

NEW YORK, Oct. 17

Coal trade in the East, both anthracite and bituminous, is quiet. There has not been any weather cold enough to stir up the domestic demand for anthracite. While the demand for steam coal continues good, supplies are abundant enough to make trade easy. The East has felt only the premonitory symptoms of car shortage, not enough to embarrass trade.

In the West the transportation question is the main one, and there seems to be little improvement in car supply anywhere. The rush season in the Lake trade has begun, and efforts are being made to get off all the coal possible before navigation closes. Coal shipments to Lake Superior up to Oct. 1 show a considerable increase over last year; but there is still a good deal to go forward under contract, for consumption in the Northwest seems to be increasing. This rush takes cars from local trade, and many mines are seriously embarrassed by their inability to make shipments.

COAL TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Oct. 6 were as follows, in short tons:

	1905.	1906.	Changes
Anthracite	3,482,568	3,314,856	D. 167,712
Bituminous	22,340,050	24,256,683	I. 1,916,633
Coke	8,385,906	9,613,714	I. 1,227,808
Total	34,208,524	37,185,253	I. 2,976,729

The total increase this year to date has been 8.7 per cent.

New York Oct. 17

ANTHRACITE

The few recent cold days brought out quite a little activity in the hard coal market, but it has not continued. Any demand upon the retail dealers is promptly reflected on the size of shipments by producers because of the fact that few of the coal yards in New York City are of sufficient size to permit the stocking of large quantities of coal; a retailer thus feels that he must replenish his stock about as quickly as he makes any deliveries from it. All coal reaching New York harbor is readily disposed of, even egg coal, which has a tendency at this time of the year to accumulate. The line trade is even more active than tidewater.

Prices remain at $4.75 for broken and $5 for egg, stove and chestnut; for steam sizes, $2.80@3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice; $1.30@1.35 for barley; all f.o.b. New York harbor shipping points.

BITUMINOUS

The Atlantic seaboard soft coal trade shows little change. Consumers are taking on rather heavier supplies, but if any strong increase should appear, the present supply of cars would be insufficient. Transportation managers of all railroads are trying to induce shippers to load and unload their cars with greater speed. The question of car supply is now the prevailing factor in the trade. Heavy grain movement in the West is the principal reason for the shortage of cars in the East.

In preparation for cold weather, shoal-water shipments are receiving close atten-

tion and contracts of this class are being closed up as promptly as a regard for freights will permit. Export trade is largely controlled by the freight market.

The far East is ordering a fair amount of coal; some shortage exists at the lower ports. The Sound shows an increased demand which is principally filled by the better grades. Trade in New York harbor is quiet, with an excessive amount of coal arriving. This point seems to be considered as a dumping ground for all the old coal. Prices remain unchanged at $2.60@2.70 for the better steam coals down to $2.30@2.40 for the poorest grades, f.o.b. New York harbor shipping points.

All-rail trade shows increased activity with stronger prices. Transportation is fairly prompt but car supply, except on the Pennsylvania, is insufficient.

Vessels in the coastwise market are in fair supply and many owners are calling for the loading and discharging clause, which is granted in many cases. Current rates from Philadelphia remain unchanged at: To Boston, Salem and Portland, 65@70c.; to the Sound, 55c.; to Lynn, 80c.; to Newburyport 85c.; to Portsmouth, 70@75c.; to Bangor, 80@85c.; to Gardiner, 85@90c. and towages.

Birmingham Oct. 15

The coal production in Alabama is improving right along. The car shortage is still felt and the officials at the mines have considerable work to do in keeping up with the supply of cars to move coal that must be delivered for urgent contracts.

Coke is a little easier, but brings a good price. The full needs in this commodity are not being met, as yet.

Retail dealers in the various cities supplied by the Birmingham district mines are not able to get all the coal they need. Some of the companies selling coal on the open market are much behind in their orders.

Chicago Oct. 15

The cold wave of the last week brought a perceptible increase of orders to Chicago wholesalers, especially for anthracite, but it was not severe enough and too short in duration to influence the market greatly. The large number of orders that came in, however, as a result of the freezing weather, was considered a significant indication, by many coal men, of the lack of supplies generally by retailers and consumers. It is generally accepted by the trade that a considerable improvement in business will not come before winter arrives for good.

Meantime, there seems a slow but steady improvement in general conditions. The car shortage has restricted supplies from the Illinois and Indiana fields, with the result that even fine coals are in better demand than formerly. Prepared sizes are growing in demand, as is the rule at this season of the year. Indiana coals are firmer than Illinois, and the demand for both is fairly good outside the city. It is the great fault of the Western trade, as local dealers see it, that coal not designed for a definite market must be shipped to Chicago. This brings the speculative element of the Western trade very largely within the city limits. At present demurrage coal is not plentiful, but this condition probably is due to lack of cars.

Illinois and Indiana coal brings $2@2.50 for lump and egg; $1.40@1.90 for run-of-mine and $1@1.10 for screenings.

Eastern coals are in short supply and relatively good demand, for all classes. Hocking is quoted at $3.15 for run-of-mine; smokeless brings $3.40 for run-of-mine and Youghiogheny $3.30 for three-quarter.

Cleveland Oct. 17

The coal market is exceptionally strong, the cause being the same as heretofore given, the shortage of cars. The lake movement is still small, and it is understood some of the shippers of coal are behind with their orders to the extent of 100,000 tons or more. The boats could be had easily but the cars are not plentiful enough to permit a heavy movement to the lake. The result has been that the small boats are getting most of the loads, while the big boats are either delayed in port or have to run to the head of the lakes light. This has prevented any advance in wild rates in keeping with the rest of the lake market.

Steam coal is extremely strong, but there is not a great deal of profit in the business. Most of the mines are running about 50 per cent. of their capacity, not having enough cars to keep up any heavier production. The result is that steam coal is selling at $1.20@1.25 at the mines. Slack was recently weak, but is now strong at 90@95c. at the mines.

The mines in the Massillon district resumed activity too late to collect any stocks to meet the fall demand. Storage yards are practically bare and the trade is running hand to mouth. Selected lump is selling at $2.10 at the mines, or $2.80 delivered Cleveland, with the retail price at $4 per ton.

Coke is strong, many consumers buying for delivery through next year at $3 for furnace coke and $3.75 for the best grades of 72-hour foundry coke.

Pittsburg Oct. 16

Coal—Production continues to be restricted through the scarcity of railroad cars, and prices have advanced from 20 to 25c. a ton on all new business. There is no change on contract coal in prices to old customers. On all new business that can be taken care of the following prices are quoted: Mine-run, $1.45@1.55; ¾-in., $1.55@1.65; 1¼-in., $1.65@1.75; nut, $1.45@1.55; slack, 85@95c. f.o.b. mine. The mines in this district are not being operated to more than 50 per cent. of their capacity, except those of the Pittsburg Coal Company, which are runing up to about 60 per cent. All the river mines are in operation, and will continue, as the rise in the rivers last week let in a large number of empty barges and flats. A number of tows went out, and it is estimated the shipments amounted to about 2,000,000 bushels.

Connellsville Coke—Production and shipments increased slightly, but prices remain firm at last week's quotations. Furnace coke for prompt or early shipment is held at $3, and for next year at $2.75@2.85. Foundry coke is quoted at $3.75 for this year and $3.60 for first quarter. The production for the week, according to the *Courier*, was 278,827 tons, and the shipments aggregated 15,734 cars, distributed as follows: To Pittsburg, 5121 cars; to points west of Pittsburg, 8739 cars; to points east of Connellsville, 1874 cars. The production in the Lower Connellsville region amounted to 110,418 tons.

Foreign Coal Trade

Oct. 17

Coal production in Belgium for the half-year ending June 30 was as follows, in metric tons:

Districts.	1905.	1906.	Changes
Charleroi.....	3,312,800	4,099,550	I. 786,750
Liège.....	2,397,300	2,518,260	I. 120,960
Mons.....	2,108 950	2,475,754	I. 366,804
Centre.....	1,677,600	1,791,236	I. 113,636
Herve.....	543,400	558,680	I. 15,280
Luxemburg	347,650	427,460	I. 79,810
Total.....	10,387,700	11,870,940	I. 1,483,240

The total increase this year was 14.3 per cent.

The output of coal in Germany for the eight months ending Aug 31 is reported as below, in metric tons:

	1905.	1906.	Changes.
Coal.....	78,383,052	90,892,206	I. 12,509,154
Brown coal.....	33,178,969	36,256,267	I. 3,077,298
Total mined..	111,562,021	127,148,473	I. 15,586,452
Coke made.....	9,384,932	13,233,346	I. 3,848,414
Briquets made,	7,290,521	9,514,747	I. 2,224,226

A large proportion of the briquets is made of brown coal, or lignite. Much of this coal as mined is friable, and does not stand handling well.

Imports of fuel into Spain for the seven months ending June 30 were 1,290,916 metric tons of coal, an increase of 46,960 tons; and 115,491 tons of coke, an increase of 30,032 tons over last year.

Imports of coal into the Straits Settlements for the half-year ending June 30, were 326,876 tons in 1905, and 413,984 tons in 1906; an increase of 87,108 tons. The larger imports were from Bengal, Australia and Japan.

Iron Trade Review

New York, Oct. 17

Little that is new can be said about the iron and steel trade. There has been considerable demand for basic pig iron, and

the large available supplies are now pretty well taken up into the second quarter of next year. There are still buyers, chiefly of small quantities, who want early deliveries, and these people find some trouble in getting what they need.

Orders for finished material show no signs of falling off. The railroads are still putting in contracts for new equipment; while more orders are coming in for material from builders in the large cities. These must necessarily take their chance for deliveries, as the mills are generally full of work for some time ahead.

It is reported that inquiries have been sent abroad for a considerable tonnage of pig iron, chiefly to Scotland. At present prices importations seem to be possible, especially where deliveries can be made to suit buyers. Some of the inquiries, however, may be made simply as a precaution.

Pig Iron Production—On Oct. 1 there were 311 coke and anthracite furnaces active, having a total weekly capacity of 469,700 tons. This is an increase of 28,300 tons over Sept. 1; but is 14,300 tons less than the high level reached in April. Taking the complete statement of the Iron and Steel Association for the first half of the year, the *Iron Age* estimates for July, August and September, and making allowance for the charcoal furnaces, the total production of the United States for the nine months ending Sept. 30 was 18,618,051 tons of pig iron, of which 2,006,000 tons were made in September.

Birmingham Oct. 15

There has been a continued good demand for pig iron in the Southern territory for delivery during the first six months of 1907. The quotations have been firm, No. 2 foundry iron being priced at $16 per ton right along. J. W. McQueen, vice-president of the Sloss-Sheffield Steel and Iron Company, last week stated that there was a steady demand and prices were firm, giving promise of holding up for some time to come. He said that the probable make for the first six months at least of the coming year would be in demand, if not for a longer period.

Furnace repairing is being rushed. The Woodward Iron Company is practically rebuilding one of its furnaces. The Central Iron Company is repairing its furnace at Holt. The Sloss-Sheffield Steel and Iron Company is improving Philadelphia furnace at Florence, Ala. A skip hoist is being added and other equipment being placed. The repairs about the Trussville furnace of the Southern Steel Company have been completed. The Republic Iron and Steel Company has almost finished repairs on its Thomas furnace.

BY TELEGRAPH

BIRMINGHAM, Ala., Oct. 20—The property of the Georgia Coal and Iron Company has been bought by the Southern Steel Company, the deal being completed today. It involves over $2,000,000. The property bought includes 57,000 acres of land, in which are coal, iron ore and some manganese ore; coal-mining improvements; 330 coke ovens and a blast furnace of 200 tons daily capacity. The property will be managed from Birmingham. The Southern Steel Company now has four blast furnaces, an open-hearth steel plant, rolling mill, wire mill and other plant for turning out finished material. It is announced that the company has sold all the finished steel it can produce to June next.

Chicago Oct. 15

The iron market continues very firm, and the amount of buying, both for the first half of 1907 and for quick delivery has surprised the prophets of the trade who looked for quietness after the brisk business of the last month or two. It looks as if the local smelters had by no means supplied the larger part of their needs, and prices are up about 50c. over last week's quotations, with an upward tendency.

Northern No. 2 is quoted at $20.50@21, on general sales, with quick delivery lots bringing 25@50c. more in some cases. Southern is quoted at $16@16.50 Birmingham or $19.90@20.40 Chicago, with apparently considerable tonnage in the market, but no eagerness to sell on the part of agents. Northern charcoal as usual is scarce at $20.50@21.

The increase of business in iron and steel products give ground for the belief that the pig iron market will be active up to the end of the year. Building material is especially active, and from rails to bars and rods there are large sales being made.

Cleveland Oct. 16

Iron Ore—Two moves have just been made which have an important bearing on the iron-ore situation. One is the purchase by the Steel Corporation of the Hill ore lands and the other is the entrance of the Lackawanna Steel Company into the ownership of a big fleet, carrying with it an assurance of a certain supply of ore for the company's needs. This week has also seen the first advance in the wild rates on ore for the season, the Duluth-Lake Erie rate being increased to 80c. against 75c., the contract rate. Shipments are slow.

Pig Iron—Spot foundry iron is almost off the market. Some sales have been made this week at $22.25 at furnace for No. 2, while a few extraordinary sales have been made at $22.50 at the furnace. The same grade of iron for first-half shipment is selling at $19.50 in the Valleys, while sales for first-quarter delivery are made at $20. Southern producers are selling No. 2 for first-half delivery at $16, Birmingham, while spot iron is selling at $17.50@18 Birmingham. The price of basic is up also, $19@19.25 in the Valleys; bessemer is selling $19.25@19.50 in the Valleys for first half.

Finished Iron and Steel—The American Ship-Building Company has taken an order for eight ships for the Lackawanna Steamship Company, a branch of the Lackawanna Steel Company. Reports say seven more ships are to be ordered soon. This increases the demand for plates and shapes for long time delivery. Pipe is higher. Sheets are scarce and strong, but the price has not advanced.

New York Oct. 17

Pig Iron—The market has been active, especially for basic iron. Probably the heaviest buying is over, but there is a search for small lots for early delivery, both basic and foundry. It is difficult to fix prices, so much depends on deliveries, and the range is rather wide. In the quotations below, the higher figures are for delivery this year, the lower for second quarter of 1907.

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

Northern:	
No. 1 X foundry	$21.50@$23
No. 2 X foundry	21@22.50
No. 2 plain	20.50@22
Forge pig	17.75@19
Southern:	
No. 1 foundry	21@22.50
No. 2 foundry	20@21.75
No. 3 foundry	19.50@21
No. 4 foundry	19@20.50
No. 1 soft	21.50@23
No. 2 soft	21@22.50
Gray forge	17.75@19
Basic pig:	
Northern	19.50@20
Virginia	20@21
Alabama	20@20.50

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

Bars—Bars are strong at 1.745c. tidewater, for common iron, while refined has sold for 1.845c. Steel bars are quoted at 1.645@1.745c., according to size and conditions of orders. Store trade is steady at 2.50c. delivered.

Structural Material—More work is coming forward. Building orders are again in evidence. Beams and channels are quoted at 1.845c., tidewater; deck beams, 1.995c. Beams and channels in smaller quantities are 2.25@2.50c. out of stock.

Rails—Standard rails are unchanged at $28. Light rails are in good demand. More orders for trolley rails are noted.

Old Material—Prices are still high, especially for steel scrap. No. 1 railroad wrought is $20.50@21.50; No. 1 yard wrought, $19.50@20.50; machinery cast, $16.50@17; heavy steel melting scrap, $17@18. Prices are for delivery at wharf or railroad terminal.

Philadelphia Oct. 17

Pig Iron—The pig-iron market is in an excited condition, notwithstanding the fact that only moderate quantities have been sold within the past few days. Our larger consumers throughout this territory have provided themselves for forward requirements to a very large extent. A great deal of inquiry prevails especially for basic and foundry iron. The reason for this

rush of inquiry just now is that very many consumers of iron have recently secured orders for work and in the upward tendency of the market they feel that it is the wisest policy to contract for supplies to cover these new contracts as they are booked. Efforts have about been given up by larger consumers to obtain deliveries within 60 days. Nearly everything contracted for is for delivery during the first or second quarter next year. It is understood that negotiations are being entered upon for foreign iron in large quantities, but freight room is scarce and this fact may interfere with large purchases for delivery this year. Quotations for No. 1 X foundry is $23, as an outside figure; $21.50 for No. 2; $20.50@21 for No. 2 plain; $18@18.50 for standard gray forge; $19.50 for basic and low phosphorus nominally $26.

Steel Billets—The mill capacity for billet making is far oversold; rolling billets are quoted at $33@34 and there are negotiations that are practically held up for large deliveries next year, and the mills have not been able to adjust details.

Bars—The situation has become somewhat complicated within the past few days by reason of a rush of inquiries from large consuming interests, particularly car builders. Large quantities of bar iron are wanted for delivery within 60 days to four months, and it is stated today that the business will all be satisfactorily taken care of.

Sheets—Sheets are selling both in a wholesale and a retail way very freely and country stores are now stocking up.

Pipes and Tubes—The pipe and tube market is strong, but not much new business is reported.

Plates—The situation is rather complicated and statements made by the plate-mill people cannot be harmonized. The substance of the situation simply is that a good deal of business is coming in and a very large amount of material is wanted for next years delivery, but the steel-car builders have not yet been able to place contracts for all the material that their engagements call for. Mill capacity is bound to be strained for at least the first half of next year.

Structural Material—The situation in structural material is about as last week. A good deal of new business has been booked, but it requires hard hammering to make satisfactory arrangements.

Steel Rails—Contracts for some 25,000 tons of steel rails have been placed for export within the past few days.

Scrap—The market has been comparatively quiet for a week, partly because of the high prices asked for steel scrap and partly because the larger consumers are fairly well provided for the present.

Choice railroad scrap is quoted at $23; No. 1 steel scrap $18.50; machinery scrap $18.50; No. 1 forge-fire scrap $15 per ton.

Pittsburg Oct. 16

One of the features of the iron and steel markets is the heavy demand for merchant pipe and an advance in prices of $4 a ton ordered by the National Tube Company effective Oct. 13. Prices have been above the established rate for about two months, but no official change was made for some reason until the announcement sent out yesterday. The mills of the leading company are in full operation and there are orders on the books that will keep them running steadily for months. All the independent pipe mills also are running and trade never was better. It is understood the independents were getting higher prices than the former rate established by the National company.

The Baltimore & Ohio Railroad has placed its initial rail order for 1907 delivery. It calls for 66,000 tons and the Carnegie Steel Company was allotted 37,100 tons. The rest was divided, the Cambria Steel Company getting 17,400 and the Maryland Steel Company 11,500 tons. Negotiations are on for steel rails aggregating fully 300,000 tons which are expected to be placed within a week. The demand for light rails is unusually heavy and the large mills are said to be sold up for several months ahead. The recent advance of $1 a ton made by the leading producer in this district did not check buying, and last week mills in the West advanced prices $2 a ton. Independent makers declare established prices are not being observed, as they are asking and receiving $2 and $3 a ton more for delivery this year.

While United States Steel Corporation concerns are adhering strictly to the established prices on finished steel products, deliveries are not guaranteed and independent interests that are not tied up with contracts are asking premiums ranging from $1 to $3 a ton for sheets, tin-plate and structural material.

Official announcement has been made of some of the contemplated improvements by the United States Steel Corporation. The Duquesne works of the Carnegie Steel Company are to be greatly extended. Two blast furnaces will be built and also 18 new 60-ton open-hearth steel furnaces, besides a 16-in. mill; and other mills are to be remodeled. Work on these extensions was begun yesterday. It also was decided to erect another blast furnace at the McKeesport plant. When these furnaces, the two under construction at the Carrie plant and those authorized at Gary, Ind., are completed the Steel Corporation will have over 100 blast furnaces and will not be compelled to buy any outside pig iron.

Joseph G. Butler, Jr., chairman of the Bessemer Pig Iron Association, reported today that on Oct. 1, 96 per cent. of the furnaces using Lake Superior ore were in operation, a gain of 6 per cent. compared with the report on Sept. 1. Today, of the 185 furnaces 9 are idle, and of these 4 belong to the United States Steel Corporation.

Edwin N. Ohl has purchased for O. W. Thompson, chairman of the Inland Steel Company, and others, the properties of the Cherry Valley Iron Company. They consist of 6,000,000 tons of ore, and two blast furnaces, one at Leetonia, O., and the other at West Middlesex, Penn. The price paid is said to be $4,000,000 but the details of the deal are not made public.

Pig Iron—Sales of pig iron for the week exceed 10,000 tons, the bulk of which was basic at prices ranging from $19.25, Valley furnaces, for first quarter, to $21 for October and $20 for November. Bessemer sales were confined to one lot of 1000 tons for November and December delivery at $19.50, Valley, and two 100-ton lots for prompt shipment at $22, Pittsburg. One sale of gray forge is recorded, for 600 tons for prompt shipment at $18.65, Pittsburg, the highest price of the year. There is no Northern foundry iron available for this year, and sales of Southern iron in small lots aggregated about 1500 tons. The price was $17, Birmingham, or $21.60 delivered at Pittsburg.

Steel—Many large inquiries for billets are being received by mills, but are not entertained, as all are behind in deliveries. Some orders are being filled by middlemen at prices ranging from $28 to $29 for bessemer and $29 to $30 for open-hearth. Sheet-bars are nominally about $30. Steel bars are still quoted at 1.50c. but premiums of $2 and more are being paid for prompt delivery. Plates remain firm at 1.60c.

Sheets—The large mills are behind in deliveries and premiums are paid for immediate delivery. For forward delivery the established prices are quoted, 2.50c. for black sheets and 3.55c. for galvanized No. 28 gage.

Ferro-Manganese—Prices dropped about $5 a ton during the week, and 80 per cent. ferro for early shipment is quoted at $77 @78. The market is irregular and difficult to quote, as it is reported a tonnage was offered at $75 and one large dealer refuses to sell at less than $80 for prompt shipment.

Cartagena, Spain Sept. 29

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were one cargo, 3850 tons Calasparra magnetic ore, to Sydney, Cape Breton. Mining in the district has been almost suspended, owing to extraordinarily heavy rains.

Prices are 8s. 10d.@9s. 1d. per ton for ordinary 50 per cent. ore, 9s. 4d.@9s. 7d. for special low phosphorus; 10s. 9d. for S. P. Campanil; 12s. 1d. for specular ore, 58 per cent. Manganiferous ores range from 12s. 9d. for 35 per cent. iron and 12 manganese up to 15s. for 25 per cent. iron and 17 manganese. All prices are f.o.b. shipping port.

Chemicals

NEW YORK, Oct. 16

Copper Sulphate—Demand is strong and supplies show no increase. There seems to be practically no copper sulphate stock and dealers are supplying their customers and doing a little outside business. About the middle of the past week the price advanced sharply from $6.50 to $7 per 100 lb. for carload lots and the latter price has ruled since. A limited amount of small lot orders have been taken at $7.25 @7.50 per 100 pounds.

Nitrate of Soda—There has been no change in the market for the week. Demands are still urgent and there seems to be no softening in price. We quote 2.60 @2.62½ for 1906 delivery.

Tin-Crystals—Both the crystals and bi-chloride of tin are in good demand, but the former acts spasmodically. We quote 25¼c. for crystals and 12¼c. for bi-chloride.

Metal Market

New York, Oct. 17.

Gold and Silver Exports and Imports.

At all United States Ports in September and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Sept. 1906..	$2,278,922	$31,419,932	Imp $29,141,010
" 1905 .	1,412,904	5,543 692	" 4,130,788
Year 1906..	35,790.962	111,764.911	" 75,973,949
" 1905..	42,677.921	30,339,602	Exp. 12,338,319
Silver:			
Sept. 1906..	3,594.311	3,253,586	" 340,725
" 1905 ..	5.527,459	3,840,005	" 1,687,454
Year 1906 ..	45.441 339	32 985,096	" 12,456,243
" 1905 ..	39.443,210	24,506,998	" 14,936,212

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

Gold and Silver Movement, New York.

For week ending Oct. 13 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 2,000	$5,566,296	$ 354,417	$ 44,587
1906.....	5,966,713	86,007,271	43,596,685	1,695,443
1905.....	32,297,368	9,642,156	27,601,096	3,674,599
1904.....	73,177,464	4,940,934	30,331,733	798,923

Exports of gold for the week were to Mexico; of silver to London. Imports of gold for the week were from England, France and Germany; of silver, from Mexico and the West Indies.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Oct. 13, gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts..	$1,030,284,300	$1,065,657,800
Deposits.....	1,026,157,600	1,050,776,000
Circulation.....	54,155,800	46,154,800
Specie.....	191,952,100	202,511,200
Legal tenders.....	74,798,700	73,207,200
Total reserve.....	$266,750,800	$275,718,400
Legal requirements....	256,539,400	262,694,000
Surplus reserve.....	$10,211,400	$13,024,400

Changes for the week this year were increases of $13,326,600 in loans, $10,427,200 in specie, $19,437,300 in deposits, $405,600 in circulation and $3,601,275 in surplus reserve; a decrease of $1,966,600 in legal tenders.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York.....	.....	.....	$202,511,200
England.....	$145,595,815	.....	145,595,815
France.....	565,036,670	$208,252,220	773,288,890
Germany.....	126,775,000	42,260,000	169,035,000
Spain.....	76,470,000	121,425,000	197,895,000
Netherlands...	27,645,000	27,820,000	55,465,000
Belgium.....	17,226,665	8,613,335	25,840,000
Italy.....	148,235,000	18,942,500	167,177,500
Russia.....	558,190,000	24,830,000	583,020,000
Austria.....	233,665,000	59,225,000	292,890,000
Sweden.....	19,385,000	.....	19,385,000

The returns of the associated banks of New York are of date Oct. 13, and the others Oct. 12. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Exports of silver from London to the East are given by Messrs. Pixley & Abell's circular as follows, for the year to Oct. 4:

	1905.	1906.	Changes.
India.....	£ 4,603,821	£ 12,478,563	I. £ 7,874,742
China.....	758,688	430,700	D. 327,988
Straits..	38,299	1,750	D. 36,549
Total.....	£ 5,400,808	£ 12.911,013	D. £ 7,510,205

Receipts for the week were £7000 from the West Indies and £80,000 from New York; a total of £87,000. Exports were £6800 to Australia and £27,500 to India; £34,300 in all.

Indian Exchange remains strong and steady. The Council bills offered in London were taken at an average of 16.06d. per rupee. Buying of silver for India has fallen off, chiefly because of the high price.

Imports of specie through the port of San Francisco for the eight months ending Aug. 31 were as follows:

	Gold.	Silver.
Coin.....	$5,707,135	$ 16,700
Bullion.....	2,097,892	1 682,122
Total.....	$7,8(5.027	$1,698,822
Total, 1905.....	1,528,830	1,797,273

The large imports of gold this year were mainly from Australia. Exports for the eight months were as follows:

	Gold.	Silver.
Coin	$ 7,555	$ 17,093
Bullion.....	5,347,864	2,427,813
Total.....	$5,355,419	$2,444,906
Total, 1905.....	1,689,650	4,441,36

The exports of gold were almost all made in February and March.

The movement of gold and silver in France for the eight months ending Aug. 31 is reported as follows:

Gold:	1905.	1906.
Imports.....	Fr. 532,800,000	Fr. 371,586,000
Exports.....	68,396,000	91,333,000
Excess, imports....	Fr. 464,404,000	Fr. 280,253,000
Silver:		
Imports.....	68,631,000	101,584,000
Exports.....	47,058,000	87,363,000
Excess, imports....	Fr. 20,573,000	Fr. 14,221,000

Imports of nickel and copper coins were 100,000 fr. in 1905 and 71,000 fr. in 1906. Exports were 245,000 fr. in 1905, and 155,000 fr. this year.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	$0.53½	$0.55
Peruvian soles and Chilean.....	0.48½	0.51½
Victoria sovereigns.....	4.85½	4.87½
Twenty francs.	3.87	3.91
Spanish 25 pesetas...	4.78	4.80

SILVER AND STERLING EXCHANGE.

Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
11	4.85¼	69	31⅞	15	4.84⅝	69⅜	32⅛
12	4.85¼	69¼	32	16	4.84⅝	69⅜	32⅛
13	4.84¾	69½	32⅛	17	4.84½	69⅜	32 1/16

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

Other Metals

Daily Prices of Metals in New York.

October.	Copper. Lake; Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
11	21⅛ @22⅛	20¾ @21⅛	97½	42⅝	5.75	6.15	6.00 @6.05
12	21⅛ @22½	20¾ @21⅛	98	42⅝	5.75	6.20	6.00 @6.05
13	21⅛ @22⅛	20¾ @21⅛	....	42⅝	5.75	6.20	6.00 @6.05
15	21⅜ @22⅛	21 @22	99 1/16	42⅞	5.75	6.20	6.05
16	22 @22½	21⅛ @22	99⅜	43⅛	5.75	6.25	6.05 @6.10
17	22 @22⅜	21⅛ @22⅛	102⅜	43⅛	5.75	6.25	6.10

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

Copper—The shortage of supplies is making itself more and more felt. The business which has been done during the week has not been very heavy. Consumers, both in this country and in Europe, hesitate to buy their requirements very far ahead at the prices ruling. They are fairly well covered for the nearer deliveries. Still, such small quantities as are wanted by belated buyers for shipment any time this side of February are making a strong impression upon the market, owing to the sold-out condition of producers, and prices at the close again show a material advance, Lake being quoted at 22@ 22¾; electrolytic, in ingots, cakes and wirebars, 21½@22¼. The average at which business in casting was done during the week is 20¾@21¾ cents.

The extreme strength of the statistical position has given the bull operators in the London standard market an opportunity to bid prices up to practically unprecedented figures. The close is at the highest, spot being cabled at £103 15s. and three months at £102 15s.

Statistics for the first half of the current month show an increase in the visible supplies of 400 tons.

Refined and manufactured sorts we quote: English tough, £103@105; best selected, £106@107; strong sheets, £110 @112.

The following estimate of the consumption of foreign copper in Germany for the eight months ending Aug. 31 is made by L. Vogelstein & Co., representatives of Aron Hirsch & Sohn, of Halberstadt, in metric tons:

Imports, eight months	87,515
Exports, eight months	7,011
Approximate consumption	80,504

The net imports, or approximate consumption, show an increase of 15,524 tons over last year.

Copper Sheets—On Oct. 11, the manufacturers of sheet copper again advanced their prices 2c. per lb., bringing the base price up to 27c. per pound.

Tin—The market in London has recorded a steady advance from day to day and closes very firm at £199 5s. for spot, £198 5s. for three months.

Domestic interests are only participating in a small way in the present movement, as there is no large buying on the part of consumers. The market closes firm at 43¼@43½ cents.

Exports of tin from the Straits Settlements for the seven months ending July 31 are reported as below, in long tons:

	1905.	1906.	Changes.
United States	10,532	7,899	D. 2,633
Great Britain	17,080	20,703	I. 3,623
Other Europe	4,822	4,515	D. 307
China	280	246	D. 34
India	685	511	D. 174
Total	33,399	33,874	I. 475

A considerable part of the exports to Great Britain are in transit to the United States.

Lead—The market remains unchanged at 5.75c., New York.

After the rapid rise, the London market has experienced a severe reaction, at one time touching £19 17s. 6d., but at the close the tone is again firm at £19 10s. for Spanish lead, £19 12s. 6d. for English lead.

The movement of foreign lead in the United States for the eight months ending Aug. 31 is reported by the Bureau of Statistics as follows, in short tons:

In bond, Jan. 1	8,148
Imports, eight months	61,407
Total supplies	69,555
Re-exports, eight months	32,095
In bond, Sept. 1	6,187
Total deductions	38,282
Balance	31,273

This balance has, presumably, entered into consumption here.

St. Louis Lead Market—The John Wahl Commission Company telegraphs as follows, on Oct. 17: Lead is strong. Common Missouri brands are selling at 5.85@5.95c., a rise of 0.05c. over last week.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 29, that the price of pig lead is 86.25 reales per quintal, silver being paid for at 14 reales per ounce. Exchange is 27.97 pesetas to £1. The price of lead, on current exchange, is equal to £17 5s. per long ton, f.o.b. Cartagena. Exports were 334 tons argentiferous and 65 tons desilverized lead to Marseilles; 620 tons argentiferous to London; 400 tons desilverized to Antwerp; 400 tons desilverized to Amsterdam.

Spelter—The market is displaying a firmer tone, owing to an improved inquiry. Business has been on a more liberal scale, and prices close firm at 6.10 St. Louis, 6.25 New York.

Reports from London also indicate a better condition of things there, and the close is higher at £28 5s. for good ordinaries, £28 10s. for specials.

Silesian Spelter Market—Paul Speier writes from Breslau, Germany, under date of Sept. 30, that demand has been strong, and the Silesian works have very little metal left for December delivery. Quotations are 53.75@54 marks per 100 kg.—5.82c. per pound—f.o.b. works for ordinary brands and 54.25@54.50 marks for specials. Zinc sheets are also strong. Zinc dust, for lots of 10 tons or over, is 48@48.25 marks per 100 kg.—5.20c. per pound, delivered at Stettin. Imports and exports in Germany for the month of August were, in metric tons:

	Imports.		Exports.	
	1905.	1906.	1905.	1906.
Spelter	2,620	4,587	6,139	6,805
Zinc sheets	11	6	1,390	1,793
Scrap	281	119	575	208
Zinc-dust		30		635
Zinc-white	91	163	617	753
Zinc oxide		443		1,612
Zinc ores	8,641	16,868	3,042	4,142

Exports of spelter for the eight months ending Aug. 31 were 41,781 tons.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 29, that the market remains quiet, with no change in prices.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been $8 on Jan. 6, the lowest $7.65 on May 18.

Antimony—The market remains firm at unchanged prices. The supply is restricted, and apparently closely held. Special brands are 25@25½c.; ordinary brands, 24c. for early delivery.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—The price continues $33 per oz. unmanufactured, while $25@27 is paid for scrap metal.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 per flask, while jobbers are asking £16 18s. 9d.

Aluminum—The chief producer gives list prices for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Cadmium—Paul Speier writes from Breslau, Germany, that there is a better demand for metallic cadmium. Quotations for metal, guaranteed 99½ per cent. pure, are 1300@1350 marks per 100 kg., boxed and delivered at Hamburg. This is equal to $1.40@1.46 per pound.

Wisconsin Ore Market

PLATTEVILLE, Oct. 13

Satisfactory conditions continue throughout the district. Sixty per cent. ore brought $44@44.50 per ton, and all that was in the bins was sold but not all loaded. This has been one of the most active weeks of the year. The developments have shown that the buyers are eager for all the ore that is being produced. The heaviest purchases were made by Grasselli Brothers, the Illinois Zinc Company, and the Mineral Point Zinc Company.

Lead remains steady at $37.50@38 per thousand. Drybone and sulphur the same as last week.

The plants of the Platteville district loaded ore as follows for the week ending Oct. 13:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	331,960	.....	.....
Mineral Point	583,500	.....	.....
Highland	394,600	60,000	.....
Linden	216,110	32,700	.....
Cuba City	207,850	39,500	.....
Rewey	115,000	.....	.....
Buncombe & Hazel Green	120,000	.....	.....
Benton	61,200	.....	.....
Dodgeville	51,400	.....	.....
Total for week	2,081,620	132,200	.....
Year to Oct. 13	60,300,541	2,832,590	3,453,910

The improvement in labor conditions,

heretofore noted, applies only to the camps near the larger towns. In the outlying camps, labor is still much short of the needs of the mines.

Missouri Ore Market

JOPLIN, Oct. 13

The highest price paid for zinc was $46; the assay price, $41 to $42 per ton of 60 per cent. zinc; the average price, all ores, $41.28.

Lead sold as high as $83 per ton, with medium grades at $80 to $82; average, all grades, $79.76.

A large reserve stock of zinc ore is having a bear tendency on prices, and although zinc ore is now as low as it should be to insure a necessary output, the stock in the bins has a depreciating effect.

A stronger demand by one of the local lead smelters caused lead to advance 50c. per ton for at least one bin of this ore, with prices generally stronger.

Purchasing agents of the various smelters are suggesting, and in some instances enforcing, a new ruling that settlements for zinc ore shall be made on a basis of actual dry weights, instead of the guessing method of 2 to 3 per cent. allowance in weight, that has been observed heretofore. Shipments for the week were as follows:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,106,070	278,200	$ 77,910
Webb City-Carterville	2,192,830	625,720	71,177
Galena-Empire	1,027,240	223,990	30,017
Duenweg	666,880	115,430	18,621
Aurora	641,300	19,020	11,452
Neck City	429,670	42,830	11,380
Oronogo	511,830	11,150	11,106
Badger	453,620	.....	9,977
Granby	421,000	22 00	7,492
Prosperity	23 440	158 090	6,815
Spurgeon	286,060	37,140	6,085
Alba	222,470	.....	5,005
Carthage	128,530	.....	2,891
Zincite	86,750	9,460	2,200
Sherwood	55,480	17,530	1,893
Totals	10,453,20 0	1,560,560	$274,021
41 weeks	434,179,450	61,459,670	$11,746,776

Zinc value, the week, $211,684; 41 weeks, $9,387,219.
Lead value, the week, 62,337; 41 weeks, 2,359,557.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	40.51	May	58.27	78.40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	43.56	August	58.00	75.36
September	46.75	42.58	September	63.50	79.64
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Mining Stocks

NEW YORK, Oct. 17

There have been four factors tending to influence the stock market the past week. The "ore-deal," copper prices, easier money, and the uncertainty of the coming election have all had their various effects.

The completion of and announcement of the details of the deal between the Hill interests and the steel corporation caused the advance of steel common to $50¼ and preferred to $108½. In addition, rumors of large earnings have had a buoyant effect. The common closed at $49⅞ and the preferred at $107¾ on large dealings.

The directors of Amalgamated meet on Thursday to act on the coming dividend of that company and traders have been holding off in anticipation. This hesitancy has had its effect on Anaconda and American Smelting, common and preferred, and prices ruled low during the week. At the closing, however, they advanced sharply, closing as follows: Amalgamated $116; American Smelting, common, $160½; preferred, $120.

The curb continues to attract the public and brokers are doing a big business. Under the leadership of British Columbia Copper and Cumberland-Ely the coppers advanced to higher levels.

Cobalt stocks continue to be attractive and are bought with the same disregard to intrinsic values as in the past. A new mine which has not been proved can hardly be worth three or four times its par value and if it sells at this figure the price is fictitious. The whole list showed considerable strength and there have not been as many "wash" sales as in the past. A few closing prices were as follows: British Columbia, $14¼; Butte Coalition, $37; Cumberland-Ely, $13¾; McKinley-Darragh, $2⅛; Mitchell, $6⅜; Nipissing, $24; Tennessee Copper, $46. Granby has shown considerable strength, closing at $143⅜. The company has issued a very satisfactory report which will be found in another column of this issue.

Boston Oct. 16

Mining shares received a set-back in the past week's trading and failed to respond to the still higher prices for the metal. The volume of trading has been smaller compared with the dealings of a week or two ago. No particular reason can be assigned, except, possibly, the easing of the New York list and the continued heaviness of Amalgamated Copper. The latter touched $116.37½ during the week, but fell back to $114, recovering to $115.87½ tonight. The directors are expected to take dividend action Thursday, and there is a question about an increase in the rate. Lake mining shares are in good request, but no material advances are to be recorded, except in a few cases. Atlantic, which was kited to $19, fell back to $14.25, with the close $16.50 tonight. Arcadian rose $1.62½ during the week to $7.37½ on the calling of a special meeting to execute a deal to sell three-fortieths of the property adjoining the Mesnard, owned by the Quincy. Old Dominion, which ran off $2 to $57.50, started up again today and touched $60.25. Shannon, which made a record at $16.62½, fell back to $14.87½, but is now on the mend.

Allouez and Centennial have been in fair demand, but do not respond with materially higher prices, both being a trifle lower at the close tonight than a week back, at $41.25 for the former and $28.25 for the latter. Mill returns from the Allouez continue to show improvement and the Centennial is opening up a large amount of reserve ground. The latter sold as high as $30.25, the middle of last week. Allouez fell to $38.50. Calumet & Hecla sold at $870 per share Monday, or within $25 of its highest record price. Quincy suffered a decline to $101.50 on announcement that there had been a cave-in, but recovered to $104 on statements that it was in an old part of the mine. Greene Consolidated ran off $3 to $25, but is up to $26 again; and Osceola, which yielded $2.25 to $126.50, closed at $128.50 tonight. Copper Range fell $2.50 to $81, recovering fractionally. Boston Consolidated sold up $1.37½ to $35, but fell back to $33.12½ tonight, and United States Smelting is off $1.50 to $60.50 per share.

The curb continues to attract attention and some days trading has exceeded that on the floor of the stock exchange. Newhouse rose sharply to above $18, a gain of almost $8. Superior & Pittsburg showed the result of heavy profit-taking, although the close is about the same as a week ago. Application will soon be made to list this stock on the exchange. Majestic was the curb feature for the week, touching $5, with the market close to $4, tonight. The company is said to be meeting with gratifying success in its openings. Boston & Ely Development is a new feature on the curb, but as yet has only been quoted a few times.

Colorado Springs Oct. 12

The local mining market has been unusually active during the past seven days, and trading was quite evenly distributed throughout the mines list. Work was the heavy trader of the week, a total of 129,400 shares of this stock changing hands. The official report for this company shows $75,000 worth of ore was shipped from this property during September. Portland, which was active a few weeks ago, had no sales recorded during the week.

San Francisco Oct. 11

There is little change in the stock market, except increased activity in the Nevada shares, and a tendency to higher prices. New stocks are being brought forward, and seem to find ready buyers. The Comstocks are still rather dull, and show little or no advance in prices.

Oil stocks are in a little better demand and show fair dealings, especially in Associated Oil and some of the Kern district companies.

STOCK QUOTATIONS

NEW YORK. Week Oct. 13

Name of Company.	High	Low	Clg.	Sales
Amalgamated	116⅛	114⅜	114⅝	384,470
Anaconda*	283¾	278½	279	46,200
British Col. Copper	14⅞	13¾	14⅛	96,010
Butte Coalition*	41⅛	39¼	40	13,775
Cum. Ely Mining	14⅛	12⅞	13½	40,620
Greene Gold	2½	2	2⅛	1,570
Greene Gold & Silver	2¼	1⅞	1⅞	51,100
Guanajuato	5⅜	4⅞	5⅛	3,100
Micmac	6¾	5	6¾	31,060
Mines Co. of Am	1⅜	1⅜	1½	12,900
Mitchell Mining	6½	4¾	6¼	42,790
Mont. Sho. Con. (New)	17¾	14¾	15¾	4,750
Nev. Utah M. & S.	5½	4¾	4¾	34,800
Nipissing Mines	23⅜	21¼	21¾	77,200
Tennessee Copper	45¾	44	45¾	2,650
Union Copper	1¼	⅞	1	29,000
Utah Apex	8¾	7¾	8⅛	2,950

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	161⅝	155⅛	159⅜	342,510
Am. Smelt. & Ref., Pf.	117⅞	115¾	117	2,750
Bethlehem Steel	19⅛	19⅛	19⅛	100
Colo. Fuel & Iron	58¼	55½	55⅝	47,040
Federal M. & S., Pf.*	99¼	94⅛	99	5,800
Inter. Salt*	39¾	38	38	2,508
National Lead	80⅞	77⅜	78¼	75,600
National Lead, Pf	103⅛	102¼	103⅜	849
Pittsburg Coal	16⅝	14½	16⅜	4,000
Republic I. & S.	39	38	38	11,000
Republic I. & S., Pf.	99	98⅛	98¾	3,670
Sloss-Sheffield	76	74½	74½	2,600
Tenn. C. & I.	162	155	162	1,150
U. S. Red. & Ref	36½	35	35	4,420
U. S. Steel	50¼	48¼	49	610,235
U. S. Steel, Pf.	108⅜	107½	107¾	55,100
Va. Car. Chem	41½	39¾	40	6,300

BOSTON. Oct. 13.

Adventure	8½	7½	8⅛	4,506
Allouez	42	38¾	39	12,200
Atlantic	19	12	14½	19,194
Bingham	37⅝	36	36	10,905
Boston Consolidated	35¼	32⅝	33½	18,490
Calumet & Arizona	140	136¾	137	2,112
Calumet & Hecla	865	825	865	181
Centennial	30¼	27	27⅜	18,387
Copper Range	84	81½	81⅛	15,290
Daly-West	19¼	17¼	18¼	5,827
Franklin	25	23½	24¾	12,986
Granby	15	14	14½	6,728
Greene Consolidated	28¼	25	25½	33,195
Isle Royal	24½	21	22¼	7,766
Mass	10½	9⅝	10	2,398
Michigan	18	16⅝	17⅝	9,846
Mohawk	69¾	68	68	2,115
Mont. Coal & Coke rcts.	3¾	3	3	8,700
Nevada	23⅜	21	22	17,312
North Butte	114½	112	112½	15,655
Old Dominion	61	57½	57⅝	20,249
Osceola	130	125	126½	5,001
Parrot	28¾	27⅛	27⅜	1,020
Quincy	108	100	102	1,955
Rhode Island	5¾	5¼	5½	3,060
Shannon	16¾	14⅝	15⅝	44,702
Tamarack	110	105	105	288
Tecumseh	15½	14¼	14⅞	3,695
Trinity	11⅝	10¾	11	7,277
United Copper, com.	69	66½	67¾	6,800
U. S. Oil	12	10	11	11,868
U. S. Smg. & Ref.	63	†60⅛	†60⅞	9,311
U. S. Smg. & Ref., pfd.	46	45	45¾	5,000
Utah Copper	69⅝	67½	67¾	14,791
Victoria	7¾	6¾	7	2,767
Winona	13½	11¾	12⅞	9,996
Wolverine	160	159	159	103
Wyandotte	2¼	1¾	2	5,470

†Ex. Rights.

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 27⅝—25¾; Comstock, .20; Davis-Daly Est., 15¼—13⅛; Gold Hill, 5—4¾; Gugg. Exp., 316—285; Rich. Eureka, 7; Standard Oil, 608—594. (Boston) Ahmeek, 95; Am. Zinc, 15—12½; Arcadian, 6⅞—5¼; Ariz. Com'l, 39; Black Mt., 8½—9; Cananea, 26—25¼; East Butte, 12½; Keweenaw, 12—11; Majestic, 2¼—2⅛; Raven, .87—.80; Shawmut, 1.00—.55; Superior Cop., 15; Superior & Pitts., 27⅝; Troy, 2⅝—2⅛.

PHILADELPHIA. Oct. 13.

Name of Company.	High	Low	Clg.	Sales.
American Cement	9¼	7	9¼	15,975
Cambria Steel	39	38¼	38½	8,433
General Asphalt	8	7⅛	8	180
Penn. Steel, pd	107½	106	107½	230
Philadelphia Co.	49	49	49	130
Tonopah Mining	21	19¾	20¾	8,028

PITTSBURG. Oct. 13.

Crucible Steel	13½	12¾	13	1,002
Crucible Steel, Pf.	79⅛	78¼	78¾	896
Harbison-Walker Ref.	13	13	13	70
Ohio Tonopah	.24	.22	.24	1,040
Tonopah Ext	6¾	5	6¼	10,441

COLORADO SPRINGS. Oct. 13.

Name of Company.	High	Low	Clg	Sales
Acacia	13⅜	12¾	13	6,000
C. C. Con	8¾	5⅛	8¼	29,000
Dante	6¾	5½	6	21,500
Doctor Jack Pot	8¾	8⅛	8⅛	....
Elkton	54	51½	54	9,900
El Paso	52	51	51	26,200
Findley	63½	61½	61½	10,500
Gold Dollar	8⅛	7	7	45,000
Gold Sovereign	6⅝	6⅛	6⅜	....
Isabella	21⅜	21	21	13,400
Jennie Sample	8¾	8	8	11,000
Mary McKinney	75½	65	75½	11,850
Portland	1.35	1.32	1.35	....
United Gold Mines	12	11	12	....
Vindicator	95	94	94	....
Work	22	17⅞	22	129,400

SAN FRANCISCO. Oct. 11.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	1.00	.95	1.00	600
Caledonia	.49	.40	.47	22,200
Challar	.17	.12	.15	3,000
Con. Cal. & Va	1.00	.84	.90	9,400
Crown Point	.15	.07	.14	6,700
Gould & Curry	.25	.20	.23	9,000
Hale & Norcross	1.30	1.15	1.20	2,900
Mexican	.90	.74	.80	9,800
Ophir	3.25	2.85	2.85	4,900
Overman	.13	.10	.12	5,400
Potosi	.15	.14	.15	1,600
Savage	1.35	1.25	1.25	2,300
Sierra Nevada	.70	.40	.60	17,050
Bullfrog Mining	.46	.43	.44	16,500
Diamondfield B B. Con.	.36	.32	.35	11,500
Goldfield of Nevada	.60	.58	.59	4,600
Jim Butler	1.47	1.30	1.40	35,850
Jumping Jack	.58	.54	.56	21,800
Kendall	.58	.57	.58	2,100
MacNamara	.81	.78	.81	9,200
Manhattan Dexter	.55	.49	.55	10,100
North Star	.45	.44	.45	13,700
Original Bullfrog	.16	.14	.16	61,800
Tonopah Belmont	6.12	6.00	6.12	1 900

Tonopah Stocks Oct. 17.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	21.12½	20.87½	21.00
Tonopah Montana	3.75	3.60	3.67
Tonopah Extension	6.12½	6.00	6.12½
Tonopah Midway	2.20	2.15	2.17
Tonopah West End Cons	1.65	1.60	1.65
Goldfield Mining Co.	.68	.63	.64
Jumbo Mining	1.50	1.48	1.48
Red Top	1.62	1.58	1.60
Sandstorm	.72	.70	.71
Montgomery Shoshone Cons	15.00	13.75	14.00

St. Louis Oct. 13.

Adams, $0.40 — $0.25; American Nettie, $0.08—$0.06; Center Creek, $2.50—$2.25; Central Coal and Coke, $64.50—$62.75; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$55.00; Columbia, $4.00—$3.90; Con. Coal, $22.00—20.50; Doe Run, $130.00—$125.00; Granite Bimetallic, $0.22—$0.20; St. Joe, $13.00—$12.00.

LONDON. *(By Cable.*)* Oct. 17

Dolores, £1 17s. 6d.; Stratton's Independence, £0 3s. 9d.; Camp Bird, £1 7s. 6d.; Esperanza, £3 5s. 0d.; Tomboy, £1 8s. 1½d.; El Oro, £1 8s. 1½d.; Oroville, £1 13s. 9d.; Somera, £0 6s. 10½d.; Utah Apex, £1 13s. 9d.; Ariz. Copper, pref., £3 12s. 6d.; Ariz. Copper, def., £3 11s. 3d.

New Dividends

Company.	Payable.	Rate.	Amt.
Esperanza	Oct.	$2.52	$1,146,600
Greene Con. Copper	Nov. 30	0.40	345,000
Guanajuato Con.	Oct. 31	0.07½	45,000
Homestake, S. Dak.	Oct. 25	0.50	109,200
International Nickel, pfd.	Nov. 1	1.50	131,123
Mammoth, Utah	Oct. 20	0.05	20,000
Miller Mg. & Smelting	Oct. 20	0.35	.....
Mary McKinney, Colo.	Oct.	0.06	78,255
New Central Coal	Nov. 1	0.40	10,000
Portland, Colo.	Oct.	0.05	150,000
Tenn. Coal, Iron & R. R.	Nov. 1	1.00	225,536
United Copper, com.	Oct. 31	1.75	787,500
Work, Colo.	Oct. 10	0.01	15,000

Assessments

Company.	Delinq.	Sale.	Amt.
Bonanza Con., Utah	Oct. 8	Oct. 25	$0.01
Deer Trail	Sept 22	Oct. 22	0.01
Exchequer, Nev.	Nov. 2	Nov. 22	0.05
Maxfield, Utah	Nov. 3	Nov. 24	0.03
Mexican, Nev.	Oct. 16	Nov. 5	0.15
Naildriver, Utah	Oct. 10	Oct. 30	0.03

Monthly Average Prices of Metals

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	65.105	27.163	30.113
August	60.259	65.949	27.822	30.529
September	61.695	67.927	28.528	31.483
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.419	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18.688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	18.442	14.813	18.719	65.881	83.994
July	14.888	18.190	15.005	18.585	66.887	81.167
Aug	15.664	18.380	15.725	18.706	69.830	83.864
Sept	15.965	19.033	15.978	19.328	69.667	87.831
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	29.325	36.390	July	31.760	37.275
Feb.	29.262	36.403	August	32.866	40.606
March	29.523	36.662	Sept	32.095	40.516
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov.	33.443	.....
June	30.329	39.260	Dec.	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	4.552	5.600	July	4.524	5.750
Feb.	4.450	5.464	Aug.	4.665	5.750
March	4.470	5.350	Sept.	4.850	5.750
April	4.500	5.404	Oct.	4.850	.....
May	4.500	5.685	Nov.	5.200	.....
June	4.500	5.750	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £16,850 per long ton; February, £16,031; March, £15,922; April, £15,959; May, £16,725; June, £16,813; July, £16,525; August, £17,109; September, £18,266.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April	5.817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	6.096	5.040	5.948	23.875	27.728
July	5.396	6.006	5.247	5.856	23.938	26.800
Aug	5.706	6.027	5.556	5.878	24.675	26.938
Sept.	5.887	6.216	5.737	6.056	26.375	27.563
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov.	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2240 lb.) good ordinary brands.