

The Engineering and Mining Journal

VOL. LXXXIV.

NEW YORK, OCTOBER 12, 1907.

NO. 15.

Operations and Tendencies of Modern Mansfeld

New Processes for the Treatment of Ores Are Employed and Electric Power Is Used in Every Way Possible

BY P. A. WAGNER AND J. S. G. PRIMROSE *

At the Mansfeld copper mines in Germany, so far as actual mining goes very few changes have been made in the well known long-wall packing method, the chief advances being in the direction of roof-pressure regulation, which is adjusted to a nicety so as to obtain the maximum amount of *Kupferschiefer* with the minimum expenditure of explosives.

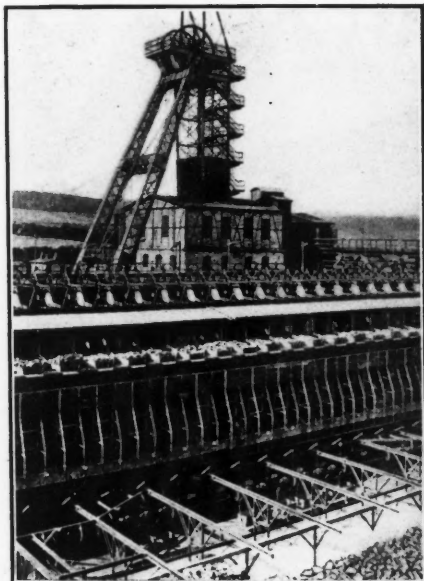
The workings are naturally getting deeper and deeper, and a new row of deep-level shafts, which will intersect the *Schiefer* at from 600 to 700 m., is already

engines; the small diameter of the drum being 5 m. and the large 6 m. The valve gear is always of the "Kraf" type. One of the two machines installed at the largest and newest mine, near Eisleben-the-Hohentahlschacht is shown in the illustration. At the Hermannschacht an Ilgner electric hoist has been put in by the Siemens-Schuckert Company. The winding engine is of the Koepe type, in which a 5-m. Koepe sheave is employed, the rope resting in a groove lined with beech wood.

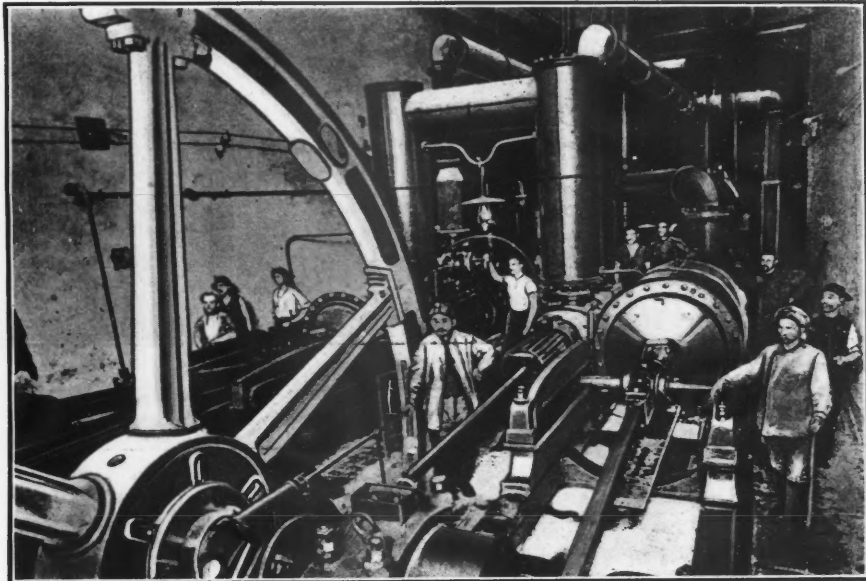
VENTILATION AND DRAINAGE

The ventilation of the mines is secured chiefly by natural means, supplemented by Rateau fans at the surface at some of the shafts.

The water from all the mines gravitates to the Segengottes shaft sump at a depth of 400 m. Here it is raised by two double-acting, external-packed, plunger pumps actuated by twin tandem-compound steam engines of 1100 h.p. to the great adit, which at this point is 150 m. below the surface. The maximum quantity of



STEEL HEAD-GEAR AT HERMANSCHACHT



CENTRAL PUMPING STATION, AT SIEGENOTTE SHAFT

partly completed. These shafts are all circular, and 6 m. in diameter, the lining being of brick backed by concrete. The shafts at present in operation average about 400 m. in depth, the diameter being from 5 to 6 m., and are all equipped with steel head-gear, of which the Hermannschacht shown in an accompanying illustration is a typical example.

HOISTING.

Hoisting is done on double-deck cages, four-trucks being raised at a time. Most of the shafts are equipped with cross compound, conical-drum, steam winding

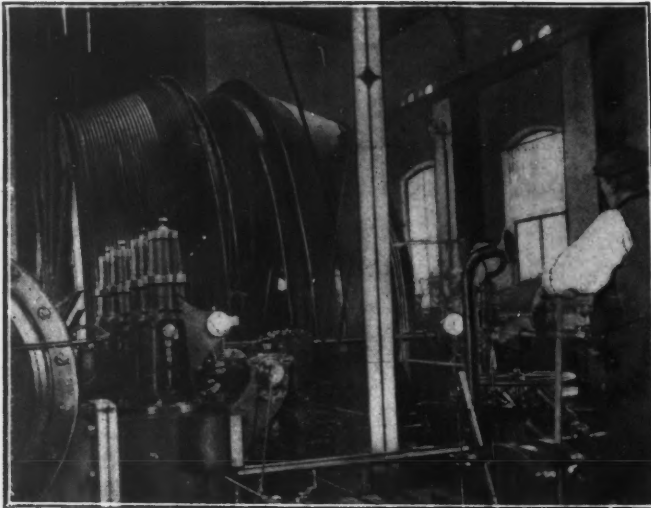
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The motor of the fly-wheel generator receives three-phase alternating current at 1350 volts, and rotates at 500 r.p.m. driving a fly-wheel of 15,000 kg. and a dynamo delivering a current of 120 to 150 amp. at 400 volts pressure to the winding motor. The engine is supplied with a compressed air brake and a magnetic cut-out device to prevent overwinding. The indicators are actuated by gearing from the Koepe sheave shaft, and have so far given no trouble through rope slip as has so frequently been suggested, since the readings agree perfectly with paint marks on the rope. The hoist has given such satisfaction, that all the new shafts will be similarly equipped.

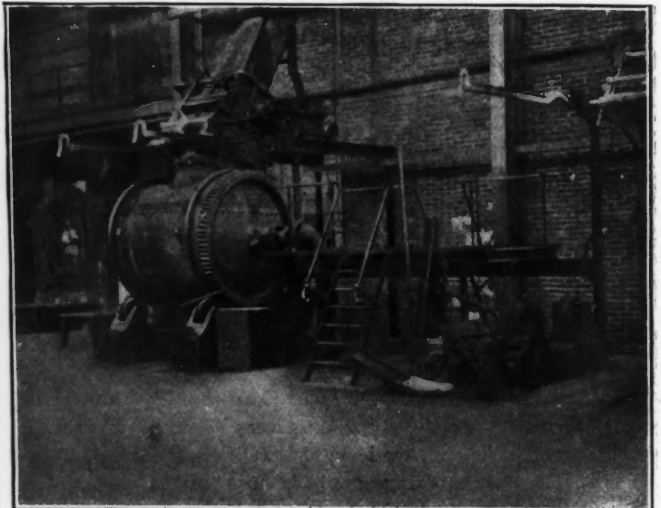
water raised by these machines, of which one is shown in the illustration, is 36 cu. m. per minute. The steam to drive the pumps at this depth is generated by boilers at the surface, and sent down the shaft in well insulated pipes, any condensed water being removed at the bottom by a steam separator. The exhaust steam is condensed in a condenser actuated by the pump tail rods, cooling water being supplied by a part of the mine water on its way to the suction valves. These great pumps have been in continuous operation for the past 10 years.

SORTING

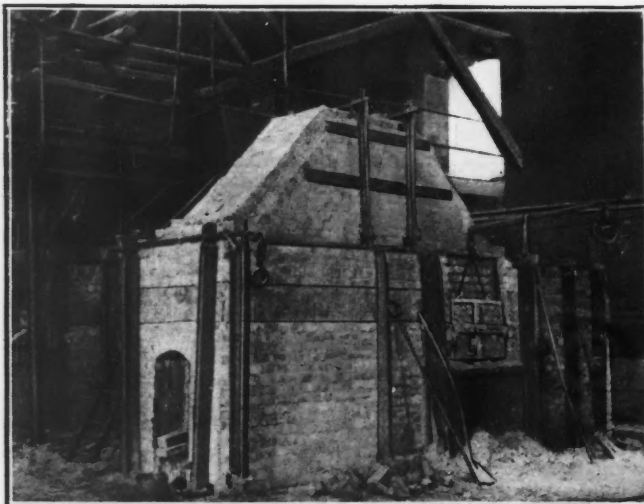
The separation of the *Kupferschiefer*



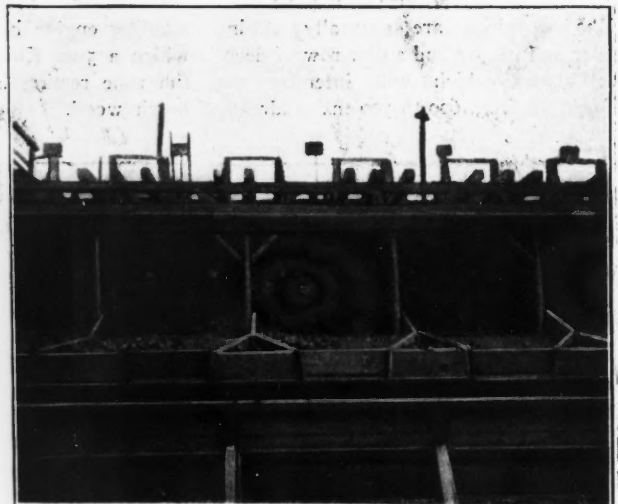
HOISTING ENGINE, HOHENTHAL SHAFT



BESSEMER CONVERTER AT THE KUPFERKAMMERHUETTE



REVERBERATORY AT THE SPURHUETTE



FRONT VIEW OF ORE-DRESSING BENCH



SLAG CASTING AT THE KRUGHUETTE



ORE CARS AT ORE-DRESSING BENCH

from the accompanying shales is, under the most favorable conditions, a difficult operation owing to the extremely fine state of division of the ore. Hence sorting belts or revolving tables are out of the question, and hand breaking and picking has to be effected on a so-called *Schiefebahn*. This consists of a broad and steeply inclined plane divided by lateral partitions into a large number of compartments, as shown in the accompanying front view. In each of these divisions are stationed two men, who are usually old miners unfit for underground work. The full trucks coming from the mine are tipped into hoppers above the bank, on which the sorters separate the *Berger* from the *Schiefer*, when necessary by sharp hammers, and the two products are then thrown into separate shoots. Formerly the *Berger* was all dumped, but now large quantities are sent back down the mine for filling and the *Schiefer* is sent to the smelter.

TRANSPORTATION

The underground haulage is at present done by horses, but in the new mines these will be superseded by electric locomotives. On the surface there are two principal modes of transport; by aerial gears according to the "Otto" systems; and by ore cars drawn by steam locomotives.

A good example of the first type is the *Seilbahn* (rope railway); from the Hermannschacht to the smelters at the Krughütte. This is 5 km. long, and is presently handling 300 tons of ore per nine hours, the speed being 15 km. an hour. A short train of ore cars is seen in the side view of the Hohenthalschacht ore-dressing bench. On arrival at the smelter, the trucks from the aerial railway are automatically detached, and then, like the ore cars, the contents are tipped over grizzlies which separates the shale into coarse, medium and fines.

ROASTING

The coarse shale is taken for treatment to the roast-yard at the Krughütte, where it is built up into long heaps, approximately 40 m. long, 2 m. high and 5 m. wide at the top to 7 m. at the bottom. Combustion is started by a ring of brushwood round the base of the heaps, and as the bituminous contents of the shale average 13 per cent., calcination proceeds to a finish without further attention. The medium material is packed on the outside of the heap, and serves to exclude excess of air, whereas the fines are briquetted with flue dust, and built in open channels in the center of the heap. The heaps burn for about a fortnight, and take another fortnight to cool off before breaking up, when it is usually found that the heat has been sufficiently high to cause sintering.

SMELTING STAGE I.

The roasted material, now averaging 3

per cent. copper, is smelted to 40 per cent. matte at the Krughütte in blast furnaces which are of the circular Pilsz type, and provided with five water-cooled tuyeres. Air blast at a pressure of 5 lb. per sq.in. is delivered by blowers of the Root type, supplemented by an old horn-beam vertical blower. The charge consists of three loads of roasted shale, which is sent as far as possible to the outside well of the furnace by lowering the bell in the cone, and two loads of coke, with some white metal slag admixed sent toward the center of the stack by raising the bell. The special point about this smelting is the high temperature employed, whereby zinc and any excess of sulphur is eliminated. The products from these furnaces are: (1) a little metallic copper, which goes to the bottom; (2) 40 per cent. matte, separated by external sumps and forehearths; (3) slag of the monosilicate type; (4) furnace gases.

The copper bottoms, got at the bottom of the external sump from which the regulus overflows into the forehearths, weigh about 2 cwt. from each 6-hour tap, and as these contain the bulk of the impurities, silver and gold included, they are separately treated, or, as at present, the bulk of them are shipped to England.

(2) The 40 per cent. matte is sent on to the roasting furnaces in the Spürhütte, although a small portion is now being treated at the experimental bessemer plant.

The illustration shows one of the converters which are all of the horizontal cylinder type, and electrically controlled and blown. The poor matte is melted in reverberatory furnaces, run into the vessel with some silica on top and blown for about an hour with air at 7 lb. pressure per sq.in.; this giving a 75 per cent. matte. Running this for blister copper in the converters has not yet been successful.

(3) The slag is conveyed by trucks to a slag molding ground in the open, where it is cast in iron molds into paving blocks of a specially durable and tenacious nature, owing to the small percentage of soluble silicates present. There is an enormous demand for these in Germany, and their sale brings in millions of marks per annum. The great point in the casting process, which is a secret, seems to be the very slow cooling caused by throwing sand on the material.

(4) The blast furnace gases after drawing off centrally, are purified by means of dust chambers and coke scrubbers, and then go to a power station where there are two 1300-h.p. Ochelhauser gas engines. These drive three-phase alternators, supplying power to the hoisting engine mentioned above, and also other places for lighting and aerial gear motors. One of the gas engines is always kept as a stand-by and a third one of 1800 h.p. is shortly to be installed. The carbon monoxide (CO) content of the gas averages 24 per cent.

SMELTING, STAGE II.

The second stage of the smelting is carried out at the Kupferkammer, or similar Hütte, where the 40 per cent. matte is first roasted in hexagonal kilns from 25 per cent. down to 12 per cent. sulphur, one charge of about 5000 kg. being worked off per kiln every 24 hours. The sulphur dioxide evolved is converted into sulphuric acid by the chamber process, and concentration is afterward effected chiefly by the Hartmann-Benkert process of porcelain basins heated in a step reverberatory furnace.

The second step is to smelt this roasted material to 75 per cent. matte at the adjoining Spürhütte in reverberatories, one of which is shown in the accompanying illustration.

SMELTING, STAGE III

There are at present three methods of treating the rich matte.

(1) *Old Method*—The regulus which contains 0.412 per cent. silver, is crushed, and roasted in two stages in double-hearth mechanically rabbled furnaces, then leached in two stages by the Ziervogel process for its silver until this is reduced to 0.018 per cent. The matte is next dried on gas flue covers, mixed with coke dust, and then reduced to metallic copper in reverberatory furnaces, and refined by polishing as in the Welsh process. The greatest quantity of copper is at present produced by this method.

(2) *Reaction, or New Welsh Process*—Here one portion of the matte is roasted "dead" in a reverberatory, and an equal quantity of fresh matte is then added in a molten state, when metallic copper is produced by the reaction of the Cu_2S on the CuO . The copper thus obtained is cast into anode plates for electrolytic refining and silver recovery.

(3) *New Gunther Process*—This process is for electrolyzing the matte directly. It has been developed with the view of producing pure copper from the 75 per cent. matte electrolytically and has only just now been patented. To make this method successful a very large number of difficulties have had to be overcome. The special features of this process are as follows:

(a) The casting of the matte into anode plates one m. square by 5 cm. thick, electric connection being made by the intermediary of small T-shaped copper pieces, tinned on the end, which are embedded in the matte. The method of casting these anodes is a secret not yet divulged, and it is to a large extent upon this that the success of the process depends. The anodes are suspended between alternate cathode plates of thin metallic copper, in lead-lined wooden vats similar to those in use in ordinary electrolytic copper refining, connection being made on the parallel system.

(b) The removal of the anodes before they become so thin as to crumble away

and contaminate the slime with too much copper sulphide.

(c) Heating the electrolyte to a temperature of 70 deg. C. by means of steam coils.

(d) The use of small voltages, (not more than 0.5 to 0.75) and very large current density, for example 1000 amp. and upwards per sq.m.; and, as in ordinary refining, the constant aëration and circulation of the electrolyte.

Practically pure copper is deposited at the cathode; iron, nickel, and cobalt go into solution, while silver and sulphur with small particles of the anodes and metallic copper collect at the bottom of the vats. For the treatment of this mud a special process has also been developed. Most of the vat liquor is siphoned off after settling, and the slimes shoveled out, although sliming is proposed, and these are then dried, or filter-pressed. Next a complex solution, the chief substance in which is acetylene tetrachloride, is used hot to leach out the free sulphur in a solution from which it separates out on cooling, leaving the liquid ready for use over again. The silver mud is sent through the Ziervogel process for winning the silver and after that the roasted residue is used to regenerate the spent solution from the vats by boiling till the solution is neutral.

USE OF ELECTRIC POWER

The present tendency at Mansfeld is to electrify everything. Three huge power stations have been erected for this purpose. One of these, as already stated, is driven from the blast-furnace gases, the sulphur gas going to warm the water for injection into the boilers of the pumping station. A second station has a complete steam installation, while the third, which will have an ultimate capacity of 15,000 h.p., has six tubular boilers fired partly by blast-furnace gas and partly by coal.

The Mansfeld field is a splendid example of modern economy in mining and smelting, and also of the benefits arising from centralization.

Lithographic Stone

Replying to an inquiry requesting information on lithographic stones, Consul-General Frank H. Mason, of Paris, states: "I can only trace one quarry of lithographic stones in France, known in the trade as Bavarian stone, or pierre de Munich, which is at Vigan, in the Department of Gard. The stone is said to be of excellent quality and has little grain or points, called by lithographers "gale" and "vermicelle," such as are found in the Bavarian stones. These stones can be polished on both sides. The quarries appear to be little worked at this time, the owners not having the necessary capital to do business on a large scale.

Not the Dream of a Dreamer but the Vision of a Prophet

BY HENRY M. HOWE*

It is of interest that the very important improvement of the basic bessemer process lately described by A. W. Richards, actually follows pretty closely a line sketched out in 1879 by the distinguished French metallurgist, M. Pourcel. The improvement which Mr. Richards described at the May meeting of the Iron and Steel Institute has for its object the treatment of the siliciferous Cleveland gray iron, which contains from 1.5 to 3 per cent. of silicon, with only 0.5 to 0.75 per cent. of manganese, to adopt Mr. Richards numbers. It was proposed by Dr. O. Massenez, of Wiesbaden, and consists essentially in getting rid of the resultant silica early in the blow.

The objection to the use of a high silicon pig is, first, that the resultant silica attacks and corrodes the lining of the converter; second, that it requires a very great addition of lime to neutralize it, so that in spite of it the slag may yet be basic enough to be retentive of the phosphoric acid formed by the oxidation of the phosphorus, and hence may prevent its deoxidation and the consequent return of the phosphorus to the metal; and third, that both the silica and the lime so dilute the phosphoric acid of the slag as to lessen its value as a fertilizer very greatly. Dr. Massenez's process avoids all these troubles by the very simple step of making the silicious slag fluid very early in the process, by adding lime and iron ore, and pouring it off as soon as the silicon is oxidized. This gets rid of this corrosive slag before the temperature has grown high enough to enable it to corrode the walls of the converter; it avoids the necessity of adding enough lime to neutralize the silica, because the removal of the phosphorus takes place after this silica has been poured out of the converter; and in the same way it avoids diluting the final phosphoric slag with this silica and the lime needed for neutralizing it.

On page 351 of the "Journal of the Iron and Steel Institute," for 1879, M. Pourcel outlines a very similar procedure. He would exaggerate "in the pig the content of silicium in proportion to that of phosphorus, and by adding a sufficient quantity of blue billy, 20 per cent. of the charge, for instance, of a mixture of 3 of blue billy with 1 of lime. By running out the cinder on the appearance of the spectrum, the greater portion of the phosphorus could be eliminated;" in these last words M. Pourcel seems to have been misled, because Mr. Richards reports that the slag which he then pours off contains "no phosphorus." Still, the

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fact remains that this perspicacious metallurgist saw in 1879 how a high silicon pig iron could be treated by the basic bessemer process, and described the two essential steps, first adding iron ore and lime, and second, pouring off the slag when the carbon flame appears.

By means of this process, Mr. Richards, with his characteristic skill and energy, has succeeded in solving the extremely difficult problem of treating by the basic Bessemer process the siliciferous and phosphoric Cleveland pig iron, a problem which has long baffled most skilful and able metallurgists. The credit which attaches to him and Dr. Massenez is so great that we can hardly doubt their willingness to accord M. Pourcel a generous share for his early suggestion, so long overlooked.

Air vs. Electric Drills

BY EDGAR NICHOLS*

In a discussion on working costs at a recent meeting of the South African Association of Engineers, H. W. Appleby stated that in one of the iron-ore mines in Cleveland, Yorkshire, England, an air compressor was working six 3½-in. air drills. Indicator diagrams showed an average of 111.06 i.h.p. This engine was replaced by an electric generator and smaller engine and six electric rock drills. When these drills were working and, it is stated, breaking as much rock as the air drills, the new engine showed only 24.52 i.h.p., a reduction of 77.91 per cent. in power used. Costs were given as follows:

	COST, PENCE PER TON.	
	Air	Electric
Oil, stores and labor.....	0.297	0.253
Coal	0.242	0.108
Repairs, making and sharpening drills and maintenance of pipes or cables	0.340	0.170
Totals.....	0.879	0.531

Such a comparison is not, however, very valuable, as much important information is not supplied. It is not stated whether the ground is hard or soft. As far as I remember the Cleveland iron ores are somewhat soft. It does not state for how long a period the new installation has been working. Quoted as an argument for the employment of electric drills in the hard quartzites and conglomerates of the Rand it is valueless, for electric drills have been tried here and experience shows that, for obvious mechanical reasons, they cannot stand up to the work and operate to the same advantage as the various types of air drills.

A third attempt to tow an oil barge across the Atlantic is being made. The trip is to determine whether towing barges in the transatlantic trade is profitable. The cargo is 4,000,000 gal. of refined petroleum in bulk.

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The Copper Mines of Ely, Nevada

Four Mines Will Have a Capacity for Producing 60,000,000 Pounds of Copper Per Annum When the Smelting Works Are Completed

BY WALTER RENTON INGALLS

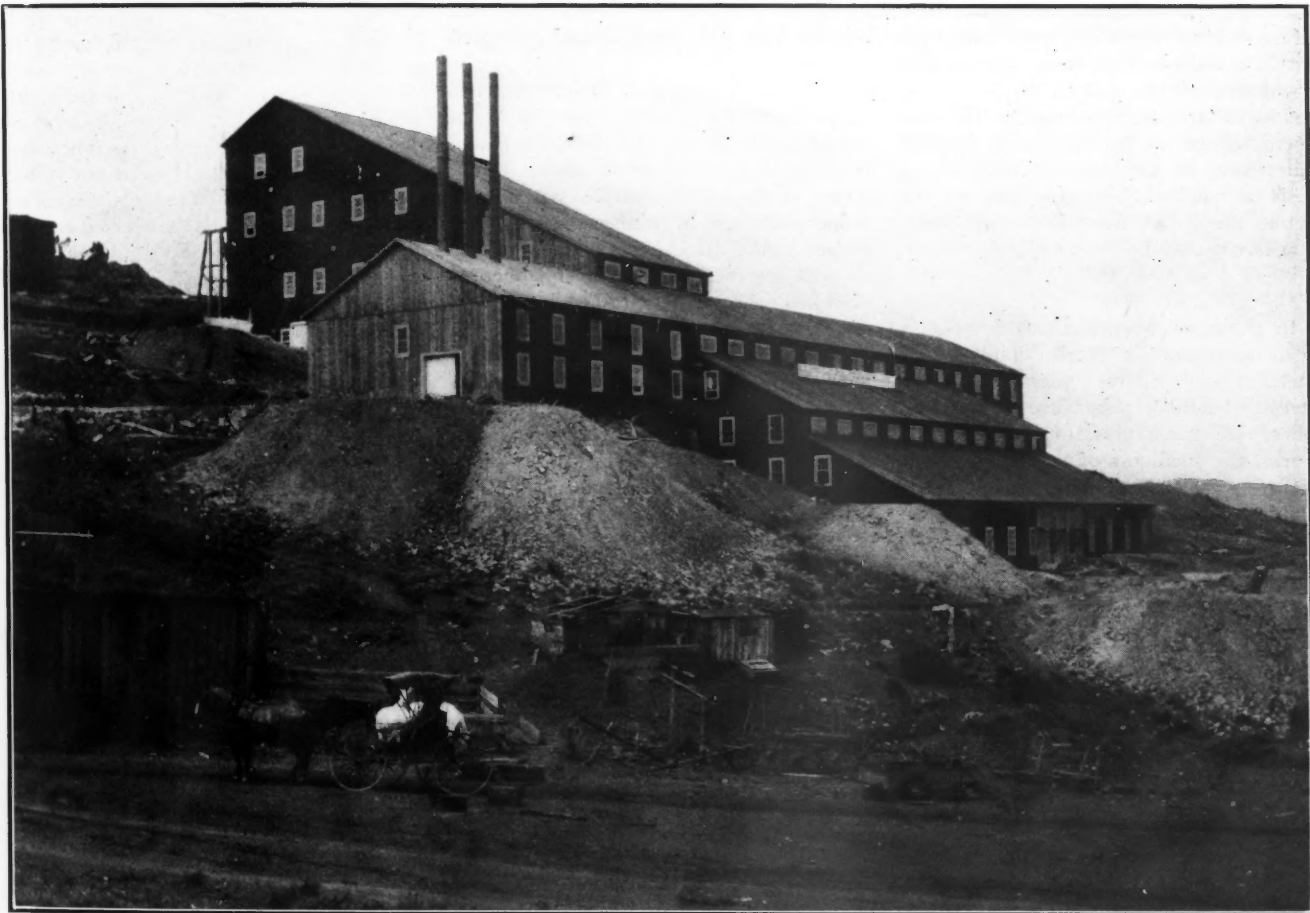
A sleeping car runs through from Salt Lake City to Ely, leaving the former late in the evening, lying over at Ogden and going west with Union Pacific train No. 3 from Chicago, lying over again at Cobre, Nev., leaving the latter place per Nevada Northern Railway at 1:30 p.m. and arriving at Ely at 6:05 p.m. This is if the train is on time, which frequently it is not. Passengers from Chicago obtain

THE NEVADA NORTHERN RAILWAY
This line was owned by the Nevada Consolidated Copper Company and was built solely for the purposes of that company, but a half-interest has now passed into the hands of the Cumberland-Ely Copper Company. By virtue of the recent mining boom at Ely the road has already developed an outside freight and passenger business which must

The elevation of Cobre is about 5900 ft.; of Ely about 6800 ft. There is a steady, gentle rise up the valley. The valley is arid and for a considerable distance of semi-desert character, but about 60 miles from Cobre there begin to be grassy places which afford some grazing.

THE TOWN OF ELY

Ely lies on the western side of Steptoe



THE GIROUX MILL

practically a through sleeper by going west on train No. 3 and changing cars between Ogden and Cobre. By any other train there is a connection to be made at Cobre, which is not an interesting place to wait in. The distance from Salt Lake City to Cobre is 176 miles; from Cobre to Ely, 141 miles. The fare from Salt Lake to Ely is \$16.60; from Cobre to Ely it is \$10. The Nevada Northern is a new line and its rates are high. However, it sells 1000-mile tickets for 5c. per mile.

yield a handsome income. Leaving Cobre the railway runs due south through the broad and level Steptoe valley. The construction of the line was of the easiest. The curves are few, there is not a bridge on the line, only one or two cuts worthy of the name and scarcely any grading. The soil was unusually good for railway construction and the track being laid with 80-lb. rails, the cars run with a smoothness unexpected of a line less than a year old; better, indeed, than on many standard railways of respectable age.

valley, at the foot of the Egan range of mountains, and at the mouth of Robinson cañon. It is one of the old camps of Nevada, having been the headquarters of spasmodic and generally unsuccessful attempts at mining during 30 years or so preceding the discovery that it had big and profitable deposits of copper ore. The situation of the town is pleasant, the ground being level and the outlook to the east open. To the west the main street of the town leads directly into Robinson cañon, but after going a short distance

through the latter the country opens out again at a slightly higher level and good roads lead to all of the mines. The mines are 3 to 10 miles west of Ely, and the location of the town at such distance from them was apparently dictated by the question of water supply, the cañon being quite dry.

Since the near approach of the railway, Ely has enjoyed a good deal of a boom in real estate and considerable material development. It has some very creditable shops and an uncommonly good hotel (the Northern). It is an active, lively town, but the hopes of the real estate boomers were dashed with cold water by the location of the Steptoe smelter 14 miles down the valley. There appears to be plenty of room in the town for any probable growth in the near future. However, some enthusiastic persons are endeavoring to establish a new town, which rather absurdly they call "Ely City," a mile or two east. The mining population of the district is, of course, bound to live near the mines, the most important of which are seven to nine miles west of Ely, but the town is the basis of supplies. No stage lines yet run out to the mines, wherefore communication is not easy.

EARLY MINING

In going up Robinson cañon the now amusing relics of early mining and metallurgical failures, characteristic of many old mining camps, are in evidence. There are two ruins of old smelting works, the smallness of their slag dumps betraying the failure of the hopes of their builders. Prominent is the Chainman gold mill, erected only five or six years ago to treat the gold-bearing surface porphyry occurring near by, an imposing mill that looks like new, so little has its lumber weathered, but commercially a failure. At the Ruth mine is the ruins of a mill that was not a failure, for it was therein that Requa and Bradley made their experiments in concentrating the monzonite copper ore that has since then made the Nevada Consolidated Copper Company and the Ely district famous. All this machinery and material had to be brought to Robinson cañon by wagon from Eureka, about 90 miles distant, which was the nearest railway point previous to the advent of the Nevada Northern Railway.

GEOLOGY OF THE DISTRICT

The geology of the Robinson mining district was studied in 1904 by Prof. Andrew C. Lawson, of the University of California, in behalf of the Nevada Consolidated Copper Company, and the results of his investigations were published in a monograph by the University of California. I regret that in making my observations in the district and in writing this article I did not have that valuable paper before me, and consequently I

am able to report only what I saw during my brief visit.

The Robinson district shows essentially a limestone formation, which has suffered laccolic intrusions of monzonite. In the important portion of the district the limestone summits have been scored away, exposing the monzonite in areas that in many places form confused associations with outcrops of limestone. At some time in the geological history of the district there were flows of rhyolite and rhyolite tuff which appear in extensive areas of the present surface. These formations are developed most distinctly on the south side of the cañon. To the north the formation appears to be chiefly limestone, which is exposed in bold cliffs. It is a formation which would appear to be kindly to lead ore, and indeed small veins of galena are said to have been found in it. Doubtless it was that ore that the early smelters attempted to work.

The surface porphyry (monzonite) of the district is frequently brownish from the oxidation of iron and in certain places is gold-bearing to a small extent. Here and there this surface porphyry is slightly copper-stained. In connection with the porphyry and associated limestone at various points there are prominent outcrops of iron ore, sometimes rather heavy iron ore, sometimes ordinary iron gossans. These are so clearly in evidence that they must early have attracted the attention of prospectors. On the Giroux property, just behind its new mill, there is a remarkable gossan of heavy iron ore, into which there is an old slope shaft. The material on the dump at the mouth of that shaft is rather heavily copper-stained. Elsewhere in the district the iron gossans show copper stains, but I did not see any so abundant as at the Giroux. Precisely such outcrops occur in other copper districts, and in the Robinson district there must be some connection between them and the big copper deposits.

It is doubtful if the general form of the big copper deposits of the Robinson district is yet understood, inasmuch as none of them has been delimited. They occur as impregnations of chalcocite and chalcopyrite in cracked and shattered monzonite, lying generally flat under a capping of leached monzonite. The latter is brownish in color; the underlying, mineralized rock is gray. The surface rock was originally copper-bearing, but the copper has been dissolved and reprecipitated lower down in a zone of secondary enrichment. Under the latter there is a zone of primary ore, lower in grade; perhaps too low grade to be workable. Comparatively little development has yet been done in this lower zone.

The limestone adjacent to the porphyry intrusions has been greatly altered by the effect of the latter and the porphyry itself has undergone metamorphism, so that frequently it is difficult to determine

where the porphyry ends and the limestone begins. Sometimes there are inclusions of more or less altered limestone in the porphyry. Underground workings in the Veteran and Eureka mines show that the limestone adjacent to the porphyry is mineralized with pyrites, but chalcocite and chalcopyrite are absent. In the extreme westerly drift of the Eureka mine the breast has passed into limestone heavily mineralized with pyrites. It is easy to account by such occurrences for the iron gossans that appear on the surface, these gossans being due to the oxidation of pyrites adjacent to the mineralized monzonite. Consequently the orebody is to be looked for to one side of the gossan, not under it. Early prospectors made the natural mistake of sinking in the gossan, but rarely if ever found anything of value. However, it seems to me that prospecting through the gossan is not in all cases to be neglected. It is hardly to be accepted that the formation of pyrites in the limestone occurred only horizontally around the porphyry. If the intrusion of the latter were a laccolite in limestone, pyrites might be as likely to form in the latter at the upper contact as at the sides. If then the limestone had been scored away only down to the neighborhood of the contact, outcrops of iron ore would be likely to occur above the mineralized porphyry. Something like this condition appears to exist at the Veteran mine. If the above assumptions be correct, the rule may be that when iron outcrops are found in proximity to surface exposures of porphyry, orebodies are to be looked for in the porphyry; but when iron outcrops are found in connection with limestone, especially altered limestone, and there is no near-by exposure of porphyry, the ore may be under the gossan.

The orebodies of the secondary zone as opened in the Ruth, Eureka and Veteran mines do not show any general evidence of faulting. In all of these mines the ore is very much cracked and there are frequent slips and selvages, running in all directions, which may be supposed to be contraction cracks, formed during the cooling of the igneous mass. These countless cracks doubtless made the porphyry easily permeable to the mineralizing solutions. It is to be observed that the chalcopyrite and pyrites, the primary minerals, frequently occur as little threads in the porphyry, while the black chalcocite impregnates the mass in minute specks, the porphyry looking as if it had been peppered. In the Veteran mine some of the westerly cross-cuts have entered a zone of black, unctuous talc, dipping westerly, which shows pronounced slickensides. On the easterly side of this talc zone the porphyry is much broken up and is extensively silicified. There is evidently a plane of shearing here, i.e., a fault, which cuts through an orebody, or against which an orebody is lying.

The Veteran orebody is distinguished



PANORAMA OF THE WORKINGS OF THE GIROUX CONSOLIDATED MINES COMPANY

from those of the Ruth and Eureka mines by a heavier mineralization with chalcocite, chalcopyrite and pyrite, which frequently appear in large blotches, and the presence of magnetite and oxidized copper minerals, even at the depth of 380 ft. With these, and certain minor differences which may be explained as results of the shearing, the Veteran orebody is essentially of the same character as those of the Ruth and Eureka mines.

The Giroux property, adjoining the Veteran, ought to throw considerable light upon the nature of the ore deposits of Ely. Unfortunately I was unable to inspect its underground workings. Judging from its dumps it has disseminated ore of the same class as that of the other big mines of the district, but it has also oxidized ores much heavier in copper. The Alpha shaft, west of the main workings, was sunk 1000 ft. before encountering ore, and then opened some rich oxidized ore.

The Alpha shaft is one of the mysteries of the Ely district. It is described as opening a wide vein of quartz lying between porphyry and limestone and Mr. Giroux holds the theory that it is a mother vein of the district, but it is difficult to reconcile this with the geological conditions of the district. Ore was not encountered in this shaft until the depth of 1000 ft. was reached, and then, strange to say, it was oxidized ore. The orebodies are said now to have been opened to the 1200-ft. level, following the walls of the "vein." The dump shows that sulphides have been found at some places. The length of this vein is said to be 6000 ft. and its width between the limestone and the porphyry 1000 ft. Whether this be a true vein, as Mr. Giroux is firmly convinced, or a development of the quartz blow-outs, which Professor Lawson calls "blouts," is a highly interesting question. It is to be hoped that Professor Lawson will some day revisit Ely and will have an opportunity to study the Alpha workings.

Besides the porphyry orebodies described above, there are said to occur at Ely deposits of copper ore in limestone, but these are said to be small, and not having examined any of them I am unable to outline their character.

THE REJUVENATION OF ELY*

After mining had been fitfully carried on at Ely for many years with only indifferent success, M. L. Requa and F. W. Bradley, of San Francisco, became interested in the Ruth mine, of which they undertook the development. They recognized the possibilities of its deposits of disseminated copper ore and foresaw the magnitude that they would prove to have and their great commercial value. They deserve the highest credit for their persistence in sticking to the enterprise, 90 miles from the nearest railway point, when the price for copper was low, and the scientific manner in which they pro-

ceeded is one of the brightest records in the annals of American mining engineering. They recognized that an immense capital would be required to bring the mines to the productive stage; so they developed them in such a way that when the time came to seek capital a large tonnage of ore could be shown blocked out. They recognized, moreover, that it would be important to furnish data as to the milling possibilities of the ore; so they installed a mill that is insignificant in comparison with that which is now being erected for the property but was highly respectable in size as an experimental mill. Finally, they employed Prof. Andrew C. Lawson to make a geological survey of the district, which he did with admirable perception of the requirements and remarkable insight into what must at that time have appeared to be highly confused geological conditions. Professor Lawson fully appreciated the association between the valuable ore deposits and the monzonite intrusions, and prepared a geological map which enabled Requa and Bradley to secure large areas of the most promising ground. They were operating then as the White Pine Copper Company. About that time the New York & Nevada Copper Company, owning the Eureka mine, a large porphyry area, went into the hands of a receiver and Requa and Bradley secured it. All this was done with very little knowledge in the outside world that Nevada possessed deposits of copper ore that would some time make it a large factor in the production of that metal.

To the best of my recollection the first that was heard generally respecting this district was through a prospectus issued by Joseph L. Giroux, which in spite of the previous high reputation of Mr. Giroux was regarded as visionary, extravagant, or what you please, in its statements as to acres of copper ore at and near the surface at a remote place in arid Nevada. Yet Mr. Giroux was not only right, but also was acute in his perception of the conditions of the district, for which he deserves high credit and as a result of which he secured a large area of mineral land that is second in promise only to that of Requa and Bradley; possibly is superior.

In 1905 the time came for Requa and Bradley, who previously had consolidated their interests as the Nevada Consolidated Copper Company, to seek additional capital. An examination of the property was made by J. Parke Channing, who fully recognized its great value in a report which is a classic in that field of engineering literature; and large blocks of the stock were sold in New York and Boston. After the company had been thus well financed, a controlling interest in it was purchased by the Guggenheims, who paid \$12.50 per share for the latter part of their purchases.

The later companies were able to secure very little of the porphyry. The Ely Witch has a little and the Butte & Ely has some adjoining the Giroux property. The Ely Central was widely advertised as possessing a large area of land directly adjoining and between the two great mines of the Nevada Consolidated. The orebodies of the latter lie flat and are of unknown extent. What was more plausible than the argument that they might connect through the Ely Central property? Doubtless the promoters advanced that argument in good faith, but with ignorance as to the geological conditions. As a matter of fact the area of the Ely Central company between the Eureka and Ruth mines is limestone and rhyolite, chiefly a large flow of the latter. Of course the Nevada Consolidated had ample opportunity to secure this property if it had thought worth while to do so. The Ely Central has done a good deal of drilling in the rhyolite but has not yet discovered ore so far as there is common information.

So it is with most of the outside companies of Ely. Their properties are chiefly upon formations other than the ore-bearing porphyry, some of which may prove to contain ore deposits, but not ore deposits of the kind that the three big companies possess. The three big companies are the only ones at Ely which have "developed" orebodies. There is nothing else at Ely which is more than a prospect. Among them there is little evidence of activity in exploration, although the orebodies of the kind they are especially seeking are capable of location by the cheap and effective method of churn drilling. Some of these companies are indeed prospecting, but in some cases it appears as if there were no anxiety even to do that.

GENERAL MINING CONDITIONS

The general mining conditions in the Robinson district are favorable, except for the scarcity of water and timber. The district is very sparsely wooded and the cord-wood heretofore used chiefly for fuel has had to be brought in from long distances and has been correspondingly costly, while the quality is inferior. Since the advent of the railway, coal has been available, the cost being \$10 per ton at Ely. The water supply in the district is very small. There is a stream in Robinson cañon only when the snow is melting. The Giroux company is contemplating pumping water to its mine from beyond Ely, a distance of 13 miles, while the Nevada Consolidated is going to pump it from Ward mountain, nine miles away.

The country is open, with broad valleys and hills that are comparatively low and of moderate slopes. The roads are excellent. From Ely to the Giroux mine, nine miles, the rise is only about 500 ft. The Nevada Northern Railway is running right up the valley with grades of

only 3 per cent. at the maximum and only two tunnels, both of them short ones. The climate is the same as elsewhere in eastern Nevada. There is a heavy snowfall in winter, the snow beginning in the late fall and continuing until April.

The mines are dry at the moderate depths to which yet opened.¹ The Veteran mine is dry at depth of 380 ft.; the Ruth is dry at 307 ft. and the Eureka at 170 ft., but below those levels water is standing in the shafts. The Giroux mine is wetter. In all of the porphyry mines the ground is soft and easily excavated. Comparatively little powder is required. Drilling is done chiefly by hand; there are but few machine drills in the whole district. Two shifts of eight hours each are able to advance a 6x4-ft. drift 7 to 8 ft. per day. Comparatively little timber is used or required in drifts of those dimensions that are not intended to be permanent. Good miners are scarce, as is apt to be the case in low-grade districts at present. Miners are paid \$3.50 per eight hours, and muckers and trammers, \$3.

THE RUTH MINE

The Ruth mine of the Nevada Consolidated is about six miles west of Ely. It was originally opened by an incline shaft, at an angle of 41 deg., with levels at vertical depths of 125 ft. + 65 ft. + 117 ft. + 111 ft., the fourth level being therefore 420 ft. below the surface at the location of the shaft. From this shaft development work was done chiefly in an easterly-westerly direction with cross-cuts connecting the main drifts and blocking out the ground. The shaft passed through the leached porphyry into ore at the depth of 90 ft. and passed through the zone of secondary enrichment a short distance below the third level. A good deal of development work was done on each level, the largest portion being on the third, where the orebody was proved to be most extensive horizontally. On the second level the horizontal section is smaller, and on the first level smaller still. As shown by these workings, there is in the Ruth mine a block of ore averaging approximately 650 ft. east and west, 200 ft. north and south and 250 ft. thick vertically. This corresponds to 32,500,000 cu. ft., or 2,320,000 tons, reckoning 14 cu. ft. to the ton. Mr. Channing's estimate of this orebody was 2,400,000 tons, averaging 2.6 per cent. copper. But little additional development work has been done since he made his examination.

The Ruth orebody has been commonly assumed to be dipping northwesterly at an angle of 39 or 40 deg. The evidence upon this point is quite inconclusive, however, being based chiefly upon the manner in which it lies against limestone on the southerly side, but it may prove that a

¹This of course does not refer to the Alpha shaft of the Giroux company which is 1200 ft. deep.

cross-section through the orebody is elliptical, or trough shape. This will be determined when further explorations are made in a northerly or northwesterly direction in which the mine has good possibilities, there being a large surface exposure of porphyry in that direction. The chances for the development of important extensions of the orebody in that direction are excellent, but as yet no drilling has been done in that direction, or indeed anywhere around the Ruth orebody to prove the extension.

THE STAR POINTER SHAFT

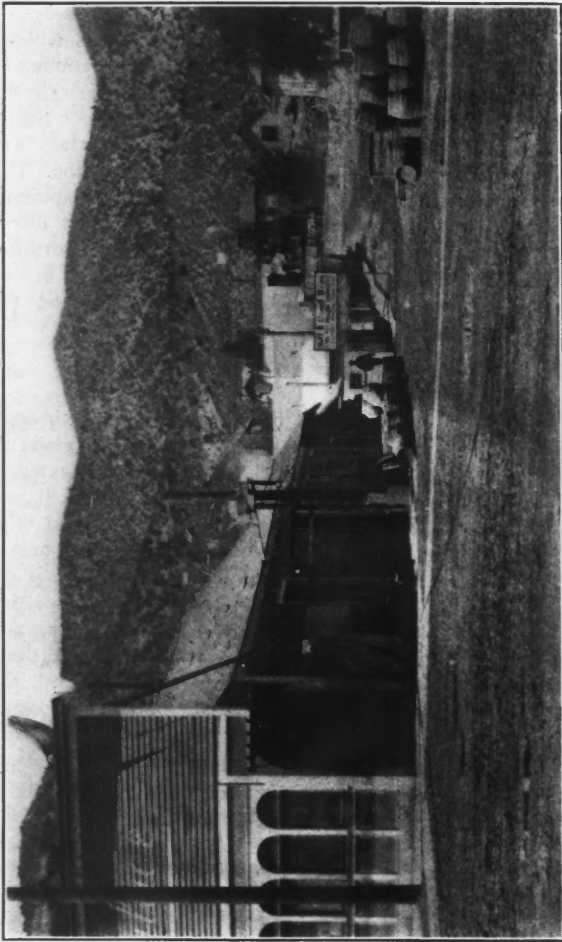
The Ruth mine will be worked through a new shaft on the Star Pointer claim to which a branch of the railway extends. The Star Pointer shaft is 2½x5½ ft., inside measurements. It is timbered with 12x12-in. sets, hung at 4-ft. centers, and is lagged with 2-in. plank. The shaft is divided into four compartments, two for hoisting ore, one for lowering timber and one for a ladder way. It is 460 ft. deep, 343 ft. to the present working level, the additional depth being for the purpose of commanding the lower portion of the orebody, which, however, will not be attacked for some time to come. The shaft is situated a long distance from the orebody, its location being selected with a view to the railway connection and also to keep the shaft far out of the way of caving of the mine, by which system the latter will be worked. The shaft will be surmounted by a steel galleys frame, erection of which has not yet been commenced (July 25).

The shaft is designed for the delivery of 2000 tons of ore per day. At the 343-ft. level the ore is to be received from a 100-ton pocket by two 5-ton skips, balanced.

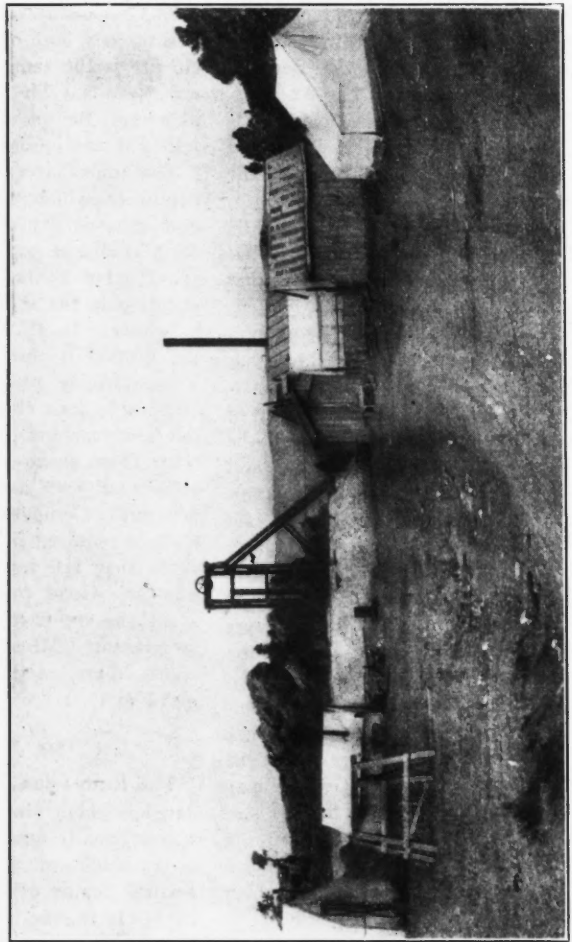
From the shaft a main gallery, 8 ft. wide at the bottom, 7 ft. wide at the top, and 8 ft. high, timbered with 12x12-in. sets at 4-ft. centers and lagged with 2-in. plank, extends easterly to the orebody, which it enters at 1300 ft. from the shaft. The main gallery is laid with 40-lb. rails at 0.3 per cent. grade and the ore is to be moved through it in trains of side-dumping cars, each of 2¼ tons capacity, drawn by an electric locomotive. Midway in the gallery there is a double track for 200 ft. Entering the orebody the main gallery continues easterly for 1000 ft., upward of 900 ft. through ore, and then loops around and comes back on a parallel course, uniting with the easterly drive at a point 1300 ft. from the shaft. At the loop there are two passageways so that trains may pass there if necessary. The haulage system is so laid out that it will have large capacity and elasticity.

THE CAVING SYSTEM

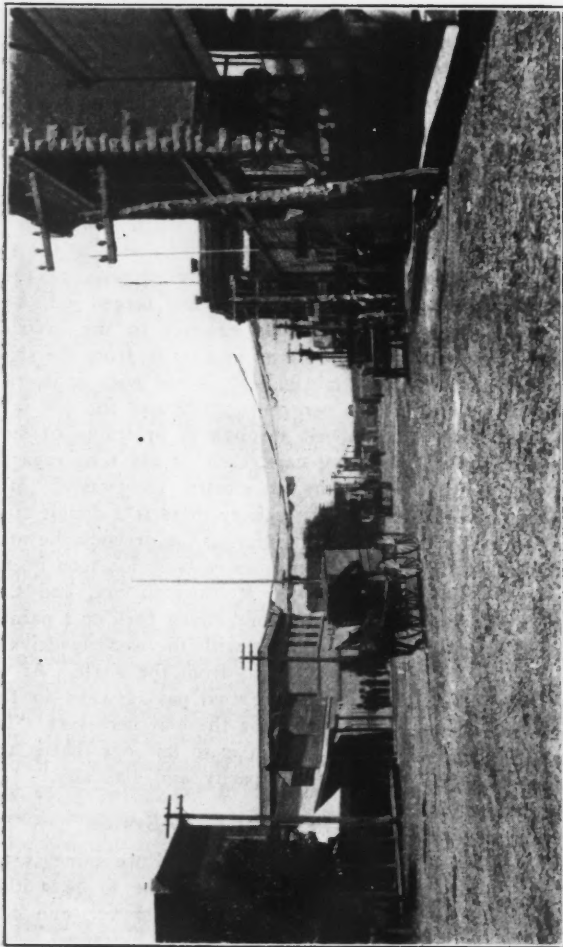
The capping at the Ruth mine is too thick to enable that mine to be worked economically by steam shovel, and consequently the ore will be extracted by the



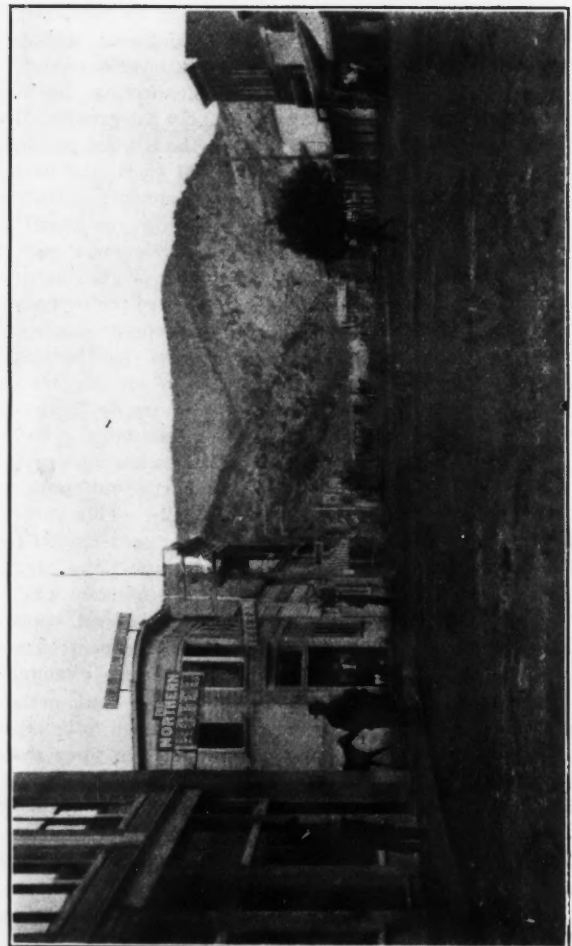
A SIDE STREET IN ELY, NEV.



VETERAN MINE, CUMBERLAND-ELY COPPER COMPANY



THE MAIN STREET IN ELY, NEV.



ELY, NEV., LOOKING TOWARD ROBINSON CANYON

caving system. The latter will be substantially the same as adopted by the Utah Copper Company, which I have described in a previous article. The ground will be opened in blocks 50 ft. square by sub-levels about 30 ft. apart, but above the highest sub-level the ore will be stoped out cleanly under the capping and the latter will be caved upon a layer of timber. The function of the latter is to keep the crushed capping separate from the ore upon which it is brought down; and by taking out a top-slice of the ore directly under the capping, practically the whole of the ore is got without intermixture of worthless material. After the removal of the top-slice, raises are put up from the sub-level next below and the ore crushing under its own weight is drawn off, the gob following it down.

As compared with the method employed by the Utah Copper Company, stoping is done in this only above the highest sub-level, but on the other hand there is a greater consumption of timber in connection with the gob. I have made no detailed estimate of the probable cost of extracting ore by this method at the Ruth mine, but considering that all the ore must be hoisted and that labor, fuel and supplies are more costly than at Bingham, it would appear likely that the ore will cost in the neighborhood of 75c. per ton, i. e., for actual extraction alone.

THE EUREKA MINE

The Eureka mine is at Copper Flat, about a mile west of the Ruth. It is opened by a shaft about 400 ft. deep with a first level at 170 ft. and a second at 390 ft. On the same level with the latter there are some workings from the old shaft of the New York & Nevada company. All the workings on the 390-ft. level are now under water and were so at the time of Mr. Channing's examination. The old assay plans show that they were in low-grade ore and they were probably below the zone of secondary enrichment, although the occurrence of some high assays indicates that perhaps they were not greatly below it. However, the bulk of the development of the Eureka mine is on the plane of the 170-ft. level, on which a main drift extends about 750 ft. northerly and southerly, while cross-cuts go to a maximum of about 400 ft. east and 400 ft. west. Parallel drifts and cross-cuts roughly block out the ground and there are eight raises, which show 70 ft. of ore overhead.

Mr. Channing assumed that the ore extended only 30 ft. below the 170-ft. level. This was merely an assumption, and was intended to be a conservative one, because there were no winzes or other guides to the probable extent of the ore downward. His estimate of the ore developed in this mine on the basis of 100 ft. thickness was 3,200,000 tons, averaging 2.2 per cent. copper. The ore had been cut into rather large blocks, but the uni-

formity of its character and mineral content caused the estimate of area to be amply justified, while that of thickness was conservative. Since Mr. Channing's examination comparatively little development work has been done, but several drill holes have been put down outside the orebody, which roughly square up the latter as an area about 800x750 ft., which at 100-ft. thickness and 14 cu. ft. to the ton would give about 4,300,000 tons.

The company has also put down four drill holes in the extension of the porphyry to the west-southwest, the two nearer ones showing low-grade ore and the two remoter ones showing good ore. It may be judged from this that there is probably an important extension of the orebody in that direction, the two nearer drill holes having gone down in lean spots, or the orebody passing in a neck between them. Aside from the matter of at 100-ft. thickness and 14 cu. ft. to the mine are in this direction.

EXPLOITATION

The Eureka mine is to be worked by steam shovels, of which four will probably be installed. Excavation will be begun at the eastern side where the hill slopes down to a small valley.¹ This also is near what is known to be the eastern boundary of the ore deposit, limestone showing on the surface near-by. At this place the stripping to be done is as little as 16 ft., but going up the hill it rapidly increases to 100 ft. and after that more. The average thickness of the capping has not yet been determined. It will probably be rather high, but we may roughly assume one ton of stripping to one ton of ore. It is believed that steam-shovel mining can be done here as cheaply as at Bingham, but while there are some more favorable conditions, I am disposed to consider on the whole that the cost will be something like 10 per cent. higher. If then we assume an actual excavating cost of 22c. per ton, and one ton of stripping per ton of ore, the cost per ton of ore will be 44c.

THE GIROUX MINES

This property is about nine miles west of Ely, at an elevation of about 7300 ft. The railway will pass through it on the way to the Veteran mine, which is just beyond the Giroux. The Giroux property has been developed through five shafts, viz., the Giroux, Morris, Brooks and Bunker Hill, which lie approximately in a line northwest and southeast, and the Alpha, which is about 1000 ft. southwest of the Brooks. The distance from the Giroux to the Bunker Hill is 2800 ft. The dumps of the Brooks, Morris and Bunker Hill shafts show porphyry ore similar to that of the other large mines of the district, and large bodies of such ore, averaging 3 per cent. copper are said to have been developed by extensive workings

¹The steam-shovels have now been installed at this place and stripping has been begun.

underground. I did not go underground at this mine and consequently can not say anything as to its ore resources from my own observation, but judging from the size of the dumps the workings are less extensive than in the two mines of the Nevada Consolidated. I was informed that over 15,000 ft. of development work had been done in the property and that there is connection from the Giroux to the Bunker Hill shaft by drifts.

The Giroux company is erecting a concentrating mill, which will probably be completed about Oct. 1. This mill is designed to treat 500 tons per 24 hours, but it is hoped that it will materially exceed that capacity. It is a side-hill mill of old-fashioned timber construction. The scheme of treatment is substantially as follows: Receiving bin of 600 tons capacity. 10x24-in. breaker. Belt elevator. Trommel, ¼ in.; oversize back to crusher, undersize to bin of 200 tons capacity. From the latter bin the ore goes to to trommel with ¼-in. holes, undersize to elevator, oversize to a set of 42x16-in. rolls, delivering to elevator which delivers to two trommels, 6-mesh and 16-mesh. The 6-mesh product goes to a 6-ft. Huntington mill, which has 16-mesh screens. Consequently all of the ore is reduced to that size. It then goes to hydraulic classifiers which feed 45 Wilfley tables and six Frue vanners. The concentrates are received in a filter bin. The power plant contains three Erie City boilers and two Atlas-Corliss engines of 450 h.p. in the aggregate. It is hoped that adequate supply of water can be obtained from the mines, but it is contemplated to put in a 12-in. pipe line to pump water from beyond Ely, the line being 13 miles long. At the time of my visit (July 24) this pipe-line had not been begun. Of course the operation of the Giroux mill is dependent upon the water-supply, and it is not to be supposed that the management of the company, which is in the hands of experienced mining men, has overlooked that important matter, although opinions may differ as to the advisability of its plans. Such water as may be secured will naturally be used over and over again minus the inevitable loss by leakage, evaporation, etc., and it is generally conducive to good work in ore dressing to be obliged to reduce the use of water to the minimum.

The various shafts of the Giroux company are connected with the mill by a railway of 3-ft. gage, two miles long, operated by small locomotives. The line of the Nevada Northern to the Veteran shaft will pass near the mill, affording the necessary outlet for the shipment of concentrates, etc.

The peculiar system of crushing and screening adopted in this mill is explained by the extraordinary friability of the ore, which is of sugary character and crumbles between the fingers, the mineral being largely released as the ore is delivered from the mine.

The Giroux company also has a small smelting plant at the mine, which was installed two or three years ago. The principal part of this is a 42x120-in. blast furnace. Contrary to some reports, it is not the intention of the company to put this plant in operation along with the mill. There are no roasting furnaces and it would be impossible to smelt the mill concentrate alone without roasting. However, the company has a certain amount of oxidized ore, which assays well in copper and iron, and a proportion of the sulphide concentrate might be smelted with it, giving a matte product for shipment, but for a while the mill concentrate will be

solidated, in which relatively small bodies of ore are said to have been developed, and the Veteran mine, adjoining the Giroux, where a large body of ore was found last October. Since then this ore has been developed by a main drift, running north-west, for about 1000 ft., and by crosscuts 250 to 300 ft. long. These workings, which are on the level of 380 ft. at the shaft, have not yet defined the limits of the orebody. Very little work to show its thickness vertically has yet been done, but there is reason to believe that this is rather large. There are old workings in the leached zone at the 124-ft. level, which are said to have cut the top of the second-

Veteran. These mines are expected to be able to deliver ore by the end of 1907, at which time it is hoped that the first part of the mill will be ready for operation. In subsequent articles I shall describe the Steptoe mill and smelter and discuss the commercial position of the Ely mines.

Iron Mines in Southern Italy

A report in *Electricita*, through the *Iron Age* (Sept. 12, 1907), makes announcement of the confirmation by the Italian Minister of Finance of an agreement between the Italian Government and a private company with a capital of \$4,000,000 for the exploitation of the iron mines in southern Italy. A recent act permits of taking 200,000 tons of ore from the Elba mines. For two years the matter has been held up by an attempt to harmonize the views of ironmasters in northern Italy with those of the southern Italian interests. The signing of the contract is of importance to Naples, as the company will now proceed to erect a large plant for smelting and rolling iron at the port of Bagnoli.

The Gayley Dry-air Blast

According to the *Iron Age*, the Illinois Steel Company, one of the constituents of the United States Steel Corporation, has placed a contract to equip two blast furnaces at its South Works, Chicago, with the Gayley dry air blast. The new plant will be so located that it can be applied to any two of the furnaces of the groups Nos. 1, 2, 3 or 4, or to the bessemer converters at the South Works. The contract for the refrigerating machinery has been placed with the Vilter Manufacturing Company, Milwaukee, and includes four horizontal duplex ammonia compressors of 275 tons capacity each, 100 coils of double-pipe ammonia condensers and 80 coils of double-pipe brine coolers. It is believed that this will be the largest single refrigerating plant installed in this country. The dry blast contract will make the installation of the Gayley process available for six furnaces in this country and two in England, the installation of two furnaces at the Cardiff Works of Guest, Keen & Co., being expected to operate in October.

An organized attempt is to be made to exploit the Canterbury Plains for petroleum says the *New Zealand Building and Mining Journal* (July 25, 1907). A syndicate is being formed to acquire boring rights from the landholders in the county of Ashburton, between the Rakaia and Rangitata rivers, and between the main line of railway and the sea beach. The presence of petroleum has been noticed at sea between the Amuri Bluff and Cheviot, along the 100-fathom line, and also in the Waihao river near Waimate.

LIST OF ELY MINING COMPANIES.

NAME.	NO. OF SHARES.	PAR.	VENDOR'S SHARES.	TREASURY SHARES.
Boston Ely Copper Co.....	1,000,000	\$ 1	700,000	300,000
Boston-Ely Development Co.....	200,000	10	.....	.....
Butte & Ely Copper Co.....	500,000	1	250,000	250,000
Chairman Con. Copper Co.....	.....	.....	.....	.....
Cumberland Ely Copper Co.....	1,300,000	5	.....	.....
Dolly Varden Copper Co.....	1,000,000	1	700,000	300,000
East Cumberland Ely Co.....	500,000	1	260,000	240,000
Ely Amalgamated Copper Co.....	500,000	5	250,000	250,000
Ely Arch Copper Co.....	1,000,000	5	.....	.....
Ely Bonanza Copper Co.....	1,000,000	1	600,000	400,000
Ely Calumet Copper Co.....	1,000,000	5	700,000	300,000
Ely Calumet Copper Mining Co.....	1,000,000	1	600,000	400,000
Ely Central Copper Co.....	1,200,000	10	900,000	300,000
Ely Consol. Copper Co.....	1,000,000	10	.....	.....
Ely Consol. Mining Co.....	1,000,000	5	.....	.....
Ely Copper Queen Mining Co.....	2,500,000	5	1,500,000	1,000,000
Ely Copper Co.....	1,000,000	5	.....	.....
Ely-Giroux Extension Mining Co.....	1,000,000	5	600,000	400,000
Ely Grand Central Copper Mining Co.....	1,000,000	1	600,000	400,000
Ely Hidden Treasure Mining Co.....	1,500,000	1	900,000	600,000
Ely Jackpot Mining Co.....	1,000,000	1	600,000	400,000
Ely Mines Co.....	1,000,000	5	.....	.....
Ely National Copper Co.....	2,000,000	2½	1,500,000	500,000
Ely Nevada Copper Co.....	1,000,000	1	700,000	300,000
Ely Nevada Exploration Co.....	50,000	5	27,000	23,000
Ely Northern Copper Co.....	1,000,000	1	700,000	300,000
Ely Ogdan Mining Co.....	1,000,000	1	.....	.....
Ely Phoenix Copper Mining Co.....	1,000,000	1	750,000	250,000
Ely Resurrection Copper Co.....	2,000,000	5	716,000	1,284,000
Ely Revenue Copper Co.....	1,000,000	1	600,000	400,000
Ely Rochelle Copper Co.....	200,000	5	125,000	75,000
Ely Sulphide Copper Co.....	1,000,000	1	750,000	250,000
Ely Western Copper Co.....	1,000,000	1	700,000	300,000
Ely Witch Copper Co.....	1,000,000	2	700,000	300,000
Giroux Cons. Mines Co.....	1,000,000	5	600,000	400,000
Giroux Ely Ext. Copper Co.....	1,000,000	1	700,000	300,000
Greenwater Ely Cons. Copper Co.....	1,000,000	1	.....	.....
Herstelle Ely Copper Co.....	1,000,000	1	500,000	500,000
Manhattan Ely Copper Co.....	1,000,000	5	600,000	400,000
McDonald Ely Copper Co.....	1,000,000	5	600,000	400,000
Montana-Nevada Copper Co.....	5,000,000	1	.....	.....
Nevada Cons. Copper Co.....	1,300,000	5	.....	.....
Nest Egg Gold and Copper Mining Co.....	3,000,000	1	1,500,000	1,500,000
Nevada Ely Copper Co.....	3,000,000	1	2,200,000	800,000
Pittsburg Ely Copper Co.....	1,000,000	5	600,000	400,000
Rickard Ely Copper Co.....	1,000,000	1	.....	.....
Robinson Mining Co.....	1,000,000	1	950,000	50,000
Salt Lake Ely Copper Co.....	1,000,000	5	600,000	400,000
Sapho Mining Co.....	1,000,000	1	600,000	400,000
Ely Mizpah Copper Co.....	1,000,000	1	500,000	500,000
Turner Ely Copper Co.....	1,000,000	10	700,000	300,000
United Ely Copper Co.....	1,000,000	5	700,000	300,000
Veteran Ely Ext. Copper Co.....	1,000,000	1	700,000	300,000
Vulcan Ely Copper Co.....	1,000,000	5	.....	.....

shipped. The Giroux company will doubtless be the first producer in the Robinson district. If it mills 500 tons per day of ore assaying 3 per cent. copper, its annual production will be equivalent to about 8,000,000 lb. of refined copper per annum. It is the intention of the company to mine by the caving system, but plans for this have not yet been formulated and at the outset the ore will be stoped and the ground timbered with square sets. The latter will be an expensive system of mining in this district, where timber is so costly.

THE VETERAN MINE

The Cumberland-Ely Copper Company owns property east of the Nevada Con-

dary ore at certain places. The ore exposed in the 380-ft. level is decidedly richer in sulphides than the ore of either the Ruth or Eureka mines, and it is believed that it averages 3 per cent. copper. The Veteran orebody is undoubtedly a large and important one and at the present time is the chief asset of the Cumberland-Ely company. Preparations are being made to sink a main working shaft for its extraction.

CONCLUSION

The Steptoe Valley Smelting and Mining Company is preparing to mill 4000 tons of ore per day. It is expected to obtain 2000 tons per day from the Eureka mine and 1000 each from the Ruth and the

Granby Consolidated Mining, Smelting and Power Company, Ltd.

This company owns an important copper property in the Boundary district of British Columbia. The report for the year ending June 30, 1907, shows \$13,500,000 capital stock, with a total surplus of \$2,775,758. The income account is as follows:

Gross earnings.....	\$4,521,549
Working expenses.....	\$2,442,456
Foreign ores purchased.....	154,156
Total expenses.....	\$2,596,612
Net profit for the year.....	\$1,924,937

Adding the balance brought over from the previous year, gave a total surplus of \$4,472,676. Payments from this were \$76,198 for exploration and bonus to employees; \$1,820,000 for dividends; total, \$1,696,918, leaving a balance of \$2,775,758, as above. There was expended for new construction and equipment, \$317,678, and for additional mining properties, \$68,164. The cost of working was \$3.697 per ton of ore; the net cost per pound of copper, after deducting value of gold and silver, was 10.14c. The average prices realized, with the quantities turned out were: Copper, 16,410,576 lb., 22.21c. per lb.; silver, 257,358 oz., 67.9c. per oz.; gold, 35,083 oz., \$20 per ounce.

Mine development was 9701 lineal ft.; diamond drill development, 7279 ft. The smelter report shows 665,915 dry tons smelted, 649,022 tons being Granby ore and 16,893 tons foreign ore.

President Langeloth's report says: "The operations during the year show a very considerable falling off as compared with the previous year, in spite of the fact that the mines were prepared to furnish a very much larger tonnage and the smelter fully equipped to handle the same. This is due to the great shortage of fuel throughout the West in the past year; the railroads were unable to procure sufficient coal to operate their trains and the company sufficient quantities of coke for its furnaces.

"In the British Columbia coalfields, whence our supply of fuel is drawn, there were two strikes, one last fall and the other last spring, resulting in the production of coke being seriously interfered with and the output crippled to such an extent that at no time could the quantities contracted for be delivered. A very severe winter caused blockades of all the railroads, which, irrespective of this, were hardly able to take care of the largely increased traffic. In order to relieve the situation temporarily, contracts were made last October for about 20,000 tons of eastern coke, which entailed an extra expenditure of nearly \$100,000, but later in the season even these supplies were stopped on account of the railroads being unable to make deliveries. All these cir-

cumstances interfered seriously with the operations of the plant, and the cost of mining and especially of smelting increased considerably. The eight large furnaces could be operated only intermittently, and during the month of May both mines and smelters had to be closed down for want of fuel. The output suffered heavily, especially at a time when prices for copper were at the highest, and this in turn precluded our receiving as high an average price for the product as would otherwise have been the case. All copper is sold at the current prices ruling as soon as the weight and assays are agreed upon with the refiners, and no stocks are, therefore, on hand.

"It was estimated at the beginning of the year that, due to the greater capacity of the smelter, the production could be increased to about 25,000,000 lb. Instead of this, only 16,403,749 lb. of copper were produced, or about 3,250,000 lb. less than the previous year. In spite of all these adverse conditions, the net profits are somewhat higher, but not at all in harmony with what ought to or could have been accomplished if the regular supply of coke could have been secured. The cost per pound of copper produced, after deducting the value of gold and silver, was 10.14c. during the past year, against only 8.35c. in the preceding year. If the mines and plants are operated to their full capacity, lower costs can again be confidently expected. At the smelter the eight furnaces are now in shape to handle over one million tons of ore per year, which should produce in the neighborhood of 30,000,000 lb. of copper.

"Among the more important new work undertaken and completed at the mines was the sinking of the new Victoria three-compartment shaft, which will be connected with the different ore levels; a complete electric hauling system is being installed on the 400-ft. level. It is estimated to hoist and crush 2000 tons of ore daily at this shaft alone. The shipping bins are between the tracks of the Canadian Pacific and the Great Northern railroads, giving the advantage of transportation to the smelter by two roads.

"The Gold Drop and Monarch properties, acquired about two years ago, have been developed vigorously, and have proved very valuable additions to our holdings. Very large quantities of ore are in sight and shipping facilities have been provided to handle a large tonnage. In a word, the mines are prepared to produce practically any tonnage that can be transported to the smelter, where the entire eight furnaces have been enlarged, and have now a maximum capacity of about 3500 tons per 24 hours.

"One element of uncertainty in the past—which at times crippled the work—has been eliminated. A contract on favorable terms has been made with the South Kootenay Power Company for the supply of electricity. The plant has been

completed, and power in abundance is now being furnished.

"The question of securing regular supplies of coke has been constantly before the board, and after mature deliberation it was decided to acquire a considerable interest in the Crow's Nest Pass Coal Company, Ltd., from which our main supply of fuel is secured. The wisdom of this step has already made itself felt, as for the last few weeks a full supply of coke has been furnished, thus overcoming the difficulties which, as already mentioned, were very costly to the company. Vice-president and general manager Jay P. Graves has been elected a director of the Crow's Nest Pass Company.

"The above mentioned expenditures may make it advisable in the near future to issue the treasury stock of 15,000 shares of the par value of \$100 each, in which event the same will be offered to the stockholders pro rata to their holdings, on terms still to be decided upon by the board.

"Considering the large quantities of ore which have been developed during the year, the board feels justified in continuing its work of providing a larger smelting capacity, but improvements of this kind take a great deal of time and have to be laid out in a careful way, in order to secure the most economical treatment and best results.

"During the year the shares of the company were converted into \$100 shares par value, by exchanging 10 shares of \$10 each into one share of \$100. The new shares have been listed on the New York and Boston stock exchanges, and the conversion was a success, as on Sept. 13, when the books closed, it showed that 134,009 shares of \$100 each are outstanding and 9910 shares of \$10 each.

"Four regular quarterly dividends, in all 12 per cent., have been declared during the past year."

A consideration not generally figured on by the prospective user of the diamond drill, is the fact that when two-carat stones become less than three-fourth carat in size, they are no longer available for setting stones, except as clearance stones in the side of the bit or core barrel, and if not so used can only be sold as chips at a small percentage of the original price per carat. This makes the original cost of the stones per carat very much more than the market price of the stones, as only 1/4 carats of each stone is available as a cutting member.

In 1858 the mines of Saxony gave occupation to 11,464 persons, while in 1900 only 2806 persons were employed. Inability to compete with foreign enterprises, which are highly organized and backed by large capital, has steadily forced the closing of the less productive mines.

Shaft Sinking by the Freezing Process

The Vertical Pipe Method Used at Two Collieries in England and a New Ring Process Employed in Germany

BY SYDNEY F. WALKER*

Sinking by the freezing process is gradually making its way. It has been somewhat largely employed in Germany and Belgium, where it has also been used for driving tunnels in railway work; and within the last few years two important sinkings have been carried out in the county of Durham, in the United Kingdom, one at Washington colliery, and the other at the Dawdon colliery, in the neighborhood of Seaham harbor.

The latter is of considerable interest, as the colliery is within a mile of the sea-shore, and is intended to work the royalties that have been obtained from the Crown, running underneath the sea. At Dawdon it was the water from the sea which caused the great trouble in sinking, enormous quantities of water passing in through gulleys in the magnesian limestone, the total quantity of water to be pumped before the freezing process was resorted to being 7050 gal. per minute.

In the United Kingdom and in Germany and Belgium, the great trouble with water-bearing strata usually arises in the loose quicksands that are sometimes met with. At Dawdon there was 92 ft. of yellow sand, and 356 ft. of magnesian limestone, while at Washington colliery there was 41 ft. of clay sand lying on a gravel bed, with a bed of clay with boulders underneath, and 34 ft. of dry yellow sand above.

PRINCIPLES OF THE PROCESS

The freezing process consists essentially in building a wall of ice around the shaft from the water from which the trouble arises, and the sand or other strata in which the water is inclosed. The ice wall consists of a hollow cylinder, completely inclosing the space in which the shaft is to be sunk, at such a distance that the process of sinking can be carried on with safety, and without damaging the ice wall. In the Washington sinking, the shaft was to be 14 ft. in diameter, and the ice wall was formed in a cylinder of a mean diameter of 20½ ft. At Dawdon the shaft was to be 20 ft. in diameter, and the holes for the freezing apparatus formed a cylinder 30 ft. in diameter.

The ice cylinder, when formed, must be sufficiently strong mechanically, to withstand all the strains and stresses that may be brought against it, both by the processes of sinking on the inside of

the cylinder, and by the working of the ground, the motion of the water and any other forces that may be present on the outside. It must also be of sufficient thickness, and must be frozen to a sufficiently low temperature, to stand the constant attrition that will go on, owing to the convection currents that will be set up in the water surrounding the ice cylinder.

As the water from which the ice cylinder has been formed will necessarily be at a considerably higher temperature than the outer portion of the ice wall, there will be a continual passage of heat from the water to the surface of the ice wall, with a continual melting of a small quantity of the ice, followed by a continual motion of the water which has delivered the heat to the ice wall, its place being taken by the colder water behind.

The thickness of the ice wall will vary, according to the conditions present. It will necessarily be thicker with a deep sinking than with a shallow one. It will also necessarily be thicker with a shaft of larger diameter, such as that at Dawdon, than with the comparatively smaller diameter, as at Washington. At present no rule can be given as to the thickness of the wall, there are so many factors in the equation, so many of what mathematicians call independent variables.

THE SURROUNDING STRATA

In addition to the questions of depth and diameter, there are also the questions of the surrounding strata, and of the strata below, which will materially modify the question of the thickness of the ice wall. At Washington colliery the wet sand to be frozen, as mentioned, rested upon a bed of clay, containing boulders varying in size from a pea to 3 ft. in diameter, and the German engineers who carried out the work, insisted upon sinking right through the clay, and right down to the yellow freestone which underlay the clay. British mining engineers expressed the opinion that it was hardly necessary to carry the freezing down through the clay, but the German contractors insisted on doing so, as they stated that they had met with considerable difficulty in sinking through running sands in Germany, where they did not carry the ice walls into a substantial stratum below.

Probably the contractors, in this case, were guided by the fact that the loose running sand surrounding the ice cylinder, though it might be supposed to in-

close the cylinder closely, since the latter would expand in the process of freezing, would not form a really substantial support, owing to the nature of the sand itself, and therefore they found it necessary to provide a foundation in the form of the lower portion of the ice cylinder in the clay.

No test was made either at Dawdon, or Washington, of the thickness of the ice wall. In each case the center of the shaft was frozen, so that it probably extended several feet outside the tubes.

In addition to freezing the water of which the ice wall is formed, the temperature of the sand, clay, limestone, or whatever the water may be held in, has also to be reduced to that of the ice formed from the water. As the freezing process is now carried out, the brine which circulates in the pipes to be described abstracts heat from the water surrounding them, and from the stratum that is held by the water, and carries it to the brine tank in which the evaporating coils are immersed, there delivers it to the evaporating coils, which in their turn carry it, by way of the compressor, or the absorber and generator, to the condenser, and thence to the cooling water.

REFRIGERATION REQUIRED

When the depth and diameter and thickness of the ice wall to be formed are known, it is not a difficult calculation to find the quantity of heat that must be abstracted from it, and delivered to the cooling water of the condenser. In order to freeze the water it is necessary first to lower its temperature from whatever it may be, say 70 deg. F., to the freezing point, in the neighborhood of 32 deg. F. Then the water must be frozen, and when it is frozen, the temperature of the ice so formed must be lowered considerably below the freezing point.

Whenever ice is formed, whether by mechanical process, or as we say, naturally, unless the ice, after freezing, is reduced a considerable number of degrees below the actual freezing point, it does not remain in a stable condition; it is more or less "sloppy." Every little addition of heat, such as may arise from friction, in this case from the presence of water at a considerably higher temperature, and from other causes, raises the temperature of a small portion of the ice sufficiently for it to become liquid, and produces a soft condition. In the present case it is particularly important

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that the ice wall should be at a very low temperature, because of the presence of the water in the strata.

The B.t.u., which is the standard for calculations of this kind, is the quantity of heat that must be added to 1 lb. of pure water at 39.2 deg. F., to raise its temperature 1 deg. F., or that must be abstracted from 1 lb. of water, at the same temperature, to lower it 1 deg. F. The quantity of heat required to raise the temperature of 1 lb. of water increases very slightly as the temperature of the water increases, and *vice versa*, but for calculations of the present kind, it is sufficient to take the specific heat of pure water as 1.

Water also, which is impregnated with salts, as the water in the neighborhood of sinkings almost invariably is, has two properties. Its freezing point is lowered, and its specific heat is also lowered. For practical purposes, however, it will be sufficiently accurate to take the specific heat of the water in the strata to be frozen as 1. The specific gravity of water in which salts are dissolved, is also increased, but for practical purposes again it will be sufficient to take it as 1, and to take the gallon of the water to be frozen as weighing 10 lb.

Hence from every gallon of water to be frozen, assuming its normal temperature to be 70 deg. F., 380 B.t.u. must be abstracted in order to reduce it to the freezing point, then a further 1420 B.t.u. must be abstracted in order to bring the whole of the water to the frozen condition.

OTHER SOURCES OF HEAT

Every substance, it is well known, exists either in the gaseous, liquid, or solid condition, owing to the presence or absence of a certain definite quantity of heat. Thus while to raise the temperature of 1 lb. of water 1 deg. F. requires the expenditure of one heat unit, to convert the same pound of water into steam at the boiling point requires 966 B.t.u. at ordinary barometric pressure. Again, the latent heat of water, which enables it to maintain the liquid condition, is 142 B.t.u.

That is to say, after the water has been reduced to the freezing temperature, 142 B.t.u. must be abstracted from every pound or 1420 units from every gallon, to reduce the water to the solid condition, ice. The specific heat of ice is only 0.5, as against water 1. Hence to lower the temperature of the ice from the freezing point to 0 deg. F., or thereabouts, the practice usually followed in sinking by freezing, 16 B.t.u. must be abstracted from every pound of ice, or taking the calculation back to the water, 160 B.t.u. must be taken from every gallon.

Putting these figures together, 1960, or roughly, 2000, B.t.u. must be abstracted from every gallon of water present, that

is to be converted into ice, in the ice wall that is to be formed.

This is, however, only a part of the heat that must be abstracted. As explained, the temperature of the sand, the clay, the limestone, or whatever the water may be held in, must be lowered to the same temperature, in this case taken as 0 deg. F., to which the water that is imprisoned in it is reduced. In order to calculate the number of heat units required to be abstracted from the sand, etc., it is necessary to know, first the quantity of sand present, say in a gallon of water, and secondly, the specific heat of the sand. At Washington colliery it was found after freezing, that the sand contained 37 per cent. of water by volume, or 19.6 per cent. by weight. Put in another way, in every cubic foot of the strata, there was about 1098 cu.in. of sand, and 630 cu.in. of water.

When the dimensions of the ice wall are known, it is a simple calculation to

be wise, as in all engineering work, to allow a liberal margin for unforeseen contingencies, the margin being as usual allowed in the refrigerating plant.

In addition to the above, if the ice wall is to remain intact, while the sinking proceeds, heat must be continually removed as it is delivered to it. If left to itself, the ice wall will slowly melt away, owing to the action of the water, as explained above, and to conduction of heat from the neighboring strata. The thermal conductivity of ice is much lower than that of the water and the stratum from which the ice wall was formed, but some heat will be constantly passing to the outer surface of the ice wall, and from it to the interior, the result being as explained.

The quantity of heat that will be delivered to the ice wall, may be determined approximately from Peclett's formula. It depends directly upon the surface exposed, and upon the difference of temperature between the surface of the

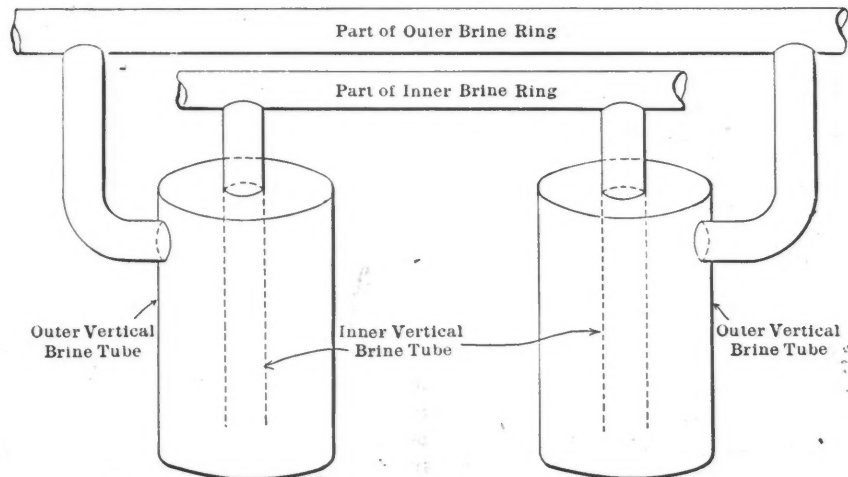


DIAGRAM SHOWING CONNECTIONS OF VERTICAL TUBES WITH BRINE RINGS

find its cubic content, and then taking 63 per cent. of this to be sand, where that is the substance in which the water is held, and 37 per cent. of water, and converting these by means of their respective specific gravities into pounds, or in the case of water, into gallons, multiplying the gallons of water by 2000 will give the number of heat units that must be abstracted to reduce the water to ice at 0 deg. The number of heat units to reduce the sand or other substance to the same temperature will be found by multiplying the weight in pounds by the specific heat, and by 70, assuming the temperature of the sand to have been originally 70 deg. F.

TO MAINTAIN FROZEN WALLS

This calculation, which may be put into a formula that will give the total number of heat units that must be abstracted from the stratum and the water held in it, in order that the ice wall may be formed. This number, it will be understood, is the minimum number of heat units that must be abstracted, and it will

ice wall and the substances in contact with it. Again a liberal allowance should be made in the plant that is designed to maintain the temperature of the ice wall at 0 deg. F., but the plant that is employed to create the ice wall, should in every case be more than sufficient to maintain it.

HOW THE HEAT IS ABSTRACTED

A ring of vertical pipes is fixed in the ground containing the water to be frozen, and carried from it to the surface. In practice the holes are sunk from the surface to the water-bearing strata, and through them to the depth to which it is decided to carry the ice wall. The tubes are placed usually from 3 to 4 ft. apart, the number varying with the diameter of the ice cylinder to be formed.

The actual freezing arrangement consists of two concentric tubes, which must stand in the ground absolutely vertical. The bottom end of the outer tube is closed, and the bottom end of the inner tube is sometimes fitted with a strainer or something of the kind, to prevent the passage of grit, etc. The inner tube is

usually from 1 to 1¼ in. in diameter, or larger with very deep sinkings. The size of the outer tube will vary with the depth of the ice cylinder, its thickness and diameter. At Washington the outer tubes were 4 in. in diameter, and at Dawdon 5 in.

The cooling action of the pipes in which the cold brine is circulating depends directly upon the surface of the pipe exposed to the stratum, and the water contained in it; hence the deeper the sinking, etc., the larger the tube.

Fixing the tubes in an absolutely vertical position presents the greatest difficulty of the process. Holes are drilled where rock or clay has to be passed through, or bored with a sharp-edged tube, and a sand pump, where sand is passed through, the holes being considerably larger in diameter than the outer freezing tubes to be employed. At Washington the holes

the exposure of the shaft work that is not to be frozen, to the very low temperature attained in the other strata.

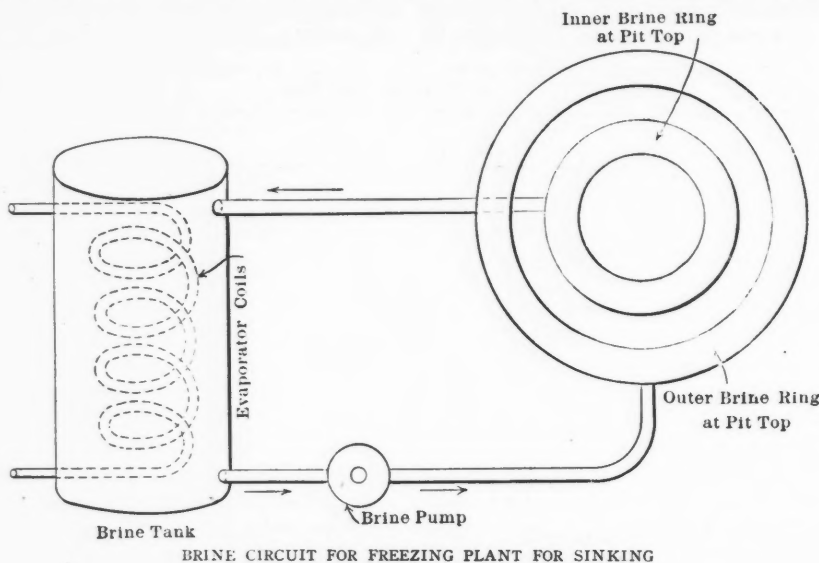
INSTALLING THE APPARATUS

It is the usual practice with the German engineers mentioned, to sink a shallow forepit, larger in diameter than the ice cylinder is to be, to accommodate the apparatus to be employed in freezing. At Washington, the forepit was 24 ft. in diameter, and was sunk to a depth of 24 ft. At Dawdon the forepit was 36 ft. in diameter, and was sunk to a depth of 8 ft. In the forepit, all the boring etc., is carried on, and the connections to the freezing tubes are made.

There are two horizontal concentric rings of pipes fixed in the neighborhood of the tubes and completely surrounding the shaft. These two rings correspond to the bus bars of an electrical distribu-

in the brine accompanied by a rapid circulation. In all cases where heat is made to pass from any substance, through a metal diaphragm to a liquid or a gas, or *vice versa*, the highest efficiency is obtained when the liquid or the gas flows over the metal surface in a thin stream, and at a comparatively high velocity. The cold surface of metal produced in the outer freezing tube extracts heat from the layer of water and sand, etc., immediately adjoining the tube; this layer, having its temperature lowered, extracts heat from the layer beyond it, and so on, a series of concentric cylinders being produced, the temperature of each cylinder being higher as it recedes from the pipe.

The layer of water immediately in connection with the pipe naturally becomes frozen very quickly, and it tends to set up a resistance to the passage of heat from the outer layers, ice having a higher thermal resistance than water. If the process is continued, however, long enough, and the plant is sufficiently powerful, the frozen area gradually extends outward from each tube, until the cylinders formed by adjoining tubes connect, and when these are welded together, the ice wall is formed. As long as the work is to go on in the shaft, these cylinders must be maintained at the low temperature mentioned, and the junctions between adjacent cylinders must also be maintained, and this, in spite of the constant delivery of heat to every part of the ice wall, by the water, etc., from the outside.



BRINE CIRCUIT FOR FREEZING PLANT FOR SINKING

were 6 in. in diameter, and at Dawdon they ranged from 9¾ in. at the top to 6¼ in. at the bottom.

The holes, when drilled or bored, are lined with guide tubes, practically filling the bore hole, and inside of this the outer freezing tubes are first fixed, and then the inner tubes. Where the tubes have to pass through a considerable depth of strata not required to be frozen, as at Dawdon, it is the practice of the German engineers who carried out the sinking at that colliery, to fix a third set of tubes between the inner and outer tubes, for the depth that is not required to be frozen. The third set of tubes is connected to the outer tubes, and it is arranged that the brine flows between the inner and the middle tubes, leaving an air space between the middle tube and the outer, and so to a certain extent insulating the strata and the shaft work that may have been done above the stratum to be frozen. The object of this arrangement is two-fold. It lessens the work the brine and therefore the compressors have to perform, and it avoids

tion system. The inner ring is connected to the cold end of the brine tank, the outer to the warmer end, the inner pipes being connected to the inner ring, and the outer pipes to the outer ring. A pump is included in the circuit between the brine tank and the rings, and the brine is kept circulating from the brine tank to the inner ring, thence down through the inner tube, up the outer tube to the outer ring, thence to the pump and to the brine tank. In the brine tank it flows over the evaporating coils through which the ammonia or carbonic acid are continuously passing and evaporating, being cooled in the process, the heat taken from the stratum and the water surrounding the tubes being carried by the brine to the evaporator, and thence to the condensing water.

The guide tubes are removed after the freezing tubes are properly in position. The temperature of the brine is not increased to a very large extent, 2 or 3 deg. C.; 3.6 to 5.4 deg. F., being the average. Efficiency in this case is secured by only a small increase of temperature

THE POWER REQUIRED

A cold-storage plant is rated as a one-ton plant, a two-ton plant, etc., according to the quantity of refrigeration it is capable of accomplishing in twenty-four hours. A one-ton plant is supposed to be capable of performing the equivalent refrigeration to that that would be produced by the melting of one ton of ice, at 32 deg. F. in 24 hours. The American ton is 2000 lb., while the British ton is 2240 lb. Hence the American ice ton is 284,000 B.t.u., and the British is 318,080 B.t.u.

When ice is to be formed, it is usual to divide the ratings by two. Thus a one-ton machine should do the same work in cooling the air of a cold store, as would be done by the melting of one ton of ice, but it will not produce one ton of ice. In the present matter it will be wiser to allow even a larger margin, and for this reason. Artificially made ice is usually reduced to a temperature of from 15 deg. F. to 17 deg. F., whereas the ice wall in the present case will be at only a few degrees F., and the lower the temperature to which it is reduced, the better it will stand.

To find the size of plant required for performing the operation of freezing an ice wall, the cubical contents of the ice wall have to be calculated, and the heat units to be abstracted respectively

from the water and the sand or rocks taken, this being the total work to be done.

The whole of the freezing can be carried out within certain limits, in as long or as short a time as the engineer chooses, the smaller the time in which the freezing is to take place, the larger the plant required for the purpose. At Dawdon colliery, I calculate that, from the quantity of brine circulating, and the increase of temperature in the brine, over 17,000,000 B.t.u. were abstracted per day, and the total heat abstracted from the water, sand, rock, etc., was 1,600,000,000 B.t.u.

THE OPERATION AT DAWDON COLLIERY

The freezing process occupied 185 days, and the work done by the brine was the equivalent of that done by the melting of 60 tons of ice per day. The plant supplied consisted of four units, each having a capacity of 40 tons, or 160 tons altogether. This would give a possible ice-making capacity, following the usual rule with ordinary ice plants, of 80 tons per day, and provide the usual working margin. The freezing could have been accomplished in approximately half the time, by the provision of a plant of double the capacity. If the plant had had only half the capacity, the freezing would still have been accomplished, but it would have taken probably more than double the time.

The most powerful plant that could possibly be put on the ground could not form the ice cylinder in less than a certain minimum time, and on the other hand, if the capacity of the plant was below a certain figure, the ice wall could not begin to form, as the heat could not be carried off sufficiently fast to allow it. The limits on each side, as usual, can be calculated if all the factors are known, but again as usual, are found from practical experience.

For ammonia, the rule for the compressor is that for each ton of refrigeration, or each half ton of actual ice-making capacity, the compressor should be able to transfer 4 1/3 cu.ft. of gas per minute from the expansion coils to the condensing coils, and the capacity of any given ammonia compressor may be found from the formula:

$$C = \frac{PLN}{7500}$$

where C is the capacity in tons, P is the area of the piston in square inches, L the length of the stroke in inches, and N the number of single strokes per minute.

Or per contra, the size of the compressor required may be found from the formula:

$$P = \frac{C \times 75000}{LN}$$

Refrigeration compressors work at a very much lower piston speed than modern steam engines, 200 ft. per minute or thereabouts.

COOLING WATER

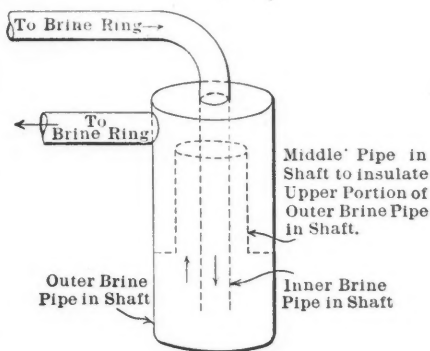
The above figures are on the supposition that the cooling water for the condenser is at the temperature of 70 deg. F. For every 5 deg. the temperature of the cooling water exceeds 70 deg. F., the capacity of the compressor is reduced by 1 per cent., and for every 5 deg. below that temperature it is increased 1 per cent. The quantity of cooling water required in the condenser will vary again with its initial and final temperatures. At 50 deg. F., with atmospheric condensers, it is usual to allow 1/2 gal. per min., the quantity increasing with the initial temperature to 2 gal. per min. at 85 deg. F., the cooling water being supposed to leave the condenser at a temperature of 95 deg. F. Where there is plenty of cooling water, it is wiser to use a larger quantity, and not to allow the tempera-

A NEW METHOD OF EMPLOYING THE FREEZING PROCESS

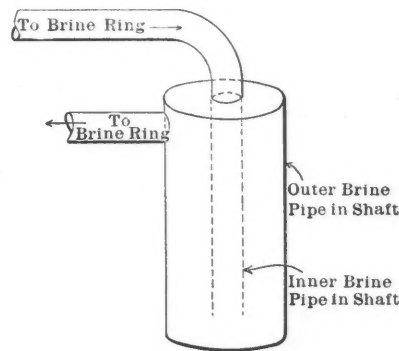
Since writing the above, information has come of a new process that has been worked out in Germany, which presents many advantages over the system described. In this system a hint appears to have been taken from the Kind-Chaudron method.

The shaft is sunk in the ordinary way to a little above the level of the water-bearing stratum. Then the freezing apparatus is put in, and only a small depth of the water-bearing stratum is frozen at once. The freezing apparatus consists of a cylinder, approximately the diameter of the shaft, 44 in. in high, as employed in Germany, its lower end being closed by a hemisphere. The cylinder and the hemisphere are divided into twenty sections, each one of which can be removed from the apparatus, and replaced at will. Each section carries brine pipes, and the whole apparatus is insulated thermally on the inside.

When the freezing is first begun, the



ARRANGEMENT OF VERTICAL TUBES IN SHAFT



ARRANGEMENT OF CONNECTING FREEZING TUBES

ture to rise much. For submerged condensers the quantity of water required will be from 20 to 25 per cent. more than with atmospheric condensers. In the submerged condenser, the water has to do the whole of the work, while the evaporation by the atmosphere does a portion of it with atmospheric condensers.

The brine tanks are usually arranged to have 60 cu.ft. of brine capacity per ton of refrigeration, that is, per half ton of ice-making capacity. At Dawdon, the four brine tanks contained 20,000 gal. of brine. The length of the evaporating coils in the brine tanks will again vary with the size of the pipes. The cooling effect depends directly upon the surface exposed to the brine, and a smaller length of a larger pipe can be employed where it is convenient to do so. The usual rule is for 1-in. pipe, a length of 150 ft. per ton of refrigeration, and for a 2-in. pipe, 90 ft. At Dawdon the evaporating coils were 8000 ft., and at Washington, 2000 ft.; both 1 in. in diameter.

cylinder and hemisphere are put together and fixed in position at the bottom of the shaft, and brine circulated through them. It is stated that an ice wall is produced, extending up the shaft to a distance of three tubing rings, and down the shaft to a sufficient distance for excavating a sufficient depth to put in another tubing ring. The ice wall is also formed on the outside, to a sufficient distance to protect the whole of the interior, when excavation commences.

When the ice wall is formed, the process again differs from that employed in the Poetsch system, employed at Dawdon and elsewhere. Two sections of the cylinder and hemisphere are thawed, and the ground in their immediate neighborhood is also partially thawed, sufficient for excavation to be carried on. Sinking in those two sections is completed, then the next two sections are thawed, and the sinking completed in those, and so on, all the way round, the tubing being placed in position, and the whole process begun again. It is stated that

the external ice wall remains solid while the excavation is being carried on, section by section.

It occurs to me that possibly a modification of the Poetsch and the Oetling system, that last described, may be possible in certain cases. In place of carrying the concentric tubes from the surface through the water-bearing stratum, sinking might be carried on by freezing a small portion at a time, by a ring of short lengths of tubes, carried down from temporary excavations at different levels, and further, that in place of concentric tubes, which must always present difficulties if short lengths are employed, a simple U joint at the bottom of the tube might be made use of.

Reflections of a Philosophical Axman

BY R. A. READ*

The axman should be a strong, active man with a love for the work.

While good men may be recruited from almost any walk of life, it has been noticed that the ex-bank clerk and the student along psychological lines have in many instances been extraordinarily successful—the former by reason of his ability to take care of the munificent salary paid him, and the latter because of his training as a mind reader.

It has also been noticed that twins make good axmen because of their ability to be in two places at the same time.

The axman's hours of work should begin approximately one hour before the party is ready to take the field, and his first duty should consist in preparing about six dozen stakes which will be carried in a basket provided by the company for that purpose, a small bond for which will be required as a means of protection in the event of any accident to the basket.

The stakes should be preferably of wood neatly pointed at one end and carefully planed on two sides so as to provide a suitable field for the talents of the stake artist. In the event of a shortage of stakes occurring in the field, any trees found growing in the vicinity may be utilized for the purpose. Axmen are warned against sharpening stakes with their teeth for, while \$1 a month is deducted from all salaries as a means of encouragement to the company physician, it is no part of the company's plan that he shall be expected to earn this.

The axes should be of the finest harveyized steel and should be carefully sharpened after each stake is driven, it having been noticed that the driving of stakes is considerably harder on the tool than either the cutting or sharpening.

In the event of the head chainman requesting permission to drive a stake or

*Steptoe Valley Smelting and Mining Company, McGill, Nevada.

two by way of a rest, the ax should be cheerfully turned over to him with some civil amenity anent the state of the weather, etc. The axman proper should then prepare to hold the stake as indicated by the chainman. Should a maladroitness stroke on the part of a careless or inexperienced man descend on a finger or wrist, avoid bad language, indicate the proper method by means of the voice, or merely rap on the ground with the free hand.

In conclusion, the attention of the axman is drawn to the necessity of perfect harmony in each party. In replying to the instrument man avoid such expressions as, "You're a liar," "I know better," "Go to H—," etc., and endeavor to remember at all times that a gentlemanly bearing is one of the first requisites of a successful axman. By a careful study of his superiors, the axman can do much toward rendering pleasant the general relations of the integral parts of the party, and his efforts along these lines will go far toward establishing that *esprit de corps*, without which nothing truly great is ever accomplished.

Glance as an Original Copper Ore

BY J. VOLNEY LEWIS*

Professor Kemp, in his admirable article on "Some new points in the geology of the copper ores,"¹ has called attention again to the erroneous old idea that chalcopyrite is the original copper ore from which all the others have been derived by various secondary processes, and has emphasized the great superiority of chalcocite, or glance, as the actual and potential source of the world's supply of copper.

It is of interest in this connection to note that in a recent study of the numerous copper localities in the Triassic belt of New Jersey² I have found chalcocite to be invariably the original and essential ore in those deposits that are closely associated with intrusive igneous rocks, as at the old mines near Arlington and Griggstown, while at a greater distance from such intrusives this mineral is found but sparingly and native copper predominates. It is true that many of these localities are like the old mine at Bristol, Connecticut, in their unsatisfactory records as producers, but this is also true of most of the old Appalachian chalcopyrite deposits.

The New Jersey deposits seem to be the result of ascending thermal waters, probably of magmatic origin, carrying cu-

*Professor of Geology in Rutgers College, New Brunswick, N. J.

¹The JOURNAL, June 22, 1907, p. 1192.

²"The Newark (Triassic) copper ores of New Jersey," Annual Report of the State Geologist of New Jersey for 1906. Abstract in *Economic Geology*, vol. II, p. 242.

prous sulphate in solution. These deposited glance in the immediate vicinity of the heated igneous mass and native copper on passing up into the cooler strata, as demonstrated experimentally by H. N. Stokes, in the laboratory of the U. S. Geological Survey.³ The native copper is often associated with extrusive sheets of diabase in the Watchung mountains, but in other cases it is far removed from them, and it probably sustains no genetic connection with them anywhere. While this hypothesis coincides admirably with Mr. Weed's conclusions for other districts, it is quite at variance with his interpretation of these particular deposits,⁴ which he attributes to "alteration due to ordinary atmospheric waters, the adjacent shales absorbing and retaining the copper by the so called absorption process." There are many places in the Triassic belt of New Jersey to which this explanation cannot possibly be applied.

Antimony Mining in Turkey

Consul E. L. Harris writes from Smyrna in regard to the present condition of antimony mining in Turkey. It appears that antimony ores are pretty well distributed throughout Asia Minor and they usually are found as fissure veins with which pyrite is sometimes associated. The condition of antimony ore mining is not very regular, as existing conditions make the cost of delivering ore at a sea port about \$44 a ton, and profitable mining is possible only when the antimony market is high.

The most important producing district is Murat Dagh, between the towns of Ushak and Kutaya. In this section, stibnite is found in quartz outcroppings and averages about 70 per cent. metallic antimony. At present the only producing mine is the Djinli Kaya at Odemish. This mine has a rather crude concentrating plant of 40 tons daily capacity. The plants lose about 30 per cent. of the pure ore in slimes and waste. It is stated that a complete refining plant which was erected on the property proved too costly to operate and it is now in ruins.

The concentrated ore is shipped from Smyrna, almost entirely to England. Transportation is generally by camel at a cost of 12c. per ton mile. Average daily wages are as follows: Expert miners, 50 to 75c.; timbermen, 75 to 87c.; ordinary laborers, 25 to 37c. The Government charges a royalty of 5 per cent. on the gross value of the ore and a 1 per cent. customs duty. The output in 1905 was 450 tons, of which 350 were from Djinli Kaya, and during 1906, 830 tons.

³*Economic Geology*, vol. I, 1906, pp. 644-650.

⁴Ann. Rep. State Geol. of N. J. for 1902, p. 131, and "Copper Mines of the World," New York, 1907, p. 267.

The Broken Hill Proprietary Company

This company owns extensive silver-lead properties in the Broken Hill district in New South Wales. Its latest report is for the half-year ended May 31, 1907. The directors' report says that the continuance of high metal values has resulted in a satisfactory balance; the profit for the half-year was £308,238, as against £314,284 for the previous six months, and this notwithstanding an increase in wages and other heavy charges which have come into operation since November last. The profit per ton of ore treated was £1 os. 9d., against £1 is. 1d. per ton, the increase in wages being equal to about 2s. 2d. per ton of ore. The accounts now presented show an increase in the reserve fund of £25,000, bringing it up to £225,000, while the insurance funds have been increased to £35,000. Two dividends (148 and 149) of 1s. 6d. each, and two bonuses of 1s. per share, amounting in all to £240,000, were distributed among shareholders. The gross profit for the half-year amounted to £331,125, which, after deducting £22,886 for depreciation, leaves a net profit of £308,238. The sum of £17,386 has been expended in construction, of which sum £10,349 was on account of plant and machinery, practically duplicating various plants; £3,341 for electric power plant and £1,265 for zinc concentration plant. After making due provision for all outstanding liabilities, there remain liquid assets, in cash, bullion, and other convertible stocks, representing a total value of £686,420, inclusive of the reserve and insurance funds.

The general manager's report says that operations during the half-year were interrupted by holidays. The output of crude ore from the mine reached a total of 290,088 tons. The fire which broke out in February, 1906, still continues to smolder between the limits imposed by the water-curtains. During the early months of the term it showed some activity near the bottom of the open cut, well within the boundaries of the water-curtains; no inconvenience, however, was felt underground.

The rainfall was very light, only 1.44 in. in six months, so that no water was conserved in the dams.

The classes of ore mined were as follows: Sulphide, 289,029; oxidized, 1059; total, 290,088 tons.

Steady work was accomplished in the concentration mills during the period, 282,279 tons having been treated, producing 47,394 tons of concentrates and 36,557 tons of smelter slimes; the recovery of lead and silver showed a small increase over that of the previous term from a slightly lower grade crude ore. Several minor improvements have been

introduced, and experiments in connection with various types of re-grinders for further reducing the ore are approaching completion. The re-treatment plant, attached to these mills, handled 32,545 tons of slimy tailings from the old dumps, producing 2242 tons of lead concentrates, and 7707 tons of smelter slimes, the residues going to the zinc plant.

During half-year 116,240 tons of tailings from the ore-dressing mills and dumps were treated, producing 25,353 tons of zinc concentrates. The grade of concentrates produced shows an appreciable improvement, largely in consequence of the substitution of deep pans for the shallow pans formerly in use. In order to provide a larger quantity of sufficiently ground feed for this process, a re-grinding plant is being erected, consisting of 15 grinding pans and appurtenances for the purpose of reducing the coarse tailings from the mills to the required fineness; the first section, consisting of four pans, is now approaching completion.

A total of 1133 tons of sulphuric acid (strong) was produced during the period. The plant worked smoothly and satisfactorily. To provide for increased requirements, two additional chambers, Gay Lussac, Glover, scrubbing and cooling towers, together with another sulphur-burner, are being added to this plant.

In all 42,941 tons of lump slimes were built into kilns, or about 6000 tons more than for the previous half-year, and 43,293 tons of sintered material were despatched to the smelting works.

At Port Pirie, eight smelters were in operation for the first five months of the term, after which an additional smelter was blown in to cope with the increased quantity of material available. Work done at this plant showed a further slight improvement in the recovery of lead. The following table shows the work done by the smelters:

	Tons Treated.	Perc'tage.
Kaolin and silicious ores.... (inclusive of purchased ores)	8,162	7.64
Sulphide concentrates.....	55,318	51.78
Sintered slimes.....	43,352	40.58
Total.....	106,832	100.00

In addition to the foregoing, there were re-treated: Flue dust, 835 tons; refinery drosses, 4003; total, 4838 tons, producing: Lead, 2857 tons; silver, 232,769 oz.; gold, 1429 oz.; thus making the total quantity passed through the smelters for the half-year, 111,670 tons.

Four out of the five roasters were in constant operation. A gas producer was installed at one of the roasters, replacing the ordinary fire-boxes formerly in use, and has proved so satisfactory as regards economy and general convenience that the balance of the plant is being similarly equipped. The plant dealt with the following quantities: Concentrates and slimes, 53,081 tons; smelting ore and

kaolin, 672; sulphide ore, 3,025; total 56,778 tons.

At the refinery 29,443 tons of bullion were treated, as against 29,520 tons during the previous half-year, producing: Silver (fine), 2,085,653 oz.; gold, 909 oz.; lead (soft), 28,701 tons; antimonial lead, 319 tons. The doré plant treated 21,499 ounces of doré bullion, producing 909 oz. gold.

During the half-year the manager continued making and tempering retorts of various mixtures of imported and colonial clays, and had a trial run with the furnace, practically testing the retorts. The later retorts put into the furnace having satisfactorily withstood working conditions, there is every reason to think that when a sufficient supply of tempered retorts of the same mixture is available regular running of this furnace will be possible. In view of the time required to temper the retorts, progress is necessarily slow.

During the period 16,530 tons of limestone were conveyed from Point Turton to Port Pirie. Work proceeded without interruption. At the coke works all the ovens were kept in constant operation, with the exception of a few days lost as a result of the coal lumper's strike in New South Wales.

Operations both at the mine and at Port Pirie have been materially hampered during the past six months through a shortage of skilled and unskilled labor, necessitating the importation of men for both establishments from the neighboring States. The position now shows some improvement in this respect.

Production of Goldfield, Nevada

BY ROBERT B. TODD*

Basing the estimate upon the weekly production of June, July, August and the first week in September, the Goldfield district, Nevada, is shipping ore at the rate of 157,144 tons per annum. Estimating the average value of this output at \$100 per ton, the value of the annual production at the present rate is \$15,714,400. The average weekly production was 2239 tons for June, 3672 tons for July and 3545 tons for August. The average for 15 weeks ending Sept. 7, was 3022 tons. During that period the mines sent out 21,180 tons by company workings and 24,154 tons by lessees' operations. The heaviest producer was the Mohawk mine with an output of 8151 tons. The Mohawk-Combination lease shipped 6220 tons; the Consolidated, 5908; the Mohawk-Jumbo lease, 5475; and the Little Florence lease, 3334 tons.

*President, Nevada-California Prospecting Company, Goldfield, Nev.

Daniel Willis James

In Daniel Willis James, head of Phelps, Dodge & Co., who died recently, the country lost a citizen of great and unusual value. To him was properly applied the term "captain of industry." The following appreciation is expressed by the *Evening Post*:

Mr. James did not know how to advertise himself. He put his name on no libraries or hospitals. No one trumpeted his industrial achievements, or was paid to tell for him the story of how he opened large areas of the Southwest to industry and agriculture. When he added a million dollars recently to his former large donations to Union Theological Seminary, it was merely announced that the money came from "a friend." To Amherst College, to Oberlin, to Columbia, to Hartford Theological Seminary, as to the Cathedral of St. John, he gave richly. Yet no one complained because he had the means to do it, for his fortune was honestly amassed, without the aid of special privilege or legislation. It is trite to say of a man like this that he is a city's and a nation's best asset. Yet it is right to dwell on it at a time when the abuse of wealth and the mulcting of the people by dishonest methods are the two topics uppermost in people's minds. Like Marshall Field, Mr. James honored the name of merchant; he showed, too, that success and honor in such a career by no means carry with them moral deterioration or an inability to appreciate the true values of life.

Tennessee Mineral Production

The official report of the mineral production of the State of Tennessee for 1906 has been issued. The figures for all products except coal and coke are given below:

Copper—The total quantity of copper ore mined in 1906 was 539,381 short tons; quantity treated, 538,141 tons, from which there was produced 17,354,781 lb. copper. The average yield was 32.25 lb. per ton, or 1.6 per cent. The number of mine employees was 628, and the amount paid for labor was \$346,496, an average of \$551.75 per man.

Lead—The total quantity of ore raised was 1248 short tons; the lead produced from ore 75 tons. the number of men employed was 23, and they received \$1300 in wages.

Zinc—The quantity of ore and rock mined was 600 tons, from which 25 short tons of concentrates were obtained. There were 7 men employed, to whom \$650 was paid.

Iron—The production of iron ore in long tons was: Brown hematite, 603,509; red hematite, 275,550; total, 879,059. The

average value was \$1.42 per ton at mines. There were 1989 employees at the mines, who received \$700,060 in wages, an average of \$351.97. The average number of days worked was 248. There were 270 horses and mules employed in the mines. Explosives used were 20,644 kegs powder and 81,431 lb. dynamite.

The quantity of pig iron made in the State was 434,388 long tons, the average value of which was \$14.60 per ton at furnace. The average yield of the ore smelted was 42.16 per cent. in metallic iron. There were 1514 men employed at the furnaces; the total amount paid in wages was \$686,502, an average of \$453.44 per man.

Barytes—The total product for 1906 was 1754 short tons. The number of men employed was 23, and they received \$2620 in wages. The average value of the product was \$3.61 per ton.

Fluorspar—The total product was 120 short tons, the average value being \$7.13 per ton. There were 13 men employed, who received \$1015 in wages.

Phosphates—The total production of the State was 499,815 long tons; sales were 516,312 tons, of which 99,982 tons were for export. The average selling prices were \$3.69 per ton for domestic use, and \$4.55 for export. The number of employees was 2213; the wages paid were \$695,841, or \$314.43 per man. The total value of the product was \$1,853,840 at mines; the sales realized \$1,979,972 in all.

Manganese Deposits in Haiti

Vice-Consul Alexander Battiste, of Port au Prince, reports that a concession was obtained from the Haitian Government by a business man in his district to exploit a mine of manganese discovered about three years ago in Coteaux, Province of Cayes. The ore is said to be rich and to be found in sufficient quantities to make the working of the mines profitable. An important fact which gives value to the concession is that the central point of deposit lies within 700 m. from the coast, and the workable surface dominates in a straight line the seacoast, thereby making it easy to transport the ore to the coast at a small cost by means of a suspended railway.

A settlement has been arrived at in the agitation which has been going on for some months past with the colliery engine-keepers of Scotland, says the *London Engineer*. After protracted negotiations, the employers have made certain concessions bringing a large body of the winding enginemen from a 12 hour shift down to an eight, nine, and ten hours shift. A permanent advisory board has also to be appointed of five or six members from each side to consider cases which will not be provided for by the scale which has been arranged.

Strength of Chains*

BY N. A. CARLE.†

The factors entering into the strength of a chain are of such a nature that although the diameter of stock and kind of material are known, it is not easy to calculate the ultimate breaking stress. It has been found more satisfactory to test about 1 per cent. of the finished chain links to destruction and thus get a practical demonstration of the actual breaking stress. The carrying capacity of the chain is then rated at one-third of the average breaking stress, and the finished chain is given a proof test of one-half of the breaking stress.

These values have been tabulated over a considerable period, and an average value obtained for different sizes of chain which is now accepted as the carrying capacity for a properly constructed chain. A table of this kind is published in Kent's Hand-book for "D. B. G. Special Crane" and "Crane" chains manufactured by the Pencoyd Iron Works.

The accompanying chart is a graphical presentation of this table, showing the breaking stress and approximate weight for these two kinds of chains up to 1½ in. diameter. The factors of safety have been added for reading the safe working load directly from the chart.

EXAMPLES

(1). What will be the safe working load for a 1½-in. D. B. G. special crane chain with a factor of safety of 3?

Starting with 1½ in. "Size of Chain," read up to "D. B. G. Special Crane," then across to 3 "Factor of Safety," and down to 25,050 "Safe Working Load."

(2). What size chain should be used with a factor of safety of 4 for a safe working load of 25,000 pounds?

Starting with 25,000 lb. "Safe Working Load," read up to 4 "Factor of Safety," then over to "D. B. G. Special Crane," and down to 15/16 "Size of Chain." If ordinary "Crane" chain is selected the size would be 1¾ inches.

It is to be noted that the D. B. G. special crane chain gives approximately 9 per cent. greater strength than ordinary crane chain. For chains from ¾ in. to 1½ in. diameter, a D. B. G. special crane chain is approximately equal to an ordinary crane chain of 1/16-in. larger diameter stock.

The minting of nickel coins in the Republic of Colombia has been ordered. The new coins will be 25 per cent. nickel and 75 per cent. copper and will take the place of one, two and five *peso* paper bills.

*An article in *Power*, September, 1907.

†General manager, Northern Colorado Power Company, Denver, Colo.

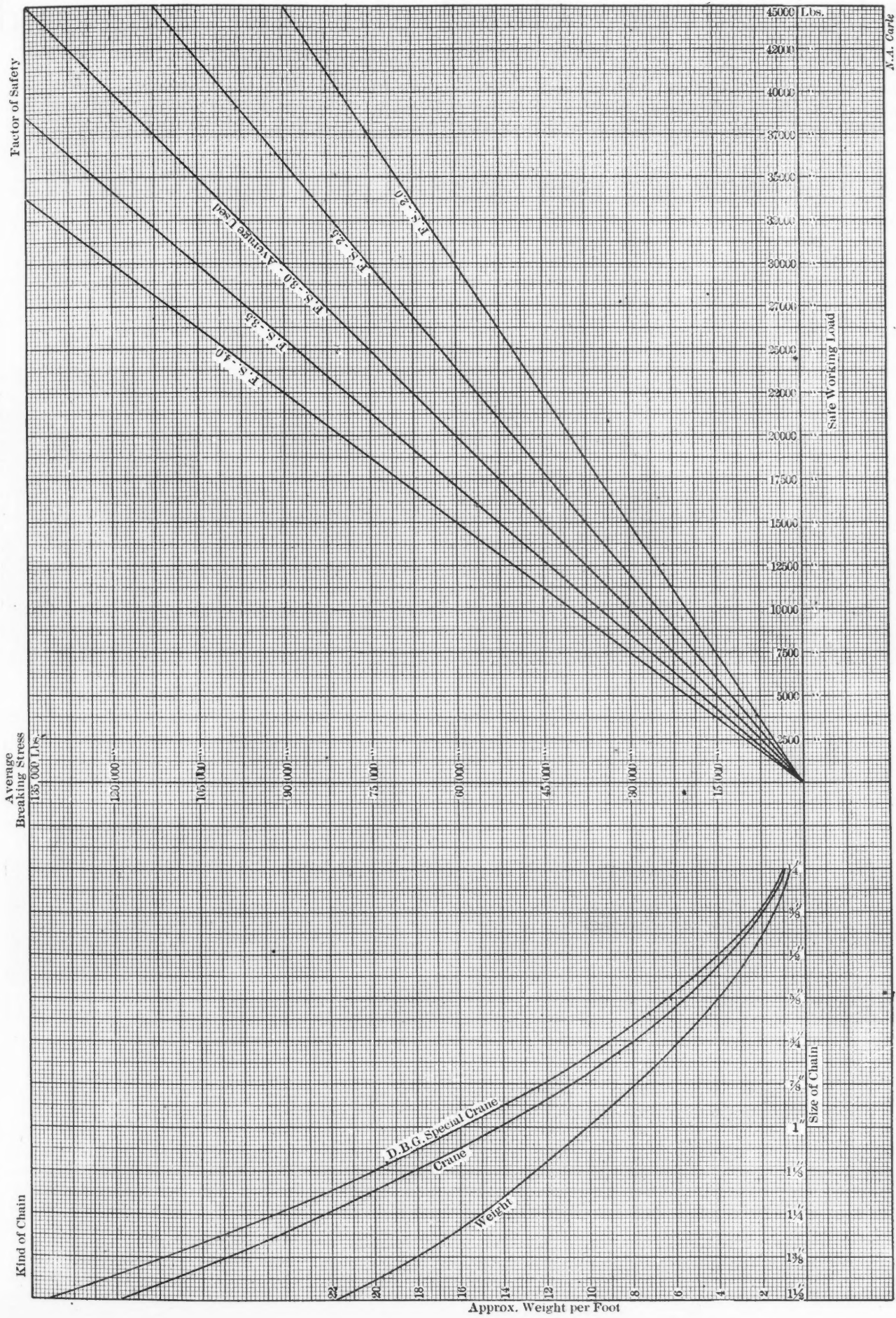


DIAGRAM FOR CALCULATING THE STRENGTH OF CHAINS

A.A. Carle

The Dover Coalfield in England

Exploration and Development of New Coalfield in Southeastern Part of England. Measures Taken to Work the Field and Probable Success

BY EDWARD WALKER

For many years it has been the theory among geologists that coal measures exist under the secondary and tertiary rocks in the southeastern districts of England. During the past few years these theories have been verified, and exploring and development work has been on a scale large enough to show that coal exists in sufficient quantity to make a commercial proposition. The present time is therefore,

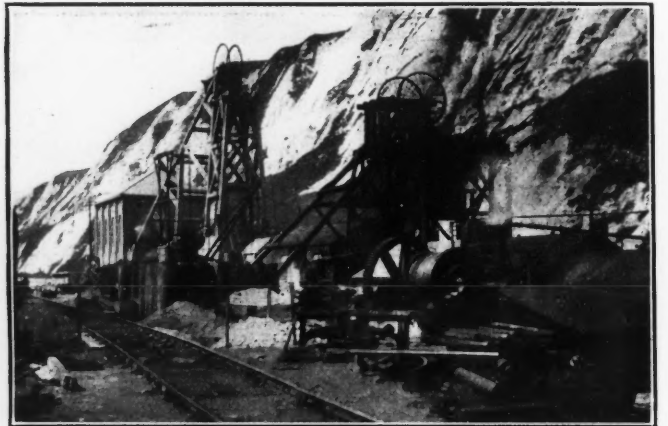
Austen, a land owner in the southeast of England, to argue that coal might similarly exist in his own territories. The only evidence produced was the similarity of the surface rocks in the two districts, chalk, greensand, etc. For some years Austen's theory received the attention of eminent geologists, some taking one side and some the other. Among those who were skeptical was Sir Roderick Mudchi-

THE FIRST INVESTIGATIONS

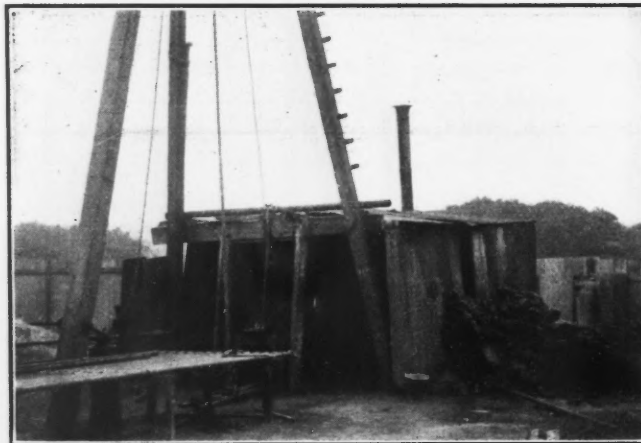
Bestwich undertook investigations and came to the conclusion that a chain of troughs of coal measures would probably be found in a line between Somerset in the West of England and the Pas-de-Calais, in France. Eventually Henry Willett undertook in 1871 to make a trial boring, and the spot chosen was at Netherfield, a few miles north of Hastings. During



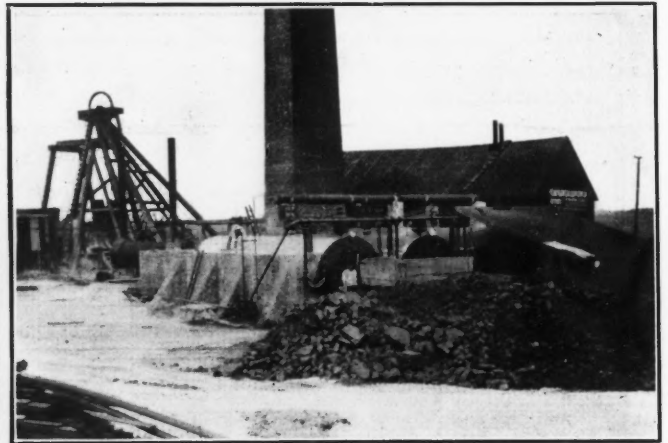
SURFACE WORKS, SHAKESPEARE CLIFF



HEAD-GEAR, SHAKESPEARE CLIFF



SURFACE WORKS, TILMANSTONE SINKING



DRILL AT WALDERSHARE BORING

opportune for a short description of the southeastern coal field.

The reason why geologists turned their attention to Kent and the southeastern district of England was the discovery of the coal deposits in France across the channel in the department of Pas de Calais. Coal was first proved to exist there in 1841. By 1850 a substantial output corroborated the evidence of the borings. In 1852 the now celebrated mines of Courrières, Lens, and Gruay, were opened up. The success of the work led Godwin

son. Most of the discussion centered round the question as to the depth at which the coal measures would be found, if at all; whether an anticline would bring them up to a workable distance from the surface; and whether certain intermediate secondary beds would be gracious enough to thin out or to be absent altogether. Godwin Austen gave evidence before the Royal Commission on coal supplies of 1866, and won over Bestwich, who was one of the commissioners.

four years the boring was carried on. At 2000 ft. they were still in the Oxford clay, and had the cheerless prospect of a considerable thickness of lower oolite, and new red sandstone to still go through. The project was therefore abandoned. Nothing further was done until 1886 when Sir Edward Watkin, chairman of the Southeastern Railway, was advised by Professor Boyd Dawkins, to use the abandoned channel tunnel works as a basis of operations for boring. It will be remembered that the Channel Tunnel was the

favorite scheme of Sir Edward Watkin for overcoming the drawbacks of the journey from England to France. After a shaft had been sunk and the tunnel driven a short way, the Government stopped the work, alleging danger from military invasion. The boring was accordingly undertaken on the site of the tunnel works, which are on the shore to the west of Shakespeare Cliff, and halfway between Dover and Folkestone.

matter, 67.40 fixed carbon and 4.94 of ash. Below this are three more seams of no value, and then at 1500 ft. comes a seam 2 ft. 6 in. thick, at 1614 ft. a seam 2 ft. 3 in. thick, at 1807 ft. a seam 2 ft. 9 in. thick, at 1875 ft. and 2082 ft. other small seams, and at 2221 ft. a seam of good bituminous coal 4 ft. thick. This is as far as the boring has gone down. A section of this boring is given in the accompanying illustrations.

For 1150 ft. it is lined with cast-iron tubing, and below that brickwork is used. Another shaft No. 3 is being sunk a short distance to the east of No. 2, and at the time of writing is 636 ft. down. The accompanying photographs give a general idea of the surface works at present erected. It will be seen that the works are on the railway at the foot of the chalk cliffs. The white of the chalk must not be mistaken for snow. At the time of my

As regards the present state of the

THE FIRST DISCOVERIES OF COAL
By 1890 the boring had got down 1100

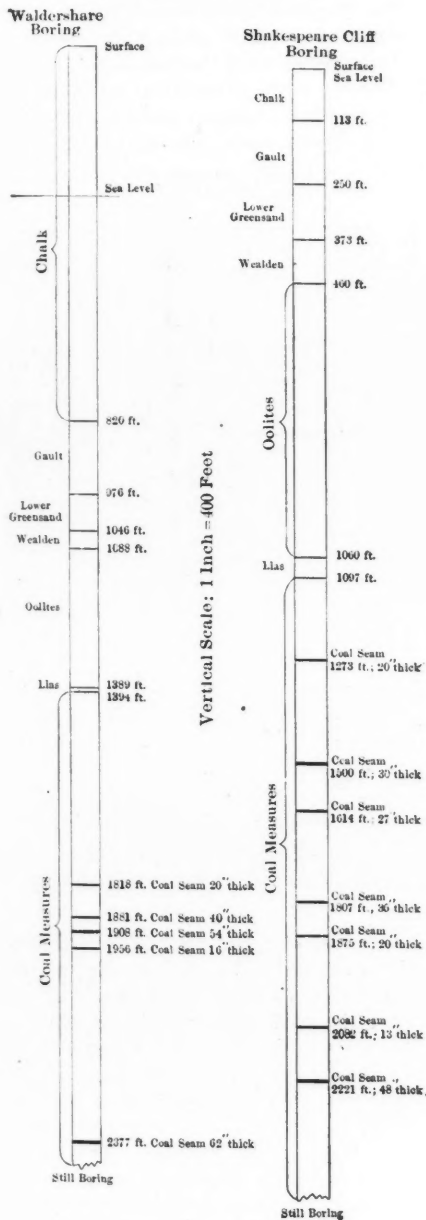
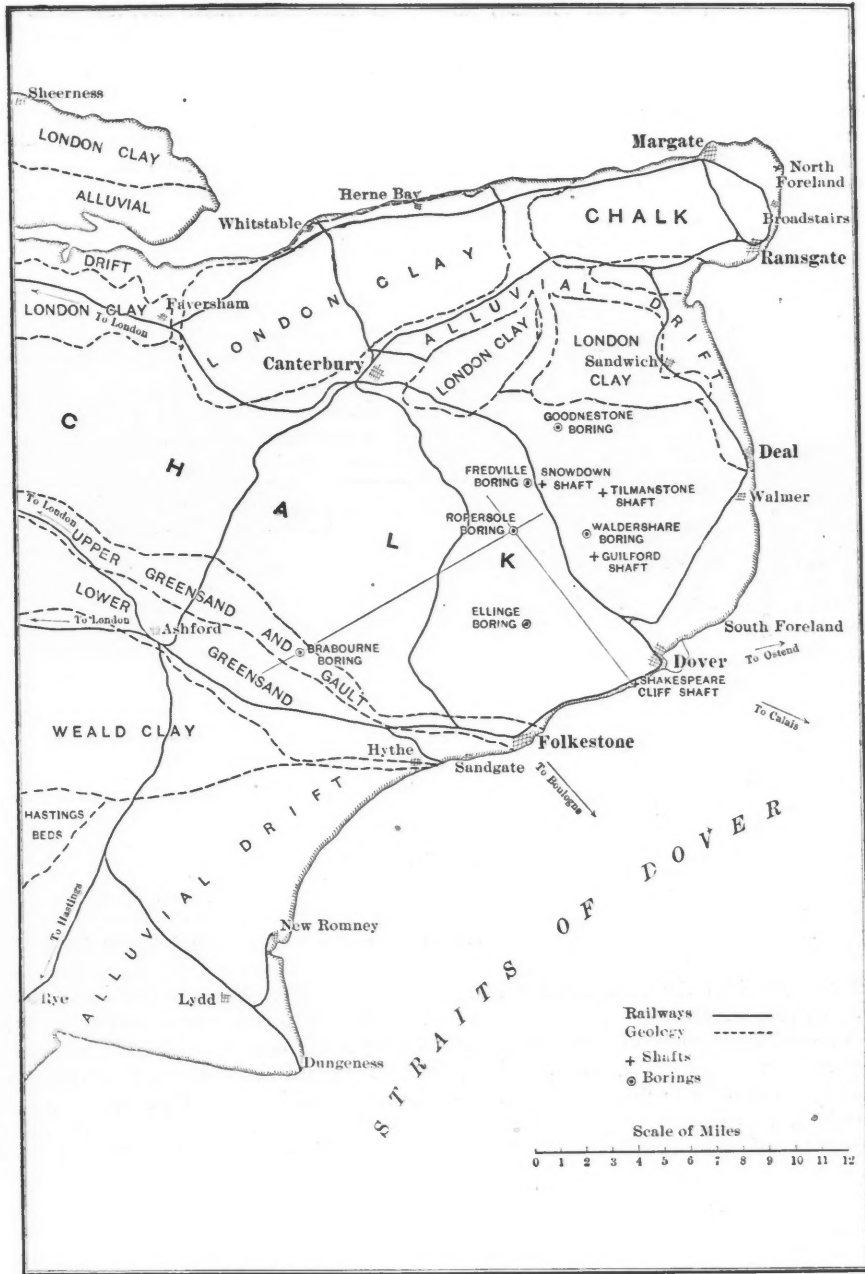


DIAGRAM OF BORINGS



SKETCH MAP OF DOVER COALFIELD

ft. through the chalk, oolites and lias and at 1125 ft. the first seam of coal was met. Three more seams were met at 1127 ft., 1187 ft. and 1218 ft., but none of these four were of sufficient thickness and quality to give satisfaction. The first workable seam is that at 1273 ft., which is 20 in. thick, with a layer of good fireclay below. The analysis gives 26.66 volatile

work, I should say that No. 1 boring and sinking, which was on the site of the tunnel shaft was abandoned, and the main boring from which the above information was obtained was at No. 2 shaft some 50 ft. to the east of No. 1. The main shaft has been sunk on No. 2, and at the time of my visit at the end of July it had reached a depth of 1632 ft. The shaft is

visit preparations were being made for driving on the seam at 1273 ft., and it was hoped that before many months, coal in sufficient quantity for commercial sale would be brought to the surface.

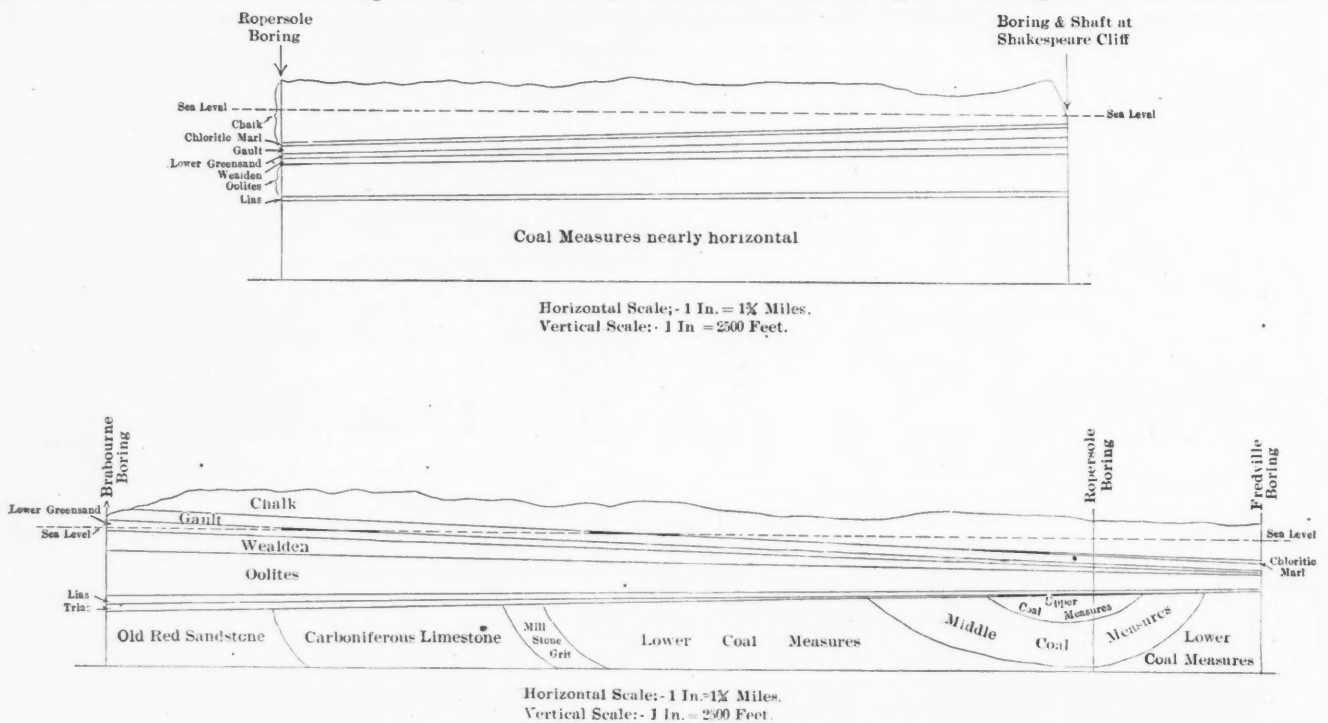
CHARACTER OF THE OPERATING COMPANIES

Having pursued the history of the

workings so far, it is advisable to make some reference to the finances in connection with the subject. The work in Kent has been done under adverse circumstances, and I am afraid I must add, with a good deal of misdirected energy. Capital has been lost and new money has had to be raised on several occasions and under onerous terms. The various companies operating are too numerous to mention. Suffice it to say that the present owners of the works at Shakespeare Cliff are the Kent Collieries, Ltd. This company and its predecessors undertook, also, trial borings at Ropersole, Brabourne, and Ellinge. At Ropersole the coal measures are not met with until 2129 ft. below sea-level. At Brabourne the Old Red Sandstone came below the Trias, so there were no coal measures found. The boring at

depth of 2700 ft. The chalk here is 820 ft. thick, and this together with gault, greensand, wealden, oolite and lias, brings the recent beds down to 1394 ft. Here the coal measures are struck, and there are numerous coal seams. The most important are the seam at 1881 ft., which is 3 ft. 4 in. thick; that at 1908 ft., which is 4 ft. 6 in. thick, and that at 2377 ft., which is 5 ft. 2 in. thick. This last seam has been named the "Rockefeller," owing to its riches. The analysis of this coal is somewhat remarkable, showing 36 to 40 per cent. volatile matter, and 52 to 55 per cent. fixed carbon. If the analysis is correct, the coal should be of great value in gas manufacture. The company has also undertaken borings at Goodnesborne and Fredville. Both of these borings have gone into wet ground, and are giving

here, a fact which shows that the engineers feel confident in meeting with coal. The information so far obtained tends to show that the coalfield is somewhat restricted in extent. The evidence obtained at the various borings is not complete, nor is the information as regards the dip of the strata reliable. But the geologists who have followed the subject incline to the belief that the coal measures so far discovered consist of a shallow trough, having its longest axis pointing in a northwest to southeast direction. Professor Boyd Dawkins has sketched out sections based on the information obtained at the Brabourne, Ropersole, Fredville and Shakespeare Cliff borings, and I give herewith some illustrations adapted from his sketches. Other engineers and geologists do not agree with his interpretation



SECTIONS OF DOVER COALFIELD DEDUCED FROM BORINGS

Ellinge got into the coal measures, but met no coal seams.

In 1904, during one of the many reorganizations, Arthur Burr, who previously had much to do with the direction of operations, parted company with his colleagues, and commenced exploring work with the financial assistance of another group. His company is called the Kent Coal Concessions, Ltd., and there are a number of subsidiary syndicates which undertake the work in connection with each boring or sinking enterprise. Mr. Burr acted on Godwin Austen's theory that toward the northeast of Dover the overlying beds would be thinner than to the south and west.

The first operation undertaken by the new company was the Waldershare boring. A section of this boring is given in the accompanying illustration. The surface of the ground is 325 ft. above sea level, and the bore hole has reached the

some difficulty. Enough has been done at Fredville to locate three seams, at 1424 ft., 1446 ft., and 1510 ft., respectively. The lowest of the three seams is 14 ft. 4 in. thick, and is of good quality.

PRELIMINARY DEVELOPMENT

No time has been lost in getting to work and sinking shafts. Three are now under construction; one is the Snowdown, adjoining the Fredville boring, another is the Guilford, to the south of the Waldershare boring and a third is the Tilmanstone, which is further to the northeast. The last-named is the furthest advanced. The shaft is circular, 14 ft. in diameter, and lined with 18 in. of brickwork. At the end of July it was down 707 ft., ten months having been occupied in sinking this far. The shaft is still in the chalk, and it is expected that the coal measures should be met with at about 1200 ft. No preliminary boring has been done

of the facts at our disposal, but personally I am inclined to believe that his explanation is as likely to be correct as any. That the coal measures should exist in this place in the form of a narrow fold is only to be expected, considering that the measures in the Pas-de-Calais are distorted in the same way, and even folded in a more erratic manner. The boring operations have been carried out with efficiency, and I think the results are reliable. The machine generally used is shown in the illustration. It is made by Thom, and uses a circular rotating diamond cutter. The core comes up in very fair condition.

CONCLUDING REMARKS

I think we may consider that coal deposits, of sufficient thickness and extent to make them workable, have been proved to exist in the Dover district, but that the geology has not been sufficiently eluci-

dated to show quite conclusively how the seams are arranged. The question whether it will pay to work these seams has yet to be proved. The drawbacks to be contended with are first, the great depths at which operations have to commence; and second, the amount of water and the soft strata met with in sinking. At Shakespeare Cliff the water in the strata is considerable, and the cast-iron tubbing has to be efficiently calked in order to prevent the working becoming filled. On the other hand, it will be possible to obtain a very fair price for household coal, for the present price charged locally for coal obtained from the north of England, is comparatively high.

The directors of operations also point to the fact that the collieries across the channel make large profits under equally



DRILLING TACKLE AT WALDERSHARE

adverse physical conditions. It is impossible to say more at the present time. Mining engineers, both in England and France, are watching the operations with keen interest, and are wondering whether the project will turn out to be a profitable one.

Experience has shown that the best method of handling tunnel muck is to place steel sheets on the bottom, close to the face, before the shots are fired. Extend these sheets back far enough to receive all broken rock and keep enough muck at the face to weight them down properly. These sheets form a smooth floor from which the muck can be shoveled, but unless they are weighted down, heavy shots may lift them and mix them with the muck and thus increase the labor of loading.

The Selection of Carbon for Diamond Drill Bits

Great care and experience are necessary in selecting carbon for diamond drill bits. The stones should be as bulky as possible and nearly round, as thin edges and irregularities make firm setting difficult and the projections wear away quickly. A small blocky stone is more economical than a larger irregular stone. Practical drillmen often prefer whole or natural stones to fragments of a larger "broken" diamond as they are water worn and somewhat rounded. But buyers ordinarily prefer the broken stones as the fresh break enables them to determine accurately the quality of the stone and its fitness for drilling purposes, while, in the majority of cases it would be impossible for them to judge the hardness and grain of the weather-stained natural stone.

Broken stones with a closely knit structure and an appearance like fine steel when broken, and gray or greenish gray in color, are hard and tough, and each grain will acquire a polish under wear. Stones with a coarse or porous grain like coke and which are dull and lusterless in color will wear rapidly. The ideal shape for a new broken stone is the cube.

In selecting whole carbons or natural stones the preference should be given to those which have a bright or polished grain; those which are coarse in texture or show wear, but no polish, should be avoided. Good carbon will stand heavy pressure but will break under a blow, hence care should be taken by the operator when running through strata of varying hardness. Crystalline or semi-crystallized stones should be avoided as they are apt to crush under pressure. Bortz or imperfect white diamonds are little used, in spite of the fact that they cost only about one-fourth as much as carbon, as they contain more or less flaws which weaken the stone and thereby restrict its use to coal prospecting and some quarry work in the Central States. Experience has shown that the person unfamiliar with carbon and diamond drilling should rely on the experience of the drill manufacturer to supply proper stones as he has everything to gain by equipping his drill with good carbon.

The Beard-Mackie gas indicator is adaptable to existing safety lamps and has been found to work well in gaseous mines. It is composed of a metal ladder with seven platinum wire rings. The height of the flame is regulated so that the lowest ring glows in fresh air, the flame is not afterward adjusted. The other six rings indicate when they glow, 0.5, 1.5, 2, 2.33 and 3 per cent. of gas according to the number of strands which glow.

Rescue Work in Nova Scotian Coal Mines

The Dominion Coal Company, in Canada, decided some time ago to equip its mines with rescue apparatus, and is at the present time building a central rescue station at No. 2 colliery. It has purchased 20 complete Draeger apparatus, 10 of the helmet and 10 of the mouth-breathing type. The rescue station itself will consist of a large practice room fitted with lockers and brackets for storing the various parts of the apparatus, the large oxygen cylinders and potash cartridges necessary for replenishment, and fitted with work tables, sink and other conveniences for keeping the apparatus in constant readiness for use. Connected with this room will be a lecture hall and meeting room for the men who meet for practice and drill. There will also be an office and a small store-room. At some later date it is possible the company may add a practice gallery that can be filled with gases, on similar lines to W. E. Garforth's gallery at Normanton, England.

An expert instructor is being engaged in England and a corps of men will be trained at each of the coal company's 10 mines. It is the intention to supplement the present equipment by placing several apparatus at each of the mines, in addition to the outfit at the central station. This latter is in direct telephonic communication with each of the mines, and is placed in close proximity to the tramline that runs through the colliery districts and the Sydney & Louisburg Railway. The organization of the rescue corps is not yet laid down, but it will probably be affiliated with the present colliery fire brigades.

New Coal Discoveries in England

There have been recently numerous paragraphs in the English papers referring to a discovery of coal and iron ore upon the Buckhurst estate of Lord Delawarr, in the county of Sussex, about eight miles southwest of Tunbridge Wells. Too much importance must not be attached to this discovery. The deposits that have been discovered are in the Hastings beds which belong to the Wealden series. The iron-ore deposits are well known and were worked in previous centuries when the surrounding forests could supply charcoal, and the coal is lignite of doubtful value. Owing to the successful work now being done at Dover, which is not far away, too much importance is being attached to the Buckhurst discovery. It is opportune to mention that the Dover coal seams belong to the Coal Measures, and are a more recent formation. There is a mistaken idea prevalent on this subject.

Colliery Notes, Observations and Comments

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

DEVELOPMENT AND MANAGEMENT

Statistics show that since 1903 the production of coal in Indian Territory has gradually fallen off. This decrease in output is attributed to the competition of oil, used as fuel by the railroads, manufacturing and other users of steam in that part of the country.

Never hurry a "nursed" hole as this practice is one of the greatest menaces to the miner. Give it plenty of time, sometimes all night is not too long. When an examination of the hole can be safely made, the tamping down to the powder should be carefully withdrawn, then insert another primer, retamp the hole and fire again. If it explodes, all the powder in the hole will probably be exploded.

Drill bits that are to be used in sandstone should be tapered somewhat and then flattened instead of drawn to a cutting edge. When a chisel-bit is used for drilling sandstone, the bit is apt to wear sharp. Rock drill bits for use in medium hard rock should have sharp chisel bits, so that if the hardness of the rock increases, the angle of the bit will become more blunt and the cutting edge become shaped to a curve instead of a straight line, which will prevent the chipping off of the corners.

Coal washing has made possible the development of many fields which a few years ago were considered too low grade to be commercially valuable, while today these same districts are producing thousands of tons of high-grade coke. Collected statistics show that during the year 1890 there was washed 1,269,810 tons of coal. In 1895 there was washed 2,186,202 tons, or an increase of 72 per cent. over 1890. In 1900, 5,374,447 tons were washed, or an increase of 146 per cent. over 1895. During the year 1905 there were 9,551,137 tons of coal washed or an increase of 78 per cent. over the year 1900.

Experience shows that in building stoppings, to seal off mine fires, the work should begin at the end nearest the return air and be carried on toward the intake end, which should be sealed off last. This method prevents danger from explosions occurring within the works that are being sealed up as it allows the fresh air current to dilute the gases within until the intake is finally sealed. Experience shows that stoppings to be effective must be air-tight and of substantial build. A good method is to lay a double wall of slate having about 8 or 10 in. of space between the walls which should be filled with dirt taken from the roadway, or other fine material.

The life of wooden pipes made up of staves is dependent upon the life of the bands holding the staves in place and resisting the internal pressure. By using galvanized wire bands deeply embedded in the wood and thoroughly and evenly coated with asphalt, the life is materially prolonged. Experience has shown that the pipe is still serviceable, even when the sectional area of banding is reduced as much as 60 per cent. by corrosion. Iron pipe is frequently unfit for service when but 5 per cent. of the metal has been corroded. Wood pipe when subjected to alternate wetting and drying will quickly rot.

The quality of lime is greatly improved by allowing it to stand as long as possible between the time of slacking and using in the wall. In some parts of Europe lime is slacked and allowed to remain in a pit for a year before using, as the first slacking is incomplete, and the whole mass contains small particles which slack only after standing for considerable time. When freshly slacked lime is used in a boiler setting, these unslacked particles swell, the mortar loosens and is shattered. Lime used for boiler settings should be slacked at least six weeks or longer if practicable before using.

Excepting the United States Coast Survey there is probably no series of surveys in America that will compare in accuracy with the anthracite-mine surveys. In one particular, however, these surveys are gravely defective, that is, in the absence of a carefully connected system of tide-water levels. Several of the coal companies have all their mines leveled and the tide elevations marked on the mine maps; in most cases, however, the elevations of the different mines are not connected, each being based on a separate datum. Accurate levels are as essential as accurate maps, and the law requiring the latter seems especially defective in making no provision for the latter. Accurate mine levels are thoroughly appreciated by superintendents and engineers.

Concrete is divided into three classes according to the use which is to be made of it. (1) Strong (containing about 15 per cent. of cement). This grade should be used for flues, retaining walls, culverts, walls for dust chambers, arches, arch work in general and foundations in wet places. (2) Medium (containing about 10 per cent. of cement). This grade should be used in engine and machinery foundations on dry, ground floors, bottoms of flues

and dust chambers, furnace foundations, stacks, etc. (3) Poor (containing 7 or 8 per cent. of cement). This grade should be used for leveling the bottom of excavations preparatory to commencing the foundations proper; and for foundations and underground works that are not called upon to support a weight of over six tons per square foot.

Stop valves used for boilers should be so placed that water can not collect above them. If the pipe rises for a distance above the boiler nozzle before turning horizontal, the stop valve should be in the horizontal run. If a long bend leads out of the boiler nozzle the stop valve should be placed at the highest portion of the bend. The valve should be provided with a drain pipe when placed in such a position as to accumulate water above it. The best results can be obtained by using two valves, one placed as near the boiler as possible and the other at the junction of the boiler pipe and the main leader, with a drain pipe placed between the two valves to tap any water due to leakage through the leader valve. The feed valve should always be a globe, as the gate valve cannot be regulated closely and often clatters owing to the pulsations of the feed pump.

Before starting a new boiler it is of the utmost importance that the walls be absolutely dry, as green walls will invariably crack the setting. If conditions permit, it is advisable as soon as the stack connections are made, to block open the ash-pit doors and the damper, so as to effect a circulation of air through the brick work. When the walls are partly dried, the boiler may be filled with water and a light fire of shavings put in, which should be gradually increased by using some wood. Continue this until the walls are thoroughly dried inside and out. Several days will be required. Experience has shown that walls if properly built can be dried out without cracking. In case steam is at hand one of the best methods of drying the brick work is to connect, temporarily, a small steam supply pipe to the new boiler and attach a trap or other drainage appliance to the blow-off pipe. The new boiler when charged with steam will then give off a large amount of heat, and so heat the air around it, and by leaving doors and dampers open there will be a steady current of warm air passing through the setting and the brick will be effectively dried out. The steam supply should be small at first and then gradually increased.

THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the

Hill Publishing Company

JOHN A. HILL, Pres. and Treas. ROBERT MCKEAN, Sec'y.
505 Pearl Street, New York.

London Office: 6 Bouverie Street, London E. C., Eng.
CABLE ADDRESS "ENGINIJOUR, N. Y."

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

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

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

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

For sale by all newsdealers generally.

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

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

Contents PAGE

Editorials:

The Smelter Smoke Question.....	697
Lake Iron Ores and Their Quality....	697
Miners and Smelters.....	697
Milling at Cobalt.....	698
The Boycott of a State.....	698
The Anthracite Combination.....	698
*Operations and Tendencies of Modern Mansfeld. .P. A. Wagner and J. S. G. Primrose	671
Lithographic Stone.....	674
Not the Dream of a Dreamer, but the Vision of a Prophet. .Henry M. Howe	674
Air vs. Electric Drills....Edgar Nichols	674
*The Copper Mines of Ely, Nevada. Walter Renton Ingalls	675
Iron Mines in Southern Italy.....	682
The Gayley Dry-Air Blast.....	682
Granby Consolidated Mining, Smelting and Power Company, Ltd.....	683
Shaft Sinking by the Freezing Process. Sydney F. Walker	684
Reflections of a Philosophical Axman. R. A. Read	688
Glimpse as an Original Copper Ore. J. Volney Lewis	688
Antimony Mining in Turkey.....	688
The Broken Hill Proprietary Company	689
Production of Goldfield, Nevada.....	689
Daniel Willis James.....	690
Tennessee Mineral Production.....	690
Manganese Deposits in Haiti.....	690
Strength of Chains.....N. A. Carle	690
*The Dover Coalfield in England. Edward Walker	692
The Selection of Carbon for Diamond Drill Bits.....	695
Rescue Work in Nova Scotian Coal Mines	695
New Coal Discoveries in England.....	695
Colliery Notes.....	696
New Publications	699
Test of a Parsons Turbine Engine....	699
High Price of British Railway Coal....	699
Personal, Obituary, Societies and Technical Schools, Industrial.....	700
Trade Catalogs, Construction News....	701
Special Correspondence.....	702
Mining News.....	705
Markets, etc.....	712

*Illustrated.

The Smelter Smoke Question

The findings of Oliver T. Crane, master in chancery of the Federal Court, in one of the injunction suits in the smelter-smoke litigation in Montana, which were published Oct. 5, are commendable for their conservatism and rationality. Although it is found that the farmers in some localities have been damaged by the smelter smoke, it is stated by the master in chancery that an injunction and the closing of the smelter would damage the farmers more than the nuisance they complain of. The Anaconda Copper Mining Company has always admitted that damage has been done in some cases, and has been ready to pay for it, although it has claimed that the amount of damage has been enormously overestimated. In this view most impartial observers agree with the smelting company; in all of these smelter-smoke complaints there has been a lot of nonsense. The findings of Mr. Crane, who awarded only \$350 to the particular plaintiff for damages done to his property, are considered a substantial victory for the company, but the judge of the United States Court has yet to pass on the findings and say finally whether or not an injunction shall issue.

Lake Iron Ores and Their Quality

The shipments of Lake Superior iron ores in September were so large, reaching a total of 4,000,000 tons from the Mesabi range alone, that it seems probable that the total supply for the season will exceed that of last year, notwithstanding strikes and other delays. The total will probably come up to 40,000,000 tons, if it does not exceed that figure. This ought to be sufficient for all purposes, especially as the activity of the blast furnaces is declining, rather than increasing. In part this decline, which has been evident for two months past, is the result of necessity as much as of a lessening demand. For the last two years furnaces have been under a heavy strain, and have been pushed almost to the possible limit of production, with the result that a considerable number must soon go out of blast for extensive repairs. While a number of new furnaces will be ready for work in the coming

year, it will be several months before they can make up for those which will be obliged to stop.

While the total supply of ores seems sufficient, there are indications of a possible shortage of those of bessemer grade. Complaints have been made recently in several quarters that the lake ores now coming down—especially those from the Mesabi—are not up to the quality expected. That the content of metallic iron is lower is generally admitted, but the charge is made that the phosphorus limit is exceeded in many cases where bessemer ore is called for. There is, so far, no official recognition of these complaints, but they come from so many quarters as to make it probable that they have some foundation. It is reported that several furnaces using lake ores have found it necessary to turn from bessemer pig to foundry and other grades. This may account for the fact that foundry iron, which sold a few months ago at \$1 to \$2 per ton above bessemer pig, is now an equal amount below that grade of iron.

This shortage of ores of bessemer grade, if it should prove to be at all pronounced this winter, will assist materially in hastening the substitution of the basic open-hearth furnace for the bessemer converter. This has been a prominent feature of our steel practice for several years past, and seems likely to continue so in the future.

Miners and Smelters

At the last session of the American Mining Congress a discussion took place on the mutual relations between the ore producers and the so-called "Smelting Trust" and the grievances of the former against the latter. It was charged, on the one hand, that the Smelting Trust was making extortionate charges for the treatment of ore, and thereby earning enormous profits upon a largely watered capital stock; on the other hand, it was asserted that there is really no such thing as a smelting trust, that competition is everywhere possible, indeed is a matter of fact in many important smelting centers, and that the profits of the smelters are fair and reasonable.

Following the discussion, a resolution was adopted providing for the appointment of a committee to investigate the

matter further and report at the forthcoming session. This committee is now gathering information as to the conditions existing in all sections of the United States, and is sending out a list of well prepared inquiries to which answers are requested from the producers of ore. It is to be hoped that the committee will receive full, accurate, discriminating and prompt replies. Such injustices as there may be ought to be corrected in the interest of good business, but the questions must be considered on a sound basis of facts. The producers and smelters of ore are mutually dependent; many mines would be useless if there were no smelters with whom the ore could be marketed, while the smelters would have no business if the miners did not furnish them with ore to smelt. The relationship is so intimate that the smelters have gone extensively into the mining business on their own account, in order to guarantee to some extent their supply of essential ores, while on the other hand some important mining companies have gone into the general smelting business. Indeed, the bulk of the ore now smelted in this country is produced directly by the smelters themselves and by large miners who have carefully entered into contracts with them. The custom smelting business, properly speaking, is now far less in volume than it used to be.

Milling at Cobalt

Ever since their discovery in 1903, the mines of Cobalt have produced ore remarkable not only for its richness but also for the number of associated minerals. The large returns from comparatively light shipments caused the managers to pay little attention to ore carrying less than 250 oz. silver per ton. In fact it was agreed that ore lower in grade than 200 oz. could not stand a combined treatment and freight charge of \$26, and heretofore such ore has been thrown on the dump. But the managers did not lose sight of the fact that some day it would be imperative to utilize this low-grade rock and four companies have already inaugurated a milling campaign.

The method of concentration which has been adopted consists of crushing with rolls, jigging and treating the fines on Wilfley tables or vanners or both. One mill, the McKinley-Darragh, has in-

stalled stamps, jigs and Wilfley tables. The Coniagas and McKinley-Darragh companies have started to mill their rock and the Buffalo and Cobalt Central companies have the foundations in readiness for the machinery. Another company has leased a mill-site from the Nipissing Mining Company.

The principal difficulty to be overcome in concentrating the ores of Cobalt is the tendency to excessive sliming. Smaltite, which is the principal metallic content of the ore, is exceedingly friable. It crushes easily but makes a large percentage of fines. Before the mills will be working satisfactorily it will be found necessary to introduce settling tanks. The Buffalo mill has taken this precaution, tanks having been provided for when the foundations were laid. The mills will at first run on ore carrying about 100 oz. silver and less per ton but experiments on the higher grades of ore will also be made to determine the practicability of treating those classes.

The Boycott of a State

The coal-mine operators of West Virginia are experiencing difficulty in securing miners, and recently held a meeting in Charleston to devise ways and means for getting a supply of workmen. A few weeks ago the State Commissioner of Mines reported that the lack of a mining population called for action on the part of the authorities and recommended various measures for stimulating desirable immigration. Agents from the principal mines are in the Pittsburg district trying to induce men to move to the regions suffering from lack of men.

Reports from various parts of Pennsylvania state that several hundred men have gone to the mines of West Virginia, but on the whole the work of the agents seems not to be successful, and the reasons for the refusal of flattering offers made by the operators of the neighboring State are rather odd. The officers of the miners' unions object to the departure of the men because West Virginia is recognized as a non-union State, and have no difficulty in persuading them to stay at home, where the demand also seems to be sufficient.

Whatever the reasons for the enmity of the union officers may be, the West Virginia operators are in a bad way, for

they are said to have many orders from western railroads which they are at present unable to fill.

The Anthracite Combination

The Interstate Commerce Commission is shortly to begin the investigation of charges made by individual operators in the anthracite region against the carriers. This will involve a general investigation of the whole question of control of the anthracite trade, on technical and legal lines. While it is well known that the production and shipment of anthracite coal have in recent years been more closely controlled and regulated than any other similar business, except, perhaps, the production of petroleum, it will be a difficult matter to prove, by legal evidence, the existence of any actual trust or combination. To do that will be the effort of the commission, and it will be interesting to see how the case against the companies will be managed.

THE INSPECTORS WHO HAVE BEEN trying to enforce the child labor law in the anthracite region of Pennsylvania seem to have had poor success thus far. In one locality where a large number of boys under the age limit were believed to be employed in the mines and breakers, only one individual was sent back to the schools. The inspectors complain that neither the boys nor the parents can be induced to divulge the correct age of the suspect, and that they are compelled to resort to the methods of the detective to discover the truth. It is notoriously difficult to enforce a humanitarian measure when the chief beneficiary will have none of it. Unless it is possible to reach records which may be consulted conveniently, the only thing to do seems to be to rely upon a gradual enlightenment of the parents as the result of longer contact with American life and ideals.

OUR CONTEMPORARY AT San Francisco makes some "off hand" and blundering remarks respecting our recent comment upon the Government statistics of copper production in 1906, but we venture to predict our contemporary will eventually see its mistake. No one is infallible. The Geological Survey formerly did not correct statistical errors however obvious, but its present policy is different. The scientific spirit aims at the truth.

New Publications

RIVER DISCHARGE. By J. C. Hoyt and N. C. Grover. Pp. 137; illustrated. 6x9 in.; cloth, \$2. New York, 1907: John Wiley & Sons.

STANDARD POLYPHASE APPARATUS AND SYSTEMS. By Maurice A. Oudin. Fifth edition revised and enlarged. Pp. 369; illustrated. 5½x8 in.; cloth, \$3. New York, 1907: D. Van Nostrand Company.

Contents. Definitions of alternating-current terms. Generators. Induction motors. Synchronous motors. Transformers. Rotary converters. Motor generators, frequency changers, and other converting apparatus. Switchboards and station equipment. Lightning protection and line construction. Two-phase system. Three-phase system. Choice of frequency. Relative weights of copper for various systems. Calculation of transmission lines. Index.

ANNUARIO DELLA INDUSTRIA MINERARIA, METALLURGICA E CHIMICA ITALIANA. Edito dalla *Rassegna Mineraria*. Anno I, 1907. Pp. 526. 4¼x7 in.; cloth. Torino, Italy, 1907: Tipografia G. U. Cassone.

This annual, compiled from the weekly issues of the *Rassegna Mineraria*, is in four parts. The first gives a summary of the mining laws and regulations of Italy, with the changes made in 1906. The second part contains a list of the officers of the Department of Mines, mine inspectors and engineers; also lists of officers and members of the different mining, metallurgical and chemical societies. The third part is a list of the mining, metallurgical and chemical operations of Italy, with their managing officers. The fourth gives tables of mineral and metallurgical production; also some general tables of weights, measures, conversion of foreign measures to metric, and of atomic weights.

REPORT OF A COMMISSION APPOINTED BY HIS EXCELLENCY THE ACTING LIEUTENANT-GOVERNOR TO INQUIRE INTO AND REPORT UPON MINING BY SINGLE OUTLET, IN CONNECTION WITH THE WORKING AND EFFECT OF ARTICLE 47 OF THE MINES AND WORKS REGULATIONS. Pp. 120; illustrated. 8x13 in.; paper. Pretoria, Transvaal, 1907: Government Printing and Stationery Office.

The commission which prepared this report was appointed in response to petitions for the suspensions of the provisions of the Transvaal mining law which prohibit the working of mines unless they are provided with two separate shafts or entries. The report gives the evidence taken by the commission, including that of some mining engineers and mine managers well known in the Transvaal. The conclusion of the commission is that the provisions of the law should stand, but

that in certain cases the operations of mines with a single entry should be permitted; such cases to be limited, however, and to be authorized only under the care and supervision of a special commission, and with special precautions.

Test of a Parsons Turbine Engine

The following data comprise the principal results obtained during an eight-hour economy test on a Westinghouse-Parsons steam turbine installed at Waterside Station No. 2 of the New York Edison Company. This test was conducted entirely by the New York Edison Company, under the direction of J. P. Sparrow, chief engineer.

The turbine unit tested is of standard Westinghouse construction throughout. It has a maximum rated capacity of 11,250 kw., and was built to operate on 175-lb. steam pressure, 28-in. vacuum and 100-deg. superheat. Under these conditions the turbine unit was guaranteed to have a minimum steam consumption of 15.9 lb. per kw. hour at the generator terminals, with a normal speed of 750 r.p.m. Incidentally, the electrical efficiency of the generator was guaranteed to be 97.8 per cent. exclusive of friction and windage, at a load corresponding to that sustained during the test. The results of the tests, detailed below, show an economy of about 7.5 per cent. better than the guarantee.

METHODS OF CONDUCTING THE TEST

During the test period, No. 2 Waterside Station sustained practically all of the 25-cycle load on the system, of which the unit under test carried practically 70 per cent. This load was maintained as constant as possible by remote control of the turbine governor by the switchboard operator. Between the first and the last hours of the test, the maximum variation in load was held within 4 per cent. above and below the average. During the last hour, however, the load decreased somewhat.

A surface condenser was used in connection with this turbine unit, and the water rate was determined by weighing the condensed steam delivered from the condenser hot well. Steam pressures and temperatures were determined close to the turbine throttle. The vacuum was measured directly at the turbine exhaust by means of a mercury column with a barometer alongside for reducing to standard conditions. This also obviated the necessity for temperature correction between the two mercury columns. During the test the vacuum was not maintained quite up to normal.

RESULTS OF TESTS

The following data represent the results of the tests, calculated for the conditions

as actually run; i.e., for instrumental errors only:

Duration of test.....	9:30 a.m. to 5:30 p.m.
Av. steam pressure at throttle, lb. per sq. in. gage.....	177.5
Av. superheat at throttle, deg. F.....	95.74
Av. vacuum (referred to 30 in. barom.) in Hg.....	27.31
Av. load on generator, kw.....	9830.48
Av. steam consumption, as tested, lb. per kw. hr.....	15.15

Owing to the departure, during the test, from specific operating conditions upon which guarantees were based, it was necessary to correct the observed results by the following amounts: Pressure, (2.5 lb. high) correction, 0.25 per cent.; vacuum, (0.69 in. low) correction, 1.84 per cent.; superheat, (4.26 deg. low) correction, 0.29 per cent.

These corrections were mutually agreed upon previous to the test as representative of this type of turbine. When applied to the observed steam consumption given above, the following results, representing contract conditions, are obtained:

Av. corrected water rate during 8-hr. test.....	14.85 lb. per kw. hr.
Guaranteed water rate.....	15.9 lb. per kw. hr.

In connection with these tests, a noteworthy agreement exists between the results noted and those previously obtained from tests of machines similar in design installed in the Manhattan station of the Interboro' Rapid Transit Company, New York, and the Long Island City station of the Pennsylvania railroad. At the same loads and with equivalent operating conditions, the performance of the machines is almost identical. These economic results, while not exceeding in actual steam consumption the best records of European practice, yet are extremely good in view of the moderate operating conditions under which the test was conducted. In fact they represent the best results that have yet been obtained by any turbine under the conditions named.

High Price of British Railway Coal

Consul F. W. Mahin, of Nottingham, reports that the British railways use about 12,000,000 tons of coal a year for locomotive purposes. The mines now demand an advance of 3s. a ton on the last contract price, due to the unusual export demand for that grade. This represents a total addition to railway operation expenses of over \$8,000,000. The railways, as a result, propose canceling a preference which they have been giving the mines. For many years they have carried 20½ cwt. of coal as a ton. Now they notify the mines of their intention to treat coal the same as other commodities. This means an advance of about 2 per cent. in coal-carrying charges, but it will not go far in recouping the railways for the increased cost of coal, which amounts to some 30 per cent.

Personal

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

N. F. Clark, consulting electrical engineer, of New York, is in the Lake Superior country.

Hon. Jean Prevost, minister of agriculture and mines for Québec, has tendered his resignation.

Gordon R. Campbell, secretary of the Calumet & Arizona Mining Company, is in New York.

J. A. Ede, mining engineer, of La Salle, Ill., has just returned from examining properties in Arizona.

William A. Paine, president of the Copper Range Consolidated Company, is at the properties on the South range, in the Lake Superior Company.

R. C. Canby, consulting metallurgist, of El Paso, Texas, has been spending a month in the East. He expects to return to El Paso next week.

Louis A. Wright, mining engineer, of New York, who has been engaged in professional work in Arizona for more than a year, has returned to New York.

Norman W. Parlee has resigned his position as superintendent of the Ivanpah Consolidated Mining Company, at Ivanpah, Cal., and has gone to Los Angeles, California.

A. P. Low, deputy minister of mines and director of the Canadian Geological Survey, has received the honorary degree of LL.D. from Queen's University, Kingston, Ontario.

Edward S. Dickinson has been appointed superintendent of the Florence iron mine at Crystal Falls, Mich. Capt. Edward Larson has been appointed assistant superintendent.

W. Fischer Wilkinson, consulting mining engineer of London, England, who has been spending three months in the mining districts of the United States, sailed for England, Oct. 9.

W. A. Bowles, who has been cashier for the Granby Mining and Smelting Company, at Granby, Mo., has been appointed assistant superintendent of the company's operations at that place.

W. H. Coghill has resigned his position as engineer to the United Zinc Companies, Joplin, Mo., to take a position as instructor in metallurgy, assaying and mineralogy in the Northwestern University, at Evanston, Ill.

C. J. Garvin has resigned his position as general manager of the Green Mountain Mining and Milling Company, at Silverton, Colo., and has removed to Denver. Lee Woods, late of Denver, succeeds him at the Green Mountain property.

Percy E. Barbour, mining engineer, of

Goldfield, Nev., was a recent visitor in New York. A personal note published recently in the JOURNAL, to the effect that Mr. Barbour had gone to New Mexico to examine a mine there was incorrect.

Daniel Davis, long connected with the Thomas Iron Company, has retired. Mr. Davis has lately been superintendent of the Lock Ridge furnaces, but leaves active work to live in retirement at Catauqua, Penn. He is one of the oldest furnacemen in the State.

H. S. Denny, consulting mining engineer and metallurgist, of London, England, who has been in the United States for several months, returned to New York this week from the Black Hills, where he has been examining mines. He intends to sail for England, Oct. 12.

H. C. Ryding, late superintendent of the rail mill at Lorain, Ohio, now operated by the National Tube Company, has been appointed assistant to Vice-President Frank H. Crockard, of the Tennessee Coal, Iron and Railroad Company, Birmingham, Ala., and has entered upon his new duties.

Daniel Guggenheim, president of the American Smelting and Refining Company, M. R. Guggenheim, Samuel Newhouse and Judd Stewart left New York Oct. 3 on the annual tour of the company's plants. The party will visit St. Louis and Denver and will go as far west as the Pacific coast.

Obituary

J. W. McCune, superintendent of the Woodward Iron Company's furnaces, Woodward, Ala., was instantly killed Sept. 18 by a bursting water pipe. He had the reputation of being one of the best managers in the Birmingham district.

J. B. Scott, manager of the Waggener Coal Company at Mossy Bottom, in the Big Sandy district, Ky., poisoned himself while on a visit to Ashland, Ky. He was 30 years old, and a successful manager. No reason for his suicide is known.

Hubert Claus, general manager of the Eisenhuettenwerk Thale, in Germany, died Aug. 21 at St. Mercino di Cascozza, Italy, where he had gone for his health. Mr. Claus, who was well known in this country, which he visited repeatedly, practically created the Thale works with its sheet mills, its foundries and its great factory for enameled ware.

S. W. Little, one of the best-known coal operators of southern Indiana, died at his home in Evansville, Sept. 27, of a complication of diseases. He had been in failing health for the last year. Mr. Little owned and managed the coal mines at Little and Blackburn, in Pike county, and gave employment to about 500 men. The town of Little, on the Evansville & Indianapolis railway, was named in his honor. Mr. Little had few labor troubles

at his mines, and had the esteem of his men. He was 72 years old.

Societies and Technical Schools

South Dakota School of Mines—This school opened Sept. 26, with a large attendance. The course in mining and metallurgical engineering is considerably strengthened by the installation of the new metallurgical laboratory, which will be completed some time during the year. New electrical machinery for lighting and power is also being installed.

Ontario School of Mines—The attendance at this school in Kingston, Ont., is so large this session that it has been found necessary to make a number of new appointments. These include W. O. Walker, lecturer in organic chemistry; J. B. McKay, assistant in mineralogy and metallurgy; E. W. Henderson, lecturer in electrical engineering; Lindsay Malcolm, lecturer in civil engineering; Wyatt Malcolm, fellow in mineralogy.

Wisconsin Mining School—The legislature of Wisconsin recently appropriated \$30,000 for the establishment of a mining school at Platteville, which is in the zinc and lead mining district. A building formerly used for normal school purposes will be the present home of the new mining school. Governor Davidson has appointed a commission which will have in charge the management of the school, under the act of the legislature.

American Peat Association—The temporary committee gives notice that the meeting for the organization of this association will be held Oct. 23-26, at the Jamestown Exposition, where the technologic branch of the United States Geological Survey has established a fuel-testing plant, at which peat and products brought together for examination and comparison will be on exhibition. All those interested in peat, either from a commercial or scientific standpoint are invited and urged by the committee to be present at and take part in this meeting. It is to be hoped that this will mark the beginning of peat enterprises on commercial as well as on a scientific basis in all parts of this country. A peat exhibit will also be made in the Mines and Metallurgy Building, of which particulars may be obtained from Dr. Joseph Hyde, Jamestown Exposition, Virginia.

Industrial

The Dozier-Putnam Company announces the establishing of an assaying and engineering office in Redding, Shasta county, California.

The National Export Association of American Manufacturers is organized to promote and protect American trade interests abroad. The New York offices are in the Park Row building.

The Waterbury Company, 69 South street, New York, manufacturer of insulated wire and cable, announces that it has appointed J. E. Ham its Chicago representative, with offices at 108 La Salle street.

The Ridgway (Penn.) Dynamo and Engine Company has re-opened its Chicago sales office at 824 Marquette Building. F. S. Hickok, who has had extensive experience in electrical and power-plant fields, is in charge as manager.

The Henry Heil Chemical Company, 210 South Fourth street, St. Louis, Mo., has acquired the sole agency for the filter paper manufactured by Max Dreyerhoff, of Dresden, Germany. This filter paper is extensively used in analytical laboratories in Europe, but has only lately been introduced in the United States.

The Jeffrey Manufacturing Company, Columbus, Ohio, has booked an order from the Monongahela River Consolidated Coal and Coke Company, of Pittsburg, for several large electric locomotives for service at the Alice and Gallatin mines. The company is also installing locomotives and machinery for the Pryor Coal Company.

Wm. Ainsworth & Sons, manufacturers of balances and engineering instruments of Denver, Colo., have placed on the market a new analytical balance of 200 grams capacity and 0.05 milligram sensibility, which embodies several new features, including multiple rider carriages for handling all weights below one gram, improved swinging yokes and skeleton hangers.

The Standard Roller Bearing Company, of Philadelphia, Penn., has increased its capital from \$3,500,000 to \$5,000,000. Large additions are now being made to the plant and equipment for the purpose of enlarging the department for the manufacture of roller bearings for shafting hangers, and also for the establishment of an entirely new department for the manufacture of roller bearings for trolley cars.

The C. L. Hathaway Rock Crusher Company, Denver, Colo., gives notice of several changes in its catalogue. It has changed the numbers and sizes of its crushers, the reasons for which are fully set forth in a "Notice to our Customers," just issued. The company has recently introduced a new hopper, which it calls the horizontal hopper.

No. 2 stack of the Dunbar Furnace Company, Dunbar, Penn., for the week ending Sept. 28, used only 1993 lb. of coke per ton of pig iron. This stack is using Semet-Solvay by-product coke exclusively for fuel, and about 86 per cent. soft and 14 per cent. hard Lake Superior ores from the Cleveland-Cliffs Iron Company's mines. The average silicon on the 42 casts of iron was 1.60 per cent., and average sulphur 0.039 per cent. Furnace makes

foundry, forge, basic, car wheel and malleable irons.

Burdett Loomis, Hawley Pettibone, H. A. Kimber and C. Lee Straub, members of the Loomis-Pettibone Company, New York, announce the incorporation of a new company, in which they will be exclusively engaged hereafter as consulting engineers. They intend adhering to the work with which they have been identified during the last 20 years, and will continue to specialize in the design, construction and operation of power, fuel and illuminating gas plants, and their application to industrial, mining, municipal and central power station work.

The Green Fuel Economizer Company, Matteawan, N. Y., issues in pamphlet form a paper on the "Fuel Economizers at the Manhattan Power Station of the Interborough Rapid Transit Company, New York City," by R. D. Tomlinson, showing by a careful analysis of tests and monthly records that the economizers in this plant are paying a net rate of 30.5 per cent. upon the initial outlay. The plant contains 64 boilers of 520 b.h.p. each and the draft is produced by four brick chimneys.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

The Cyclone Drill Company, Orrville, Ohio. Cores. Pp. 80, illustrated, paper, 6x9 inches.

American Locomotive Company, New York City. Prairie Type Locomotives. Pp. 40, illustrated, paper, 6x9 inches.

The Cyclone Drill Company, Orrville, Ohio. Cyclone Blast Hole Drills and Loaders. Pp. 10, illustrated, paper, 9x12½ inches.

The Goulds Manufacturing Company, Seneca Falls, New York. Goulds Pumps for Every Service. Pp. 48, illustrated, paper, 4½x8½ inches.

The Jeffrey Manufacturing Company, Columbus, Ohio. Catalog 69A. Jeffrey Standard and Special Screens. Pp. 56, illustrated, paper, 6x9 inches.

Union Smelting and Refining Company, 604-608 East 19th street, New York City. Anti-Friction Babbitt Metal. Pp. 8, illustrated, paper, 3½x6 inches.

Coates Clipper Manufacturing Company, Worcester, Mass. Bulletin No. 20. Coates Flexible Transmission. Pp. 28, illustrated, paper, 6x8 inches.

De La Vergne Machine Company, Foot of East 138th street, New York. The "De La Vergne" Vertical Oil Engine. Pp. 8, illustrated, paper, 4x9 inches.

The Allentown Rolling Mills, Allentown, Penn. Pump Data No. 20. The Aldrich Horizontal Quintuplex Electric Pump. Pp. 8, illustrated, paper, 6x9 inches.

The Brown Hoist Machinery Company, Cleveland, Ohio. "Brownhoist" Locomotive-Cranes with Brown Patent Grab Buckets for Handling Ore, Coal, Limestone, Slag, etc. Pp. 27, illustrated, paper, 6x9 in.; 1907.

Construction News

Trail Creek, Colorado—The Metropolitan Mining Company is preparing to install machinery. The office of the company is at Idaho Springs, Colorado.

Golden, Colorado—It is reported that new machinery is to be put in for the Malachite property at Golden. Mark Hackett, Golden, Colo., is manager.

Columbine, Colorado—The Hahn's Peak Mining Company is arranging to install machinery on the Tom Thumb group. H. O. Granberg, Columbine, Colo., is secretary of the company.

Georgetown, Colorado—The Prudential Mining Company, in which Eastern people are interested, will install an air-compressor plant. J. J. White, Georgetown, Colo., is manager.

Apex, Colorado—The Boston-Occidental Mining Company has suspended operations for an indefinite time, pending the installation of a new and larger plant of machinery. C. S. Ripley, Apex, Colo., is manager.

Black Hawk, Colorado—An air-compressor plant is to be installed at the Elsinore mine. L. E. Tobias, Black Hawk, is superintendent.

The New National Tunnel Company is figuring on the purchase of a large air-compressor plant. G. Whitney Adams, Central City, Colo., is manager.

Virginia Cañon, Colorado—The Specie Payment Company is having plans drawn for the installation of a large and complete electric power plant to be installed at the Two Brothers plant in Virginia cañon and a contract has been let for the erection of new buildings at the mouth of tunnel. A. M. Welles, 752 Equitable building, Denver, Colo., is manager.

La Aurora, Mexico—The Teziutlan Copper Mining and Smelting Company has begun the erection of a hydro-electric plant near its mines. The plant is located on the Atoyac River. The power will be used to operate the machinery of the mine and smelter. The New York office of the company is at 82 Beaver street. George D. Barron is president and E. Du B. Lukis chief engineer.

Yreka, California—The Gold Ball Mining Company has commenced work on the construction of its transmission line, which will furnish electricity for both the Gold Ball and King Solomon mines, also to other mines in this vicinity. The company has purchased the large ditch and flume formerly owned by the Salmon River Hydraulic Mining Company. The company's address is at Yreka.

Special Correspondence from Mining Centers

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

REVIEWS OF IMPORTANT EVENTS

San Francisco

Oct. 5—The Trinity Copper Company shipped its first ore Oct. 1 to the terminal of the Balaklala's aerial tram-line at Kimberley, Shasta county. The ore is transported up the mountain side on a skipway and dumped from the skips into the ore-bins at the terminal station. From the station to the smelter, a distance of five miles, is down hill, gravity operating the aerial tram-line. The tram-line is nearly completed. The five-mile cable is in place on the 64 towers and the buckets are being attached. The smelter at Coram was built to handle ore from both the Balaklala and the Trinity mines. In the same county the Mammoth Copper Company has blown in its third blast furnace, which has been remodeled, and work has been commenced on the fourth one. Several hundred men are grading on the Sacramento Valley & Eastern Railroad between De Lamar and Copper City, and it is expected that within four months trains will be running from the De Lamar smelter to Pitt, three miles above Kennett. The Mountain Copper Company is about to reopen its foundry at the smelter at Keswick, and is preparing to start up its McDougall roasters, which have been shut down for the past three years. There are four of them at Keswick, six having been removed to the other smelter of the company near Martinez.

Copper developments in the vicinity of Happy Camp, Siskiyou county, seem to be progressing, and several groups under bond will doubtless be taken by those holding the options. F. H. Dakin, Jr., has a number, and Bernard Gilpin, also representing Los Angeles men, has adjoining claims. The mines are mainly owned locally and are being developed by California capital. It is reported that the Pacific Reduction Company will shortly erect a 200-ton smelting plant near Daggett, San Bernardino county, the junction of the Salt Lake and Santa Fe railroads, or at Crucero, at the junction of the Tonopah & Tidewater and the Salt Lake railroads. One of the T. S. C. Lowe coke and gas systems will be installed at the same place.

The Copper King mine, of Fresno county, which has been shipping its ore north to Tacoma, has closed down, and the 50 miners have been discharged. This is due to the fall in price of copper, and work will not be resumed this season. The profits of the mine have been cut off by the reduction in value of its product. The mine does not usually operate in

winter, owing to the bad roads for teaming, but the shut-down comes this year before the rains. The Fresno copper mine has not closed down, but no ore is being shipped.

The Daulton Copper Company, of Madera county, has closed down its mines this week, owing to the low price of copper. This company has been shipping its ore, which is not of high grade, as far as Arizona for reduction, but the low percentage of copper in the ore would not admit of further shipments at present prices.

Keystone drills are being used to test the ground on Greenhorn creek in Nevada county, and Berkeley men will build several dredges if the ground proves sufficiently rich. On the same stream work on the dam which will restrain the debris from the Red Dog hydraulic mine is progressing.

The Skidoo Mines Company, of San Bernardino county, expects to complete its water-pipe line to the mines within a month and a quartz mill with 400 tons daily capacity will be erected when the water supply is assured. In the same camp, Skidoo, a strike of coarse free gold has been made in the American Eagle mine, which is being developed by a private leasing party of local business men. Another strike of free gold ore has been made in the Gold Bird claim, and much of the rock is being sacked for shipment. The ledge is small, but much specimen ore is being mined.

In the Fremont Consolidated Mining Company's mines at Drytown, Amador county, where they are operating as one property the Fremont, Gover, North Gover and Loyal Lode claims, with Arthur Goodall as manager, they have again come across a lot of "candle-box ore" very beautifully studded with nuggetty gold. This is from the Fremont claim where a lot of the same kind of ore was found last December. The property is paying continuous dividends, and is one of the old ones of the Mother Lode section, reopened a few years ago by Goodall, Perkins & Co.

Orleans, in Humboldt county, on the northwest coast of the State, has long been known as a placer and hydraulic mining camp, but now copper ore has been discovered at Tomahawk, one of the camps in Orleans district, and a number of claims have been located and are being developed in a small way. There is great lack of roads in that region and everything has to be carried in on pack trains

The Yuba county quartz men have been up in the Grass Valley section offering miners \$3.25 per day, but could get none at that rate. Miners are scarce throughout the State.

It is reported that the Comstock mines may have to close down owing to lack of power and light, the electricians having been called out on strike. The companies generating power and light in that section have failed to reach an agreement with the Pacific Council of the International Brotherhood of Electrical Workers, after some weeks of conferences between the superintendent of the electrical companies and a committee of the district council. The miners are understood to be in sympathy with the electricians and will quit work when the light and power give out.

The Nevada-California Power Company, which is building a duplicate power plant at Bishop, Inyo county, to furnish power to local mines as well as those of Goldfield, Nevada, is having trouble with its labor force, more wages being demanded. This strike is on authority of the Western Federation of Miners. General Manager C. W. Hobbs has been in conference with the federation representatives and explained to them that the company cannot grant their demands, as funds for this extensive work were raised after careful computation based on the present wage rate. So far as Goldfield service is concerned, the suspension of these additional improvements will have no effect, as for present needs the power is now sufficient; but a duplicate line would prevent any shut-down in the mines in case of breakdowns; hence the desire of the company to have this extra line in working order before the winter sets in.

After a lot of backing and filling on the part of the miners' union, the strike at Angels Camp, Calaveras county, has finally been called off by a vote of 165 to 64, only the Austrian and other foreign miners voting to continue the contest with the mine-owners. Nearly a week ago the union voted to stop the strike, but some who voted against that action declared that some sort of "snap judgment" had been taken. Accordingly another vote was taken with the result stated above. The big mines have started up with regular union men, but the old leaders and some foreigners are still active in stirring up strife. These latter declare they will not work, and will withdraw from the union. The trouble is now between the two factions of the union.

Salt Lake City

Oct. 5—The mine-owners of the American Fork mining district are in need of better transportation facilities, and an effort is being made to build a railroad into the district from the town of American Fork.

Late reports received from Pioche, Nev., were to the effect that the new railroad into that camp from Caliente, on the main line of the San Pedro, Los Angeles & Salt Lake, is completed to a point six miles out. Regular trains will be operated into the camp not later than Nov. 1 next.

The annual report of the Consolidated Mercur Gold Mines Company, has been issued. During the fiscal year ended June 30, the company paid two dividends of \$25,000 each, and closed with cash on hand and bullion in transit to the amount of \$67,455. The mill treated 245,169 tons of ore and extracted therefrom \$2.62 per ton; while the tailings varied from 87c. to \$1.18, with the average at about 98c. a ton.

The management of the Utah Copper Company reports that the month of September will end with the new Garfield mill having treated about 100,000 tons of the copper-bearing porphyry ore from its Bingham mine. No information has been released as regards the results. It is believed, however, that the plant has come up to expectations.

The Honerine mine and mill at Stockton has been closed indefinitely, and it now rests with the stockholders to decide what course shall be pursued in the future. The company has an indebtedness of about \$200,000.

The Colorado, Crown Point and Iron Blossom Mining companies, with properties in the Tintic district, have decided to join in the sinking of a union shaft. By this means, the respective properties can be developed with less expense to each, and the shaft is so situated that drifts and crosscuts can be run into the respective properties without serious difficulty.

The Jennie Gold Mining Company, operating at Gold Springs, Iron county, has let a contract for new mill equipment. The present plant is to be enlarged so as to handle an output of 100 tons a day from the mine. It will have a cyanide department. Twelve Nissen stamps will be used for crushing.

There appears to be a concerted plan to curtail the production of copper from Bingham mines. During the past ten days, several low-grade copper mines have been wholly or partially closed. The management of the Yampa mine and smelter has ordered those properties closed, effective Oct. 5, throwing 450 men out of employment. It is believed others will follow in the same course.

Oct. 7—The next few months will witness a great falling off in copper production from Utah. Several of the mines

have closed down entirely; others have partially done so. During the past two weeks 1000 men have been laid off in the camp of Bingham and nearly one-half this number were employed in the Yampa mine and at the Yampa smelter. The Boston Consolidated is operating with a greatly reduced force; so is the United States Mining Company and the Bingham Consolidated has practically ceased production from its Bingham properties. There has been a curtailment reported by other companies operating in the camp. It is evident that there is to be a readjustment. While the low price of copper has had much to do with the bringing about of the existing conditions, other things have contributed, such as the inadequacy of transportation facilities, the scarcity of fuel and the unrest of labor. It is believed that there will be further reductions in production and a corresponding decrease in the demand for labor. Wages were voluntarily increased in every mining district in the State during the past two years to meet the demands of the increased cost of living. But copper, as well as the other metals, could be sold for a higher figure and the companies could well afford to pay the increase. But a recession has come and the closing of the mines temporarily is probably the better plan to establish a new wage scale. In Park City, there has been no cutting down of the working forces in the mines, except in the Daly West, Daly and Ontario mines, where the union miners went on a strike about two weeks ago. These mines have been closed indefinitely; but other properties in the district are working the usual number of men. In Tintic, Alta and Mercur conditions are normal; but in Beaver county some of the low-grade copper propositions have ceased making ore shipments.

The Yuba East mine, which is considered to be one of the richest properties in the Pioche, Nevada, district, has been purchased by a Boston syndicate. The property has been idle for several years on account of litigation.

A reorganization of the Bingham West Dip Mining Company has been effected and Harry S. Joseph, speaker of the Utah House of Representatives and a well-known Salt Lake mining man, has been made president. This company was formed several years ago to drive a drain tunnel into the camp of Bingham from the Tooele county side of the Oquirrh range of mountains. The adit has been completed to a distance of about 2000 ft. in all.

At the annual meeting of the stockholders of the Horn Silver Mining Company, held in this city, the following directors were elected: Juan M. Ceballos, A. I. Harrison, William H. Wolverton and Theodore B. Moore, of New York, and Philo T. Farnsworth, John Sharp and H. S. Young, of Salt Lake City.

The project to drive a drain tunnel adit in the camp of Alta is assuming form. The expense of the proposition will be borne by the three principal operating companies of the camp.

Bisbee, Arizona

Oct. 5—The Calumet & Arizona interests are looking over the Kelvin field, east of Phoenix, and have had men there some time. The district is assuming the boom phase and a great deal of interest is taken in it by mining companies throughout the territory.

The old Silver King mine, in Pinal county, idle for many years, is to be reopened as a copper property. Copper has always shown more or less in the workings of the Silver King, and at times has been troublesome to the metallurgists. The mine lies in a copper district, near the Kelvin properties, but transportation is still a difficult problem in the way of extensive mine operations.

Duluth

Oct. 7—During the past four years the Cleveland Cliffs Iron Company has opened a new range on Lake Superior, or, rather, has developed from nothing a new portion of an old range, separated from the remaining portion by a number of miles. This is the so-called Cascade district of the Marquette range, where this company has spent hundreds of thousands of dollars in land purchases, diamond drilling, the opening and development of mines, and now in extensive equipment and the establishment of a model town. Drilling operations have been conducted within over 40 square miles, and as high as 30 drills have been at work at one time. Four good mines have been developed, one by previous explorers, and the company owns practically all the land in the district. It has built its Marquette & Southeastern road to the Cascade, has secured immense holdings outside of iron lands, and is now busily engaged in preparing its mines for heavy shipments next year. These mines are the Princeton, formerly known as the Swanzy, and which was operated for some years by Tod, Stambaugh & Co., the Austin, Stephenson and Smith, all of which lie in a radius of about three miles on the Escanaba river. At the Austin there is a central power plant to furnish air for all the properties. The Smith lies close to the river and a shaft is to be sunk by the pneumatic method through 60 ft. of quicksand to the ledge by the Foundation Company, of New York, which has commenced preliminary operations. This shaft is to be rectangular in shape, and will be of reinforced concrete. The Princeton is mining heavily, and last year produced 175,000 tons of ore. The company has laid out a beautiful townsite, under the guidance of architect W. H. Manning, of Boston.

The western part of the Marquette range, in which this Cascade district is situated, is very active just now, with more old mines resuming and new ones starting explorations than ever before. The Humboldt, Bessie, Boston, American, Conrad and others are all being developed.

There is no change in strike conditions on the Mesabi range, and the mines are still guarded by deputies. Men are still hanging around, but the great majority have gone back to work or left the country. A large amount of money has been sent out of the country by these miners since the strike began and men have followed it. From the little mine village of Sparta, containing not more than 1000 persons in all, there have been sold drafts to Europe more than \$75,000. Much of this has gone in considerable sums, one miner being known to have sent to Finland more than \$700, the result of accumulations of years of hard labor. The men sending out such sums are not the sort to lose, but they are usually going with their funds, to spend their remaining years in plenty on the other side.

At the Dunn mine at Crystal Falls, on the Menominee range, ore is beginning to make at a depth of 1000 ft., and the future of this old and long abandoned mine is brighter than it has been for many years.

The Buckholz property in the Iron River district of the Menominee range, developed into a mine by local parties, has been taken over by Pickands, Mather & Co., and will be extensively improved this winter, so as to become a shipper next spring. The mine joins the Beta of the Mineral Mining Company and was in the hands of the Buffalo & Susquehanna interests early this season. There is a good showing of ore in a short drift from the shaft. This Cleveland firm has not been interested close to Iron River before.

Scranton

Oct. 9—The Lehigh Valley Coal Company has been making extensive purchases of land between Hudsonville and Weatherly for the purpose, it is said, of establishing large waterworks. It is claimed that there is a large bed of coal underlying the land stretching from Beaver Meadow to the Broad Mountain above Mauch Chunk. The company has been exercising the right of eminent domain to acquire the land for use as a water shed, and since the first of the year has purchased 2200 acres.

Another hoisting record was made at No. 3 colliery of the Delaware & Hudson at Plymouth, this week, when 999 cars were raised in a working day. The last record was 881 cars.

At a meeting of the Conciliation Board, held in Wilkesbarre last week, but one grievance came before the members, this being the trouble at No. 6 colliery of the

Lehigh Coal and Navigation Company, where the men complained that the company had demanded that they cut and set five sets of timbers in a distance of 20 ft., where formerly they had placed but four sets. They complained that they were given no extra compensation, while the company argued that the difference was offset by a decrease in the size of cuts required. The board decided in favor of the men, but gave the company the option of granting the men an increase in pay of 50 cents per yard; they to be paid at this rate for their work since the new order went into effect, or to revert to the former conditions. The board will meet in Wilkesbarre on Oct. 10 next.

The following statement has been issued by the officials of the Lehigh & Wilkes Barre Coal Company in connection with the explosion in the South Wilkes Barre mine, last week, when three persons were killed: "Upon further investigation and information the company is satisfied that the accident was caused by leaving a door open on the fifth west gangway which interfered with the ventilation and allowed a body of gas to accumulate. The identity of the party or parties who left the door open is unknown."

Toronto

Oct. 8—Professors T. L. Walker and W. A. Parks, of Toronto University, have obtained a great variety of mineral specimens from the mining districts of Ontario and British Columbia for the museum of the departments of geology and mineralogy of the university. Cobalt, the Port Arthur districts and the gold- and coal-producing areas of British Columbia are fully represented:

A petition signed by many citizens of Cobalt is being prepared for presentation to the Ontario Government, asking for the enforcement of regulations providing that due care be taken in surface blasting. Several accidents have recently been caused by blasting operations.

The German-Canadian Development Company, which has staked from 25 to 30 miles of coal-bearing land in the upper reaches of the Brazean river, between 4000 and 5000 ft. above the sea level, claims to have secured a property equal in value to the Crow's Nest Pass property. The prospecting party, which was in charge of Col. C. E. Talbot, M. P., of Bellechasse, Quebec, a director of the company, secured the services of Dr. D. B. Dowling, of the Geological Survey, in selecting the locations, which comprise 33 revealed seams ranging from 4 to 20 ft. in thickness. The Brazean river is situated between the Saskatchewan on the south and the Athabasca rivers on the north and the main line of the Canadian Pacific is about 150 miles to the south. Close to the location is ample water power from which 1000 to 1500 h.p. can be de-

veloped, which will be serviceable in developing and operating the mines.

Work was started last week on the Thorold smelter near Hamilton on the Welland canal.

The Canadian mounted police, after two years' work, have finished cutting an 8-ft. trail from Peace river through the Rocky mountains to the Yukon Territory, giving a 700-mile route from Edmonton, and affording access to a hitherto inaccessible part of the country.

Johannesburg

Aug. 31—The present condition of the share market is one of the best commentaries on the state of affairs in the Transvaal. If one looks down the list he finds stocks standing at figures far below their apparent intrinsic value. At present prices some of the mines will give 16 to 20 per cent. to the investor, and show a life of 25 to 30 years, but no one buys them. The reason is the uncertainty of the labor situation.

One of the mines that has suffered most, so far as the share market is concerned, is the Consolidated Main Reef. After the war these shares rose to £3 each. During the past three months sinister rumors have gone around concerning the mine and the shares have dropped to 7s. 6d. each. The annual meeting was held last week and the chairman made some reassuring remarks about the mine. The rumor that they intended closing down was false. During the past year a dividend of 7½ per cent. was earned, but only 5 per cent. paid, the balance being held back to push development. The public seems to have lost confidence in the firm which controls this mine.

The dreariness of the time was somewhat relieved last week by the visit of the Crown Prince of Portugal to Johannesburg. The interests of the Transvaal and the Portuguese East African colonies are bound together, for it is from this section of Africa that the majority of the Kafir mine labor of the Transvaal is recruited. Delagoa Bay, the principal Portuguese port, handles a large amount of the Transvaal imports. The Crown Prince was given a most hearty welcome. His charming personality made a most favorable impression on the people. After a visit to the underground workings of the Robinson mine, the Prince was entertained by the Chamber of Mines. A large and distinguished gathering of mining men, government representatives and military men greeted the guest at the lunch.

The first session of parliament is now over. To a large extent it has been a session of commissions. All kinds of commissions have been appointed. Some of them are still sitting. The Government does not seem to take much notice of the work of these commissions, for in the case of the Patent Law Commission, the Botha ministry has neglected its recommendations entirely.

Mining News from All Parts of the World

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

THE CURRENT HISTORY OF MINING

Alaska

Alaska Smelting and Refining Company—This company, with offices at 82 Beaver street, New York, made an assignment, Oct. 4, to G. K. Bell.

COPPER RIVER

In the controversy over the right-of-way for railroads into the Copper River country, the Government has decided to give the Alaska Home Railway Company the right to build through Keystone cañon and over the military reservation.

SUSITNA

Local authorities estimate that nearly \$250,000 in gold will be brought out as the result of the work done this season in the Susitna district.

Arizona

Shannon—This company completed its new smelting furnace on Sept. 10. This will give the works a capacity for the production of about 2,000,000 lb. of copper per month.

BISBEE DISTRICT

Arizpe Mining Company—This company has received three hoists for use at three of its shafts south of Cananea. It has been at work more or less actively for the past four years.

Clark Smelter—At Jerome the W. A. Clark smelter is no longer sinking into the mine and work on abandoned portions of the property has been resumed. A large furnace will blow in shortly. The company is building a 500,000-gal. oil tank at Jerome Junction on the Santa Fe, Prescott & Phenix road.

Globe Consolidated—At Globe the Gem shaft was sunk last month 112 ft. to the 1003-ft. level, record work for the district. At 1100 ft. the shaft will be bottomed and a drift started to intercept the veins. The Mallory shaft, bottomed at 792 ft., cut white iron and cupriferous pyrite at 450 ft. The Bird shaft, sunk by prior owners, showed good copper values from surface, but the present company expects to cut the Bird vein at depth.

Mansfield Mining Company—This company, with a property north of Nogales, is talking of erecting a smelter, and will endeavor to sell stock for the purpose. The company claims to have a large tonnage of high-grade ore blocked out.

Norton Shaft—The shaft on this claim of the Calumet & Sonora has cut a body of silver lead running about 75 per cent. lead and from 100 to 150 oz. silver, which is the full width of the shaft and in which the men are now about 9 ft. It is expected to change to copper sulphides at depth. On an adjoining claim the same company has another shaft down through the same material and into rich chalcopyrite and bornite.

Old Dominion—At the Old Dominion and United Globe properties 700 men have recently been laid off, and the smelter is taking as small amounts of custom ores as possible.

Ortega Mining Company—This company, near Cananea, has closed down, no reason being given and no date set for resumption.

San Simon Copper Company—This company, at Paradise, is trying the formation at new points. The company was organized as the Chiricahua Development Company, by Marquette, Mich., people, who secured the assistance of T. F. Cole, of Duluth, and for three years extensive development was carried on. An effort will be made to put in a small custom concentrator for the Paradise region, in the hope that it may stimulate the production of ores now unworkable.

Shattuck—This mine at Bisbee has decided to reduce its output from 400 tons of ore per day to about 200 tons sulphides for the Globe smelter, the oxides that were sent to Douglas not being required at present.

Saddle Mountain—This mine is still idle, though the rail rates that were said to be responsible for the close have been readjusted satisfactorily. It is understood that resumption will take place after the smelter is completed and a railway is built from Winkelmann.

Santa Rosa Mining Company—This company, operating south of Douglas, has denounced about 4500 acres surrounding its mine, which is now under extensive development. The orebodies have been found and will be carefully developed. Thos. Collins, of Michigan, the chief owner, has taken personal charge of operations.

Superior & Pittsburg Mining Company—This company at Bisbee, which is making 1,000,000 lb. of copper monthly, will not reduce its product but is increasing slightly. This month shipments from Cole and Junction shafts have been larger than usual. The company is developing large orebodies around its Hoatson shaft, and

will be mining heavily there as soon as the embargo is taken off the production of copper.

Wolverine—The tunnel cut 40 ft. of good ore, and was stopped in the limestone beyond. A test incline will be sunk on the dip and it is believed that this will show connection with the drillhole 100 ft. away.

PINAL COUNTY

Copper Creek Mining Company—We are informed by this company, operating about 14 miles east of Mammoth in Pinal county, that it has recently opened several large bodies of fine ore. The four most important workings show bodies of rich copper glance carbonate and oxide ores. The company is receiving estimates on a 300-h.p. central power plant, and smelter complete. An electric surface tramway two miles long will be at once put in to handle ores from the mines to the smelter. A post office, called Copper Creek has been established at the company's camp.

California

AMADOR COUNTY

Iron Coal and Iron Company—This company is reopening the McNeeley copper mine in Irish Hill district, which has been idle for 25 years. Geo. W. Tauton is superintendent.

BUTTE COUNTY

Cape Horn Mining Company—This company has been organized to purchase the Cape Horn mine on the West branch of the Feather river, 18 miles from Oroville. W. M. Wilson is manager. Quite a force of men is to be set at work at once.

CALAVERAS COUNTY

Talc—Shipments of green talc are being made by W. T. Robinson from the Lookout mine near San Andreas.

INYO COUNTY

Orient Group—This property has been acquired by Bush Brothers, of Rhyolite. Their group is situated 2½ miles from the principal Ibex mine and 4 miles from the Confidence mines on the east side of the southern end of the Funeral range.

MODOC COUNTY

Mount Vida Mining Company—This company, at Fort Bidwell, has a crew of men at work and is taking out ore. This is one of the eight incorporated companies in Hoag district.

NEVADA COUNTY

Aurora Mining Company—On this mine, at Randolph Flat, a new engine, hoist, pump, etc., are being installed. H. B. Skewis is superintendent.

Banner—Work has commenced on this mine, at Nevada City, H. A. Ball, superintendent, with 20 miners employed. The South drift for the 900-ft. level is being run toward the old pay shoot.

Black Bear—This property, near Grass Valley, has been bonded to James English and Egan Bros., who are taking out some high-grade ore.

Golden State Mining and Development Company—This company, operating at Chicago Park, has struck some rich ore in a 6-ft. ledge. Work is progressing on the new mill site.

Kenosha—At this mine at Deadman's Flat, Grass Valley district, the big plunger pump has nearly drained the shaft. Good ore was uncovered in the bottom of this shaft just as the mine was flooded nearly a year ago.

Prosper—This property on Canada Hill, owned by C. and A. Kirle and G. Carey, has been bonded to H. A. Ball, who has men at work running a tunnel to tap the ledge.

PLUMAS COUNTY

Indian Valley—This mine, near Greenville, E. J. Franz, superintendent, is not closed down, as reported, but the force has been reduced until a new mill is installed.

Consolidated Copper-Gold Mines Company of Nevada—This company has made a good strike of copper ore in Copper Hill in Ward Creek district. The copper ore carries gold and silver values also.

Casa Grande—An important strike has been made in these mines in old Bullion district, near Cima. The property is at Meadville, a new camp $6\frac{1}{2}$ miles from Cima. There are 10 claims in the group, owned by S. & T. Meade, of Los Angeles.

SHASTA COUNTY

Black Tar Mining Company—This Chicago corporation, holding a bond on the Niagara mine at French gulch, is building a 10-stamp mill. The old 18-stamp mill is being torn down. Frank Seybel is superintendent, and has 12 miners at work.

SIERRA COUNTY

Docile—This old mine at Alleghany is being reopened by G. J. Fresborough, who worked it many years ago.

Monjar Mining Company—In the Young America drift mines of this company at Forest, pay has at last been struck after two years' work running the bed-rock tunnel.

Rainbow Extension Group—At this mine, Alleghany, R. P. Giles, superintend-

ent, good ore is being taken out, but the "bonanza" shoot is, not being mined.

Sierra Buttes—Operation of 40 stamps is temporarily suspended in order to develop new ground to get plenty of rock for the entire 60 stamps in the mill.

SISKIYOU COUNTY

Champion Group Mining Company—This Portland company is developing quartz mines in Humbug creek, and has also bonded 14 claims in Oak Bar district, consisting of the Beaver Creek group.

Scott Bar Group—This group of 12 claims near Scott Bar has been bonded to R. A. Murray of Etna.

Copper—O. Poor has sold to Portland, Ore., men, 40 acres of copper-bearing land close to the town of Yreka, on the Herzog place.

Drummer Boy Gold Mining Company—L. S. Bean has sued this company to foreclose a \$20,000 mortgage. It was in connection with this mine that E. W. Emmons was recently convicted of obtaining money under false pretenses, through selling shares.

Highland—At this mine, near Etna Mills, there is an 18-in. vein of rich rock. This is the mine that last year yielded about \$30,000 from one ton of ore.

Preston Peak Copper Company—This property, near Happy Camp, has been sold at sheriff's sale to C. F. Hickey, of San Francisco, for \$34,750.

Rock Point—Simon & Nesbit, owners of this claim at Scott Bar, recently found a \$545 nugget. All their gravel yields coarse gold.

TRINITY COUNTY

Brown Bear—All the work in this mine, at Deadwood, continues to be done by leasers. The Bully Chooop Mining Company now has a bond on the property.

Bully Chooop Mining Company—The mill at this mine has been closed down on account of lack of water and will not resume till the fall rains come.

Golden Jubilee—While two Huntington mills are running steadily on ore, the men are at work putting up the buildings for the new stamp mill.

TUOLUMNE COUNTY

Omega—At this mine near Jamestown, C. W. Ayres superintendent, the rich vein recently struck on the 300-ft. level proves to be 14 ft. wide. The mine is owned by the Mother Lode and Table Mountain Gold Mining Company.

United Mines Corporation—This company, about to operate the old Dead Horse mine, is putting in concrete foundations for the new 100-stamp mill.

Ellen Winton—At this mine, Groveland, owned by T. J. Crowley, of San Francisco, the engine for the mill has arrived and the mill started.

Sierra Gold Mining Company—As soon as this company can obtain electric power it will begin work again on the Del Monte mine, at Groveland.

La Fiesta Gold Mining Company—This company has contracted with the Angels Iron Works for a 10-stamp mill for the Kanaka mine near Groveland.

Eagle Shawmut Mining Company—A triplex electric pump is being installed at the 600-ft. level of the Shawmut mine. The company has also bought a 200-h.p. Ingersoll-Sergeant air-compressor.

TULARE COUNTY

Borax—R. L. Rails, of Delano, has located four borate claims on Deer creek, in the mountains east of Porterville.

Colorado

BOULDER COUNTY

Magnolia Mining and Reduction Company—The property of this company at Magnolia, has been sold to Curtis G. Cook, of Hartford, Conn., the consideration not being stated. It is understood that arrangements will be made to start up operations again at an early date.

CLEAR CREEK COUNTY

Indiahoma—Oklahoma and Colorado capital is interested, in this new incorporation, and has taken hold of the Cannady group on Chicago creek. W. W. Cannady, Idaho Springs, Colo., is manager.

Metropolitan—A contract has been let for 4000 ft. of tunnel work on this property on Trail creek to Idaho Springs people and machinery is to be installed in the near future. Office of company is at Idaho Springs.

GILPIN COUNTY

Old Town Consolidated—At a depth of 1950 ft. a large body of concentrating and smelting ore has been opened up in the Old Town shaft, the smelting streak carrying gold, silver and copper values. G. K. Kimball, Jr., Idaho Springs, Colo., is manager.

Peringo—Justin K. Richardson has deeded to the Six Day Mining Company for a consideration of \$200,000, the Peringo group of 22 lode claims, four mill sites, Perigo 30-stamp mill, together with machinery, buildings, etc., situated in the Independent district.

Tucker—A Wild mill for crushing and Wilfley tables have been added to the Tucker mill, making the daily capacity 100 tons, and an extension of the Gilpin Tramway has been made so that custom ores can be handled. Heavy developments at the mine are planned. H. W. Kane, Central City, Colo., is manager for F. W. Hearne & Co., the owners.

LAKE COUNTY—LEADVILLE

The drill-hole at Thirteenth street has

been delayed for the past week on account of the drill striking a large boulder. A heavy piece of railroad iron was dropped to the bottom of the hole, 575 ft., and this also stuck at the bottom. The Western Mining Company is now making a casting and will endeavor to remove the obstruction.

Ball Mountain—At the head of California gulch; the Sunday and the Elva Elma are shipping excellent ore, and from the latter shipments are going out daily. Development work on both properties will continue during the winter.

Dinero Tunnel—This tunnel in Sugar Loaf district has reached a distance of 1300 ft., and during the last hundred feet several small veins have been cut, but there remain 1700 ft. yet to be driven before the tunnel strikes the Dinero veins.

Fryer Hill—The revival of mining on this hill is due to the opening of a market for low-grade silicious ores, as nearly all of the properties on the hill contain large bodies of this class of ore. The Silver, Tip Top, Dunkin, American, Climax, Robert E. Lee and others are shipping in the neighborhood of 300 tons daily. In addition a good tonnage of iron is being sent out.

Greenback—A new station is being cut at the 900-ft. level, Carbonate hill, and when completed a large pump will be installed and the unwatering of the property commenced.

Holy Cross—The French Mountain Mining Company, successor to the Gold Park Company, has spent \$300,000 in building roads, erecting buildings, etc., and after going to this expense, with that of development, it has now to face a law suit. The principal vein in the district is the Grand Trunk, which has been developed by two tunnels and a shaft, the latter the discovery and down 80 ft.; the upper tunnel, driven on the vein is in 650 ft.; the lower tunnel, a crosscut, has been driven 2230 ft., the last 120 ft. being on the vein. In the lower tunnel the vein dipped out of its territory and into that of the Shamrock, an adjoining claim. The owners of the Shamrock secured an injunction against the French Mountain Company. The court ordered that the tunnel be driven further ahead to a certain point and from that an upraise be carried to connect with the vein in the upper tunnel and so prove the continuity of the vein. This is now being done, and the ore that is being taken from a 10-ft. vein is being stacked. The company has installed a fine cyanide mill at a cost of \$100,000, with a capacity of 130 tons daily.

Jennie June—This shaft, East Tennessee Park district, is down 125 ft., with a fair streak of ore at the bottom; drifting in both sides of the shaft is now in progress. A tunnel is being driven on the Helen Gould group, following a small streak of ore which is extremely rich in

places. Work will be carried on at both properties during the winter.

Mammoth—When the shaft was first sunk on this property, Big Evans gulch, at a depth of 600 ft. a good vein of ore was opened, carrying native silver and fair values in lead. The present operators drove from the shaft south 75 ft. and upraised 104 ft. where a streak of ore was opened. During the week a vein 2 ft. wide was opened that runs high in silver and 25 per cent. lead; sufficient work has not been done on the discovery to prove whether it is the main ore-shoot or not.

ROUTT COUNTY

Greenville—This company, operating at Greenville, near Steamboat Springs, has decided to install an air compressor plant to facilitate operations. The group will be cut with tunnel workings.

Miller Mining Company—Sullivan air compressor and drills have been ordered for the Martha tunnel. Peter Smilanvic, Steamboat Springs, Colo., is manager.

Illinois

GALENA DISTRICT

Appelton-Galena—Milling is now in progress at this mine, known locally as the Dinsdale. The mill is of 50 tons daily capacity. Both lead and "jack" are found in crevice openings.

Black Jack—The Black Jack-Marsden mine, four miles south of Galena, is at present producing 30 to 40 tons of zinc and about 5 tons of lead concentrates daily; as high as 50 tons of zinc has been recorded on several occasions. The mine is worked 24 hours and the mill 20 hours per day, and 68 or 70 men are employed. The bins are now stacked up to their full capacity of 1000 tons. The zinc product is being shipped to the Winnebago plant at Hazel Green for roasting and magnetic treatment. This mine is so heavily watered that up to this time no use has been made of the mill pond; the flow of water, as raised from the mine by two 20-in. pumps, is sufficiently strong to supply the mill water.

Pacific Gold Mining Company—This newly equipped property is handling 50 tons daily, which turns out about 7 tons of carbonate or drybone concentrates.

Ten Strike—This mine has joined the list of Galena's producers; one car of "jack" has been shipped and two more are ready for market. Disseminated jack and lead are found 118 ft. from the surface. There is a small mill of 25 tons daily capacity on the property.

Vinegar Hill—The skeleton of the Vinegar Hill mill is being inclosed this week. Boilers are in place and machinery is on the ground ready for installation. The zinc ore at this mine is in solid sheet

formation, pitches and flats, and carries less than the average amount of iron. A carload of hand-cobbed jack of high grade was shipped last week.

CLAY COUNTY

An event of importance in the coal-mining industry of this State will be the opening of a large new mine by the Clay County Coal Company, of Terre Haute. This company was organized two years ago with a capital of \$100,000. It recently secured a large tract of coal land near Coal Bluff, which is considered as good coal land as is to be found in this part of the State. The company paid \$50,000 for the 500 acres and is opening the first mine between the Big Four and the Chicago & Eastern Illinois tracks, which location will afford ample shipping facilities. The coal taken from the new mine is what is known as Minshall coal. The first vein was worked by the farmers until the land was purchased by the company. The new mine is being equipped with all modern machinery and appliances, and the tippie is constructed of steel. Motor cars will bring the coal to the hoist, all the "digging" will be done by machinery and screens will separate the coal into a dozen different grades.

Indian Territory

Asphalt—C. N. Gould, geologist of the State University of Oklahoma, has investigated the asphalt resources of this Territory; and announces that considerable quantities are found in the Chickasaw Nation and other parts of the Territory. No exploitation is as yet under way. The asphalt is said to be exceptionally suitable for street paving.

Michigan

HOUGHTON COUNTY—COPPER

Superior—Shaft No. 1 is down 650 ft. and sinking to the 700-ft. level. Shaft No. 2 is down 275 ft. No work has been done at No. 2 for some time. Good copper-bearing rock is still found at the bottom of No. 1 shaft.

Trimountain—Shaft Nos. 2 and 3 will hereafter be worked alternately by day and night shifts so as to allow certain shaft improvements.

Calumet & Hecla—Operations at the Delaware property have been discontinued because the copper value does not continue with depth on the Montreal lode. Exploratory work will be carried on through the winter. Nos. 19 and 20 shafts on the Kearsarge Amygdaloid have been closed down.

Copper Range Consolidated—All work has been suspended at the new electric power plant. This plant was under construction at the Michigan smelter and

was to furnish power for the Copper Range group of mines and mills.

Oscola—This mine has stopped all but five drills in the main mine, necessitating the laying off of nearly 500 underground miners. At the north and south Kearsarge branches of this property one shift has been discontinued.

KEWEENAW COUNTY—COPPER

Cliff—Preparations are being made at the Tamarack mill to receive several hundred tons of ore from the old Cliff property in Keweenaw county. A 2-ton skip will be installed.

Seneca—Sinking will probably soon be begun for a new shaft. The ledge was found by trenching at a depth of 4 ft. The Seneca property consists of about 1880 acres north of the Mohawk and Ahmeek mines and is believed to carry the Kearsarge lode. It is under Tamarack-Osceola management.

MENOMINEE RANGE—IRON

Verona Mining Company—This company is about to begin extensive exploratory work about 5 miles north of Amasa. A diamond drill and test-pits will be employed. In the Felch mountain district, in section 9, a shaft has cut a deposit of low-grade ore. The company is also exploring in Atkinson township, Iron county, and has assumed the Coe-Piper lease on the Bucholz exploration in the Iron River district.

Missouri

ST. FRANCOIS COUNTY

Federal Lead Company—This company has made a sweeping reduction in output and has discontinued work in shafts Nos. 9 and 10, also on the new railroad. Five of the eight operating shafts are now closed and ore is being raised only from the Central, Rogers and Derby shafts. The No. 1 mill is closed down and only two sections of the new Central mill are at work. All the prospecting drills have been called in and between 500 and 600 men have been laid off.

St. Joe Lead Company—The directors have just completed their semi-annual visit and have decided on sweeping retrenchments. The diamond drills, 17 in number, are being called in and laid up for the winter, the extensive town improvements on the sewers and in extending the water works at Bonne Terre have been stopped, and the Gumbo, Hill and Crawley shafts have been closed down. A reduction in wages is under consideration, as the price of pig lead has shrunk about 30 per cent.

Montana

BUTTE DISTRICT

The reduction of the copper output and working force of miners in Butte now amounts to 26 per cent. of the normal; that is, the curtailment amounts to almost three-fourths of the usual production.

The general belief in Butte is that a further curtailment will be ordered and that a complete shut down of the Amalgamated, North Butte and Coalition mines will result.

East Butte Copper—This company has cut into a body of high-grade copper ore 182 ft. north of the 900-ft. station of No. 1 shaft. The crosscut went through 52 ft. of milling ore and then broke into a good body of ore on the hanging wall, the average assay from which is 9.4 per cent. copper. The face of the crosscut is in 3 ft. in that class of ore, and the drills were still in it at last accounts.

CASCADE COUNTY

Ripple—The Montana Gold, Silver, Platinum and Tellurium company has commenced suit in the district court against J. C. E. Barker and others to recover for certain ore alleged to have been shipped from this mine at Neihart, by the defendants illegally, and also to secure a decree of the court declaring that the defendants have no title or interest in the property. The plaintiff asks that its title to the property be quieted by a decree of court, and that an accounting be had to determine the amount in which the defendants are indebted to the plaintiff.

FERGUS COUNTY

Barnes-King—A dispute, which probably will lead to litigation, has arisen in connection with this company. The stock of the company was taken up, upon its flotation, by some prominent mining men of Butte, and by a prominent financial house in Boston. The mine has been producing and was supposed to have large reserves of ore. However, there were recently unfavorable reports respecting the management of the company, which led the stockholders to elect a new board of directors with John Gillie, general superintendent of the Amalgamated mines, as president. Mr. Gillie has made an examination of the mine and reports that not to exceed 25,000 tons of ore are developed, and that the net value of this ore does not exceed \$50,000. It is reported, moreover, that this orebody was discovered after the present company came into possession of the property. There are charges of fraud in connection with the promotion of the company and great indignation prevails among the stockholders.

JEFFERSON COUNTY

Comet—At this mine, near Basin, an experimental concentrator, of 20 tons daily capacity, has been installed. A. K. McDaniel is in charge.

Hope—The three-compartment shaft is now down 300 ft. Crosscutting will be begun when it reaches the 500-ft. level.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Albemarle—This mine will shortly be

developed on an extensive scale. A large amount of preliminary work is under way, including the erection of a 25-h.p. hoist.

Combination Extension—The ledge in the 400-ft. level is fully 60 ft. wide and carries ore of milling grade. It is believed to be a continuation of the Little Florence orebody.

Eureka—The shaft at Diamondfield has reached a depth of 293 ft. A ledge was struck at that point, also a flood of water that is pouring into the shaft at a rate of 15,000 gal. a day.

Francis-Mohawk—A 15-ft. vein has been encountered in the 300-ft. level. It is believed to be a continuation of the Jumbo vein which runs through the Gold Bar, Blue Bull and other mines. The best values run along the footwall, but the whole orebody is of milling grade. The shaft will be continued to the 500-ft. level.

Goldfield Horseshoe—Development work has been resumed on this property, which adjoins the Rochester. A new shaft will be sunk to a depth of 300 ft. and crosscuts will be run to develop the two low-grade veins which were cut in the upper workings.

Jumbo Leasing—A drift is being run from the south crosscut on the 300-ft. level to intersect the Jumbo vein which lies to the west of the workings.

Laguna—A large station is being cut at the 450-ft. level to open a connection with the Red Top workings in order to improve the ventilation in both mines.

Mohawk-Jumbo—High-grade ore is being mined in the 400- and 500-ft. levels. Last week the Mohawk-Jumbo Leasing Company shipped 1000 tons of \$25 ore, and another shipment is ready to go forward.

Red King—The shaft is down to the 450-ft. level. Prospecting is being done at this depth. The mine is making a large amount of water and sinking has been held up until better pumping facilities are provided.

Rogers-Goldfield Syndicate—The Little Florence vein has been cut in a southwest drift on the 300-ft. level. The ore at present averages \$100 per ton. This find has improved the prospects of the Rosebud, O. K. Fraction, Nevada Pearl and Combination Extension mines.

St. Ives—A 6-in. vein has been cut in a winze from the 100-ft. level that carries phenomenally rich ore. The company will resume shaft-sinking to cut the vein at depth.

Simmerone—The ledge has been cut in the 265-ft. level at a distance of 200 ft. from the station. The ledge carries ore of shipping grade and dips toward the shaft. The shaft will be sunk to the 365-ft. level, from which a crosscut will be run to develop the orebody.

NYE COUNTY—MANHATTAN

Big Mogul—The shaft is in quartz of milling grade, which is somewhat broken, but it gives indications of becoming a firmer orebody at depth.

Ivanhoe—Arrangements are being made to resume developments on this property, which has been long idle. At 100 ft. the vein is of fair size and carries ore of milling grade. A pumping plant will be installed.

Rosario—Work on this property is confined to the erection of a crushing mill.

Santa Lola—A vein has been cut in the tunnel at a distance of 800 ft. from the entrance. It is over 20 ft. wide and carries ore of milling grade. The management has decided to continue the tunnel to intersect the King Oscar vein, which is estimated to be 400 ft. distant from the vein just struck.

Thanksgiving—A new pumping plant will shortly be installed and the vein will be opened up in the 340-ft. level.

United—Development operations have been resumed on this property. The company has large holdings adjoining the Original mine.

Velvet—The shaft is being sunk to the 400-ft. level. The shaft at 360 ft. is in hard dacite country carrying quartz stringers.

Midway—Stopping has been started on the 10-ft. ledge between the 535-ft. and 435-ft. levels which carries shipping ore. Drifts are being run from the 435-ft. level to cut two parallel veins which are known to carry rich ore. Drifting is also in progress on the large vein cut 600 ft. north of the shaft at the 800-ft. level. The company is working a large force of miners.

WHITE PINE COUNTY—ROSEBUD

Brown Palace—Tunnel No. 1 is in 360 ft. and tunnel No. 2 is in 260 ft. The shaft is down 44 ft. and considerable ore has been taken out in the sinking operations. Ore is being broken in the cut on the north side of the hill and sacked for shipment.

Dreamland—The shaft is down 160 ft. and a crosscut is being driven to the east to cut the vein. The crosscut is in 12 ft. and a rich stringer has been cut a short distance from the shaft.

Brown Palace Extension—A large force of men has been put to work on the Red Top claim. The crosscut is in 85 ft. and is close to the ledge.

Dreamland—A ledge has been cut in a crosscut from the 100-ft. level. This is the deepest working in the district in which ore has been opened up.

Golden Anchor—The vein recently cut in the tunnel has been drifted on for a distance of 60 ft. The ore carries gold and silver and is of milling grade.

White Alps—The Rosebud Mining and Leasing Company is pushing work on its lease on the Lucky Boy claim of the White Alps. A new ledge has been uncovered.

New Mexico

GRANT COUNTY

Lordsburg—The 85 mine is equipped with steam hoist and air drills and is cutting a 600-ft. tunnel to intersect the Emerald vein. The Robert E. Lee has been explored by a Pennsylvania capitalist, and on the Nellie Bly a good strike of bornite ore has been made. The Shannon has found new ore near the surface, and the Alice at 300 ft. The Miser's Chest is stoping for shipment. In former days the Viola vein produced much good ore; the shaft is being retimbered with a view to an early resumption of shipments.

Stein's Pass—The King & Queen Copper Company and the King Kendall Mining Company have acquired many claims around the Johnny Bull mine and will soon begin development. At the Granite Gap mine the shaft is approaching the 300-ft. level.

LINCOLN COUNTY

Eagle Mining Company—This company will soon have its 200-ton cyanide mill ready for operation. Ben Horner is working the Vera Cruz mine and has developed considerable ore on which a mill run will be made. On the H. & S. group, almost enough ore has been opened to warrant the erection of a small mill. Near Nogal, the Nogal Peak Company is actively mining.

Carrizoso—W. A. McIvers is pushing operations on the Buster Brown and Milton groups, which are being equipped with steam hoists and compressors. Near Capitan it is reported that Texas investors have bought some coal land.

MAGDALENA DISTRICT

Graphic—Manager Joseph Brown is blocking out ore between the Waldo tunnel and the old lower workings of the Graphic, and has demonstrated that the orebody is continuous from the tunnel level to the old workings. Shipments of lead carbonates are made to the Deming smelter and of zinc ore to the works at Joplin, Mo.

Mine Development Company—This company has connected the Tip Top tunnel with the south end of the Key workings. Ore bins have been constructed and shipments have been begun.

Mistletoe—An extension ore shoot has been developed in the main tunnel which will prospect the entire group and has been driven 1200 ft.

Success Group—The Hill Bros. are preparing to ship ore from their group over

the summit of the range at the south edge of the district.

Tri-Bullion—This company is working on the Nit shaft and completing the mill and installation of machinery at the Kelly mine.

OTERO COUNTY

Jarilla District—The tunnel through Lucky hill for the tram road that is to connect the Cuprite, Herschberger, Turquoise and Lucky mines with the railroad at Jarilla, is about ready. At the Lucky mine exploring is being done by a diamond drill and at the cuprite a good strike of ore has been made at a depth of 150 ft. On the Monte Carlo property a surface equipment has been erected and the shaft is being sunk. The Last Chance has now reached a depth of 300 ft. The Turquoise has a quantity of copper ore ready for shipment and is experimenting on its second-class ore with a hand jig with a view of erecting a mill for its treatment. At the Southwest smelter in Oro Grande, the sampler and fire protection systems have been completed. Many delays have been experienced in getting this plant ready to start, and it is a question if enough ore can be obtained for continuous running. The 28-mile pipe line from the Sacramento mountains, which furnishes water for the smelter and town of Oro Grande, will also be used for the gold placers on the south flank of the Jarilla range. The First National Mining Company expects to have a 100-ton gravel-washing plant in operation before winter, and the Moffitt Company is installing a similar equipment. The Electric Mining Company will try to get water for its ground on Baird hill by sinking a well to 1000 ft. and has ordered machinery for washing the gravel.

RIO ARRIBA

Bromide-Headstone District—The Emerald mine, which shows rich ore, has been unwatered for examination by a representative of eastern capital. The Red Jacket Company will soon start its new 50-ton mill, which contains a 6-ft. Huntington grinder followed by amalgamating plates and tables for concentration. An 8-ft. vein carrying gold has been pierced by a crosscut at the bottom of the Red Jacket shaft. On the Wheat claim, owned by the Isabelle Mining Company, a boiler and hoist has been erected and the shaft will be deepened to open out more of the ore. The 16 to 1 claim has been sold by G. F. Hall to Boston investors, who have installed new machinery and have already struck copper carbonate on the 150 ft. level, that will pay to ship. The Bromide Copper Company, which is backed by Pennsylvania capital, has unwatered its Pay Roll mine to the 250-ft. level, where a large body of copper sulphides with gold is exposed. Manager Riker has put in a new loco-

tive boiler and a small Hendrie & Bolt-hoff friction hoist at the H. S. P. mine. and a contract has been let for sinking the shaft 100 ft. deeper. The property is owned by New York people, incorporated as the Empire Copper Mining and Milling Company. The Tusas Peak Company owns the Jesse and Tampa groups and has a 400-ft. shaft in the latter, in which a good body of copper sulphides has been developed by crosscutting. At Tusas, three miles from the mine, a Bruckner roaster has recently been added to the company's 150-ton leaching mill. The Milwaukee & New Mexico Mining Company is preparing to develop the Sardine group, while on the Danbury group the recent work of J. P. Rinker has exposed considerable ore. In Spring gulch W. H. Ashton has been exploring his ground and has patented the Lucky Boy, Oro Fino and Denver claims, which adjoin the Whale mine. The Tusas Mining and Milling Company is preparing to resume work in its Independence group; on the Santa Fé, the tunnel is already 300 ft. long, and is to be extended, while the Mineral Point owners claim to have 15,000 tons of \$7.50 ore blocked out.

SIERRA COUNTY

Hillsboro—An 8-in. vein of ore assaying \$400 per ton has been opened up in the Sofia & San Antonia mines owned by Elfego Baca, the Albuquerque attorney, and it is reported that a controlling interest in the property has been taken over by the Golden Courier Mining Company. The Ready Pay's 50-ton mill, equipped with two Huntington grinders and two Wilfley tables, is being run intermittently. Manager Kasser is equipping the Ocean Wave group for active work, and is planning to erect a 20-stamp mill.

Pennsylvania

ANTHRACITE COAL

Lehigh Coal and Navigation Company—This company has installed a pair of 42x60-in. Allis-Chalmers direct-acting hoisting engines in the water shaft of No. 9 colliery, at Lansford. This hoist is intended to raise tanks weighing approximately 13,500 lb. complete and containing 25,000 lb. of water. The rope, 650 ft. in length and weighing 3350 lb., is also included in the complete load and lifted at a speed of 3000 ft. per minute. The engines operate under 80 lb. steam pressure, with enough power available to keep the hoist in continuous operation under severe conditions of service. The valves used on the engines are piston type, operated by link motion set to allow steam to follow about 95 per cent. of the full stroke. The links and blocks for the valve motion are of forged steel, case-hardened. They are of the built-up pattern, operated by a steam reversing engine. The wood-lagged drum, 12 ft. 8 in. in diameter and 14 ft. 6 in. long, has five

spiders, cast in halves, and brake shoes for a 12-in. strap fitted in the middle of the drum. A safety controller and indicator are installed to show the location of the cage in the shaft and to prevent the overwinding of the engines. All levers for operating the throttle-valve, emergency valve, steam and hand reverse, steam and hand brake and all necessary drains are brought to an engineer's platform located between and in line with the rear end of the cylinder.

Philadelphia & Reading Coal and Iron Company—This company's statement for August and the two months of its fiscal year from July 1 to Aug. 31 is as follows:

	August.	Two Months.
Earnings.....	\$2,883,510	\$5,839,649
Expenses.....	2,693,102	5,501,825
Net earnings.....	\$ 190,408	\$ 337,824

For the two months there were increases of \$1,451,431 in gross earnings; of \$1,243,528 in expenses; and of \$207,903 in net earnings.

BITUMINOUS COAL

Coking Vein—It is reported that a 9-ft. vein of coking coal has been tapped at a depth of 290 ft. by the Connellsville Coke Company at Towerhill in Green county. This is considered proof of the extension of the great Connellsville vein into Green and Washington counties and many Green county titles are being examined.

COKE

Hostetter-Connellsville Coke Company—It is announced that a deal has been completed by which the H. C. Frick Coal and Coke Company acquires the stock in this company owned by George L. Whitney and associates and the Hostetter estate. The price is said to have been based on \$7,000,000 for the property. The Frick company already owned a considerable interest and the new purchase gives it complete control. The company owns a large tract of coking coal and a number of coke ovens.

South Dakota

LAWRENCE COUNTY

Imperial—Two new orebodies, one on the Dolphin and the other on the Baltimore group of claims, have been struck in the tunnels. They are 50 ft. below the present workings.

H. S. Denny, consulting mining engineer of London, has been examining mines in the Black Hills in behalf of an English syndicate, and incidentally has been studying the local methods of ore milling.

Ruby Belle—Under a porphyry dike the richest and biggest orebody on this property was discovered. The company proposes increasing its working force this winter.

PENNINGTON COUNTY

Egyptian—Holden & Co. have leased

this property and started work in the stamp mill. The 300-ft. double-compartment shaft will be sunk deeper and the Tykoon mill used for amalgamating and concentrating.

Etta Hill—Since the opening of the season this company has shipped seven carloads of spodumene to the Standard Essence Company, of New Jersey.

Grand View—A six-drill air compressor is being installed and the five-stamp mill will be enlarged. The 180-ft. shaft is to be sunk to the 500-ft. level. The ore has widened with depth.

Holy Terror—The mine is unwatered to the 400-ft. level and a larger pump is being installed, as timbers in the shaft prevent the skips from working.

Mainstay—Work will be resumed upon the return of General Manager Griffith. The 30-stamp mill will be enlarged to 40 stamps and a flume for creek water will be erected.

Mariposa—Recent work has opened up a ledge of good milling ore 12 ft. wide, 675 ft. from the mouth of the tunnel. The ore runs on an average of \$4 per ton in gold and there is a 25-ft. streak of high-grade ore on the hanging wall adjoining.

Northfork—Chicago and Joliet, Ill., investors have formed a company and with a few days' work struck ore, carrying gold and copper, being the third important copper strike on this belt in two months. The property lies 2½ miles northwest of Keystone and contains 140 acres. H. B. Leonard is president; Edgar Leonard, vice-president, and C. J. Patton, secretary-treasurer.

Provident Mining Company—A test run for tin is being made at the Tykoon mill. The ore comes from the Christiernsson property recently purchased.

Utah

SALT LAKE COUNTY

The eastern end of the Tintic mining district has come into prominence during the year by reason of important developments made in some of the mines there, particularly the Colorado and Beck Tunnel. As a result, several new companies were formed and are now conducting a vigorous campaign of exploitation. Among them are the Crown Point, Iron Blossom and Sioux Consolidated. All of them are well equipped with hoisting and other machinery. A joint shaft is being sunk by the Colorado, Crown Point and Iron Blossom companies, and is now down to a depth of 140 ft. Crosscuts and drifts will be run off to each property for development purposes.

TOOELE COUNTY

Cliff Mining—This company, operating in the Ophir district, marketed about 1500 tons of ore during September. The property has been developed through three tunnels, all of which are connected. The

mine is a producer of high-grade silver-lead ore.

Honerine—The properties of this company at Stockton have been closed indefinitely. Stockholders have a problem as to the best means of paying off the existing indebtedness, about \$200,000 in all.

Virginia

FLOYD COUNTY

Tancray—This old property which has been idle for several years has been leased to Louis Straus & Co., conditional upon the erection of a smelting plant of 40 tons daily capacity. The mine was originally worked for iron but recent discoveries show the existence of paying quantities of copper.

Wisconsin

PLATTEVILLE ZINC-LEAD DISTRICT

Acme—Ore from this mine is being roasted this week at the Empire calciner and tests close to 62 per cent. metallic zinc. The company is erecting a calciner of its own which when completed, will make four such complete plants for the Platteville district in addition to the new electric-static separator.

Columbia—This mine, in which R. A. McKinney and others of Pittsburg, Penn., are interested, has uncovered two flat sheets of "jack." The upper flat will average 8 in. in thickness, while the lower one increased from 10 in. to 2 ft. of the same grade as hitherto encountered. The two flats are 30 ft. apart with scattered "jack" between.

Empire—The new power plant has started up after several weeks shutdown to make proper connections. The new plant is located beside the mill along the tracks of the Chicago, Milwaukee & St. Paul railroad and consists of two 125-h.p., high pressure horizontal tubular boilers, one 18x48 in. Bates-Corliss engine, one cross-compound belted Ingersoll-Rand Imperial air compressor, one 100-kw. and one 40-kw. generator, connected in tandem, to furnish power for electric hoist, pumps, etc. The plant is so arranged that any part can be operated independent of the others.

Enterprise—This mine has resumed roasting having several hundred tons of green concentrates on hand. The new shaft on the west end is completed and all hoisting is done at this place. A number of new sheets were uncovered in the bottom which measure as high as 10 in. in thickness. The Enterprise was opened between six and seven years ago. A single-jig 50-ton mill is run day and night and turns out about 20 tons of concentrates daily.

Hodge—The jigs at the Hodge mill were bedded for the first time this week and after a few minor adjustments are made in the pumping apparatus steady

grinding will begin. The mill has 75 tons daily capacity and is equipped with the Missouri type of slotted grates in jigs; nearly all the concentrators in this district are equipped with the Cooley type of jig. The Hodge has a body of "jack" in pitches and flats in well defined, compact sheets.

Missabe—This mine, owned by W. J. Power, of Hibbing, Minn., has made its first shipment, under new management. A carload brought \$32.50 per ton. Another carload lies in the bins. After much "dead" work in the way of opening up and re-arranging, the mine and equipment has been put in good condition.

Quincy—This mine made a better showing during the week and 2.5 ft. of rich ground, which has been carried along for 17 ft., makes clear across the 6-ft. drift and continually grows stronger. The ground becomes looser as the main range is approached.

Royal—The roaster and magnetic separator at this plant will be completed within two weeks. A 60-h.p. Brownell engine is being installed, in addition to the 100-h.p. Corliss, to furnish extra power for the roaster. The 75-ton mill is running regularly 10 hours per day and turns out about 2 tons of concentrates per hour; 500 tons of raw concentrates are in the bins awaiting calcining.

Wyoming

ALBANY COUNTY

Sherman Copper Mining Company—A contract has been let to sink a shaft 300 ft. deep on this company's property near Sherman.

Canada

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore for the week ending Sept. 28 were as follows: Buffalo, 60,000 lb.; Foster, 128,000; Nipissing, 178,210; total, 366,210 lb.

City of Cobalt—A vein, 5 or 6 in. wide, of niccolite and native silver has been found at the first level and some distance from the main shaft. It is supposed to be an extension of one of the veins of the Buffalo mine.

Coniagas—The concentrating plant is in successful operation treating low-grade ore, of which the company has on the dumps about 7000 tons, and a larger amount is blocked out for mining. Only high-grade ore will be shipped, the low-grade being run through the concentrator. About 100 tons per day is being treated.

Nipissing—The squatters who have been occupying the north end of the property have been ordered off so that the Meyer vein can be opened and developed.

Silver Leaf—Operations were recently resumed by Superintendent Brown with a force of 22 men. During the strike a new shaft was sunk by contract to a depth of 50 ft.

Temiskaming & Hudson Bay—Several important finds have been made in drifting on the 65-ft. level. In the east drift a rich 8-in. vein was struck and 25 ft. west of the shaft four veins averaging from 2 to 6 in. have been found, all carrying native silver, argentite and cobalt. The shaft is down 80 ft., and in sinking, three carloads of rich ore were extracted, two of which netted \$50,000.

United States Cobalt—Last week a 10-in. vein rich in argentite and native silver was found in drifting on the 50-ft. level at about 20 ft. from the main shaft.

LARDER LAKE DISTRICT

Larder Lake Proprietary—Several tests have been made on ore at the stamp mill, the first story of which has been completed. The mill-run from one vein 30 ft. wide gave 10 dwt. gold per ton. Ore from another shaft sunk on an 8-ft. vein gave 16 2/3 dwt. gold per ton.

MANITOU LAKE DISTRICT

Laurentian—Provincial Inspector E. T. Corkill, who returned recently to Toronto from a trip to northwestern Ontario, reports that the shaft has been sunk to the 300-ft. level. Drifting is being done at that depth to tap the rich ore pocket found at the 100- and 200-ft. levels.

OTTO LAKE DISTRICT

Crawford—It is reported that 10 tons of highly mineralized gold ore have been taken out. The showing made by this property has encouraged a rush of prospectors to the neighborhood, and much of the surrounding area has been staked.

PORT ARTHUR DISTRICT

Hanson Consolidated—Shaft No. 3 is down 380 ft. Superintendent E. B. Everhart reports that the vein maintains its width and shows higher silver contents in addition to traces of gold.

Mexico

CHIHUAHUA

Palmar Mining Company—Two new electric hoists are to be installed on the property of this company in Parral. Power will be supplied by the Parral Power and Reduction Company. Manuel Aguilera is manager.

GUANAJUATO

Bolanitis—This producing mine in La Luz district is reported to have been purchased by George W. Bryan and other Americans. The mine, which is less than 10 years old and has produced millions, will be developed at depth and will be equipped with a modern mill.

Guanajuato Reduction and Mines Company—This company is treating 500 tons daily of ore from its old dumps. It has 145 stamps dropping regularly and contemplates the addition of a still larger unit.

Metal, Mineral, Coal and Stock Markets

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

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Oct. 9—The Interstate Commerce Commission will shortly give a hearing on charges of discrimination and exorbitant rates, made by Henry A. Meeker & Co., independent anthracite operators, against the Lehigh Valley Coal Company.

The eastern bituminous trade shows great activity under a strong demand from the shoal-water ports. All of the best grades of wide-seam coal are practically out of the market and consumers are content to accept some of the best Pennsylvania grades, paying from \$3@3.25 per ton at tidewater. It is reported that 20,000 tons of coal were purchased for export and the lowest figure that could be obtained was \$3.40 per ton at New York.

The situation in the far East is peculiar. It is usual at this time for consumers to be pretty well stocked with coal for their winter use, but so great has been the demand for manufacturing purposes that the supply of coal going to this territory has been used nearly as fast as it was received. Consequently consumers are not stocked up and are calling loudly for their winter supply. Shippers are giving their entire attention to this territory.

Transportation facilities, both by land and water, are not as good as could be desired. At Norfolk and Newport News vessels are held on demurrage. This is caused by poor labor and scarce car supply, which causes coal to run through slowly. In the all-rail trade certain railroads are suffering on account of connecting lines advancing charges for foreign cars in order to force them back into their own hands. The railroads that are now affected were in the habit of abusing their privileges in the past. Throughout the trade all consumers are strictly on their monthly proportions.

In the West there are increasing complaints of car shortage and slow transportation. Otherwise the trade is generally in good condition.

COAL TRAFFIC NOTES

Anthracite coal shipments in September were 5,442,334 tons; being 274,318 tons less than in August, but 914,348 tons more than in September, 1906. For the nine months ended Sept. 30 the total was 40,295,646 tons in 1906, and 49,645,616

tons in 1907; an increase of 9,349,970 tons, or 23.2 per cent.

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Sept. 28 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite.....	3,240,710	4,176,304	I. 935,594
Bituminous.....	23,601,756	28,746,087	I. 5,144,331
Coke.....	9,369,141	10,407,260	I. 1,038,119
Total.....	36,211,607	43,329,651	I. 7,118,044

The total increase this year to date was 19.7 per cent.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to Oct. 5 were 773,171 tons.

Coal traffic originating on the lines of the Southern Railway for the seven months ended July 31 was, in short tons: Tennessee district, 1,031,665; Alabama district, 1,236,391; total, 2,268,056 tons.

The coal tonnage over the roads in the Ohio Coal Traffic Association for the seven months ended July 31 was as follows, in short tons:

	1906.	1907.	Changes.
Hocking Valley.....	2,099,049	2,165,336	I. 66,287
Toledo & Ohio Cent. . .	878,064	994,618	I. 116,554
Baltimore & Ohio.....	930,251	1,260,230	I. 329,979
Wheeling & L. Erie. . .	1,114,216	2,001,865	I. 887,649
Cleve., Lorain & Wh. . .	1,096,757	1,649,157	I. 552,400
Zanesville & Western . .	591,257	932,736	I. 341,479
Toledo Div., Pen. Co. . .	1,297,639	1,369,635	I. 71,996
L. Erie, Alliance & Wh. . .	333,873	706,303	I. 372,430
Marietta, Col. & Cleve. .	4,505	14,787	I. 10,282
Total.....	8,345,611	11,094,667	I. 2,749,056

All the roads report gains this year. The total increase was 32.9 per cent. The tonnage in 1906 was cut down by strikes in April and May.

New York

ANTHRACITE

Oct. 9—The demand for prepared sizes continues strong and the supply is good. The trouble seems to be a lack of cars, which naturally tends to scarcity of coal. Small sizes are in the same position as they have been in for some time, and the demand is unabated. Prices are quoted as follows: Broken, \$4.75; egg, stove and chestnut, \$5; pea, \$3.25; buckwheat No. 1, \$2.75; buckwheat No. 2 or rice, \$2.15 @2.25; barley, \$1.75, all f.o.b. New York harbor.

BITUMINOUS

Trade in New York harbor has assumed considerable activity, the demand being exceedingly strong and the supply scarce. The absence of good grades of coal from the local market is noticeable and some of the best Pennsylvania

grades bring \$3@3.25 per ton, f.o.b. New York harbor shipping ports. Orders from shoal-water ports are urgent and producers are giving this territory preference over all others during the last few weeks before navigation closes.

The far East has consumed more coal than usual and stocks are by no means as large as they were at this time other years. The small stocks held by consumers in this territory causes them to clamor for larger shipments. The Sound is taking on considerable coal and the trade is not as particular about quality as a few weeks ago. Grades which formerly would not have been accepted are now readily contracted for. So far as stocks are concerned, the Sound is in a better position than the far East, but consumers are still calling for large shipments.

In the all-rail trade prices have advanced to \$1.50 at the mines and as the call for coal increases this price will undoubtedly advance. Transportation from mines to tide is slow, cars taking from 12 days to two weeks to come through, against 5 days when running on fast schedule. Car supply is the cause of much complaint from nearly all producers, and is influencing coal consumption and prices all over the country. In the coastwise-vessel trade vessels are not in good supply on account of the delays in discharging. It is a sore point with shippers that vessels are held up for several weeks and are thus kept out of the market. Freight rates are quoted as follows: From Philadelphia, to Boston, Salem and Portland, 90c.; to Portsmouth, \$1; to Lynn, Newburyport and Bangor, \$1.10@1.15; to Saco and Gardiner, \$1.25 and towage; to the Sound, 80c. per ton.

Birmingham

Oct. 7—Prices for coal here are strong and the demand good. The output of the mines is as large as labor and the transportation facilities will permit it. The railroads in this district are doing everything possible to assist operators in the largest possible output; but there is a lack of cars and locomotive power is not at all as plentiful as it might be. Alabama coal is going in all directions, several of the Southern States taking fuel supplies from this district.

Coke is in good demand with quotations favorable. All indications are that the demand for coke and the present prices will continue.

Chicago

Oct. 7—Strength continues in the coal market, nearly all grades of Western and Eastern coals being in increasing demand. The only weakness is in fine Western coals, for steam use. Domestic coals are starting early in demand, and anthracite is selling well. There is a general absence of demurrage coal. Car shortage is still an evil to the trade, but the situation does not seem to be as bad as in previous autumns.

Prepared sizes of Illinois and Indiana coals are advancing in price, prevalent quotations being \$2.15@2.65. Run-of-mine is slightly higher also, at \$1.75@2.50. Screenings are weak at \$1.05@1.40. Brazil block is in large demand and small supply at \$3.20.

Of Eastern coals smokeless is still in good demand, with the supply larger, but not sufficient to weaken prices; lump and egg being especially strong at \$4.30@4.50 and run-of-mine holding at \$3.40@3.50. Pittsburg No. 8 is somewhat scarce, and holds up firmly to \$3 for 1¼-in. Youghiogheny is strong at \$3.35 for 1¼-in., and \$3.25@3.35 for ¾-in. Hocking is active at \$3.50 per ton.

Pittsburg

Oct. 8—A scarcity of railroad cars is preventing full operation of the mines in this district but the trouble is not as serious as formerly at this period of the year. There is an active demand and the new prices are being well maintained. Quotations remain on the basis of \$1.25@1.30 for mine-run coal, f.o.b. mine. The rivers were navigable during the week and over 2,000,000 bu. coal went to lower ports, the bulk of which was shipped by the Monongahela River Consolidated Coal and Coke Company.

Connellsville Coke—Production and shipments continue to increase but supply does not seem to be equal to the demand. Prices are practically unchanged, on the basis of \$2.85@3.10 for standard Connellsville furnace coke and \$3.25@3.50 for foundry coke. The *Courier* in its weekly summary gives the production in both the upper and lower Connellsville region at 429,127 tons. The shipments amounted to 14,326 cars distributed as follows: To Pittsburg, 5244 cars; to points west of Connellsville, 8167 cars; to points east of Connellsville, 915 cars.

Foreign Coal Trade

Exports of coal and coke from the United States for the eight months ending Aug. 31, are reported as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.	Changes.
Anthracite.....	1,472,422	1,811,062	I. 338,640
Bituminous.....	4,894,744	6,792,022	I. 1,897,278
Total coal.....	6,367,166	8,603,084	I. 2,235,918
Coke.....	515,877	594,165	I. 78,288
Total.....	6,883,043	9,197,249	I. 2,314,260

These figures do not include coal bunkered, or sold to steamships engaged in foreign trade. The coke exported went chiefly to Mexico and eastern Canada; the distribution of the coal was as follows:

	1906.	1907.	Changes.
Canada.....	4,726,233	6,485,331	I. 1,759,098
Mexico.....	765,789	761,722	D. 4,067
Cuba.....	439,682	515,637	I. 75,955
Other W. Indies.....	220,966	298,821	I. 77,855
Europe.....	68,666	161,978	I. 93,312
Other countries.....	145,830	379,595	I. 233,765
Total.....	6,367,166	8,603,084	I. 2,235,918

The increase in exports to Europe was in shipments to Italy, which took 110,327 tons this year. The exports to other countries were chiefly to South America. The exports to Canada—75.4 per cent. of the total in 1907—were, in detail, as follows:

	1906.	1907.	Changes.
Anthracite.....	1,445,994	1,784,123	I. 338,129
Bituminous.....	3,280,239	4,701,208	I. 1,420,969
Total.....	4,726,233	6,485,331	I. 1,759,098

The increase this year in anthracite was 23.4 per cent., and in bituminous coal, 43.3; the total gain being 37.2 per cent.

Imports of coal and coke into the United States for the eight months ending Aug. 31, were, in long tons, as follows:

	1906.	1907.	Changes.
Great Britain.....	76,917	30,323	D. 46,594
Canada.....	1,021,993	930,221	D. 91,772
Japan.....	10,775	78,558	I. 67,783
Australia.....	122,224	273,130	I. 150,906
Other countries.....	4,393	6,693	I. 2,300
Total coal.....	1,236,302	1,318,925	I. 82,623
Coke.....	86,182	90,035	I. 3,853
Total.....	1,322,484	1,408,960	I. 86,476

The decrease in imports from Canada into California was made up by larger receipts of Australian and Japanese coal. Some Nova Scotia coal comes to New England ports, but the bulk of the imports of coal is on the Pacific coast. The coke is chiefly from British Columbia, though a little comes from Germany.

Iron Trade Review

New York, Oct. 9—The iron and steel markets continue quiet, so far as new business is concerned. Pig iron is especially quiet, the demand being only for small lots needed to make up deficiencies. In finished material the only activity is in structural material, and that is not of a pronounced character.

The steel-rail question is still unsettled, though some orders are reported to have been placed. The Lehigh Valley has placed one for 15,000 tons of open-hearth rails with the Bethlehem Steel Company.

The Jones & Laughlin Steel Company will begin at once the erection of four additional open-hearth furnaces at the South Side plant in Pittsburg. This will add 1000 tons a day to the company's steel production.

The Maryland Steel Company was the lowest bidder on the steel rails called for by the Government for use on the Pan-

ama Railroad, and will probably receive the contract. The price was about \$30 per ton, delivered.

Steel Rail Specifications—Recently there was submitted to the full committee of the American Railway Association and the steel companies the report of the sub-committee of eight. It is understood that the steel companies are a unit, but that the railroad interests are divided, the majority, however, being agreed in demanding that the phosphorus contents shall not exceed 0.085 per cent. The majority of the railroad representatives persist in their demand for a 25 per cent. discard. It is understood that the steel companies will claim that it is impossible to furnish the tonnage of rails required if the phosphorus limit is insisted on. The discard is, of course, a question of price, and while this has not yet been officially considered, the attitude of the railroads has apparently been sounded sufficiently to create the feeling in steel circles that there is little chance of the interests coming together. The report of the full committee will not be made public until Oct. 30, when it will be presented to the American Railway Association at its semi-annual meeting.

Iron and Steel Exports—Exports of iron and steel, including machinery, from the United States for August, and the eight months ended Aug. 31, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.	Changes.
August.....	\$15,307,723	\$17,587,181	I. \$2,279,458
Eight months..	113,298,201	129,409,247	I. 16,102,046

The total increase for the eight months was 14.2 per cent. The leading items of export for the eight months were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	55,886	54,172	D. 1,714
Billets, ingots & blooms	102,439	59,044	D. 43,395
Bars.....	56,614	65,921	I. 9,307
Rails.....	232,077	218,570	D. 13,507
Sheets and plates.....	69,006	85,172	I. 16,166
Structural steel.....	74,606	90,039	I. 15,433
Wire.....	112,449	103,850	D. 8,599
Nails and spikes.....	42,976	40,660	D. 2,316

The more important gains were in bars, sheets and structural steel; the larger decreases were in wire and in ingots and blooms.

Iron and Steel Imports—Imports of iron and steel, including machinery, in the United States for August and the eight months ending Aug. 31, are valued by the Bureau of Statistics as follows:

	1906.	1907.	Changes.
August.....	\$2,623,677	\$3,393,255	I. \$ 769,578
Eight months....	21,544,688	28,795,719	I. 7,251,031

The increase for the eight months was 33.7 per cent. The chief items of the iron and steel imports for the eight months were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	203,165	420,117	I. 216,952
Scrap.....	10,303	22,553	I. 12,250
Ingots, blooms, etc.....	13,688	10,374	D. 3,314
Bars.....	23,676	27,039	I. 3,363
Wire-rods.....	12,202	12,674	I. 472
Tin-plates.....	31,944	43,243	I. 11,299

There were considerable increases in pig iron, in scrap—chiefly steel scrap—and in tin-plates.

Iron Ore Movement—Exports and imports of iron ore in the United States for the eight months ended Aug. 31 are reported as follows, in long tons:

	1906.	1907.	Changes.
Exports.....	184,972	112,370	D. 72,602
Imports.....	737,660	865,657	I. 127,997

Most of the exports were to Canada. Imports were from Cuba, Spain and Algeria.

Imports of manganese ore for the eight months were 140,863 tons in 1906, and 124,711 tons in 1907; a decrease of 16,152 tons.

Baltimore

Oct. 8—Included in the imports for the week were 20,277 pigs of spelter. Receipts of manganese ore were 6000 tons from Bombay, India. Arrivals of iron ore were 15,050 tons, all from Cuba.

Birmingham

Oct. 7—Some few sales of small lots of iron, delivery within 60 to 90 days, have been made lately. Outside of this and the receipt of a number of inquiries for iron to be delivered during the first half of the coming year, the market has been quiet. Quotations are holding up, the furnace companies asking \$18@18.50 per ton, No. 2 foundry, for this year's delivery. No price under \$16 is heard of in this district for delivery next year. The home consumption is exceptionally strong; with but few exceptions all plants employing pig iron are running full.

Chicago

Oct. 7—The pig-iron market continues to be dull. Sales are confined to small lots for last-quarter delivery. There are a few inquiries for first-quarter business; otherwise it might be said that 1908 business is not in existence. That the attitude of the market is one of expectancy that prices will go considerably lower is the opinion of men well versed in the business. Sales for 1908 will undoubtedly be large, as soon as buying begins freely.

For last-quarter delivery No. 2 Southern iron brings about \$18 Birmingham (\$22.35 Chicago), and No. 2 Northern \$22.50. Lake Superior charcoal iron is quoted at \$26.50. Nominal quotations for the first quarter of 1908 are about \$1 under last-quarter quotations, but it is difficult to say what price could be obtained on a fair-sized lot for actual delivery. Premium business has disappeared, the furnaces being willing to ship small amounts and on quick delivery at prevailing quotations.

Coke is steady with signs of increasing strength, at \$5.90 Chicago for the best Connellsville.

Philadelphia

Oct. 9—The latest developments in the pig-iron market indicate a greater num-

ber of inquiries all along the line, most of them from smaller consumers, two or three from large interests where basic iron is used. These inquiries, outside of basic, have not resulted in much business, but the office men feel encouraged. Most of the iron inquired for is for early delivery. The delay, it is explained, is on terms, buyers hanging back for concessions. There does not appear to be that depressing tendency in this market that we read about in some other markets. Quotations are not reliable, but instances of a pronounced cut in price are rare. No. 2 foundry may be safely quoted as averaging \$20.50; gray forge, \$18@18.50; basic, \$18.50; low phosphorus, \$27.50@28, nominally.

Steel Billets—Two or three contracts have been renewed or extended. The outlook is good at the prices which have been held for several weeks.

Bars—A steady flow of orders, rather small for the most part, is reported by mill agents. Common iron appears to be doing well. Steel bars are strong, and those who buy for quick delivery do not find any favors.

Sheets—The sheet mills are running about as usual.

Pipes and Tubes—It is impossible to observe any change.

Plates—The plate mills have secured some large orders within a week and more are coming. Prices are strong on small lots. Manufacturers take a hopeful view.

Structural Material—Business is made up of small orders, and in the aggregate it is satisfactory. Prices are strong on these orders.

Steel Rails—The only business reported is in light rails. Many industrial plants are equipping their yards, and considerable mining territory is under development.

Scrap—While business is somewhat better, the anticipations of our larger dealers have not been realized. Recent fluctuations have made scrap users conservative.

Pittsburg

Oct. 8—The only activity in the iron and steel markets this week was in plates and shapes. The Carnegie Steel Company booked orders during the past few days aggregating over 50,000 tons. Most of this business, however, came from consumers whose annual contracts expired Oct. 1 and the bulk of it is for delivery extending through one year. All the plate and structural mills continue busy and are well filled with orders which will keep them going the rest of this year. It is known that a number of important contracts for structural steel are being held up in anticipation of lower prices, but it was positively asserted today by a representative of a large interest that there would be no drop this year. The only finished

line in which shading has been noticed is in black sheets, but this has been small and was done by some of the independent concerns. While demand has fallen off in steel bars, the mills are well fixed for the rest of the year and the price is being strictly maintained.

Rail buying is for small lots only. During the week the Carnegie Steel Company took orders for standard sections amounting to about 600 tons and also sold 1000 tons of light rails. The Lorain plant of the National Tube Company of Ohio is still helping the Carnegie company in its deliveries that must be made before Nov. 1. It is expected that the Edgar Thomson works will be closed some time in November for repairs. The result of the conferences on rail specifications for next year will be announced at a meeting to be held on October 30. Despite reports to the contrary, the mills in the Pittsburg district are in full operation. According to representatives of the Jones & Laughlin Steel Company, the largest independent interest, that concern has orders on its books that will keep the mills going into the first quarter of next year. The Carnegie company was forced to postpone the closing for repairs of its bessemer department at Homestead, owing to urgent need of steel. The only real dullness is in sheets and tin-plate, the leading interest having closed several of its plants outside of this district for repairs.

Pig Iron—The pig-iron market continues inactive. There have been no transactions on which quotations may be based, but it is extremely doubtful if less than \$22, Valley furnaces, can be done on bessemer iron. The idle Duquesne blast furnace of the Carnegie company was blown in during the week but two others went out, one at Donora and one at South Sharon. The company is this week operating 51 of its 55 furnaces. Two are likely to be blown in during the week. Foundry iron is still weak and some furnaces are holding out for \$21, Valley furnaces, but the only transaction for over a week was one carload at that price. Gray forge has declined and is being offered at \$19.50, Valley, and it is believed this price could be shaded on a desirable order. Basic is held around \$20.90, Pittsburg, but one large producer is asking \$1 more.

Steel—While billets continue in good demand, the supply shows an improvement and prices are a trifle weaker. It is believed \$29 could be shaded for bessemer and \$30 on open-hearth billets. Plates continue strong at 1.70c. and steel bars at 1.60c.

Sheets—The sheet market is dull and some independent interests are still shading the price \$2 a ton. Prices, however, are unchanged, black sheets being quoted at 2.60c. and galvanized at 3.75c. for No. 28 gage.

Ferro-Manganese—A drop of \$1 a ton is noted, sales for prompt shipment having been made at \$57 a ton.

Metal Market

NEW YORK, Oct. 9.

Gold and Silver Exports and Imports

At all United States Ports in Aug. and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Aug. 1907..	\$ 4,596,262	\$ 3,196,161	Exp. \$ 1,400,101
" 1906..	598,078	7,972,868	Imp. 7,374,790
Year 1907..	48,375,360	28,075,590	Exp. 20,299,770
" 1906..	33,511,040	80,344,979	Imp. 46,833,939
Silver:			
Aug. 1907..	6,748,085	4,678,879	Exp. 2,069,206
" 1906..	4,049,173	2,776,976	" 1,272,197
Year 1907..	41,922,336	30,461,715	" 11,460,621
" 1906..	41,847,028	29,731,510	" 12,115,518

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. 5 and years from Jan 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$ 10,000	\$ 107,889	\$ 1,255,641	\$ 38,265
1907.....	32,505,587	7,872,372	40,666,414	2,115,509
1906.....	5,964,713	80,440,975	43,242,268	1,650,856
1905.....	32,291,943	5,835,360	27,028,737	3,605,561

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

The Treasury Department estimate of the money in the United States on Oct. 1 is as follows:

	In Treasury.	In Circul'n.
Gold coin (inc. bullion in Treasury).....	\$ 200,123,252	\$ 561,956,589
Gold certificates.....	80,685,260	640,204,609
Silver dollars.....	4,063,364	84,758,166
Silver certificates.....	12,875,749	460,847,251
Subsidiary silver.....	7,812,842	124,986,237
Treasury notes of 1890..	6,652	5,700,348
U. S. notes.....	3,555,391	343,125,625
Nat. Bank notes.....	16,711,565	584,276,549
Total.....	\$328,834,076	\$2,805,854,374

Population of the United States, Oct. 1, 1907, estimated at 86,429,000; circulation per capita, \$32.46. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the treasury as assets of the Government does not include deposits of public money in national-bank depositories to the credit of the treasurer of the United States, amounting to \$158,304,381. The total amount in circulation Oct. 1 was \$16,652,754 more than on Sept. 1, and \$6,279,320 less than on Oct. 1 last year.

The joint statement of all the banks in the New York Clearing House for the week ending Oct. 5 shows loans \$1,089,068,400, a decrease of \$11,283,100; deposits, \$1,036,703,300, a decrease of \$18,490,400, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	\$192,084,000	\$192,216,700
Legal tenders.....	75,173,800	69,607,200
Total cash.....	\$267,257,800	\$261,823,900
Surplus.....	\$ 9,423,125	\$ 2,648,075

The surplus over legal requirements shows a decrease of \$1,227,825, as compared with the previous week this year.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to Sept. 26:

	1906.	1907.	Changes.
India.....	£ 12,451,063	£8,975,154	D. £ 3,475,909
China.....	430,700	.....	D. 430,700
Straits.....	1,750	625,950	I. 624,200
Total.....	£ 12,883,513	£9,601,104	D. £ 3,282,409

Imports for the week were £4000 from the West Indies; £286,000 in bars and £6000 in Mexican dollars from New York; a total of £296,000. Exports were £26,250 to the Straits and £157,290 to India; £183,540 in all.

Indian exchange has been a little firmer, Council bills selling in London at 16.03d. per rupee. The Indian Government is reported to have purchased some silver for coinage.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	\$0.51½	\$0.52½
Peruvian soles and Chilean.....	0.46	0.48
Victoria sovereigns.....	4.85	4.87
Twenty francs.....	3.87	3.92
Spanish 25 pesetas.....	4.78	4.80

SILVER AND STERLING EXCHANGE.

Oct.	Sterling Exchange.	Silver.		Oct.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
3	4.8540	66½	30½	7	4.8570	65½	30½
4	4.8560	66½	30½	8	4.8595	65	30
5	4.8580	66	30½	9	4.8605	64½	29½

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

Other Metals

Oct.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
3	14½	14	61½	34½	4.75	5.35	5.20
4	14½	14	62½	34½	4.75	5.35	5.20
5	14½	14	.....	34½	4.75	5.35	5.20
7	14½	13½	64	34½	4.75	5.40	5.25
8	14½	13½	63½	34	4.75	5.45	5.30
9	14	13½	62½	33½	4.75	5.50	5.35

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, and represent the bulk of the transactions made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter brands command a premium.

Owing to operations in exchange and depression caused by lack of India inquiry, silver has had a decided drop and the market does not yet show a firm and positive tone.

Copper—Events have not borne out the hopeful feeling that was expressed in the trade a fortnight ago. The interest of consumers generally has failed to develop and in the meanwhile producers have become more anxious to sell. Consequently the orders in the market have been eagerly competed for, while offerings have developed from unexpected quarters. Business has been on a fairly liberal scale during the last week, chiefly for export, but under the conditions outlined above prices have steadily declined. The pressure has been especially in electrolytic copper, resulting in that grade falling substantially to the terms of casting copper. The only encouraging feature in the situation has been the improvement in business with domestic consumers, especially in lake brands, which under ordinary conditions would be considered small, but shows the necessity for replenishing supplies in some quarters.

The market closes easy at 14@14½c. for lake copper and 13½@14c. for electrolytic in ingots, cakes and wirebars. Business has been done in casting during the week at 13¾@14c.

A squeeze of the bears in the London standard market at one time forced the price for spot copper up to £64, but after these commitments were covered it declined rapidly and the close is cabled as steady at £62 5s. for spot, £62 for three months.

Refined and manufactured sorts we quote: English tough, £60; best selected, £67; strong sheets, £73.

Exports of copper from New York and Philadelphia for the week were 2496 long tons. Our special correspondent gives the exports from Baltimore for the week at 1421 tons of copper.

The Lamb Process Copper Extraction Plant, of Highhill, Va., is making electrolytic copper direct from ore on a commercial scale.

The Rio Tinto Company in London has declared a half-yearly dividend of £2 7s. 6d. per share, which compares with £3 six months ago, and £2 10s. a year ago.

Copper Sheets—The base price of copper sheets is now 20c. per pound.

Copper Wire—The base price of copper wire, No. 0000 to No. 8, is now 16¼c. per pound.

Butte Copper Mines—Our Butte correspondent under date of Oct. 5 reports that by the first of the year there may be a complete suspension of operations in the Butte district. Affairs seem to be shaping to that end. For a week the copper production has been about 25 per cent. of the normal, and orders for a further curtailment have been expected from New

York. The miners' union of Butte has given assurance that there will be no trouble over the contracts between the miners and the companies relating to the scale of wages, by which the miners agreed to return to the old scale of \$3.50 per day when copper prices should drop below 18c. per pound. No attempt has yet been made to enforce the contract, but all the mining companies have sent formal notices to the union that for the present no change would be made, and that the \$4 per day rate would still be paid. This notice was probably deemed necessary to protect the companies' legal rights, as a failure to enforce the contract might be taken as a waiver of it. To the notices the union has made a reply in which it says: "We extend the thanks of the union for your attitude in this matter and hope that the amicable relations existing between the companies and the Butte miners' union will exist for an indefinite period of time. We realize that the agreement entered into between your companies and this union is binding on both parties, and fully appreciate your position in the matter in our behalf."

Lead—The price of the American Smelting and Refining Company for desilverized remains 4.75c., New York, and 4.67½c., St. Louis. The curtailment of production in various quarters has somewhat relieved the pressure in the outside market, which consequently is a little stronger. Sales have been made at 4.60@4.65c., New York.

London still reports a continued scarcity of near-by metal, but closes easier at £19 10s. for Spanish lead, £19 12s. 6d. for English lead.

The price of lead on Sept. 6 was stated correctly as 4.75c. in the text of the market report of our issue of Sept. 14 but by a clerical error was given as 5.25c. in the table, which error was inadvertently introduced in computing the average for the month. The correct average for September is 4.813.

During the half-year ended May 31, 1907, the Broken Hill Proprietary Company, of New South Wales, sold and delivered 24,372 tons of lead; of which 2587 tons were sold in Australia and New Zealand; 4831 tons in India, China and Japan, and 16,954 tons in Great Britain.

The movement of foreign lead in the United States for the seven months ended July 31 is reported by the Bureau of Statistics as follows, in short tons:

	1906.	1907.	Changes.
In bond, Jan. 1.....	8,148	5,691	D. 2,457
Imports, seven months....	55,607	42,861	D. 12,746
Total supplies.....	63,755	48,552	D. 15,203
Re-exports, seven months..	29,074	26,061	D. 3,013
In bond, Aug. 1.....	7,356	5,379	D. 1,977
Total deductions.....	36,430	31,440	D. 4,990
Balance.....	27,325	17,112	D. 10,213

The balance has, presumably, entered into consumption in the United States.

Tin has been extremely weak both in the London and the domestic market. The continuous decline has scared off buyers entirely and hardly any business is reported. The London market closes weak at £149 10s. for spot, £146 5s. for three months, while quotations in this market are nominal at 33¼ cents.

Stocks of tin in sight Oct. 1 are reported as follows, in long tons:

	In Store.	Afloat.	Total.
United States.....	1,248	1,965	3,213
London.....	2,808	4,785	7,593
Holland.....	1,509	183	1,692
Total.....	5,565	6,933	12,498

The total shows an increase of 633 tons over that reported Sept. 1. United States stocks do not include those at Pacific ports.

Ricard & Freiwald report the supplies and deliveries of tin, usually included in trade statistics, as follows, for the year ended Sept. 30, in long tons:

	1906.	1907.	Changes.
Straits.....	56,538	55,755	D. 783
Australia.....	5,795	7,015	I. 1,220
Banka and Billiton.....	11,068	13,212	I. 2,144
Total.....	73,401	75,982	I. 2,581
Deliveries, U. S.....	37,500	37,100	D. 400
Deliveries, Europe.....	36,596	38,305	I. 1,709
Total.....	74,096	75,405	I. 1,309
Visible stocks, Oct. 1.....	12,691	13,386	I. 695

Supplies not included in statistics for the year were: Cornwall production, 4500; Bolivia, 16,394; Straits shipments to India and China, 1292 tons.

Spelter—The advance in this market has made further progress, stimulated by very large purchases on the part of galvanizers. The market closes firm at 5.50@5.55c. New York, 5.35@5.40c. St. Louis.

The London market has also shown a firmer tendency and closes at £21 17s. 6d. for good ordinaries, £22 2s. 6d. for specials.

The zinc smelters of Kansas are feeling the strain of the narrow margin between the prices of spelter and ore. Last week, the United Zinc and Chemical Company passed a dividend on its preferred stock. The latter amounts to \$1,640,000 (\$1,700,000 authorized) and is 7 per cent., cumulative. The company has been paying 1¼ per cent. quarterly.

Zinc Sheets—The base price is now \$7.50 per 100 lb.—less discount of 8 per cent.—f.o.b. cars at Lasalle and Peru, in 60-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.50c. per 100 lb.

Antimony—The market is quiet but steady and the demand is fair, although there is a falling off from the scale of the last two or three weeks. Quotations

are, 12c. for Cookson's; 10¼c. for Hallett's; and 10¼@10½c. for ordinary brands.

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

Quicksilver—This metal is steady. Current prices in New York are \$40.50 per flask of 75 lb. for lots of 100 flasks or over. For smaller orders prices run up, according to size and conditions, reaching \$55@57 for retail lots. San Francisco quotations are \$37@39 per flask for domestic business, and \$36@37 for export. The London price is £7 7s. 6d. per flask.

Platinum—The demand does not seem to increase and the market for platinum is stationary. Prices remain the same as last week except for scrap, which has declined a little. Quotations are as follows: Hard metal, \$30; ordinary, \$27.50; scrap, \$22.50 per Troy ounce.

Minor Metals—For minor metals and their alloys, wholesale prices are, f.o.b. works:

	Per Lb.
Cadmium, 99.5% f. o. b. Hamburg....	\$1.27@1.35
Chromium, pure (N. Y.).....	80c.
Copper, red oxide.....	50c.
Ferro-Chrome (60).....	9c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	10¼c.
Ferro-Chrome (66-71% Cr., 6% C.)....	12c.
Ferro-Chrome (66-71% Cr., 6.5% C.)....	11¼c.
Ferro-Chrome (60-70% Cr., 1% C. or less)	38c.
Ferro-Molybdenum (50%).....	90c.
Ferro-Titanium (20%).....	80c.
Ferro-Tungsten (37%).....	30c.
Ferro-Vanadium (25-50%, per lb. vanadium contents).....	\$4.50@5.50
Magnesium, pure (N. Y.).....	1.50
Manganese, pure 98@99% N. Y.....	75c.
Manganese-Copper (80@70%) N. Y..	45c.
Molybdenum (98@99%, N. Y.).....	\$1.65
Phosphorus, foreign red (f. o. b. N. Y.)	90c.
Phosphorus, American yellow (f. o. b. Niagara Falls).....	42c.
Tungsten (best) pound lots.....	\$1.18
Ferro-Silicon (50%) spot. Ex. ship Atlantic ports.....	\$110 ton.

Variations in price depend chiefly on size and condition of orders.

Missouri Ore Market

Joplin, Mo., Oct. 5—The highest price paid for zinc ore was \$44 per ton, on an assay base price of \$38 to \$42 per ton of 60 per cent. zinc. The average price was, however, lowered on account of a largely increased shipment of silicate from Aurora, Granby and Spurgeon mines, to \$38.06. The highest price paid for lead ore was \$55 per ton, medium grades selling at \$50@52, and all grades averaging \$51.90 per ton.

The shut-down of the mines during September resulted in a restriction of the output of 7892 tons and a reduction in the stock of 1390 tons, a total restriction of 9282 tons.

Shippers were threatened with a car shortage during the week, and are endeavoring to have all ore shipped as rap-

idly as purchased, lest the fall movement of crops shall seriously interfere with ore supplies.

Following are the shipments of zinc and lead from the various camps of the district for the week ending Oct. 5:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	2,186,130	643,190	\$60,548
Joplin.....	2,117,320	292,270	62,063
Galena.....	893,220	87,750	19,155
Alba-Neek City.....	699,070	.....	15,029
Duenweg.....	310,990	114,350	9,207
Badger.....	410,780	.....	8,892
Granby.....	780,000	20,000	8,540
Aurora.....	394,540	27,870	7,150
Spurgeon.....	220,590	35,500	4,021
Prosperity.....	.....	137,140	3,565
Carl Junction.....	51,380	12,160	1,363
Cartage.....	63,280	.....	1,360
Sarcosie.....	61,450	.....	1,229
Wentworth.....	41,110	.....	822
Reeds.....	52,910	.....	793
Zincite.....	32,070	.....	673
Seneca.....	54,850	.....	549
Totals.....	8,369,600	1,370,230	\$194,899

40 weeks.....459,082,270 69,685,510\$13,046,012
 Zinc value, the week, \$159,321; 40 weeks, \$10,471,257
 Lead value, the week, 35,578; 40 weeks, \$2,574,755

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

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January...	47.38	45.84	January...	75.20	83.53
February..	47.37	47.11	February..	72.83	84.58
March.....	42.68	48.66	March.....	73.73	82.75
April.....	44.63	48.24	April.....	75.13	79.76
May.....	40.51	45.98	May.....	78.40	79.56
June.....	43.83	44.82	June.....	80.96	73.66
July.....	43.25	45.79	July.....	74.31	58.18
August....	43.56	43.22	August....	75.36	59.54
September.	42.58	40.11	September.	79.64	53.52
October...	41.55	.....	October...	79.84	.....
November..	44.13	.....	November..	81.98	.....
December..	43.68	.....	December..	81.89	.....
Year.....	43.24	.....	Year.....	77.40	.....

Wisconsin Ore Market

Platteville, Wis., Oct. 5—Ore sales and shipments in the district have been somewhat more brisk. The price of zinc ore has not advanced, but buyers are more active than they have been for several weeks past. The highest price recorded for the week was \$41 on a market of \$40 for 60 per cent. zinc. No lead was sold or shipped out during the week.

Following are shipments of zinc ore for the week ending Oct. 5, so far as reported, with shipments not heretofore reported for the week ending Sept. 28:

	Oct. 5 Zinc ore, lb.	Sept. 28. Zinc ore, lb.
Mineral Point.....	156,000	50,000
Harker.....	206,260	136,240
Linden.....	177,490	107,370
Highland.....	100,800	110,700
Galena.....	120,000	.....
Hazel Green.....	.....	.....
Benton.....	345,450	.....
Cuba City.....	.....	.....
Rewey.....	.....	.....
Livingston.....	140,000	.....
Platteville.....	191,020	.....
Total.....	1,438,020	394,310

The bins at many mines are filled to overflowing with finished concentrates; only few of the big producers closed down since the slump in the market, and light purchases on the part of buyers, coupled with a disinclination among producers to sell at reduced prices, has re-

sulted in a big surplus amount of marketable ore.

A meeting of the mining operators and affiliated interests was held at Mineral Point, Sept. 27, to form an association for promoting the local welfare and advancing the mining interests of the district. About 150 were in attendance and all the camps were well represented. A preliminary organization was affected under the name of the Tri-State Mining Association; a meeting will be held at Platteville, Oct. 25, for the election of officers. A similar organization in the southern part of the district, known as the Ten O'clock Club, with headquarters at Galena, has proved helpful and beneficial.

Chemicals

New York, Oct. 9—The general market is reactionary and inclined to be dull although prices are not lower than a week ago. Antimony salts have had a sharp advance in sympathy with the increase in the price of metal.

Copper Sulphate—The market is inclined to be dull and buying is largely on the hand-to-mouth order. The quotation of the largest producer has been brought down to a level with the price quoted by outside makers and is now \$6 per 100 lb. for carload lots and \$6.25 for smaller quantities. Outside makers, however, are said to shade this price to \$5.87½ for large lots.

Exports of copper sulphate from the United States for the eight months ended Aug. 31 were 18,225,709 lb. in 1906, and 6,256,738 lb. in 1907; a decrease of 11,968,971 lb. The exports in 1907 contained approximately 698 long tons of copper.

Nitrate of Soda—The market is quiet and very little business is being done. There are the usual number of inquiries and prices hold about the same as last week. Quotations are as follows: For spot delivery, 95 per cent., 2.40@2.45c.; 1908 delivery, 2.45@2.47½c.; 1909 delivery, 2.40c. The 96 per cent. grade sells 5c. higher for all deliveries.

Messrs. Mortimer & Wisner, of New York, report statistics of nitrate in the United States on Oct. 1 as follows, in long tons:

	1906.	1907.	Changes.
Stocks, Jan. 1.....	13,100	13,050	D. 50
Imports, 9 mos.....	214,680	244,445	I. 29,765
Total supplies.....	227,780	257,495	I. 29,715
Deliveries, 9 mos.....	227,114	251,895	I. 24,781
Stocks, Oct. 1.....	666	5,600	I. 4,934
Afloat for U. S. ports.....	93,700	85,000	D. 8,700

Imports are all from the west coast of South America. The quantity afloat includes all cargoes due to arrive at U. S. ports before Jan. 15, 1908.

Heavy Chemicals—Imports of heavy chemicals into the United States for the eight months ended Aug. 31 are reported as follows, in pounds:

	1906.	1907.	Changes.
Bleaching powder	70,423,368	74,891,954	I. 4,468,586
Potash salts.....	170,826,224	175,569,553	I. 473,329
Soda salts.....	13,686,669	13,525,004	D. 161,665

Exports of acetate of lime for the eight months were 44,356,473 lb. in 1906, and 56,114,353 lb.; an increase of 11,757,880 lb. this year.

Phosphates—Exports of phosphates from the United States for the eight months ended Aug. 31 were, in long tons:

	1906.	1907.	Changes.
Crude and rock....	694,718	694,304	D. 414
All other.....	18,571	23,996	I. 5,425
Total.....	713,289	718,300	I. 5,011

The larger exports in 1907 were 200,225 tons to Germany; 130,101 to Great Britain; 94,909 to France; 63,082 to Italy.

Sulphur—Imports of sulphur and pyrites into the United States for the eight months ended Aug. 31 were, in long tons:

	1906.	1907.	Changes.
Sulphur.....	62,451	12,022	D. 50,429
Pyrites.....	375,947	419,586	I. 43,639

Most of the sulphur now imported is Japanese sulphur received on the Pacific coast. The decrease in imports is due to the utilization of Louisiana sulphur in place of the Sicilian product. Estimating sulphur contents of pyrites, the total imports of sulphur were 212,830 tons in 1906, and 179,856 in 1907; a decrease of 32,974 tons.

Mining Stocks

New York, Oct. 9—The general stock markets have been dull, but not especially weak. Business continues altogether of a professional type. The absence of outside buying is shown by the small total of business. Amalgamated Copper closed about \$60; United States Steel at \$27 for the common and \$88½ for the preferred. On the curb, mining shares have been dull, with few movements of importance. The fall in Barnes-King Development, which recently dropped from about \$5 to 87c., was checked, and the stock sold up to \$1.25. The company is referred to in another column.

Boston

Oct 8—There is little inspiration to be derived from the copper share market for the past week. The volume of business has fallen off, and the market merely drags its weary length along from 10 to 3 o'clock, without accomplishing much either way. Prices sagged late last week, recovering somewhat, but are below those of a week ago in most cases.

Amalgamated has had a \$1.75 rise from \$58.50 to \$60.25. Copper Range fell \$2 to \$56.50, with slight recovery and North Butte broke \$2.75 to \$46, closing at \$47 to-night. Western losses in this stock have been very heavy.

Persistent selling of Boston Consolidated caused a drop in the stock to \$14.12½. The offering has emanated chiefly from abroad, where practically

one-half of the company's stock is owned. The price in London reached even lower levels. Greene-Cananea made its low record today at \$7.12 1/2, (a drop of \$1.50 for the week. This compares with \$25 shortly after the flotation of the company. There are 2,500,000 shares, of which 246,124 shares are still in the treasury for exchange for Greene Consolidated and Cananea Central stock which is outstanding.

Few people in Boston were hurt by the Barnes-King episode. Boston & Corbin holds close to \$8.50. This company's income from March 15, when it started operations, to Sept. 1, was \$12,408 and expenditures were \$5874, solely for development work.

STOCK QUOTATIONS

Table with columns for NEW YORK and BOSTON, listing stock names and prices. Includes sub-sections for NEW YORK and BOSTON with columns for Name of Comp., Clg., and price.

Table with columns for N. Y. INDUSTRIAL, BOSTON CURB, and LONDON, listing stock names and prices. Includes sub-sections for N. Y. INDUSTRIAL, BOSTON CURB, and LONDON with columns for Name of Com., Clg., and price.

NEVADA STOCKS. Oct. 9. Furnished by Weir Bros. & Co., New York.

Table with columns for Name of Comp., Clg., and price. Lists Nevada stocks such as TONOPAH STOCKS, GOLDFIELD STOCKS, GREENWATER STOCKS, MISCELLANEOUS, and COLO. SPRINGS.

Assessments

Table with columns for Company, Delinq., Sale, and Amt. Lists companies like Challenge Con., Nev., Diamond Creek, Cal., Emerald, Utah, etc.

New Dividends

Table with columns for Company, Payable, Rate, and Amt. Lists companies like Am. Agri. Chem., pf'd., Anaconda, Central C. & C., com., etc.

Monthly Average Prices of Metals AVERAGE PRICE OF SILVER

Table with columns for Month, New York, and London, showing average prices of silver from 1906 to 1907.

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

AVERAGE PRICES OF COPPER

Table with columns for Month, NEW YORK (Electrolytic, Lake), and LONDON, showing average prices of copper from 1906 to 1907.

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

AVERAGE PRICE OF TIN AT NEW YORK

Table with columns for Month, 1906, 1907, showing average prices of tin at New York from 1906 to 1907.

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Table with columns for Month, New York, and London, showing average prices of lead from 1906 to 1907.

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

AVERAGE PRICE OF SPELTER

Table with columns for MONTH, New York, St. Louis, and London, showing average prices of spelter from 1906 to 1907.

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