

The Engineering and Mining Journal

VOLUME 98

OCTOBER 10, 1914

NUMBER 15

Platinum Ore in Southern Nevada

BY FRED A. HALE, JR.*

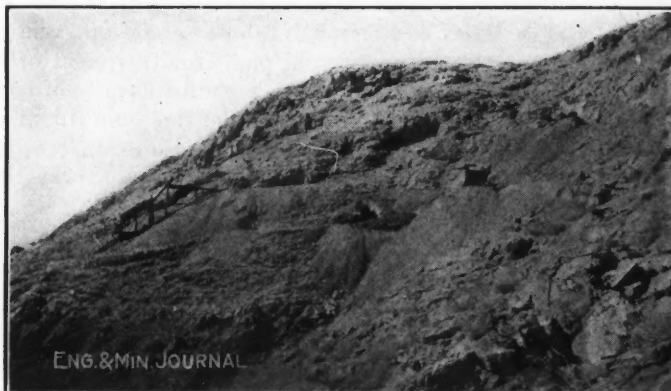
SYNOPSIS—Some recent discoveries, four miles east of the California line and 10 miles west of Goodsprings, Nev., are much richer in platinum than earlier finds in Clark County. The ore in the Boss mine occurs in a crushed fault zone in limestone, which also traverses a batholithic intrusion of acid porphyry. The ore so far developed contains from 0.5 to 1 oz. of platinum per ton, a greater amount of gold, some silver, and small amounts of the base metals.

The presence of platinum and metals of the platinum group in ores from southeastern Nevada was noted by members of the U. S. Geological Survey as early as 1909, the platinum metals occurring with copper, nickel and

narrow-gage railroad of the Yellow Pine Mining Co. at Jean.

BOSS MINE ORIGINALLY WORKED FOR COPPER

The property of the Boss Gold Mining Co., formerly known as the Boss mine, was originally explored in the early '90s on account of the copper content of the ore, there having been a large outcrop of copper-carbonate ore at the surface. A leaching plant was constructed at Goodsprings to treat the ore from this and the Columbia mine. The leaching plant proved a failure, and the mine reverted to the original owners, Yount & White, of Goodsprings. Not recognizing the more valuable constituents of the ore, the property was permitted to remain idle until the



BOSS MINE WHERE RICH PLATINUM ORE HAS BEEN FOUND, 10 MILES WEST OF GOODSPRINGS, NEVADA
Upper workings of Boss mine



BOSS HILL, SHOWING WORKINGS AND TRAMWAY OF BOSS GOLD MINING CO.

cobalt in ores from the Key West and Great Eastern mines, near Bunkerville in Clark County. In these properties, the orebodies are associated with pegmatites and very basic intrusions, carrying pyrrhotite and chalcocite, the content of platinum metals in the ore varying from 0.1 to 0.2 oz. per ton, so far as data are obtainable.

A deposit of ore, containing the platinum metals in greater quantity and entirely dissimilar in occurrence, has recently been discovered in the western portion of Clark County at the property of the Boss Gold Mining Co. This deposit is 10 miles west of Goodsprings, in the Yellow Pine mining district, and only four miles from the California line. It is easily accessible by team or automobile from Goodsprings, which is connected with the main line of the S. P. L. A. & S. L. R.R. by the

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spring of 1914, when the Boss Gold Mining Co. was organized for its further development.

The country rock in the vicinity of the Boss property consists of thick-bedded limestones, probably of upper Mississippian age, dipping about S 60° W at an angle of 10° to 20° from the horizontal. These limestones are cut by a large batholithic intrusion of acid porphyry, which has been identified as a quartz monzonite, showing large phenocrysts of orthoclase feldspar and occasional quartz crystals in a fine-grained ground mass, the whole presenting a facies almost identical with the numerous porphyry intrusions throughout the Yellow Pine district.

The orebodies so far developed occur entirely in limestone, in a crushed fault zone, striking N 30° E, which traverses both limestone and porphyry. A tunnel has been driven into this fault zone from the point where the

largest outcrop occurred; at lower levels, two other tunnels have been driven, the first of which, about 30 ft. lower than the upper tunnel, has encountered the main ore zone. The lowest tunnel is being driven at an elevation several hundred feet lower than the upper workings, and has not yet reached the main ore zone.

ORE RICHER IN PLATINUM THAN FIRST DISCOVERIES

The main of upper tunnel followed the ore for a distance of 200 ft. along its strike, in a northeasterly direction. The ore varies in thickness from 2 to 10 ft., the average being about 6 ft., and in appearance is a brownish granular mass, showing occasional streaks of hard quartzose material. Both walls of the ore are shattered limestone, and along these walls occurs an encasement of malachite, varying in thickness from a few inches to several feet. The main body of the ore zone carries little copper. An average of the ore, sampled at 5-ft. intervals for 200 ft. along the upper tunnel gave the following results: Gold, 1.13 oz. per ton; silver, 5.20 oz.; copper, 0.20%. These samples were not analyzed for metals of the platinum group, but H. K. Riddall, chemist for the Yellow Pine Mining Co., who analyzed the samples, reported that metals of the platinum group were present, this being the first report of the presence of these metals. It has since been learned that this ore contains 0.5 to 1 oz. of platinum per ton.

In June, 1914, a winze was started from the upper tunnel following the ore on its dip, and high-grade ore was encountered within a few feet. The appearance of the ore did not change materially except for the occurrence of small masses of a greenish talc within the vein. Some of these masses were sufficiently large to be mined separately, and two small shipments, aggregating about one ton, were forwarded to the American Smelting & Refining Co. at Murray, Utah. Their settlement analysis was as follows, platinum not being determined or paid for: Gold, 124.79 oz. per ton; silver, 23.9 oz.; lead, 1.05%; copper, 0.65%; insoluble, 73.2%; sulphur, 3.1%; iron, 6.7%.

On the same control sample of this shipment, Ledoux & Co., of New York, report the following analysis for metals of the platinum group: Platinum, 99.08 oz. per ton; palladium, 16 oz.; iridium, trace.

The winze has been sunk to a depth of about 35 ft., and drifts driven on the ore in both directions, developing a considerable tonnage of ore. A carload shipment of material from this development, without sorting, returned as follows: Gold, 8.752 oz. per ton; silver, 5.02 oz.; copper, 0.97%; insoluble, 80.7%.

On similar material from this location, Ledoux & Co. report as follows: Gold, 11.55 oz. per ton; platinum, 7.38 oz. Several carloads of material of about this class are now broken in the mine, pending negotiations for the satisfactory disposition of the ore.

RATIO OF PLATINUM TO GOLD

It has been fully determined that metals of the platinum group are present in all of the ore thus far developed. Ledoux & Co. state as their opinion that the metals are in the free state, "being apparently alloys of gold and platinum metals." It would also appear from numerous assays that the platinum metals bear a fixed ratio to the gold content, being in the proportion of about $\frac{2}{3}$ oz. platinum to 1 oz. gold. The ore is thoroughly oxidized, no sulphides having as yet been recognized, and the gold alloys have a "rusty" appearance, showing no colors

after panning until they have been thoroughly scrubbed or treated with acid.

The occurrence of the ore is especially peculiar in that it occurs entirely in limestone, the nearest known porphyry contact being about 600 ft. distant. The ore apparently follows the stratification of the limestone more or less regularly, indicating replacement, but appears to be confined in a fault zone about 60 ft. in width, following the fault planes along their strike. A gouge occurs along some of these fault planes, which is strongly indicative of porphyry, and metamorphism is noticeable in the adjacent limestone, indicating that an igneous intrusion may be closer to the orebody than is apparent from the present development. It is probable that the porphyry was the original source of the ore, the precious metals having been deposited in the crushed fault zone, with copper and iron sulphides, which since have been thoroughly oxidized. It is a noticeable fact that the malachite above described carries little gold or silver and no platinum metals are evident. A carload shipment of copper ore from the same workings contained 23.4% copper, but only 1.4 oz. silver and 0.16 oz. gold per ton.

From present development it would appear that the district bids fair to become an important producer of platinum. The Boss Gold Mining Co. has erected a tramway from its upper workings to the wagon road, and is in a position to maintain steady shipments as soon as satisfactory terms for the ore have been arranged. Some difficulties have been encountered, as the Western smelters appear unable to handle this class of ore to advantage, but it is hoped that satisfactory arrangements can be made with Eastern firms. The company is also conducting a series of tests on the lower-grade ore, and expects to erect an experimental plant for treatment of ore on the ground. Numerous other claims have been located in the vicinity, and are now under development. The Azurite Mining Co., whose ground adjoins that of the Boss, has developed some ore, although of somewhat different character from that of the Boss mine.

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First-Aid Instruction in California

BY LEWIS J. EDDY

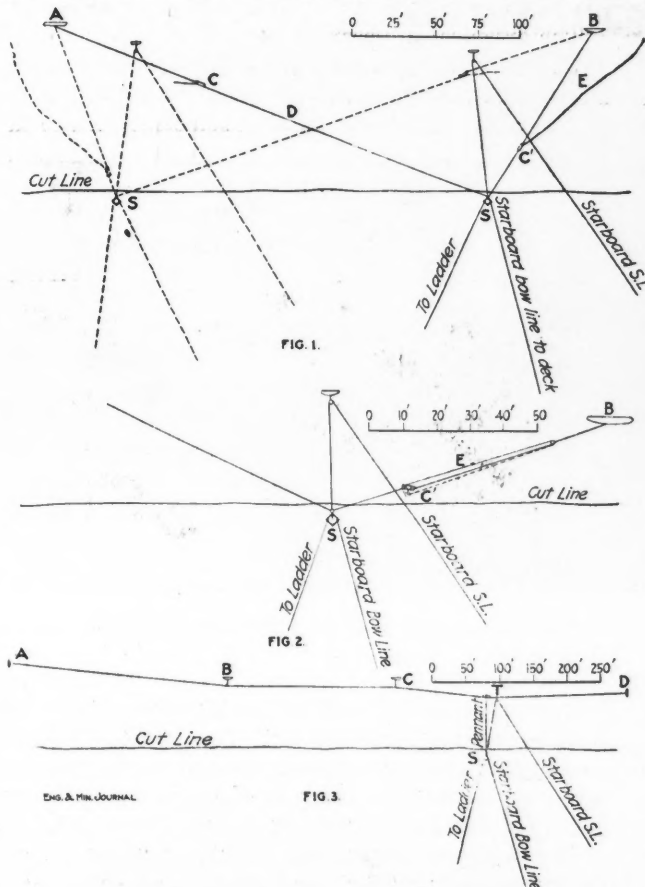
Mine rescue and first-aid training instructions were given to miners at Grass Valley by U. S. mine rescue car No. 5 on Sept. 16. The car was not sent to Grass Valley on account of the fact that the railroad from Colfax to Grass Valley and Nevada City is narrow-gage. The car remained at Colfax but the equipment was shipped and the full complement of men went with the equipment. The work was in charge of E. Steidel, junior mining engineer, and George W. Riggs, first-aid instructor. Both operators and mine bosses, and the miners as well, showed a great deal of interest in the work as taught by the government men, and it has been planned that a half-shift tri-monthly practice will be inaugurated. Instructions were given miners at the North Star, the Brunswick, the Empire and the Champion. Practical demonstration of rescue training was successfully carried through in an abandoned end-drift on the level 28 of the North Star mine. A fire was kindled and the men under instruction were obliged to work under actual mining and mine-fire conditions. The smoke and gas generated by the timber fire extinguished the carbide lamps. The men

were provided with self-contained oxygen-breathing apparatus allowing them to penetrate gas and smoke. The North Star has two sets of breathing apparatus in perfect condition, and is otherwise provided, as other mines in the district are, with the necessary apparatus for rescue work. At the conclusion of the evening demonstration by two teams of five men each, one from the North Star, one from the Empire, A. B. Foote, superintendent for the North Star Mines Co., addressed the government men and miners on the subject of first-aid and rescue work and assured the miners that the management of the North Star would do everything in reason to aid them in their efforts. H. M. Wolfen of the Industrial Accident Commission and the Bureau of Mines was present at the night demonstration and commended the miners for their excellent work.

Side Lines in Dredging

By W. H. WRIGHT*

If you ask a man experienced in gold dredging what parts of the dredge most affect yardage, he will surely put the main winch among the first three if he does not



ARRANGEMENT OF DREDGING LINES

place it first and the main winch is important only because it controls the working lines.

On both head-line and spud dredges the operation of the side lines is much the same. The bow-swinging lines are in constant motion when the dredge is digging. These lines carry a large part of the digging strain. In dredges of the type of which Natoma No. 10, in the American River district, Calif., is an example, the bow lines are

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1 1/4-in. high-grade steel-wire rope. This rope passes from the winch through proper sheaves and fair-leads to a sheave on short; then around this sheave to the digging ladder just aft of the lower tumbler bearings. The shore sheave weighs in the neighborhood of 800 lb., and is anchored by 1 1/2-in. lines to two deadmen which are 300 ft. or more apart along the cut line. The methods of handling this heavy equipment with little, or no, loss of time are very interesting. Those here described are the practice of the Natomas Consolidated in American River district, Calif.

In Fig. 1, A and B are the deadmen; C and C' the "come-alongs" fastened at the ends of the anchor lines. The pennant lines, E and D, are fastened to the sheave S by a heavy clevis and lead in the opposite directions to the "come-alongs" C and C' through which they pass. Beginning in the position shown by the full lines, the pennant line D is out through the "come-along" C to its full extent, while only a small part of the line E has passed through the "come-along" C'. The stern line SL, runs through a light independent sheave, anchored to a stump or a small deadman, then is fastened to a shackle

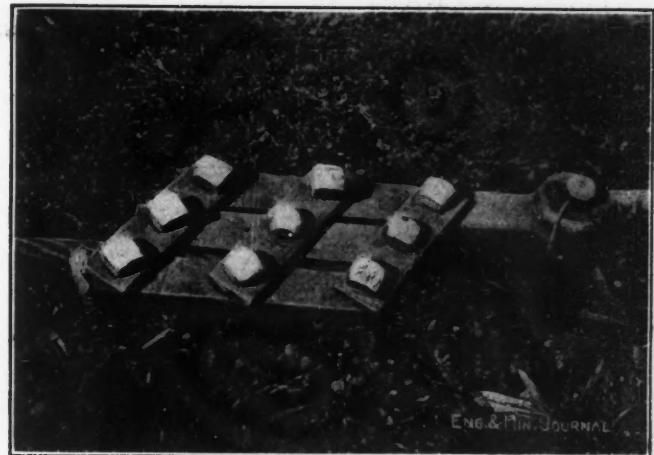


FIG. 4. "COME-ALONG" WITH PERMANENT LINE GRIPPED IN IT

on the shore sheave S. When it becomes necessary to move the lines and sheave ahead, a strain is taken on the stern line and the sheave, side line and anchor lines are pulled far enough out on the bank to give the necessary amount of slack. The grips of the "come-alongs" are loosened. The slack of the pennant line D is pulled through the "come-along" C by hand, and the grip tightened. The stern line is now slackened and the strain is taken on the bow line which pulls the sheave out over the edge of the cut; at the same time the pennant line E is pulling through the "come-along" C'. When the sheave S reaches its proper position, the grip of the "come-along" C' is tightened and the lines on the starboard side are ready for another day's run. The same movements are gone through on the port side.

This operation is repeated as often as the length of the lines will permit. When the position is reached as shown by the broken lines, a connection is made with a deadman still farther ahead than A and by using a longer anchor line on B, the "come-along" C' is advanced until it can be fastened to the deadman A.

Fig. 4 is a photo of a "come-along" showing the pennant line gripped in it. Another style of "come-along"

which is much more easily handled, is now coming into use. This is given in detail in Fig. 5. It consists of two plates riveted to a forged block, which has a $1\frac{1}{4}$ -in. groove in one end. Through each end of the plates a $1\frac{3}{4}$ -in. pin is passed. At the grooved end of the forging, the clearance between the pin and the forging is just sufficient for a $1\frac{1}{2}$ -in. rope to pass freely when the "come-along" is lying at right angles to the rope. At the end

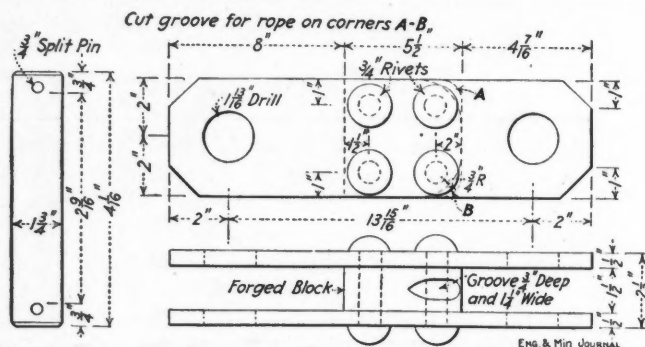


FIG. 5. "COME-ALONG" FOR HANDLING DREDGE LINES

of the anchor line, Fig. 2, a small sheave, 12 in. or 14 in. diameter is placed. The pennant line from the shore sheave *S* passes around this sheave and back to the "come-along" *C*, to which it is fastened by one of the pins. The pin at the grooved end is now removed and the



METHOD OF FASTENING BOW LINE ON PORT SIDE

"come-along" is fastened over the pennant line. When the line is slack the "come-along" will move freely up and down the pennant line, but when there is a strain on the line, it is gripped between the pin and the grooved end of the forged piece, as shown in Fig. 5. A similar arrangement is on the other pennant line, allowing either line to be quickly shortened or lengthened. This device is much lighter and more easily handled than the other and is preferred by the men.

In shallow ground, where the progress is rapid, another arrangement is used. This is shown in Fig. 3, and is known as a trolley. A long anchor line is stretched between two deadmen *A* and *D*. The length varies, but a 1000-ft. length is often used. The line is reinforced by other deadmen as *B* and *C*. The shore sheave *S* has a single pennant line which is fastened again to a small sheave which runs, or "trolleys" upon the anchor line. Sometimes a bridle is used instead of a single line. The trolley sheave is kept in the desired place by a short rope sling, at either end of which is fastened an "Indian-

head," a device similar to the "come-along." The stern line is fastened in the same manner as in the other methods described, but is anchored to the anchor line. By loosening this sling the trolley is quickly shifted to the proper place. Often the pull of the side line will bring it there with no effort.

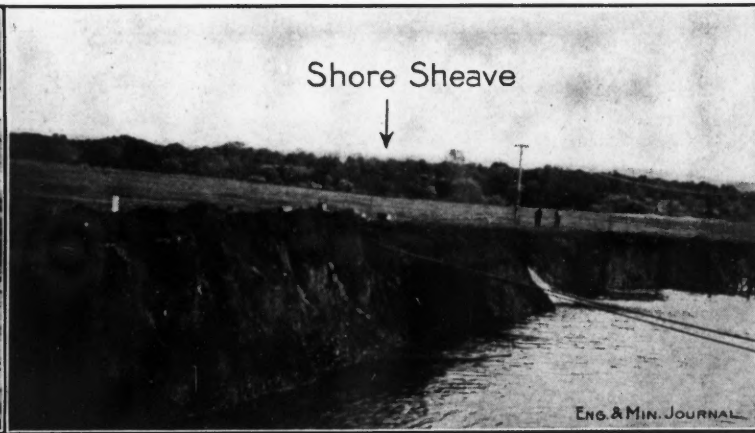
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Opportunities for Mineral Development in Canada

SPECIAL CORRESPONDENCE

The scarcity of certain metals and alloys resulting from the war conditions in Europe has been pointed out in the JOURNAL. For some of these Canada may be able to offer supplies. Of antimony, for instance, there are known deposits in Nova Scotia and New Brunswick, some of which have been exploited, and could be put on a producing basis in a short time. Some of the Nova Scotia ores carry gold, but have been worked only in a small way. Antimony ores have also been found in Wheaton district in the Yukon.

The arsenical ore-bearing belts of Hastings and Frontenac counties in Ontario, offer opportunities for securing a supply of this product, and should be worked to advantage as many of the ores contain sufficient gold to defray



SHORE SHEAVE AND SIDE LINES IN ACTION

operating expenses. This field has the benefit of excellent transportation facilities and cheap electric power, and the Ontario government allows a bonus of \$10 per ton on all white arsenic produced. Good arsenical ores are also found on the eastern coast of Nova Scotia. Canada already furnishes arsenic to the United States markets.

The feldspars of eastern Ontario present an opportunity for the production of potash and potash salts to take the place of the extensive importations from Germany.

A shortage in the supply of chromite and magnesite from Greece, Turkey and Asia Minor, could be well made up from the chromite deposits in the eastern townships of Quebec and the magnesite which occurs in important quantities on the north shore of the Ottawa River.

Molybdenite occurs through eastern Canada in many places and tungsten deposits are also available should the war create an additional demand of these minerals for alloying steel for armament purposes.

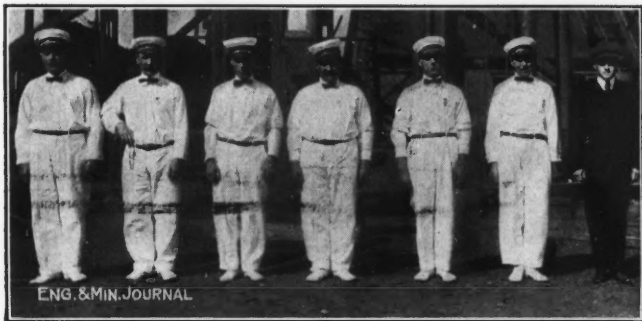
The Ishpeming First-Aid Contest

SPECIAL CORRESPONDENCE

The first annual first-aid contest, held under the auspices of the Lake Superior Mining Institute, was described to some extent in the *JOURNAL* of Sept. 5. The contest took place at Ishpeming, Mich., Aug. 31. Twelve teams participated, representing those mining companies in the Lake Superior district that have been most progressive in first-aid and mine-rescue work.

The first prize, five bronze medals given by the American Mine Safety Association, together with \$50, was won by the Republic Iron & Steel Co.'s Marquette range team. The second prize went to the Cleveland-Cliffs Iron Co.'s Negaunee mine team, and consisted of six silk umbrellas, given by the Pluto Powder Co., and \$30 in cash. The Oliver Iron Mining Co.'s Marquette range team took the third prize, a self-rescue apparatus, given by the Draeger Oxygen Apparatus Co., and \$30. The cash prizes were given by the Institute and by the du Pont Powder Co.

The mining companies represented in the contest were the Cleveland-Cliffs Iron Co. with four teams from the Marquette range; the Republic Iron & Steel Co. with two



AN IRON-COUNTRY FIRST-AID TEAM

teams, one each from the Mesabi and the Marquette; the Oliver Iron Mining Co. with two teams, one each from the Marquette and the Gogebic; Pickands, Mather & Co. with two teams, one from the Iron River district and one from the Mesabi; the Newport Mining Co. of the Gogebic with one team; and the Breitung Iron Co. of the Marquette also with one team. The Calumet & Hecla Co. had no entries but sent down two teams to observe the demonstration.

The judges were Dr. A. F. Knoefel, vice-president of the Vandalia Coal Co., of Linton, Ind.; R. Y. Williams, director of the Illinois Miners' and Mechanics Institute; and G. H. Hawes, rescue engineer, of Pittsburgh, Penn.

In a first-aid contest the subject or patient is supposed to have been injured, the nature of his injuries being stated beforehand, and the team of five men puts on the bandages and splints it considers necessary before transporting the victim to a doctor. The following are examples of the problems given the teams: Treat a compound fracture of the middle third of the right thigh, accompanied by violent bleeding; treat a simple fracture of the right thigh, fifth and sixth ribs on left side broken, compound fracture of the right wrist with bright red blood bleeding; treat a man insensible from drowning. The teams all work on the same problems or similar problems to make comparison easier, and are graded by the judges on the basis of one hundred perfect. Discounts are

made for improper treatment, failure to be aseptic, failure to stop bleeding, lack of neatness, not doing the most important thing first, and similar mistakes. In this contest each team had five problems or events to work on, the average of the marks given for each event being the final score. The highest score made in this contest was 97, the lowest 90, an excellent showing altogether.

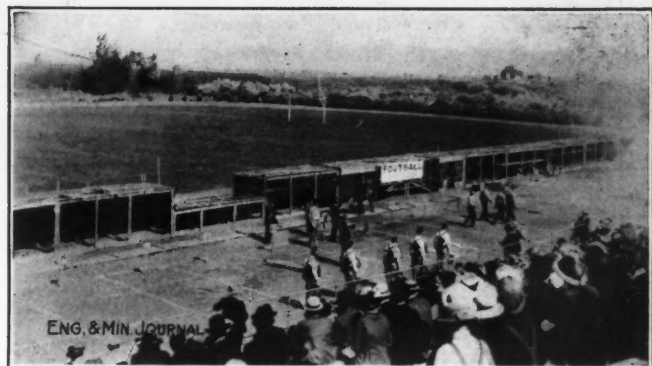
It is surprising the amount of interest taken in these contests by the men at the mines. The rivalry for places on a first-aid team to represent the mine in a contest is keen. Men living on the mining locations often get together on winter evenings and practice among themselves in order to make the team in summer. Since the teams are picked from the best men at each mine and as nearly all of the teams in this contest were winners in contests with other teams of their companies for the honor of representing the company and for the trip to Ishpeming, the work in the final contest was extremely well done.

The results in this campaign for first-aid work are satisfactory to all parties interested. The most noticeable are the decreasing amount of time lost from work by the men from injuries, the fewer complications of injuries from improper handling, and the better feeling of the employees toward their employers.

Nevada State Mine Rescue Meet

By FRANCIS CHURCH LINCOLN*

An interesting mine-rescue and first-aid contest was held on the Mackay athletic field of the University of Nevada, Reno., Nev., on Labor Day, Sept. 7, 1914. The meet was held under the auspices of the engineering colleges of the University of Nevada with the assistance of



ARRANGEMENT OF DRIFT AT NEVADA MINE-RESCUE MEET

the U. S. Bureau of Mines, the American Red Cross Society, and the Nevada Industrial Safety Association.

The miners participating in these contests were trained by E. Steidle, mining engineer, and George W. Riggs, first-aid instructor, who were attached to Mine-Rescue Car No. 5 of the U. S. Bureau of Mines. Since the first of July this car has trained 69 miners and ten University students in mine-rescue work, and 130 miners and 15 University students in mine first-aid in the state of Nevada. In addition to training these men, week-end lectures have been given to 4400 Nevada miners, and 5200 people have visited the mine-rescue car. Prior to the State meet, two local contests were held in Nevada—

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one at Ely on the Fourth of July, in which eight teams competed, and the other at Tonopah on Aug. 9., where there were five contesting teams.

The mine-rescue maneuver in which the several teams participated took place in a model drift consisting of timber, laths and tarred paper, built according to the design of E. Steidle. The side toward the grandstand was left open, save in the part used as a gas and smoke area, which was provided with windows on the grandstand side. The model was 6 ft. high and 260 ft. long. It consisted of 8 ft. of drift 6 ft. high, followed by 20 ft. of drift representing a hanging fall in which the height was only 2 ft. Next to this came 20 ft. more of open drift and then a gas and smoke chamber 40 ft. in length with an inclined obstacle in the center. Beyond the gas and smoke chamber were 20 ft. more of open drift and then 20 ft. representing a fall with an opening 3 ft. in height above the fall; and, finally, there were 60 ft. more of open drift to the face.

The teams underwent physical examination at the hands of doctors and then each in turn tested and adjusted its apparatus, stood a 3-min. test in a small test house

won by the Tonopah Extension Mining Co., the third by the Tonopah Development Co., and the fourth prize was tied between the West End Consolidated Mining Co. and the Goldfield Consolidated Mines Co. Other contesting teams were those from the Tonopah Mining Co. and the Veteran mine of the Nevada Consolidated Copper Co. Three teams of students from the University of Nevada, two from the Mackay School of Mines and one from the Electrical Engineering Department, also competed against each other.

California First-Aid Meet

By LEWIS H. EDDY*

The initial first-aid meet in the mining history of California was held at Jackson, Amador County, and was participated in by teams made up from mines in the Mother Lode region. The meet was a part of the program prepared by the Labor Day celebration under the auspices of the Miners' Union. Teams were entered from Amador City, Sutter Creek, and Kennedy mine. A team from Plymouth was also expected, but was prevented from par-



TEAM FROM KENNEDY MINE AT WORK

filled with smoke and gas and then went through the model drift and rescued a miner supposed to be overcome near the face of the drift. Each team carried a stretcher and oxygen breathing apparatus for the use of the injured man, and proceeded with all the precautions laid down by the U. S. Bureau of Mines. The first prize was won by the team from the Tonopah Mining Co., the other contestants being teams from the Veteran mine of the Consolidated Copper Co., the Tonopah-Belmont Development Co. and the Goldfield Consolidated Mines Co.

The mine first-aid teams worked on the problem of a miner found in a drift under a fall of rock and in contact with an electric wire. Their object was to rescue the patient, restoring breathing, and attend to his injuries, which included a deep electric burn on the small of the back, scalp wound and cut in left eyeball with severe bleeding, fracture of the right collar bone, simple fracture of the right forearm, and compound fracture of the right thigh 5 in. above the knee, with severe bleeding. The time allowed for this was 25 min. The winner of the first prize was the McGill concentrator team of the Nevada Consolidated Copper Co. The second prize was



PATIENT AFTER TREATMENT BY AMADOR CITY TEAM

participation by an automobile breakdown on the way to the grounds.

The standing of the teams at the conclusion of the meet was as follows:

Kennedy team, first prize, \$65 cash; general average of team, 99%. Amador City team, second prize \$30 cash; general average of team, 97%. Sutter Creek team, third prize, \$20 cash; general average of team, 94%.

Kennedy mine team was composed of Capt., H. E. Stewart, R. White, William Dougherty, Gordon Ireland, John Church, Nick Snell. Amador team: Capt., L. C. Cain, O. Anderson, Williamson, I. Brown, E. Worth, D. Kelly. Sutter Creek team: Capt., Henry Loge, William White, Gustave Schroder, Fr. Gehironi, James Jury, W. R. Forbes. The judges were Dr. Gall, Dr. Endicott and S. E. Robbins.

The prizes contributed amounted to \$115. The Miners' Union contributed \$50; Supt. W. S. O'Brien, of the Amador mine, contributed \$20. The balance was made up by contributions from the Kennedy, Argonaut, South Eu-

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reka, Central Eureka, Keystone, Bunker Hill, Treasure, Fremont and Plymouth mines.

A feature of the meet was the attendance of a large number of interested spectators who were not in the least

extensively used for lighting and power, though the blowing engines and rolling mills will be operated by steam engines.

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The Quicksilver Situation

The quicksilver situation is at present of unusual interest because of the large use of mercury in the preparation of fulminate for explosives, the present and probable future consumption of which must have an important bearing on the market for the metal, withdrawal of available supplies and future demands. The following notes by H. D. McCaskey of the U. S. Geological Survey are of interest at this time:

The world's production of quicksilver, in metric tons, was 4171 tons in 1913, and has averaged 3728 tons, or 109,584 flasks of 75 pounds net each, annually for the past 10 years. During 1904 and 1905, the United States led the world in production, but from 1906 to date the leading producer has been Spain, whose great cinnabar deposits of Almaden, the output of which has been controlled by the Rothschilds and marketed chiefly in London, have proved very rich. The deposits of quicksilver ore in Idria (Carniola, Austria), and at Monte Amiata (Tuscany, Italy), have with those of the United States (chiefly California) furnished the bulk of the remainder of the world's supply. The figure given in the Survey report for 1913 show that during that year Spain produced approximately 1490 metric tons, Italy, 388 tons, Austria, 855 tons, the United States, 688 tons, and Mexico and all others, 150 tons.

The production of the United States was 20,213 flasks of 75 lb. each; the imports were 2289 flasks, and the exports 1140 flasks, giving an approximate consumption and stocks available of 21,666 flasks, which is probably not far from the present domestic consumption. The domestic demand is mainly for making fulminate, for amalgamation of gold and silver ores, and for manufacture of electric and other appliances. It seems unlikely that domestic production will greatly increase, so that there will hardly be any surplus in the United States for export.

The Austrian production of quicksilver, controlled as it is by the government, is definitely cut off from the world's markets, and the Italian supplies must be considered uncertain. The Spanish output is mainly controlled in London, and if this remains, but little metal will be free, for a time at least, for the foreign trade. Undoubtedly large quantities of available European quicksilver will be immediately utilized in the manufacture of explosive caps for fixed ammunition for both small arms and artillery. In the countries now involved in the war, present stocks are unknown, but even if extensive they must be heavily drawn upon for some time to come, and exportation is not only prohibited by some of these countries, but quicksilver is declared contraband by all of them.

The demand from Mexico, Central and South America and from China and Japan must be met from the United States, if at all. But, as shown above, this country has little or no surplus over its own consumption. It is apparent that, for a time at least, demand will exceed the supply and prices are likely to be high. At present, they are about double those prevailing in the earlier part of the year, the quotations being \$75@80, New York, against \$36@37 per flask in June last.



SUTTER CREEK TEAM, SHOWING METHOD OF PREPARING MAN WITH INJURED BACK FOR TRANSPORTATION ON MINE CAGE

stingy in offers of advice. Anyway, there was more actual interest aroused in first-aid-to-the-injured work at the Jackson meet than has ever been stirred up by any similar undertaking in the state.

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An Australian Steel Plant

The steel plant under construction by the Broken Hill Proprietary Co. at Newcastle, N. S. W., is now well advanced so far as the first unit is concerned, and that unit will probably be at work early in 1915, according to the *Australian Mining Standard*. The plans include six units, for which provision has been made. The work now in progress includes a blast furnace of 10,000 tons monthly capacity, three 65-ton basic openhearth-steel furnaces, a blooming mill and a 28-in. three-high rolling mill. The company owns 264 acres of land, which will be sufficient for the proposed extensions. At present the product will be rails and structural shapes, but plate and bar mills will be added later.

The iron ore will come from the company's Iron Knob property in South Australia, and the limestone for flux from Wardang Island, South Australia. Coal will be brought from the government mines at Tighe's Hill, and coke will be made at the plant in a battery of 66 Semet-Solvay recuperative byproduct ovens, now being erected. The gas will be used in the works. Electricity will be

Old Dominion Mine Rescue Contest

The accompanying page of illustrations shows various phases of a mine-rescue contest held on Labor Day by the Old Dominion Copper Mining & Smelting Co. at Globe, Ariz. This was one of the first contests of its kind

held in the Southwest, and was a highly successful affair.

The contest included carrying a patient on a stretcher through timbered drifts in which were placed obstacles of various kinds, work in a smoke chamber and application of the pulmator. Two teams of underground men were entered and one team from the engineering department.



ASSEMBLING APPARATUS



JUDGES INSPECTING ASSEMBLED APPARATUS



CARRYING PATIENT ON STRETCHER ACROSS OBSTACLE



CREW OF FOUR WITH PATIENT ON STRETCHER



APPLYING PULMOTOR TO PATIENT



THE WINNING CREW

Mine Stores and What Mines Use--II

SYNOPSIS—In this continuation of a previous article are detailed the tramming supplies, building material, general hardware, and machinery used in 10 months of steam-shovel and 10 months underground work by the Nevada Consolidated Copper Co., six months work by the Miami Copper Co., and one year's work by the Hollinger.

In the previous article a list of fuels, power, lumber, explosives, oils and greases, iron and steel, pipe and fittings, and tools used at the Nevada Consolidated Copper Co., Ely, Nev.; Miami Copper Co., Miami, Ariz.; New Jersey Zinc Co., Franklin Furnace, N. J.; and the Hollinger Gold Mines, Porcupine, Can., was published. The following list gives details of other supplies consumed at these mines during the same period covered by the previous article.

NEVADA CONSOLIDATED COPPER CO.

Mine Supplies for 10 Months in Steam-Shovel Mining; 2,376,966 Dry Tons Ore and 2,480,962 Cu.yd. of Waste Mined.

Tramming and Haulage Supplies

Cars, dump and parts:			
Car wheels.....	160	60- and 70-lb. rails, lb.....	277,530
Knuckle locks.....	132	Track bolts, kegs..	235
Knuckle locks, sets	128	Track spikes, kegs.	503
Brake beams.....	10	60- and 70-lb. tie plates.....	12,359
Brake-beam heads..	7	Guard rail.....	2
Bottom body rests.	28	Switch-lamp reflectors.....	3
Top body rests.....	93	Switch-lamp lenses	22
Tower draw bal cut	11	Switch-lamp wicks.	864
Draw bar.....	1	Angle bars, pr.....	1,605
McCord oil boxes...	30	Switch points.....	12
Draft springs.....	86	Frogs, 8-in., 60-lb..	2
Nest truck springs.	56	Frogs, 75-lb.....	6
Triple union.....	6	Connecting-rod....	1
Nonpressure auxiliary reservoirs.....	9	Switch lamp complete.....	4
Bottom center posts	5	Switch-lamp burners.....	106
Clevises and pins..	81	Switch and cross-ties.....	13,132
Cut-out cocks.....	7	Steam-locomotive parts:	
Car swivels.....	25	Injector repairs, pc.	802
Spring seats.....	13	Blowoff cocks.....	6
Cut-out handles...	75	Cylinder cocks.....	24
Yoke.....	1	Cast-steel dog wheels.....	3
Spring barrel.....	1	A. B. C. springs....	40
Column posts.....	207	Headlights.....	4
Column guides.....	85	Locomotive whistles	3
C. S. truck bolster..	12	Driver brake shoes.	600
Steel draft lugs....	118	15-in. knuckles....	12
Air hose, 1 1/4-in., ft.	150	Boiler checks.....	14
Hose gaskets.....	825	Injector nozzles....	12
Hose clamps.....	8	Sand, tons.....	122
Steel carrying arms	12	Westinghouse air pumps.....	2
Angle cocks, 1 1/4-in	77	Air-pump parts...	98
Train-line tees....	12	Boiler check valves	12
Brass wedges.....	16	Eccentric and boxes complete.....	4
Steel center plates.	24	C. S. hangers.....	20
Fulcrums.....	78	Comp. coil springs.	200
Cylinder gaskets...	5	Gage cocks.....	24
Check-valve gaskets.....	12	Boiler-front ends..	4
Oil-box covers....	8	Triple-feed lubricator.....	2
Release valves....	5	Brake-beam hangers.....	8
Car unions.....	25	Brake hangers.....	2
Triple valves.....	3		
Triple-valve gaskets.....	9		
Angle cock handles	96		
Brake block.....	1		
Rails, fittings, etc.:			

Building Material

Cement, lb.....	6,000	Glass, 10x12 and 12x24-in. panes.....	326
Fireclay, lb.....	759	12-light windows..	177
Concrete filler, lb..	400	Doors.....	111
Lime, lb.....	1,000	Compo board, ft....	6,373
Brick.....	3,950	Shingles.....	4,350
Corrugated roofing sheets.....	2,108	Transoms.....	12
		Building paper, rolls.	10

General Hardware

Machine bolts, lb....	14,438	Wire screen, rolls..	2
Stove bolts, lb.....	82	Lock washers, lb....	431
Boiler patch bolts, lb.	198	Cut washers, lb....	1,580
Cotter keys, lb.....	710	Tapped nuts, lb....	7,022
Lag screws, lb.....	391	Rivets, lb.....	5,658
Wood screws, gross.	117	Copper rivets, boxes.	30
Setscrews, lb.....	70	Copper rivets, lb....	6
Capscrews, lb.....	776	Tin rivets, lb.....	28
Boat spikes, lb....	2,550	Upholstering tacks, lb.	31
Nails, lb.....	8,585	Steel brads, packages	50
Galvanized iron, sheets.....	439	Sash chain, ft.....	310
Stove-pipe iron, sheets	61	Sundry locks.....	224
Ridge roll, ft.....	1,276	Head washers, lb....	190
Window spring bolts.	282	Steel butts, pr.....	204
T-hinges, pr.....	106	Screen-door springs..	52
		Coat and hat hooks..	197

Sash pulleys.....	237	Drawer pulls.....	24
Sash locks.....	63	Door springs.....	120
Sash lifts.....	56	Shelf brackets, pairs.	2
Casement fasteners..	70	Casters, sets.....	14
Blank keys.....	24	Strap hinges.....	56
12-in. bb. acting door hinges.....	1	Hasps.....	61
Door pulls.....	29	Hooks and eyes.....	8

Machinery and Parts

Steam-shovel parts:		Hinge frames.....	2
Panama dipper teeth (14,812 lb.)	161	Dipper hinges.....	6
Vanderhoef dipper teeth (12,672 lb.)	96	Side frames.....	4
Hoisting chains, 990 lb.	9	"A" frame collar...	1
Missing links.....	370	Cylinder heads.....	2
Prop. chain links..	364	Propelling shaft...	1
Asbestos brake blocks.....	87	Propelling chain plates.....	8
Bolster springs....	50	Rail cleaner.....	1
Friction band blocks	40	C. S. Bed plate....	1
Boiler flues.....	80	Transom casting..	1
Eccentric straps....	29	Miscellaneous machinery:	
Rail clamps.....	26	Cold cutting-off saw	1
Rocker arms.....	20	Bevel gear for radial press.....	1
Throttle casings...	19	Bull wheel and pinion.....	1
Crossheads.....	11	Compressor parts..	6
Crosshead shoes....	21	Locomotive steam gages.....	3
Propelling pin.....	1	Air gages.....	4
Crankshafts.....	3	50,000 gal. water tanks.....	4
Eccentric sheaves..	8	Grease cups.....	1,811
Mang. dipper door front.....	1	Lubricators.....	3
"A" frame legs....	2	Lubricator repairs, pc.....	56
Dipper rails.....	7	Water gages.....	10
Car bolster.....	1	3-hp. motors.....	3
Crosshead pins and shoes.....	3	10-hp. motor.....	1
Crank brasses.....	4	Vacuum pump repairs, pc.....	390
Connecting-rod....	1	Oil pumps.....	10
Half bushing.....	1	Oil-pump repairs, pc.....	305
Sprocket sheave....	1	Electric pump.....	1
"A" frame castings	2	Water-valve rubbers.....	9
Propelling gears...	2	Water-valve springs	3
Swing drum.....	1	Water-valve stems.	3
Thrust cylinder....	1	Injector repairs, pc.	98
Thrust springs....	1	Pet cocks.....	218
Exhaust pipe.....	1	Water-gage glasses.....	1,562
Manganese-steel rack.....	1	1-hp. motor.....	1
Manganese-steel lip	2	7 1/2-hp. motor.....	1
Piston gland.....	1		
Throttle valve.....	1		
Crank disks.....	2		

NEVADA CONSOLIDATED COPPER CO.

Supplies Used in Underground Mining at the Veteran Mine 10 Months, Jan. 1, to Oct. 31, 1913; 216,784 Dry Tons of Ore Mined.

Tramming Supplies

Car trucks.....	15	Brake blocks.....	11
Carwheel keys.....	24	Carwheels.....	5
Car boxing.....	1	Track spikes, lb....	1,400
Fish plates.....	50		

Building Materials

Common pressed brick	500	Gravel, cu.yd.....	37
Firebrick.....	450	Window glass lights.	287
Cement, sacks.....	232	Plate glass, 40x72..	1
Lime, lb.....	2,030	Malthold roofing, rolls	75
Corrugated iron sheets.....	156	Compo board, sq.ft..	1,128
Shingles.....	6,000	Screen doors.....	67
Six-light windows...	19	Doors.....	3

General Hardware

Machine bolts, lb....	537	Ridge roll, ft.....	45
Nails, lb.....	7,882	Piacit slate, bbl....	1
Rivets, lb.....	308	Slop jars.....	4
Copper rivets, lb....	11	Spring hinges.....	14
Roofing tacks, lb....	64	Fence wire, lb.....	600
Lag screws, lb.....	344	Padlocks.....	26
Nuts, lb.....	136	Night latches.....	7
Cut washers, lb....	164	Rim locks.....	7
Wood screws.....	3,960	Window bolts.....	144
Galvanized iron, 30x96, sheets.....	19	Screen-door catches..	6
Stove bolts.....	6	Screen-door hooks and eyes.....	48
Butt hinges, pairs..	86	Roof jacks.....	2
Hinges and hasps...	69	Fly screen, rolls..	5
Roller casters.....	10	Water tank, 30 gal..	1
Window shades.....	3	Tacks, lb.....	3
Inside door sets....	11	Skeleton keys.....	60

Machinery, Parts, Etc.

Compressor parts:		Prospector hoist...	1
Follower heads....	2	Pinions.....	2
Crossheads.....	2	Indicator gear's set	1
Valve seats.....	4	Orebin gates, sets..	4
Stay-bolts.....	1	Shop pump.....	1
Valve.....	1	Grease cups.....	9
Pump.....	1	Lubricators.....	4
Intake valves.....	14	4-in. motor pulleys..	3
Gland nuts.....	2	1-hp. motor.....	2
Valve stems.....	8	"Iler" pulverizer....	1
Valve springs....	9	20-in. Barnes drills..	1
Stuffing-box gland..	1	Part for mine bell..	1
Stuffing-box nut....	1	Keystone blower....	1
Valve caps.....	8	Pet cocks.....	8
Skip parts:		Steam gages.....	3
Pins.....	3	Gage glasses.....	41

Lugs	1	3-hp. motors.....	8
Shafts, 2x22 in.....	2	5-hp. motor.....	1
Castings	22	Sand-line sheave.....	1
Cage dogs.....	2	Valve casings for	
Mine-hoist parts:		pump	6

MIAMI COPPER CO.

Mine Supplies, Jan. 1 to July 1, 1913, Underground Mining;
489,627 Tons of Ore and 32,668 Tons of Waste Mined

Tramming and Railroad Supplies

Tram cars.....	6	70-lb. filler blocks,	
Tram-car wheels and		sets	20
caps	48	70-lb. rigid frogs.....	6
16-lb. steel rails, lb..	8,657	70-lb. joints.....	16
30-lb. steel rails, lb..	194,300	Steel switch lugs.....	50
40-lb. steel rails, lb..	8,500	15-ft. switches.....	6
70-lb. steel rails, lb..	268,680	Ground throw stands..	2
Track spikes, lb.....	10,259	3-ft. gage turntables..	3
30-lb. fish plates, sets	1,160	Automatic ground	
Tie plates.....	7,500	throws	52
Angle bars, 70-lb. rails	400	Cross-overs.....	3
Gard braces, 70-lb.		Cattle guards.....	2
rails	250		

Building Materials and General Hardware, Etc.

Nails, lb.....	40,334	Awnings	35
Litholite plaster,		Corrugated iron,	
sacks	143	sheets	506
Cement, sacks.....	8,680	Bridge flooring,	
Lime, lb.....	30,869	sheets	461
Hydrated lime, lb....	7,400	Drag-belt scrapers....	1,298
Asphaltum, lb.....	1,060	Diamond-drill carbons	
Six-light sashes.....	123	and bortz.....	\$850
Doors	49	Linoleum, yd.....	388
Screen doors.....	33	Chute gates.....	75
Windows	8	7-oz. burlap, yd....	11,800
Maple hand rails.....	8	Talcott belt hooks... 1,266	
Bricks, common and		Bolts, nuts, washers,	
fire	1,735	etc.....	\$2,353
Galvanized-steel sky-			
lights	5		

Machinery, Parts, Etc.

Callow screen drums..	4	Nonburn brake lin-	
Callow screens.....	51	ing, ft.....	61
Chile mill ring dies..	6	Step bearing buttons	2
Chile mill roll shells..	12	Chicago spring butts	26
Chile mill screens....	516	Pitman crank.....	1
Chile mill shafts.....	3	Manhole covers.....	2
Quarter-section man-		Holman hoist cylinder	1
ganese steel.....	24	Pebbles for tube mill,	
Liner plates.....	37	lb.....	1,291,264
Hearts for rolls.....	4	Silex lining for tube	
Roll shells.....	22	mill, lb.....	101,040
Roll shafts.....	3	New machinery:	
Pump valves with		42x16 automatic	
seats	8	rolls	3
Packing rings and		Elevator head shafts	4
keepers	8	Hardinge mills, 8-ft.	4
Boiler tubes.....	60	Power hacksaw....	1
Brass flywheel bush-		Blake crusher, 9x15	1
ings	28	Braun pulverizers..	2
Boss elevator pulleys		C C D generator and	
Elevator buckets.....	305	pulley	1
Braun pulverizer disks		Motor-generator set	
Bronze worms.....	16	W/ autostarter... 1	
Pulleys	2	Motors, two 1-, and	
Working sticks.....	2	one 2-, 5- and 120-	
Hammer cylinder for		hp.....	5
drill sharpener.....	1	Transformers	2
Bore ring for coup-		Switchboard panels	
ling clutch.....	1	Hoist, 5x7.....	1
Box and cap counter-		Leyner drills.....	14
shaft	1	Pumps	2

NEW JERSEY ZINC CO.

Mine Supplies Used in Six Months; Ore Broken, 261,650 Tons;
Waste Broken, 97,770 Tons; Total Tons Broken,
359,420 Tons

Tramming Supplies

Haulage and under-		Trolley wheels.....	6
ground cars and		Track bolts.....	251
parts:		Electric locomotive	
Cars complete.....	10	and parts:	
Wheels	12	Locomotive complete	1
Packing collars....	11	Carbon brushes....	49
Coil springs.....	42	Controllor	1
Axles	30	Ptg. fingers.....	60
Electric haulage parts		Draw heads.....	1
and track parts:		Insulator	1
Rail bonds.....	31	Lining	1
Frogs	6	Pinions	2
Insulators	8	Rheo. complete....	1
Drift pins.....	2	Rev. segments....	2
Sleeves	8	Sleeving, yd.....	5
Suspension screws..	26	Mica tubes.....	10
Terminals	14	Mica washers.....	108
Harps	9	Draw bars.....	2
Trolley harp screws		Coils	2
Spikes, lb.....	11,592	Fingers	39
Fish plates, pairs..	40	Grids	6
Plain ears.....	48	Brush holder.....	1
Switches	3	Studs	6
Switch parts.....	2	Arm lining.....	1
Ins. screws.....	13	Divis. plates.....	3
Suspensions	13	Optg. segments....	58
Suspension pipe		Brake shoes.....	4
thread	8	Springs	3
Metal bushings....	4	Packings, lb.....	1
Trolley heads.....	3		

Cement, bags.....	12	Asphalt, lb.....	4
Fire clay, lb.....	179	Galvanized iron, sheets	1

General Hardware

Stove bolts.....	30	Tacks, packages.....	1
Machine bolts, lb....	1,467	Door hangers.....	1
Elevator bolts.....	26	Butt hinges, pair....	2
Shear off bolts.....	2	Strap hinges, pair....	8
Carriage bolts.....	29	Hasps	7
Washers, lb.....	441	Bolt hooks.....	35
Split washers.....	582	Latches	2
Felt washers.....	624	Padlocks	18
Rivets, lb.....	5,093	Brass machine screws,	
Copper rivets, lb....	8	lb.....	35
Cotter pins.....	145	Cap screws	36
Nuts, lb.....	258	Wood screws.....	262
Nails, lb.....	64	Lagscrews	944
Awning pulleys.....	9	Setscrews	10

Machinery, Parts, Etc.

Ingersoll-Rand drill		Turbo pump shaft..	1
sharpener	1	Roller bearings....	2
Drill press.....	1	Grease cups.....	2
Leyner drill sharpener		Pet cocks.....	2
parts:		Sheave, 20-in.....	1
Sharpener complete.	1	Mine signal parts;	
Shank device.....	1	Coil springs.....	10
Pin pullers.....	2	Contact springs....	3
Cup leathers.....	4	Rubber pieces.....	2
Die	1	Cameron pump parts;	
Springs	9	Valve springs.....	27
Dolly springs.....	34	Water valves.....	11
Grid springs.....	3	Fiber gaskets.....	2
Crimps	2	Follower	1
Hammer cylinder... 1		Rev. valve.....	1

HOLLINGER GOLD MINES

Supplies for one year. (Part Used in Construction); 140,131
Tons of Ore and 11,544 Tons of Waste Mined

Tramming Supplies

Cars:		Tracks, steel rail, 12-	
Ore cars.....	12	lb., lb.....	40,064
Dump cars.....	3	Track bolts.....	6,200
Carwheels.....	52	Fish plates, pairs....	156
Car axles.....	23	Track spikes, kegs... 107	

Building Material

Asbestos mill board, lb.	573	Metallic laths, sq.yd..	5,250
Asbestos steets, 48x48		Galvanized siding,	
in.....	11	squares	275
Asbestos paper.....	17	Doors	107
Asbestos fiber board,		Sash, pairs.....	481
crates	9	Window glass, cases..	83
Common brick.....	18,500	Fire clay, tons.....	8.5
Firebrick	6,750	Corrugated ridge caps	1,943
Cement, bags.....	3,200	Barn door hangers, ft.	64
Plaster, bags.....	2,400	Galvanized shingles,	
Corrugated sheeting,		squares	332
sheets	2,979	Corner blocks.....	870
Roofing paper, rolls..	64	Wall board, sheets....	47
Tar paper, rolls.....	594		
Building paper, rolls..	1,100		

General Hardware

Bolts, 1/4 to 1 1/2 in.		Staples, kegs.....	95
diam.....	14,657	Hasps and staples....	190
Carriage bolts, 1/4 to		Inside door locks....	143
5/8 in. diam.....	7,720	Padlocks	324
Elevator bolts.....	6,300	Miscellaneous locks..	115
Stove bolts, packages		Thumb latches.....	35
Washers, pressed, lb..	1,395	Coat and hat hooks..	432
Bridge and lock wash-		F. H. B. screws, gross	332
ers, 1/2 to 1 in.....	2,554	Rivets, 1/4 to 5/8 in., lb.	316
Nuts, various sizes, lb.	5,814	Screw hooks.....	60
Cotter pins.....	420	Carpet tacks, pkgs....	513
Door bolts.....	47	Lagscrews, 1/4 to 1 in.	5,333
Nails, various sizes,		Cap screws, 1/8 to 3/4 in.	580
kegs	589	Setscrews, 3/8 to 1/2 in.	717
		Engine studs.....	714

Machinery, Parts, Etc.

Electrical Machinery,		Crosshead guides...	32
etc.:		Steel springs.....	90
Transformers	6	Valves	32
Transformer tank..	1	Valve seats.....	40
Bristol rec. gages..	4	Valve bolts.....	40
No voltage releases		Pinions	4
for circuit breaker		Cylinders	2
I. G. resistance....	2	Frames	2
Field rheostat.....	1	Crossheads	3
Bus bar clamps and		Crankshaft	1
terminals	14	For 10x12 vertical tri-	
200 amp. ammeter		plex pumps:	
with shunts.....	1	Crucible steel valve	
Rheostat	1	seats	24
Bristol rec. ammet-		Cast-iron ball valves	12
ers	3	Renewable guides..	24
Circuit breaker....	1	Cast-iron glands....	3
10,000 Ohm magneto		Bronze crank bear-	
Motors, 25 hp.....	1	ings, sets.....	8
Motors, 50 hp.....	3	Bronze crossheads	
Motors, 10 hp.....	2	and bearings.....	4
Portable ammeter..	1	Cast-iron plunger	
Telephone switch-		rings	12
board	1	Garlock rings.....	12
Hoist parts:		Stuffing-box rings..	6
Asbestos brake		Insertion rings,	
blocks	30	cast iron.....	6
Quadrant stand....	1	Cast-iron crosshead	1
Crank pin brasses,		Chilled plungers....	2
set	6	Gears	3
Indicator chain, ft..	30	Cast-iron pinions... 2	
Side frame and		Valve chamber.....	1
cylinder	1	Leather valves and	
Eccentric strap....	1	bolts	18

Crosshead brasses, sets.....	7
Crosshead pins.....	4
Quadrant complete with connections and levers.....	1
10-in. sheaves.....	6
24-in. sheaves.....	3
48-in. sheaves.....	2
Drum shaft friction gear.....	1
Pinion.....	1
Cylinder head and gland.....	1
Crank disk and pin Crossheads.....	1
Friction pins, sets..	12
Throttle valves.....	5
Crank pin brasses..	3
Friction brake band	1
Friction screws and nuts.....	6
Cage springs.....	66
Counterweights for cage.....	3
Cage.....	1
Compressor parts; Discharge valve cages.....	6
Cut-off valve.....	1
Cut-off valve spindle	1
Inside plugs for discharge valve.....	6
Bottom case for eccentric.....	1
Inside valve plugs..	9
Inside plugs for H & L pressure valves	30
Valve springs.....	18
Crushers; Stationary jaw plates.....	4
Swinging jaw plates	3
Cheek plates, pairs.	3
Toggles, sets.....	14
Gyratory spider cap	1
Gyratory top shell..	1
No. 5 Bz. Ball crusher complete.....	1
Gyratory, discharge spouts.....	3
Gyratory, C. I. hoppers.....	5
Gyratory, lower dust cover.....	1
Gyratory, C. I. wearing plate.....	1
Gyratory, rock shaft and levers.....	2
Crusher pitman....	1
Stamps and challenge feeders;	
Stamp stems.....	6
Chrome steel heads.	14
Chrome steel cams..	16
Mang. steel end liners.....	31
Mang. steel front liners.....	19
Mang. steel back liners.....	23
Stamp shoes.....	145
Dies.....	160
Forged steel dies..	30
False dies.....	45
Cast iron hoppers..	3
Cast steel tappets..	6
Hard iron false bottoms.....	9
Boss heads.....	7
Spout liners.....	9
Lower back spout liners.....	8
Cam shaft pulley flanges, pairs.....	2
Cam shafts.....	3
Wood battery pulley, 72x17.....	3
Hand wheel and screw.....	1
Center box.....	1
Conveyor parts; Upper guide rollers	38
Troughing carriers.	36
Screw conveyor couplings.....	38
Return rollers.....	40
6-in. screw conveyor, lengths.....	56
Grinding pans; Shoes, sets.....	4
Spiders.....	5
Dies, sets.....	4
Adjusting screws..	4
Tube Mill; Tube mill scoops..	34
End liners.....	24
Spiral scoops.....	3
Discharge screens..	4
Head liners, set....	1
Cover liners.....	6
Manhole covers.....	4
Spiral liners.....	3
Special C. S. head mach. bolts.....	109
Silix lining, lb.....	91,120
Pumps and parts—for 8x10 Vacuum;	

Cast-steel crank-shaft.....	1
10x5x13 Cameron pump.....	1
Prospectors' sinking pump.....	2
For 16x9x12 fire pump; Cast-iron slide valves.....	2
Water cylinder brass liners.....	2
Brass plungers....	2
Suction discharge valve seats and stems.....	8
For 8x5x7 pump; Iron packing gland, steam end.....	1
Valve rods.....	1
Diaphragm pump parts;	
Large gear wheel..	1
Rubble diaphragm..	14
Diaphragm castings	32
No. 4 diaphragm pumps.....	4
For 7x9 vertical triplex pumps;	
Crosshead bearings, sets.....	6
Leather U packing rings.....	24
Valve seats.....	14
Valve plates.....	9
Valve springs.....	48
Valve stems.....	45
Garlock rings.....	18
Wrought-iron valve rings.....	18
Cast-iron ways....	48
Bronze crankhead Bearings.....	5
Chilled-iron plungers.....	2
Cast-iron gears....	3
Cast-iron ball valves.....	6
Pumps, complete..	2
Cameron pump rubber valves, sets.....	6
Pulleys; Split wood, 4x6 to 56x10 in.....	26
Solid iron, 8x8 to 30x4 in.....	14
Steel, 6x3 to 18x12 in.....	40
Steel pulley bushings.....	67
Diester Slime Tables; Extended ball and socket bearings..	53
Wedge sockets....	24
Bolts for adjusting eccentric.....	48
Handwheel, rods, nuts and collars..	3
Setscrews for adjusting eccentric.	48
Riffler with steel tacks, sets.....	58
Crankpin brasses, sets.....	31
Roller bushings, sets	12
Rollers, sets.....	12
Linoleum table covers.....	68
Rocking end supports.....	12
Holding down springs.....	53
Wedges.....	29
Spring seats.....	17
Ball castings.....	31
Curved levers.....	20
Special setscrews..	230
Oil guards.....	14
Box cranks.....	27
Adjusting plates..	12
Table pullers.....	14
W. A. collars.....	12
Main springs.....	48
Steel tacks, lb.....	30
Table ball castings.	16
Miscellaneous machinery and parts;	
Filter leaves.....	46
Belt-driven blower.	1
Merrill precipitation press.....	1
Dorr thickener mechanisms.....	4
Merrill zinc feeder.	1
Burr keyseating machine.....	1
Plain engine lathe..	1
McDougall drill No. 3.....	1
Floor plates for copper furnace, lots.	1
20 Rd. water jacket, copper furnace..	1
Parks pusher complete.....	1
Locomotive jack-screws.....	2
Oil bath chain cases	9
Worm for Dorr thickener.....	1
Worm gear for Dorr thickener... 1	
Lifting device for Dorr thickener... 1	
Settler discharge fittings.....	12
Deister cone baffles	2
For Dorr Classifiers; Connecting-rod brackets.....	3
Connecting-rod bracket caps....	4
Angles, 1/2x2 1/2x2 1/2.	262
Bell cranks.....	3
Cam rollers.....	7
Cams.....	2
For Morgan crane; F. S. worm.....	1
F. S. pinion.....	2
C. S. gear.....	1
Bronze friction disk	1
Lot of iron work for furnace.....	1
Dust flue, complete..	1
30-in. by 30-ft. stack.	1
Cover for Steele-Harvey furnace.....	1
Liners for Steele-Harvey furnace, sets... 2	
Test car.....	1
Litharge cars.....	4
Blast piping, set..	1
Briquetting press..	1
Spider-arm castings	4
Lathe chucks.....	2
Chuck plates.....	1
Boiler arch abutments.....	2
Dead plates.....	2
Cast-iron melting pots.....	2
Chain drive, ft....	17.5
Chain-drive studs and washers.....	108
Chain-drive guide links.....	97
Chain-drive liners..	204
Trommel screen plates.....	10
Roller bearings for trommel.....	1
For Merrill pipe cutter; Power gears.....	6
Dies, sets.....	4
Grease cups.....	260
Lubricators.....	51
Injectors.....	9
Large steel gears..	5
Maple cogs, set....	1
Miter steel gears, pair.....	1
Boiler arch castings.	8
Pet cocks.....	73
Pressure gaugcs..	17
Oil cups.....	62
Oil cadgers.....	120
Solid collars.....	59
Shaft hangers.....	18
Cast-iron bevel gears, pair.....	4
Bevel mortise gears, pair.....	4
Litharge cars.....	4
Pressure-reducing valves.....	4
Steam traps.....	3
Standard rigid pillow blocks.....	43
Keyless shaft couplings.....	27
Trommel screens..	20

(To be concluded)

Zinc Corporation's Condition

The Zinc Corporation issued the following circular to its shareholders, dated Sept. 17: In consequence of the war the contract for sale of zinc concentrates to the smelters in Germany is void, the market for lead is disorganized and restricted, and the Broken Hill Proprietary Co., to whom the lead concentrates are sold, has availed itself of the war clause in its contract, and is not operating its smelting plants. Under these circumstances the directors regret that it is not possible to earn dividends. At the commencement of the war the zinc concentrator was at once shut down, but as there was temporarily a rise in the price of lead, and the demand for this metal seemed likely to be maintained, the lead concentrator was continued in operation, mainly in order that the labor on the field should suffer as little as possible through unemployment. It was, however, plainly impossible that this could be long continued unless the concentrates could be sold. The cost of running the lead department is over £10,000 a month, and at this juncture the company's cash resources are limited in consequence of capital expenditure in the enlargement of the plant, and the recent acquisition of the interest in the Broken Hill South Extended property.

Negotiations for combination between the leading companies were commenced at an early period in order that the mines might continue in limited operation on joint account, but the probable demand for lead is not large enough to justify the belief that on any equivalent scale of operation the companies could even pay expenses. Nothing has been yet agreed. The directors are engaged in investigating the conditions of zinc smelting throughout the world. Hitherto the largest part of the production of spelter for European consumption has come from Germany and Belgium. It is believed that the Germans will have taken good care to demolish the Belgian smelting plants, and it is reasonable to suppose that the German works will not escape intact. Even after the close of the war, which may be long, it will probably require

a lengthy period before the smelters will be able to cope with the supply of concentrates or the demand for spelter. The conclusion appears to be that the company should erect its own smelting plant with the double object of increasing its profits and the removal of this business from Germany to England. The chief difficulty is the size of the works required and the corresponding amount of capital which would be necessary for their construction and operation. This problem is under careful consideration.

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De Beque Petroleum Field in Colorado

BY G. R. DE BEQUE*

The recent discovery of oil in paying quantity, at De Beque, Mesa County, Colo., opens up an oil field that gives promise of considerable importance. A general resumé of the geology and history of the oil development in that vicinity may be of interest. I am indebted to a report published by the U. S. G. S. in 1913 for much of the information contained herein but am likewise personally familiar with the region.

The district embraces about four townships in Garfield and Mesa Counties. The main line of the Denver & Rio Grande crosses the southern part of the field. The town of De Beque, on this railroad, is an important supply point for the territory to the north, east and south. The area is traversed, also, by the Grand River, one of the largest streams in Colorado, the town of De Beque being at the junction of Roan Creek with this river.

In recent geological time, the surface of this area extended from the plateau region on the north to Battlement Mesa on the south. Through this plateau the Grand River has cut a valley 3600 ft. deep. The rocks exposed and underlying the surface in the area are sandstone and shale of Tertiary and Cretaceous ages. The rocks close to the surface are assigned to the Green River and Wahsatch formations of Tertiary age, while the Mesaverde formation of Cretaceous age is not far below. The important oil strata are found in the Mesaverde formation. There are numerous anticlines, the principal one having an east-west course across the southern part of the field and a maximum throw of 35 ft.

Petroleum was first discovered in 1902, at a depth of 614 ft. in De Beque well No. 1. Excitement followed this discovery and ten wells were drilled in two years, the deepest attaining a depth of but 1000 ft. Difficulties with caving grounds and fresh-water sands made so much casing necessary that, by the time bores reached any great depths, they were generally so reduced in size that continuation of operations was impossible. Oil was developed in all but two of these wells and some of them would have proved profitable producers had they been pumped. A strong flow of natural gas was encountered in every bore but this gas has never been commercially utilized and has been flowing to waste for 12 years.

Prospecting for oil was discontinued in 1903 through lack of financial backing to carry on the work; but, in 1911, the work was resumed by local people and a well, started with a 14-in. bore at the surface, was drilled to a depth of 1365 ft. Here the casing collapsed from pressure of gas and water and it was found impossible either

to repair or to remove the injured casing. The gas flow from this well has been estimated at 250,000 cu.ft. per 24 hours.

A second well was drilled near the dome of the east-west anticline in the southern part of the field. The depth and thickness of the different oil sands encountered in this hole are:

At 785 ft.,	1.5 ft.
At 1130 ft.,	5 ft.
At 1435 ft.,	20 ft.
At 1550 ft.,	50 ft.
At 1807 ft.,	50 ft.
At 2010 ft.,	thickness as yet not determined.

The sand encountered at 1550 ft. was so compact that it did not permit a free flow of oil. An attempt was made to shoot the well but the charge exploded before reach-



NIGHT PICTURE OF THE WELL THAT WAS DRILLED AND COLLAPSED IN 1911

ing the bottom. This resulted in ruining a section of the casing, admitting a flow of fresh water that congealed the paraffin and stopped the flow completely. At a depth of 1807 ft., another sand gave a steady flow of high-grade oil but the drillers, desirous of making a big showing, drilled too far, penetrated this sand, entered a fresh-water sand directly beneath, and the flow of oil was thereby again stopped. After casing off the oil and water, drilling was resumed. At 2010 ft. the drill penetrated a hard capping and entered another oil sand. The immediate rush of oil and gas produced an explosion that

*Mining engineer, Denver, Colo.

was plainly heard in the town one mile away. Oil shot into the air to a height of 75 ft. and, igniting from the forge-fire near-by, consumed the entire rig. After quenching the flame, a new derrick was erected, the drill was run down 7 ft. into the oil sand and a pump was installed. The first pumping record showed a flow of 20 bbl. per day. The flow increased during the first week to 100 bbl. per day and the indications are that the well will soon be pumping a still larger quantity of oil alone.

This oil is golden brown in color, has a 32% paraffin base, is extremely viscous and solidifies quickly upon exposure to the air. Due to the possible recovery of numerous valuable byproducts in the refining process, this oil has a commercial value of \$1.50 to \$2.50 per barrel.

Further development of this oil field will be accompanied by the installation of a local refinery and the construction of a pipe line to the Rangely field that lies about 50 miles to the north.

Cottrell Plant for Converter Gases at Garfield, Utah

A commercial-size plant for the electrostatic treatment of converter gases by the Cottrell method has just been placed in operation at the Garfield Smelting Co.'s works at Garfield, Utah. The new Cottrell plant was described by Supt. W. H. Howard in a paper¹ before the American Institute of Mining Engineers.

The converter gases which are destined for Cottrell treatment for recovery of lead fumes, etc., pass through a long steel flue of 210-sq.ft. cross-sectional area and about 1000 ft. long, precipitating the cupreous materials from the smoke and cooling the gases for delivery to the electrical precipitator.

SEVEN-UNIT ELECTRICAL PRECIPITATOR

The electrical precipitator consists of seven units, containing 360 5-in. pipes 10 ft. long per unit, and a total of 2520 pipes for the whole installation; the other electrodes are No. 14 steel wires hung in the center of the pipes. Six units will ordinarily be operated while one is being cleaned. On the basis of seven operating, with an output of 250,000 cu.ft. of gas, a velocity of 12 ft. per sec. will be obtained; on the basis of 200,000 cu.ft. a velocity of 9.6 ft. per sec., and with six units on the same volume, 11.2 ft. per sec., all within the required velocity for the special treatment of converter smoke. Certain changes contemplated in converter hoods will further reduce the volume of gas delivered to the treator. Gases from the converter flue will be delivered to the lowest chambers of the treator through 36-in. pipes, there being three pipes per unit; each pipe has a deflector extending across to insure the best possible distribution. The gases on reaching the upper chambers pass through 36-in. pipes to the main flue leading to the chimney, there being three pipes per unit, again tending to the maintenance of an even flow through the electrodes.

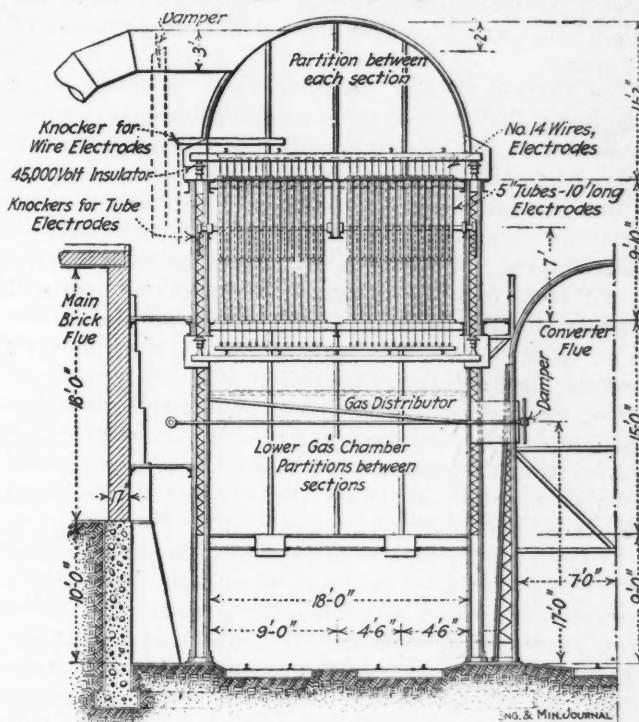
TRANSFORMER AND RECTIFIER HOUSE

With the apparatus used in an experimental converter-gas plant of 608 pipes, it was estimated that the maximum power required was 25 hp. In determining the size

¹Electrical Fume Precipitation at Garfield," "Bull." A. I. M. E., August, 1914.

of transformers necessary for the new installation, this figure was used as a basis. As the units consist of 360 pipes each, and as it may be necessary at times to connect two on the same transformer, it was decided that 20-kw. transformers would have liberal capacity for any condition that might arise. The power necessary for the treatment of 250,000 cu.ft. of gas per min. will probably amount to 100 hp. The electrical apparatus includes seven complete motor-generator-rectifier sets and transformers, and switchboard panels to control these.

A set consists of a 30-hp., 250-volt, direct-current motor, direct connected to a 20-kw., 4-pole, 60-cycle, 220-volt single-phase alternating-current generator. The 220-volt current is stepped up to 20,000 to 30,000 volts by means of a 20-kw. transformer, and then led back to the rectifier, which is on the same shaft with the motor-generator. Here it is rectified before going to the treator. The voltage before going to the transformer



CROSS-SECTION OF 360-TUBE COTTRELL UNIT AT GARFIELD

may be regulated to any desired value by varying the field excitation with a rheostat on the switchboard.

On the switchboard are located the necessary switches and instruments for the motor-generator sets. Each generator circuit is supplied with an automatic circuit-breaker switch which can be set to carry a short circuit for a definite length of time before opening. The new commercial-size plant has not been in commission long enough to justify any conclusions other than those already worked out in the experimental plants.

EARLY EXPERIMENTS AT GARFIELD

Besides describing the commercial plant, Mr. Howard discussed the general features of the precipitation problem at Garfield. Some of the experimental data are given below and the fractional-precipitation tests made on the lead gases at Murray will be of special interest to lead metallurgists.

When experiments were begun at Garfield to deter-

mine if the lead fumes in the copper converter gases could be recovered at reasonable expense, two methods suggested themselves: (1) Filtration through bags, (2) electrical precipitation of the condensed fume by a Cottrell plant.

Tests in filtering the converter gases through the ordinary woolen bag developed that the converter gases at Garfield did not contain in themselves sufficient neutralizing elements for the purposes of direct-bag filtration. While blowing on white metal only, the fabric was usually destroyed in from 10 to 14 hr.; when blowing on matte, the bag in one instance lasted 60.5 hr. Owing to the constantly changing quantities of SO_3 , it was considered impracticable to feed the necessary amount of neutralizer without great waste, and hence baghouse treatment of these gases was considered impracticable.

The Cottrell process was next considered. Under existing conditions at Garfield, it was not imperative to effect a complete elimination of SO_3 , and a method was sought that would recover the valuable constituents of the gases.

The Cottrell process described in its simplest terms consists in the conversion of a high-tension alternating current of 30,000 to 60,000 volts into a direct, intermittent current of the same potential, and the application of this current to certain electrodes suspended in a flue conveying the gases to be treated. The electrodes in their simplest form consist of narrow suspended plates spaced from 5 to 12 in. apart, depending on voltage; between adjacent plates, parallel and equidistant from them, is stretched a fine wire to every space, the wires forming the discharge electrodes and the plates the collecting electrodes. There is thus maintained through a silent or glow discharge an electrically-charged field through which the gases travel and all dust or condensed fume or moisture becoming electrified is deposited on the plates.

At Garfield, the volume of gas including entrained air at the converter hood produced from each Pierce-Smith converter, calculated at standard temperature and pressure, was found to approximate 25,000 cu.ft. per min., equivalent to over double that volume at flue temperature. An average of four to five converters is operated under normal plant conditions, and practically there are never over four blowing simultaneously, equivalent to a production of 200,000 cu.ft. of gas per minute at flue temperature for the whole department.

The ratio of SO_3 to SO_2 has been variable, depending on the character of the matte treated and on the period of the blow; the average of several determinations showed 1 to 18, but the ratio was as high as 1 to 8 at times.

The Cottrell precipitating plant used by the Balaklala Consolidated Copper Co. at Coram, Calif., was studied with a view to profiting from that experience. There the apparatus worked best with gases between 120° and 140° C. A temperature approaching but not less than 120° seemed most desirable, though in the light of later knowledge this was not deemed sufficiently low to condense all smoke-forming elements, which on being discharged into the atmosphere became visible as smoke. At the Coram plant, the collecting electrodes used were suspended sheet-iron plates, 6 in. wide by 10 ft. long, spaced 5 in. apart. The discharge electrodes consisted of two iron-wire strands in which were twisted pieces of asbestos fiber forming numerous points for the discharge of the high-tension direct-intermittent current of 28,000

to 30,000 volts. The recovery of solids from the smoke was usually from 80 to 90 per cent.

As the result of experimentation at Garfield by Messrs. Rathbun & Barker, a 50,000-cu.ft. converter-gas treater was erected, using pipe electrodes instead of plates as a collecting electrode, and substituting a single wire for the pubescent discharge electrodes used at Balaklala. This preliminary plant was equipped with 608 five-in. pipes, so that on the assumption of the treatment of 50,000 cu.ft. of gas per min., the average velocity through the pipes would be about 10 ft. per sec., or the gases would be under treatment for one second in a 10-ft. pipe. Gases from the blast furnaces, from McDougal roasters and from reverberator furnaces were tested in a smaller plant, and it was found that to obtain "perfect clearance," the velocity had to be reduced to about 3.5 ft. per sec. in the pipes. In special experiments with gases diluted with air, perfect clearances were obtained with a velocity of 7 ft. per sec. in the electrodes; this was equivalent to reducing the particles per unit of volume, and such a condition would be obtained by passing gases through a proper settling chamber preparatory to Cottrell treatment. It was found that mixed gases from the various furnaces could be treated with results equally as good as for the blast-furnace and roaster gases separately.

RESULTS OF GARFIELD EXPERIMENTS

The results of the tests at Garfield from December, 1912, to April, 1913, were:

(1) The establishment of the pipe electrodes, now generally being adopted in Cottrell installations.

(2) The replacement of the pubescent electrode by a single wire.

(3) Proof that from 95% to practically complete clearance of Garfield gases can be accomplished if temperatures be maintained under 100° C.

(4) That by the treatment of gases at different temperatures by feeders in series with the necessary drop in temperature between feeders, fractional precipitation may be possible. For example, collecting the bulk of the lead in one treater and then by the further cooling of gases collecting most of the arsenic, sulphuric acid, etc., in a second treater.

The method of fractional precipitation has since been experimentally tried on the roaster gases at the Murray plant of the American Smelting & Refining Co. Dust, acid and moisture carried by the gases produce a sticky, muddy deposit on the electrodes when tried in one treater, and the difficulty of removing this mud became a problem. Two small treaters were then placed in series. The temperature of the gases entering the first treater averaged 125° C., and in the second treater at 70° C. In the first as high as 95% of the total precipitate was collected in a comparatively dry condition. In the second treater, most of the remaining dust, acid and water, approximating 4%, was collected, sometimes sufficiently moist to drip from the pipe. It is too early to state that this problem has yet been completely solved, as the maintenance of proper temperatures is of critical importance to the work. While experimental results have warranted trying the process on a large scale at Garfield, there is as yet no definite assurance that the element of time may not develop difficulties not now apparent. The Garfield and Murray gases were considered particularly favorable to treatment by the Cottrell process.

Details of Practical Mining

Cutting Up a Boiler with Dynamite

BY ARTHUR O. CHRISTENSEN*

The accompanying illustrations show how a boiler, which had been sold for scrap iron, was broken up by means of dynamite. Being too heavy to move intact except at considerable expense, it was broken into three pieces and the dome taken off at an expenditure of about three hours' labor by two men and a box of $\frac{7}{8}$ -in., 50% dynamite. Another boiler broken up at this time by cutting the rivets, required the time of two men for the greater part of a week.

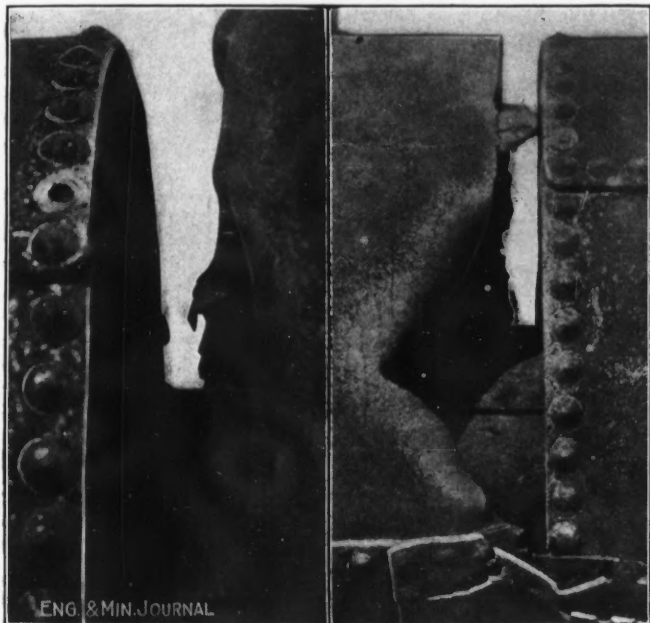


FIG. 1.

FIG. 2.

THE TWO CUTS MADE IN THE BOILER SHELL

The dynamite was removed from its wrapper and plastered snugly against the boiler close to the lap joint, a belt of sticks end to end being carried all the way around the boiler. The lower half of this belt was formed by stringing the sticks on a piece of wire like beads and holding them against the boiler by tightening the wire.

The cut shown in Fig. 1 was made thus; the iron was bent down where torn. Fig. 2 shows the other cut; in this case the dynamite was tamped by covering with clay. The boiler plate is shown cut off sharp. Evidently the force of the explosion was exerted more quickly or at least was more concentrated.

Both figures show the two inner tubes of the boiler still unbroken. They were cut in the same way that the shell was. The dome was similarly removed. Firing was done electrically and only two blasts were necessary for the job.

*Mining engineer, Franklin, N. J.

Canvas Pipe for Blowers

BY EDWARD P. SCALLON*

The underground mines of the Mesabi Range secure their air supply through systems of natural ventilation. Most of the mines are amply supplied by currents between the hoisting shafts and openings made for lowering timber into the workings, while others make connection into adjoining openpits or underground mines.

In some of the older mines, however, difficulty is experienced at times in distributing sufficient fresh air to working places situated on dead end drifts. This is especially true in drifting or slicing under the timber mat.

These conditions have been successfully overcome at the Lincoln mine, Virginia, Minn., by the installation of small portable blower fans on drifts or crosseuts carrying the main air currents at the nearest points to the areas to be ventilated. The air is carried from the fans to the working places by means of canvas pipe from 8 to 12 in. in diameter; this is either run along the floor of the drifts or hung from the timbers by means of wires attached to ordinary nail-keg hoops slipped over the pipe. This piping was purchased from George B. Carpenter & Co., Chicago, and is not expensive as compared to metallic tubing. It serves all the purposes for which it is intended and has a distinct advantage over rigid pipes in the rapidity with which it can be installed, especially where curves in the line are required. Galvanized iron nipples and elbows are used to make connections and branches. The pipe at the Lincoln has been in service for 18 months and is still in good condition. It has been found, however, that the life of the canvas can be prolonged by one or two treatments with linseed oil previous to its installation in the mine. In one of the neighboring mines the canvas treated in this way was completely ruined by rats and it was necessary to discontinue this practice. Damage results also from neglecting to remove the free end a sufficient distance from the breast before blasting.

The blowers are No. 4 Buffalo, belt-connected to Crocker-Wheeler motors, the set mounted on a base made of two 2x6-in. planks. An ordinary timber truck is used to move the set from place to place in the mine. The fans are run at a speed of 2640 r.p.m. and each unit is capable of ventilating two or three working places and when used as a booster in an air-way often gives the impetus necessary to properly ventilate a large area. In addition to the installations at the Lincoln there are several other blower fans on the Mesabi range, one mine at Chisholm receiving its full supply of air from a fan at the shaft collar.

Natural ventilation at the Lincoln is aided also by chimneys over up-cast shafts, and steam pipes within them, by doors and brattices underground and by doors over the down-cast shaft which open toward the four

*Mining captain, Lincoln mine, Virginia, Minn.

points of the compass, so as to take advantage of the momentum of the various winds in assisting the motive column underground.

Resuscitation

The Bureau of Mines in *Technical Paper 77*, gives the report of the committee on resuscitation from mine gases. The committee was composed of doctors. After reviewing the committee report, the Bureau engineers make the following recommendations in cases of gassing or shock:

In case of gassing, remove victim at once from gaseous atmosphere. Carry him quickly to fresh air and immediately give manual artificial respiration. Do not stop to loosen clothing. Every moment of delay is serious.

In case of electric shock, break electric current instantly. Free the patient from the current with a single quick motion, using any dry nonconductor, such as clothing, rope, or board, to move patient or wire. Beware of using any metal or moist material. Meantime have every effort made to shut off current.

valve, of which the latter communicates directly with the atmosphere.

No mechanical artificial resuscitating device should be used unless one operated by hand that has no suction effect on the lungs.

Use the Schaefer or prone pressure method of artificial respiration. Begin at once. A moment's delay is serious.

Continue the artificial respiration. If necessary, continue two hours or longer without interruption until natural breathing is restored. If natural breathing stops after being restored, use artificial respiration again.

Do not give the patient any liquid by mouth until he is fully conscious. Give him fresh air, but keep his body warm.

Send for the nearest doctor as soon as the accident is discovered.

Concrete Bulkhead under 200-lb. Head*

At the Hibernia magnetite mine in New Jersey, it was found desirable to separate the old workings from

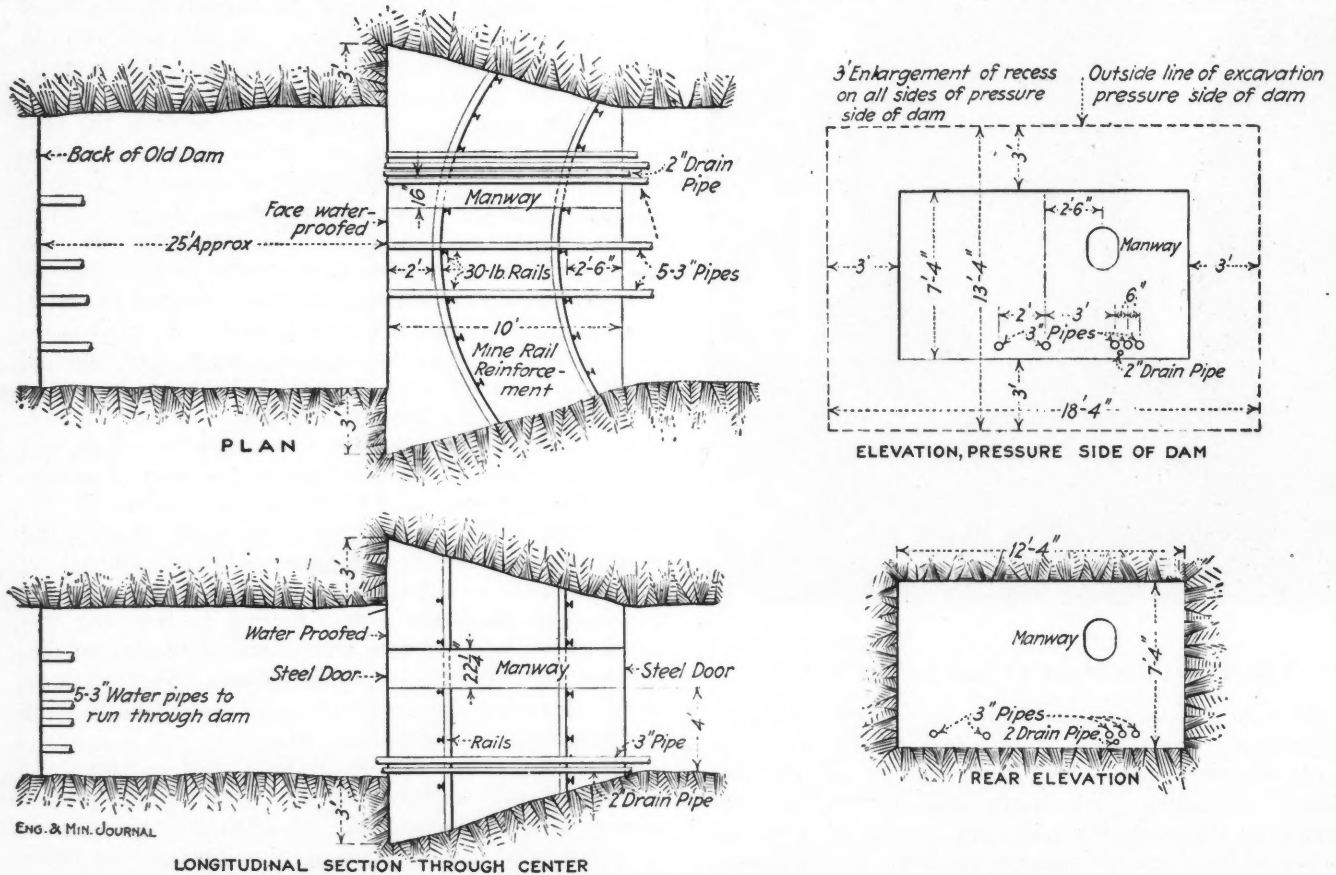


FIG. 1. PLAN AND LONGITUDINAL SECTION AND END ELEVATIONS

Attend instantly to the victim's breathing. If the victim is not breathing, he should be given manual artificial respiration at once. If the patient is breathing slowly and regularly, do not give artificial respiration but let nature restore breathing unaided.

In gas cases, give oxygen. If the patient has been gassed, give him pure oxygen, with manual artificial respiration.

The oxygen may be given through a breathing bag from a cylinder having a reducing valve, with connecting tubes and face mask, and with an inspiratory and an expiratory

the new and to allow the former to fill to the 850-ft. level. There was a temporary bulkhead on the 10th level and a rock bulkhead of indeterminate thickness on the 16th level. The water pressure on the 16th-level bulkhead would be 200 lb. per sq.in., with the old workings filled. It became necessary to design and install new bulkheads. For the 16th level, the truncated-wedge design of dam was adopted. The pressure side of the dam is of greater area than the back, so that the resultant

*Taken from an article by Sidney L. Wise and Walter Strache in the A. I. M. E. "Bulletin," August, 1914.

action is similar to driving the wedge. By cutting generous skewbacks in the walls, roof and floor, this becomes in reality an invisible arch. The wedge feature tends to compress the materials in the bulkhead, thereby adding to its imperviousness.

Concrete was chosen as the material. To lessen the labor and simplify form construction, straight forms were placed on both the front and back of the dam, making the arch invisible.

As ordinary concrete is not impervious under a head of 200 lb., it was decided to waterproof the concrete by facing the entire pressure side with a 3-in. layer of "Impervite," a waterproofing compound. This facing was carried up with the concrete to insure a perfect bond. A manway through the dam was provided to permit inspection or repairs.

The relative positions of the old and new bulkheads are shown in Fig. 1. The old bulkhead leaked to the extent of about 16 gal. per min. The five pipes through it permitted pumping to the surface the water from behind it. The new bulkhead was designed to continue this function of drainage if it were necessary, and hence prolongations of the pipes were carried through it.

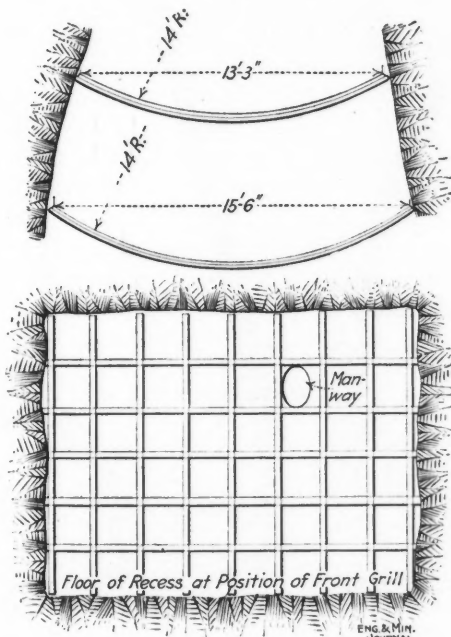


FIG. 2. THE STEEL RAIL REINFORCEMENT

The details of the steel reinforcement are shown in Fig. 2, the horizontal rails being curved to the radius of the invisible arch. Great care was taken thoroughly to coat all metal surfaces with mortar. The design of the manway is shown in detail in Fig. 3.

It was decided to use a 1 : 2 : 4 mixture. The cement was Atlas portland; a local sand, carrying less than 3% of foreign matter, was obtained; the broken stone was a gneiss, the result of former milling operations.

In drilling the recesses for the bulkhead, care was taken to point the holes so that the excavation would coincide with the design in form and dimensions. At a distance of 25 ft. from the old dam, holes 36 to 39 in. in length and spaced 1 ft. apart were drilled in the sides, roof and floor, at right angles to the course of the drift, using stopping and hand drills. Thirty-five feet from the old bulkhead, a series of holes 4 ft. in length and from

1 to 1½ ft. apart were placed slanting to conform approximately with the inclinations of the skewbacks. These holes were burdened with only about 1 ft. of ground. Under ordinary conditions, longer holes would have been drilled, but the proximity of operating pumps made extraordinary precautions necessary for their protection during the shooting. A group of six holes was shot at a time. A third series of holes was drilled slanting to conform with the deeper portions of the recesses. When blasted, this series broke evenly at the line of the 3-ft. hole first drilled, and the resultant recess conformed almost exactly to the figure determined upon, while the total excavation agreed with the original estimate of 60 yards.

The materials required were stored close to the shaft collar. Due to the lack of space on the level, the matter of delivering the materials without interrupting work was troublesome. Sand and stone were sacked on the surface. The empty bags produced as the cement was used augmented the 200 old cement bags purchased for the sacking. A small night crew lowered much of the material required for the next day's work.

The 10 curved rails were bent on the surface over a 14-ft. radius. The bulkhead forms were built of 2-in. undressed lumber, with 6- to 10-in. round posts for studing and braces. The forms were thoroughly braced and were wired to stiffen them. The interior faces of the forms were covered with tar paper, and the junction of the forms with the rock was plastered with a 1 : 1 cement mortar on all sides. The pressure-side forms were carried to the roof of the level at once, but did not extend into the recess.

The recess was thoroughly cleaned of loose rock and washed down, and all the reinforcing material, the pipes and the manway were placed in position before the concreting was started. The floor and sides of the recess

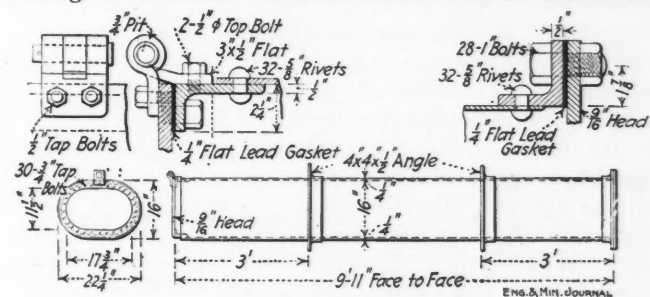


FIG. 3. MANWAY TUBE THROUGH THE CONCRETE

were plastered with a 1 : 1 cement mortar before placing the concrete.

A batch of concrete contained 2/3 cu. yd. The sand was first placed on the mixing platform and the heaps flattened down. On this was emptied the cement, and these two materials were thoroughly mixed and flattened out before receiving the stone. This mixing took place about 12 ft. from the front form of the bulkhead. Enough water was used to make a wet mixture. Two men did the first mixing and turned the mass, then passed it on to the next two, who again turned it, passing the finished concrete to the last two men at the mixing board. These men shoveled directly into the form. In this manner, while each two men received a short rest of a few minutes between batches, fresh material was being placed on the starting end of the mixing platform while the men nearest the form were still disposing of the concrete

mixture. This also insured a thorough mixing. One man remained in the form to level off each batch. The best day's work consisted of placing 12 yd. of concrete.

The waterproofing compound was carried up as a 3-in. facing, level with the concrete. An even thickness of the waterproof layer was maintained by the use of three forms of $\frac{3}{64}$ -in. plate, 6 ft. long by 6 in. wide, fitted at the upper corner with 3-in. spreading bolts. These forms, placed across the entire width of the face, were raised 3 to 4 in. at a time, and enough concrete was then shoveled against them to keep them in place. The almost semi-liquid waterproofing compound was mixed on the level and was carried to the forms in buckets.

Before leaving at night, sharp stones of about 100 lb. weight were set at least 6 in. apart in the concrete mass. This made a strong bond, and before concreting the next day, this rough surface was freshly plastered with a thin 1:1 mortar. As the roof was reached, false forms were placed, and the work was finally finished in tightly bonded dovetailed blocks. Throughout the work, the leakage from the old dam passed through the 2-in. drain pipe of the bulkhead.

Seven 2-in. grout pipes, four on the pressure side and three on the opposite side, were placed in the concrete as the work neared completion. They were all placed near the roof and directed to the places most difficult to fill with concrete. As the work had to be hurried, but a day and a half elapsed after completion of the cement work before grouting was begun. The grout consisted of one and one-half parts of sand to one part of cement made fluid with water-dissolved "Impervite." A mine-made grout gun was used and the grout was forced successively into the several pipes by means of air under the pressure of 85 lb. per sq.in. When the grout was forced through the different pipes, its ejection through the other pipes indicated that the greater voids were filled. As the gun connections were changed, those pipes giving the greatest discharge were plugged, and the discharge was finally limited to one pipe. This, too, was filled and plugged. The first day's grouting was allowed

to set over night, and the following day all the pipes were again tested. This time there was no communication between the pipes, and as little or no grout could be forced into any one of the pipes, the grouting was considered most satisfactory.

For three weeks the new bulkhead did not receive any load. During this time the 2-in. drain pipe was left open. The bulkhead was tested by pumping water up to the pressure of 160 lb. into the space between the old and the new bulkheads through the 2-in. drain pipe. The results were entirely satisfactory; the total seepage amounted to only $\frac{1}{2}$ gal. per min. at first, and this small leakage subsequently stopped almost completely.

A cheap class of labor was employed exclusively, the men receiving \$2 per 10-hr. shift. Following is a table

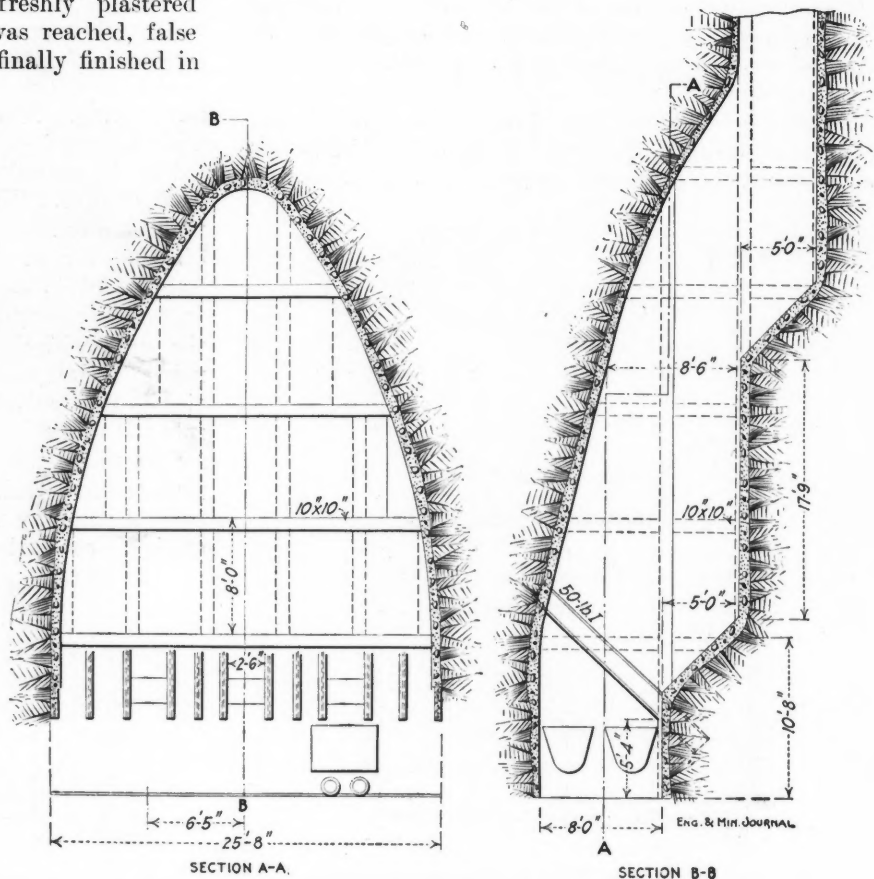
showing the cost of the work. The interference caused by the necessity of keeping two large pumps in operation within 50 ft. of the bulkhead was perhaps the greatest cause for the apparent high cost. The labor cost of lowering materials was also high.

SUMMARY OF COSTS

	Total	Per Cu. Yd
Labor	\$790.00	\$13.17
Superintendence	130.00	2.17
Transportation	50.46	0.84
Materials	503.88	8.38
Totals	\$1474.34	\$24.56

Concrete Storage Chutes in Stopes*

It has been found economical at the Copper Queen for certain kinds of ore, to put in concrete pockets and cyl-



VERTICAL SECTIONS OF A CONCRETE-LINED POCKET IN A COPPER QUEEN STOPE

indrical raises to be used as storage chutes, since the upkeep cost is practically nothing, whereas with timber chutes this is high.

The drawing shows a concrete pocket built particularly to handle sticky ores from the Dividend sliee. It has the shape of a funnel, with the large end downward. About 30 ft. above the sill, in the top of this funnel a 45° offset or baffle was put in, and from this point the raise was continued to a level 200 ft. above the sill. This raise is circular and lined with concrete, and, while it has not yet been proved that this type of pocket will be successful, it is confidently believed that it will materially lower the cost of handling the ore.

*From A. I. M. E. "Bulletin." August, 1914.

Details of Milling and Smelting

A Simple Solution Meter

Operation of the counter-current decantation process at the Tom Reed mill, Oatman, Ariz., necessitated some method of accurately measuring, and regulating, the amount of solution drawn off for precipitation. The problem was solved by S. S. Jones, superintendent in charge of the property, by arranging a 6x6-ft. tank into which all solution precipitated is collected. The tank has two discharge nozzles, one 1 in. diameter and one

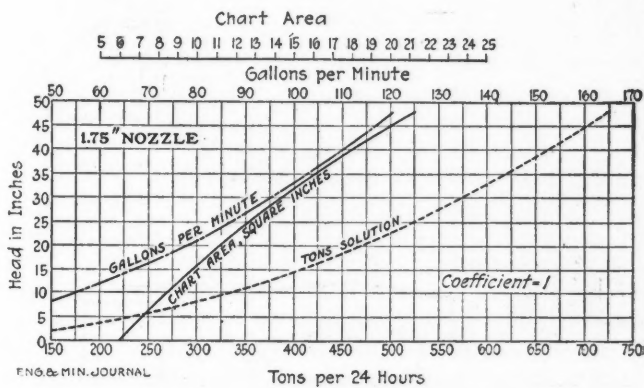
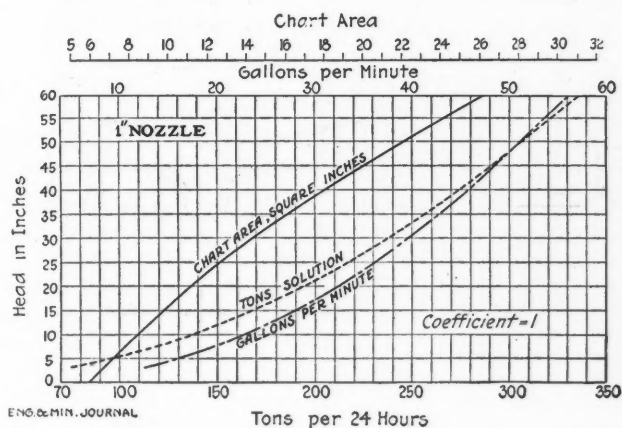


CHART OF SOLUTION FLOW THROUGH DIFFERENT NOZZLES

1 3/4 in. in diameter. They have taper of 12 1/2% from the axis of the nozzle, with a coefficient of discharge practically equal to unity. The flow has been calibrated by measurement over stated periods of time, finding that the ratio of actual to theoretical discharge varies from 99.8 to 100, and 100.03 to 100. A Bristol water-level gage allows the head to be averaged for any period.

Solution measurement is based on the equation in which the discharge in cubic feet per second equals

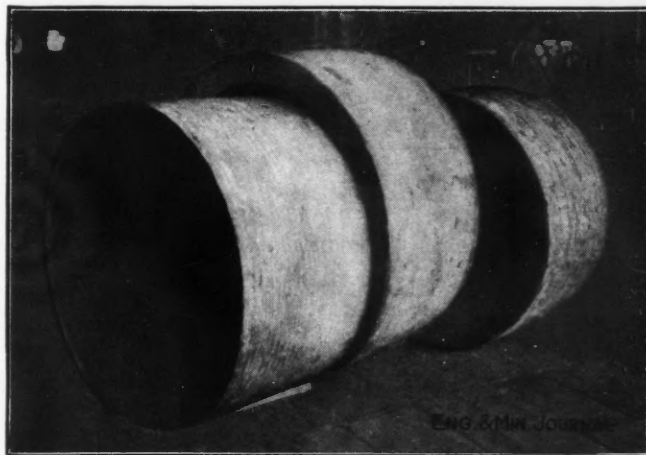
$$AC\sqrt{2gh}$$

where *C* is the coefficient of discharge, *A* the area of nozzle in cubic feet, *g* the acceleration due to gravity, and *h* the head of solution in the tank in feet. Charts were

plotted from this equation for each nozzle, and are shown in the accompanying illustration. The arrangement is entirely satisfactory. There is but one moving part, the dial of the gage. The whole system was worked out, and designed at the Tom Reed plant, with the single exception of the water-level gage.

Roll Shells

The accompanying photograph shows how thoroughly modern roll shells are worn down before they are discarded. The picture is of some 54x24-in. shells used by



54x24-IN. ROLL SHELL

the Anaconda Copper Mining Co. When put on the rolls they are 5 in. thick, as shown by the shell in the center; when discarded they are only 3/4 in. thick.

Electro-Deposition of Lead from Lactate and Formate Solutions*

The attempt to get smooth coherent deposits of lead from lead lactate and lead formate solutions has been made by Frank C. Mathers and Barrett W. Cockrum. The addition of glue and free acid did not give good results, such as are obtained with hydro-fluosilicic and perchloric electrolytes. The conclusions of the authors are:

The baths that give the best deposits contain 4% of lead as lactate or 2% as formate, 1 to 5% of lactic or formic acid, 4% of ammonium perchlorate, and 0.25% of Barbados aloes. The mixture was warmed and then filtered in order to remove the insoluble gum in the aloes.

Other addition agents than Barbados aloes were tried, but of these peptone was the only one of marked value. A current density of 3.6 amp. per sq.ft. was found to be best. With higher current densities, the deposit became

*An abstract of a paper presented at the Niagara Falls meeting of the American Electrochemical Society, Oct. 1-3, 1914.

rougher. Thick deposits were obtained without difficulty. The specific gravity of this electro-deposited lead was 11.25 and 11.28 for lactate and formate baths, respectively. Sodium naphthalene sulphonate can be used instead of ammonium chlorate. Other salts of strong acids did not give as good results as the perchlorate.

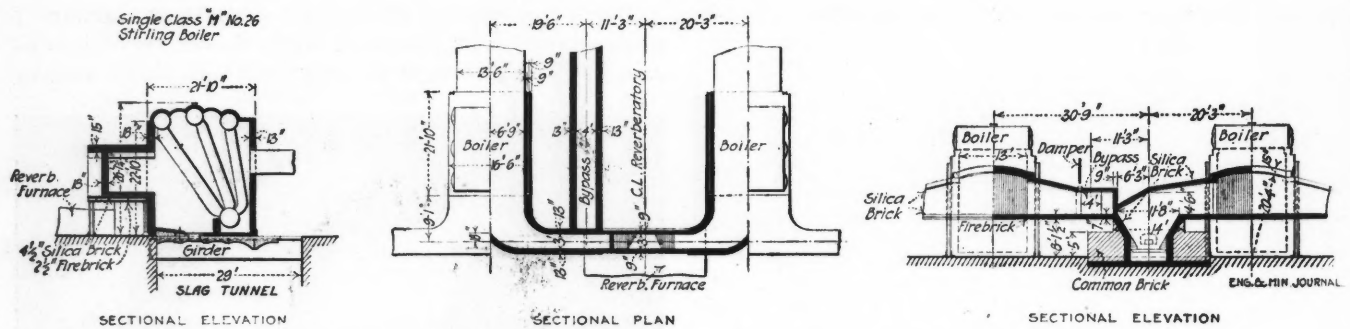
Arrangement of Reverberatory Waste-Heat Boilers

BY PERCY E. BARBOUR*

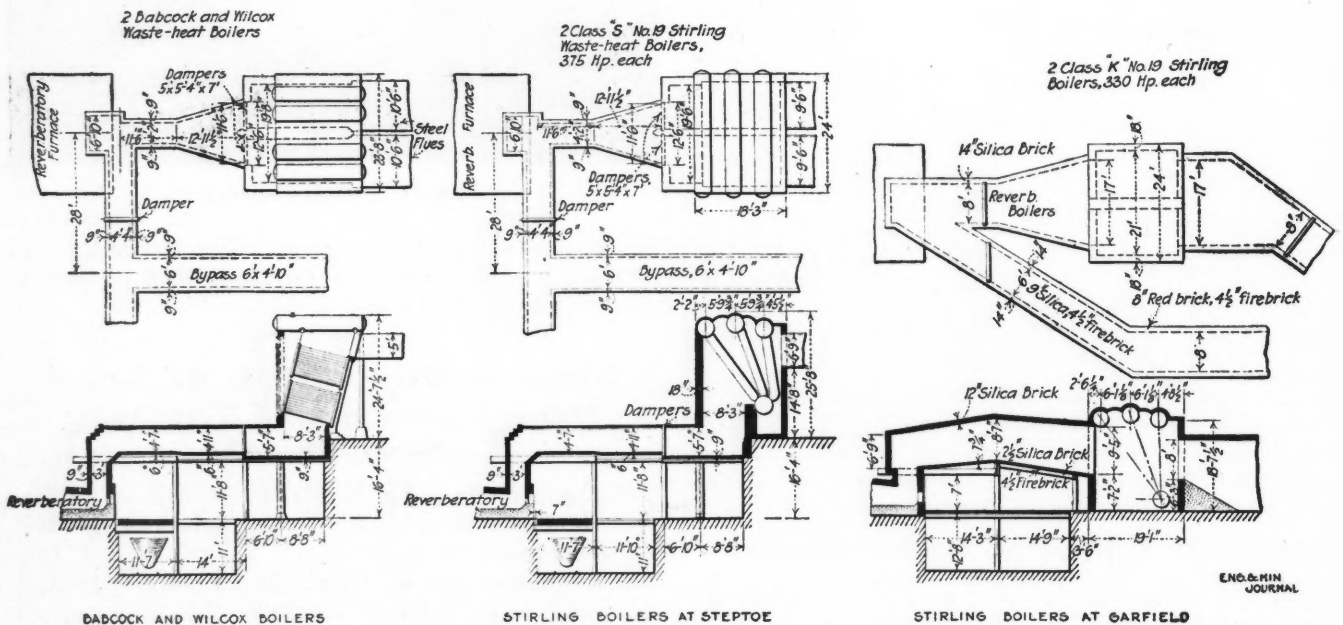
When waste-heat boilers were first applied to utilize hot furnace gases, it was general custom to use two boilers in tandem. It was soon discovered that the second

three important plants, the International Smelting Co., at Tooele, Utah, the Steptoe Valley Smelting & Mining Co., at McGill, Nev., and the Garfield Smelting Co., at Garfield, Utah. Stirling boilers are used more than any other type for reasons hard to explain, probably. The Steptoe plant has some Babcock & Wilcox boilers, the installation of which is shown, as well as the Steptoe layout for its Stirling installation of two Class S, No. 19 boilers. The installation of the single Class M, No. 26 Stirling at the Tooele plant, and the layout of two Class K, No. 19 Stirlings at the Garfield plant, are interesting.

Although local conditions often control features of design, it may be noted, without being critical, that Steptoe is the only plant, of the three mentioned, to in-



ARRANGEMENT OF STIRLING WASTE-HEAT BOILERS AT THE INTERNATIONAL WORKS, TOOELE, UTAH



ARRANGEMENT OF WASTE-HEAT BOILERS AT VARIOUS SMELTING WORKS

boiler was little more than an economizer and was an expensive unit as such and therefore two boilers in parallel were tried instead of the tandem arrangement. This is universal practice now where more than one boiler is used.

The flue arrangements from reverberatory furnaces to boilers vary according to local conditions and the personal equation of the designing engineer. In the accompanying illustrations are shown the installations at

roduce the incandescent gases at a point corresponding to the firebox of an ordinary installation. This is a necessity with the Babcock & Wilcox boiler, but is it not also an advantage with the Stirling?

Provision for bypassing the gases is necessary, and while the periods of bypassing, and thus wasting them, are comparatively of short duration and at more or less rare intervals, right-angle turns in the flues necessarily reduce the draft more than the easy angles of the Garfield arrangement.

*Mining engineer, 887 Middle St., Bath, Me.

The Cost of Doing Things

Study of Hoisting Costs in a Small Mine

By H. S. KNOWLTON*

The investigation of hoisting costs described in some detail in the following paragraphs, is interesting as showing the method of attacking the problem. At the mine, where the investigation was made, a railroad spur runs to the property and the ore is trammed about 200 ft. from the shaft before being dumped into the cars. The mine was operated by both steam and electricity at the time of the test, the compressor being driven by a motor and the hoisting and ore-drying done by steam.

The steam plant has been long in service and was somewhat the worse for wear. The rear grate of the boiler was in poor condition, necessitating carrying the main part of the fire on the front grate. The engine was in fair condition, although steam leaks at its joints were noted. Its movement was reasonably smooth and balanced, but due to the fact that a trip up the shaft was made about every seven minutes, the cylinder cooled off between trips and condensed a large quantity of steam. When the engine was started, this condensed water tended to force out between the joints, since the drains were closed, and this kept the engine constantly in a leaky condition. It was not known how evenly the work of the engine was divided between the head and crank ends of the piston, as no cards could be taken. The engine was never bored for indicating, and when an attempt was made to obtain a card by means of the drain cocks, so much condensation water was encountered that no results were obtained.

The mine runs two shifts of eight hours each, and operates on a seven-day basis. The first day-shift cage goes down at 7 a.m.; at the noon hour, the first cage comes up at 11:50 a.m., and the first cage goes down again at 12:30 p.m.; at the end of the shift, the first cage comes up at 3:50 p.m. The first night-shift cage goes down at 4:30 p.m.; for the lunch hour the first cage comes up at 8:50 p.m. and the first cage goes down again at 9:30 p.m.; at the end of the shift, the first cage comes up at 12:50 a.m. The engineer fires up his boiler at about 6:30 a.m., and maintains full steam until 1 a.m., when the fire is banked until the next morning. The boiler is an 80-hp. Fairbanks-Morse outfit, fired to a steam pressure of about 90 lb. The water is heated to 120° F. before admittance to the boiler. The hoist is a Davis machine of the slide-valve, simple, noncondensing type, with 10x12-in. cylinders run at 250 r.p.m., and exhausting into the air. The drum is 4 ft. in diameter, friction driven. The shaft is 620 ft. deep, and the time of a hoisting trip is about 60 sec. In addition to the steam required by the hoist, some is used in ore drying, the lead being of 1-in. pipe, 100 ft. long, run in the open and covered with 3/8 in. of canvas; the estimated steam consumption of the drier is 10% of the total generated.

The coal used comes from Crested Butte, showing on test a heating value of 13,728 B.t.u., is dry and contains only 4% of ash. Its cost, delivered at the mine on a spur track, is \$4.50 per ton, and as the spur is 300 ft. from the bins and 30 ft. lower than the latter, the estimated cost delivered at the bins is \$5 per ton.

The mine has six levels, of which only the fourth and sixth are worked at present. Ore was being taken only from the fourth at the time of the test, and waste from the sixth, where drifting and sinking were being carried on. The depth from the collar to the fourth level is 468 ft., and to the sixth, 620 ft. The distance from the collar to the sheave wheel is 30 ft. The test was run on two days. On the first day a test of only 10 hr. was

CONDENSED TABLE OF RESULTS

From Fourth Level to Top, 468 Ft.

	No. of Trips	Seconds of Hoisting	Rope Speed, Ft. per Min.	Net Weight, Lb.	Gross Weight, Lb.	Ton-Ft.	Average Hp. Rate
Handling Ore							
1st period....	31	1513		57,084	122,184	28,591	91.0
2nd period....	36	1846		69,903	145,503	34,048	88.9
3rd period....	33	1661		58,990	128,190	29,996	87.0
Total.....	100	5020		185,977	395,877	92,635	
Average....		50.2	560	1,860	3,959	926,355	88.9
Handling Men and Empty Cage							
1st period....	14	700		6,773	27,031	6,325	43.6
2nd period....	15	808		8,960	30,665	7,176	42.8
3rd period....	14	693		4,760	25,018	5,854	40.7
Total.....	43	2201		20,493	82,714	19,355	
Average....		51.2	548	476	1,925	451	42.4
All Trips							
Total.....	143	7221		206,470	478,591	111,990	
Average....		50.6	555	1,445	3,350	783	75.0

From Sixth Level to Top, 620 Ft.

Handling Waste							
1st period....	19	1103		25,715	67,344	20,877	91.2
2nd period....	15	899		20,361	53,226	16,500	88.4
3rd period....	21	1265		28,746	74,757	23,175	88.1
Total.....	55	3267		74,822	195,327	60,552	
Average....		59.4	626	1,362	3,550	1,100	89.3
Handling Men and Empty Cage							
1st period....	10	637		2,496	17,676	5,541	42.0
2nd period....	5	306		340	8,030	2,489	39.1
3rd period....	3	197		1,530	6,144	1,905	46.6
Total.....	18	1140		4,366	31,850	9,935	
Average....		63.4	587	242	1,725	535	42.0
All Trips							
Total.....	73	4407		79,188	227,377	70,487	
Average....		60.4	516	1,085	3,118	966	77.1

Total Work Done

	No. of Trips	Seconds of Hoisting	Distance per Trip	Gross Weight, Lb.	Ton-Ft.	Average Hp. Rate
Ore.....	100	5,020	468	395,877	92,635	88.9
Waste.....	55	3,267	620	195,327	60,552	89.3
Men and empty.....	43	2,201	468	82,714	19,355	42.4
Men and empty.....	18	1,140	620	32,050	9,935	42.0
Total and average....	216	11,628		705,968	182,477	75.0

obtained on account of an accident to the hoist. On the second trial a full day's test was run, all data being taken from the time the first cage went down the shaft in the morning until the last cage came up on the mid-night shift. The test included the two shifts when work was under way, i.e., from 7 a.m. until 1 a.m. No data were obtained during the remaining six hours, the boiler being banked and no ore hoisted.

An observer with a stop-watch was stationed in the engine room; he noted the exact time required for each hoisting trip, the time of day at which the cage was set on its chair, and the level from which the cage was hoisted. Another man at the top of the shaft obtained the exact

*133 Lexington Ave., Cambridge, Mass.

time at which each trip ended, noted the material lifted and the cubic contents of each car. Other men were employed to weigh as many cars of ore as possible, and so obtain for each class of ore raised the average weight of ore per cubic foot. Enough cars of each grade were weighed to give a fair average, the differences lying mainly in the moisture content. But two grades of ore were lifted, one marked "1-hole" and one "2-hole;" the ore contained a large amount of iron sulphide. A good deal of waste was hoisted from the sixth level. The average weight of 1-hole ore was 160 lb.; of 2-hole ore, 145.5 lb.; and of waste, 105 lb. per cu.ft. In the boiler room a man weighed all the coal, read the boiler pressure and the feed-water temperature every 15 min., and noted the amount of water fed into the boiler. At the end of the test, the weight of ash from the coal was obtained.

In the tabulation of data summarized below, the gross weight is made up of one-half the weight of the rope corresponding to the length of the hoisting trip, plus the full weight of the rope from the landing point to the sheave pulley, plus the weight of the car and cage. These weights were as follows: Cage, 1130 lb.; car, 653 lb.; half weight of $\frac{7}{8}$ -in. rope, fourth level to top landing, 281 lb.; weight of rope, top landing to sheave, 36 lb.; half weight of rope, sixth level to top landing, 372 lb. The weight of the cage was obtained by actually weighing it free from any support due to bearing on the guide rods or to the cable. The weight of the car was the average of all empty cars weighed while weighing the ore and the weight of a man in mining clothes was assumed as 170 lb.

The average rate of work was 944 ton-ft. per min. The total time consumed in hoisting was 193.8 min., or 2.23 hr. The average horsepower rate was 75, hence a total of 242 hp.-hr. of work was performed. Knowing the quantity of coal used, the consumption per horsepower-hour is 10.3 pounds.

In these calculations, one horsepower is assumed as equivalent to 415 ft.-lb. per sec. This allows 24.6% for mechanical friction and other losses and is sufficiently close for approximation. The average time consumed in lowering the cage to the fourth level was 46.3 sec. and to the sixth level, 67.2 seconds.

The steam-plant test showed that in the two runs, the coal consumption was 2482 lb., or 4.6 lb. per sq.ft. of grate surface per hour. The boiler evaporated 7.36 lb. water per pound of coal, and the ash was 6%. The data secured indicated that about 1700 lb. of coal is required for an ordinary day's run of the plant. A monthly fuel consumption average of 26 tons was indicated. The monthly cost of coal for hoisting operation was figured at \$177, not including the 10% for the drier. A fixed charge of \$15 per month is paid for water, regardless of the amount used.

During the first test, 61,334 foot-tons of work was performed with a coal consumption of 902 lb. Deducting 10% for the drier, 85 foot-tons was performed per pound of coal as fired. In the second test during the first shift a total of 60,213 foot-tons of work was performed with a net coal consumption of 630 lb., giving 69.1 foot-tons per pound of coal. The total work per shift was practically the same for each of the three shifts of the test. The average amount of useful work performed by the hoist per day was estimated at 122,000 foot-tons. The actual working time of the hoist was found to be 126.25 min.

per day, giving an average rate of work of 58.6 hp., or an output of 123.29 hp.-hr. useful work per day. Tests upon a hoist of the electric type similar to the equipment at the mine showed 68% overall efficiency, controller to cage, so that it was calculated that the service at the mine under test could be handled by a supply of 181.5 hp.-hr. per day, equivalent to 4115 kw.-hr. per month.

At present the steam hoist operates at a rope speed, varying from 500 to 600 ft. per min. As but about 75 trips are made per shift, this speed could easily be cut down. The time for lowering the cage is 46.3 sec. to the fourth level, and 67.2 sec. to the sixth level and about three-quarters of the load is hoisted from the fourth level. Thus one minute is ample time for lowering the cage. Allowing one minute at the top and bottom, respectively, for changing cars, it appears that a total of 225 min. out of a possible 480 are required for lowering the cage and changing the cars. This leaves 255 min. for hoisting proper. With a rope speed of 300 ft., about two minutes would be necessary for the average lift, taking in all from 150 to 200 min. per shift. Thus it is seen that 300 ft. is a sufficiently high rope speed. The maximum demand will be calculated on both a 500- and 300-ft. per min. rope speed.

The maximum load weighed 4180 lb. gross. With a rope speed of 500 ft. per min., this would require $\frac{4200 \times 500}{33,000}$, or 63.6 hp. of useful work. Applying the efficiency of 68% for this class of hoist, we find the maximum demand to be 93.6 hp. With a rope speed of 300 ft. per min., there would be required $\frac{4200 \times 300}{33,000}$, or 35.15 hp. useful, or 51.7 hp. actual.

Applying a rate of 5c. per kw.-hr. for the first 20 kw.-hr. per horsepower demand, plus $2\frac{1}{4}$ c. per kw.-hr. for the balance, with a maximum guarantee of \$1 per month for each horsepower of the maximum demand, the following obtains:

For the 500-ft. rope speed, with a maximum demand of 96.3 hp.:

$93.6 \times 20 \times \$0.05$	\$93.60
$(4115 \text{ kw.-hr.} - 1872 \text{ kw.-hr.}) \times \0.0225	50.47
Total	\$144.07

Load factor, 8.3%.

For the 300-ft. rope speed, with a maximum demand of 52 hp.:

$20 \times 52 \times \$0.05$	\$52.00
$(4115 - 1040) \times \$0.225$	69.19
Total	\$121.19

Load factor, 14.75%.

Inasmuch as there is ample time during the shift to make over 90 trips at the rope speed of 300 ft. per min., while only 75 trips are necessary, it is undoubtedly the best plan to install an electric hoist operating at a rope speed of 300 ft. per minute.

The cost of steam operation per month worked out at \$117; the cost of electrical operation at 300-ft. rope speed, \$121; the cost of electrical operation at 500-ft. rope speed, \$144. The cost of the steam operation does not include the repairs to the boiler, etc., upon which no data could be obtained.

A comparison of costs shows that it is advisable to install an electrical hoist with a rope speed of 300 ft. per min. While the costs of operation with steam or electricity are about the same, the convenience and simplicity of the motor operation give a decided advantage in favor of the electrical installation.

The Ajo Copper District, Ariz.

SYNOPSIS—Geographical position, history, geology and development of the New Cornelia copper property in southern Arizona, controlled by the Calumet & Arizona. No overburden; upper carbonate zone with sharp change to chalcopyrite and bornite zone. Grade uniform, about 1½% monzonite intrusion in rhyolite. By drilling, test-pitting and drifting about 40,000,000 tons developed. Lower part will be handled with steam shovel. Problems of treatment, railroad connections and water supply in a fair way to be settled.

The Ajo copper mining district lies in southwestern Arizona, about 30 miles north of the Mexican line, 125 miles west of Tucson and 43 miles south of Gila Bend, the nearest railroad point. The Little Ajo Mountains rise a few hundred feet above wide desert valleys, and the camp itself lies in a small basin on the east side of the range, separated from the open desert by low hills. Its elevation above sea level is about 1900 ft. In the center of the basin the brilliantly stained rocks of Copper Mountain rise 150 ft. above the village. The scanty supply of water is obtained from wells in the desert and from prospect pits in the camp. The nearest abundant source of water is the Gila River, 50 miles north.

HISTORY OF THE DISTRICT

Next to Santa Rita, N. M., the Ajo district is said to be the first southwestern copper district worked by Americans, high-grade material having been hauled out in the early '60s. A good many stock companies at one time or another have been organized on the strength of the surface showings. In the fall of 1911, the Calumet & Arizona took an option on all available stock of the New Cornelia Copper Co., one of the reorganized companies that had attempted to work the district. The C. & A. started prospecting by diamond drilling, following this with test pitting, and with drifting in the sulphide zone. The work resulted in the outlining under the iron- and copper-stained outcrop of a low-grade copper orebody covering an area of about 55 acres, and reaching a known maximum depth of over 600 ft. below the surface. Following this development, James Phillips, Utley Wedge and others, under the name of the Ajo Copper Co., took an option on the property of the Rendall Ore Reduction Co., and the U. S. Smelting, Refining & Mining Co. took an option on the Childs group of claims between the New Cornelia and the Rendall properties. The United States company gave up its option after sinking a few churn-drill holes; the Phillips interests, however, still hold their property, but without doing any development work.

GEOLOGY

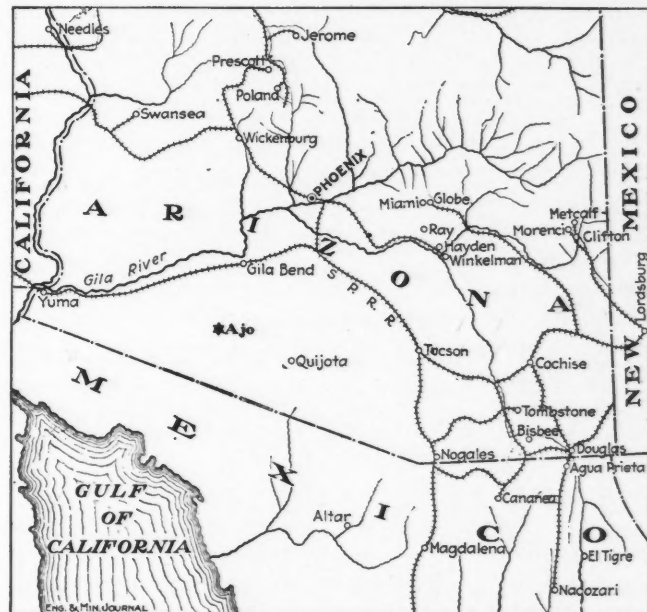
Except for a conglomerate, the regional rocks are igneous. The earliest formation exposed consists of rhyolite, breccia and tuff. An intrusion of monzonite porphyry cuts and uplifts the rhyolite. This porphyry, in the character of its minerals and its crystallization, varies a good deal locally. Following the monzonite are dikes of diorite or diabase, probably allied with the

Tertiary flows, which cover much of the surrounding desert region. The more recent conglomerate is a coarse aggregate of rhyolite and monzonite fragments, which may be earlier or later than the Tertiary flows just mentioned. It is evidently the result of rapid erosion of the mineralized rhyolite and monzonite of Copper Mountain.

The only great alteration of the rock other than that accompanying the mineralization is found along the rhyolite-monzonite contact, where fine-grained monzonite and recrystallized rhyolite are difficult to distinguish.

STRUCTURE

The monzonite laccolith or batholith uplifted the rhyolite bed into a dome which was eroded in fairly recent times. The intrusion is eight to 10 miles long and one to four miles wide with its long axis extending N 20° W. The northern part forms high hills north of the basin; the southern end forms Copper Mountain. The copper orebody is found at the southern end of the in-



KEY MAP, SHOWING SITUATION OF AJO CAMP AND RAILROAD FACILITIES

trusion, where the monzonite plunges beneath the rhyolite. On the top of Copper Mountain, small remnants of the rhyolite lie flat; on the west the rhyolite dips to the southwest and on the east to the southeast at about 20°. The southerly pitch of the rhyolite beds is fairly steep; all contacts are irregular. There are many inclusions of rhyolite within the monzonite and irregular intrusions of monzonite break up through the rhyolite, especially to the east of Copper Mountain. The diorite and diabase dikes cutting both monzonite and rhyolite seem to have little effect on structure or mineralization.

Both the monzonite and the rhyolite near it are thoroughly shattered by fracturing in all directions. Although some fractures are accompanied by considerable gouge and may be faults of importance, most of them can be traced only a short distance and are probably contraction fissures. While in any one portion of the porphyry there is generally a well marked direction of strongest

Condensed from a paper prepared for the Salt Lake meeting of the A. I. M. E. by Ira A. Joralemon, geologist of the Calumet & Arizona Mining Co., Bisbee, Ariz.

fracturing, in the mass as a whole no such generalization can be made. The somewhat idealized east-west sections show the most important points in the geologic structure.

THE DISSEMINATED OREBODY

The mineralization has formed a low-grade disseminated copper deposit, together with higher-grade veins in the monzonite and narrow rich veins in the adjoining rhyolite. The disseminated orebody is roughly pear-shaped in outline, with its neck toward the south; its outline agrees almost exactly with that of Copper Mountain and the silicified iron-stained hills to the north of the mountain. While the area of the orebody is about 55 acres, its depth varies from less than 50 ft. below the surface on the outskirts to an unknown depth of more than 600 ft. in the center. In vertical section the deposit would resemble a mushroom.

The disseminated sulphide is chalcopyrite and bornite. Within the limits of the orebody the monzonite is shattered by a network of fractures; of these the larger often run about N 20° W parallel with the axis of the intrusion, but others have all possible directions. Along many of these there exist quartz veins running from ¼ in. to 1 ft. in width, and between the veins much silicification has taken place. The sulphides were introduced with the quartz in seams or films along the fractures and in small flakes disseminated in the porphyry. In general, a mixture of vein and disseminated material is required to bring the ore up to grade. In the main part of the orebody, pyrite is present in small quantities only. Chalcocite is rarely found except in thin films just below the water level. A small and variable amount of magnetite disseminated through the ore is apparently earlier than the copper minerals and may be an original rock constituent.

Along some of the larger fractures sulphide seams widen to an inch or more, and several of these close together will form a band of ore 10 to over 100 ft. wide, running from 3 to 5% in copper. In general, the grade of ore is subject to abrupt changes, the richer portions being found in the more thoroughly fractured part of the monzonite. The bands of rich and lean material follow in general the fracturing in the vicinity. The rich bands are so narrow and irregular as to prohibit economical sorting, and the whole mass has to be considered as low-grade ore.

SULPHIDE PRIMARY

It seems clear that the sulphide ore is primary and not the result of enrichment by descending solutions. Variations in grades are due to differences in the intensity of the original mineralization, a fundamental distinction between this orebody and most of the other disseminated copper deposits that are being mined.

BOUNDARIES

The boundaries of the orebody are commercial. Toward the southwest it extends to the rhyolite contact, and in some places the rhyolite is mineralized sufficiently to form commercial ore, but it is generally under 1% and not commercial. To the east the change from ore to lean material is not so much the result of a decrease in mineralization as it is of a change from copper sulphide to pyrite, together with a decrease in the amount of silicification and an increasing prevalence of the dioritic type

of monzonite. To the west and northwest, the change from ore to lean material is caused by a decrease in mineralization all around. Where the bottom has been found, the ore gives place to less fractured and less silicified monzonite containing little copper sulphide. Occasionally, a sudden change to a more acid and a more basic variation of porphyry is accompanied by a drop from ore to lean material. The association of ore with coarse-grained monzonite is noticeable, but it seems probable that these are coördinate results rather than cause and effect and depend on conditions existing at the top of the intrusion.

SURFACE ALTERATIONS

The result of alteration by surface waters, unlike those in other low-grade copper districts, has resulted in the formation of malachite, limonite, hematite and a little chrysocolla. The rock is still hard, although the feldspar is somewhat kaolinized. The prevailing color is a deep red-brown, due to staining by iron oxide, although brilliant copper staining can be seen in places. Probably over 85% of the copper in this oxidized zone is in the form of malachite. Some disseminated sulphides are found in hard ores between fractures, but these are relatively unimportant. As in the sulphide zone, values vary greatly and rich and lean bands alternate. Along large fractures some softening and leaching is found, with less copper in the adjoining harder rock. But more usually, the variation in value is not accompanied by any change in the degree of alteration of the rock. The general copper content from top to bottom of the oxidized zone is constant, and is almost exactly the same as that of the underlying sulphide zone.

SHARP DEMARCATION

The bottom of the oxidized zone is almost a horizontal plane lying about 20 ft. below the deepest arroyos and 150 ft. below the highest hills, and this plane of demarcation agrees almost exactly with the present ground-water level. The transition from carbonate to sulphide is abrupt; less than 5 ft. of material whose classification is doubtful, is usually shown by the drill cores, although along large fractures bands of carbonate and sulphide ore may alternate over a distance varying from 15 to 20 ft. vertically. Nor is there any appreciable enrichment at the top of the sulphide zone except for a few local exceptions. This abrupt change on a horizontal plane will greatly simplify both mining and treatment of the ore.

RICH VEINS IN RHYOLITE

The low-grade orebody just described was not what first attracted attention to the district; this was rather the existence of rich veins in the surrounding rhyolite. These vary in width up to 6 ft. and carry malachite, cuprite, chalcocite and bornite. They are associated usually with dikes of monzonite, which themselves are frequently mineralized up to 2 or 3%. In one or two places, lenses of this disseminated ore in monzonite dikes accompanying veins reach a width of over 50 ft. and promise to yield a good tonnage. The development has not yet been carried far enough to show their ultimate importance.

PROVING THE OREBODY

To develop the New Cornelia property, the ground considered as probably ore-bearing was coördinated with east-west and north-south lines at 200-ft. intervals and

drill holes were sunk at the intersections; the actual drilling was conducted by the E. J. Longyear Co., of Minneapolis, Minn., and the sampling was done under the direction of Calumet & Arizona representatives. Not a great deal of core was obtained, and both the core and the sludge were, therefore assayed and the results combined in the proper ratio by the use of a chart furnished by the Longyear Co.¹

TEST-PITTING AND DRIFTING

After six months of drilling, test-pitting was begun for the sake of checking the drilling results. The pits were about 4x6 ft. in size, sunk with windlass and hand drills, Mexican and Papago Indian miners being employed. The work was done on contract, and after practice, the men became so efficient that up to a depth of 50 ft., test-pitting was cheaper than diamond drilling. During the last year of development, test pits were sunk 50 ft. deep on the coördinate points in advance of the drilling, in order both to expedite the work and to decrease the drilling cost.

SAMPLES

Every tenth bucket hoisted from each hole was taken for a sample and large samples were thus obtained for every round shot. Then after the pit was completed, it was resampled in 5-ft. sections by cutting a rectangular vertical groove 3 in. deep by 6 in. wide, so as to give about a 500-lb. sample for each 5-ft. section. These channel samples averaged about 0.15% lower than the bucket samples, and were taken for the final samples of the pit.

In the sulphide ore the pits encountered water, which made sinking so slow that only a few hundred feet was done in the sulphide zone. However, to check more thoroughly the drilling results in the sulphide and prove a constant grade of ore between drill holes, drifts were run on coördinate lines from the bottoms of two of the deepest test pits and raises were put up from these drifts to check the drill holes. For the sake of giving accurate samples the material broken in each round was hoisted separately, dumped on an iron plate, and every tenth shovelful taken out for the large sample to be cut down later.

EXTENT OF WORK DONE

Up to September, 1913, when development work was stopped, 84 diamond-drill holes had been bored, varying in depth from 200 to 1000 ft., and giving a total footage of 23,097. Of these 19 were stopped in ore. In all, 77 test pits were sunk with a total footage of 3955; of this, 3606 ft. was in carbonate ore and 349 in sulphide; 1059 ft. of the test-pitting checked drill holes in carbonate ore; 175 ft. checked drill holes in sulphide, and 2721 was done in advance of drilling. The drifting in the sulphide ore amounted to 1513 ft. and the combined sinking and raising on drill holes in sulphide ore was 317 ft.

RESULTS OF DEVELOPMENT

The sinking, drifting and raising checked the drilling accurately. The channel samples of the test pits in carbonate averaged 0.005% lower than the corresponding diamond-drill samples; the test pits and raises in sulphide averaged 0.05% lower than the diamond-drill samples; and the drifts in sulphide averaged 0.26% higher

than the assay value of the blocks through which they were run, as indicated by the drill holes at the corners of the blocks. In calculating the ore, drill samples were used wherever drilling was done, and channel samples of test pits were used where sinking was done in advance of drilling. The estimate of the ore developed is as follows:

	Tons	Copper. Per Cent
Ore estimate:		
Carbonate	11,954,400	1.54
Sulphide	28,303,600	1.50
Total	40,258,000	1.51
Available by steam shovel:		
Carbonate	11,954,400	1.54
Sulphide	20,526,800	1.54
Total	32,481,200	1.54
Not available by steam shovel:		
Sulphide	7,776,800	1.40
Rock which must be removed to make steam-shovel tonnage available:		
Rock in carbonate zone.....	708,400	0.65
Rock in sulphide zone.....	2,600,000	0.63
Total rock	3,308,400	0.63

The gold and silver content is low, generally amounting to less than 15c. per ton. In computing the tonnage, no material running under 1% in copper was included. The estimate of ore available for steam shoveling depends on the assumed maximum grade of track in approaches and pits, and on amount of lean rock in the sides and bottom of the pit which it will pay to remove in order to get access to the ore. It is likely that the proportion removed by steam shovel will be greater than that indicated in the table. Not only will there be no stripping expense, but the absence of overburden precludes the possibility of lowering grades by the admixture of barren material. Both tonnage and content of copper, therefore, should come out closely to the estimate.

PLANS AND PROBLEMS

Three problems will arise in connection with the exploitation of the New Cornelia copper property. These are the questions of treatment, water supply and railroad communication. The question of treatment has been pretty well worked out.

As for water, two deep wells were drilled in the large valley northeast of Ajo, and water was found in both at a depth ranging from 550 to 750 ft. By means of a boiler plant and compressor, the water was raised from one of these drill holes with an air lift having a capacity of about 175 gal. per min. Pumping at this rate did not exhaust the water in two weeks. In view of such a flow from an 8-in. drill hole, it seems reasonably sure that a shaft with a little drifting will furnish an ample supply, and such a shaft has been started.

As for the railroad, preliminary surveys have been made both from Gila Bend, on the Southern Pacific, and from Tucson, the junction point of the Southern Pacific, and the El Paso & Southwestern systems. The respective distances are 44 and 130 miles. Both lines would lead through a gently sloping desert country and should be constructed at a cost of less than \$20,000 per mile. The route has not yet been selected.

The orebody already developed will supply a 4000-ton mill for over 26 years, or a 6000-ton mill for over 18 years. Indications are that the life of the mine will be greatly lengthened by the development of a large tonnage of deep ore along the fracture zone in the center of the orebody. For the next quarter of a century, the Ajo will be one of the greatest copper districts of the Southwest.

¹See "Eng. and Min. Journ.," Mar. 21, 1914.

Holcomb Valley Mining District

SPECIAL CORRESPONDENCE

The old but interesting mining district of Holcomb Valley, in California, has been more active than in several years. The Gold Mountain mine, at Doble, is running its 40-stamp mill with a newly constructed cyanide plant. It is operated by a group of young men, ex-departmental officials of the Chino Copper Co., under a lease and option of purchase. The title is vested, I believe, in Captain J. R. De Lamar and T. H. Oxnam; Mr. Oxnam's son is exercising general supervision of the property on behalf of the owners and is also superintending the extraction of ore.

GOLD MOUNTAIN MINE

This mine has had many vicissitudes. It was owned in early days by E. J. (Lucky) Baldwin, who built a 30-stamp mill on the property, which was destroyed by fire before it had run any great length of time. Prof. John A. Church held it under option for some time. During this period, Charles Rolker built and operated a 5-stamp prospecting battery below the present mill.

Many years later, Captain J. R. De Lamar purchased the property, erected the mill previously spoken of and ran for some little time, suspending operations in 1902. Since that period several mill runs were made, the last of which, about three years ago, was carried out by T. H. Oxnam, to determine definitely if plate amalgamation would alone answer. This question was answered in the negative.

THE MINE AND THE DEPOSIT

At the present time the mine is worked principally from a series of three gloryholes or opencuts, connected by mill holes with one of the tunnel levels. A comparatively small force of men can keep the mill supplied with ore now, but as the top of the ore bins in the mill is only 7 ft. lower than the mouth of the tunnel, and as there are about 1000 ft. of track, delivery of ore to the mill when the upper reserves are exhausted, will prove somewhat more expensive or inconvenient. For this reason, the choice of this mill site, where the hill side is practically all mill site, is open to criticism. The assay plan of the mine shows the ore to be somewhat spotted, but in large sections the value, low-grade at the best, is fairly well maintained. T. H. Oxnam, in his mill run, confined his work to a paystreak of quartz on the foot-wall side. This was of higher grade than the mass itself. Occasionally in this, I am informed, free gold could be seen, which is a rare occurrence in the mass of iron stained "quartzite," forming the main body of ore and said to be 500 ft. wide at the apex of the formation, where work is now going on.

I inclose "quartzite" in quotation marks, for I have some reason to believe that the rock is a highly acid rhyolite. It was classified as quartzite, however, by Professor Church and the miners who came here from Delamar, Nev., noted a great similarity to the quartzite ore of that mine and dubbed it accordingly. This rock covers a large area south and west of Gold Mountain. At Hollonet and Bear Valleys, the sheetings have been thin and are now represented by debris. At several points, this rock has been found to lie upon shale. At the Gold Mountain mine, there are shales and intrusive rocks of

porphyritic texture on the foot wall, but the true foot is considered to be a mica schist. This I have not observed in the workings of any other prospects.

The concentration of values at Gold Mountain seems to be in a region of faulting, shearing and shattering. The value is in the cleavage planes largely, which are stained or coated with iron oxides. The gold in the mass is probably derived from the decomposition of pyrite, which I have not seen in an undecomposed state. Promising looking specimens from another section of the field containing pyrrohotite, were found to carry no gold. The ore seems a typically good cyaniding ore, and the double process of cyaniding and plate amalgamation should give a fairly high percentage of extraction. While the surface ore contains an iron-stained clay, the mass itself should produce little true slime; at the present time, however, there is considerable colloidal matter in the battery pulp.

THE MILL

At the mill a pronounced innovation consists of the use of a Janney classifier, the several products of which are delivered directly to separate tanks. The sand tanks are equipped with Butters distributors. For the slimes there are two mechanical agitators and one settler. It is stated that frequent shutdowns have occurred from the limited settling capacity.

The cost of mining ore is estimated at 50c. per ton and the total cost of operations at \$2. As the assay value seems to be considerably in excess of this latter figure, a reasonably high extraction should return a working profit, when the disadvantages of working a plant which is in part old and in bad condition and in part new and untried, are overcome. As the orebody is large, a success by the present lessors will mean future working on a much larger scale with a more modern plant.

Water for steam and milling purposes is obtained from Baldwin Lake, a shallow sheet of water one-half mile from the mine and several hundred feet lower than the mill supply tanks. Twelve years ago this lake went completely dry, but as Bear Lake Reservoir is only four miles distant from the west end of Baldwin Lake, and as Holcomb Valley, three miles away, at no great difference of elevation, is itself a natural reservoir, there will probably be no great difficulty at any time in extending operations.

PLACER OPERATIONS

Wood for fuel is abundant. Cedar is commonly used. There is also good pine on the neighboring forest reserve for what mine timber is required. A sawmill is running in Holcomb Valley. Holcomb Valley was one of the last large placer camps in California. It was discovered by Holcomb, a hunter, at the outbreak of the Civil war, and attracted many miners from the Kern River district, and indeed from camps further north. The field of operations was over three miles long and a maximum of one mile wide. The rim of the main channel and tributary gulches were mainly worked. The great quantity of water to contend with and the rough nature of the bedrock, consisting of great boulders of granite, effectually prevented work on bedrock, while every indication was that the channel would be exceedingly rich if ever worked. I am informed by a placer miner who has had considerable experience in working the rim gravel in the last few years, that this will run in specially good

places from 50c. to 75c. per cu. yd. The aggregate of production in early days was large, but almost entirely from shallow rim diggings.

It was the dream of the early placer miners that a bedrock tunnel to drain the valley should be undertaken. Captain De Lamar was the first, however, actually to begin work on a tunnel from the Mojave River side of the valley. It was not completed by him, but by an English company, managed and promoted by a mining man named Pedley. Owing to faulty surveys, however, the tunnel, when completed, with the perversity common to bedrock tunnels, was 18 ft. above bed, although the grade had been cut down from 2% to 1% in the latter half of its 11½ miles of length. As the bedrock was rarely more than 20 ft. below the surface, the work was entirely useless and the tunnel is now caved and abandoned. The company then began dredging in a crude way, but was again unable to realize from the bedrock pay, owing to the massive character of the boulders on it, its irregularity and the great body of water in which it is submerged. Work was finally suspended and the valley lay practically dormant, except for pocket hunters, until three years ago, when H. W. Larssen, a mechanic, began experimenting with a dredging apparatus of his own invention. This, in its improved form, is now successfully working on the rim gravel of the main channel, below Osborn Flat.

NEW DREDGING MACHINE

Without attempting any accurately detailed description of his ingenious apparatus, it consists of a dredging ladder, screen elevator and sluice box with riffles mounted on trucks, of which there are three, the latter two being auto-driven. The driving engine, when the machine is stationary, furnishes the power for the dredging. The buckets are two in number, skip-shaped, driven by endless wire rope from drums. The buckets are of 3-cu. ft. capacity and supplied with a cutting edge; the gravel which is mainly fine on the rim is dumped from the buckets into a revolving screen, the fine is elevated by a bucket elevator to the sluice box, which extends over the dredging piles, so that the tailings are stacked behind the work. The cut of the buckets is on the upward incline, which varies in pitch with the depth of working and the inclination of the ladder. The entire construction is of steel and the buckets run on roller wheels guided by the channel steel of the ladder framework. Water is supplied from a well, but the suction of the pump, a small centrifugal, is placed also in the dredging pit, and the suction can be thrown one way or the other by means of a valve. In this way the amount of water pumped from a distance can be reduced to a minimum. The ladder itself can be lowered by winches to attain a depth of 21 ft. For light gravels, the machine would appear to be excellent, but, of course, the buckets are not capable of handling large boulders or cutting hard bedrock. In flat valleys, the auto drive permits of rapid shifting of the dredging site. Its mobility is, therefore, attractive. Its economy in the use of water should promote its use in semi-arid regions. It will not compete with modern gold dredges where these can be used, for it would seem like an ingenious toy alongside of one of the Natomas boats, but it can be said to be the modern mechanical evolution of the long tom and sluice box, with manual labor reduced to a minimum.

Although this machine with its forerunners has been

in successful operation for three summers, it does not solve the working of the main channel, which must be left to a drainage tunnel, such as previously planned, but so badly executed. This three miles or more of channel is certainly an attractive field for speculation, although much of the ground is patented and the divers interests would no doubt be difficult to harmonize. Mr. Larssen is working on patented ground of his own.

ORIGIN OF PLACER GOLD

The origin of this gold is an interesting question. I am inclined to believe that the greater part of it has come from the rhyolite (quartzite), which has entirely disappeared in places in the valley proper, though the gravel handled consists largely of waterworn specimens of this rock. The gold is generally fine, though at Coarse Gold Gulch, in the lower part of the valley, as the name would indicate, the gold was all coarse, from wheat grains up, in size. The area of this quartzite bed or rhyolite flow has been large and it is natural to suppose that there have been other points like Gold Mountain, where conditions have permitted local enrichment. There are areas which now seem to me to be good ground for systematic surface prospecting. On part of the country there is extensive sub-aerial degradation now going on, the acid rock shattering like glass under the combined influence of frost and thaw. On the hill slopes there are great slides of talus.

This contemporaneous action, together with more extensive erosion of earlier periods, will account for the disappearance of the sheeting from some granitic and limestone areas. In the granite itself, seams of rich quartz have been found, but they are without permanency. These are insufficient to account for the gold extracted from the valley. Therefore, I prefer to attribute the source of the auriferous gravel to this capping rock, admitting the hypothesis that there have been places of local enrichment equal, if not superior, to Gold Mountain. As to the rock itself, a purely microscopic examination of many specimens leads me to the belief that it is an acid crystalline rock instead of a metamorphosed mechanical aggregate.

The Old Rose mine, or an extension of it, on Tiptop Mountain, about 15 miles from Bear Valley, it is rumored, will be worked again. The ore is gold-silver with enough copper to interfere with cyaniding, though a cyanide plant was erected.

In this vicinity several minerals of economic value have been found, notably graphite on Sugarloaf Mountain, asbestos, and a sporadic occurrence of scheelite.

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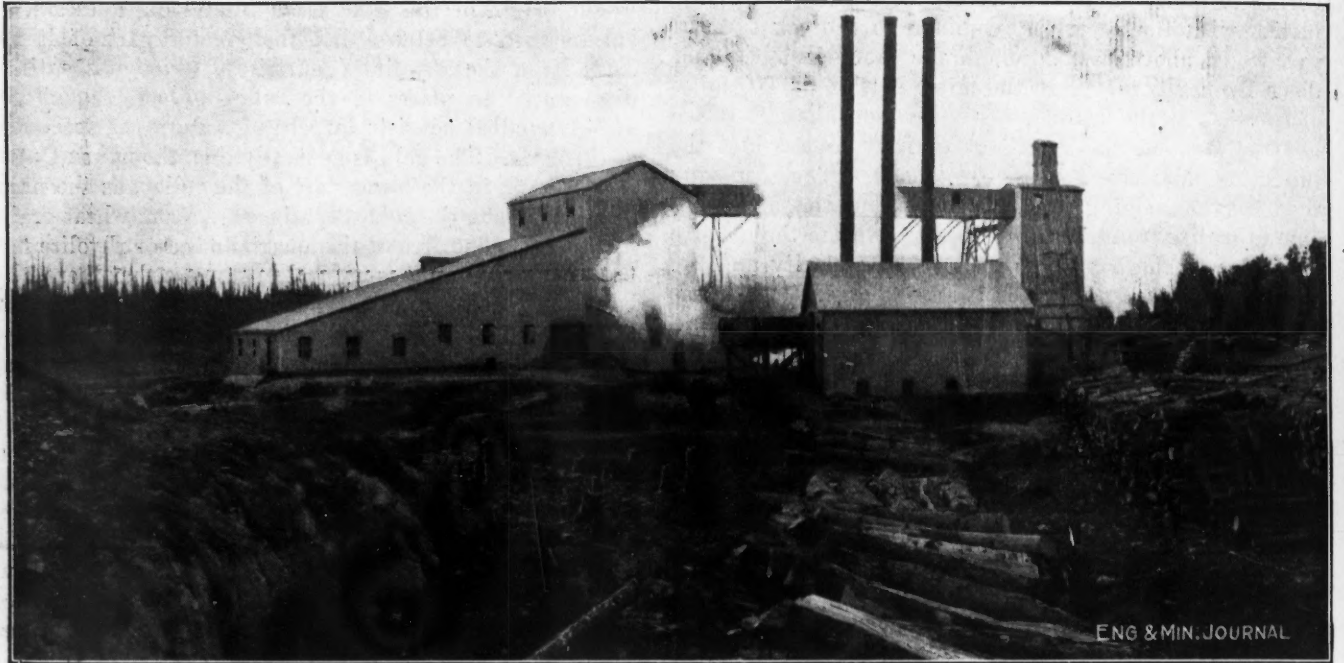
Cement

The president of the Universal Portland Cement Co. reports that the sales of that company are running about 10% less than at the same time last year, but that shipments are still about the same. Prices are slightly lower but are satisfactory. The company is operating at more than 80% of its capacity.

An important factor in sustaining the cement business is the large amount of road building that is going on in this country, which more than offsets the loss of railroad business and in building in the cities.

The effect of the war on the cement business is uncertain. Germany, Belgium and England have been the exporting countries heretofore. There is now a great opportunity ahead of the United States in South America and other markets previously supplied by Europe.

Photographs from the Field



ENG & MIN. JOURNAL

THREE NATIONS' MINE AND MILL, PORCUPINE, ONT.

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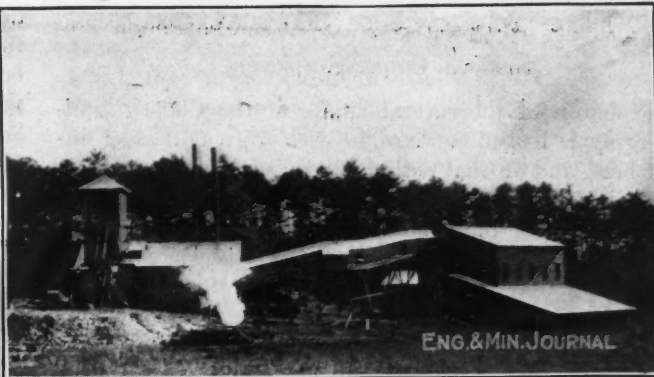


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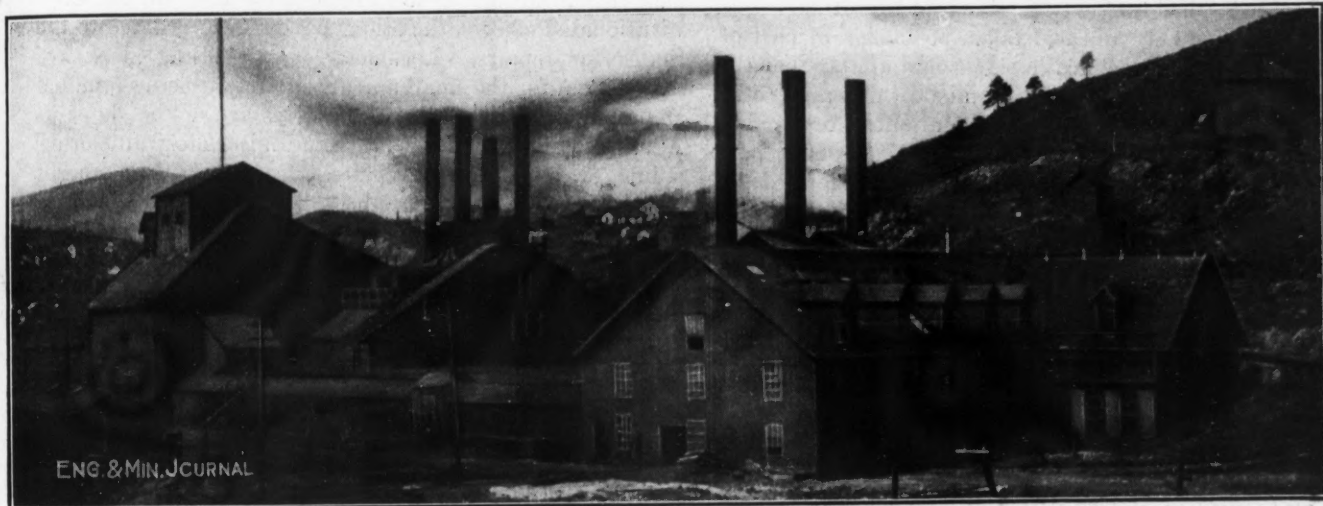
WRECK OF A MINER'S CABIN CAUSED BY A SNOW SLIDE IN MONTANA



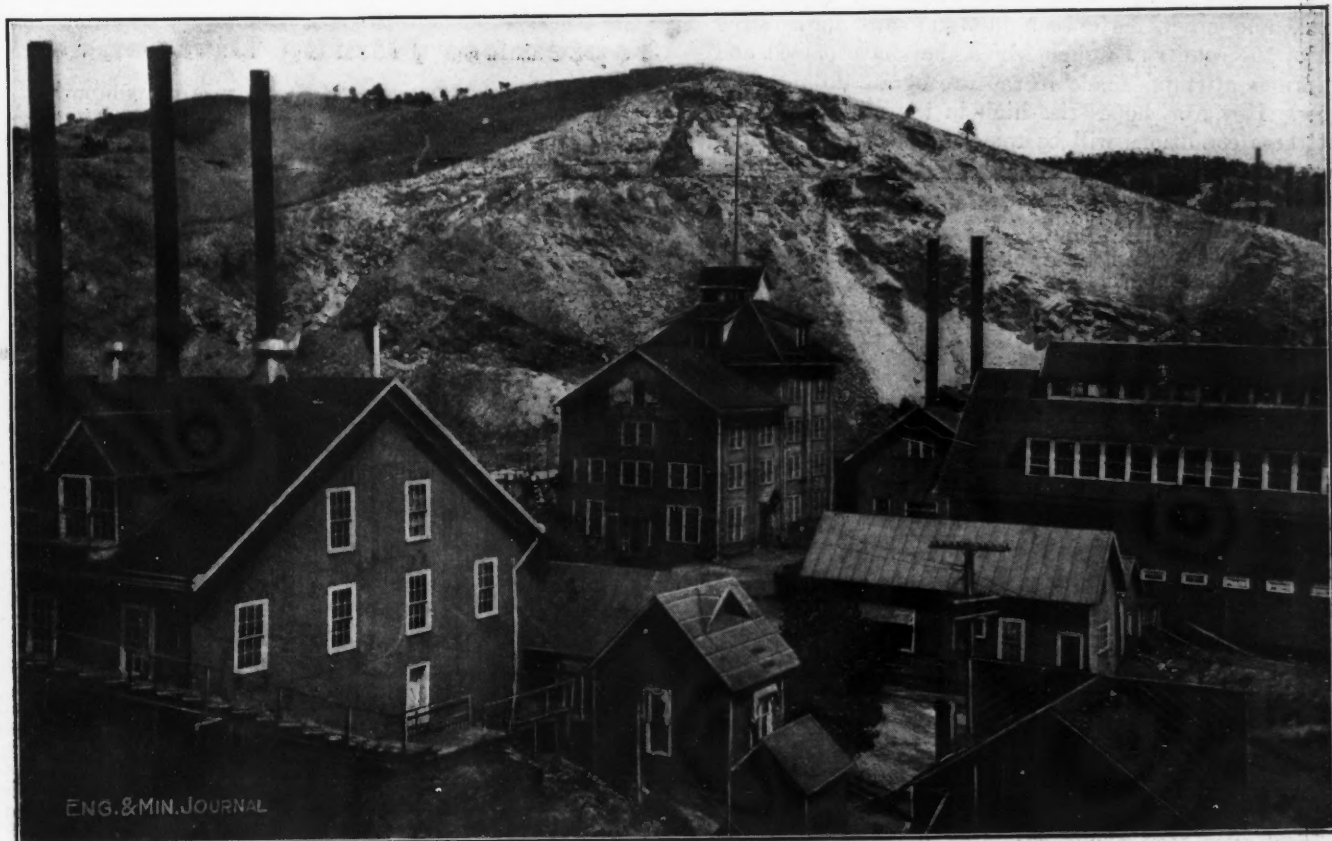
IOLA MILL, CANDOR, N. C.



COGGINS MILL, ELDORADO, N. C.



OLD ABE HOIST



STAR HOIST

Two of the Homestake Mining Co.'s hoists, in the Black Hills, S. D.

The Mexican Situation

SPECIAL CORRESPONDENCE

The action of the several chiefs of the Constitutionalist army is looked forward to with a great deal of interest here, and on that action will depend whether or not Mexico is to have a period of peace. The popularity of Villa throughout the country is much greater than that of Carranza. It is recognized that Villa has not had the training that would qualify him for the presidency, but the man selected and supported by him would probably meet with greater degree of approval than would anyone else.

At present fighting with the Zapatistas is going on to as great an extent as in the past, and until recently the Zapatistas had carried the struggle to within a few miles of Mexico City and had taken possession of part of the water-works at Xochimilco. It would appear that the Constitutionalist are making the mistake of waging war on the rich rather than on the revolutionists or bandits still at large. Many executions have taken place, part of which are merely the expression of hatred toward his former employer by some peon who has risen to power. Among the more notable executions were those of Señores Espinoza y Cuevas, a former governor of San Luis Potosi, and Barrenechea, also of San Luis Potosi. In the large cities the houses of many of the prominent people have been seized and turned into barracks for the soldiers and others have been occupied by officers. Much valuable furniture and other personal property has been taken from these private residences and shipped to other points by these officers. A decree of guarantees for life and property was issued in Mexico City and later withdrawn, and no one allowed to leave the city without a passport.

On the other hand, large bands headed by Argumedo, Orozco and others have been pillaging and devastating part of the country through which they have passed and no serious attempts made to capture or annihilate their forces. However, hopes rise high in the minds of many that these conditions will be remedied in time, and that the present authorities will gradually dominate the situation in a manner that will be fair to all and will stamp out all pillage and brigandage.

The people are tired of revolutions and want to be allowed to work; and it is believed that Orozco, Argumedo and the various juntas in the States and in Mexico will receive no moral or financial support for further revolutions from the majority of people in the country. As a matter of fact, it is safe to say that 90 per cent. of the people in Mexico have never wanted a revolution and scarcely know what it is all about. There have been great abuses of the lower classes, which should have been remedied and could have been remedied only by a revolution, but they had not been roused to the point where as a whole they realized that fact.

Decrees have lately been issued in several states by the present military authorities regarding minimum rate of wages and maximum number of hours. In Aguascalientes the minimum wage is placed at one peso per day for eight hours; in San Luis Potosi a maximum day's work is nine hours with minimum pay of 75 centavos for all kinds of work with the exception of mines, where a minimum of one peso and 25 centavos per day is to be paid. Tiendas de raya have been abolished. If these decrees become permanent laws great hardship will, for a time, result

to the haciendas, and will inevitably result in higher prices for the necessities of life. In the end it may prove of benefit to the Mexican people, for it will probably result in increased wants with increased efforts necessary to satisfy those wants. Thus it may happen that the very low efficiency of the labor may be raised to a higher point.

Business of all kinds, industrial and mining, is as yet, practically at a standstill. Very few banks are open in Mexico City and practically none outside of Mexico City.

A few of the smelters are operating on much reduced schedule and will probably be unable to increase the scale of operations until the war in Europe is ended and there arises a market for copper and silver.

Railroad travel is attended with considerable discomfort. Few first-class coaches are available, and no Pullman cars at all are in use except those used by the Constitutionalist officers, the others having been ordered to the States for repairs. Locomotives and rolling stock are scarce, even for the small amount of freight being handled at present. Many of the locomotives are in the shops at Aguascalientes, Mexico City, San Luis Potosi and other points, for much needed repairs. Great numbers of freight cars and passenger coaches have been destroyed and it is likely that the railroads in the States will not permit more of their cars to enter Mexico until they have positive guarantees that these cars will not be destroyed during further revolutionary movements. The Constitutionalist have taken possession temporarily of the National Lines of Mexico and deserve considerable credit for the activity they have shown in repairing the roadbeds and in endeavoring to reestablish traffic conditions. It is feared, however, that no extensive resumption of business will be undertaken until positive guarantees for protection of property can be offered, and until the European troubles are settled.

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September Mining Dividends

Dividends paid by 22 United States mining companies in September amounted to \$3,280,058; payments by metallurgical and holding companies to \$10,995,380; and

United States Mining Companies	Situation	Per Share	Total
Alaska Treadwell, g.	Alas.	\$0.75	\$150,000
Argonaut, g.	Calif.	0.20	40,000
Bunker Hill & Sullivan, ls.	Ida.	0.25	81,750
Bunker Hill Con., g.	Calif.	0.01	5,000
Butte & Superior, g.	Mont.	0.75	406,703
Center Creek, g.	Mo.	0.05	5,000
Chino, c.	N. M.	0.50	432,410
Colo. Gold Dredging, g.	Colo.	1.00	100,000
Federal M. & S. pfid., ls.	Ida.	1.00	119,861
Fremont, g.	Calif.	0.02	4,000
Golden Cycle, g.	Colo.	0.03	45,000
Grand Central, g.	Utah	0.05	25,000
Hecla, ls.	Ida.	0.02	20,000
Homestake, g.	S. D.	0.65	163,254
North Star, g.	Calif.	0.40	100,000
St. Joseph, l.	Mo.	0.05	70,470
Utah, c.	Utah	0.75	1,201,710
Wasp No. 2, g.	S. D.	0.01	5,000
Yak, g.	Colo.	0.02	20,000
Yellow Pine, l. & s.	Nev.	0.02	20,000
Yukon Gold, g.	Alas.	0.07½	262,500
Yosemite, g.	Calif.	0.10	2,400
Iron, Industrial and Holding Companies			
American Sm. & Ref. Co. com.	U. S.	\$1.00	\$500,000
American Sm. & Ref. Co. pfid.	Mex.	1.75	875,000
International Nickel, com.	N. Y.	2.50	948,133
Lackawanna Steel, pfid.	N. Y.	1.75	612,115
National Lead, pfid.	U. S.	1.75	426,436
National Lead, com.	U. S.	0.75	154,915
Phelps Dodge, c.	U. S. Mex.	2.50	1,125,000
United States Steel, com.	U. S.	1.25	6,353,781
Canadian, Mexican and Central American Companies			
Caribou Cobalt, s.	Ont.	\$0.02½	\$25,000
Crown Reserve, s.	Ont.	0.02	35,376
Hedley, g.	B. C.	0.50	60,000
Hollinger, g.	Ont.	0.15	90,000
Kerr Lake, s.	Ont.	0.25	150,000
Lucky Tiger, g. s.	Mex.	0.09	64,380
Peterson Lake, s.	Ont.	0.01½	63,000
Standard, s. l.	B. C.	0.02½	50,000

by Canadian mining companies to \$537,756, compared with \$6,475,567, \$12,435,518, and \$1,612,804 for the same three classes, respectively, in 1913.

Totals for the first nine months of the year are: 1914, United States mining companies, \$45,690,640, against \$54,015,894 in 1913; 1914, metallurgical and holding companies, \$67,647,473, against \$68,603,024 in 1913; 1914, Canadian and Central American companies, \$12,602,124, against \$16,654,423 in 1913.

The general effects of the European war are shown in the reduction in the September payments of Federal Mining & Smelting; Phelps Dodge, and Chino and in the omitted dividends of Calumet & Arizona, Calumet & Hecla, Crucible Steel, Green-Cananea, Granby, Nevada Con., Nova Scotia Steel & Coal, Ray, and Superior & Pittsburgh, so that large as are the month's totals, when considered only by themselves, it cannot be concealed that the war has put American mining in an uncomfortable position.

The Davey Mine Cave

SPECIAL CORRESPONDENCE

What might have been the greatest mine tragedy in the Joplin district or in Missouri occurred at the American Davey mines near Carterville at six p.m., Oct. 1. Fortunately, only two men were seriously injured, while six others received minor injuries. The cause of the near tragedy was the caving of Nos. 1 and 2 mines on what is known as Davey Hill.

The cave-in covered 8 to 10 acres of ground lying directly east and southeast of the company power plant and No. 3 mill. The area of caved ground extended south about 500 ft. and came close to taking in No. 2 mill. Singularly enough the surface of most of the caved ground was covered by the mill ponds. The superficial showing was simply the lowering of the ground in a dish-shaped manner a distance of 12 to 20 ft. Around the margin of the caved area great cracks appear showing where the ground broke, the various buildings are tipped at an angle and there is no water in the ponds. The group is owned by the American Zinc, Lead & Smelting Co. About 100 acres of ground was mined out, the surface standing upon small pillars. Besides this there are adjoining tracts, held and mined by other companies that have a large acreage cut out. The caved ground was under sub-lease to a company that was cleaning up the ground, as the miners term it, "skinning the pillars," and in some cases taking them out entirely. The supports were weakened until finally the roof broke down.

The ground worked had a face 12 to 20 ft. high in what is known as sheet ground. The lessees had about cleaned it up. For a number of days terrible popping sounds had been giving warning that there would soon be a fall and no miners were directly under the caving area. In adjoining drifts at No. 3 mine there were 50 men at work. It was this group that was threatened with injury and death. When the fall came, the concussion of the air was sufficient to hurl the men off their feet as though they were feathers. Some of them were thrown 20 ft. and none succeeded in staying on their feet. They brought up usually against a wall or pillar and suffered a good deal of bruising.

The worst accident was that of a tub hooker who was thrown into the bottom of No. 3 shaft where some shaft

lining torn loose by the air fell upon him and broke his arm. A carman had some heavy bruises on his back which may develop into a serious injury. Others were merely stunned or scratched. The air of the mine was so filled with dust that it was stifling and was difficult to see through. All hat lamps were blown from the men's heads and all were put out. It was necessary to grope in the darkness with only the aid of matches till some of the lamps were found. Part of the men escaped by climbing a 200-ft. ladder at No. 7 shaft, 400 ft. north of the caved ground. The gas and electric lines at No. 3 shaft were broken so that hoisting was interfered with at that point. Immediate steps were taken to repair these breaks and hoist the men. Those who waited till the repairs were made were hoisted out. Every man was out three hours after the cave took place and not a single fatality was reported.

In the little town of Johnstown which surrounds the mines at this point, everyone felt the shock as though it were an earthquake. The expulsion of the air from the shafts threw great clouds of rock dust into the air over the town. Roofs and siding were torn off a number of the derrick houses over shafts nearest the caving area. When the real reason of the disturbance was made known the whole district responded and from every camp hurried ambulances and miner volunteers expecting a great loss in life. Beyond all question there was the greatest crowd around the mine that has ever been seen in this field. When foreman Newton Keithly notified the office by telephone that his men were all alive and safe, there was great relief felt on top by the surface watchers, among whom were the men's families and friends.

The work of rescue was taken up immediately under the supervision of general superintendent H. I. Young who hurried to the mine from his home. Keithly's telephone message allayed anxiety for the moment but every effort was made to hurry repairs on the hoisting apparatus so the men could be got out. There were fears that more ground would cave before the rescue could be made.

While the cave covers a greater area than any previous, its damage so far is not so great, either in loss of life or property. It is estimated that the loss will not be over \$15,000 for the oil, powder and sludge-mill buildings that will have to be moved and reerected. It will be necessary to relay the broken water and gas lines over the caved ground. All of the main buildings are unaffected thus far. The operators were expecting the trouble and had taken out all machines and underground equipment two days before.

Contrasted with this is the old Tronpe cave-in which took down a mill and a huge pile of valuable concentrates and in which five men were buried while only two bodies were ever recovered. Another cave which caused heavy financial loss occurred at Oronogo when the old Aurora Circle went down carrying the mill and several carloads of ore already on board of cars and ready to ship. It was only recently that in mining this ground, the Oronogo Circle company took out the trucks of some of these buried cars.

Outcrops in Page and Rockingham County, Virginia, indicate the probable existence of deposits of manganese ore similar to the one which has been successfully worked at Crimora in Augusta County. So far as explored these deposits seem to be wad found in a stiff, heavy clay, says M. A. Rowan, of Lowmoor, Va., in the Baltimore "Manufacturers' Record."

Editorials

Selling to Bolivia

The market for American mining machinery and mining supplies in South America has always existed; it was receiving increased attention at the hands of our manufacturers when the outburst of the European war attracted public attention to our opportunity there. It seems now as if we might take over South American trade to the exclusion of practically all other nations. For this reason some notes from a correspondent upon the tin-mining fields in that country are of timely interest.

Tin mining is one of the greatest, if not the greatest, industry in Bolivia. If the United States could supply all the materials consumed by this business, that itself would be a tidy addition to our foreign trade. The native Indian is the only laborer available in the country for mine work, but he is far from satisfactory. The demands of economical mining should see this poor labor largely replaced by good American machinery.

According to Prof. Francis Church Lincoln, who has recently returned from Bolivia, machine drills have been recently introduced, and their use is rapidly spreading. The Llallagua mine is using 60 Ingersoll-Rand stopers and is drifting with piston machines and Temple-Ingersoll electric air drills. Señor S. I. Patiño is using Siemens-Schuchert electric drills and the Temple-Ingersoll machines. Messrs. Harrison and Böttiger are using the Siemens-Schuchert electric drills at Araca. The Avicaya mine is using Stephens "Climax" drills for drifting. The Compañía Minera de Oruro and M. Louis Soux, of Potosi, are using Ingersoll-Rand air hammer machines for all purposes. Aramayo, Francke & Co. have been driving with Temple-Ingersoll machines, and are beginning to sink and drive with air-hammer drills. The Totoral mine has ordered an electric plant and is going to install Temple-Ingersoll machines.

Power is a serious question with the Bolivian miners. Steam, being expensive, is used only on a small scale and for auxiliary purposes. Coal, charcoal, llama dung, called *taquia*, and a resinous plant known as *yareta*, are the principal fuels. High freight charges from the coast make coal cost about three times as much inland as at tide-water. Anthracite gas-producer installations have proved economical and oil engines have found a wide application, the oil coming from the Lobitas field in Peru. The low efficiency of power plants at the high elevations of the Bolivian mines is a factor not to be left out of consideration in estimating power requirements. In some places water power is available and the development of hydro-electric plants should consume a good deal of electrical generating machinery and transmission supplies.

The explosive most commonly used in the Bolivian mines is 50% gelignite, although several mines employ 62% gelignite, and 90% gelatin is required to do the work in the Totoral district.

The high prices of timber have almost eliminated its use underground, except for lining important shafts;

while the ground usually is hard enough to stand well, in many cases dry-walling is resorted to, and pillars of waste are built in the stopes. It would seem as if cement and structural steel could be sold for purposes of ground support.

Most of the mine haulage is performed by men or by mules, but electric haulage is employed in the Huanchaca mine, and an electric locomotive has been installed in the Avicaya tunnel.

In general, illumination is carried on by means of a miner's lamp consisting of a wick which burns tallow in an open iron vessel. Candles are also in wide use, and acetylene is being tried at Potosi, while at the Huanchaca, San José, and Compañía Minera de Oruro mines, the passages are lighted by electricity.

While most of the drainage takes place through tunnels, at the Huanchaca mine hot water is handled with electric pumps, at the San José and Compañía Minera de Oruro there are large steam pumps, and the Morococalla mine is equipped with a newly installed cornish pump.

Preparation of the ore for shipment or smelting consists largely of hand picking; by far the greater part of Bolivian tin is exported in the form of concentrates running from 55 to 70% metallic tin, and known locally as *barrilla*. Milling ores from the oxidized zone, where sulphides are not in large proportion, is relatively simple; while the ores from the sulphide zone require rather complex treatment. When concentration alone will not effect a good separation on account of the presence of sulphides, roasting is resorted to to free the tin. The ores are subjected to preliminary concentration, roasting, regrinding and reconcentration, either on wet concentrators, as in the first instance, or upon magnetic separators. Tin ores containing silver are given a chloridizing roast and leached, to remove the silver content before concentration for the tin.

Primitive methods are still in use in many cases, such as crushing with rocking stones and with old-fashioned Chilean mills, screening by hand, and concentrating by hand jigs, on circular buddles and moss-bottomed launders.

A good many foreign companies have installed modern mills with machinery from Europe or this country, but in many cases this has been improperly selected. It is not uncommon to see the native millmen sweeping down the Wilfley tables with brooms, as if they were some kind of buddle, and in some mills the Wilfleys will be found discharging all their products over the end, perhaps with a board nailed to the lower side to prevent any material from escaping by its proper channel. Naturally, the tailings from such concentration are re-treated profitably by native methods.

As a result of the European war, the shipment of tin ores to Europe has been interrupted. This is particularly serious because she depends mainly upon the taxes on tin exports for her revenues. The United States con-

sumes $2\frac{1}{2}$ times Bolivia's present tin production, and yet smelts no tin.

There is a lot of talk nowadays about developing a South American export business, but there is not going to be any such business of a one-sided nature. If we sell to South American countries, we must buy from them. In the case of Bolivia it would be an ideal trade if we might sell her mining supplies and take payment in tin.

It would seem the opportunity of the ages for some American smelter to secure control of the Bolivian supply and erect a reduction plant in the United States; if ever that is to be done, but the inauguration of such a business is not the simple matter that some persons have assumed. We have in mind Mr. Burrage's misadventure with the International Tin Co., which years ago erected a smeltery (now dismantled) at Bayonne, N. J., to inaugurate tin production in this country. Mr. Burrage intended to import black tin from Malaya, but just when his works were ready the Straits government put a prohibitive export tax on the ore. Mr. Burrage then naturally scouted for an ore supply from Bolivia, without succeeding in developing such a business for his smelting works.

Since then the output of tin concentrates in Bolivia has grown a good deal, and its exports have lately been sufficient to supply a smelting works of good size. On the other hand, these ores have gone from Bolivia to Great Britain and Germany on long-time contracts, and in some cases, certain people have interests in both mines and smelting works. The diversion of an adequate part of the Bolivian supply to the United States would be a matter of hard work and would hardly be possible until exchange banking facilities are provided. However, our financiers are working to provide such and if Bolivia has to buy from us, arrangements for her to pay will have to be devised. The inauguration of tin smelting in the United States may be a hard job, but until this country, which is the largest consumer of tin, achieves a larger part in providing its supply, it will be a reflection upon our business enterprise.

Mechanical Ventilation of Metal Mines

Progress in methods of winning ore is less spectacular and slower than progress in methods of treating the ore won. The miner finds his possible field of development much more restricted than does the metallurgist and encounters a further obstacle in the passive but resolute resistance of the always conservative miner. Progress is made, nevertheless, to some extent in the method of stopping, but more especially in the mechanical work of pumping, hoisting, drilling, tramping, etc. Illumination and ventilation have never received the attention they deserve. Metal mining in these respects is far behind coal mining. There has, however, been a marked change in the attitude of operators toward these points of practice in the last few years. It is beginning to be realized how important in their effect on the efficiency of the underground men are adequate illumination and fresh air.

Most metal mines still depend principally on what is styled "natural" ventilation for the conveyance into the mine of outside air. Natural ventilation depends on a difference of pressure of the air columns in two or more openings. In most mines, this differential pressure carries in sufficient air. For the further control of the air

underground, however, almost every mine has been compelled to adopt some supplementary means, such as compressed air, small blowers or exhausters, brattices and doors, etc.

The natural ventilating current is usually more cheaply obtained and maintained than one set up mechanically. But although it may be adequate in the quantity of air it conveys underground, so long as the air is left to follow the easiest course, when the current is forced into the remote workings and dead ends where it is most needed, the added resistance reduces appreciably the volume of flow. Furthermore, since natural ventilation is largely dependent on unstable atmospheric conditions for its operation, it will vary with the seasons, the prevailing weather, and the time of day. There are recorded cases in the Southwest where the ventilation has reversed its direction every day toward noon. It is not our present intention to discuss the whole question of natural versus artificial ventilation. But it is a fact that these two characteristics of natural ventilation, namely, its unreliability and its frequent insufficiency, are operating strongly at present toward the wider use of fans in metal mines.

In heavily timbered mines, in sulphide mines, in regions of dying vulcanism, and in the vicinity of underground fires, the ventilation problem is particularly difficult. And it is in such mines as these that fan ventilation is most commonly seen.

Unquestionably the fan is superior to other means of forced ventilation. Compressed air in itself is absurdly inefficient; used with an injector to entrain and propel other fresh air, it becomes more efficient, but is admittedly inferior to the fan system.

The toughest ventilating problem in metal mines of this country, if not of the world, exists on the Comstock Lode. High temperatures and high humidity have here put the operators to their utmost ingenuity in order to keep the working places endurable. An account of the Comstock ventilation by George J. Young, complete to date of writing, can be found in Vol. 61 of the A. I. M. E. *Transactions*. Fans are installed in great number in these mine workings, but they are chiefly used for boosting and diverting the air current and are small, being driven by 5- to 20-hp. motors and handling up to 12,000 cu. ft. of air per min.

On the top of the Ward shaft, according to Mr. Young, a 50-hp. fan, rated at 75,750 cu. ft. per min., exhausted from the pump compartment during sinking. A fan was also being installed at the collar of the Ophir shaft, rated at 140,000 cu. ft., to be driven by a 100-hp. motor.

At the Newport mine on the Gogebic iron range, a fan system provides positive ventilation in the workings of the mine otherwise hard to reach with fresh air. This proved a great relief to almost intolerable conditions.

The *JOURNAL* of Aug. 15, contained a short article quoted from an A. I. M. E. Bulletin, where is noted the fact that fans have been installed by the Copper Queen for parts of the Gardner mine with excellent results. Two Sirocco blowers are used to force in 70,000 cu. ft. of air.

One of the most striking instances of the advantage of the ventilating fan is found in the Miami mine, where the installation of the system for stopes in which the ventilation had been poor, increased the efficiency of the miners working there by, we believe, 35%, the same number of men getting out one-third as much tonnage again as

previously. Furthermore, there was a distinct saving in power charges. The ventilating air did away with the use of compressed air solely for ventilating and cooling, cutting the monthly consumption for the mine from 9,000,000 cu.ft. to 5,000,000 cu.ft., and the saving on the compressors was not only greater than the cost of running the fan, but was so much greater as to pay for the fan in a short time.

Fan ventilation not only contributes to the comfort and efficiency of the men; a further advantage consists of the positive control which it provides of the direction of ventilation. The records of mine accidents are filled with accounts of mine fires in which the unexpected reversal of the ventilating current threw the noxious products of combustion into parts of the mine considered safe and caused many deaths. This is a point greatly insisted upon by the Bureau of Mines and rightly so.

We cannot but feel that in the next few years metal-mine ventilation will see great changes in practice and fans will be used in increasing number. Work up under the timber mats of Lake Superior and in the sulphide stopes of Butte and Bisbee will become less arduous to the miners and more profitable to the company.

BY THE WAY

The JOURNAL readers are no doubt familiar with the status of the journal *Economic Geology*, started in 1905 by a small group of earnest workers, and now advanced to the position of the principal exponent of applied geology. They are probably less familiar with the sacrifices which have been made that this goal should be reached—how the free services of the editors have been given in the spare hours of professional duties, and often to work which should have been done by clerical assistance—and how every device has been utilized to bring the expenditures within the slender annual income of \$3000 or \$3500. They hope the time has come when they may apply for assistance to those who are directly or indirectly interested in applied geology. The plan of a small endowment fund based on the sale of preferred stock at \$25 par value has been authorized by the Economic Geology Publishing Co. In case of dissolution of the company the par value of preferred stock is to be returned to the stockholders. Waldemar Lindgren, of the Massachusetts Institute of Technology, will be glad to answer any inquiries and receive such subscriptions as may be offered by those interested in the cause.

The Eureka-Nevada railway, which used to be the Eureka & Palisade, has written a caustic letter to President Wilson upon the question of railway mail service, the motive being the award of a contract to a carrier using a mule team at a higher price than the railway offered for the business. The Eureka & Palisade railway—we cannot forget the old name—needs every cent's worth of business it can get. It is the most interesting survivor of early railroading in the region west of the Rocky Mountains that we have. It is a narrow-gage line, about 84 miles long, operated with the old equipment, including the toy locomotives with balloon smokestacks, of 40 years ago. Once there was a daily service between Eureka and Palisade where connection is made with the

Union Pacific. This was in the days when Eureka was a great mining camp. With the wane of Eureka the railway service became every other day, and finally but twice a week as at present. A few years ago the line was washed out in some places and then there were no trains at all for several months. The trip up to Eureka on the crawling, jerking, puffing little train is not a thing of joy, but it is infinitely superior to a mule-team or stage-coach trip. Certainly the postoffice department ought not to discriminate against the old Eureka & Palisade, excuse us, the Eureka-Nevada.

From the Philippine Islands comes a plaintive letter from a man who says there are many mining engineers "in the bush" who would like to know occasionally how the home team stands. Therefore, while those readers who get a daily paper look the other way, we are going to give the standing of the four principal leagues after the games of Oct. 5, 1914.

NATIONAL LEAGUE				AMERICAN LEAGUE			
	W.	L.	P.C.		W.	L.	P.C.
Boston	93	58	.616	Philadelphia	98	52	.653
New York	83	69	.547	Boston	90	61	.596
St. Louis	81	72	.530*	Washington	80	72	.527
Chicago	78	76	.507*	Detroit	80	73	.523*
Brooklyn	74	78	.487	St. Louis	71	82	.464*
Philadelphia	73	79	.480	New York	69	83	.454
Pittsburgh	69	85	.448*	Chicago	70	84	.455*
Cincinnati	60	94	.390*	Cleveland	51	102	.333*
INTERNATIONAL*				FEDERAL LEAGUE			
	W.	L.	P.C.		W.	L.	P.C.
Providence	95	59	.617*	Chicago	86	65	.563
Buffalo	89	61	.593*	Indianapolis	85	65	.560
Rochester	91	63	.591*	Baltimore	79	68	.538
Toronto	74	70	.514*	Buffalo	77	68	.531
Newark	73	77	.487*	Brooklyn	74	74	.500
Baltimore	72	77	.483*	Kansas City	65	83	.439
Montreal	60	89	.403*	Pittsburgh	62	81	.434
Jersey City	48	106	.312*	St. Louis	62	86	.419

*Final score.

For the further information of the wanderers, the first two games of the World's Series will be played in Philadelphia on Oct. 9 and 10, the third and fourth in Boston on Oct. 12 and 13.

Engineering News thus comments upon the dangerous nail: To step on the point of a nail causes a direct loss of money. Somebody has to pay for the resulting injury, which is often a serious one. Unfortunately, the man who leaves the nail sticking up is seldom the one to step on it. But in the long run, if A steps on the nail that B left, and B steps on C's nail, C on A's, or otherwise around the circle of events, the situation is much the same as if every man that left a projecting nail point where somebody could step on it or catch on it was likely to suffer the injury himself. This is a clear argument for more care in dealing with projecting nails. Two concerns state that injuries from nails form 3 to 6 per cent of their total casualties, according to George Gilmore, Chief Engineer of the Travelers Insurance Co. *The Travelers' Standard* in an article on the nail hazard points out further that clinching a nail may make it more dangerous than the straight projecting point, if the clinching is not thorough. A nail point bent over so that it is nearly flat on the face of the board but yet clear of it a few sixteenths of an inch may catch the foot or hand to worse effect than an unclinched point, while at the same time it seems safe and thus invites the accident. The safe clinch is one in which the point is buried in wood, as shown on p. 437 of the JOURNAL of Sept. 5, 1914.

PERSONALS

D. J. Williams, manager of the Montana-Continental Development Co., was in Victoria, B. C., last week.

T. Walter Beam, of Denver, Colo., has been examining mining properties near Hedley, British Columbia.

Fred H. Nye has returned to Denver after making two examinations in the Black Hills region, South Dakota.

G. C. Bateman of Toronto, Ont., has been appointed consulting engineer to the Long Lake Gold Mines near Sudbury.

M. J. O'Boyle, late of Morenci, Ariz., has joined the forces of the Socorro Mining & Milling Co., at Mogollon, New Mexico.

Cutler B. Whitwell is at Forbestown, Butte County, Calif., where he will be engaged in examination work for the next six weeks.

Judge E. H. Gary has resigned his directorships in all companies except the Steel Corporation and its immediate subsidiaries.

Otho E. Youtsey, of Denver, has undertaken permanent duties as electrical engineer for the Portland Gold Mining Co., Victoria, Colorado.

Carl A. Allen and C. L. Colburn, of Denver, have gone to Breckenridge, Colo., to unwater and examine the Juniata and Country Boy mines.

Louis M. Richard, of Colorado Springs, Colo., examined property owned by Milwaukee capitalists at White Signal, N. M., during September.

Alfred Ross, who formerly operated in the Central mining district in Grant County, N. M., has gone to the Organ region in Don Ana County to engage in leasing.

Edwin E. Chase has returned to Denver, Colo., after a prolonged vacation in California, and has reopened his office there and is ready for active work in mine examination.

S. H. Brockunier, of Nevada City, Calif., has just completed an examination of the cement materials on the property of the Yellowstone Cement Co., near Gardiner, Montana.

J. M. Jones, for some years connected with the Lalance & Grosjean Mfg. Co., Harrisburg, Penn., has been appointed general manager of the Massillon Rolling Mill Co., Massillon, Ohio.

D. Brewer Gehly, heretofore secretary of the Cambria Steel Co., has been elected treasurer in place of Alex. P. Robinson, who resigned on account of ill health, but remains vice-president.

Frank H. Sistermans has retired from Batopilas, Chihuahua, Mexico, having completed some examinations in that district. He is at present with the Mines Management Co. at No. 60 Broadway, New York.

John R. Stanton has been elected president of the Michigan Copper Mining Co., succeeding the late Joseph E. Gay. Frank McM. Stanton succeeds his brother as treasurer, and George W. Drucker becomes secretary.

Dean William R. Appleby, of the Minnesota School of Mines, has returned to the University after a trip through the Canadian Rockies and the mining districts around Vancouver, B. C. He visited the chief coal fields of British Columbia, the Marble Bay Copper Mining Co.'s mine and the Britannia Mill.

William H. Davey has resigned as vice-president and general manager of the Massillon Rolling Mill Co., Massillon, Ohio, to become general manager of a new company that will operate the plant of the National Rolling Mill Co., Mansfield, Ohio. He is one of the best known men in the sheet-making industry.

Dr. Edward Ewing Pratt, for some time manager of the Industrial Bureau of the Merchants' Association of New York, has been appointed by President Wilson chief of the Bureau of Foreign and Domestic Commerce, Department of Commerce, succeeding A. H. Baldwin who has resigned to become commercial attaché of the American mission at London.

Adolph Greiner, president of the Iron & Steel Institute, who is general manager of the Cockerill steel works at Seraing, Belgium, near Liège, has been released by the German military authorities. The Germans placed M. Greiner under arrest because he refused to run the plant on behalf of the German authorities. The Germans then endeavored to work the establishment themselves, accompanying the substantial increase in wages which they offered with warnings to employees who neglected their duties or who impeded the output in any way.

OBITUARY

Philander R. Jennings, senior partner in the historic tin plate and metal firm of Bruce & Cook, which has been doing business at 190 Water St., New York, since 1812, died on Sept. 21 at his summer home at Merrick, Long Island. Mr. Jennings was 63 years of age. He had a wide circle of friends in the metal business, and was also connected with many other interests. He began his work with Bruce & Cook when a boy and worked his way up until he was admitted as a member in 1835, becoming senior partner in 1904.

Horace A. Hutchins died at Madison, N. J., Sept. 30, aged 76 years. He was born at Warren, Ohio, and at an early age went to work in a store at Cleveland. He served as a paymaster during the Civil War and later entered the oil business, forming the firm of Westlake, Hutchins & Co. In 1870 the firm sold out to the Standard Oil Co. and Col. Hutchins entered the employ of the company. From 1874 until he retired 10 years ago, he had entire charge of the domestic business of the company. Since his retirement he has spent his time in yachting, travel and the care of his country estate.

Joseph Fawell died at Pittsburgh, Oct. 2, aged 60 years. He was born in England and came to this country in 1878. In 1879 he entered the employ of Mackintosh, Hemphill & Co., of the Fort Pitt Foundry, Pittsburgh, as draftsman. He was promoted to be chief draftsman and later chief engineer, holding that position till 1902, when he was chosen president of the company, to succeed N. A. Hemphill, retired. Mr. Fawell was regarded as one of the foremost authorities on rolling mill practice, and probably was more closely identified with the progress of that industry than any other individual in this country. Few rolling mills of prominence in this country have not some machinery which has been designed under his supervision. He leaves a widow, two daughters and a son.

SOCIETIES

American Iron & Steel Institute—Arrangements are completed for the fall meeting, to be held at Birmingham, Ala., Oct. 29-31. The sessions for the reading and discussion of papers will be held at the Hotel Tutwiler on Thursday and the banquet will be held there Thursday evening. On Friday and Saturday the members of the institute will be the guests of the Tennessee Coal, Iron & Railroad Co., which has arranged a two-day tour by special train to the coal mines, iron mines and iron and steel plants of the Birmingham district. A feature of the trip will be a barbecue on Friday at Bay View. In case a party of 100 members can be organized in the East, a special train will be run from New York and Philadelphia.

STATEMENT OF THE OWNERSHIP, MANAGEMENT CIRCULATION, ETC., OCT. 1, 1914.

of The Engineering and Mining Journal, published weekly at New York, N. Y., required by the Act of August 24, 1912.

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Alfred E. Kornfeld, 10th Ave. at 36th St., New York, N. Y.
Emma B. Hill, 80 Munn Ave., E. Orange, N. J.

The balance of the stock issued (less than 1% each) is owned by 70 employees, 3 ex-employees, and 14 others who are wives, daughters or relatives of employees.

Known bondholders, mortgagees, and other security holders holding 1 per cent. or more of total amount of bonds, mortgages or other securities. Mortgage on building held by Dime Savings Bank, Brooklyn, N. Y.

G. W. Dibble, Vice-President,
HILL PUBLISHING COMPANY.

Sworn to and subscribed before me this 30th day of September, 1914.

RICHARD L. MURPHY,
Notary Public.

(My commission expires March 30, 1915.)

Editorial Correspondence

SAN FRANCISCO—Sept. 30

The Permanent Oil Land Lease Amendment to the general leasing bill which was passed by the House, and which is expected to be passed by the Senate, lends encouragement to oil operators in California who are in contention with the Government withdrawal orders. The amendment provides for leasing by the Secretary of the Interior of oil or gas lands included in orders of withdrawal upon which work was in progress on Jan. 1, 1914, and claim to which was made prior to July 3, 1910. The lessee is to pay as royalty to the Government one-eighth of the oil or gas produced. Leases will run for 20 years with renewal privileges thereafter for periods of 10 years. Leases are to include gas or oil lands not to exceed 640 acres.

Production of Crude Petroleum in California Fields in August exceeded the July production by 65,000 bbl., in spite of the warning of the big marketing concerns that production should be curtailed. Sales for August were 300,000 bbl. less than for July. Total production in August was 9,034,853 bbl.; total shipments, 7,971,224 bbl., leaving a surplus of 1,063,629 bbl. added to the stocks on hand, which increased the total stocks at Sept. 1 to 15,018,481 bbl. Notwithstanding the increased production the number of wells drilling in August was 15 less than in July, or a total of 207. Four wells were abandoned in July and 13 abandoned in August. But the number of new rigs completed increased from 16 in July to 19 in August. The number of producing wells decreased from 5988 in July to 5984 in August. Large refiners are declining to take oil from small producers in excess of contract requirements, although the market for refined goods is said to be improving. Owners of gusher wells are obliged to make large expenditures for necessary storage to meet uncontrollable output.

DENVER—Oct. 1

A 160-Acre Sulphur Tract a short distance north of Cody, Wyo., is being developed and equipped by Fred Berger, mining engineer, and George B. and William B. Berger, bankers, all of Denver. They are constructing a 50-ton refinery, as the first unit. Crude sulphur, as quarried, will be hauled two miles to the plant by rail and there dumped into a hopper which, in turn, will deliver into small steel cars having perforated sides and bottoms. These cars will be run into closed retorts where heat will melt the sulphur and permit it to flow from the gangue and collect in a drain leading to collecting vats, where it will solidify.

BUTTE—Oct. 1

In the Ouster Proceedings against Mayor Duncan, the hearings for which were completed Sept. 26, the testimony of witnesses called by the defense did not bring to light anything new. After the conclusion of testimony, attorneys for both sides agreed to submit the matter without argument. Judge Ayers will take the matter under advisement. It is probable that a decision will not be rendered until the ouster proceedings against Sheriff Driscoll are disposed of. Hearing of his case was begun Sept. 28, also before Judge Ayers. Several of the leaders of the mine workers, including Muckle McDonald, will have a hearing before the military court within a short time.

At the Montana State Fair, held in Helena Sept. 21 to 26, the Butte Mine Workers' union widely circulated a pamphlet, entitled "The Truth about Butte," in which the military regime, as well as the mining companies, business men and private citizens came in for a good deal of adverse criticism. Among many incorrect and misleading statements the circular contained the charge that Pinkerton detectives were enlisted in the companies of the military command at Butte. To this statement Maj. Dan J. Donohue objected and ordered the members of the executive board of the Butte Mine Workers' union to write and circulate a denial of their charge. This order was promptly complied with in a statement signed by President Doran and the committee.

With the protective citizens' organization available in case of emergency, it was agreed, at a recent conference between the Governor, the military authorities and Butte citizens that a reduction of the present military force could be made with perfect safety. Probably one-half of the militia now in Butte will be sent home in a few days. The rest will remain un-

til certain work commenced by them is completed and as long as the city requires their protection. [Late dispatches report Duncan ousted Oct. 5.—Editor.]

SALT LAKE CITY—Oct. 1

Receivers for Ohio Copper, M. J. Hirsch and G. C. Austin appointed by the New York court, have been confirmed by Judge John A. Marshall, of the Federal court here. Local creditors appointed M. H. Sowles chairman of a committee, which petitioned the court for the appointment of a local man as sole receiver, the petitioners objecting to the appointment of the New York receivers. Judge Marshall held that, as there was no apparent reason for having an additional receiver; the receivers appointed by the New York court would be confirmed, upon their giving bond for \$10,000 and filing the required oath. A meeting was held recently in the company offices by the local creditors. Labor liens, amounting to about \$35,000, it is understood, are the first to be disposed of.

TONOPAH—Sept. 30

I. W. W. Activity in Tonopah was shown by the attempt to dynamite the office of the Tonopah "Daily Bonanza," Sept. 22. The I. W. W. is suspected on account of the activity of the "Bonanza" in the arrest and conviction of an organizer of the order for shooting a miner recently. On the afternoon following the explosion the following call was circulated: "A mass meeting of the citizens of Tonopah who believe in law and order and admire fair play is called for Wednesday evening at eight o'clock, at the Nevada Theater, to protest against the dynamiting of the 'Bonanza' printing establishment as an outrage that should meet with condign punishment. If you want to live in peace and happiness under the American flag, you are urged to attend." This was signed by the leading business men of Tonopah. Long before the appointed hour the theater was filled to the doors and as soon as called, the meeting was turned into a campaign demonstration for the Socialist ticket. At the conclusion of speeches by the leaders of the I. W. W. and socialist organizations, the meeting adjourned, not a business man having spoken. About three weeks ago, it is stated, threats of violence were circulated and "stickers" posted in public places, reading:

MOB RULE IN TONOPAH, NEVADA

Don't come to Tonopah, because if you defend your life and property here you will be sent to prison.

Protest to the county and state officials against the imprisonment of John Pansner who defended his life and property. (Stockwitz Press, 1212 Turk Street.)

These placards are similar to those issued by the San Francisco headquarters of the I. W. W. while that organization was operating against the hop ranches of California a year ago. Further developments are waited with interest.

SEATTLE—Sept. 30

Construction of the Government Railroad in Alaska—at least from the coast to the Matanuska coal fields—could begin before the close of the year, according to the latest reports of the government commission of engineers now on the final stages of their surveys. This report has been given out following instructions to survey a route for a road which could be constructed to the coal fields in the shortest time for the purpose of bringing out coal in case it should be needed for emergency naval purposes. The survey is being run from the Copper River & Northwestern at mile 38 to Trout Creek in the Bering River field and the commission states that the road could be completed in six months. The length of the proposed extension would be 38 miles and the total length from the coal fields to the coast about 76 miles. The estimated cost of the road is placed at \$2,054,000 including rolling stock and other equipment. Between Mile 18 and 25 there would be a maximum grade of 1.7% against the expected coal traffic. There is little doubt in the minds of Alaskans that if any of the claims in the Bering River field are opened under the leasing bill this route will be used.

W. C. Edes, chairman of the government railroad commission, is making an inspection of the Portage Bay terminal, and Commissioner Frederick Mears and Thomas C. Riggs are making the survey to the Bering Field and checking up the railroad company's surveys on the present line. Before presenting their final report the commissioners will have figures

not alone upon the cost of construction over the various routes proposed, but of the amount of tonnage which may be developed along them. Chambers of commerce and commercial organizations all over the territory are gathering data on the amount of development work done, along the various routes suggested, together with information as to the amount of ore tonnage that might be expected.

ISHPEMING—Oct. 2

Curtailment on the Marquette Range has begun even thus early in a marked degree. Several mines have been closed, others are working only four days a week. The Cleveland-Cliffs has closed its Maas mine at Negaunee, where 250 miners were employed, and the Mackinaw and Gardner mines in the Gwinn district, and has reduced the force at the Salisbury in Ishpeming from 160 men to 26. Every employee of this company from the president down has had his salary cut 10%. A number of the young men employed in the geological and mining engineering departments will have to look elsewhere for work after Oct. 15. The forces at most of the shops and other surface plants have also been reduced. Expenses must be cut whenever possible, says the president. The Mary Charlotte, a Breitung mine, has shut down at Negaunee. The Republic Iron & Steel will operate its Hartford mine for only four days a week until business conditions improve. The Oliver Iron Mining Co. reduced its force on the range two months ago. In closing mines the operators have done everything possible for the old hands and the men with families depending upon them for support; many young men at mines that continue to operate were laid off and their places given to the older men. Few of the companies on the Marquette have been successful in disposing of a large ore tonnage this year, and some of those who have sold part of their product did not receive cash. The Cleveland-Cliffs has about 1,000,000 tons of ore in stock at its Stephenson, Maas and Salisbury mines. Most of the companies are well supplied with ore in stock and do not feel that they should be mining when they do not know when there will be a market. All feel certain, however, that when the European war is ended there will be a big demand for iron and steel and that the ore will command a fair price.

HOUGHTON—Sept. 19

Mass Continues to Operate at the Rate of 1000 Tons Daily and the rock is showing satisfactory results. The company was fortunate in making a substantial sale just as the war broke, and in contracting for other lots for later delivery. The management is desirous of maintaining operations if it is possible to do so without loss.

Keweenaw Will Find It Necessary to Suspend Operations if the general business situation does not look brighter within a few months. Operations have been most encouraging. The loading station at the fifth level has been completed and the two drifts are well under way. Drift openings on the third and fourth levels continue satisfactory. Shaft sinking will resume this week.

Quincy Is Maintaining Its Production at about 4000 tons daily and is keeping six stamps running at the mills. This is not a normal output, but it is the best that has been attained since the strike. Greatest economy in operation is exercised and every effort is made to keep costs down to a figure which will show a profit even on the present low price of copper. No. 7 shaft remains closed.

Houghton Copper Is Planning to Mill a considerable tonnage of rock which can be turned into copper and later into cash, if the proper arrangements can be made. Proposals have been made to two different interests to mill the rock. A short railway spur could be built to connect up with the Isle Royale's railway extension to the Superior, and thus find an outlet to any one of the various Calumet & Hecla subsidiary mills. And a short spur might be built to connect with the old Atlantic railway, and thus find an outlet to the Michigan Smelting Co.'s plant—the Copper Range plant. The shareholders in Houghton Copper should know what the mill test shows. The Houghton is supposed to be working the same formation as the Superior. Superior's stockpile to all appearances looked like poor rock. Yet it made a sensation when milled. Local miners all claim the Houghton rock will make a good mill showing.

Plans to Resume Operations at the Winona on a limited scale are on foot. This work will not be undertaken by the company as an organization, but by some of the best miners that worked for the Winona when it was operating. The details of the plans are not ready for publication as yet. Superintendent Rex Heeber is interested in the scheme as much for the benefit of the miners as for the good of the company. The plan is to put about 30 good men at work in the upper levels, having the men work the property on tribute. In this way, the company would be assured of an income, although limited. The miners are anxious to make

the arrangements. They are comfortably housed at the Winona, like the location and their jobs, and do not want to pull up stakes and move away. Most of them are married men. The Winona company has more than \$125,000 in the treasury, as the last assessment was practically all paid.

Superior's Opening in Lower Levels continues up to average. The main producing shaft is at the 20th level. From the 18th level the drift over to the second half has attained half of the distance. This drift is in the best commercial copper the mine has opened at any time. General underground conditions remain satisfactory and rock shipments are up to standard. The suspension of operations at the Houghton, immediately adjoining, is greatly regretted. This mine has a showing of copper for fully 450 ft. of drift openings, in what is supposed to be the Superior lode. In fact, out of a total of 650 ft. two-thirds is in good copper and the remainder fair. All work has stopped and the mine will fill with water. There remains unpaid a large proportion of the last assessment. Most of the stock is in the hands of Houghton people who originally owned the lands that went into the company. They continue to have every faith in the value of the property but are pinched so that ready funds are not easily secured. The forced sale of stock, for nonpayment of assessments, was postponed.

GALENA, KAN.—Sept. 25

The Walter King Mining Co., on the Schmidt Bros.' land, has been sinking a new shaft for several days, and a few days ago struck a body of zinc ore at 30 ft. This was 8 ft. thick. There are now eight good mines in operation on this tract.

The Durston Mining Co., on the McElroy and Luscomb land, has started its pumps, after a shutdown of several weeks on account of the low price of spelter. It expects to have the ground unwatered within a few days, when full operation of the mines and mill will be commenced.

Hale Baugh and Associates are making arrangements to sink a new shaft on their lease on the Schermerhorn land south of Galena, where they drilled recently and made a strike of both lead and zinc. They discovered the run of ore while drilling for other parties on another tract of land joining the Schermerhorn tract, and immediately secured a lease for the Schermerhorn tract and commenced drilling. The run extends from 70 ft. to 90 ft. It is a sheet formation.

At Baxter Springs, the Lennan people are sinking a shaft to the 270 level and expect to strike ore soon. They are also developing the Miami mill shaft in good ore, while good lead is being secured in the opening up of the Lennan mill shaft. Last week, the company turned out 147,350 lb. of lead ore and 107,325 lb. of zinc ore. The Haymarket Mining Co. expects to erect a new mill within a short time. The company has two shafts down to the 200-ft. level, with about 23 ft. of good ore in each shaft.

At Cave Springs, the Hoosier Mining Co. on the Hartley land is preparing to sink its shaft deeper to encounter another run of ore that was found in drilling. Dr. J. A. Cotton, H. Mays and H. Conley are sinking a shaft on their lease on the Hackett land and have struck an 18-ft. face of ore at the 130-ft. level. Warren Sparks and P. J. Demereth have found a good run of ore on the Brownie lease at 24 ft.; others have struck paying ore at the remarkable depth of 8 ft.; these are the shallowest mines in the district.

TORONTO—Oct. 3

The Decision of the Directors of La Rose to prospect their ground more thoroughly, has imbued that company with new life. For the past few months, pessimistic utterances by some of the directors foreshadowed an early cessation of operations, but this event has now been indefinitely postponed. Fifty men have been put to work on surface trenching and underground work has been resumed on the University, which in the early days of the camp was considered one of the most promising properties of La Rose consolidation. On La Rose Extension, a new deep exploration shaft will be sunk, and the territory in the vicinity, thoroughly prospected.

The Profits of the Cobalt Mining Companies will show decreases for 1914 on account of the prices now obtaining for silver. The present price is 6c. under the high record for 1914 and 10c. below the high record for last year. The fluctuations in price and the uncertain condition of the market also prevent the shippers from taking advantage of the best prices. With the resumption of operations by the Beaver, the Timiskaming and the Drummond Fraction, the camp is again back to normal. Most of the companies are economizing as far as possible, cutting down on development and other work which is not at present essential. Labor conditions are good, and while there are about 800 fewer men employed than at the commencement of the war, there are few idle men in the camp.

The Mining News

ALASKA

THE BOYLE CENTRAL GENERATING STATION project abandoned. Intended to generate power on Upper Yukon and distribute to Eagle, Circle, Dawson, Fairbanks, etc. Joe Boyle at head of Canadian company backing undertaking. Financial conditions forced abandonment. Entrance of railroad may revive project. Greatly desired by Fairbanks lode miners.

SEA LEVEL (Ketchikan)—This gold mine taken over by B. T. Spalding, who is making plans to start operations at once.

GOLDEN EAGLE (Port Wells)—Five-stamp mill and Pelton water wheel installed. Expected to have plant in operation soon.

TREADWELL GROUP (Treadwell)—Treadwell milled \$1,596 tons in August producing \$155,636 free gold, \$157,158 gold in concentrates; Mexican figures, 20,202 tons, \$16,013 and \$16,971; United figures, 39,585 tons, \$43,875 and \$39,145.

ARIZONA

Gila County

MIAMI (Miami)—Directors deferred action on regular quarterly dividend. Last one in July was 50c.

INSPIRATION (Miami)—Reported from Boston will start producing first of February. Originally intended to have mill ready this fall and full 10,000-ton capacity by first of 1915. Plan modified to meet existing market conditions. At first mill will treat 5000 tons. No efforts made of late to push underground development, mine opened far ahead of milling demands.

Mohave County

GOLDEN GEM (Cerbat)—Mine unwatered and being sampled. Old workings being cleaned out and mill put in shape for test run.

YUCCA MINING CO. (Yucca)—Mill started Oct. 1. In adit level 3 ft. of mill ore developed. In raise from 600 to 700 level 4 ft. of good ore found.

WHALE (Kingman)—J. H. Conway who has bond on property opened up 6 ft. of copper ore. Preparations being made to mine molybdenite, which will be shipped east.

RAINBOW (Chloride)—In adit level 250-ft. from portal, several feet of milling ore opened up. Chief value lies in gold though there is small amount of lead with no silver. Milling plant is under consideration.

COPPER GIANT (Hackberry)—Final payment made by United Verde. During past 18 months Verde did about 1500 ft. of work, blocking out large amount of ore. Property originally owned by W. K. Ridenour and associates.

CYCLOPIC (Kingman)—Mill continues to operate steadily. In mine 30-in. vein almost vertical opened up. Carries \$40 in gold. New hoist being installed and sinking will be carried to 200-ft. level. Previous work done on flat vein about 40 ft. thick.

Pinal County

RAY CONSOLIDATED (Ray)—Suspension foot-bridge to be built across Mineral Creek from general offices to mines, replacing smaller structure torn out in recent storm.

KELVIN-SULTANA (Kelvin)—Work resumed on 300-ft. level. Connection to be made between 305 raise and bottom of old No. 2 incline recently retimbered. Drifting will be continued on No. 1 vein, 500-ft. level, which shows small amount of silicate ore. Concentrator expected to be running by Oct. 10.

Yavapai County

UNITED VERDE EXTENSION (Jerome)—In 1200-ft. cross-cut 3 ft. of 14% copper ore reported recently encountered. Ore drifted on for 150 ft. with same width and richness. In crosscut 1202, 300 ft. to east, orebody struck 21 ft. wide, assaying 7.8% copper, \$1 to \$2 gold and silver.

WHITE CLOUD CONSOLIDATED (Harqua Hala)—Work to be resumed at Bonanza and Golden Eagle mines. Company succeeds Yuma-Warrior company. Camp to be rehabilitated and several contracts for development work in zones recently explored will be let. H. W. Stevens in charge.

CALIFORNIA

Butte County

INDIAN SPRINGS (De Sable)—Old tunnel being reopened and expected operations will resume shortly.

Calaveras County

CALAVERAS COPPER CO. (Copperopolis)—Reported will resume operations. Oil-flotation process may be installed.

Eldorado County

CALIFORNIA JACK (Georgetown)—Surface improvements, including 10-stamp mill, boarding house and blacksmith shop destroyed by fire.

PACIFIC (Placerville)—Property, closed down since war started, leased to P. D. Burt and J. H. Santo. Development work in progress on 500-ft. level.

Inyo County

MINNIETTA (Trona)—Tramway being built to facilitate development.

Mariposa County

ORO RICO (Coulterville)—Mine, closed down pending litigation, may resume operations. J. C. Wilson, San Francisco stock broker, who held option on property, sold half-interest to A. E. Tower of New York for \$175,000. Tower later brought suit, alleging fraudulent representations. Wilson filed cross-suit, claiming he had put up development expenses amounting to more than \$60,000. Wilson is awarded judgment for \$35,000.

Nevada County

MAJOR (Nevada City)—J. B. Proctor is interested in the erection of stamp mill.

San Benito County

BRADFORD (Emmett)—Operations resumed at this quicksilver mine.

San Bernardino

NEW ELDORADO (Dale)—Shut down from shortage of water. Good rain should permit resumption.

SUPPLY (Dale)—Property operated by United Greenwater Co., employing 80 men, treating 100 tons daily, crushing with rolls for cyanide. Rumored will sink winze 400 ft., giving total depth 1500 ft. John McGee, general manager.

Shasta County

MAMMOTH COPPER (Kennett)—Operations resumed following shutdown for repairs. Two furnaces blown in. New air-cooling plant will double capacity of baghouse.

Siskiyou County

BIG CLIFF (Etna Mills)—H. B. Wintering interested in installation of stamp mill.

SISKIYOU MINES CO. (Happy Camp)—New boxes and flumes will be installed for next winter's work.

CONNELL (La Grange)—Reported large orebody disclosed by recent development work, said to carry gold, silver and copper.

Tuolumne County

STAR (Columbia)—Ore dump purchased; sulphurets to be worked.

SCHINDLER (Sonora)—Gasoline engine installed to furnish power for pumps and hoisting.

COLORADO

Clear Creek County

GEM (Idaho Springs)—Large body of ore opened on 1400-ft. level east heading.

CENTENNIAL (Georgetown)—New raise has opened 30-in. quartz vein, assaying 2.4 oz. gold and 30 oz. silver.

CAPITAL (Georgetown)—Lessees Masters & Oldfield have opened 36-in. vein of rich ore. Seventh level, now 800 ft. long, being advanced with two shifts.

JENNY LIND (Idaho Springs)—Leased for two years to John Kuykendall, Denver. Tunnel driven 600 ft. on Jenny Lind vein and 700-ft. drift from Big Five tunnel opens Ogden vein. Property also developed by 200-ft. tunnel from Virginia Cañon. Active development will be resumed about Dec. 1.

Dolores County

PELLINGTON (Rico)—One of company's directors reports opening new shoot of lead carbonate in bottom adit. Operations curtailed months ago by depression in copper market making low-grade stuff nonprofitable; new find may stimulate activity.

Lake County

DOUBLE DECKER (Leadville)—Mine being reopened, after years of inactivity, by W. H. Covey.

NORTH SIDE (Leadville)—Manager W. J. Davis has erected shafthouse and machinery for new shaft now down 60 ft. without reaching bedrock.

TENDERFOOT (Leadville)—After weeks of hard work reopening caved ground, mine again on shipping list. New development makes workings quite safe and larger tonnage than ever can be regularly handled.

Summit County

TONOPAH PLACERS (Breckenridge)—Three boats work full time, combined daily yardage being nearly 10,000. One boat each operates in valleys of Blue River, Swan River and French Creek.

Teller County

FREE COINAGE (Altman)—Operation of Neville mill resumed with daily capacity of 60 tons. Ore mined from Pinto workings and averages about \$7 per ton. J. B. Neville, general manager.

VICTOR LEASING CO. (Victor)—New company recently organized by Messrs. Tallon, Kundsen and Wilcox to operate through upper Granite shaft of Granite Gold Mining Co. Development operations in progress.

VINDICATOR (Independence)—Main shaft has reached total depth of 1942 ft.; sinking operations discontinued. Cutting of 19th level station, at depth of 1907 ft. begun. Development in lower levels satisfactory.

CHRISTMAS GOLD MINING CO. (Victor)—Company defendant in suit brought by C. M. Becker asking judgment for \$1,064,265 to cover ore said to have been taken illegally from Christmas property by Golden Cycle Mining Co.

DRAINAGE TUNNEL—Heading now penetrating solid formation and work no longer retarded by caving of dike material. Daily advance a little over 6 ft. Work will be continued another 30 days under management of executive committee, headed by J. F. Burns.

IDAHO**Coeur d'Alenes**

COEUR D'ALENE SILVER-LEAD MINING CO. (Mullan)—St. Paul and Milwaukee men have advanced \$10,000 to finance immediate development. Property comprises 12 claims six miles east of Mullan. Silver-lead and zinc showings.

HECLA (Gem)—Capacity of mill increased from 300 to 400 tons, and many improvements to reduce operating costs incorporated in plant. The five Wilfley tables moved to space covered by old boiler room and coal sheds; six new jigs now occupy space formerly taken by tables; old boiler room and coal shed torn away and replaced by addition with two whole sides of glass.

MINNESOTA

WITH DEFINITE TONNAGE REPORTS from all but two of ore docks at head of Lake Superior, September figures are about 4,500,000 tons, as against 6,100,000 tons in September, 1913. Total thus far in 1914, about 23,000,000 tons, as against 32,400,000 last season. On this basis, 1914 total ore shipments will be 33,000,000 tons, compared with approximately 50,000,000 tons last season.

Cuyuna Range

THOMPSON (Crosby)—Two shovels continue working in ore of openpit; will try to ship 200,000 tons this season. Underground work being prosecuted vigorously and company plans to remove a portion of its product next season through shaft after milling it down.

INTERSTATE IRON CO. (Crosby)—Company, mining branch of Jones & Laughlin, has withdrawn practically all drills from Cuyuna range and dropped all options except one, where one drill is still retained. Company held under option C. M. Hill Lumber Co. property, controlled by N. P. interests, and Cuyuna Iron & Manganese Ore Co. property, adjoining Pennington on north. These commonly considered the best unopened orebodies on range. Property still under option is 40-acre tract to westward end of North Range, near Rowe mine at Riverton.

MONTANA**Beaverhead County**

BOSTON & MONTANA DEVELOPMENT (Elkhorn)—Stockholders' meeting will be held in Butte, Oct. 20, to act on several matters agreed upon at Aug. 5 meeting. Proposed Southern Montana Ry. Co. bond issue of \$3,000,000 for 30 years at 6% will be guaranteed by deed of trust, and bonds made convertible into stock of development company. Latter owns all stock of the Southern Montana and will construct the 100 miles of road to connect company's mines in French Gulch and at Elkhorn with Butte. President Allen, of the development company, states belief that railway bonds will soon be taken by English capitalists, notwithstanding war. Surveys for proposed route completed, rights-of-way secured, townsites laid out and everything ready for construction.

Deer Lodge County

BLUE EYED NELLIE (Anaconda)—Some recent development work opened up large body of zinc. Several carloads, shipped to Oklahoma smelter, ran 30% and 40%. Management is contemplating erection of plant for treating ore at mine. Nature will depend on results of tests now being carried on.

Silver Bow County

NORTH BUTTE (Butte)—Quarterly dividend, due in October, will be passed. Intimated directors will take no formal action on matter, merely neglecting to authorize disbursement. Last payment in July was 50c. To date, dividends are \$11,905,000; in 1914, \$645,000.

BUTTE-BALLAKLAVA AND BUTTE-ZENITH CITY (Butte)—I. Friemuth, of Duluth, president of both companies on recent visit announced that company intends to do some development work at Butte-Ballaklava during winter; how much will depend on general conditions affecting mining industry. Mine shut down some time ago in compliance with general policy of curtailment prevailing in Butte camp. At Butte-Zenith City mine work was carried on without interruption and assays from workings on 460 level indicate presence of extensive copper orebodies.

NEVADA**Churchill County**

SODIUM AND POTASSIUM NITRATE in foothills 40 miles east of Fallon discovered, it is stated. Deposit found over area of 300 acres. Ground staked and location work being done.

Esmeralda County

SANDSTORM-KENDALL (Goldfield)—Ore of shipping grade struck in south drift on 350-ft. level. Development work being done on 200- and 350-ft. levels.

Humboldt County

INCENDIARY FIRES AT ROCHESTER damaged buildings of Codd and Big Four leases. Most damage at Codd lease, where office building was destroyed. Shaft houses saved.

Lander County

AUSTIN-MANHATTAN CONSOLIDATED MINING CO. (Austin)—Lessees treating old tailings dumps by cyanidation. In Upper Austin, treatment of dump containing 30,000 tons nearly completed. Plant will then be moved below Austin-Manhattan mill, where dump estimated at 100,000 tons will be re-treated.

Lincoln County

ORE SHIPMENTS FROM PIOCHE are being made by Prince Consolidated, 30 to 40 cars per week; Amalgamated Pioche; McFadden lease on Day Bristol, 70 tons per week; and Vesuvius lease.

Lyon County

NEVADA-DOUGLAS (Ludwig)—Mine closed until better copper market is obtained. Construction of leaching plant will continue. Expected to be in operation by Jan. 1, 1915.

Mineral County

TRUCKEE RIVER GENERAL ELECTRIC CO.—Power line will be extended from Pine Grove to Rockland at once.

ALAMEDA (Luning)—Stated work on this group will be resumed within 30 days; ore carries gold, silver and copper.

GOLD PEN (Bovard)—Stated 25-ton shipment to Selby plant, San Francisco, gave returns of \$12,000 in gold and silver.

COMMERCIAL (Manhattan)—Sampling and testing discontinued. Said ore zone too limited to justify 100-stamp mill contemplated. Churn drills are idle.

SILVERADO—Car of high-grade silver ore being hauled to Hudson. Considerable development work under way in district. Strike of gold ore reported from Swagger Cañon.

Nye County

BIG PINE (Manhattan)—Understood Mushett & Wittenberg, operators of property, are intending to install large tube mill. Schist ore is easily crushed and gold content is freed easily, so it is expected that coarse crushing and tubemill work is all needed.

MONITOR BELMONT (Belmont)—Preliminary survey for electric power line of Nevada California Power Co. from Manhattan to Belmont completed and installation to begin at once. Stated modern mill is to be built. First work will be draining of 500-ft. shaft, which has 300 ft. of water in it.

WHITE CAPS MINING CO. (Manhattan)—Third carload of ore now being shipped to Western Ore Purchasing Co. at Millers. Chutes all installed for oxidized ore above first level in the east orebody. Milling in one of local mills is contemplated as soon as ore bins can be installed at collar of working shaft.

LITIGATION HILL MERGER MINING CO. (Manhattan)—Special stockholders' meeting called to vote on plan of consolidation with adjoining companies, Manhattan Amalgamated and Earl. Planned to purchase milling plant for properties and furnish working capital for development. Estate of the new company would cover area of about 80 acres, and includes the whole of the Litigation Hill section.

Storey County

CHICAGO-NEVADA (Virginia City)—Development work under way at this property in old Flowery district, east of Comstock, in Six Mile Cañon. Upper levels being cleaned out and repaired and new work done. Lower levels filled with water; question of unwatering being discussed. Test run of 50 tons showed ore to be free milling and of good grade.

Washoe County

PLACER GOLD IN RENO found in excavating for Fordon building, it is stated. Gold was free from quartz and rounded. Other finds of gold made in Reno, but not in such quantity. This part of Reno once bed of Truckee River, and south of Reno, on Truckee River, Mill City placers are worked intermittently.

FRANCO-AMERICAN SYNDICATE (Pyramid)—This company, operating near Pyramid Lake, will make shipment. Stated sufficient ore developed to warrant construction of mill.

NEW MEXICO**Don Ana County**

MEMPHIS MINE (Organ)—Reported body of copper, gold and silver ore encountered during sinking of 50-ft. shaft. Smelter report said to show 16.5% copper, 8 oz. silver and \$3 gold per ton. Air compressor and drills may be installed.

Grant County

CHINO (Hurley)—Milling operations extended from four days per week to five and a half. Many houses being erected in camp.

BURRO MOUNTAIN (Tyrone)—Experimental mill again in operation. Installation of Diesel engines under way. Many employees affected by curtailment of development secured employment in Mogollon district.

EMPIRE ZINC (Pinos Altos)—Construction of tramway from mines to Silver City, nine miles distant, under consideration. Development work continues on Cleveland and Utter groups. Several miles of roads recently completed.

Lincoln County

YELLOW JACKET MINE (White Oaks)—Property leased by Swoyer & Evans, who have made preparations for shipping iron ore to C. F. & L. Pueblo, Colo.

PARSONS MINING CO. (Parsons & Nogal)—Contract made with Wild Cat Leasing Co., of White Oaks, to supply electrical power for mills. Parsons company agreed to build and maintain adequate power lines, installation to begin at once. Mills will be overhauled.

WILD CAT LEASING CO. (White Oaks)—Order placed for 500-kw. steam turbine generator; will be ready for operation by Jan. 1. Fifteen-stamp mill running 20 hr. per day; North and South Homestake mines being operated.

Luna County

FAULKERSON, DAVIS & DAVIS (Gage)—At 50-ft. depth, silver-lead ore penetrated; occurs in limestone. Property situated in Victoria Mountains, 20 miles west of Deming. Ore transportation facilities good. El Paso smelting plant treats ore.

Socorro County

MOGOLLON MILLS unaffected by cyanide situation, having enough on hand for six months. Companies still need first-class miners.

SOCORRO (Mogollon)—One-mile tram from Pacific mine to Fannie mill under construction; will carry 20 buckets.

Taos County

JUNE BUG MILL (Red River)—Concentrating tables will be added to equipment for treatment of newly discovered ores on Silver Queen property. Concentrates will be shipped to Pueblo, Colo.

UTAH
Juab County

TINTIC SHIPMENTS for the week ended Sept. 26 amounted to 104 cars.

UNCLE SAM (Eureka)—One to two cars weekly shipped by lessees, of whom five are working.

OPOHONGO (Mammoth)—Operations resumed and shipments made. Lessees working below 700 level.

SCRANTON (Eureka)—Lead ore 2 to 3 ft. thick developed in the large body of iron ore on the 500-ft. level.

TINTIC ZINC (Eureka)—Tunnel in 550 ft. in mineralized ground; raising done for 85 ft. in rock mineralized with zinc and copper.

TINTIC STANDARD (Eureka)—Work being done on 1000- and 1200-ft. levels. Station being cut on 1200 and heavier hoist installed. Some trouble from gas.

KNIGHT CHRISTENSEN MILL (Silver City)—Some changes and improvements have been in progress; expected to be able soon to treat up to capacity, 100 tons daily.

MAMMOTH (Mammoth)—Mine has resumed production. Week ended Sept. 25, 12 cars of ore carrying silver, gold and copper were shipped. This comes chiefly from new stopes on 600.

EAGLE & BLUE BELL (Eureka)—Good progress being made sinking main shaft, now below 1600 level. Ore being shipped from between 1000- and 1600-ft. levels. Output for week ended Sept. 25, 12 cars.

VICTORIA (Eureka)—Silver-lead ore being mined on 1000 and 1200 levels, and occasional shipments of gold ore made. Working forces again normal, one shift working. Present output about 250 tons of ore daily.

IRON BLOSSOM (Silver City)—Ore being mined from east vein parallel to main ore channel, on and above 500-ft. level. Shipments of silver-lead ore in excess of dividend requirements. Development being done on 1900-ft. level.

CHIEF CONSOLIDATED (Eureka)—Arrangements made for diamond drill work on 1400 level. Said to be intention to prospect the ore zone more thoroughly rather than to drill into new ground. Ore being shipped from 1200-, 1400- and 1600-ft. levels. Eighty feet of drifting done on vein recently opened on 1600; work is in shipping ore; no cross-cutting done yet. Ralls being laid for new spur to mine. May Day doing work in Chief ground under lease, and silver-lead ore opened 25 ft. by 4 or 5 ft. thick. Net smelter returns will be divided equally between companies.

Tooele County

HIDDEN TREASURE (Stockton)—Zinc ore being shipped from this property in Dry Cañon. About 35 men are employed. Mine produced silver-lead ore in past.

GREAT DESERT COPPER (Clive)—Shipments from strike at Wild Cat Mountain, 19 miles south of Clive, will soon be started; 260 tons of ore on dump, carrying silver, copper and gold. Spur and switch being put in by Western Pacific, to which hauling will be done by auto truck. Property is in Cedar Range, on edge of Great Salt Lake desert. J. M. Hamilton, general manager.

WASHINGTON
Douglas County

LUCKY FIND (Waterville)—Col. John Buchan, owner, considering installation of mill for ore treatment.

Pierce County

JARBRIDGE—A 15-ton stamp mill and cyanide plant, to be installed at once at this mine, owned by Jarbridge Consolidated Mining Co., Tacoma, Wash.; 800-ft. tunnel will be driven.

Stevens County

SAN POIL (Republic)—J. L. Harper concerned in new company has bond and lease on San Poil mines and mill for four years, price \$185,000, payable in installments through life of bond.

UNITED COPPER CO. (Chewelah)—After idleness of several weeks, due to suspension of operations by Granby Smelting Co., at Grand Forks, B. C., where mine output was being treated, mine was scheduled to resume shipments Oct. 1. President Conrad Wolfe has entered into a two years' contract with Consolidated Mining & Smelting plant at Trail, B. C., for treatment of entire product of mine. Rate said to be about best ever obtained by United Copper; in addition Great Northern has announced freight reduction of 25c. per ton on United Copper ore. During shutdown small force did development work. Drift north from point of intersection of lower tunnel with main vein driven 500 ft., giving approximately 1000 ft. vertical depth; now 9 ft. clean shipping ore showing. Drift in shipping ore all the way, vein ranging from 2 to 9 ft. wide, much of it gray copper. Mine to resume work with at least 75 men; superintendent, E. A. Wolfe and foreman, M. D. McIntosh, assembling force. Output to be about 225 tons daily, 100 tons to be shipped and 125 tons to be treated at concentrator. Four-mile wagon road from mine to Chewelah repaired and ballasted and mine should be able to make deliveries all winter.

Whatcom County

EXCELSIOR (Glacier)—New machinery including stamp mill, concentrating table and sawmill are being installed at this gold mine. Hammond & Fry of Seattle, are owners.

CANADA**BRITISH COLUMBIA**

BRITISH COLUMBIA COPPER (Greenwood)—According to newspaper report, company has closed smelting plant and ceased mining. Exploratory work continues on part schedule. Management advises 10,000,000 tons of ore put in sight

on Copper Mountain. Averages about 1.85% copper and carries 72c. in gold and silver. Construction work on proposed new mill not started. Size not definitely determined, but with blocking out of all ore now in sight, initial capacity is expected to be at least 1000 tons daily. Construction will be delayed.

Ontario

TEMISKAMING (Cobalt)—Mine will reopen.
DRUMMOND FRACTION (Cobalt)—Mine has resumed operations.

SCHUMACHER (Schumacher)—Work cut down to one drill underground. Reported mill to be built and vein above 300 level developed.

MCINTYRE (Schumacher)—Hitch occurred in negotiations for majority control by Nipissing; deal abandoned.

BEAVER—(Cobalt)—Mine will resume underground operations. Mill kept running but mine closed for five weeks.

TOUGH OAKES (Kirkland Lake)—Most of underground employees discharged due to the inability to raise funds in England. Mill continues running on dump ore.

AT KIRKLAND LAKE, work stopped on several properties recently taken over by new English company, under direction of Harry Cecil.

NORTH THOMPSON (Porcupine)—Property being examined by Porcupine Crown with view to combining. If examination is satisfactory combination will take place on basis of dollar for dollar on actual present value.

HOLLINGER (Timmins)—New six-compartment shaft to be sunk at central point on Acme property, to be used as a main working shaft for all properties of Canadian Mining & Finance Co. One of new 50-drill compressors now ready; as little work is being done on Acme, additional power will be available for Hollinger. Acme has sufficient ore developed to supply 20 stamps of Hollinger mill; therefore cut down development work. Hollinger has uncovered new surface showing near office, one of best discoveries on property.

MEXICO

CARRANZA CANCELS HUERTA MINE TITLES, according to official advices to State Department in Washington. Department states that decree dated Aug. 20 was issued by Mexican central administration, cancels all mining titles obtained during Huerta administration and declares null all proceedings relative to acquirement of mining claims started during Huerta regime. Sixty days from date of decree allowed mining agents to make applications for renewal of all procedure previously taken. Further stipulated that all payments required by mining laws of Mexico in connection with mining titles or mining claims must be made again to present central administration. All rights will be lost by persons who have not complied with above-mentioned rules before expiration of stipulated 60 days, and the mining land will thereafter be considered as open to denouncement.

SOUTH AMERICA**Colombia**

PATO MINES—Cable to Oroville Dredging in London from mines manager states dredge turned quarter over and sank, middle of September; floated week later; estimated three weeks for repairs.

Assessments

Company	Delinq.	Salv.	Amt.
Best & Belcher, Nev. (post.)	Sept. 25	Oct. 16	\$0.05
Black Bear, Ida. (post.)	Oct. 1	Nov. 1	0.01
Black Traveler, Ida.	Sept. 22	Oct. 24	0.005
Bullwhacker, Mont.			0.15
Cardiff, Utah	Oct. 19	Nov. 9	0.01
Carney Copper, Ida.	Sept. 21	Oct. 21	0.00225
Chalona, Nev.	Oct. 3	Oct. 21	0.0025
Coeur d'Alene Investment, Ida.	Oct. 10	Nov. 14	0.002
Columbine, Colo.	Sept. 15	Oct. 20	0.02
Comstock Copper, Ida.	Oct. 5	Nov. 5	0.001
Continental, Ida.	Oct. 6	Nov. 5	0.016
Copper Crown, Ida.	Oct. 10	Nov. 14	0.002
Copper King, Ida.	Oct. 1	Nov. 1	0.01
Copper Plate, Ida.	Aug. 29	Nov. 29	0.002
Dalmatia, Ida.	Oct. 1	Nov. 2	0.001
Davis-Daly, Mont.	Oct. 15		0.25
Diamondfield Black Butte, Nev. (post.)	Oct. 15	Nov. 21	0.01
East Hercules, Ida.	Oct. 1	Nov. 1	0.001
Ely Con, Nev.	Oct. 15	Dec. 2	0.03
Eureka, Ida.	Sept. 25	Oct. 26	0.001
Federal Elr., Nev.	Sept. 21	Oct. 21	0.005
Giant, Ida.	Sept. 21	Oct. 23	0.003
Hilarity, Ida.	Oct. 12	Nov. 23	0.003
Honolulu, Ida.	Sept. 15	Oct. 12	0.0025
Jack Waite, Ida. (post.)		Oct. 17	0.01
Lead King, Ida.	Oct. 1	Oct. 16	0.0005
Lewis & Clark, Ida.	Sept. 15	Nov. 13	0.001
Liquidator, Ida.	Sept. 12	Oct. 12	0.002
Little North Fork, Ida.	Oct. 12	Nov. 12	0.001
Lucky Deposit, Utah	Oct. 12	Nov. 15	0.005
Lucky Swede, Ida.	Sept. 19	Oct. 19	0.001
Monarch-Pittsburgh, Nev. (post.)	Sept. 14	Oct. 19	0.01
Nabob, Ida.	Oct. 1	Nov. 2	0.005
National Copper, Ida.	Oct. 5	Nov. 5	0.03
Overman, Nev.	Oct. 8	Oct. 29	0.05
Pacific, Utah	Oct. 5	Oct. 21	0.0025
Reindeer-Queen, Ida.	Sept. 21	Oct. 21	0.002
Rescue Eula, Nev.	Sept. 10	Oct. 15	0.01
Royal Mining, Ida.	Sept. 23	Oct. 19	0.0015
Silver Pick, Nev. (post.)	Sept. 30	Nov. 2	0.01
Snowshoe, Ida.	Sept. 19	Oct. 19	0.005
Sonora, Ida.	Sept. 28	Oct. 27	0.002
Sunset, Nev.	Sept. 21	Oct. 26	0.01
Tarbox, Ida.	Sept. 26	Nov. 27	0.0025
Tonopah Gipsy Queen, Nev.	Sept. 2	Oct. 17	0.01
Treasure Vault, Ida.	Sept. 15	Oct. 12	0.02
Union Con, Nev.	Oct. 15	Nov. 5	0.05
United Copper, Wash.			0.005
Valentine, Ida.	Sept. 12	Oct. 12	0.001

The Market Report

METAL WORKING

NEW YORK—Oct. 7

Pessimism and declining prices have been the characteristics of the markets for copper, lead and spelter during the last week.

Present conditions greatly increase the cost of doing foreign business. Freight rates, insurance, and cable tolls all run high. One international metal house which normally has cable tolls of \$1000 to \$1500 per month now finds its monthly bills running upward of \$3000, largely because coded messages are not now accepted.

Copper, Tin, Lead and Zinc

Copper—The question of the exportation of copper to Holland has been the chief subject of concern during the last week. Great Britain is going to pay for the copper that she has seized, which will be satisfactory to the consignors when the terms have been adjusted, but no copper is henceforth to go to Holland beyond the requirements of that country, which will cut off all possibility of delivering copper to Germany and that is not satisfactory to producers who want to dispose of all the copper they can. The producers have been much disturbed over this situation. However, in well informed quarters it is believed that Great Britain cannot maintain her present position.

At the beginning of our week some copper was sold at 11½c., regular terms. At the end it was understood to be had at 11½c., regular terms. The business that has been done, however, has been small.

Base price of copper sheets was reduced ½c. per lb. on Oct. 1 and is now 17c. per lb. for hot rolled and 18c. for cold rolled. Full extras are charged and higher prices for small lots. Copper wire is quoted at 13¼c. per lb. for carload lots at mill.

Exports of copper from New York for the week were 3245 long tons. Our special correspondent gives the exports from Baltimore at 600 tons copper.

The Granby Consolidated report for the year ended June 30, 1914, shows a production of 23,320,097 lb. copper; an increase of 631,483 lb. over the previous year.

Tin—The market has been quiet but firm. Consumers are buying futures whenever they have offers, but the offers are rather scarce.

Lead—Following the reduction by the A. S. & R. Co. last week further shading of prices was begun by independents and the expectation that the market would sink to a still lower level was general. This proved to be correct. Independents sold at 3.70c., New York, 3.55c. St. Louis, and lower, right from the beginning. Some round lots were turned over at the decline and there were increased sales of domestic lead for export. However, things did not move fast enough and on Oct. 5, the A. S. & R. Co. reduced its price to 3.60c., New York, and having been undercut by independents reduced again, this time to 3.50c., New York, on Oct. 7. These successive cuts have temporarily produced something like demoralization in this market.

The bald fact is that unsold stocks in the hands of producers are bigger than they want to carry in present circumstances and a level of price has got to be found that will move them or curtail production, or both.

Smelter—During the early part of the week there were sales of a moderate tonnage, in lots of 50 tons and over, at 4.75@4.80c., basis St. Louis, including some for export to England. The latter business was, however, for spelter of closely specified grade, e.g. 99¼% Zn or 99¼% Zn, and the transactions in each case were matters of special negotiation. The market in London is about £23½@24, or about 5.10@5.20c. at par of exchange. The American equivalent under present conditions cannot be closely figured until business is finally consummated. One exporter reckons roughly 40s., or say 45c., between London and St. Louis. During the latter part of the week spelter was unsalable at 4.75c., at which the metal was offered liberally from numerous quarters. There was a little encouragement, however, in the increasing interest exhibited by British buyers, who signified that £2½ might be an attractive figure.

Other Metals

Aluminum—The market is quiet and only a light business is reported. Quotations are rather lower 18@19c. per lb. being named for No. 1 ingots, New York.

Antimony—Business is better, with a fair amount of sales. Ordinary brands—Chinese, Hungarian, etc.—are selling at 11@11½c. per lb. Cookson's is held at 13@14c., with a tendency to higher prices manifest.

Quicksilver—The market has been in fair condition, but has settled down a little. The New York quotation is \$55@60 per flask of 75 lb., and the market is steady at that figure. The latest London quotation is £9 per flask.

Gold, Silver and Platinum

Gold—On Oct. 1, the pool made the first shipment of gold to Ottawa, Canada, the amount being \$10,000,000. This gold is credited to the Bank of England, and sales of London Exchange are made against it. An additional \$15,000,000 will be sent soon.

Iridium—This metal is scarce and prices have advanced. Holders are not willing to give any definite quotations.

Platinum—The market is uncertain, owing to the difficulty of predicting future supplies. Prices are nominally \$50 per oz., but advances are possible at any time.

Silver—The market has continued very steady; this is owing to the demand from the mint and some outside orders being about sufficient to absorb the offerings.

London quotations for the week are: Oct. 1, 24d.; Oct. 2, 24d.; Oct. 3, 23½d.; Oct. 5, 24½d.; Oct. 6, 24d.; Oct. 7, 24 pence.

Owing to a misprint which was overlooked, the price of silver in London, on Sept. 22, was given in our market report at 24½d.; it should have been 24¼d. The correct average London price for September was 24.26 pence.

Exports of silver from London to the East, Jan. 1 to Sept. 24, as reported by Messrs. Pixley & Abell:

	1913	1914	Changes
India	£5,163,500	£4,478,500	D. £685,000
China	652,000	42,000	D. 610,000
Total	£5,815,500	£4,520,500	D. £1,295,000

DAILY PRICES OF METALS

NEW YORK

Oct.	Sterling Exchange	Silver, Cts. per Oz.	Copper		Tin		Lead		Zinc	
			Electrolytic, Cts. per Lb.	Cts. per Lb.	Cts. per Lb.	New York, Cts. per Lb.	St. Louis, Cts. per Lb.	New York, Cts. per Lb.	St. Louis, Cts. per Lb.	
1	4.9550	52½	*	31	3.65 @3.75	3.50 @3.60	4.90 @4.95	4.75 @4.80		
2	4.9550	52½	*	31½	3.65 @3.75	3.50 @3.55	4.90 @4.95	4.75 @4.80		
3	4.9500	52½	*	31½	3.65 @3.75	3.50 @3.55	4.90 @4.95	4.75 @4.80		
5	4.9475	52½	*	31½	3.60 @3.65	3.45 @3.40	4.90 @4.95	4.75 @4.70		
6	4.9465	52½	*	31	3.60 @3.65	3.45 @3.40	4.90 @4.95	4.75 @4.70		
7	4.9575	52½	*	31	3.50	3.35	4.90	4.75		

*No quotations.

The quotations herein given are our appraisal of the markets for copper, lead spelter and tin based on wholesale contracts; and represent, to the best of our judgment, the prevailing values of the metals specified as indicated by sales by producers and agencies, reduced to basis of New York, cash, except where St. Louis is given as the basing point. St. Louis and New York are normally quoted 0.15c. apart.

Some current freight rates on metals per 100 lb., are: St. Louis-New York, 15½c.; St. Louis-Chicago, 6c.; St. Louis-Pittsburgh, 12½c.; Chicago-Baltimore, 10½c.; Chicago-New York, 13½c.

Zinc and Lead Ore Markets

JOPLIN, Mo.—Oct. 3

The high price of blende is \$45, the assay base \$39@42; metal base, \$37@39 per ton of 60% zinc; calamine base, \$22@23 per ton of 40% zinc; average all grades of zinc, \$37.52 per ton. The high price of lead is \$47.95, the base \$46 per ton of 80% metal content; the average of all grades is \$45.70 per ton.

SHIPMENTS WEEK ENDED OCT. 3

	Blende	Calamine	Lead	Value
Totals this week..	8,662,140	1,192,800	1,567,280	\$220,790
Totals this year..	400,167,920	30,165,400	68,882,020	9,932,760

Blende value, the week, \$171,580; 40 weeks, \$7,949,990.

Calamine value, the week, \$13,350; 40 weeks, \$351,430.

Lead value, the week, \$35,860; 40 weeks, \$1,631,340.

PLATTEVILLE, WIS.—Oct. 3

The base price paid this week for 60% zinc ore was \$40@42 per ton. The base price paid for 80% lead ore was \$44 per ton.

SHIPMENTS WEEK ENDED OCT. 3

	Zinc Ore, lb.	Lead Ore, lb.	Sulphur Ore, lb.
Week	4,257,840	118,260	799,240
Year	121,309,600	4,040,760	26,451,870

Shipped during week to separators, 4,272,330 lb. zinc ore.

IRON TRADE REVIEW

NEW YORK—Oct. 7

Iron and steel exports in August amounted to \$6,599 gross tons, against 114,790 tons in July, an average of 141,000 tons a month during the first six months of the year and a record rate of 275,000 tons a month reached for a few months back in 1912. The decrease in August proves to be much less than expected. August iron and steel imports, largely ferromanganese, were 28,768 gross tons, an increase of 14% over July imports, and the heaviest for the year, excepting April. September is not likely to show large exports, as very little fresh tonnage was entered, but export bookings are now at approximately the rate for a few months before the war. In the past fortnight the Steel Corporation has booked about 70,000 tons, its first really large export sales since the war started. Some of the independents have participated in export business, particularly in rods, wire and nails for England. Canada is buying somewhat more freely. South America presents very poor prospects.

The reduction in freight rates on Alabama iron, ordered by the Interstate Commerce Commission, took effect Oct. 1. It is generally about 35c. a ton, but has not been accepted by all the lines north of the Ohio. The chief selling points affected are Cincinnati, St. Louis, Chicago, Cleveland and Buffalo.

United States Foreign Trade in Iron and Steel, including machinery, seven months ended July 31, is valued as follows by the Bureau of Statistics of the Department of Commerce:

	1913	1914	Changes
Exports	\$179,703,554	\$129,816,916	D. \$49,886,638
Imports	20,872,321	18,752,973	D. 2,119,348

Excess, exports .. \$158,831,233 \$111,063,943 D. \$47,767,290

The decreases shown this year were 27.8% in exports and 10.1% in the imports.

PITTSBURGH—Oct. 6

There has been no noticeable decrease in domestic buying in the past week or two, but the rate is a low one, probably not over one-third of capacity at the outside, while production and shipments are at an average rate of about 50% of capacity, and further curtailment is to be expected within a few weeks unless buying increases very decidedly. An interesting fact is that the Carnegie Steel Co. has scarcely varied at all from a rate of about 62%, measured in ingot capacity, for four months.

Prices have shown a softening tendency in spots, but this is not uniform. Sheets have firmed up to an absolute minimum of 2c. and 3c., Pittsburgh, for black and galvanized. Tinplate has sold this week at \$3.40 and \$3.50, though there are reports that \$3.25 can be done in some instances. The minimum on shapes has dropped \$1 a ton to 1.15c., following a similar weakening in bars and plates, but 1.20c. is still quoted on ordinary business by the large mills in the case of all three products.

Pig Iron—The market continues absolutely stagnant, but there are no evidences of any weakness, blast furnacemen representing that they will blow out their furnaces rather

than cut prices. Deliveries are scarcely equal to production, even though production is at the lowest level for years. We continue to quote: Bessemer, \$14; basic, \$13; No. 2 foundry and malleable, \$13@13.25; gray forge, \$12.50@12.75, f.o.b. Valley furnaces, 90c. higher delivered Pittsburgh.

Ferromanganese—The English makers have made a further reduction on forward deliveries, amounting to \$7 a ton, and now quote \$68; Baltimore. There is nothing doing in prompt lots, as supplies are ample. Dunbar furnace which was expected to make an alloy of 30 to 40% manganese has not yet gone in and there is a question whether much of such material could be sold.

Steel—At last there has been some action in unfinished steel, after a period of weeks in which \$21 for billets and \$22 for sheet bars were quoted as asking prices. Efforts to sell sheet bars resulted in \$20.50, maker's mill, Youngstown, being done, but no very large tonnage could be disposed of even at this cut price. We now quote billets at \$19.50 and sheet bars at \$20.50, maker's mill, Youngstown, and billets at \$20 and sheet bars at \$21, maker's mill, Pittsburgh. It is understood that a large block of openhearth sheet bars has been offered at \$20, delivered Pittsburgh, without finding a taker, but that fractional parts would hardly be sold except at an advance. Rods are \$26, Pittsburgh. Export quotations on billets, sheet bars and rods are now at about the domestic level, against premiums formerly asked.

IRON ORE

Imports and Exports of Iron Ore in the United States seven months ended July 31, in long tons:

	1913	1914	Changes
Imports.....	1,408,170	850,883	D. 557,287
Exports.....	521,497	378,131	D. 143,336

Of the imports this year 487,563 tons were from Cuba and 222,680 from Sweden. Imports of manganese ore were 227,761 tons in 1913, and 163,390 in 1914; decrease, 64,371 tons.

Imports at Baltimore for the past week included 2571 tons of manganese ore from Liverpool and 6250 tons from Rio Janeiro, Brazil.

COKE

Coke production in the Connellsville region for the week is reported by the "Courier" at 247,221 short tons; shipments, 248,063 tons. Production of Greensburg and upper Connellsville districts, 35,155 tons.

Foreign Fuel Trade of the United States seven months ended July 31, in long tons:

	Exports		Imports	
	1913	1914	1913	1914
Anthracite.....	2,448,913	2,211,604	30	15,902
Bituminous.....	10,008,012	7,090,084	826,184	758,044
Coke.....	550,751	408,441	39,098	61,715
Bunker coal.....	4,409,370	4,525,876
Total.....	17,417,046	14,236,005	865,912	835,661

The bunker coal, or coal furnished to steamships in foreign trade, is practically all bituminous. The great bulk of the foreign trade, both exports and imports, is with Canada.

CHEMICALS

NEW YORK—Oct. 7

The general market is still disturbed and unsettled, though there is a better position with regard to supplies.

Arsenic—The market remains extremely dull. In the absence of business, quotations remain at \$4.50 per 100 lb., but this price is largely nominal.

Copper Sulphate—The market is quiet, but steady, on a moderate business. Quotations are unchanged at \$4.50 per 100 lb. for carload lots and \$4.75 per 100 lb. for smaller parcels.

Nitrate of Soda—Business continues quiet, with only moderate sales. Quotations are 1.87½c. per lb. for spot and November-December; 1.90@1.92½c. for 1915 deliveries.

PETROLEUM

The monthly statement of the "Oil City Derrick" shows new oil wells completed in September as follows: Pennsylvania grade, 327; Lima-Indiana, 115; Central Ohio, 88; Kentucky, 13; Illinois, 139; Texas-Louisiana, 92; Kansas-Oklahoma, 660. This shows 1434 wells completed, a decrease of 332 from the August report. New production is given as 131,910 bbl., an increase of 6637 bbl., due to large wells in Oklahoma and the Gulf Coast. Among the completions were 234 dry holes, 75 fewer than in August, and 217 gas wells, an increase of 32, due to the work of the gas companies in Ohio and the Mid-Continent.