

THE ENGINEERING AND MINING JOURNAL

Control of Fire in Sulphide-Ore.

BY W. M. SEAMANS.

Many of our famous copper mines—notably the Anaconda in Montana, the United Verde at Jerome, Arizona, and the Iron Mountain of the Mountain Copper Company at Keswick, Cal.—are or have been jeopardized by extensive mine fires. These orebodies in question are composed largely of iron and copper sulphides. Careful observation shows that almost invariably the stope faces have been carried far beyond the filling and thereby extensive settling of ground was caused. Owing to the subsidence of the ground the orebody becomes broken and fissured, the fissures frequently reaching to the surface.

This settling of large areas naturally causes a grinding action, producing considerable finely pulverized ore, especially on the lines of the numerous fissures. The primary cause of fire is the oxidation of this finely divided iron and copper sulphide, aided by the grinding and crushing action referred to. Fire breaks out spontaneously, follows the fissures, and the intense heat generated actually causes new fissures in even solid bodies of ore.

While fire will travel rapidly in the broken ground, through solid masses of ore, it forces its way, though at an almost imperceptible rate, yet inevitably. Of course the mine timbers ignite; the pyro-ligneous acid gas, added to the sulphurous acid fume, fires the workings and it is consequently impossible to continue operations.

One successful method of controlling these conditions, and extinguishing the fire has been practiced by Joseph J. Shaw, a mining engineer. He reasoned that (as the broken ground might be considered a porous mass) by installing a system of positive ventilation, or, in other words, using a ventilating fan as a blower and not as an exhaust fan, it would be possible to force the sulphurous acid gas back into and through the broken ore. As a natural result the mine workings should be cleared of gas; the hot faces of ore would be chilled and mining operations could be resumed.

This operation was put into practice at the Iron Mountain mine in Shasta county, Cal., by Mr. Shaw, effecting the recovery of all the ore in the fire zone and extinguishing the fire. Thousands of tons of ore at temperatures ranging from 160° F. to 450° F. were recovered with comparatively little inconvenience to the men.

To practice this system successfully, the operator must necessarily know by experience when the air pressure is just sufficient to keep the working places free from gas and not enough to force fresh air through the burning ore. The gases, themselves

being extinctive in character, by being forced slowly through the burning ground, aid in extinguishing the fire.

This plan is also being successfully followed by Mr. Shaw at Senator W. A. Clark's famous United Verde mine at Jerome, Arizona, where extensive fires have seriously impeded operations for a number of years. Though at work but three weeks, Mr. Shaw is sending ore from the fire-zone to the smelter in daily increasing quantities.

Fluorine in Blast-Furnace Slags.

BY L. S. AUSTIN.*

The occurrence of fluorine in lead (or copper) blast-furnace slags is a subject that seems to be ignored by most of the authorities on smelting, but it is well worthy of attention. In relation to this occurrence, I can furnish the following information:

Smelting plants treating Mexican ores have to take into consideration the quantities of fluor spar present in them. For example (and referring to ores of the northern part of Mexico), the Nina Vera contains at times as much as 15 to 17% of CaO, combined with fluorine; ore from the Veta Grande may carry as much as 10%.

Inasmuch as the presence of fluor spar is an advantage in smelting an ore, it must be taken account of, since the fluorine needs CaO to satisfy its needs, and this lime is not available for any other purpose (as, for example, to assist in fluxing the silica). Hence, if we are intending to run a type slag (of the composition 34% SiO₂, 33% FeO and 23% CaO) in a charge containing 2% fluorine, the CaO would have to be raised to 27% to satisfy the fluorine present.

I have by me two examples of slag, one containing 1% fluorine, and the other 3%. Now, another difficulty presents itself in running these slags. The silica (as ordinarily determined) is bound to be reported low, since the HF will carry some of it off when evaporating the solution to dryness to render silica insoluble. This increases the trouble to the metallurgist; since, if unaware of the presence of fluorine, he would imagine he had a sufficiency of lime, when in fact, he should add still more to his charge.

Inattention to this requirement in fluxing the charge has resulted not only in giving a slag high in silver and lead, but even in freezing up the furnace, to the discomfiture of the metallurgist, who did not know where was the difficulty nor what would be the proper remedy for the trouble.

In actual operation, the plan has been to consider the CaO, which will dissolve on digesting the ore with acetic acid, as being in combination with fluorine, and, by keeping a record of all such lime in the charge, it is possible to estimate the

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amount of it so combined in the slag. Aside from this, no further determinations are considered essential to the daily blast-furnace operations.

The analysis of slags for fluorine by the classified methods is quite tedious; nevertheless, such work has been performed, and this resulted in finding it present in them.

The Madagascar Gold Fiasco.

All who have followed recent events in Madagascar will be disappointed by the report of the Lyons-Madagascar Syndicate that has just been issued in Lyons, France. Last year's mining operations in Madagascar resulted in a profit of only \$5,000. The report states that, on account of "lack of experience on the part of the company's engineers, the samples selected for assay did not represent the average value of the gold content of the ore."

The Lyons-Madagascar Syndicate was formed in Lyons in 1895 for exploration purposes. Several concessions were secured; and in 1897 the Syndicate became a limited-liability company, with a capital of \$22,000. Prospecting work was commenced on concessions at Anasaa and Andramary and at several places in the Province of Fénerive. The results appeared so satisfactory that by the end of 1903 the company had made a net profit exceeding \$20,000 out of the gold obtained during prospecting work. The company's \$20 shares rose on the Lyons Bourse to fifteen times their nominal value. Recently, very unfavorable reports on the gold mining prospects of the island were issued by Transvaal and English engineers, and now the hopes built by Frenchmen on the Madagascar Exploration Syndicate and its subsidiary companies have been bitterly disappointed, and it is questionable whether the Governor of Madagascar, General Gallieni, did not act wisely in discouraging gold prospectors. His action has been supported by the Colonial Administration in Paris, where considerable cold water was thrown on the ardor of would-be concessionnaires, and—judging from the report issued by the Lyons Syndicate—not without good reason. Madagascar does not, so far, hold out promise of being another Witwatersrand.

Gold Mining Prospects in Panama.

James Boileau, a Detroit mining engineer, who recently arrived in New York from Colon, expresses the opinion that the Isthmus of Panama promises to become an important gold-producing district.

At present the practical impossibility of determining the legality of land titles prevents mining companies from attempting to operate on a large scale. In Canaz, where Mr. Boileau's company has been operating, pay ore was discovered in large quantities near the surface, and the slag heaps of primitive mines worked years ago were found to repay working over.

Surveying Secondary Mine Openings.*

BY FLOYD L. BURR.

One of the problems encountered by most mine surveyors concerns the location and alignment of those openings which, from the surveyor's point of view, might be termed "secondary." These "secondary openings" are chiefly raises, winzes and stopes; but they often include short or crooked drifts more or less remote from the principal workings, or accessible only with difficulty from the regular levels. It is not to be implied that these places are unimportant; indeed, they are often of great importance in the exploration, development and exploitation of the ore. However, it is not usually necessary to make elaborate surveys of these places, nor to determine all azimuths and distances with the same degree of accuracy that is required for the general survey of the mine. In short, these openings must be approximately but not accurately located.

Of course all this work can be done with a transit in the usual way; and I believe most beginners would be inclined at first to do it in that way. In the great majority of cases, however, the use of the transit in such places involves so much danger to both man and instrument, so much general difficulty in taking steep sights, and so great an expenditure of time in the building of stagings and in the setting up the instrument in cramped, wet and dirty places, that it is impracticable.

In resorting to hand instruments, the angle in the vertical plane offers no difficulty, as almost any clinometer is capable of giving sufficiently close results. But the matter of the azimuth is not so easily treated. Usually the compass is employed, and occasionally with good results; but it is not reliable. In working around these cramped, crooked places, one cannot readily eliminate the effect of pipes, drills, etc., which are generally present and often hidden.

Having encountered a goodly number of these problems, I have finally settled upon the following scheme, which I believe serves the purpose better than anything else. As far as I know, no one else has ever tried it in this form. The idea is an outgrowth of the old Cornish method of stretching wires or strings from one point to another, and hanging thereon the compass or clinometer, thus determining the magnetic bearings and the vertical angles of all the lines. This method is cumbersome and has the same old inherent fault of depending upon the magnetic needle. I believe further that it would be difficult to use it on lines steeper than 30° or 40°. My plan is to stretch a strong, smooth string from one point to another, taking in usually, at one setting, all points of the proposed traverse. The angles between the portions of the strings are determined

by measuring with a steel tape line from the vertex out to each of two "riders" (placed one on each string at suitable distances out), and then measuring across from one "rider" to the other. It is obvious that by the measurements the angle is determined, and it remains only to lay it out graphically or compute it in the office.

When the angle is in an approximately horizontal plane (as would usually be the case in the survey of a drift) there is nothing more to be done. When one or both legs of the angle are inclined (as in the survey through winze or raise), the angle will be in an inclined plane, and further observation is necessary in order to determine its horizontal projection; the vertical angle of each leg must be found. This may be accomplished, and my usual practice is to hold the straight-edge of a clinometer lightly up against the under side of the string and set the instrument by successive approximations. For this I use Brunton's pocket mine transit, but any other clinometer would do as well. In the absence of a clinometer, a plumb bob may be suspended from the vertex (or from a point vertically over the vertex), a "rider" is placed on the plumb line, and measurements are made to each leg of the angle.

Only a fairly smooth string and one uniform in size should be used; of course it must be wound on some kind of convenient reel, such as any blacksmith can easily make. It is desirable to have as much as 300 or 400 ft. of string. I carry with me a small spool of No. 22 soft copper wire for "riders," merely breaking off a piece two or three inches long, and giving it one or two close turns around the string.

Nails or spikes, driven into the sides of drifts or raises, or into convenient timbers, serve for points, the string being given one or two turns around the nail under the head. Care must be taken to have the string entirely free between points. For maximum accuracy, the points should be so chosen that the angle never exceeds 160° (though fair work may be done with greater angles). Obviously, the farther the riders are placed from the vertex the more accurate the determination. Generally the distances are about 5 or 6 ft. Measurements should be taken carefully; say, to the nearest 1-200 of a foot. The intersection of the lines of the two strings is the vertex. It is not necessary to avoid wet, dirty places. Special arrangements of the strings will suggest themselves for special situations.

The notes may be kept in any convenient form, but must record whether the deflection in the horizontal plane is to the left or right.

In the office the angle is determined graphically by laying off the three measurements to a suitable scale; say, one foot to an inch, and measuring the resulting angle with a protractor. The solution may be accomplished (on the prin-

ciple of the slide rule) by the aid of a chart giving the logarithms of the sines and cosines of all angles from 0° to 180°, by lengths of lines drawn to a suitable scale. These lengths are taken off with a pair of dividers and combined graphically. Probably the most satisfactory solution for ordinary work is by pure graphics.

The accuracy of this "string method" is fully as great as is necessary for the work for which it is to be used. With ordinary care the horizontal angles may always be determined within one degree of the true figure, and often within ten minutes of arc.

Copper Refining.

According to Boleslas Bronislowski (*L. 'Eclairc. elect.*, 1905, XL, Suppl. XXVI-XXXI), the electrolytic factory of Nicolaeff, in Moscow, Russia, produces yearly 500 tons (metric) of electrolytic copper, of 99.8 to 99.9% purity; this is made from ore containing not less than 50% Cu, mixed with melted scrap (sawings), carrying 75 to 80% Cu. As by-products, there are obtained 1 ton (metric) of silver and 0.04 ton (metric) of gold. There are 240 lead-lined wooden tanks; with four 30-kw. dynamos, of 300, 400 and 500 amp. capacity, respectively, and an efficiency of 82 to 84%. The energy loss in the whole plant is 27 to 28%. The current density is 20 amp. per sq. meter; the potential, at an electrode separation of 5 cm., is 2.7 v. The electrolyte is conveyed by 12 acid-resisting steam pumps, and is stirred by air-blast. It is brought up (from 4 or 5% Cu, and 6% H₂SO₄) to a standard of 10% Cu, with copper oxide. For storage, refining and standardizing, 67 tanks are required. Blue vitriol is made from the waste electrolyte. The residue of "white-metal" oxides (antimony) is worked up for anti-friction metal, the gold and silver being separated electrolytically. Also, saving is made of the salts of nickel, chromium, etc. The plant encloses 35,620 sq. meters (8.8 acres), of which 7,770 sq. m. (1.9 acres) is occupied by buildings.

Gold in Labrador.

Advices from Newfoundland state that (in addition to Dillon Wallace and Mrs. Hubbard) other prospectors were out searching for gold in Labrador this summer. Messrs. Cabot and Quackenbush, of Boston, recently penetrated the interior on a similar quest. Both were reticent as to the result of their prospecting; but it is understood they struck inland from Davis Inlet, and that their objective point was a region said by the Montaignis Indians to contain gold. It is understood that the prospectors will return to Labrador next summer with a complete equipment and undertake mining operations. It is probable that many other prospectors will visit Labrador next year.

*A paper read at the Lake Superior Mining Institute, Menominee Range, Oct., 1905.

Shaking Screens at the Truesdale Washery.

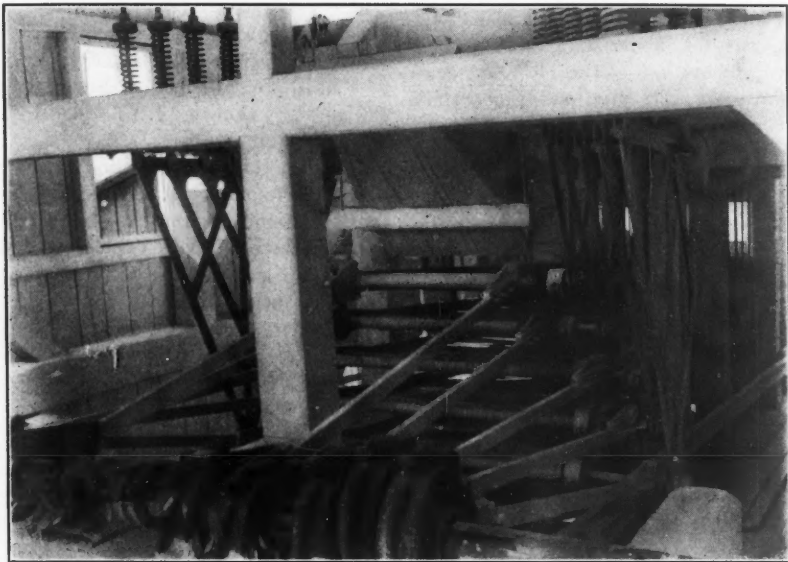
The washery is an annex to the breaker at the Truesdale plant of the Lackawanna Company; it is designed to handle all coal dropping through the chestnut screens of the breaker; in addition thereto the "bony" (coming from the mechanical pickers of the breaker) is re-broken and goes to the washery for preparation. Consequently, five sizes of coal are made in this building, namely, chestnut, pea and the three buckwheats.

The sizing is done on two shaking screens; during the separation the coal is washed by copious streams of water. After leaving the shakers, the chestnut and pea sizes go over spiral pickers for the removal of slate, and then to pockets. After being screened the buckwheat sizes are sent directly to pockets.

The accompanying illustration shows one of the shaking screens in position at

of adjusting them to balance. At the Truesdale, the screens are suspended by rods and are balanced by the special arrangement shown in the illustration. The hangers at the eccentric end are in the form of a triangle whose base is uppermost. The lower end, or apex, constitutes a journal for a bar connected with, and supporting, each screen respectively. Each triangular hanger is supported by a shaft which passes through a journal in the middle of the base of the triangle. The screens are balanced by tightening or loosening the springs attached to each of the two upper corners of the triangular supports. This construction is shown in the illustration; the balancing of each screen is obvious. The springs should be so adjusted as to tend to return the screen to a middle position during its movement back and forth.

The shaking motion is transmitted to



SHAKING SCREEN AT TRUESDALE WASHERY.

the washery. The view was taken at the eccentric, or high end; the sides of the five screens, making up the shaker, do not show clearly on account of timbers being in the way. The two top screens of this deck are 5 ft. 9 in. wide; the three bottom ones are 6 ft. 2 in. The top screen is 30 ft. long; they decrease in length at a nearly uniform rate, the bottom screen being only 25 ft. long.

Each deck of the shaker is built of 3 by 4 by $\frac{5}{8}$ -in. timber, with $2\frac{1}{2}$ by $2\frac{1}{2}$ by 5-16-in. angles, to which are bolted round-mesh, perforated-steel screen-plates. There is a space of about 16 in. vertically between the screens; they all pitch about 1 to 12 in the direction of flow of the coal. Each of the five decks is suspended by iron hanger-rods, except at the eccentric and where a special support is used.

Mechanical engineers differ as to the best methods of hanging screens and also

each screen by a pair of eccentrics attached to the end, as shown. The eccentric cams are keyed 72° apart on the driving shaft. If all the screens moved in the same direction at the same time, excessive vibration of the building would result; this tendency is largely remedied by working the screens against each other. In connection with this, attention to balancing by means of the springs is particularly important. This shaker will be driven by a 19-h.p. electric motor, giving the eccentric shaft 150 r. p. m.

At some breakers and washeries, the shakers have board hangers; such an arrangement serves not only as a support, but also balances the screens and tends to prevent side motion. However, the device here illustrated is capable of quick adjustment at any time; it is a simple matter to prevent side motion by having the screens travel between posts provided with iron plates at the bearing points.

Unwatering the Hamilton Mine.*

BY JOHN T. JONES.

In September, 1891, this mine (which is at Iron Mountain, Mich.) was sinking its No. 2 shaft on what may be called a "stunt contract." The men were working under a verbal contract (which lasted during the entire sinking of the shaft), as follows: They were paid company account \$2.25 per day up to 50 ft. per month. On all distance made over 50 ft. they received a bonus of \$1 per foot for each man. For the month of September, each of the men (30 in number) received a bonus of \$67; this means that they sank and timbered 117 ft. for that month. There had been a gradual increase from 50 ft. at the start to 117 feet.

The entire shaft is in dolomite of the following composition: 65% lime, 30% magnesia, and 3% silica. It was hard on steel, although breaking well with 45% powder. All was going merrily and the men were in expectation of beating the September record. The shaft had been sunk thus far with barely enough water to do the drilling.

On Oct. 22, I noticed a commotion at the collar of No. 2 shaft. The men had just brought to surface a miner, named Biddick, who had been finishing the last hole of a series in the northwest corner of the shaft. The method of drilling the holes involved the use of four cross bars which were lowered at the same time, with two drills on each bar; as soon as the drills had finished their holes the bars were hoisted to the surface. All had been hoisted, but Biddick, when he struck into a vug. The water came out with such force that Biddick was tossed about like a ball, and was brought to the surface blinded and nearly dead.

Captain Carbis and myself got in the bucket; we gave orders to the engineer to hoist to the surface at the first stroke of our bell, and went down. All that could be seen was a "water spout" boiling up through a flood of water. The drill and cross-bar were left in the bottom of the shaft (1,448 ft. deep).

The plan for cutting down the shaft contemplated 24 holes as follows: The eight end-holes to be perpendicular; those in the next row, at a slight angle; the eight center-cut holes, at about 60° . The whole series were drilled; then all were plugged with turned plugs, except the eight center-cut holes. These were first blasted and mucked out; then the angle holes were blasted and mucked, and the end holes last.

Toward evening, Mr. Banks (superintendent of the Ludington mine) came to my office and said he was much obliged to me for taking the water from the sump at "A" of the Ludington, the water going to my new No. 2 Hamilton. This sump was several hundred feet above

*A paper read at the Lake Superior Mining Institute, Menominee Range, Oct., 1905.

where we cut the water in No. 2. The water continued to rise in No. 2 until it came within 90 ft. of the collar of the shaft. We were then installing the 10-ton hoisting plant and decided to try bailing to see if the water would abate. We were working at this plant when, on December 31, the hanging wall of the Ludington began to move, and the water came into the eleventh level of that mine. The water was measured, and was running at the rate of 6,000 gal. per min. This drowned out the Ludington and filled the No. 1 Hamilton. The Ludington made futile attempts to get the water down until February 6, 1892, when they pulled the pumps and abandoned the mine. The water then rose until it reached the water level in No. 2 Hamilton, 90 ft. from the surface.

At this period negotiations were pending to have the Hamilton and Ludington take care of the water jointly. Not being able to agree on any proposition, P. L. Kimberly bought a controlling interest in the Ludington, the minority agreeing to form an unwatering pool and divide the expense, *pro rata*, between the two companies, according to the holdings of the stockholders. It was the opinion of most of the stockholders that the water came from a vug, or cavern, and that, after emptying, it would abate and assume the normal flow. All were of the opinion that if the flow of 6,000 gal. was constant, the properties would be valueless.

By June, 1893, the five shafts were equipped with bailers of a total capacity of 8,000 gal. per min. Before starting, we had to connect the 1,325-ft. level of the No. 1 Hamilton (which was still dry) with the No. 2 on account of the latter having a bailing capacity of 2,560 gal. in each of its two large bailers (or ten gross tons per trip) and two other bailers with a capacity of 500 gal. each. On April 1, 1892, we made a test of the bailers in No. 2, and found that we could keep the water down by running about one-fourth of the time. We then closed down until we finished negotiating.

We had made the opening to connect with the 1,325-ft. level at No. 2, and had started a crosscut from No. 1 toward No. 2, leaving a distance of 275 ft. to connect the two shafts. This connection would have to be made through No. 2, and the question arose: What would be the danger to human life when the time should come to put in the final shot that would bring the water?

It was decided to drill advance holes (one center hole and four angle holes) 28 ft. long. Mine surveying has been reduced to a science; but, when life is at stake, it takes great faith to place men in a dangerous position. So we were compelled to take additional precautions in these holes. The advance holes would act as scouts. We started these feelers when within 50 ft. of the breast in No. 2 crosscut. The pressure of water at this depth is practically 600 lb. to the sq. in. (43 tons per

sq. ft., or a total of 6,000 tons against the face of the drift). When within 50 ft. of the water, the drift began to wrinkle, making a continuous shower of limestone flakes fall from the roof of the drift. That was the time that tried the men. But Capt. Carbis and his assistants never flinched. They kept working until one of the drills struck through.

The expectation was that water would come, but it was compressed air that had been driven ahead of the water on that drift when it came into the Ludington; and it had remained there under a pressure of 6,000 tons. When the drill was released from the chuck, it went back out of the hole like a ram-rod out of a gun, struck the side of the drift and bent like a bow. The remaining holes were then charged and fired. After the blast the captain let down a box with candles and found the barrier was still unmoved. He then recharged all the holes, tamped them and fired again; this time the water came up the shaft almost faster than a man could climb, but the undertaking was accomplished without loss of life.

The bailers were then put in operation and in 21 days we had lowered the water 896 ft.; hoisting 54,000,000 gal. with the large bailers at No. 2 Hamilton; 10,000,000 gal. with small bailers at the same shaft; 4,000,000 from the Ludington "A" shaft; 11,000,000 from the Ludington "B" shaft; 600,000 from Ludington No. 5; and pumping 4,000,000 with a Cornish pump; making a total of 87,000,000 gal. in 21 days. In 90 days 125,000,000 gal. were pumped. The flow was then normal, and in six weeks the water was out of both mines.

In conclusion, I would advise anyone undertaking a like job, to drill diamond drill holes at least 75 ft. ahead, and tap the water with enough holes to lower the water.

Potassium Salts.

In the press bulletin of the U. S. Geological Survey, No. 201 (Oct. 16, 1905) in commenting on potassium salts, W. M. Curtis points out that there are seven districts in the United States (including a Mexican locality extending into the United States), which seem to offer the most favorable conditions for boring and in which a hole put down 1,000 to 2,000 ft. would decide whether a field has a bed of potassium salts or not. These seven fields are in the neighborhood of (1) Cody, Wyo.; (2) Magnesian Lake, near Laramie, Wyo.; (3) Byron Springs, Contra Costa County, Cal.; (4) Death Valley, Cal.; (5) Sierra de las Cucapas basin, Lower California, extending into San Diego County, Cal.; (6) Boundbrook, N. J.; and (7) Mount Tom, Mass.

The first passenger coach drawn by a steam-engine was invented by William Lymington, of England, in 1786.

Accidents in Michigan Iron Mines.

The report of John T. Quine, inspector of mines for Marquette county, in Michigan, covering the year ending Sept. 30, 1905, shows that there are in that county 28 iron mines and one quarry. The total number of men employed in and about the mines during the year was 5,000. The total number of men killed during the year was 22, an average of 4.35 per 1,000 employed. Of these accidents 18 occurred underground and 4 on the surface. The causes of the underground accidents were: Fall of ground, 4; cave of ground, 3; premature blast, 4; powder explosion, 2; falling down shaft, 2; falling down slope, 1; fall of drill tripod, 1; struck by pump plunger, 1. The causes of the surface accidents were: Hoisting rope, 1; falling from dump car, 1; crushed by dump car, 1; struck by gear wheel on steam shovel, 1. The report describes these accidents in detail.

The variety of nationalities in the Lake region is shown by the statement of persons killed, which is as follows: English, 7; Finnish, 6; Swedish, 4; Norwegian, 2; Italian, 2; Danish, 1. There are no Americans on the list.

The inspector calls attention to the fact that only four accidents were caused by falls of ground, an unusually good record. Six men were killed by explosives, and in three cases, at least, the accident was due to carelessness. It seems difficult to impress miners with the necessity of using proper precautions in handling explosives and setting off blasts.

The year was one of great activity in the iron mines of the county.

Mineral Production of Peru.

The *Boletin del Cuerpo de Ingenieros de Minas del Peru*, No. 24, states that the mineral and metallic production of Peru in 1904, compared with 1903, was as follows:

	1903.	1904.
Coal, metric tons.....	42,920	42,920
Bituminous shale, metric tons.....	16,000	16,000
Coke, metric tons.....	1,000	1,000
Crude petroleum, metric tons.....	37,079	38,683
Kerosene, cu. meters.....	2,744	2,744
Gasoline, cu. meters.....	110	110
Benzine, cu. meters.....	50	50
Residuum, metric tons.....	4,000	4,000
Lead, metric tons.....	1,302	2,209
Copper, metric tons.....	9,497	9,504
Silver, kilos.....	170,804	145,166
Gold, kilos.....	1,078	601
Borax, metric tons.....	2,466	2,675
Salt, metric tons.....	17,637	18,545
Sulphur, metric tons.....	21	21

The output in 1904 had a total value of \$6,662,910, United States currency.

According to statistics collected by the *Chicago Chronicle*, upward of 300,000,000 barrels and kegs are manufactured annually in the United States. The largest demand is in the cement business, which uses approximately 35,000,000 barrels per annum. About 15,000,000 barrels and kegs are required for bolts, nuts and nails. [The estimate for the consumption in the cement industry is evidently exaggerated.]

The Dunderland Iron-Ore Deposits.

SPECIAL CORRESPONDENCE.

The opening of the Dunderland iron-ore deposits in Norway by the English company controlled by many of the leading British ironmasters, is proceeding as rapidly as possible, and as the whole of the plant (with the exception of the briquetting machinery) is now in position, a short account of the scheme will be of interest.

These iron-ore deposits contain about 50% of magnetite and hematite. The ore has to be crushed, magnetically concentrated, and briquetted. The deposits are situated about 12 miles inland from the head of Ranen Fjord, and are about 200 miles from Trondhjem. A port has been made at Gulsmedvik, at the head of the fjord, and the harbor has been dredged and loading piers built. The railroad has been constructed from the port to the ore deposits, through rugged and difficult country, full of gorges and cataracts.

girders, which are supported by two concrete piers, 42 ft. apart and 90 ft. high. After passing through the coarse-crusher house, the ore is carried by means of belts to the top of a drying house, and is afterward passed by belts to the coarse-stock house. From there it is taken to the fine-grinding house, where it is reduced to about 40-mesh size.

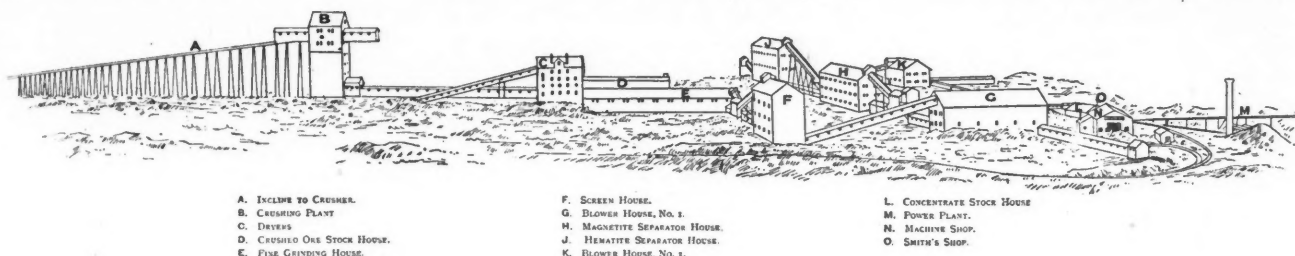
The concentration is done in four stages. The finely ground ore is passed through a blower house, where the impalpable gangue is blown away, and it is then passed successively through two sets of magnetic separators, the first of which extracts the magnetite and the second the hematite; and finally the magnetite and hematite are passed through a second blower house, where the ore is further cleansed from impurities. The ore is then stocked in the concentrate stock house, from which it is loaded into cars and transported to the briquetting plant at the seaport. At the present time the whole of the above-described plant is in

Process for Purifying Tantalum.

The firm of Siemens & Halske has recently secured the Bolton electric process for purifying tantalum (U. S. patent No. 799,441). This was developed by Werner von Bolton, a Russian, and is an improvement on the sodium process of reduction in that the metal is freed entirely from oxides.

Since tantalum has an affinity for nearly all known elements (being especially liable to react with them at high temperature), it occurred to Bolton to try the electric furnace in a vacuum. He found it impossible to use carbon electrodes, because of the liability of forming tantalum carbide, and therefore employed metal electrodes, and successfully, especially when made of tantalum.

The proposed method of reduction consists in first forming the impure metal into rods, or other suitable form, by pressure or by pounding in a crucible of refractory material. Such a crucible may consist of



A. INCLINE TO CRUSHER.
B. CRUSHING PLANT.
C. DRYERS.
D. CRUSHED ORE STOCK HOUSE.
E. FINE GRINDING HOUSE.

F. SCREEN HOUSE.
G. BLOWER HOUSE, NO. 1.
H. MAGNETITE SEPARATOR HOUSE.
J. HEMATITE SEPARATOR HOUSE.
K. BLOWER HOUSE, NO. 2.

L. CONCENTRATE STOCK HOUSE.
M. POWER PLANT.
N. MACHINE SHOP.
O. SMITH'S SHOP.

CONCENTRATING WORKS AT DUNDERLAND MINES.

The most difficult part of the work was encountered half a mile from the port, where a cutting had to be made through a blue glacial clay, which, when saturated with water, formed a fluid mud. During the spring and autumn there is a heavy rainfall; and on those occasions, and also on the break-up of the frost, the clay oozed and slipped down, filling the cutting in a short time. It was impossible to adopt an ordinary angle for the sides of the cutting, so additional earth had to be removed, and after careful draining the whole of the slopes and the roadbed were covered with three feet of sand, in order to keep the frost and damp from the blue clay. The railway is now complete, and in all sections effectively resists the action of the weather.

The ore deposits are worked by open cut. The rock is blasted and loaded by means of steam shovels into cars. The rate at which ore will be won will be from five to six thousand tons a day. The loaded cars proceed to the mill and discharge the ore at a height of 75 ft. into the coarse-crushing house. This house contains four sets of rolls, which gradually reduce the ore to half-inch size. The first rolls, called the giant rolls, reduce the material to 10-in., and are capable of breaking pieces of rock 10 tons in weight. They are 7 ft. in diameter and 7 ft. wide. This crushing plant is built on steel

place and in full working order, waiting only for the completion of the briquetting plant.

The most difficult part of the whole scheme has admittedly been the devising of a system of briquetting that would produce a briquette efficient in the blast-furnace, and at sufficiently low cost. Many experiments have been made with various systems before embarking on great expenditure. A system has been finally adopted in which nothing but water is mixed with the ore, and a pressure of five to six thousand tons to the square inch is used in molding the briquettes. These briquettes are then placed on small cars and passed through gas furnaces, where they are heated to a temperature of 1,300° C. It is hoped that the briquetting plant will be ready in the spring.

Notwithstanding the plentiful supply of water power in the district, steam is used, and the power is mostly distributed by electric motors. It was considered advisable to instal a steam plant, as the capital expenditure on a water supply would have been too great.

Up to the present time nearly \$10,000,000 have been spent on this enterprise. If the briquetting plant comes up to expectations the whole plant should be in active operation by the summer of 1906, and it is not likely that any further capital expenditure will be required.

oxide of magnesium or thorium; it is lined on the inner side with a conductive coating, as of metallic tantalum. The contents of the crucible are connected to one pole, preferably the anode of a continuous current. A rod of tantalum metal (of sufficient size to prevent its being melted in the arc) serves as the cathode. A large cathode may be made of silver; but if too small, it will melt.

The crucible containing impure tantalum is enclosed in a casing with the electrodes, and an air-pump is attached to produce a partial vacuum. The casing has a spy-hole of glass, and provision is made for shifting the position of the cathode without destroying the vacuum. In operation, the cathode is moved over the surface of the mass of impure tantalum, so that the electric arc passes successively through all parts of the mass, melting the metal and expelling the oxygen or oxide. In this manner large lumps of pure tantalum are obtained, homogeneous and free from blisters.

Quicksilver in Arizona.

Quicksilver deposits occur in Yuma county, Arizona. The Colonial Mining Company is developing a mine at Cinnabar, 14 miles from Ehrenberg. A shaft, 180 ft. deep, has been sunk on a 6-ft. vein carrying 5% of cinnabar. Arrangements are being made to erect a reduction plant.

Tropical Climate as an Economic Factor in Mining.

BY J. P. HUTCHINS.*

In view of the rapidly increasing interest taken in placers located in the tropics, and particularly available for working by the dredging method, any emphasis on the importance of climate as a chief factor will certainly be apropos. Success in dredge-mining is largely responsible for a search that is only in its beginning, and which will result in a thorough investigation of the auriferous valleys of the equator. Many men will take part in this work, and a certain discretion in the selection of these men, aided by prudent preparation on their own part, will be of great benefit. In many instances, men have been sent who were unfitted for living in the tropics. This has proved disastrous both to employer and to employee; it has resulted in financial loss for the former; often the employee returns without accomplishing anything, and broken in health, if indeed he returns at all. The object of this article is to give a statement of what actual experience in a recent trip to the interior of Colombia suggests.

A serious handicap was a lack of proper preparation, and here I speak feelingly. It may be well put on the plane of an economic problem, and in this aspect it merits careful thought. Mature consideration (by anyone about to investigate the tropics, either as employer or employee) will certainly tend to a bettering of present conditions. Climate is a more serious drawback to operating in the tropics than either unstable government or inferior transportation facilities. Besides being immutable, the climate is largely responsible for bad government, and it is entirely to blame for bad transportation. The axiomatic statement, "Bad climate makes bad people," means bad, both morally and economically.

The bearing of climate on the operation of mines is one that is not sufficiently recognized; although climatology, as affecting mining, has had some attention during recent years. It has included the numerous problems of working the many kinds of frozen alluvion in the far north and progress has been made; but there is still much to be accomplished. For instance, the exploitation of a vein mine in a zone where the ground is perpetually frozen is yet to be successfully accomplished; neither have all of the problems of the frozen placers been satisfactorily solved. It is not generally supposed that tropical climate is such as to make any particular difference, and the ignorance concerning it is simply appalling. Many mining failures have been caused almost entirely by adverse climatic conditions, and an increased prudence, in any consideration of properties located in equatorial regions, is absolutely essential.

*Mining engineer, New York.

An account of the climate of Colombia will prove helpful. Its remarkable diversity is due to unusual topographic features. Like other equatorial countries of South America having the lofty Cordilleras within their boundaries, it is unique in this respect: Deep valleys penetrate high plateaus and mountainous regions. The daily range of temperature depends solely upon the altitude. The variations of temperature due to altitude are perennial; and, if the altitude of any district is known, its temperature can be inferred quite exactly, and its climate approximately. In the valleys and at all altitudes less than 3,000 ft., tropical temperatures of 100° F. as maxima and extremely high humidities are the rule. Between 3,000 and 4,000 ft., the range is, roughly, 80° to 85° F.; between 4,000 and 5,000 ft., 70° to 75° F.; between 5,000 and 6,000 ft., 65° to 70° F. Bogotá, at 8,300 ft., has 50° to 60° F. for its range. Two rainy and two dry seasons (the former beginning with the equinoxes, the latter with the solstices, and each of about three months' duration) normally occur. Frequently the littorals have longer wet than dry seasons, while the dry seasons are likely to be longer in the interior. Years of abnormal seasons are not infrequent.

The coastal and valley regions (though in parts about 10° N. lat.) are hottest, while the valleys (where distant from the coast and not within the zone of the trade winds) have the worst climatic conditions. The temperatures are seemingly higher. The writer has observed 103° F. in the shade. No breeze nor other palliating circumstances tempered this almost infernal heat, and an atmosphere, seemingly supersaturated, added to a discomfort almost painful in its intensity. The white man of temperate zones does not thrive in such pestilential conditions, and he must be selected with a due consideration of his fitness. This does not mean, merely, that he should be rugged in health. He will be exposed to yellow fever (always existent and frequently epidemic on the coasts) from which he must start for the interior, where it is found only in isolated cases and below an altitude of 1,500 ft. Bilious and intermittent fevers, dysenteries, diarrheas, and beri-beri are prevalent; they seem to be caused by poor food and exposure to infection, the numerous means for which—air, earth and water—all combine to supply. It may seem that in such environment white men cannot live; this, however, is not the case. With a few simple precautions it is possible not only to live, but to do a fair amount of work as well. Anyone with easily deranged digestion or at all subject to disorders of the alimentary tract or to any of its organs of secretion or excretion, should stay away. In the history of patients afflicted with the above mentioned complaints, it will be found, almost invariably, that preceding

the sickness, there is marked decrease in vitality and a consequent anæmic and debilitated condition. This is caused by unsuitable food, with various other accessory, though more easily remedied, causes.

Many of us have been led to believe that the tropics are the lands of Panama hats, long cigars and lemonades, delicious fruits on every tree, and willing menials to serve with keen delight for a mere pittance. The real state of affairs is an absolute dearth of luxuries (which are rather to be rated as necessities in the tropics), while the absolute necessities, such as good, wholesome food, well cooked and appetizingly served, and the ordinary care of a usually unsanitary and uncomfortable dwelling and other things conducive to one's fitness, are almost unobtainable. Fresh meat, well cooked or even prepared so as to be edible, is, in nearly all the interior valleys, difficult to get. Beri-beri, a disorder not well understood, is said by some medical authorities to be due almost entirely to this condition. To have good fresh meat, a refrigerating plant is essential; and any operations, contemplating the permanent employment of white men, should provide one. This may seem rather in the nature of luxury; but if men are to be kept well and efficient, its absolute necessity is apparent to those who have tried to exist on canned meats or putrid and maggoty beef. There are other causes of danger which, though important, are merely contributory and more easily remediable, and may be passed over lightly. It may be mentioned, however, that mosquito-proof houses, if not essential for comfort, are at least necessary for protection from a relentless and unconquerable army of insects, who make any clerical work by day or night a task of divided figuring and fighting. The one idea, which must always be kept in mind is, making constant effort to provide every means for good health. Thus, anything conducive to comfort and even amusement is, in the tropics, a necessary part of mine equipment.

Besides the above mentioned ills, there are the terrible scourges of leprosy and syphilis. The latter is so common as to be a constant menace; the poor natives, in their pitiable ignorance, make little attempt to stay its progress or to effect a cure; the result is horrible. Exposure to it is frequent and unavoidable; thus there is the danger that the numerous insects may break the skin and thus provide an easy means of infection. Prickly heat, in temperate zones merely an annoyance, is sometimes so severe as to cause acute suffering. With other affections common in the tropics causing rash, it results in a pernicious irritation, and it is seldom that the epidermis is not so abraded as to afford numerous chances for infection. The importance of antiseptic washes for such difficulties is apparent; a weak solu-

tion of carbolic acid has been found not only a relief, but efficacious against infection. It is wise for anyone contemplating a trip to equatorial regions to consult a doctor; first as to the fitness of the candidate for such a trip; and, second, as to

tance. Sickness, however, is not entirely avoidable; but simple treatments, some in the nature of preventives, usually suffice. Fortunately, malignant fevers are not common in the interior; there one usually gets sick gradually; he has warning

from a climate hot, humid, and notably unhealthful, to one cool, dry, and remarkably salubrious. Above 4,000 ft. elevation the conditions are good. The inhabitants of the mountains and plateaus are a superior class, and one is able to



FIG. 1. CUSTANITO MINE, TAKEN FROM CONSULTING ENGINEER'S CAMP, BUENA VISTA.—ELEVATION, 600 FEET.

medicines. It must be kept in mind that one is likely to be hundreds of miles from the nearest doctor, in a region where sickness is most common, and where medicines are not to be obtained. Sleeping sickness, so deadly in tropical Africa (and thought to be one form of beri-beri), has not been observed by the writer in South America.

and time to get a radical change of climate, which is all that will effect cures in cases of extreme anæmia and debility, primary stages of most of the common complaints.

The unique topography of the northern countries of South America, having the lofty cordilleras within their boundaries, offers unusual possibilities. There, with

get good food and accommodations, with medical attention if necessary. The surprising and almost incredibly rapid recovery of health and strength is due primarily to good food and a change of climate. The quickest way of getting into the higher altitudes should be immediately ascertained by anyone going into the tropics, and one must be prepared for



FIG. 2. CAMP ON NECHI RIVER.

The prevention of sickness in the tropics should be the first aim of all who go there; only thorough preparation and precaution, by those best informed, can achieve such a result. Therefore good food and accommodation are of prime impor-

a minimum of traveling, it is easy to experience all of "the 24 climates," which the old geographers reckoned between the equator and the polar circle. It is necessary to cover only a few hundred miles in any case, and usually much less, to pass

such trips on short notice. It will be found advantageous to send white men to the mountains occasionally, even though they are not sick; the increased efficiency will no doubt make it good economic practice.

It is not within the scope of this article to dictate what medicines are best; but I give a few suggestions from my experience. The personal factor shows clearly in the choice of the proper medicine to combat as common a malady as "malaria," and methods of prevention and remedies are legion. However, if one can overcome the debilitating influences of climate, food, and environment, not much medicine will be necessary. If the digestion be well regulated, no serious fevers will be contracted. In the tropics, a clean stomach not only makes a clear head, but much more.

It is difficult to impress upon one who has lived only in the temperate zone the necessity of providing a supply of proper food. He is apt to think the conditions similar to what he has been accustomed, and imagines it possible to subsist on the plain, rough food of our mining camps. But it must be thoroughly appreciated that one is to encounter an entirely new and unusual environment; any preparation and outfitting for work in the tropics without a thorough realization of this condition, is almost sure to be not only unsatisfactory, but even of serious consequence. It is not possible to keep well on the rough but indigestible fare elsewhere relished because of good appetite, and upon which we are accustomed to thrive. Bacon and ham, the prospector's *sine qua non*, cannot be regarded as safe in equatorial regions. Besides being difficult of digestion, and, therefore, unsuitable, it is neither possible to keep them without refrigeration, nor even to obtain them in the interior. To one of rugged health and excellent digestion, and who has "roughed it" in the temperate zones, this is all likely to seem unnecessary. But he is the one who, confident of himself, conceited in his magnificent health, and deeming himself invulnerable, is most unlikely to make proper preparation or take good care of himself after reaching the tropics. To him, rather than to his less healthy brother (who is prone to be careful) it is a great and woeful surprise to find himself weakened and shaken through illness caused probably by some indiscreet and unnecessary exposure.

Until refrigeration shall be provided, it will be necessary to depend largely upon canned goods. Canned meats may be had in large variety, but it is well to remember that "potted chicken," "potted veal," "ham loaf," and others with pretty names, all taste as if they were "salt horse" with the salt omitted. Appetizing foods in large variety are essential; roast beef, roast mutton, roast chicken and various ragouts, all canned, are a few which, to one not familiar with tinned food, will be suggestive. Canned soups are exceedingly palatable and nourishing. Vegetables, fruits and jellies are tasty, and should be provided in large variety. In any selection, individual taste must be

consulted; but it must be kept in mind that, whereas one can eat the same food day after day in temperate zones, in the tropics frequent change of fare is necessary in order to stimulate the usually poor appetite. It was noted that in all the camps at some time there was a lack of staple supplies. One should order generously; any excess can be sold to the natives at good profit. The most difficult to provide is some substitute for bread. Various crackers and biscuits are but indifferently successful; whoever relies upon but one form, such as soda crackers, will make a common and inexcusable mistake. Variety must be had in all supplies, and a number of dainty cheeses and other foods which serve as desserts are essential. In purchasing all tinned goods it is wise to get them in small cans, for the contents of an opened can spoil very soon. Supplies such as flour, oat-meal and dried fruits soon become musty unless packed in air-tight cans; and numerous and persistent ants penetrate anything that is not in metallic cases, hermetically sealed. Humidity, predatory ants, and thieving natives make the commissariat a problem. Usually it is possible to obtain canned goods in considerable variety in the coast towns; but it is well not to rely on these fluctuating markets; moreover, supplies purchased in the temperate zones are better in quality, variety, freshness and cost. A small amount of alcoholic stimulants taken as a tonic may be beneficial; but—in spite of testimony to the contrary—it seems that it is better for most men to avoid it.

Clothing for hot climate and numerous garments are necessary. At times excessive perspiration is responsible for several complete changes in a day. Native laundresses use rough boulders for washboards, with distressing results; a generous number of garments (with as few brittle buttons as may be consistent with decency) are requisite. About a dozen Turkish towels may be used as handkerchiefs. One double blanket, several sheets and pillow-slips should be provided. All clothing must be frequently washed (and consequently macerated). So in providing an outfit, one must remember that—like ice and virtue—it does not last long in the tropics. High hunting boots or "bootees" reaching half way to the knee, though hot, afford a needed protection from numerous venomous snakes. It is to be remembered that any superfluous garments can always be advantageously sold to the natives; hence it is wise to be sure to provide an ample supply of clothing. Import duties fluctuate rather surprisingly, but supplies of almost all sorts are cheaper when imported, and are much more satisfactory than when bought in the coast towns.

One should be vaccinated, and in time to allow a complete recovery before sailing for the tropics. Antiseptics for application to snake or insect bites, as well

as to any abrasions, are essential. Tonics, discreetly used, are valuable. Idling is detrimental to health. Over-exertion has bad consequences; one cannot be too strongly warned against indiscretion of this sort, for it is easy and natural. A "hot" pace is possible in a temperate zone; but only a moderate enthusiasm is possible in the hot zone if one is to keep well. For instance, the temptation to waste time in showing *peon* laborers how to handle pick and shovel, or to lend a helping hand to hurry things along, is constant and must be withstood. The results of such endeavor are dubious, and frequently an immediate attack of fever follows. The *peon* of the tropics is a poor laborer, primarily because of the bad climate; but no human being can work hard in such conditions. It may well be said that, in general, native labor in a poor climate is poor commensurately.

In many more ways does climate affect the economic working of mines; one is constantly confronted with problems due to rank vegetation, boring insects, floods, and other meteorological phenomena. For instance, the maintenance of a high-tension electrical-transmission system will involve all the difficulties due to poles rotting, being bored by insects, or blown down in tropical tempests, with danger to apparatus from severe electrical disturbances.

There seems to be an immunity to many maladies, which one acquires even after a comparatively short stay in the tropics. This is largely due, no doubt, to the knowledge that experience gives; although there seems to be an ability on the part of the people who have been there before, to ward off the insidious maladies. It is possible for most people to go into the tropics for a short stay, say, not more than three months, and stand it fairly well; but those who go to remain much longer must be men selected with an idea of their particular fitness, whether because of previous experience, or by reason of having unusual health and youth, combined with tenacity of purpose, self-reliance, patience, adaptability, and sobriety. These qualities, elsewhere essential, are no less requisite in bad climates.

Fig. 1 shows a part of the Nechí river, one of its numerous bars, and banks where gravel of dredgeable character is found under typical conditions. Fig. 2 shows a typical habitation on the bank of the Nechí river. It also shows the dense tropical undergrowth encountered on every hand in the equatorial valleys.

There are great possibilities in the tropics where bad climatic conditions exist; but it is certainly true, if such possibilities are to be properly investigated and profitably exploited, that more importance must be given to climate in the considerations. It is not a fatal obstacle; but much intelligent and unremitting effort is necessary in combating it, and

the consequent added expense must be anticipated in a new system of cost-sheets—a system not available from past experience in other zones.

The Durkee Electric Drill.

The Durkee electric drill has been in use in general mining work for the last four years, but until last spring was never tried in quarry excavating. Last April, the New York Edison Co. made tests which give data as to the efficiency of the electric drill in excavation work, such as is constantly being done in New York city, the electric drill being used on two different jobs. The first test was conducted at the 121st Street Station and resulted as follows:

Date.	No. of Holes Drilled.	Depth in In.	No. of Working Hours per Day.	Time Lost Blasting and Mucking.		No. Ft. Drilled per Day.	Kw. Hr. Consumed.	Cost per Day.
				Hr.	Min.			
1905.								
Apr 21...	12	58	6½			58	8.7	\$.87
22...	15	58	8	1	30	73	10.9	1.09
23...	13	58	8	1	20	63	9.4	.94
25...	12	58	8	1	15	58	8.7	.87
26...	13	58	8	1	15	63	9.4	.94
27...	2	58	1		5	10	1.5	.15
28...	12	58	8	1	10	58	8.7	.87
29...	13	58	8	1	50	63	9.4	.94
May 1...	3	58	2½		40	15	3.2	.32
2...	10	58	7		35	48	8.2	.72
3...	8	58	6		50	39	5.8	.58
4...	2	58	1			9	1.3	.13
5...	9	58	6		40	44	6.6	.66
6...	11	58	8		45	53	7.9	.79
8...	12	58	8		25	58	8.7	.87
9...	13	56	8		30	63	9.4	.94
10...	11	58	8		20	53	7.9	.79
11...	5	58	8		35	61	9.0	.90
	6	74						
12...	5	74	8	1	5	49	7.4	.74
	6	36						
13...	16	36	8		45	48	6.3	.63

On April 21 and 27, and May 1, 2, 4 and 5, the heavy rain prevented a full day's work. The average drilling per day was over 60 ft., at an average cost of 1.5c. per ft. The second test was made at the northeast corner of Twelfth street and Fourth avenue. The following table shows the results:

Date.	No. of Holes Drilled.	Depth in In.	No. of Working Hours per Day.	No. Ft. Drilled per Day.	Kw. Hr. Consumed.	Kw. Hr. per Ft.	Cost per Ft. Cents.	Cost per Day.
July 5...	17	48	8	68	8.09	.131	1.31	\$.89
6...	17	48	8	68	4.35	.123	1.23	.835
7...	18	48	8	72	8.06	.120	1.20	.86
8...	3	48	1.5	12	.05	.04	.40	.05
10...	11	48	6	44	4.05	.92	.92	.405
11...	20	36	8	60	6.45	.107	1.07	.645

On July July 8 and 10 the work was stopped on account of rain.

At both 121st street and Twelfth street, the rock is of mica schist and muds easily.

In the nine months ending Sept. 30 the United States imported 157,993 tons of clay, valued at an average of \$6.10 per ton. The quantity shows an increase of 11,414 tons over last year. A considerable part of these imports are china clay.

The Willamette Meteorite.

One of the most interesting mineralogical exhibits at the Lewis and Clark Exposition was the ponderous original which forms the subject of this sketch.

Henry A. Ward presented a paper on the subject to the Rochester Academy of Sciences, on March 24, 1904. Ellis Hughes, a Welshman, while prospecting in the fall of 1902, near the border of Clackamas county, Ore., discovered what he believed to be a "blow-out of metallic iron." He kept the find secret because it was on land owned by the Portland Land Company. Shortly after this, however, and with much difficulty, he slowly moved this supposed sample of iron to territory satisfactory to Mr. Hughes. The Portland Land Company brought suit against Hughes for the possession of the meteorite; the suit is not yet decided.

In the Willamette meteorite, nine holes pierce the mass from its upper surface to

when polished and etched with acids) are observable at a surface from which a sample was sawed off for analysis. Some of the oxidized "scales" from this meteorite, at the locality where found, have recently been obtained.

The meteorite itself is also oxidized on its surface, presumably occasioned by the wet climate of Oregon.

Witwatersrand Mine Values.*

BY J. H. CURLE.

Year in and year out, even during the so-called periods of market depression, four out of every five Rand mines stand at an inflated valuation. On the one hand are the small outcrop mines, with their short lives. As the ore gradually diminishes in these, and dividends are paid away, the shares should in like proportion fall off palpably. So long as the ore keeps up to its past standard, and the dividends do not decrease, the shares stand firm as a rock. It is magnificent, certainly, but not sound business.

On the other hand are the big unproved outcrops, both east and west, and the deeper mines of the central Rand. It is an article of faith to assume that all these are highly payable; that their ore contents are regular in value, and that they are worth, on the average, about £2,000,000 per mine. If a person like myself, somewhat lacking in the gambling sense, points out that this umpire method of valuation is not justifiable, even where the Rand is concerned; that that field is full of poor patches of ore, occurring in the most unaccountable localities; that its past results have been secured by working the richest mines, and by picking out the best ore in these mines; that further cash is required for bringing all these mines to the producing stage, to the extent of about £28,000,000, and that it will be anything from four up to ten years before the bulk of these mines can produce any gold—he is looked on as eccentric and inconvenient.

I must not be thought to run down the Witwatersrand. As a goldfield it is equal in value to all the other goldfields of the world. My last visit there, in 1904, convinced me of the immensity of this industry, which in due time may carry the Transvaal's output of gold to nearly £40,000,000 a year. Where the economic interests of the field are concerned, such, for example, as the introduction of Chinese labor, my sympathies have been and are with it, heart and soul. But having this splendid asset, why should we not try to get the maximum of benefit therefrom? Why this insane wish to place on a sentimental and gambling basis an industry of this sort bearing the essentials of soundness?

*From *The Economist*, London, Oct. 21, 1905.



WILLAMETTE METEORITE.

the base below. The tremendous friction of the densely compressed air (through which the meteorite passed on its way to the earth) was comparable to that of some solid substance. . . . The air crowded in front of a meteorite having a velocity of 60 miles per second has been shown by physicists to generate a temperature of over 5,000° C. (9,000° F.), a heat amply sufficient to melt away its surface. It is to the melting, rubbing and chiseling effects of this air compression, with its following air-stream that we may attribute the glazing, pitting, hollowing and channeling which were observed on the front side of the cone and on the flanging base of this great meteorite.

Professor Ward estimated the weight to be 27,000 lb. (13.50 tons). (It is claimed now, however, that this dome-like mass weighs 18.2 tons.) Two analyses of this monster were made at Ward's request, one by Whitfield, which gave Fe, 91.46%; Ni, 8.30%. The other, by Dawson, gave, Fe, 91.65%; Ni, 7.88%; Co, 0.21%; P, 0.09%; sp. gr., 7.7.

This meteorite is 10 ft. long; width across base, 7 ft. 2 in.; vertical height, 4 ft. 1 in. Widmanstaetten's figures (linear and angular markings exhibited

A sovereign is worth only 20 shillings. Why should those in control of the mines represent it as being worth 25 or 30 shillings?

It is, of course, possible that those who control the destinies of the Rand do not realize the eventual harm which its persistent over-valuation will one day bring about. It is natural that their own side of the question should occupy their minds; but, then, it is just as natural that the future welfare of our gold-mining industry should occupy other minds, and that they should consider its interests as coming first. The great lesson that the controllers of the Rand mines have to learn is that that field has neither the regularity in ore nor in value it was once thought to have, and that the whole basis of mine-valuation there has got to be altered. We cannot, by any stretch of reasoning, figure out the value of unproved mines—either shallow or deep—inferentially, and assume results based on those of near or adjacent properties. We cannot sit down and figure out values of shares in the ridiculous rule-of-three fashion so common where these mines are concerned. We cannot take past results as a basis, for in the past only the richest mines have been worked, and even in these the best ore has often been picked in quite a flagrant way—a fact which has only begun to leak out in the last year or two. We cannot take, as a basis of value for the unproved section of a mine, the value of the payable ore in the developed section. To do this one would require to know the quantity of unpayable ore, developed but often left out of published estimates. The Rand magnate would have us believe there is no unpayable ore. This is one of the fallacies he must grow out of before he can be taken seriously.

To put the matter briefly, the Rand is overvalued, and no amount of sophistry can make the great majority of the properties there worth the prices they stand at. What the public or the capitalists care to do at any time in the way of putting the shares up, in no way affects their intrinsic value. Sentiment may usurp the place of ore, as, for example, it has done in Rhodesia, in Egypt and the Sudan, in West Africa, and in the earlier days of West Australia, but in the long run logic—an ore reserve—will win the day.

Grossly overvalued as most Rand mines usually are, there are a few, from time to time, which appear to have an intrinsic value equal to their market valuation. The center of gravity in this respect lies undoubtedly in the East Rand district, and indications certainly point to some of the mines there as being hopeful ventures. Before long the East Rand Proprietary Company will have its four subsidiary mines—Driefontein, Angelo, Comet and Cason—working at full pressure, and no doubt will have floated off its remaining ground into a fifth company. Yet hope-

ful as all these mines are, it seems to me that they now stand at a full valuation. Granted that the present values will continue to each uttermost boundary, then the shares might reasonably be considered not dear. But why grant any such thing? Why take a risk that you would never dream of accepting in any other industry? Take the Angelo for example. An excellent mine this, over the section already explored, but is it probable that such considerable widths and values will be found right down to the bottom? I think it is at least doubtful. What evidence is there, for or against? The Angelo Deep put down two bore-holes. These were poor. It has now reached the reef with two shafts, but so far as I know the work already done proves the reef to be narrow and split up, and the value (relatively to the width) poor. It is true that only a little work has been done, and that the Angelo Deep may turn into a good mine; but it is quite fair to say that there are at least poor patches in this mine, and that these may easily extend upward into the Angelo mine. My point is this: Does the price of the Angelo mine, or of any other Rand mine, make allowance for these continually recurring poor patches? Is it not rather based on the assumption that practically all the ore is payable, and is not the price of the share worked out elaborately by rule of three on this basis? Where in the calculation do the poor patches come in? Let me assure the reader, out of a considerable fund of experience on the subject, that gold mines cannot be valued in this way, and that it is one of the faults the capitalists must correct in themselves, and in their satellites on the press, before they will be entitled to the confidence of serious people.

To return, however, to the East Rand. Of the Proprietary Company's group, those in control now consider the Comet to be the most promising mine at the price. Apparently the values in the lower levels of that mine show considerable improvement. The reader may infer something from this. If one mine which has been rather poor can become richer in depth, another mine which was rich near the surface can as easily fall away in value lower down. That is why I am rather doubtful of Angelo and Cason. Each of these has been unusually good in the upper levels, and a falling off in value lower down is a contingency to be reckoned with. Even at that, these would no doubt remain excellent and highly payable mines—at a price; the trouble is that they have been valued by the absurd rule-of-three method, on their richer ore, and that if they become only normally good mines a lot of people will lose their money.

The Boksburg mine has now commenced development work, and in two prospecting shafts payable ore has been found. In other shafts there is poor ore, and it will be remembered that ten boreholes sunk

some years ago all showed poor reef. The prospects of this mine are questionable, but not hopeless. Below this is the East Rand Extension, which several years ago put down two boreholes and got exceptionally high values. I have always been skeptical about these. I shall be interested to learn whether the shafts now going down on East Rand Extension will confirm the borehole values, but my impression is that they will not. Despite the poorish results attained so far by the new plant of the Kleinfontein, due to the very gradual adaptation of the Chinese miners to their environment, I still look favorably on the prospects of that mine. With about 15 different levels in course of exploitation, showing no falling off in width or value in depth, and with three hopeful boreholes on the ground immediately below, I consider that the ore contents of this mine have been more fully tested than those of most other properties of similar area, and, taking note of the splendid surface equipment, the long life of the mine, and as I believe of the eventually complete success of the Chinese miners, I must still hold to my idea that this is one of the safest shares on the Rand. The adjacent Benoni is still hanging fire. Every now and then rich patches show in development, but these are not continuous, and the net result to date is not good. But it is still a mine to watch closely.

Based on pure assumption, the prospects of Van Dyk Proprietary and Rand Collieries, two other properties in this section of the Rand, are quite hopeful. The first shows two payable boreholes out of five put down, and each of the two bores put down by the latter was unusually good. If these four holes are all genuine, and I have heard of no doubts on this head, they represent a hopeful condition of affairs. They are not far apart, and refer to an area where the reef lies at not much over 2,000 ft. deep. Until actual results are shown from this area, some years hence, it must be held to have hopeful prospects, but I am not prepared to assign any exact valuation to the shares of the two mines. Speaking generally, the prospects of the far East Rand basin between Boksburg and Heidelberg are not good. Only about one borehole in ten in this area has shown payable values, and the regularity of the ore underlying it cannot be held to rank as yet with the Central Rand. The bold scheme of development now being undertaken by the Brakpan mines, backed by its large cash resources, shows that some of the Rand houses have confident expectations of this newer area, but I shall withhold a definite opinion until such time as their shafts shall have reached the ore.

For each 15 lb. of water required to be evaporated per hour in drying, one boiler horsepower, 130 sq. ft. of steam pipe and 14,000 cu. ft. of air are required under good conditions.

An Electrical Steel-Furnace.*

BY GUSTAVE GIN.†

This furnace allows of the simultaneous and uninterrupted realization of the following operations: Fusion; oxidation of impurities; reduction of dissolved oxide of carbon; and "recarburation," or introduction of the constituent elements of the final steel. The design represents one form of construction of a furnace for this purpose; Fig. 1 is a plan, and Fig. 2 and 3 are cross and longitudinal sections, respectively. The essential parts are a crucible for fusion and refining by oxidation (1); a compartment for reduction and recarburation (2); and a chamber (3) for the observation of the color.

The electrodes of the first compartment are connected to one of the terminals from the source of electricity; the electrodes of the second and third compartments are connected in parallel with the other terminal. The current passes from the electrodes to the metal through a

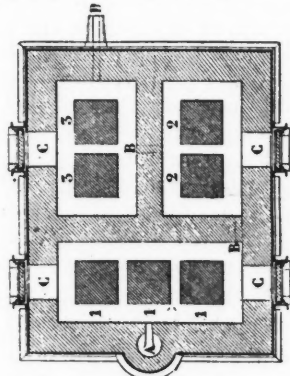


FIG. 1.

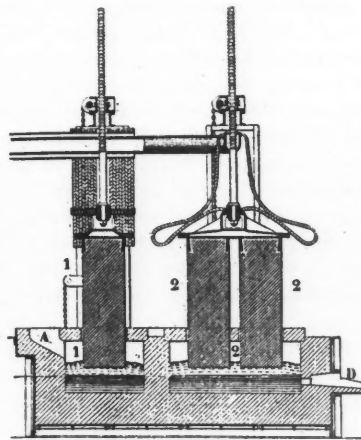


FIG. 2.

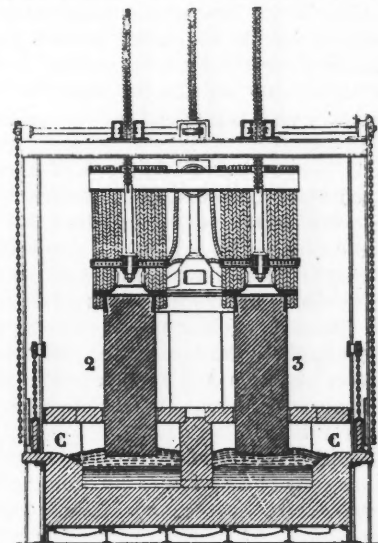


FIG. 3.

sheet of slag, this being the seat of the heating action of the current. The baths of metal communicate by the openings (B) of sufficiently reduced section, in order that (by reason of the Joule effect) the metal may not remain solid.

The base and sides of the first compartment are, in the part permanently occupied by the metal, constructed of a basic or acid material, as the metal to be refined is or is not phosphatic; but the part in contact with the slag is neutral. In compartments 2 and 3, magnesia is employed for the floor and for surfaces not touched by the slag; chromite is used for the upper part. In operation, melted iron or steel is introduced through the orifice A; it is distributed through the three compartments, on the floors of which scrap iron is strewn, being placed in connection with B. Arcs are established, and the material is introduced in small quantities; this, after fusion, forms the superficial baths in which the Joule effect is produced. The oxidizing bath of the first compartment is composed of some mineral or slag rich in oxide of iron; in addition, some lime, if the metal

to be refined is phosphatic. The baths of the other two compartments are neutral and little reducible by carbon. Aluminates of lime and magnesia (made from a mixture of bauxite, with limestone or dolomite) give favorable results. The addition of fluorite renders it more fusible and mobile.

The zone of most intense heat in the oxidation chamber is close to the contact of the metal and slag; in this region, the reduction of the oxide is effected at the expense of silicon, manganese and carbon of the metallic bath. According to the proportion of reducible oxides, the reaction is more or less rapid; it is shown in the turbulence of the bath, where the metal is agitated; this also aids oxidation by constantly changing the surface of contact. The oxidizing action is kept up, and its intensity and rapidity are regulated by the introduction of oxides of

iron or by stirring. The high temperature affects the elimination of the carbon almost at the same time as that of the silicon and manganese.

The circulation of the refined metal is from the first into the second compartment. In the latter, the reduction of the dissolved ferrous oxide and the recarburation of the metal take place; these two operations are accomplished by the admission of carbon in the form of coke, iron or of castings, prepared by the fusion of iron or steel in the electric furnace in the presence of an excess of carbon. In raising the metal to a sufficient temperature, cast iron is obtained which absorbs as high as 7.7% of carbon, which it retains on cooling, partly as combined carbon and partly as intermingled graphite. It may be advantageous to introduce this carburated cast iron in the liquid state.

The regulation of the chemical properties of the finished steel is accomplished in the third compartment, where test ports are placed to allow the estimation of the carbon content and to indicate corrections required to be made for impurities observed by spectroscopic tests. In the last two compartments the steel has no contact with the atmosphere, as it

comes in contact only with a neutral slag; thus there is no tendency for oxidizing action. This slag, influenced by the high temperature and the carbon content, furnishes a slight quantity of aluminum, which diffuses into the bath of steel and absorbs oxygen in whatever form it may be present.

The charging and the withdrawal of the slag are effected by means of the openings C; the orifice D, is provided for tapping the steel. In pouring, the electrodes 3, are lowered and immersed in the metallic bath. At the same time the electrodes 1, are raised. During this operation the immersion of the first electrodes is increased so that the level of the metal remains constant at the height of the tap

hole. After the electrodes touch the bottom of the crucible, the level of the metal can no longer be maintained, and it falls until the slag appears in the flowing jet; this is then stopped. This operation is of considerable importance. The immersion of the electrodes prevents the formation of unequal levels between the second and third compartments. The metals cannot mix at the different stages of the operation; they can be run off only after thorough refining to a known chemical composition.

Pouring is nearly constant in duration; and the dissolution of carbon through the immersion of the electrodes varies but little. Thus it is possible to keep a careful account, and to guarantee a definite composition within narrow limits for the final product.

After tapping, electrodes 3 are raised again, and electrodes 1 are immersed in the metal; part of the metallic oxide passes from 1 into 2, while the carburated steel in 2 penetrates into 3. The levels remain in there at their normal height, the electrodes immersed in 1 taking the place of the steel. If at this moment we tap in completely refined material in the first compartment, simultaneously raising electrodes 1, the metal introduced fills the

*Abstract of a paper read at the eighth general meeting of the Amer. Electrochem. Soc., Bethlehem, Pa., Sept. 19, 1905.

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space given by removal of the electrodes, but it does not penetrate directly into compartment 2, for there is no sensible difference of level. The operations remain distinct and independent and can succeed each other in continued rotation as long as the material retains the temperature of reduction; the capacity is such that each tapping only removes a fraction of the metal, the remainder acting as a heat retainer. It may be remarked that the metal in the first passes to the second compartment without carrying the slightest trace of slag, thus excluding outside impurities.

Chinese Question in the Transvaal.

BY A. SELWYN-BROWN.

The labor question is again causing trouble in the Transvaal. Experience is showing that the Chinaman is not a good substitute for the Kaffir in mining work, and apparently the Chinese cannot be obtained in very large numbers. At present there are 44,491 Chinamen in the Transvaal, in addition to 88,634 Kaffirs and 16,500 white miners. Advices from China state that recruiting is proceeding slowly, as the Chinese do not show a disposition to change an easy-going life in the fields for the hard, strenuous work in mines and the imposed confinement in compounds. The recruiters, however, hope for better success when the cold weather sets in and field work in China is not so plentiful as at present.

It has been found that the celestial is far more wily than his Kaffir brother; he is an expert shirker and requires rigid supervision. The employment of Chinese coolies has made a better demand for white bosses, and the ratio now is about one white to eight Chinese.

Chinamen have not the physical strength of the Kaffirs. They have been used during long centuries of slow-plodding labor in the fields. Consequently, when transported to South Africa and sent into the mines and continuously driven to sustained heavy manual efforts by the white bosses, their strength is overtaxed, and they are physically forced to rebel. On escaping from the compounds, all avenues of employment being closed to them, they have no choice but to engage in crime for their sustenance. The country is now overrun with bands of Chinese marauders, who are breaking and entering houses and stores, waylaying travelers on the highways and committing many criminal assaults, the danger of these murderous depredations being so great that the Government has been compelled to increase the police force and arm the terrified inhabitants. The alarm of residents in the country districts forced the authorities to arrange for the high commissioner, Lord Selborne, to make an extensive tour of the backveld to speak on the Chinese question and endeavor to pacify the Boers. In one of the first speeches of the tour, delivered at Mosilikatze Nek, on Sept. 20, Lord Selborne

expressed the opinion that the Government could not agree with the popular demand for the immediate repatriation of the Chinese; but matters might be improved by the Government rendering the regulations relative to the supervision of the Chinese more stringent, granting a reward for each Chinaman captured by the public outside the Rand, and saddling the mine owners with the entire cost of the extraordinary increase in the police force the Chinese trouble rendered necessary.

The gold yield in the colony is steadily increasing, but financial and general economic conditions remain in a lethargic condition; share transactions are small, and the outlook for the immediate future is not promising. This unhealthy state of affairs has been referred to in many of the mining reports issued recently, and diverse views are being expressed. Blame is placed by many on a suggested apathetic and unsympathetic administration. Others attribute the trouble to over-capitalization, the promotion of many worthless propositions and the wholly inadequate production of the colony's soil, with the consequent diversion of large sums of money that would otherwise be circulated in the country. On investigating the broad economic aspects of the problem, it is difficult to avoid the conclusion that the industrial derangement induced by the war, and apparently intensified by the employment of colored labor, is in reality the fundamental cause of the present unsatisfactory conditions prevailing in the colony. A full study of the question is undoubtedly made difficult by many side issues obscuring vital points; but when a comparison of Rand conditions is made with those at Kalgoorlie, some apparently complicated matters are illuminated. Both fields possess much in common. They are remote from seaports, and are dependent for supplies upon outside sources. Local industrial prices are comparatively high, and the mining industries are paramount. There is, however, this important difference: while the African field utilizes low-priced colored labor, the Australian field exclusively employs expensive white labor, the Australian miner being paid per eight-hour day about as much as the Chinese coolie gets for a week's work. Yet, as the chairman of the Hainault Gold Mining Company stated at the annual meeting in London on Oct. 9, "in the matter of working costs, Western Australia is at least ten years ahead of Johannesburg." This anomalous condition is due, not so much to the high efficiency of white labor, as to the local circulation of wages resulting in the prevalence of prosperous economic conditions. This is, naturally, in accordance with the well-established doctrine of the interdependence of capital and labor in the improvement of local economic conditions. The infraction of this doctrine is directly connected with the commercial stagnation in South Africa.

No radical improvements, doubtless, can be expected without important changes in present economic practices, and the progress of events will be followed with universal interest.

A Freak Oilfield.

BY H. C. GEORGE.*

In the latter part of last August many of the newspapers contained accounts (some true and some otherwise) of an oilfield which had just been discovered at Warren, Pa.

As I was in that vicinity at the time I had an excellent opportunity to investigate the "Grasshopper Oilfield," as it was called.

This is located within the borough of Warren, on a level strip of ground called "the flats," and near the Allegheny river. The formation in which the oil pool lies consists of sand, gravel and glacial drift which cover the Devonian rocks of the region. The oil is found at a depth varying from 15 to 22 ft., depending upon the elevation of the land surface above the water level. Such a discovery seems hard to credit, in a region where most of the wells are drilled from 800 to 1,500 ft. The gravel bed in which the oil occurs is about a mile and a half long and half a mile wide; but the oil pool covers only a small part of this area; its greatest width being about 200 yards and its length about 500 yards.

The first oil was found by a man while driving a water well at the rear of his house. This well, like the others driven later, was operated by a common pitcher pump and its production for the first week was about 50 barrels a day. After this discovery became generally known, wells were driven rapidly by the simple sledgehammer method. Most of the wells produced some oil, and many produced 50 barrels a day for several days. The oil produced was pumped into barrels and hauled to the local refineries.

The first wells which were driven at the lower end of the field produced an oil resembling crude "Tiona" petroleum, both in color and sp. gr. It is greenish in color and has a sp. gr. of 0.81.

Wells driven more recently at the upper end of the field produce a dark thick oil having a sp. gr. of 0.83. This latter the refineries refuse to take, as it has a bad odor, which it retains even after being distilled.

The oil occurs as a scum on the surface water, and as the formation is gravel, sand and glacial drift which is porous, the surface water remains at the same level as the water in the river. The Wilborne Oil Works sunk a 4 by 6 ft. shaft to the oil. When the oil was nearly reached the pit became so gaseous that the men digging could not stay in longer than two minutes at a time. In this shaft

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it was noticed that the surface of the oil rose and fell with the water in the river.

The wells are driven very cheaply, the equipment required being about 25 ft. of $1\frac{1}{2}$ -in. pipe and a pitcher pump. The pipe to be driven has a shoe or point at the lower end; above this is 6 to 12 in. of perforated surface to admit the oil to the pipe.

The value of the wells depends upon the position and the length of the perforation of the pipe. At first the thickness of the scum of oil was about 6 in., as shown by the wells having a 6-in. perforation and producing nearly pure oil; while those having a 12-in. perforation produced about half water. The wells which produced the most oil were those having a 6-in. perforation at the proper elevation to take the largest percentage of oil and the smallest percentage of water, and having the most rapid and systematic operation.

The production has gradually decreased as the scum of oil becomes thinner and the percentage of water to be pumped becomes greater. At the present time there are very few wells pumping, and those only intermittently.

Numerous theories have been advanced to account for this freak oil pool. Some think it is due to loss from the refineries, there being no less than six within a radius of a mile. This seems reasonable, as the refineries claim that they lose from 6 to 8% of the oil that they get from the producers. This loss is caused by leaks in pipe-lines and tanks. The pipe-lines being buried, might leak for years without giving any surface indication. Another theory is that the wells on these "flats" (which were drilled down to the Warren oil sand years ago, and later "pulled out") may have been improperly plugged, thus allowing the gas in the oil-sand rock to force the oil up into the gravel.

The drillers of some of the oldest wells in the locality claim that they occasionally struck oil near the surface; that was years before the refineries were built. If such was the case, the oil pool must be of natural origin. Even if there was an original native oil pool, it is quite possible that it may have been augmented by losses from the pipe-lines, the wells and the refineries.

O. Boudouard (*Comptes Rendus*, CXLI, July 24, 1905, p. 243) gives the results of his investigations as to the influence of steam upon the reduction of carbon dioxide by carbon. His earlier researches showed that the reaction of reducing gases in the blast-furnace was more energetic if moisture was not present, but that at $1,000^{\circ}$ C. this retarding influence of water disappeared. Testing as to whether moisture has any tendency to alter the equivalence of the reaction, $\text{CO}_2 + \text{C} = 2\text{CO}$, he found no difference in the equation, whether moisture were present or absent.

Tungsten Ore in Washington.

A correspondent writes that in the summer of 1904, while the United States government surveyors were employed setting bronze monuments in the Cascade mountains along the international boundary line, between British Columbia and the State of Washington, some of the party discovered float quartz, which they thought contained gold and silver. They returned to the place of discovery along in the winter and staked a claim and took samples of rock to Loomis, Wash., to be assayed. The result was disappointing, and the locators subsequently relinquished their right to the claim. The assayer, J. E. Beaton, at subsequent leisure, made qualitative tests of the ore and found that it reacted for tungsten, iron and manganese. He sent samples of the ore to Edgar C. Riebe, New York, and the Primos Chemical Company, Primos, Pennsylvania. To the latter he also sent wolframite concentrates, the analysis of which gave WO_3 (tungstic acid) 72.8%. Other analyses gave in addition 14% iron and 13% manganese. Clayton Baldwin, an old prospector, who had grubstaked the surveyors and became interested with them, discovered vein croppings and, later on, took Henry Bahrs, a mining man of Loomis, to see the ground. Mr. Bahrs recently located on it seven claims, as follows: The Elizabeth, Henrietta, Marie, Wolframite, Cathedral, Tungsten and Armor Plate. The claims are situated on the southern slope of a hill in Township 40, Range 22, Willamette meridian, in the northwestern part of Okanogan county, Wash., $1\frac{1}{2}$ miles south of the British Columbia boundary line, about 16 miles south of Nickel Plate mine, of Hedley, B. C., and 3 miles east of Cathedral peak. The main vein, which is about 4 ft. wide, traverses the center of the Henrietta, Elizabeth, and Marie claims, as evidenced by the croppings. Another vein, 8 in. in width, parallels it at a distance of 25 or 30 ft. Both veins strike easterly and westerly and dip northerly into the hill. Float rock was found largely distributed on the hill, and the other claims were located on either side the first three named. At present the surface is covered with new snow, 2 ft. deep, but a camp has been established, and six men are employed exploiting the main vein. It has been stripped 60 ft. in length and an incline shaft has been sunk on it 30 ft. deep. It is thought the ore will concentrate 10 to 1 or better. Suitable log buildings have been erected for mess and bunk houses, a cellar, blacksmith shop, etc., and ample provisions and mining supplies for the winter, sufficient to last for eight months, have been sent to the camp. A charter has been applied for for the organization of a company, under the laws of Washington. The property can be reached by a Government trail, going 45 miles westerly from Loomis, and another 15 miles from the Similkameen river,

where connection will be made with the Victoria, Vancouver & Eastern Railway, which is now under construction.

The Reed Mine.

BY A SPECIAL CORRESPONDENT.

This is a sketch of the discovery and history of the Reed mine, in Cabarrus county, N. C., being the first gold mine in the United States.¹

Gold was first found at this mine in 1799, by Conrad Reed, a boy 12 years old, and a son of John Reed, the proprietor; the discovery was made in an accidental manner. The boy, while shooting fish with bow and arrow, in a small stream called Meadow Creek, saw a yellow substance shining in the water. He found it to be some kind of metal, and carried it home. Mr. Reed examined it, but as gold was unknown in this part of the country at that time, he did not know what kind of metal it was. The piece was about the size of a small smoothing iron.

Mr. Reed carried the piece of metal to Concord, and showed it to William Atkinson, a silversmith; but he not thinking of gold was unable to say what kind of metal it was. Mr. Reed kept the piece for several years on his house floor, to lay against the door to keep it from shutting. Later, in 1802, he went to market to Fayetteville, and carried the piece of metal to a jeweler, who told him it was gold; he requested Mr. Reed to leave the metal with him and said he would flux it. Mr. Reed left it, and on his return was shown a bar of gold 6 or 8 in. long. The jeweler asked Mr. Reed what he would take for the bar. Mr. Reed (not knowing the value of gold) thought he would name a "big price"; so he asked and received \$3.50 (!).

After returning home, Mr. Reed found gold in the surface along the creek. He then associated Frank Kisor, James Love and Martin Phifer with himself. In 1803, they found a piece of gold in the branch that weighed 28 lb. Numerous pieces were found at this mine, weighing from 16 lb. down to the smallest particles. The whole surface along the creek for nearly a mile was rich in gold. The veins of this mine were discovered in place in the year 1831. They yielded a quantity of gold. The veins are flint or quartz.

The foregoing was certified to, in 1848, as a true statement of the discovery and history of this mine (as given by John Reed and his son Conrad Reed) by one George Barnhardt.

The total weight of the gold nuggets found from 1803 to 1835 is said to have been 115 lb. "by steelyard weight." The largest was the nugget of 1803, referred to above, 28 lb. Others were 16 lb., $13\frac{1}{4}$ lb., $9\frac{1}{2}$ lb., 9 lb., 8 lb., 7 lb. and down to 1 lb. in weight. The Reed was a famous mine for nuggets in its day.

¹Wheeler's "History of North Carolina," p. 63.

The Manufacture and Characteristics of Wrought Iron.*

BY JAMES P. ROE.†

The puddling process consists, essentially, in the removal from molten pig iron of nearly all its carbon and silicon, and most of its phosphorus and sulphur, by agitation in the presence of a suitable cinder, and gases of the right composition and temperature; and, finally, by crystallization, due to the greater infusibility of the iron as the metalloids are oxidized.

It demands of the puddler a reasonable degree of skill, and a kind of labor which, though wholesome, is very severe. The necessity of such labor has long been recognized as the great practical difficulty and expense of the process; and numberless mechanical devices have been proposed for its diminution, but, thus far, without any marked degree of success.

Reactions of the Puddling Process.—The puddling process permits the use of irons of greatly varying composition. My experience covers irons containing as much as 3% of silicon and of phosphorus, 2.5% of manganese, and 0.35% of sulphur, though, of course, not all in the same pig iron. In all these cases, iron was produced that would weld freely, and showed no cold- or red-short tendency. Such extreme irons are not desirable. On the contrary, they are costly in time, labor and iron-loss. For rapid work, good yield, and fitness for ordinary uses, a desirable composition would be about 1% of silicon, a somewhat smaller percentage of phosphorus, 0.1% of sulphur and 0.5% of manganese. For special grades, it is necessary to select the pig in each particular case.

The various iron oxides, charged as fettling, flux and oxidizing agents, should be characterized, in the order named, by infusibility, fusibility and the ability to be readily reduced, for the part they respectively play in the operation. The flux (as the material directly forming the cinder) must be present in sufficient quantity to receive the oxidized metalloids, and low enough in silicon to retain them as the temperature of the bath increases. This cinder is the vehicle for oxygen, whether supplied by roll-scale, ore, or the oxidizing gases of the furnace; it protects the puddled mass from undue oxidation by the gases; and, finally, it forms the welding-cinder. Its composition is changed during the process by additions; by reactions upon the fettling and the bottom; and by the condition of the fire and position of the damper.

The cinder in the ball, when drawn, is controlled largely by temperature at the time of going on high-boil and at the time of drawing; this temperature, at both periods, being chiefly governed by the damper. In the shingled ball, it is controlled

by the amount of work or pressure; the cinder being generally smaller in amount when a hammer, than when a squeezer, is used. Is the puddle-bar, and in the finished product, the cinder is dependent upon the reduction in area and the rapidity of this reduction. These conditions put the process thoroughly under the control of the operator.

High cinder-contents are desirable for free welding, for such purposes as pipe-making, etc.; and low cinder-contents, products which are to be subject to severe physical strain.

The order and proportions of the oxidation of the principal metalloids are shown in the diagram.

The object of agitation, which is ordinarily accomplished by the rabble, is, to produce as uniform conditions as possible throughout the bath; to bring into intimate contact the cinder and iron; and to prevent as far as possible the settling of the iron, in a partly refined condition on the relatively cold bottom, and its becoming, as a consequence, too cold on the under side. This occurs in a measure during the "drop," particularly in large furnaces, and necessitates "turning."

Small heats, such as are still worked at Low Moor, England, are best adapted for uniformity of product; since the workman has not the physical strength and endurance to agitate the larger baths efficiently, though he obtains material assistance from a good "high-boil." Another disadvantage in large furnaces is the necessity of starting to draw "young," since otherwise the later balls are subject to severe loss. The irregularities thus produced are, however, largely overcome by the subsequent treatment of piling and reheating. Piling operates as a fairly efficient mixing by the natural law of chances; and reheating helps, by maintaining the iron at a temperature, and for a period, which permit both the oxidation of the carbon of the "young" iron and the reduction of some of the cinder present. Hence, the small pieces of which an iron pile is formed are desirable under existing methods of producing puddled iron. But piling has also its disadvantages, in the production of laminations, due to carelessness, or lack of means or skill, and in the high cost of handling loose piles.

The Structure of Puddled Iron.—By reason of decreased fusibility through the elimination of carbon, puddled iron crystallizes ("comes to nature") at a lower temperature than steel. Each grain or crystal is surrounded by an envelope of cinder; which, when the clusters are dense, fills the intervening spaces. The greater part of this cinder is then hammered or squeezed out, and the succeeding operation of rolling elongates the crystals into what are commonly known as fibers; each fiber existing in a matrix of cinder. This fibrous formation in a matrix of ferrous silicate is the controlling characteristic of wrought iron, and the source alike of its virtues

and its faults. The fibrous structure can be distinctly seen under the microscope at various powers, and often with the naked eye. It is perhaps more correctly described by Prof. Howe, who says: "I understand that this 'sort of fiber' is more apparent than real, the grains themselves being equi-axed, yet separated into quasi-fibers by layers of slag. . . ." Admitting the correctness of this remark, each series of crystals forms an integral structure, which has to be ruptured separately, producing, in every-day practice, results analogous to those we would look for in a true fiber.

Many instances of the arrest of fracture by the fiber occur in the experience of most engineers with shafts, bolts, chain-hooks, etc. An illustration recently came under my observation. About two years ago, a shear cam-shaft, 9 in. in diameter by 48 in. between journals, was bent about 0.5 in. at one side of one of the two cams, producing a crack about 2 in. deep and open almost an eighth of an inch. The lateral movement of the large spur-wheel, due to the bend, was carefully noted, and measured at frequent intervals to learn whether the fracture was extending. As it did not extend, and no convenient opportunity offered for straightening, the shaft ran till July of last year, when it was taken out, straightened and replaced. It is doing good work, and running true today. Had it been steel, it would have been necessary to take it out at once, and, after straightening, anneal it; even then, a greater risk would have been run than with wrought iron.

Drive-pipes for wells furnish another illustration. Wrought iron withstands the shock of driving at the threads, whereas steel breaks off at the root of the threads.

A blast-furnace plant of two stacks had an experience bearing upon this question. One stack was erected about 30 years ago, with a shell of wrought-iron plates; the other, about four years ago, with a shell of basic open-hearth steel plates. Both were evidently subjected to the same character of strains, and in approximately the same position. The wrought-iron shell bulged out under strain, but did not crack; while the steel shell suffered a vertical rupture extending about 20 ft., and not following to any marked degree the lines of the riveted joints.

Physical tests of steel made in the laboratory on an 8- or 10-in. section give results which superficially appear to be superior to those of wrought iron, particularly in the feature of elongation. But when studied with greater care the elongation is seen to be largely concentrated, and not so uniformly distributed throughout its length as is that of iron.

This tendency to concentrated elongation in steel, and to more widely distributed elongation in wrought iron, is shown in their respective tests, in full-sized sec-

*Abstract of a paper read before the American Institute of Mining Engineers, May, 1905.

†General superintendent of iron mills, Glasgow Iron Co., Pottstown, Pa.

¹ "The Metallurgy of Steel" by Henry M. Howe, p. 193.

tions, for eye-bars in bridges; the specified elongation being the same for iron and steel in a length of 10 feet. The following are results of such tests:

	Elastic Limit.		Ultimate Strength.		Elongation, Per Cent.		Reduction of Area.
	Lb. per Sq. In.	Lb. per Sq. In.	In 12 In.	In 18 Ft.	Per Cent.		
Iron....	31,550	48,810	23	15.22	28.30		
Steel....	33,150	59,260	39	14.40	51.50		

There is greater general confidence in welded articles made of iron than of steel. This is well-founded: the cinder present in iron, and its low carbon-contents, naturally facilitate welding. This receives further confirmation from the fact that, as the carbon is increased in steel, the uncertainty of a good weld becomes greater.

Resistance to Oxidation.—That wrought-iron resists oxidation better than steel is becoming the general opinion of those who have studied the question under actual working conditions. The difference is naturally more apparent in thin objects, such as corrugated roof-sheeting, tin-plate for roofing and the like; but its influence is the same regardless of mass. The difference in the life of light sections is about as five to one in favor of puddled iron.

The explanation of this resistance to oxidation is two-fold:

1. The cinder, a ferrous silicate, enveloping each fiber, is much attenuated by rolling, and in that condition is elastic. A piece of iron fresh from the rolls is covered with relatively thick scale, which will readily crack off to a large extent, exposing a surface of iron fibers with its intervening cinder. These fibers oxidize somewhat rapidly, leaving a finely corrugated surface of cinder, which resists further atmospheric action, as may be seen in heaps of *scoriae* from old hearths, believed to date from before the Christian era. Being elastic it persists for considerable though varying periods; but eventually it cracks off under vibration, expansion and contraction, or mechanical wear. The cycle is then repeated and so on.

2. Puddled iron is a mechanical combination of two substances, iron and cinder, which offer differing resistances to such pressure as that of rolls or hammers. The result is a rough surface, which forms a more lasting bond with any protecting agent such as tin or paint, than the smooth surface of steel, which does not aid in any way the adhesive qualities of the protecting agent.

In connection with the question of oxidation, I may instance the experience of a large tube-works, carrying a considerable stock of iron tubes, and accustomed to take from, and add to, the top of the stock-pile, without regard to the tubes in its lower part, knowing that these, when ultimately reached, would be found to be corroded uniformly over their whole surface, but could be re-rolled to a lighter

gauge, producing perfect tubes. After beginning to make steel tubes, they followed the same practice; but these tubes were found after re-rolling to be pitted through, and therefore valueless.

I am indebted to Dr. R. W. Raymond, secretary of the Institute, for the suggestion contained in the following communication:

"In preparing your paper for the press, I notice that you have omitted to mention, in connection with the question of the more rapid oxidation of soft steel, a chemical reason, namely, the presence of manganese in that metal. Many years ago, as consulting engineer of the firm of Cooper, Hewitt & Co., I approved the substitution of low-carbon steel for wrought iron, for certain articles of manufacture. The immediate result was complaint from

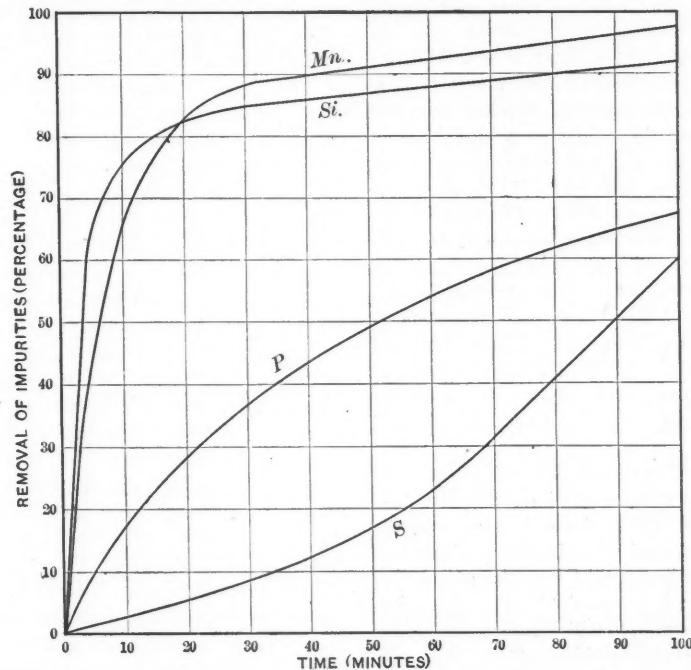
suspect that the trouble lies in the manganese of the metal coated, and in the series of reactions which its easy oxidation initiates.

"It seems to me that the 'pitting' of steel, to which you refer, is directly due to manganese."

Defects of Wrought Iron.—Under this head, we have to consider transverse weakness, lower ultimate strength, laminations and high labor cost in production:

1. Transverse weakness is inherent, though less marked as the cinder-contents are reduced.

2. Lower ultimate strength and elastic limit, demanding (for the same factor of safety, and if the possible effects of the "pitting" of steel be ignored) a greater section for a given strain, is also an inherent weakness, so long as the product



both consumers and selling agents, that these articles rusted so soon as to look old even upon delivery. A careful investigation, conducted for the firm by the late Dr. T. M. Drown, located the source of this trouble in the manganese of the low steel, or "ingot-iron." In that particular case the rapid surface-corrosion probably did not affect the real usefulness of the articles. But it may easily be inferred that, when a coating of tin, zinc or paint is applied to a sheet of metal, a very slight extra liability to oxidation in that metal may set up a series of chemical and galvanic reactions of destructive character.

"I have had recent occasion to realize with surprise and consternation the imperative necessity for frequent repairs to roofs, pipes, etc., of tinned or galvanized iron. My trusted mechanic declares that all his customers are similarly affected, and protests that he can no longer obtain anywhere materials of this class as durable as they used to be. He thinks that something is the matter with the processes of coating with tin or zinc; but I shrewdly

is made from built-up piles, requiring low carbon as an essential condition for good welding.

3. Laminations, due to imperfect welding, are commonly the result of inefficient machinery, or lack of skill. This defect also is inherently associated with the use of built-up piles, especially when these are made, wholly or in part, from scrap of miscellaneous character. I recall an instance in which a lot of 1½-in. "rounds" were ordered to be made for special bolts from muck-bars only. While cutting them to length on the anvil we noticed that, after superficial nicking, some pieces fell off, even without bending. Upon investigation, the so-called "iron" was found to include pieces of hard steel rail, fairly well defined in form, and surrounded by soft wrought iron, presumably "muck-bar," which peeled off with the freedom of a banana-skin; the exterior and the core not being welded together.

4. The high labor cost of production is probably the principal cause which has

checked, during recent years, the legitimate increase in the use of wrought iron. It is constantly receiving greater emphasis, as the younger generation of workmen, with greater educational advantages, turns away from arduous manual toil, and particularly from the opprobrium attached to the term "puddler," as indicating a relatively servile and ignorant class. The severity of the work, together with the inferior social status of the worker, has depopulated puddling mills in this country and England, and caused, in certain districts, the abandonment of puddling.

With the exception of relative transverse weakness, all the above shortcomings of wrought iron are due to the method of manufacture rather than to inherent qualities of product. Iron puddled in large masses by mechanical means, and rolled direct, as soft steel is, would give us fibrous structure; resistance to oxidation; high tensile strength; low cost, and the absence of laminations. Such a material would cover the field now jointly held by puddled iron and soft steel, even to the possible use of the latter for rails.

Conditions Essential to Successful Puddling.—The conditions necessary to produce such iron are: (1) A large unit of manufacture; (2) adequate mechanical means; (3) cinder of proper composition; (4) a flame of the right composition and temperature; (5) a relatively permanent furnace lining; (6) a relatively small loss of iron; (7) simplicity of means and method.

1 and 2. Conditions (1) and (2) are the chief factors (indeed, if we consider bessemer steel alone, the only ones) in the low cost of steel manufacture. These two conditions, introduced into the production of wrought iron, would have a like effect upon its cost. I will consider later the means of effecting this end.

3. As already shown, the right cinder for the puddling process is largely produced from, and corrected by, the oxides forming the sides and bottom of the hearth. It is, however, evident that the purer oxides of iron are inert while in position, and become active only after absorption into the bath. Hence, when suitable oxides are introduced in the form of cinder, ore and roll-scale, there is no need of drawing upon the bottom and sides, provided these latter are of such nature as to resist the chemical action of the cinder and the temperature of the gases.

4. The proper regulation of the flame is essentially a simple matter, presenting difficulty only when associated with the motion of the furnace (if the latter be movable).

5. The lining offers a somewhat complex problem, both metallurgically and mechanically. It must resist the chemical action of a compound cinder; the friction of the mass as the iron comes to nature; and a somewhat high temperature. Moreover, in a mechanical furnace, it must

maintain its position throughout the movements of the furnace itself.

6. The minimum loss of iron is secured by the reduction of some of the iron-oxide additions, resulting in an actual gain of weight of the puddled mass, over the pig charged, in an ordinary puddling-furnace. This gain is exceeded by the final loss, due to the delay in the period of balling and drawing. By reducing the period of drawing, as by discharging the whole mass in one piece, this loss may be avoided and a possible net gain effected.

A mechanical puddler, erected at Pottstown, Pa., and fulfilling the conditions above stated, was described by the writer at a former meeting of the Institute.²

Wolfram in New South Wales.*

BY HARTWELL CONDER.

The New England district of New South Wales is situated in the northern division of that State, extending north of Tamworth some 180 miles to the Queensland border. Diamonds, gold, silver, tin, lead, zinc, molybdenite, bismuth, and wolfram are all produced in economic quantities within a comparatively limited area, and wolfram also occurs widely distributed through the district. A strange characteristic of the special tin area herein described is the absence of sulphide minerals; pyrite seems not to occur in these formations. The rocks are frequently split and jointed, and the crevices down to over 80 ft. are filled with clay; this clay usually carries good wolfram. The permanency of the ore in depth is another question. So far no workings here have gone below 100 ft., at which depth wolfram in moderate quantity was found.

The treatment adopted for the ore is that of wet crushing and concentration. For wolfram alone in a quartz gangue, magnetic separation is well suited, but in this case the frequent presence of bismuth in pay quantity entails a process which shall save both these minerals. The occurrence of the ore, sometimes in large masses and sometimes in fine patches, places it between the galena ores (for which rolls are the recognized weapons) and tin ores (for which stamps have established their efficiency). For this reason, one company in the district has erected a stamp battery; another a mill with Gates rolls; each employs tables and vanners, though the mill uses jigs as well. The loss in slime with the battery is not so great as might be expected, as wolfram does not break very readily on its cleavage planes. On the other hand, most of the ore is set free by the rolls, and a saving of power is effected.

In the battery the ore is broken by hand to about 3 in. size, and fed to stamps by

² "Puddled Iron and Mechanical Means for its Production," Philadelphia Meeting, May, 1892, *Trans.*, xxxiii., 551.

*Abstracted from a paper in *Min. Jour., Ry. & Com. Gaz.*, Aug. 12, 1905.

a Challenge feeder. The screens are 10 mesh, and the pulp comes from the boxes to a Wilfley table (No. 5 model). The first product is ready for bagging, the middle product goes to a 4-ft. Frue vanner, which cleans it to market grade; the tailing from both tables goes to settling pits, with possibilities of re-treatment in the future. There is a considerable loss in the tailing.

In the roll mill, the ore is broken by a stonebreaker to about 1 in., and passes over a picking table to Gates rolls, where it is crushed to match a 3-16 in. trommel, the oversize being returned. It is then sized through 1/8 and 1-16 in. trommels, the oversize going to jigs. The undersize goes to a hydraulic classifier; two spigot products going to tables of the Wilfley type, while the overflow goes to a settling tank and thence to a 6-ft. Frue. The middle product of the tables is sent to another Frue. The ore is low-grade, and it proves difficult to dress this up to a market standard of 60 to 65% of tungstic acid.

The dressing problem is not an easy one. It was recognized that further machinery would be required to treat the tailing. Wolfram ore, though harder than galena and not nearly so brittle, has a perfect cleavage; but the mineral tends to break longer on two planes than on the third, so that tabular fragments of all sizes are common. The sp. gr. of wolfram is 6.9, and of quartz 2.6, but the principle of water concentration depends on the proportion of surface to weight; so that, should a fragment of wolfram be eight times as long as it is thick, its settling ratio comes down as low as a cubical fragment of quartz of the same weight. Particles of this shape are not uncommon, and make clean concentration no simple matter. Even with a vanning shovel it is not easy to clean a sample.

The Deutsche Gold- und Silber-Scheide Anstalt v. Rössler, of Frankfort-on-the-Maine, Germany, English Patent 6585, March 28, 1905, describes the process wherein molecular proportions of sodium peroxide, or sodium-potassium peroxide, and of boric acid are caused to react in aqueous solution, and an equivalent quantity of an acid (hydrochloric acid, for instance), that will form a readily soluble alkali salt, is added, the containing vessel being meanwhile cooled. The crystals that form are separated, washed with ice-water and dried at not above 35° C. The hydrated perborate thus obtained may be deprived of water of crystallization, and thus enriched in the proportion of available oxygen present by drying in vacuum.

In the nine months ending Sept. 30 the imports of diamonds into the United States were valued as follows: Uncut, \$7,514,848; cut, \$14,507,347; total, \$22,022,195. This is an increase of \$6,433,847 over last year. The demand for diamonds is an indication of prosperity.

THE ENGINEERING AND MINING JOURNAL

Published Weekly at

505 PEARL STREET, NEW YORK

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

To Foreign Countries, including postage, \$8.00 or its equivalent, 33 shillings; 32 marks; or 40 francs.

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

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

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; Palace Hotel, San Francisco, and the leading hotels in the principal cities.

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THE ENGINEERING AND MINING JOURNAL.

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

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THE PAPER ON control of fire in mines of sulphide ore, appearing in this issue, is another instance of the supreme excellence of common sense. This application of sulphur fume in extinguishing fire in inaccessible places is as old as its traditional use in burning chimneys.

THE CABLE REPORTS put the October output of the Transvaal at 425,000 oz. of fine gold, which is 8,503 oz. above that of September, but still 3,581 oz. less than the record made in August. This brings the total for the ten months ending with October up to 4,032,621 oz. fine gold, or \$83,354,276; an amount greater by \$4,232,000 than the production for the entire year 1904. There is now no doubt that the Transvaal total will be over \$100,000,000 for the current year.

IN THIS ISSUE we give two articles relating to Transvaal mines, both having considerable reference to the use of Chinese labor on the Witwatersrand. These letters are both by engineers of experience—Mr. Curle being well known everywhere—and the contrasted views which they express as to the value of Chinamen on the Rand will attract attention. It is possible that both are open to criticism, and we hope that some of our Transvaal friends will take the opportunity to express their views upon the subject. It is an extremely important one to the Transvaal, and the more facts that are brought out, the better it will be understood.

THE REPORT OF the Alaska Treadwell Company, which we publish elsewhere, shows that the operation of this great property on Douglas Island in Alaska continues on the same scale which has been maintained for several years. The Treadwell mill continues to turn out gold from ore carrying \$3 or less per ton, and to operate at a profit which enables the company to pay substantial dividends to its stockholders. In this mill and in the mines economy of operation has been carried apparently to its limit. If the ore carries only \$3, the expenses are still so much less that the profit is not only appreciable, but very considerable.

THE DANGERS AND DIFFICULTIES, especially to health, which are experienced by mining engineers whose work takes them to a tropical climate, are well shown in this number by Mr. J. P. Hutchins. He

has, by actual hard experience, learned the best methods of preserving health and carrying on the work under the conditions prevailing in South America, and it is a service to his professional brethren that he has been willing to record his experience for their benefit. The warnings, such as he gives, may be of great service to others, and it would be well if his example could be followed by more engineers whose work has led them into remote countries, or into those regions where risk to health and life is considerable.

Iron Ore in Ontario.

The location of iron-ore deposits, apparently of large size and importance, in northern Ontario, follows a long period of exploration. Prospecting in Ontario for some time produced nothing apparently of permanent value. When the Mesabi range in Minnesota was opened, a great many people anticipated that equally valuable deposits would be discovered in the adjoining sections of Ontario, then comparatively an unknown country. This has not been the case, however. Search on the Atikokan range revealed nothing of importance, and on the Michipicoten nothing of value has been found outside the Helen mine, which is worked by the Lake Superior corporation. The new deposits, known as the Moose Mountain range, are north of Georgian Bay, and about 70 miles from the water, so that the construction of a section of railroad at moderate cost will give them transportation to the lake. Diamond drills and test-pits have shown them to be of considerable extent and value, and their development will probably begin early next season. It is to be noted that, with the exception of the great Canadian contracting firm of Mackenzie & Mann, the parties interested in the Moose Mountain range up to date are from the United States.

Mining Regulations in Japan.

On another page we give an abstract of the new Japanese mining law. It will be noticed that mining rights within the empire are practically limited to Japanese subjects. An interesting question arises as to the possibility of the extension of the operation of the law to the newly acquired territories in Korea and Sakhalin. Both possess valuable mineral resources, which will be developed in the near future. An extension of the law would hamper foreign investments by the neces-

sity of conducting business through Japanese intermediaries—always an unsatisfactory circumambulation. The anti-foreign clause induces doubts as to the sincerity of the recent expressions of prominent Japanese statesmen regarding the desire for the investment of foreign capital in Japanese industrial ventures, and the practice of the open-door policy.

The new law was framed after a competent commission had studied the mining laws of the chief Anglo-Saxon mining countries, and there were doubtless weighty reasons for granting permanent proprietary interests in mining lands instead of recognizing the principle of the State reservation of minerals. When a Government absolutely abandons all rights to minerals, there is always a possibility of valuable mineral deposits being tied up by private interests, as has happened in other countries where absolute grants are the rule. Apparently the Japanese were induced to adopt the principle of private ownership by financial reasons. The clause in the new law relating to mortgages gives this impression.

Uses of the Metals.

The proper uses of the various metals is rapidly becoming better understood. This is to say that it is becoming better appreciated that lead, for example, is not merely a metal adapted to indiscriminate uses, but is produced in various grades, differing in properties through the presence of comparatively small quantities of impurities, which are useful for different purposes. Lead that will be entirely satisfactory in sealing the joints of cast-iron water pipes obviously need not be of the high degree of purity that is required of pig for the manufacture of red lead. Similarly, copper for rolling into sheet does not have to possess the high electrical conductivity of copper for drawing into wire.

These differences have been, of course, recognized for a long time. Except in the case of copper, however, it has not been so well understood just what is the effect of various impurities and what are the limits that can be safely tolerated for various purposes. Take the case of spelter, for example; the requirements used to be more severe than they are now, which is not to say that the consumers are any the less particular (on the contrary, they are quite the reverse), but they themselves understand more accurately what they

need and do not impose needlessly severe limitations.

The case of spelter is particularly striking, inasmuch as while we find the various grades of copper varying through a range of only about 0.5 cent per pound; and the various grades of lead varying through a range of less than 0.25 cent per pound; spelter, on the other hand, often shows a difference of 2.5 cents per pound between the best and the poorest, with a considerable variety of grades interposed.

Gold Production of the World.

In this JOURNAL for Jan. 5, 1905, we estimated the gold production of the world for the year 1904 at \$350,915,765. In the table below we give the figures as corrected and collected for "The Mineral Industry," Volume XIII. The difference between these final figures and the estimate made in the closing days of the year was only \$3,590,121, or about 1 per cent., showing a very close correspondence. It is not claimed that the corrected total is absolutely accurate; that is not possible, in view of the fact that in a number of countries no attempt is made by the governments to collect statistics; while in some others—such as Russia, for instance—where gold is taxed, some portion of the output is concealed. Gold lends itself more readily to such concealment than any other metal, owing to its high value in comparison with its bulk, and to the ease of transfer and disposal resulting from its universal currency. Nevertheless, the returns from all the important producers are sufficiently accurate to make the total a close approximation to the actual fact.

In our table the figures for the United States and for a few of the South American countries are those given by the director of the Mint. For most foreign countries, including all the important ones, they are from official sources. The total for 1904 is the largest on record, exceeding that of 1903 by \$17,697,288, or 5.1 per cent.; that of 1902 by \$48,912,651, or 14.1 per cent.; and that of 1901 by \$86,448,215, or 24.9 per cent. It was more than two and one-half times the average of the extraordinary decade which followed the discovery of gold in California and Australia.

With the exception of the large increase in the Transvaal, the changes were not great, when we compare 1904 with 1903. Australasia retained the first rank as a producer, largely owing to the excellent results from the mines of Western Aus-

tralia. The United States retained the second rank, while the Transvaal remained third, notwithstanding its gain of \$16,863,420, or 27.5 per cent. Russia was fourth, the production being nearly the same in both years, which is remarkable in view of the disturbance caused in Siberia by the war. Canada was fifth, though its total decreased \$2,443,590, or 13.4 per cent.; a decline due to the smaller production of the Yukon, which is now passing through the depression inevitable to all placer mining countries in the time between the first working of the rich deposits, and the advance which will surely come with the more general and systematic exploitation of the country. Mexico and India were, respectively, sixth and seventh in the list of producers; and they are the only other countries showing over \$10,000,000 in the yearly totals.

The five great producers—Australasia, the United States, the Transvaal, Russia and Canada—report a total output of \$287,432,111, or 82.8 per cent. of the world's total for 1904. In the current year the Transvaal will undoubtedly take the first rank; and the extraordinary group of mines operating on the great basket deposit of the Witwatersrand will show an output equal to that of the whole world 20 years ago.

The second table given herewith shows the gold production of the world, according to the best authorities, from 1850 up to the end of 1904. For the period from 1850 to 1900 we have given the yearly averages by five-year periods, and from 1901 to 1904 the actual yearly production, as reported. At the opening of the last half of the nineteenth century production had been raised to a high point by the discoveries in California and Australia. Nevertheless, as will be seen, it was considerably below that of recent years. The average yearly production for the second five years of the period was slightly above that of the first. The output then began to fall off with the exhaustion of the first riches of the placer mines of the new regions; but the reduction was comparatively slight until 1870, when it became distinctly apparent, and in the five years from 1881 to 1885, inclusive, it had fallen to a very little over \$100,000,000, the lowest yearly production recorded since the California discoveries. In the next five years, 1886 to 1890, there was a slight increase, which became a considerable one in the following five-year period, when the

Transvaal production first began to have its effect. In the five years ending with 1900 this was very marked, the production increasing by nearly another \$100,000,000; the greater part of this came from the Transvaal, but a considerable portion was due also to discoveries in North America, to the extensive working of mines, to the use of the cyanide process and to the advances made in Western Australia. The year 1901 showed a slight check, resulting from the Boer war, and the consequent stopping of mines in the Transvaal; but the deficit was partly made good by the Klondike discoveries and the extensive working of mines in Alaska and the Yukon. In 1902 there was a marked increase, due to the causes given above, and to the partial opening of the South African mines; this was emphasized in 1903 and 1904, as shown in the first table.

GOLD PRODUCTION OF THE WORLD.

	1903.	1904.
America, North:		
United States...	\$73,591,700	\$80,723,200
Canada.....	18,843,590	16,400,000
Newfoundland ..	141,477	209
Mexico.....	11,511,530	12,605,500
Central America.	1,875,001	1,120,700
America, South:		
Argentina.....	30,000	9,200
Bolivia.....	19,520	3,000
Brazil.....	2,274,000	2,032,984
Chile.....	665,000	636,900
Colombia.....	2,724,000	2,032,984
Ecuador.....	275,000	132,900
Gulana (British).	1,611,000	1,460,580
Gulana (Dutch).	438,564	520,212
Gulana (French).	2,101,000	1,788,800
Peru.....	716,567	399,654
Uruguay.....	57,800	25,368
Venezuela.....	300,000	300,000
Europe:		
Austria-Hungary..	2,251,086	2,240,166
Germany.....	1,707,650	1,817,288
Italy.....	31,663	44,000
Norway.....	7,404	7,234
Portugal.....	864	827
Russia.....	24,980,320	25,075,358
Spain.....	5,382	5,312
Sweden.....	33,900	42,235
Turkey.....	20,607	29,000
United Kingdom..	102,339	102,400
Africa:		
Madagascar... ..	1,139,963	1,345,121
Rhodesia.....	4,174,513	4,820,223
Transvaal.....	61,259,281	78,122,701
West Coast.....	1,239,807	1,500,000
Asia:		
Borneo (British)..	725,000	723,450
China.....	6,500,000	4,500,000
E. Indies (D'tch).	501,000	662,500
India.....	11,140,069	11,602,464
Japan.....	2,086,657	4,500,000
Korea.....	3,500,000	1,000,000
Malay Peninsula..	325,000	392,522
Australasia (Six States and New Zealand).....		
	89,220,102	87,100,852
Unspecified.....	1,500,000	1,500,000
Total.....	\$329,628,356	\$347,325,644

The figures exhibit the remarkable fact that in fifteen years the gold production of the world has been multiplied three times.

Not all this great increase has been due to discoveries of new gold deposits. A very considerable portion of it is the result of improved methods of treating ores. The cyanide process alone has furnished an appreciable part of the gain, and other methods of working and treatment of ores have done their share. No small portion

of the output of 1904 came from gold mines which had been abandoned at an earlier date as not payable, but the operation of which has been renewed under improved methods. This is the case not only in the United States, where the advance in metallurgy has been very great, but also in other countries, as in Western Australia, where successful treatment of the ores in some of the largest mines now in operation presented problems which were at first regarded as difficult of solution. These improvements in mining and beneficiation of ores will doubtless continue to have their effect for years to come, and will aid in keeping up the gold production, even should no extensive new deposits be discovered. There is every reason to look for a maintenance of the present rate of output for several years at least; at any rate no great decrease is probable. Where the next great developments are to come from is, of course, uncertain, but the most probable direction seems to be in the mines of South America, which have heretofore been worked on a very small scale, and which for a number of years past have actually produced less—or at least not more—than they did in the early days of Spanish settlement and exploitation. Eastern Asia also holds out the promise of increased yields.

GOLD PRODUCTION OF THE WORLD, 1850-1904.*

1851-55, yearly average.....	\$132,701,302
1856-60	134,070,945
1861-65	122,977,779
1866-70	129,602,578
1871-75	115,566,164
1876-80	114,576,000
1881-85	101,614,811
1886-90	112,409,599
1891-95	162,724,688
1896-1900.....	261,906,948
1901	260,877,429
1902	298,412,993
1903	329,628,356
1904	347,325,644

Fifteen years ago it was the consensus of opinion of eminent economists, such as Soetbeer, Leroy-Beaulieu and others, that not more than 25 per cent. of the gold produced in any one year could be considered as an actual addition to the world's stock of money; that is, that not more than 25 per cent. was added to the circulating medium after allowance had been made for gold lost or destroyed, coin melted for other purposes, and the amount required yearly for use in the arts had been deducted. It is probable that this estimate has been very considerably exceeded within the past three or

*From 1850 to 1882 the figures are Soetbeer's; from 1882 to 1900, they are those of the United States Mint; from 1900 to 1904, they are those published by "The Mineral Industry."

four years. Possibly not more than 25 per cent. of the gold mined has taken the actual form of coin, but a large amount has been used as bullion in bank reserves as the basis of circulating currency. Without going too deeply into this point, which requires very extensive research, we should be inclined to put the amount added to the circulating medium—either as coin, or, as we have said above, as bullion reserved to guarantee circulation—at between 45 and 50 per cent. of the total mined. This increase in proportion is in part due to the extensive demands of modern commerce, and in part also to the great increase in production, which has grown much faster than the amount which can be profitably used in the arts of manufacture and decoration. It must be remembered, however, that increase in wealth has caused an increasing demand for the precious metal for manufacturing purposes.

Undoubtedly this large increase in the production of the precious metal has been one—and a leading one—among the many complex causes which have brought about the present great activity in trade and manufacture all over the world. That such an advance has been made, in spite of the waste and devastation caused by the Boer War in South Africa and by the recent war in the East, is in great part due to the extraordinary supplies of gold which have been available for trade. A similar expansion of trade activity was witnessed after the Californian and Australian discoveries. At the present time it is much greater than it was then, owing largely to the extraordinary improvement in methods of communication and manufacture all over the world. This subject is an extremely attractive and suggestive one for discussion, but its proper consideration would require far more space than we are able to devote to it here.

There is every reason to believe, as we have said above, that the large production of gold will continue for several years at least. There is no doubt, for instance, that 1905 will come fully up to the figures of 1904, with a probability that it may exceed them. The full resumption of mining in the Transvaal will be an important item in the increase. Already the gold production of the Witwatersrand has exceeded in ten months the entire output of last year; and in other countries there has been no loss, if there has been but little gain.

Metallics.

The first commercial arc-lighting central station was installed in 1879.

In pyrite smelting the power consumption is ordinarily 0.5 to 1 h.p. per ton of ore.

Castor oil is of some benefit to leather belting, but it must not be used too often, or in too great quantity.

Wire is said to have been "killed" when it is given sufficient tension to produce a permanent set. In other words, when the elastic limit of the material has been exceeded.

Pipe lines for steam, when 40 ft. long or over and subject to intermittent use, should always have expansion joints of some type provided. Indeed, the best practice is to use expansions for all lines, whether kept in use all the time or not.

A steel rail, which had been fractured on an English railroad, on examination exhibited internal evidence of having been originally made from good pig iron, but in the manipulation an excessive percentage of combined carbon and manganese had been introduced.

The furnace as a means of ventilation is more economical in deep mines than in shallow ones, as it acts by heating a column of air; the higher that column, the greater will be the difference in the weight of air in the upcast and downcast shafts, and consequently the greater the motive power.

At Kosaka, in Japan, a zinky ore, low in copper, containing up to 20% barytes, is smelted pyritically at the rate of 1,000 tons per day in a furnace which is 300 by 42 in. at the tuyeres; with the exception of the new blast-furnaces at Anaconda, Mont., and at Isabella, Tenn., this is probably the largest in the world.

Fine flake graphite is a valuable lubricating medium for rock drills. When drills are assembled after cleaning, it is a good plan to apply graphite to the moving parts; it imparts a desirable smoothness to the operation of the machine, as well as allowing the quantity of oil used to be considerably reduced.

A rough blueprint frame that will give satisfaction consists of a sheet of heavy plateglass and a blanket; the blanket is laid in two or three folds upon a table top or other plane surface; the blueprint paper is placed on top, face up, and then the tracing to be printed. The weight of the plate glass is sufficient to hold the three in contact.

The suggestion has been made that a bulletin board should be placed at every tunnel entrance or shaft-house for the purpose of noting "missed" holes, and that the outgoing shift should not be allowed to report verbally any misses, but

for the information of all should note such on the blackboard provided. This is an idea that is worthy of adoption.

In construction, the men executing masonry or concrete work will often go to considerable trouble to secure screened sand, irrespective of the really positive advantage that is to be obtained in most cases by using unscreened material. Sand that will pass an 8-mesh sieve ought never to be screened except for the highest-class brick or cut-stone (coursed) masonry.

The tops of oil tanks about gas plants, where the hydrocarbons are obtained from crude oil, are often depressed several inches below the edge of the tank. This is done purposely, in order that the "dish" formed may be kept full of water and so prevent the direct action of the sun's rays upon the metal; as this latter is apt through the heat developed, to cause the giving off of an inflammable vapor.

To one who walks across the top of a full or partly filled gas holder for the first time the sensation is apt to give rise to uneasiness; the top is made of thin metal, often of No. 18 sheets, and when stepped upon rises and falls like the waves of the ocean. Gas holders are not self-supporting, and the frame work used in erection is consequently made strong enough to prevent collapsing of the holder when it is empty.

The gold yield from the three principal eastern States of Australia for the month of July amounted to 144,959 oz. fine, which is 9,068 oz. in excess of the corresponding month in 1904. The States of New South Wales and Victoria have made up some of the leeway of previous months, but Queensland still continues to lag behind, and, with the exception of Mount Morgan, a decrease is shown in the output from all the principal fields.

Prof. H. O. Hofman made experiments to determine by synthesis the conditions under which zinc ferrate may be formed in roasting ferruginous zinc ores, the probability of the formation of such a compound having been pointed out by several metallurgists. His experiments tended to show that various compounds of zinc and iron may be formed, not merely a single definite compound corresponding to formula. His experiments were, however, quite inconclusive.

Feed water in some marine work has been fed to the boilers at a temperature of 218° F. This makes the boiler practically a reservoir, for as soon as the pressure is relieved the water flashes into steam. The first feed-water heater is fed with exhaust steam, and the second with live steam from the boiler. The hot well water is usually fed to the first heater at from 140 to 160° F. by gravity; the exhaust steam being supplied from the auxiliary engines and pumps.

Ammonium chloride, or sal-ammoniac, is the natural flux for zinc when it is melted. Molten zinc rapidly oxidizes, and this oxide rises to the top as dross. This dross, when entangled in the metal, causes the production of dirty castings and rough-coated sheet metal or wire. Means for removing dross from the metal are supplied by ammonium chloride. When sprinkled on the surface of the melted zinc it rapidly causes the dross to change to a liquid slag which melts and leaves the metal underneath in a clean condition. This slag is easily removed (or pushed aside) so that clean zinc may be taken out by a hand-ladle.

Exhaustive experiments to ascertain the most economical method of breaking ore in mines have been conducted by the General Mining & Finance Corporation in South Africa. Both hand and machine drills were tested for a period of over six months with the following results: A great saving was shown by the use of machine drills where the ledges were more than 5 ft. in width. In ledges of 4 or 5 ft. in width the cost was practically the same by hand and by machine, while ledges under 3 ft. were operated at greater cost by machine. In narrow ledges where one-man machines were used, machine drilling was not so costly as hand drilling.

According to an investigation by E. Knecht, the composition of soot, obtained in Manchester, England, was as follows: Ammonium sulphate, 10.7%; mineral matter (ash), 19.6%; acid constituents, 10.9%; benzene extract, 10.0%; and difference (carbon?), 48.8%. London soot contained considerably less extractive matter than Manchester soot, the difference being most noticeable in the smallness of the benzene extract (1/3%). A sample of soot from Prague (lignite coal) gave a neutral aqueous extract. The acid extract contained only traces of ammonia and the benzene extract amounted to only 0.2%. The amount of acid constituents soluble in sodium hydroxide was 2 per cent.

Tests of samples of Joplin blende showed that decrepitation began at 290° C. and ignition at 480° C. Tests of ferruginous blende from Warren, New Hampshire, showed an ignition point of 515° C. Ferruginous blende from New Mexico took fire at 534° C. The results of experiments on these ores showed that the ignition point of blende increases very nearly in proportion to the percentage of iron, the ores investigated showing an increase of 4.19° C. per 1% of iron. In roasting, it appeared that ferruginous blende gives up its sulphur less easily than the blende that runs low in iron. The irony blende, under suitable conditions, furnishes a larger proportion of soluble zinc sulphate than blende low in iron, and the formation extends over a longer roasting period.

Colliery Notes.

The clearest way of stating the commercial efficiency of a colliery winding engine is by giving the amount of fuel used to raise a given weight a given height. It is best written as "coal used per actual horsepower-hour."

One reason for the adulteration of graphite with coke dust or ground anthracite is found in the difficulty of detection. As the adulterants are nearly pure carbon, their use is not apt to be discovered without the most searching investigation.

The use of masonry or concrete piers for supporting the roof in coal-mines is economically permissible only when the value of the coal which would otherwise be left as a support is greater than the cost of removing and marketing the coal and building the pier to take its place.

Experiments, made by the British Admiralty, have shown a difference of roughly 10% in the calorific values of coal stored under water and in air. This is presumably due to the loss by oxidation in the atmosphere; the coals tested were of practically the same calorific value when put into storage.

In some English collieries working on thin seams the coal is filled and conveyed from the working face by an endless belt, chain and sled system, or by a system of chains and scrapers working in a trough. The desirable conditions of their successful application are a good floor and roof, a thin seam, and long face workings.

With the single exception of oak, the strength of timber seems to increase with its specific gravity, without respect to its species. This property, while not generally known, is yet unconsciously utilized by timbermen in some of the Pennsylvania coalfields, who state in characteristic and expressive dialect, that the heavier sticks "have got more beef" than lighter woods.

The great advantage of machine coal-cutting consists of the reduction of mining costs, as well as in the enhanced value due to less breakage and to the increased safety. As breakage affects, to a great extent, the price which may be obtained for the final product, every practicable means is taken to guard against it, and the machines themselves are designed to effect the removal of the coal with as little breakage as possible.

Where coal dust is used for firing boilers or furnaces the utmost precaution must be taken in the grinding mill. Minute particles of finely divided carbon are present in the atmosphere of the mill, and "dust explosions" are liable to occur, with disastrous results. The risk is even greater than in flour mills, where we frequently hear of such explosions, and in coal mines where much dust is held in suspension, the danger from this cause is more universal

than that from the gases present in what are termed "fiery" mines.

A German engineer has invented a shaft-boring machine based upon the principle of the hydraulic ram. It depends on the shock produced when the flow of water through a pipe is suddenly arrested. The shock in the new machine impels a piston which drives the boring bit against the shaft bottom. The recoil is effected by a spring. This combination enables a large number of powerful blows to be struck in a small unit of time. Another advantage is the complete absence of heavy lifting, as in the old style of trepan borer.

Machines are employed in some British collieries for removing dust. Powerful armored-hose suction pipes are run up close to points of emission of dust from drill holes to collect the dust and gas charged air which is delivered to a portable purifying apparatus consisting of (1) a fan, (2) a filter composed of a frame filled with sawdust or slag-wool, and (3) a washer, consisting of a tank filled with lime-water and disinfectant. Baffle plates force the air to repeatedly pass under the surface of the water. The CO₂ thus coming in contact with the lime is rapidly absorbed, while the disinfectant destroys any disease germs. The purified air is returned to the working face by flexible armored hose. This method is practicably applicable to the working parts; it is not suitable for the road-ways, which are fertile collecting grounds for dust.

Temperature tubes in coal piles, or in pockets where bituminous coal is stored, form a valuable indicator in cases where spontaneous combustion is liable to occur. The pipe of which they are made may be anywhere from 2 to 4 in. diameter, and have the top left open for the insertion of a thermometer; this is inserted and allowed to remain at the desired point in the tube until a sufficient time has elapsed for it to assume the temperature at that point, after which it is raised and read. The reading taken will show whether a dangerous temperature has been reached, usually in time for precautions to be taken to prevent actual combustion. A "maximum thermometer" (one with the tube constricted so that it registers the highest temperature attained) should be used for this purpose. A more permanent arrangement (and one that is especially suited to coal pockets in power stations or permanent storage plants) instead of a thermometer, uses a thermostat, ringing an alarm when the temperature reaches a dangerous point. The pipe may be perforated for some five feet above its bottom, with a hose coupling threaded on at the top. In this case, if a stream of water under heavy pressure is turned into the pipe it may be effective in quenching the fire; though it is usually a matter of great difficulty to reach the seat of the trouble without actually exposing it.

John Veith.

The death of John Veith, long general superintendent of the Philadelphia & Reading Coal & Iron Company, was recorded in the JOURNAL of Oct. 21. He was for many years a prominent figure in the anthracite country, and in recognition of his many good qualities, we reproduce below an appreciation of his character from *Saward's Coal Trade Journal*, written by a correspondent who evidently knew him well:

"Mr. Veith was a typical mining superintendent. The first years of his experience in the art of mining were spent in the ranks of workmen. He advanced steadily by force of character and by intelligence to the position of mining superintendent of the largest corporation in the hard-coal industry, and discharged the onerous duties of that office with rare skill and judgment. He knew what it was to cut coal, and his face and hands bore testimony of the work he had done in the face. Whenever a dispute arose between the miner and the boss, Mr. Veith knew what a day's work was, and he could with unerring judgment say what a piece of work was worth. An honest workman never needed to be afraid of appealing to him, and invariably he made a just bargain with an honest wage-earner. This practical knowledge, gained by him as a young man in Middleport, enabled Mr. Veith to put himself in the miner's place. He never bulldozed a man, and he was too honorable to overreach his fellow-man in a bargain. He was always approachable. The most insignificant miner never needed to hesitate to place his case before him in person. If his cause was worthy of consideration he invariably gave it attention at once, and if it was necessary to rebuke a boss for his tyranny Mr. Veith did so.

"He was a shrewd reader of human nature. As the Reading Company bought out the collieries in the '70s of the last century, it was done mostly at the advice of this man. When the company's operations developed, and it became necessary to choose men to put in positions of authority, the task devolved on the mining superintendent, and as the collieries multiplied, the chief of the department had to be familiar with each operation. In the choice of men, Mr. Veith seldom made a mistake. He confessed that he was bunced once or twice. But, as a whole, he picked out good men, and the men in charge of the collieries today are those whom he placed in authority. He had under him as faithful a body of men as any company in the anthracite territory can boast of.

"He was a disciplinarian. He had much of the military instinct of the German nation about him, while the love of order was the secret of much of his success. The men under him were held to the rules laid down by him, and their reports were regular and continuous. These qualities

enabled him to keep in touch with the extensive operations of the company. Division superintendents came from every part of the territory with their reports, and, one after the other, he could follow them without confusion, and was able to understand their difficulties and give them advice. He was a practical miner, and his advice was often sought by men in the business of mining outside the Reading Company. But with all his knowledge, he was not above error, and no one was more ready to confess it. When he became old and the duties of the office were too arduous for him, it was with difficulty that he was persuaded to relinquish the reins which he had so long held. He was retired and placed on the pension list with full pay. This was done in honor of the veteran who had seen so much service.

"Men of John Veith's character and ability have made the Philadelphia & Reading Coal & Iron Company what it is this day. He loved justice, and invariably insisted on a square deal. When misunderstood and misrepresented he was patient; when his life was threatened by men or when he stood face to face with imminent danger he was calm and courageous; in trying situations he never lost possession of himself; he was confident of his ability and exercised self-reliance. He had his difficulties with the employees, but his calmness at all times gained their admiration if not their co-operation. He had many hairbreadth escapes, and came to a good old age and died at home. He was a man of strong common sense and firm convictions. He looked with considerable misgiving at the conduct of youths in the coalfields, and often expressed fear that the rising generation would not be as amenable to discipline as their fathers, and that the problem of wages and conditions in mining would become more difficult in the future."

Zinc in Plant Ash.

According to *Oest. Zeit. f. Berg. u. Hüttenw.* (1905, p. 479), in the district of Sulcis, in Sardinia, a variety of rock rose is called, by the miners, the "calamine plant." U. Cappa has analyzed the ash of this and other plants of the neighborhood; he discovered that all plants growing on the waste heaps and in the neighborhood of the zinc deposits contain more or less zinc. He concludes that the zinc cannot be in the least harmful to the plants, for all the specimens analyzed were fully developed and thoroughly well grown. Each plant was thoroughly washed before calcination, to free it from adhering earth; and the wash-water showed no trace of zinc. The zinc content of the ash varied from 10.69 to 29.37 per cent.

The pneumatic wood-boring machine is in use on the South Side Elevated in Chicago, where it is regularly boring 15-16 in. holes through 14 in. of green oak.

Correspondence and Discussion.

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

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL. Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

The Gympie Goldfield.

Sir—I have read with much interest the description of this field, by F. D. Power, in this JOURNAL (June 1, 1905, p. 1040). On the whole, the description is accurate; but there are some points to which I venture to call your attention. For instance, he states: "The minerals associated with the gold are iron pyrite, marcasite, mispickel, galena, massicot, zinc blende, copper pyrite, tetrahedrite, malachite, stibnite, native arsenic and tellurides of gold." Now, the impression is conveyed that the

as well. Some of the larger reefs are more like stockwerks than simple quartz reefs.

The faulting is everywhere evident, and curiously enough, plays a part in the gold patches of the mines. The east and west cross-courses (which cut across the reef and fault them) generally change the value of the stone. It is common experience that when driving on a reef which happens to be poor, one may expect an improvement on passing a cross-course; and when on good gold, the appearance of a crosscut is not welcomed. There are exceptions; thus, sometimes the reef is good on both sides.

The big bodies of pay stone seem to be more in the south end of the field than in the north. To a certain extent the reefs seem to get smaller and more patchy as they go north; and the extreme north of the field, "the two mile," has been very patchy indeed; while the extreme south, "the Scottish mine," is practically one vast stockwerk.

Another fact worth noting is that reefs which are big outside the "slate beds," are generally small in them, and *vice versa*.

The occurrence of the payable stone in the reefs, as they pass through the slate beds, has led to the system of mining adopted; that is, sinking straight shafts to the slate beds, then crosscutting to see if any reefs are thereabouts, and then opening them up in the beds.

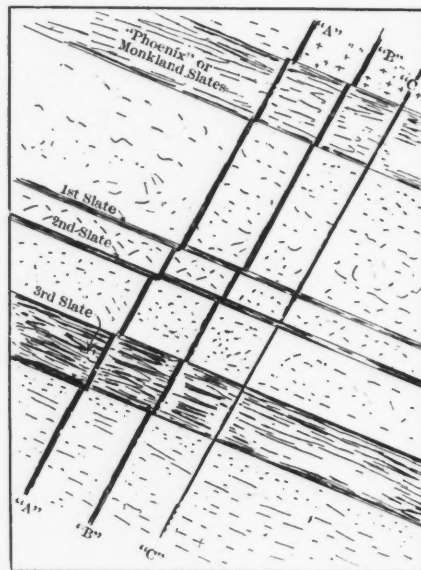
Some of the crosscuts are long, and are carried through and past the slate bed; hence, if in this extension a reef is struck, the shaft has to be sunk and a lower crosscut put in, calculated to strike the reef at the bottom of, or a little below, the slate; raises are then put up, etc.

As a final result, Gympie is noted for crosscuts, and reefs are not found for want of crosscutting. As the slate dips to the east (and it seems at a somewhat steeper angle than in the shallow west), the eastern mines are all "deep-level" ventures, sinking to 2,000 ft. (or more) before opening out, and then crosscutting in search of reefs. No surface evidence of reefs can be relied on, and many of these deep-level crosscuts are failures. In fact, the deep eastern ground is somewhat of a "frost"; the slate beds are of no use without good reefs, and these are wanting.

The big, rich reefs and slate beds at the south end of the field are cut off abruptly by the Inglewood fault. It is worth remarking that the reefs are biggest and best thereabouts, and the slate bed (the Monkland) is at its thickest (300 ft. or more).

Some expensive prospecting has been done south of this fault, most of it being directed by the "pickologist" instead of the geologist; it has been a dismal failure.

The goldfield boundary is not far away, and then freeholds follow; this is somewhat a deterrent, as there is no mining on private-property act in Queensland. Nevertheless, shafts, equipped with heavy ma-



ore is refractory, but the reverse is the case; Gympie ore is quite free-milling. Sometimes there is a little galena or iron pyrite; and most of the minerals mentioned above are found in isolated specimens only. The highest assay I have had (from a fair sample of iron pyrite) was only 2 oz., while the general run is only a few pennyweight per ton.

Of course, with "specimen stone," it pays to regrind the tailing; and in the case of mineralized specimen stone, there would be a percentage of concentrate. But as specimen stuff is crushed separately, no difficulty presents itself.

Gympie gold occurs much like chopped-up string. Sometimes these strings are fairly thick. I have seen one the size of a man's small finger, and frequently pieces like nails.

The gangue is quartz, or calcite; but, as there is often a reef on both hanging and foot wall, and veins in between, the included country rock is generally crushed

chinery and going down 2,000 ft. or more (looking for the slate, especially such a thick bed as the Monkland slate, which may not be there), are quite out of place.

Boring is the proper way to prospect (for slate) in this part of the field, and the diamond drill could not be put to a better use than to look for the lost slate bed.

W. H. Rands (former Government geologist of Queensland) is of the opinion that the slate is thrown east. It is unfortunate that prospecting operations in the faulted beds were not carried out under scientific supervision. The eyesore of half a dozen deep shafts in sight of one another would then have been avoided.

The accompany sketch shows three important gold-bearing veins, two of which (A and B) are characteristically faulted, while the other (C) is undisturbed.

W. C. WALWORTH PIERCE.

Gympie, Queensland, Sept. 12, 1905.

Marmatite.

Sir—Some time ago I noticed a note somewhere regarding the use of this word to designate the ferriferous varieties of zinc blende. Permit me to say that some such word is necessary, in view of the commercial difficulties. Thus, most of the zinc ores of Colorado (and especially of the southwest) consist of a combination of plain blende and marmatite. In one case, in my experience, other methods having failed, the electrostatic process of Blake succeeded in raising 22% material to a concentrate with 56% zinc.

H. W. HARDINGE.

New York, Oct. 30, 1905.

The Canas Mines, Ltd.

Sir—In your issue of Sept. 30 your London correspondent speaks of the recent advertisements of the Canas Mines, Ltd. Mr. Hedley Ludlow, of Ludlow Brothers, at present operating in the camp of Zimapan, informs me that the property claimed by this company no longer belongs to it, as it failed to keep up the mining taxes thereon. According to the Mexican mining law the property therefore became open for denouncement again, and has since been taken up by other parties. Mr. Ludlow said he had heard that the company in question had announced the recent shipment to England of some tons of the ore which had given remarkably high results, while to his certain knowledge no ore whatever from the camp of Zimapan had been exported to England for a number of years. The Ludlow Brothers are ore buyers, purchasing ore in Zimapan, as well as in our camp here at Pachuca; they are carrying on both smelting and mining operations in Zimapan; they are familiar with the various camps and mining operations throughout the State of Hidalgo, and have been for years, and are therefore in a position to state the facts regarding the above matter.

Any of your readers not familiar with the Mexican mining law should know that it is not enough to be shown a title to a property, though it may state that a certain property has been duly granted to a certain person for exploitation; the one claiming ownership of such a property must also be able to show a properly stamped receipt from the Government for the last mining taxes. These must be paid every four months, and if the above company actually possessed the property it claims, it would now have a duly stamped receipt for same dated July, 1905.

O. R. WHITFORD.

Pachuca, Hidalgo, Mexico, Oct. 27, 1905.

The Yaqui Indians in Mexico.

Sir—I note in the obituary column of the JOURNAL of Oct. 21 a paragraph stating that a despatch from here says that John C. Anderson, a resident of Boston, and an American mining engineer named Edgar J. Jones had been killed by the Yaqui Indians, but the despatch does not state where this killing took place.

The reading of this article was such a surprise to me that I immediately investigated the matter, and beg to inform you as follows: That no one in Hermosillo has heard of the killing of any Americans recently; that the office of the military commander of this zone has no knowledge of this killing; and that the local banks, United States consul and the mining men about town do not know who these parties are. I do not think it would be possible for any American to be killed by the Indians without the fact coming to be known to someone in Hermosillo; therefore I am confident that your information is not correct, and unless you have proof to the contrary, I beg that you will publish a denial of the account.

Central Sonora is suffering severely from the Indians, whose attacks are against unprotected wood-choppers and unguarded freight wagons, with an occasional assault upon small, lone ranches, whose inhabitants are usually without means of defense. Armed travelers, in parties of four or more, and using precautions to avoid ambush, are, up to date, immune from attack, as the Indians never give pitched battle, even when they are in superior numbers.

Since the killing of four Americans on Jan. 19, which was mentioned in the JOURNAL, no Americans have been killed by the Yaquis in Sonora, and to the best of my knowledge none have been held up or robbed.

J. NELSON NEVIUS.

Hermosillo, Mex., Oct. 28, 1905.

[The note in question was a press despatch, dated from Hermosillo, by way of San Antonio, Texas. It was given as a despatch, with no guarantee of the correctness of the statement. There was nothing to indicate that it was a fabrication at the time. Our correspondent's

statement is, undoubtedly, correct, and the origin of the despatch remains a mystery.—EDITOR E. & M. J.]

New Publications.

Electricians' Handy Book. By T. O'Connor Sloane. Pages, 760. Illustrated. Size, 4½ by 6¾ in. Leather, \$3.50. New York: The Norman W. Henley Publishing Co., 1905.

A convenient summary of information useful for the electrical engineer, but not so technical nor so complete as the similar volume by Foster.

The Electrolytic-Dissociation Theory, with Some of its Applications. By H. P. Talbot (Prof. Inorgan, and Analyt. Chem. Mass. Inst. Tech.) and A. P. Blanchard (Instructor, Mass. Inst. Tech.). Pages, 84. Illustrated. Size, 6 by 9 in. Cloth, \$1.25. New York: The Macmillan Co., 1905.

This is an elementary text-book, embodying the application of the modern theory of solution to the principles and practice of qualitative analysis. The book is an excellent illustration of the widespread acceptance and use of this theory as an efficient working hypothesis.

Synchronous and Other Multiple Telegraphs. By Albert Cushing Crehore. 124 pages. Illustrated. 6½ by 9½ in. Cloth. \$2. New York, 1905: McGraw Publishing Company.

Contents.—Introduction. The receiving apparatus in the duplex-duplex system. The transmitting apparatus in the duplex-duplex system. Applications of the duplex-duplex system. The alternating and direct-current quadruplex. Low-frequency duplex-duplex. The operation of synchronous motors on wires which are used for no other purpose. The operation of synchronous motors on wires which are also used for telegraphs. Measurements in synchronous telegraph circuits. Explanation of the measurements. Different conditions of instruments and line leakage. Working in opposite directions on the same wire. Morse circuits. General considerations and particular systems. Index.

Mining in Tennessee.

R. A. Shiflett, chief inspector of mines, has issued his report on the output of the mining industry of Tennessee during 1904. The State's products were these:

Coal, short tons.....	4,847,242	\$5,617,095
Coke, ".....	386,875	923,120
Barytes, ".....	10,565	37,132
Copper ore, ".....	287,830	641,860
Copper, fine, lb.....	13,905,018	1,721,549
Iron ore, long tons....	539,820	613,705
Pig iron, ".....	271,659	2,692,132
Lead ore, short tons..	900	1,204
Zinc ore, ".....	73	1,204
Phosphate rock, 1 g tons	468,443	1,485,665
Marble, cu. ft.....	372,560	523,872

Coal affords the principal mineral wealth. As compared with 1903, the above output shows an increase of 36,484 tons, but a decrease of \$556,629 in value. The value per ton in 1904 was \$1.16.

Mining was active for an average of 209 days, and 9,972 men were employed in and around the mines, earning \$1.91 per day each. Draft animals numbered 1,191. There were 28 fatal and 129 other accidents; ratios of 2.8 and 13 per 1,000 employed, respectively. Strikes caused the idleness of 180,696 working days, involving a diminution of 421,021 tons in output, with money losses of \$340,788 in wages and \$488,384 in disposition of coal. The 83 mining machines, distributed among 14 operators, accounted for 481,845 tons, or 10% of the total output. Of pick machines, 48 Ingersoll-Sergeant and 20 Harrison; and of chain-breast machines, 14 Jeffrey electric and 1 Morgan-Gardner, were in use.

Of the 2,390 coke-ovens, owned by 16 operators, 1,540 were in blast during the year, employing 532 men. The condition of the coal fed to them was: Unwashed run-of-mine, 37,626 tons; washed run-of-mine, 192,379 tons; unwashed slack, 34,405 tons; washed slack, 467,547 tons; total, 731,867 tons of coal, the average yield from which was 52.86% of coke, selling for \$2.38 per ton.

From the treatment of 384,886 short tons of copper ore, 13,905 lb. of fine copper was recovered, a yield of 1.81% of the tonnage treated. The product was sold at an average price of 12.39c. per pound.

Iron blast-furnaces were active for an average of 260 days each, employing 1,022 men. Tonnage treated was 718,667 tons, from which the recovery averaged 38% iron. This was sold for \$9.91 per long ton.

The phosphate industry employed 2,017 men for 225 days each. The output comprised 451,943 tons of brown and 16,500 tons of blue rock; stocks on hand were enlarged from 99,614 tons at the opening to 112,276 tons at the close of the year. Sales disposed of 455,781 tons (\$1,488,348), of which 120,498 tons went abroad. The price was \$3.01 for domestic and \$3.95 for foreign orders.

Expenditures for labor in the several industries were these:

Coal	\$3,732,577	9,972	\$1.91
Coke	138,587	532	1.14
Barytes	11,535	125	1.00
Copper ore	180,929	611	1.61
Iron ore	304,100	1,230	1.35
Pig iron	409,972	1,022	1.33
Lead ore	3,500	20	1.75
Zinc ore	600	2	1.00
Phosphate rock	580,429	2,017	1.20
Marble	113,674	415	1.20
Total	\$5,563,903	15,946	\$1.35

These totals do not include the wages paid to the workers in copper smelters, of which no record is given.

Notwithstanding the great increase in the use of cement, imports of this material into the United States have decreased rapidly. For the nine months ending Sept. 30 the imports in 1903 were 749,914,533 lb.; in 1904 they fell to 279,587,129 lb.; this year there has been a further decrease to 224,380,358 lb. This is less than one-third of the imports three years ago.

Armored Steam Hose.

Disintegration of steam hose is the cause of much annoyance and loss of time, as well as of expense for renewing the discarded material. Several factors enter into the life of any hose for this purpose. Of these, the heat causes the inner tube of the hose to lose its elasticity when the rubber is over-vulcanized or burned by the temperature of the steam itself. This is especially so in hose subjected to higher pressure or temperature than may have been used in vulcanizing it. The pressure also gives rise to considerable expansion, and when the steam is turned off the fatigue of the material prevents its return, through its elasticity, to its original condition. As a result of this, minute cracks are apt to form in the inner tube, and when the steam is turned on again it enters the interior of the hose through these openings and tends to separate the rubber from the cloth insertion; the former is apt to crumble up and sometimes gets into the steam-chest of the drill or other machinery to which the steam may be sent, and causes serious damage. When the inner tube has become damaged to this extent, the hose becomes useless and has to be discarded.

In quarrying or mining work the hose is one of the many articles used that does not receive careful treatment. It is apt to be dragged around rocks, or sometimes to have them carelessly thrown upon it. It becomes kinked and cut by contact with the jagged edges, and the exterior surface in this way is of comparatively short life. To meet this condition, as well as to provide a means of resisting the destructive effects of expansion, a new steel-armored hose has been placed upon the market; the armor is flexible and interlocked about the outside of the hose; it entirely encases the rubber lining and protects it from external injury. It is designed, according to its manufacturers, the Sprague Electric Company, of New York, with the idea of preventing an open rupture, in order that work could be continued with a damaged hose. Even if it should leak the armor provides sufficient closure to permit the steam pressure to be maintained for temporary use until repairs can be effected.

Questions and Answers.

Marmatite.

Is there any difference between zinc-blende which is nearly pure, and the feriferous variety called marmatite?

P. S.

Answer.—So far as electro-static separation goes there is no apparent difference between "rosin jack" and marmatite. One is separated as readily as the other. Their assay values, however, are different. The iron does not seem to affect the conductivity as far as Western ores are concerned. For the most part, Western zinc

ores are not zinc-blende but marmatite, which rarely carries more than 51 or 52% zinc. In most cases these marmatites may be regarded as blende (ZnS), in which part of the zinc sulphide has been replaced, molecule by molecule, by FeS; thus, the formulas of many of the Leadville zinc ores will be not ZnS, but (ZnS)₂ FeS; (ZnS)₄ FeS; (ZnS)₈ FeS, etc., respectively. This fact causes these ores, even if clean, to bring a much lower price than clean blende, and also gives some trouble in smelting. It also makes it difficult to concentrate these ores, by mechanical means, higher than 46 to 48%, as against the 62 or 63% in the case of zinc-blende. But in electro-magnetic work, the action on pure zinc-blende is decidedly different from that on marmatite. The pure blende is absolutely non-magnetic, while the marmatite is more or less so, depending upon its combined iron. Hence the suggestion to class the magnetic varieties of blende under the general head of marmatite is useful.

Sluice-head.

What kind of pumps are adapted to lift one sluice-head of water 25 ft. high, and what amount of water would be required?

F. G.

Answer.—A 5-inch centrifugal pump, with a 10-h.p. motor (or 10-h.p. steam-engine), will lift about 600 gal. per min. about 25 ft. The discharge of a "sluice-head" is assumed to be about 600 gal. per min. It has been found to be good practice to use rather larger centrifugal pumps than the manufacturers recommend for a given amount of water, as less power is required than when it is necessary to run pumps above an economical speed to get an expected capacity, and one often greater than the pump can well supply.

Abstracts of Official Reports.

Alaska Treadwell Gold Mining Company.

The carefully prepared report of the manager at Douglas Island, Alaska, Robert A. Kinzie, is, as usual, full of detailed information. It covers the year ending May 15, 1905.

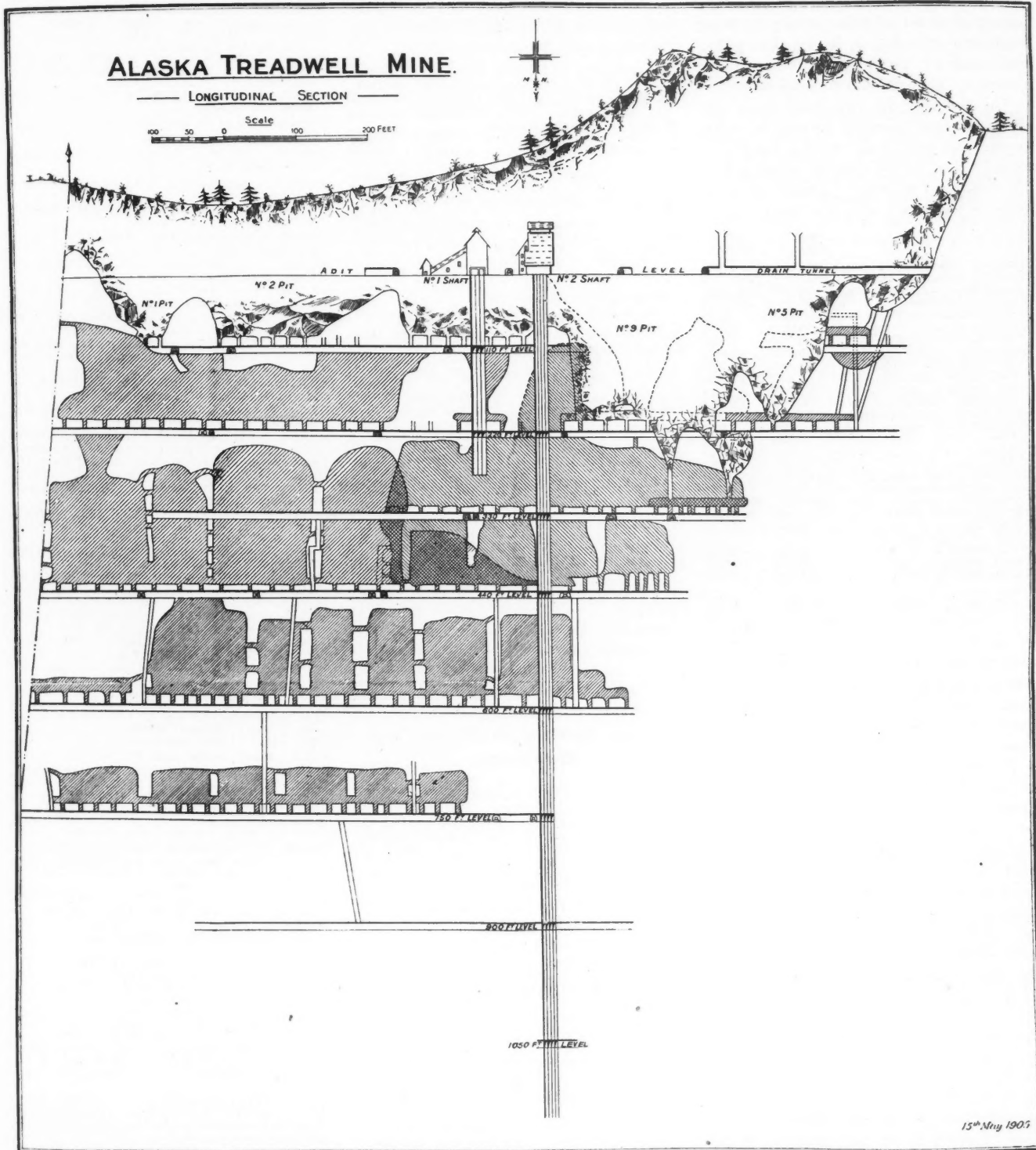
Development during the year comprised 4,650 ft. of drifts, 1,332 ft. of crosscuts, 4,475 ft. of raises, 1,152 ft. of stations, and 223 ft. of shafts. The main shaft has reached a depth of 1,155 ft. and preparations have been made for sinking it further. The average of 54 samples taken in the last 173 ft. was \$1.14. The open pits have been sunk to a depth of 600 ft.; slides of foot-wall rock will prevent the extension of the open pits to the south. The cost of extraction from these open pits is now about the same as from large underground stopes.

Of the 876,234 tons of ore mined and sent to the mill, 781,397 tons came from stopes, the remainder being supplied by development work. In addition, 936 tons

of previously broken ore was sent to the mill, and 91,823 tons of ore broken during the year was left in the mine. The cost of mining, hoisting, crushing and delivering to the mill bins the above tonnage was

highest values, while the poorest ore in the mine comes from the 1,050-ft., the lowest level. Of the 968,057 tons of material broken, only 155 tons was sorted out as waste.

is not sufficiently opened to be estimated. The progress of stoping is made clear by reference to the accompanying section; this may be compared with the section, showing the work done in the preceding



\$0.96, including development and the mining of the broken ore left in the mine. The open pits and underhand stopes above the 220-ft. level contributed 35% of the output, and the stopes on the 440-ft. level an equal amount. Of the other levels, the 600-ft. was the heaviest contributor. The average of 4,716 samples taken throughout the mine was \$2.65; one of the open pits, and the 330- and 440-ft. levels show the

Reserves of ore at the end of the year, including the ore that must remain in pillars, were estimated at:

	Short Tons.
Above 330-ft. level.....	1,014,995
Above 440-ft. level.....	239,407
Above 600-ft. level.....	515,712
Above 750-ft. level.....	945,305
Above 900-ft. level.....	579,000
Broken ore in stopes.....	664,985
Total.....	3,959,404

The tonnage tributary to the 1,050-ft. level

year, published in our issue of Sept. 29, 1904.

Machine drills are employed throughout the mine. There were 42 of them at work every day, on the average, during the year, of which 20 were stoping, 11 driving development, and the rest working in the open pits, or cutting-out stations. Those in the pits accomplished the most work; each one would drill an average of 3.57

15th May 1905

eleven-foot holes, or 39.4 linear feet per 10-hour shift, breaking down 57.26 tons of ore at a cost of \$2.77 for explosives. Those underground, cutting seven-foot holes, would average 4.8 holes, or 36 linear feet per shift, and broke about 31.5 tons of ore apiece, at a cost of \$2.66 per day each for explosives and of \$2.59 for supplies, power and repairs. To break one ton of ore required 1.13 ft. of hole to be drilled.

The company has two stamp mills, one of 300 stamps, operated entirely by water power, and one of 240 stamps, capable of running part of the time by steam power, the remainder by water. Details of operations of these two mills are instructive:

	240-Stamp.	300-Stamp.
Running time, steam.....	125d. 11h.	.....
Running time, water.....	234d. 12h.	286d. 7h.
Lost time.....	5d. 1h.	78d. 17h.
Tons ore crushed.....	396,094	481,076
Per stamp per day.....	4.58	5.60
Sulphurets saved, tons.....	8,420	9,633
Per cent of crushed.....	2.126	2.003
Quicksilver used, ounces.....	73,810	89,007
In batteries, ounces.....	60,480	68,369
On plates, ounces.....	6,925	17,303
On vanners, ounces.....	357	404
Cleaning amalgam, oz.....	6,048	2,931
Quicksilver lost, ounces.....	24,869	38,796
Supplies used, shoes.....	865	951
Dies.....	595	930
Stems.....	469	173
Tappets.....	58	51
Recovery from amalgam..	\$478,621	\$485,139
Concentrate saved, tons.....	8,420	9,633
Concentrate saved, value..	\$460,357	\$552,293
Tailings, total value.....	\$77,949	\$93,028
Per ton.....	\$0.20	\$0.19
Gross recovery per ton ore crushed.....	\$2.57	\$2.35
Value amalgam per ounce.....	\$6.13	\$6.39
Value bullion per ounce.....	\$18.86	\$18.86

Among the adjuncts of the mining plant, the foundry contributes most to economy of operation. Here are made all the shoes and dies used in the mill, as well as material required for construction. A machine shop is kept fully occupied with the company's work, and a sawmill is operated by lease to an outsider.

A new hoisting engine has been installed at the No. 2 shaft. It is of the horizontal Corliss type, cylinders 24 in. diameter and 60 in. stroke, and was constructed by the Allis-Chalmers Company. The engine is built to hoist a load of four tons of ore from a depth of 2,000 ft. at the rate of 2,000 ft. per minute. Its cost, including installation, was \$56,923. To supply it with steam, two new boilers were added in the 240-stamp mill, involving the erecting of another stack. A new Rand air-compressor was set up in the 700-ft. claim, for the purpose of supplying the Treadwell mine, and to afford surplus power to sell to the Alaska Mexican and the United Gold companies. Two independent fire pumps, capacity 1,000 gal. per min. each, have been set up to take water from the ocean. In addition to their protective function, they can be, and have been, used to supply battery water for the 240-stamp mill.

There were 55 accidents during the year, of which 4, all caused by fall of rock, were fatal, and 2 were serious. Labor is plentiful; ordinary laborers get \$2 per day with board and lodging; machine runners in the open pits get \$3.50, on account of their

hazardous position. The average number of employees was 636 per day for the year.

Operating and construction expenses are given by the report in elaborate detail, which would take too much space for reproduction here. They may be assembled, both in totals and in averages per ton milled (877,170 tons) as follows:

	Totals.	Per Ton Milled.
Recovered in bullion.....	\$970,462	\$1.1064
In sulphurets.....	1,037,381	1.1826
Profits on stores and supplies.....	69,317	0.0790
Interest and dividends.....	18,304	0.0209
Total receipts.....	\$2,095,464	\$2.3889
Mining and development..	\$841,785	\$0.9597
Milling.....	133,547	0.1522
Sulphuret treatment.....	133,253	0.1519
All other operating.....	36,075	0.0411
Construction and repair charged to profit and loss.....	41,365	0.0472
Total operating and construction.....	\$1,186,025	\$1.3521
Net profit for year.....	\$909,439	\$1.0368
Balance brought forward..	827,633	
	\$1,737,072	
Dividends (18%).....	\$900,000	
Depreciation, etc.....	150,852	
	\$1,050,852	
Balance carried forward..	\$686,220	

Other construction, charged against capital, amounted to \$120,626. The company is capitalized at \$5,000,000, and in its 15 years has made operating profits of \$7,331,644, from ore which, during that time, has averaged \$2.51 in value per ton. Operating profits for the year under review were the largest ever experienced, although operating expenses have reached lower averages in past years. During the 15 years they have averaged \$1.24 per ton.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

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

Week ended Oct. 3, 1905.

- 800,984. PROCESS OF PURIFYING METALS.—Henry M. Chance, Philadelphia, Pa.
 801,007. EXCAVATING-MACHINE.—John Helm, St. Louis, Mo.
 801,013. MACHINE FOR OPERATING COAL-AUGERS.—John H. Huhn, Uniontown, Pa.
 801,072. DEEP-BORING APPARATUS.—Eduard Frieh, Nordhausen, Germany, assignor to Deutsche Tiefbohr Aktien-Gesellschaft, Nordhausen, Prussia, Germany, a corporation.
 801,129. PROCESS OF REDUCING ORES.—Henry Arden, San Francisco, Cal., assignor to John Treadwell, Oakland, Cal.
 801,136. INGOT-STRIPPER.—Dwight B. Cheever, Chicago, Ill., assignor to Whiting Foundry Equipment Company, Harvey, Ill., a corporation of Illinois.
 801,143. PROCESS OF PREPARING DUST ORES FOR BLAST-FURNACES.—Heinrich E. Esch, Giessen, Germany, assignor to the firm of Fellner & Ziegler, Frankfort-on-the-Main, Bockenheim, Germany.
 801,144. PREPARING DUST ORES FOR BLAST-FURNACES.—Johann C. Feiner, Frankfort-on-the-Main, Germany, assignor to the firm of Fellner & Ziegler, Frankfort-on-the-Main, Bockenheim, Germany.
 801,147. MINING-CAR.—Andrew C. Latimer, Meadow Lands, Pa.

- 801,158. PROCESS OF MAKING INSOLUBLE ALUMINUM ACETATE.—Rudolf Reiss, Charlottenburg, and Otto Schmatolla, Berlin, Germany.
 801,166. PICK.—Alexander Walker and Richard W. Mewes, Whatcheer, Iowa. Week ended Oct. 31, 1905.
 802,974. DUST-COLLECTOR.—Charles Clark, Toronto, Canada, assignor of one-half to John Gamble Greey, Toronto, Canada.
 802,978. MINER'S LAMP.—Gustavus A. Duncan, Deadwood, S. D.
 802,980. PROCESS OF MAKING OXALIC ACID, ETC.—Frederick A. Feldkamp, Newark, N. J.
 802,985. EXCAVATING-MACHINE.—John Helm, St. Louis, Mo.
 802,987. AMALGAMATOR.—Henry J. Horstmann, Fort Wayne, Ind.
 803,076. FURNACE.—Daniel M. Somers, New York, N. Y.
 803,147. ELECTRIC FURNACE.—Edwin Appleby, Chicago, Ill.
 803,156. COAL-SCREEN.—Henry Duggan, Toluca, Ill.
 803,227. EXCAVATOR.—Willis B. Hard, Meridian, Miss.
 803,236. CALORIFIC KILN.—Edwin A. King, Philadelphia, Pa.
 803,263. ELECTROLYTIC CELL.—Henry S. Anderson, El Paso, Tex.
 803,278. ARTIFICIAL FUEL AND PROCESS FOR MAKING.—Andrew Engle, Metz, Iowa.
 803,283. SAFETY DEVICE FOR ELEVATORS.—Joseph Gummerson, Pittsburg, Pa.
 803,337. METALLURGICAL FURNACE.—Harry H. Goodsell, Leechburg, Pa.
 803,407. COAL-WASHING APPARATUS.—Robert Dick, Cartersville, Ill.
 803,460. MEANS FOR FIXING TAPPETS TO STAMP-STEMS.—Frederic Anderson and James S. Jarvis, East Rand, Transvaal.
 803,472. EXTRACTION AND PURIFICATION OF ZINC.—Alfred V. Cunningham, Wilmington, England.
 803,479. MAKING ARTIFICIAL STONE FROM MAGNESITE.—Miklos Gerster, Budapest, Austria-Hungary, assignor of one-half to Heinrich Freund & Soehne, Budapest, Austria-Hungary.
 803,484. APPARATUS FOR SINKING WELLS.—Dory Hickox, Gardena, and Charles Killefer, Los Angeles, Cal.
 803,506. PROCESS FOR HYDRATING LIME.—James Reaney, Jr., Sherwood, Md.
 803,534. PROCESS AND APPARATUS FOR PRODUCING COMBUSTIBLE GAS MIXTURES.—Charles K. Harding, Chicago, Ill.

GREAT BRITAIN.

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

Week ended Oct. 20, 1905.

- 17,985 of 1904. PROCESS OF RECOVERING POTASH.—Societa Romana Salfati, Rome, Italy. Recovering potash and alumina from leucite by treating it with caustic soda and lime.
 20,543 of 1904. ZINC SMELTING FURNACE.—J. Armstrong, London. A furnace for smelting zinc ores continuously, consisting of tall, narrow, vertical chambers surrounded with flues.
 25,087 of 1904. COAL-CUTTING MACHINE.—G. W. Bousfield, H. M. Lane and M. W. Robinson, Wakefield. Improvements in the chains carrying the cutting tools of coal-cutters.
 3,185 of 1905. PROCESS OF SMELTING COPPER.—R. Baggaley and C. M. Allen, Pittsburg, U. S. A. A system for smelting low-grade copper ores without concentration or roasting, by separating the ore into two portions relatively high in iron and silica, producing a low-grade matte, and treating this matte in a converter lined with non-siliceous material, and adding alternately charges of ore containing iron and silica.
 3,359 of 1905. STAMP-MILL.—F. H. Millhouse and W. MacFarlane, Johannesburg. Improved method of securing tappets to the stems of stamp-mills.
 7,563 of 1905. ROCK-CRUSHER.—W. A. Merralls, San Francisco. A rock-breaker in which the rock is broken between a revolving cylinder and a crusher jaw mounted on toggles at the lower end.
 8,387 of 1905. CONVERTER.—C. M. Allen, Butte, Mont. Making converters of solid, thick metal, instead of with water-jackets, so conducting away the heat from the inner surface without running the risk of chilling the whole charge.
 9,774 of 1905. BLAST-FURNACE BLOWING.—J. W. Dougherty, Steelton, Pa. A method of blowing blast-furnaces without the liability of explosions.
 16,275 of 1905. SAFETY LAMP.—J. Prestwich, Manchester. Improved locking device for miners' safety lamps.

Personal.

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

Prof. S. F. Emmons, of the United States Geological Survey, visited Salt Lake recently.

Messrs. W. S. Cleaves and John Stockett, of Hancock, Mich., were Salt Lake visitors recently.

Mr. H. W. Hardinge will make New York his permanent headquarters, with a branch office in Denver.

Mr. L. S. Judd, a Chicago mining expert, has been examining mines in Clear Creek county, Colo., this month.

Mr. Joseph A. Coram, of Boston, who visited Butte a few weeks ago, is again in that city on mining business.

Mr. Arthur C. Claudet has been nominated for the presidency of the Institution of Mining and Metallurgy for the coming year.

Mr. Charles H. Palmer, of Boston, for years manager of the property of the Butte & Boston Co., in Butte, is spending a week in Butte.

Mr. Foster Hewett was in New York last week, and is now on the way to Peru, where he will remain for some weeks on professional business.

Mr. E. G. Straub, of Denver, who is interested in Gilpin county mines and in Goldfield, Nev., mines, is making a business visit to the East.

Hon. Lyman J. Gage, formerly secretary of the Treasury, has been looking after mining interests in Boulder county, Colo., during the past week.

Mr. W. R. Lawson, founder of the *Financial Times*, of London, Eng., passed through Toronto this week on his way to the Cobalt mining region.

Mr. N. H. Emmons, 2d, of Boston, has been appointed mining engineer for the Old Dominion Copper Mining & Smelting Co., at Globe, Arizona.

Mr. Henry F. Collins, of London, has left for Spain to undertake the management of the Cerro Muriano copper mines for Messrs. John Taylor & Sons.

Mr. W. H. Ogilbe, manager of the American Tin Mining Co., has returned to San Francisco after six months' absence at the properties above Nome, Alaska.

Mr. Robert Jaffray, of Toronto, a director of the Crow's Nest Pass Coal Co., of Fernie, B. C., who has been on an official visit to the mine, has gone on to Vancouver.

Mr. J. W. Miller, one of the original owners of the Grand View group of claims and promoter of the Grand View

Gold Mining Co., has returned to Loomis, Washington.

Mr. W. Laird, of Pittsburg, Pa., a heavy stockholder of the Pittsburg Consolidated Co., operating near Idaho Springs, Colo., has been looking after this interest for about 10 days.

Mr. Robert P. Kirk has resigned as superintendent of the Big Bend Cinnabar Mining Co., at Big Bend, Texas, and has resumed consulting work. His office is at El Paso, Texas.

Mr. Jas. McEvoy, chief geologist for the Crow's Nest Pass Coal Co., of Fernie, Southeast Kootenay, is examining coal lands in the Similkameen and Nicola districts of British Columbia.

The directors of the Daly Reduction Co. have appointed Mr. R. B. Lamb general manager and superintendent of the company's business and property at Hedley, Similkameen, British Columbia.

Mr. H. V. Croll, manager of the Salt Lake City office of the Wellman-Seaver-Morgan Co., who has been at the general offices at Cleveland for a number of weeks, has returned to Salt Lake City.

Mr. Charles J. Bandmann, of San Francisco, will shortly leave for Mexico to take charge of mining properties, owned by the Magdalena Mining Co., situated near Llano and at La Brisca, State of Sonora.

Mr. James E. Rule, of Bald Mountain, Colo., president of the Roderick Dhu Gold Mines Co., of Gilpin county, has been examining mining properties near Montezuma, in Summit county, Colorado.

Mr. William A. Kidney, who has been superintending work in the Butte & Basin Co.'s concentrator in Basin, Mont., during the last four years, has been appointed general superintendent of the property of the United Copper Co. in Butte.

Mr. N. C. Banks, manager of the Black Mountain Mining Co., Magdalena, Sonora, Mex., is visiting Duluth, Minn., in connection with the supervision of that mine. This company operates the Cerro Prieto gold mine, near Magdalena.

Mr. Wm. Griffith, mining engineer and geologist, of Scranton, Pa., who lately returned from Alaska, was a visitor to Nanaimo, Vancouver Island, British Columbia, where are situated the collieries of the Western Fuel Co., of San Francisco.

Mr. F. L. Bliss, manager of the Ajax Engine Works, of Corry, Pa., and Charles Swap, of Youngstown, O., large stockholders in the Grand View Mining Co., have been visiting the company's property, at Loomis, Okanogan county, Washington.

Mr. James Ross, of Montreal, president of the Dominion Coal Co., has returned home after a tour of several weeks in Europe, during which he inspected the leading collieries in Britain and Germany

and obtained much information as to the latest mining methods.

Mr. A. M. Dewey, of Washington, D. C., president of the Q. S. Mining & Smelting Co., has gone to the mine, in Okanogan county, Wash., for a thorough examination of the company's property, and is accompanied by Mr. L. K. Armstrong, of Spokane, Wash.

Mr. Robert Howes, formerly assistant general manager of the Washington Water Power Co., of Spokane, has taken a similar position with the Great Northern Power Co., of Duluth, Minn., where, in addition to the general duties of his position, he will be in direct charge of construction.

Major Joly de Lotbiniere, civil and electrical engineer, who has been engaged for some time in India supervising the installation of several large hydro-electric plants, is in Victoria, British Columbia, visiting his father, Sir Henri Joly de Lotbiniere, lieutenant-governor of that province.

Mr. Franklin Playter, of Boston, owner of the Richardson gold mine, Nova Scotia, is in Toronto. He is visiting this province to investigate the possibilities of peat manufacture as a means of utilizing the peat bogs adjacent to the Richardson mine for fuel, in place of the 300 tons of coal consumed every month in operating 60 stamps.

Mr. C. W. A. Koelkebeck, mechanical engineer, for the past four years with the Garrett-Cromwell Engineering Co., and for 10 years previous with Julian Kennedy, has joined the engineering staff of the Wellman-Seaver-Morgan Co., Cleveland, Ohio, where his attention will be given to blast-furnace, steel-plant and rolling-mill construction.

Mr. John L. Harris, superintendent of the Quincy Mining Co., of Hancock, Mich., has left the employ of the company and has been succeeded by Mr. C. L. Lawton, who has been assistant superintendent for the past 90 days. Mr. Harris and the president of the company were unable to remain in substantial accord longer. For 13 years Mr. Harris has been at the Quincy, and his father, Samuel B. Harris, was agent and superintendent for 20 years before him.

Mr. Paul Johnson, superintendent of the Alaska Smelting & Refining Co., of Hadley, Prince of Wales Island, Alaska, was at the Tyee Copper Co.'s smelting works, at Ladysmith, Vancouver Island, British Columbia, on Oct. 19, for the purpose of looking into the hot-blast system invented and installed by Mr. Thos. Kiddie, now manager of the Britannia Smelting Co.'s works at Crofton, also on Vancouver Island. Mr. Johnson also visited the Crofton smelter before proceeding to Seattle, Wash., on his return to Alaska.

Obituary.

Charles J. Devlin, the widely known coal-mine operator, who recently underwent bankruptcy, with liabilities of over \$5,000,000, died at St. Elizabeth's Hospital, Chicago, Oct. 31, as the result of a stroke of paralysis. He suffered a similar stroke last summer. Mr. Devlin was 52 years old, and leaves a widow and five children. Before his failure in July last, Mr. Devlin was at the head of 26 different companies, coal-mining enterprises and mercantile establishments in Kansas, Missouri, Illinois and other States. For many years he was one of the most active business men in the Southwest. His wealth consisted largely of coal-mining properties in southern Kansas, in the vicinity of Marceline, Mo., and in Illinois. They included the Mount Carmel, the Toluca, the Marquette, Third Vein, the Devlin Coal Co., the Devlin-Miller Coal Co. and the Southwestern Fuel Co. As the result of overwork, Mr. Devlin collapsed last summer, and while papers were being drawn up at Kansas City to form a corporation intended to take over and manage his enterprise, the First National Bank, at Topeka, Kan., of which he was the principal stockholder, failed. The bank was found to hold close to \$1,000,000 of Devlin paper, and its failure caused runs on several Topeka banks and the failure of one Kansas City bank that held his paper. This failure put a stop to the incorporation of Devlin's properties, and Devlin went into bankruptcy. The report of the Devlin receivers, made on Oct. 19, placed his liabilities at \$5,631,000. Two months ago Mr. Devlin went to Europe for his health and only recently returned to New York.

Societies and Technical Schools.

California State Miners' Association.—The annual meeting is called, to be held in Nevada City, beginning Nov. 22, and continuing three days.

Black Hills Mining Men's Association.—This association, at a recent meeting in Deadwood, S. Dak., elected the following officers for the ensuing year: W. J. Thornby, Deadwood, president; J. V. N. Dorr, Lead, first vice-president; Walter McKay, Lead, second vice-president; Otto P. Th. Grantz, Deadwood, third vice-president; D. A. McPherson, Deadwood, treasurer; Jesse Simmons, Deadwood, secretary.

Trade Catalogues.

The France Packing Co., Tacony, Pa., issues its catalogue of steam packings.

The Southern Pacific railroad issues an attractive booklet, entitled "The Sacramento Valley."

The American Steel & Wire Co., Chicago, Ill., issues a flyer describing its "Crown" rail bonds.

The Midvale Steel Co., Philadelphia,

Pa., issues its new catalogue of smelter castings and stamp-mill parts.

The Hayward Co., 97 Cedar street, New York, issues a flyer on the subject of its "Two-in-One" hoisting drum.

The National Electric Co., Milwaukee, Wis., issues its bulletin, No. 358, describing belt-driven A. C. generators.

The Sandusky Foundry & Machine Co., Sandusky, Ohio, issues its catalogue of power pumps and accessory apparatus.

The S. H. Supply Co., Denver, Colo., is succeeded by the firm of Morse Bros., who are sending out a new catalogue.

"Liquid Fuel Equipment" is the new catalogue of the W. N. Best American Calorific Co., 11 Broadway, New York.

The American Hydraulic Stone Co., Denver, Colo., issues a bulletin showing the use of its product in building work.

The Electric Water Purifying & Filter Co., of 25 Broad street, New York, is sending out a pamphlet descriptive of its purification process.

"Winter Days in Sunny Colorado," is the title of an attractive booklet issued by the passenger department of the Denver & Rio Grande railroad.

The Yale & Towne Manufacturing Co., 9 Murray street, New York, issues its catalogue of portable electric hoists. The dimension drawings are sufficiently complete to be of value, and the publication is of standard size.

Industrial.

Richardson Bros. Co., Los Angeles, Cal., have recently opened an office in the Hanover Bank building, Nassau and Pine streets, New York.

The Grays Harbor Steel Co. is to build a plant at Grays Harbor, Washington, for the manufacture of crucible steel under the new process of John Barrett, New Brighton, Pa. Considerable equipment has been purchased from the Beaver Falls works of the Crucible Steel Company.

The officers of the Cross Mountain Iron Co., recently incorporated to develop iron and other mineral lands in Carter and Johnston counties, Tennessee, are George K. Hamble, president; William Spaulding, secretary and treasurer; Col. Charles P. Toncray, general manager. The main offices will be at Bristol with operative headquarters at Elizabethton.

The Danville Foundry & Machine Co., Danville, Ill., has been awarded the contract for the largest hoisting engine ever built in Illinois. The contract was obtained in competition with several other builders. The engine is for the Co-operative Coal Mining Co., at Breese, Ill. The hoist will have a pair of engines with 34 by 60-in. cylinders, and is designed to raise 17 tons at one lift.

The Jones & Laughlin Steel Co., Pittsburgh, has announced the letting of the con-

tract for the equipment of its new 26-in. structural mill on which work is being rushed. The mill will be driven by two Corliss engines which are being made by the C. & G. Cooper Co., Mt. Vernon, O. The roll train is being made by Mackintosh, Hemphill & Co. All the mill tables, hot bed, shear tables, etc., are being turned out by the Morgan Engineering Co., Alliance, O., and the cold saws and shears by the United Engineering & Foundry Co. The Fort Pitt Bridge Co. is constructing the buildings.

A despatch from Wheeling, W. Va., says that a deal has been completed by which the large iron and steel plants of the La Belle Iron Works at Wheeling, and Steubenville, Ohio, will soon pass into the control of the American Sheet & Tin Plate Co. The directors will issue a circular to the stockholders requesting them to give options on their stock at \$200 a share, and as the stock issue is \$7,000,000, the deal involves \$14,000,000. Already more than \$11,000,000 is practically under operation. The options will draw 1% a month until exercised. This deal leaves but two large independent iron mills in the Wheeling district.

Technical Publicity Association.—At a meeting and banquet of the Technical Publicity Association, held at the Aldine Club, New York, Nov. 3, the following officers were elected: President, C. B. Morse, Ingersoll-Rand Drill Co.; first vice-president, H. M. Cleaver, Niles-Bement-Pond Co.; second vice-president, Frank H. Gale, General Electric Co.; secretary, Rodman Gilder, Crocker-Wheeler Co.; treasurer, H. M. Davis, Sprague Electric Co.; members of executive committee—Graham Smith, Westinghouse Co., and Chas. M. Manfred, Johns-Manville Co. H. M. Davis addressed the association on "The advertising appropriation." An informal discussion followed, in which the members exchanged views on the disposition of advertising appropriations.

Construction News.

Joplin, Missouri.—A stamp mill is projected for the Magnolia Mining Company.

Windy Arm, Alaska.—A new smelter is to be erected here, in the interest of J. H. Conrad, of Seattle, Washington.

Republic, Washington.—Frue-Vanning and Wilfley concentrating tables are to be installed at the Mountain Lion mill.

Georgetown, Colorado.—The Mazeppa is preparing to put up a stamp mill and concentrator. E. W. Shepard is general manager.

Toledo, Ohio.—Pickands, Mather & Co. are to erect a new blast-furnace and coke plant in addition to their existing plant at this place.

The Cleveland Cliffs Iron Co. will erect a large steel mill near Presque Isle.

Apex, Colorado.—The Derby Mining &

Milling Co. is arranging to instal machinery for mining and working the ore. J. R. Moles, Apex, is manager.

Earles, Kentucky.—The Midland Coal Co. expects to build two tipples, with a capacity of 1,000 tons daily. Chas. E. Martin, of this place, is interested.

Cartersville, Georgia.—The Etowah Development Co. expects to develop its iron-ore property, near this place, by the installation of washing and other machinery.

Cedar Grove, West Virginia.—The New Cedar Grove Coal & Brick Co. will mine coal and manufacture brick. Thos. Boyd and Henry Calderwood, of this place, are interested.

Ensley, Alabama.—The Tennessee Coal, Iron & Railroad Co., of this place, will build a plant for the manufacture of cast-iron pipe. The capacity is to reach 5,000 tons per month.

Overbrook, Indian Territory.—J. A. Goodwin, secretary Oklahoma Oil, Paint & Asphalt Co., Oklahoma City, is contemplating the erection of an asphalt refinery in this district.

Russellville, Alabama.—The Louisiana-Alabama Coal Co. is preparing to develop coal lands, 12 miles south of this place. W. S. Douglass, of Russellville, will have charge of the work.

Norfolk, Virginia.—It is reported that the Norfolk & Western Railway Co. has had plans prepared for the construction of proposed steel pier, to cost \$1,000,000. C. N. Churchill, Roanoke, Va., is chief engineer.

Lock Raven, Maryland.—The Baltimore County Marble & Trading Co. will open a marble quarry on the Great Gunpowder river. Wm. H. Surratt, Central Savings Bank Building, Baltimore, can give information.

Bristol, Tennessee.—The Cross Mountain Iron Co. will need hoisting, pumping and other machinery for the development of iron mines in Carter and Johnston counties. George K. Hamble, Bristol, Tenn., is president.

Chanute, Kansas.—Work on the new pipe-line was begun here on Oct. 28. The line is to run from the Kansas fields to Mastin and then cross Missouri to strike the Whiting line; 125 men are at work at present, and supplies will be required. The line is a Standard Oil project.

Calgary, Alberta, Canada.—The Alberta Portland Cement Co. is establishing at Calgary Portland cement works to have an initial production capacity of 600 barrels per day, with provision for enlargement to an eventual capacity of 2,000 barrels per day. The capital is being provided by those who are also chiefly interested in the Vancouver Portland Cement Co., operating cement works at Tod inlet, near Victoria, Vancouver island, British Columbia.

Special Correspondence.

San Francisco. Nov. 1.

The county of Tuolumne is usually the first one in the northern part of the State to feel the shortage of water for mining operations every fall, and some of the larger mines have been closed this year for several weeks. But Nevada county, the banner gold-mining county of the State, is not nearly so much affected. This year, however, the water supply is very short, no rain having fallen since last winter, though the time for the wet season has arrived. All the mines of Grass Valley and Nevada City will shortly have to close down for a time, as the water companies gave notice that after Oct. 28 all the water to be sold to mines would be barely sufficient to run their pumps. This means that all the other parts of the mine must suspend, as the water is necessary for power at every mine in the district. This condition of affairs has existed once or twice before in the history of Nevada county, and in 1898 there were several weeks when the mines could not operate on account of a scarcity of water.

The California Miners' Association has decided to hold the annual convention this year from Nov. 22 to 25 at Nevada City, Nevada county. Heretofore all the conventions have been held in San Francisco, so the idea of meeting in a mining town is a new one. Whether or not the plan will be a success remains to be seen, although the Nevada County Miners' Association expects to do everything possible to make the convention a notable one. The community is certainly a most hospitable one, as was evidenced when the California Miners' Association entertained the American Institute of Mining Engineers in this State a few years ago. But Nevada county has not affiliated with the California miners of late, and for two years past there was no representation from the county at the annual convention. The miners of the county became in some way "disgruntled," or apathetic, and neither contributed money nor moral support to the State association. The reasons for heretofore meeting in San Francisco have been good ones. Numerous miners visit the metropolis in the fall months and take the period of the convention to come. They are always well entertained, and have a good time in addition to attending to the business of the convention. Whether or not they will go so willingly to an interior mining town is yet to be seen. The San Francisco delegation to the convention is always the largest of all the counties, as most of the subscribers are from this city. As they are largely composed of business men, with scant time at disposal, it is hardly probable that any very large number will go so far as Nevada City. Nevertheless, the experiment will be tried for this year, at any rate. Committees of the association have been appointed at Nevada City and at

Grass Valley to co-operate with the local committee to make the convention as much of a success as possible. Fred. Searles, W. F. Englebright and Nat. P. Brown are appointed by the association for the Nevada City committee, and Geo. Mainhart, A. D. Foote and C. G. Church will serve as committeemen at Grass Valley.

The surface plant of the Lightner mine at Angels, Calaveras county, has been destroyed by fire and a loss of some \$100,000 entailed. The mine is the most productive one in the camp, so that the works will doubtless be re-built at once. Superintendent Alexander Chalmers has been in charge of the property for the past five years and in that time they paid \$500,000 for debts and improvements, and meantime paid to the shareholders dividends to the amount of \$2.37 per share.

The District Court of Appeal has decided in favor of the Anti-Débris Association in the case of the county of Sutter vs. Geo. C. Sargeant and others. The Polar Star mine case, known as Sutter County vs. Johnson, has been appealed by the defendant. Both these cases involve the question as to whether a permit granted by the California Débris Commission has the effect of staying all action in the State courts.

Shasta county produced during the year 1904 over 80% of the copper from California mines. During the year the total copper produced in the State was 29,974,154 lb. Of this amount 26,438,145 lb. came from the mines of Shasta county, leaving 3,536,009 lb. as from the counties of Amador, Calaveras, Fresno, Inyo, Madera, Mariposa, Merced, Placer, San Bernardino and Stanislaus.

For a consideration of more than \$2,000,000 the Balakalala copper properties in Shasta county have been transferred by the Western Exploration Co. to J. A. Coram, of Boston, Mass., and the White Knob Copper Co., of which William H. Brevoort is president, and W. S. and C. K. McCornick, of Salt Lake. Coram gets a half-interest and the White Knob and the McCornicks a quarter each. This ends the litigation begun by Coram in the Federal courts.

After six years of costly litigation, the case of the Globe quartz mine, Detrick, Trinity county, has been finally settled. Judgment has been entered in favor of defendants, and H. M. Hall and H. Duvergey are now the undisputed owners of the property. The action was begun six years ago, and was hotly contested all along the line. The settlement of the suit will be of benefit in the county, and the vicinity of Detrick in particular. During the years that Messrs. Hall and Duvergey have been in possession, development work has been steadily prosecuted, but the mine has not been worked on a scale commensurate with its importance, owing to the uncertainty of litigation. Nevertheless, over 3,000 ft. of tunnels, cross-

cuts and upraises have been run and the orebody opened up in good shape. By running tunnel No. 2 ahead 1,200 ft., a large body of good ore has been disclosed. The mine has been handicapped by the fact that it was originally opened on the Stuart's Fork side, where the snow fall is heavy and the snow lies late in the spring, it being possible to operate the mine not over six months a year. Now, the working tunnel will be driven on through the mountain and the property will be worked from the Cañon creek side, thus permitting operations to be carried on throughout the year.

Paradise, Ariz. Oct. 28.

Progress continues in this district with most gratifying results. The King of Lead has again started up with the old lessees at work. They will continue the driving of the crosscut tunnel, and expect to tap the ledge in about 40 ft., making the tunnel about 340 ft. from entry. As soon as the ore is tapped with this tunnel it will give 75 ft. additional stoping ground, and the old property will again become a shipper.

The Duluth & Chiricahua Development Co. is pushing the shaft and installing the gallows frame. The company will sink the shaft 200 ft. to cut the formation.

Development work continues to be pushed at both ends of the Manhattan Development Co.'s property. In the Smith tunnel, on the east end of the ground, they have cut five veins in a distance of 150 ft., forming lenses like the spokes of a half-wheel, all seeming to have a pitch to the southwest. The first vein encountered has much more of a dip than the last, and they may all pitch into the main ledge with depth. If they do come together there should be found a large body of ore. The tunnel will have to be driven about 200 ft. further to cut the main contact. At the west end of the property they have some good-looking ore in the drift.

S. S. Badger, owner of the Lexington group, has finished his survey of the property, where he has a showing of sulphide copper ore on the surface. The blow-out outcrops about 100 ft. long by 30 ft. wide, and carries 8% copper.

The Chiricahua Development Co.'s work in the three drifts and crosscut continues. The large iron water bucket-dipper is handling the water in a satisfactory manner. Samuel R. Kaufman and William G. Rice, directors of the company, arrived at the mine last week for a 10 days' visit.

John A. Duncan, from whom the Chiricahua Development Co. purchased its ground, is also the owner of the Mayflower group, which joins the Chiricahua Development Co. on the southwest. He has just completed the purchase of the Longfellow and Picket Post claims, both joining the Mayflower.

The Cochise Consolidated Copper Co.

is rushing work on the 100-ton concentrating plant, and is pushing development in the zinc tunnel and main shaft. The new plant consists of an 100-h.p. gas engine for the concentrator and hoists; also electric lights for the property.

Denver. Nov. 4.

Sensational articles, giving the impression that the Mine Owners' Association had renewed war on the Miners' Union having been published in our daily press announcing a strike on the Alta properties, near Telluride, the writer sifted the matter down to the fact that, when the attention of the operators of said properties was drawn to the fact that a number of miners were in their employ who did not have the necessary cards, while these operators belonged to the above association, they notified these men to procure the cards, when they, to the amount of about 20 in all, went to Telluride and quit work. Neither the mine nor the mill shut down at all.

Accompanied by a large number of counter affidavits, in reply to those, filed by Mr. Doyle's attorneys, and denying unprofessional conduct on the part of Mr. Burns' counsel and of the members of the jury, who tried the celebrated case of Doyle vs. Burns a few months ago, the Burns attorneys have filed a protest against a new trial of the suit at Council Bluffs. About a million dollars' worth of stock in the Portland Mining & Milling Co. is involved.

According to the annual report of W. J. Cox, the general manager of the Camp Bird Mines, Ltd., the aggregate profits amounted to \$1,610,505, and it seems that the average grade of the ore was somewhat higher than was the case before. Lower freight rates and smelting charges contributed to very satisfactory results. Four dividends and a bonus were paid during the year.

Several Denver parties, together with a few from Cripple Creek, have, during the past few days, closed a deal with Rasmus Hanson, one of the old-timers in the San Juan country, for the Mountain Queen group of mines, north of Silverton, in Cunningham gulch. The price is stated at \$100,000. The property has been profitably worked for several years.

President Hearne, of the Colorado Fuel & Iron Co., has left here for New York to confer with George Gould in regard to the plans for the future, the latter having secured control at the annual meeting.

Nearly a hundred acres of land in the vicinity of the Missouri Pacific roundhouse, at Pueblo, have just been purchased by the Denver & Rio Grande railroad, to be used for the building of new shops, where the principal repair work of the Gould system, in this part of the country, will be handled. An expenditure of about \$300,000 is contemplated.

There is a good deal of guessing in regard to the plans of the Southern Pa-

cific's building an extension from Salt Lake City, eastward through the southwestern portion of Colorado, headed for a connection with the Rock Island system. Filings have lately been made on passes over the Greenhorn and other ranges, and in the southern part of Fremont county, the Rock Island system has for some years owned quite an amount of coal land. The situation between the Gould and the Harriman interests in this State is becoming interesting.

Scorro. Oct. 25.

A strong reason for the backwardness of New Mexico in mineral development, as compared with the neighboring Rocky Mountain States, may not be generally known. I refer to the large area of mineral country which is comprised in the land grants of the territory; this system of grants is a legacy from Mexican rule. Unlike the public domain, mineral claims were not subject to location by *denouncement* on these grants, and hence titles obtained from the grantees were hazy. The final adjudication (by the United States Court of Private Land Claims) of the title to these grants was finished on June 30, 1904. About one-sixteenth of the claimants were given a clear title to their tracts, the balance reverting to the public domain. With the assurance of a good title to mineral deposits everywhere, there is now no reason why New Mexican mining districts should not make up for lost time.

A scene of considerable present activity is Otero county. About 50 miles north of El Paso, on the El Paso & North-eastern railroad, the Southwest Smelting & Refining Company, of St. Joseph, Mo., is preparing to build a copper smelter of 150-ton daily capacity. It has a large townsite, called Jarilla, in which about 1,000 lots have already been sold. Water for municipal and irrigation purposes will be piped from the Sacramento mountains, 21 miles distant, and contracts for 1,300 tons of pipe have already been let to the Crane Company, of Kansas City. The smelter contract (which will include steel buildings and the latest improvements) has been let to the Commonwealth Construction Company, of Denver, Colo.

In Grant county, also, considerable activity is shown. Granite Gap, a deserted village, has taken on a new lease of life, owing to the revival of mining by the Pratt Consolidated Mining Company (composed of Los Angeles and Boston capitalists). The shipments by wagon to Antelope Pass (on the El Paso & Southwestern railroad) now amount to 200 tons daily; the ore carries 30% lead, 5 to 10 oz. silver, and 25% iron. Granite Gap lies in San Simon district.

Chloride Flat, a famous producer just west of Silver City, after 15 years of silence, may be heard from again. Manuel

Taylor, who has spent a dozen years in searching for ore, recently made a strike at a depth of 60 ft. in his Grand Central claim. This claim lies between the Seventy-Six and the Baltic mines, which, in the eighties, produced nearly \$5,000,000.

The Organ district, in Donna Ana county, is also picking up. The new shaft of the Stephenson-Bennett silver-lead mine is going down (3 ft. a day) to reach the 600-ft. level. The Modoc mine is shipping silver ore to the El Paso smelter. At the Memphis, a recent strike shows a large orebody running well up in copper.

In Rio Arriba county, the Bromide district will increase its copper and gold production as soon as the new concentrator of the Tusus Peak Gold & Copper Company shall be completed. In the Headstone district, the buying of the Woody stamp mill by the Dixie Queen Mining Company guarantees that work will be carried on all winter at the Santa Fé tunnel and on the Red Jacket claim.

Tonopah. Nov. 1.

The latest sensation is caused by the discovery of a body of high-grade ore in the Golden Anchor mine at Tonopah on the 900-ft. level on the north crosscut. The values are higher than those encountered on the 600-ft. level, the same vein having been found at the lower level.

The prospecting claim on the Manhattan field, north of Tonopah, is looking well and promises to be a yielder of high-grade ore. There is a prospect of this property shortly becoming involved in legal troubles.

In the Toiyabe district, near Smoky valley, about 45 miles north of Tonopah, the Central Nevada Mining Co., a Japanese corporation, controlled by Mr. Komada, of San Francisco, a Japanese, and employing exclusively Japanese help, under the management of Mr. Fukuda, a graduate of the University of California, is working an antimony mine in Big Creek cañon.

The Comanche mines, in the Grapevine district, near the California-Nevada State line, and 15 miles southwest of Bullfrog, are opening up well. Some of the surface stone assays up to \$15 per ton, and the ore is increasing in value with depth.

The situation at Bullfrog is very promising. Developments are being vigorously prosecuted, and such mines as Montgomery Shoshone, Gibraltar, Eclipse, Denver, Original Bullfrog and Bullfrog Mining show increased values almost at each shift. The construction of railroads, mills and necessary machinery is going on rapidly.

A merger of the properties on Montgomery Mountain, Bullfrog, with the exception of the Shoshone, is being attempted by capitalists of Denver, San Francisco and New York. The people back of the proposed merger are reported to be financially strong, and should the deal go through it would mean the immediate em-

ployment of a small army of men and the development of a large area of territory.

Butte. Oct. 24.

Ben. B. Thayer, representing H. H. Rogers, who has been inspecting the Amalgamated mines here during the last three weeks, finished his work yesterday and left for New York last night. Mr. Thayer, before starting East, stated that mines of the company were in first-class condition, and the veins never looked better than they do now, adding that it was the intention to keep immense ore reserves opened and sink the shafts as necessity required. The shaft of the West Colusa, a Boston & Montana mine, is to be sunk 40 ft. at once, which will make it 2,000 ft. The Diamond, of the Anaconda group, which was closed down nearly a month ago on account of an accident to the hoisting engine, was started up yesterday full blast, and is again yielding its customary quantity of ore, 800 tons per day. The new engine on the Mountain View is ready for work, but will not go into commission until enough ore is accumulated to prevent interference with regular shipments while the cables are being changed. Boston & Montana is having some trouble by reason of a shortage of cars in which the product of its mines is conveyed to the Great Falls smelter; but the Great Northern Railway company has ordered 300 extra cars, and expects to have them here November 10.

North Butte continues to extract between 500 and 600 tons of first-class ore per day. Its shaft work will not be finished until the latter part of November.

Pittsburg & Montana Copper is increasing its daily output of ore. It is drifting west on four veins, the faces of which show good ore. This vein is 6 ft. wide, and is between talc-lined walls of granite. The lowest copper assay obtained from any of the ore extracted during the last month was 4%. The company is sinking a winze on the 1,200 of the Donner vein, with a view of determining the pitch. It is 110 ft. deep. The first 50 ft. showed a north pitch, but from that point it was south, the regular pitch of the vein system of Butte. An upraise has been made between the 1,200 and 1,000 in the west workings. The company will begin sinking its new 1,200-ft. shaft this week. Its smelter is in operation and working well, nearly 12 tons of blister copper being turned out by a portion of the Baggaley process every 30 hours.

Reins Copper has its shaft down 940 ft. and is sinking at the rate of 15 ft. a week. It will go to the 1,200 before crosscutting the lead.

Raven has opened up two veins of copper-silver ore in its property, but is shipping only that which comes from the levels. The ore is of good quality, carrying from 7 to 10% copper and 12 oz. silver. Heavier shipments are announced for the near future.

Pittsburg & Montana Copper will ship 100 tons of blister copper East today. This will be its first shipment. The metal is the output of the plant, having been made from crude ore without previous concentration or roasting. The company has begun sinking its new shaft and will send it down 1,200 ft. When the work is finished it will have three shafts of this depth. The orebodies continue to improve in size and quality. None of the ore mined runs less than 4% copper and 10 oz. silver, while much of it runs as high as 16% copper and 24 oz. silver. Officers of the company say they will have no trouble in keeping the plant in continuous operation on ore from company mines.

Owing to a shortage of cars, Boston & Montana fell 10,000 tons short in its shipments of ore from Butte to its Great Falls plant during October. It is thought the condition will not improve until the close of navigation on the Lakes, when cars now used in hauling iron ore will be brought to Montana for use. The Great Northern Railroad Co. says it has ordered 300 new steel cars for Boston & Montana and United Copper ore use and they were to have been delivered Oct. 15, but they have not arrived here.

Amalgamated is short on coal, but may be able to overcome the difficulty without shutting down any of its mines or smelters. It consumes 1,500 tons per day, 900 in the Washoe plant and the remainder at its Butte mines. The shortage is due to the failure of the railroad company to provide sufficient transportation facilities. The mines of the company are all in good shape now and the average daily production of 10,500 tons is being maintained.

Leadville. Nov. 4.

One of the busiest sections in the camp at present is South Evans, and two strikes lately made have drawn attention to the district. Both of the strikes were made after the men had worked for over a year on the properties without opening a pound of ore. James Johnson a year ago secured a lease on part of the Izard and started work at the 200-ft. level, and has kept pounding away ever since; lately he opened up a fair body of sulphide and the little work done since shows the ore-channel widening. Tom Evans has been at work on a shaft on the west side of the gulch and at the bottom of Breece hill and in addition to sinking the shaft 300 ft. has done considerable prospecting in drifting and upraising; a few days ago work was resumed in the shaft and after going down a few feet a good body of sulphide was encountered; the shaft will be sunk until the bottom of the shoot is reached. The Green brothers, on the lower shaft of the Favorite, are shipping from the upper and lower levels of the property, the richest ore coming from the upper workings, from which 40 tons daily are being shipped that net the lessees \$25 per ton.

At the 300-ft. level the streak of ore is small, but it is expected that it will catch the shoot above within another 50 ft. The ore recently struck in the Nevada at the 200-ft. level is opening out and the lessees look for a good body of ore before the drift is run another 100 ft. The New Year and the Little Ellen will be connected by a drift so as to give both properties better air. From the Little Ellen 25 tons daily are being shipped of a grade of ore that runs \$25 per ton. Work with the diamond drill has ceased on shaft No. 2 of the Ollie Reed, as the results were not satisfactory; the company will devote all of its energy to No. 1 shaft where there is a good body of ore.

In the Big Evans section the Fortune is shipping a little better than 50 tons daily from the upper workings, and preparations are being made to get to the lower levels and open the sulphide bodies. Since the fire nothing is being done at the Resurrection. The Silent Friend, toward the head of the gulch is shipping about 200 tons monthly.

The manner in which the mines on Carbonate hill continue to send out heavy tonnage is astonishing. As a whole the mines have been steadily producing for the past 27 years, and there seems to be no end to the ore contained in the hill, as the properties owned by the Morning and Evening Stars are producing at the rate of 400 tons daily. On the Waterloo two shafts are being worked and the tonnage amounts to 75 tons daily. At Crescent No. 2, at the 400-ft. level, a good body of carbonate ore has been opened that runs well in lead, as well as carrying about 10 oz. silver per ton. From the Evening Star shaft the company is shipping 50 tons daily, and from the Ladder, Porter, Catalpa, etc., a good tonnage is going out daily.

On the south end of the Gallagher a set of lessees recently opened a body of ore that runs \$50 per ton and they are shipping a carload a day. At the north side the company is prospecting on a small streak of ore. The Flagstaff in the same neighborhood is shipping a fair amount of ore from the recent strike at the 570-ft. level, and at the same time carrying on extensive prospect work.

The physical condition of the downtown properties is excellent and the tonnage from a number of them is heavy; the heaviest shipper is the Coronado, which is sending out 300 tons daily, and this is followed up by the Northern, that is shipping 125 tons daily. It is expected that the balance of the pumps in the Penrose will be set before the end of the month, which will permit the mine to be worked extensively. The Bohn shaft, East Second street, is now down about 600 ft. and is in contact matter with, so far, no water. A new tram has been erected at the Midas and the machinery overhauled preparatory to its resuming work.

The Ruby mine, Twin Lakes district, recently shipped a carload of first-class ore that ran \$300 per ton; the low-grade stuff is being stacked on the dump waiting the completion of the mill, and the property will work all winter.

The Belle of Granite shaft will be sunk another 200 ft., making it 675 ft. deep. The vein at the bottom of the shaft runs high in gold, silver and copper.

Salt Lake City. Nov. 3.

Utah will be represented by a strong delegation at the meeting of the American mining congress, which convenes at El Paso next month. The delegates have organized, with Harry S. Joseph, chairman, and Charles F. Warren, secretary, both of Salt Lake City. Frank Pierce, a well-known Salt Lake attorney, will respond to the address of welcome for Utah.

Dr. John T. White, of Salt Lake, has brought suit against G. D. B. Turner, manager, and the West Quincy Mining Co., operating at Park City. Dr. White asks for an accounting from Turner; also to be decreed a one-third interest in the profits alleged to have been made by the latter in the organization of the West Quincy Co., to which he claims he is entitled. The plaintiff was at one time an officer of the J. I. C. Mining Co., which at one time operated a lease on the ground now in possession of the West Quincy.

An important mining deal has been consummated in Salt Lake which involves the ownership of the Balaklala copper mine in Shasta county, California. The consideration is said to be \$2,000,000, of which sum \$250,000 has been paid over to the Western Exploration Co. It had been supposed that the White Knob Copper Co. held an option on the mine. In fact, representatives of the company did have the property under bond and made one payment, when it developed that J. A. Coram, one of the Bingham Consolidated largest shareholders, held a valid claim, which resulted in a compromise, the Coram interests taking 50% of the stock, the White Knob Copper Co. 25%, while the balance is vested in W. S. and Clarence McCornick, who are friendly to the Bingham Consolidated interests. The directorate of the Balaklala Consolidated Copper was reorganized. J. A. Coram, Boston, Mass., was chosen president; William Brevoort, New York, vice-president; Clarence K. McCornick, Salt Lake, treasurer; and Charles O. Ellingwood, Salt Lake, secretary.

A fire at the Sunnyside coal mines of the Utah Fuel Co., on Oct. 27, destroyed property of the value of approximately \$300,000. The damage involved nearly a third of a mile of trestle work running up to both mines, the main hoist to No. 1 mines, tipples, mine cars and numerous buildings. This has entirely cut off the source upon which the Salt Lake, valley smelters, as well as some of the plants in Montana, depended for their supply of

coke. The Utah smelters were left with only just about enough coke on hand to keep them going for 10 days. A shut-down is threatened unless coke can be obtained elsewhere before the expiration of that time. About 750 tons of coke per day is used at the smelters owned by the American Smelting & Refining Co., Bingham Consolidated, United States and Yampa. It will be from 40 to 60 days before the Sunnyside and Castle Gate coke-ovens can be used.

It has been definitely decided that the mines at Alta are to be given rail facilities. The Rio Grande Western has leased its roadbed from Bingham Junction to Wasatch to Henry M. Crowther, of Salt Lake, manager of the Continental Alta mines. Above Wasatch, and on up to the mines, a narrow-gauge line, equipped with electric motors and cars, will be built. Owing to the difficulty of getting teams, the camp's output is greatly curtailed. The present monthly output is from 2,000 to 2,500 tons.

The official announcement has been made that the Burlington railroad system is to be extended to Salt Lake by building west from Gurnsey, Wyo. The road will open up a mining region tributary to Salt Lake, one particularly valuable for its coal and oil resources.

The construction of the new Western Pacific railroad westward from Salt Lake to San Francisco is in progress, and is doing much toward stimulating mining in western Utah and eastern Nevada districts.

Announcement has been made of the settlement of the Utah Copper trouble, and now nothing stands in the way of carrying forward the work of constructing the new concentrating mill, which is to have an initial capacity of 2,500 tons per day. Col. E. A. Wall, who brought an injunction suit against the company, and in which the courts granted a temporary restraining order, preventing any steps being taken toward an increase of the capital stock from 450,000 to 600,000 shares of a par value of \$10 each, and also a \$3,000,000 bond issue, accordingly ordered its dismissal. Good progress is being made with the excavations and concrete work for the new plant. The construction of the plant will be under the direction of Manager D. C. Jackling, supervised by engineers of the American Smelters' Securities Company.

Two libel suits have been filed in the district court at Salt Lake against M. C. Van Orden and eleven other shareholders of the Sheba Gold & Silver Mining Co., of Nevada. The plaintiffs are George Morgan and H. B. Clawson, former president and vice-president of the company. Fifty thousand dollars is sued for in each case. The contents of a circular, to which the names of the defendants were attached, and in which the former directors and officers were charged with alleged improper conduct, furnished the basis.

Duluth. Nov. 1.

The Duluth, Missabe & Northern and the Great Northern railway have been building much new track about the Mesabi range village of Hibbing this year. By interchange of trackage both roads will soon have the equivalent of a double track line on both sides and through Hibbing, connecting with their main lines, thus greatly facilitating ore traffic for both roads. They will then have double-track lines complete from their docks to their northern terminals, for each already has a double line of its own from the ore yards at Mitchell and Kelly lake to the docks at Duluth and Superior. The Great Northern has completely changed its entrance to the Mahoning mine, on account of stripping operations at the Hull and Rust, and now comes into the mine near the western end of the great spiral pit. The Missabe line has revised all its lines about the Hull, Rust, Burt and Sellers, on account of the change in conditions at all of them. The Oliver Iron Mining Co. has built tracks westerly for two miles from the Hull, to handle the immense amount of stripping waste that it is taking from that property. The tremendous traffic from these mining centers necessitates a vast terminal system, and this the roads have been obliged to build anew this year.

Sales of ore for fall delivery are made occasionally, and at about 35 to 40c. above the season schedule. It is certain that standard Mesabi bessemer ore could be sold at \$4 for fall delivery if it could be got out. This is 50c. a ton over the schedule of 1905, and it is certain that most of the 1906 ore will be sold at least as much above last season, if indeed not at a higher rate.

The Mayas Iron Co., of Duluth, is stripping 25,000 yards from a small mine in section 15-59-14, it being the most easterly of any deposit on the Mesabi that has been found large enough to mine. They have about 350,000 tons in sight and have been offered a royalty of \$1 a ton for the ores in the ground, but have refused it, thinking the ore can be mined at a price that will permit a much larger profit. They will mine some 25,000 to 30,000 tons next year, and will build a railroad to the property at once. It is 1½ miles from the main line of the Duluth & Iron Range road.

On the Deerwood, or Cuyuna range, some ore is being shown that runs up to 57 and 60% iron for single holes or considerable parts thereof, and it seems to be a fact that merchantable non-bessemer ore has been shown in some quantity. Very little can yet be told as to the character of the formation in which this ore was laid down, but the impression is gaining ground that it was laid down at about the same time as the Mesabi, and may have been disturbed later by diorite intrusions, some of which may have come to surface,

and others may have remained at rolls in the formation.

At section 30-62-11, the most famous piece of land on the Vermillion range, a shaft 4.5 by 12 inside is being sunk and is now down 30 ft. and it is going down at the rate of about 18 in. per 20 hours. It will rest at about 300 ft., and crosscutting will be carried on at the level and above it. Ore was cut in drill holes on the site of this shaft at about 130 ft. The rock is very hard and with air drills it is not supposed that more than 2 ft. per day can be accomplished.

The old Verona mine, which has recently been abandoned by Pickands, Mather & Co., is to be explored by John T. Spencer, of Iron Mountain. He proposes to sink the west shaft and drill extensively for ore.

The Saginaw Mining Co., of Norway, Mich., which is under the control of John T. Jones, has let a contract to Longyear & Hodge, well known drillmen of the Mesabi range, to explore the property thoroughly and work begins at once. This summer, what seemed to be a fine ore deposit was cut in the Saginaw explorations of Mr. Jones, and the drilling will be to determine what this ore deposit amounts to. It is quite regular, standing at an angle of about 65° south, pitching west and has been drifted on for 75 ft. It is good ore and may mean an important discovery.

The Oliver Iron Mining Co. is to sink its No. 8 shaft at the Soudan mines, Vermillion range, to 1,500 ft. this winter, to reopen No. 12, and to develop the Lee portion of the property, that has been explored but not entered. Shipments from Soudan this year amount to about 200,000 tons, which is against no ore during 1904.

Platteville, Wis. Oct. 28.

Several contracts for the installation of new machinery have been awarded. The most important among them was that for the Sunset Mining Co.'s concentrating plant, to be erected at its mine in the Rewey camp. The output from this mine will cut quite a feature in the production of the district, as soon as the company is able to start the mill. An interesting sight in connection with the Sunset ore dump, is the large pile of nearly pure ore in blocks.

The installation of the machinery on the Great Northern property, situated in the northern part of the Platteville camp, is being pushed. It is expected that the large Ingersoll compressor will be running within 15 days; the work is being done by the Galena Iron Works Co. A great deal of prospecting has been carried on since last February at the Great Northern mine, just north of Platteville. The mine is supposed to be located on an off-shoot of the Empire range. As their crosscut is driven in, the ore continues to grow richer, with a very strong sheet formation.

The installation of a central power plant by the associates of the General Electric Co. is reported to be an assured fact. The new syndicate has secured sufficient contracts for power to warrant their going ahead with the enterprise.

Scranton. Nov. 6.

Great interest has been centered in the purchases of coal lands by the Schuylkill Coal & Iron Co. in the Schuylkill and Shamokin territories, and considerable curiosity has been aroused as to the personnel of the promoters. The charter, which is a very broad one, was obtained a few years ago by three Scranton men, who intended to organize a holding company. Nothing was done after the charter was obtained. Recently the charter was sold for a small sum to some clients of Welles & Torrey, of Scranton, the local attorneys of the Delaware & Hudson Co. Afterward it developed that the men in the new project were affiliated with that company. This made the matter more mysterious, inasmuch as the Delaware & Hudson system is about 60 miles away from the coal lands purchased. By some it is claimed that the company intends to build a branch line to connect with their new acquisitions, while others assert that it is a preliminary to an amalgamation between the Pennsylvania and the Delaware & Hudson. The remarkable feature is the fact that while the various properties have been offered to different anthracite companies time and time again on more advantageous terms, the Schuylkill Coal & Iron Co. is now giving high prices and buying up everything in sight. It is said that negotiations are almost closed for the purchase of the Shaffer tract, which will cost in the neighborhood of \$5,000,000.

The Lehigh Valley Co. has taken possession of the mining properties of Coke Bros. & Co., for which it paid \$18,400,000. A check for \$6,400,000, and a temporary bond for \$12,000,000, was presented, the latter to be replaced by that amount of the new collateral 4% trust bonds when they have been prepared for issue. E. B. Thomas, president of the Lehigh Valley railroad, was elected president of the company as well as of the affiliated companies. It is stated that the reorganization of the new boards in the various Coxe companies will not interfere with the present policies, and no changes are contemplated at this time. In connection with the purchase, the Lehigh Valley Co. assumes payment of \$600,000 value of equipment ordered by Coxe Bros. Co. before the deal was consummated, while in addition to the actual property acquired, the Lehigh Valley will secure all the assets of the company, as well as a considerable sum of money in banks. The purchase money is to be divided among the Coxe heirs as follows: Alex. B. Coxe and Alexander Brown Coxe, four-fifteenths each; Eckley B. Coxe, Jr., and heirs of Henry

B. Coxe, three-fifteenths each; E. B. Ely and heirs, one-fifteenth. President Thomas, of the Lehigh Valley, has made the statement that his company is not in the market for additional coal properties, as the Coxe properties will furnish the company all it requires.

W. C. Price, a mechanic employed at the Truesdale colliery of the Lackawanna company, has invented a "fan indicator." A shaft fan is an arrangement which is used in every shaft to steady the cage so that cars may be loaded and unloaded without any extra strain on the rope and the appliances at the top of the shaft and cage. These fans are in charge of the cage tender at each lift. It is his duty to place the fans when he is about to load a car on the cage, so that it will rest on the fans. When the cage leaves it is likewise his duty to draw in the fans, thus clearing the shaft. Many fatalities have been caused by the neglect of the tender to do this, so that when the cage swiftly descends the shaft the bottom strikes the exposed fans and destroys the cage. These accidents are liable to occur at any time, as the engineer has no means of knowing whether the shaft is clear, or if the arms of the fans are still projecting. Mr. Price claims that his device will overcome this, as the engineer will have an indicator showing the condition of each fan in the shaft. The whole work will be done by electricity.

A tunnel 7,000 ft. long, which will cost \$100,000, is being built by the Pennsylvania Coal Co., to drain its two large mines in Dummore. The tunnel will be 15 ft. wide by 7 ft. high and will be used in some places for the purpose of hauling coal from the different veins it will cross. It is being built in a straight line and has been completed a distance of 5,000 ft. The two collieries, which it will drain, have a flow of about 1,700 gal. of water per minute, and as the level of the shaft is 1,000 ft. higher than the Lackawanna river, into which the water will be discharged, there will be no trouble in the water flowing. The grade of the tunnel will be 0.33%. The work is in charge of T. W. Reid.

The Black Diamond breaker, of the Lehigh Valley Co., opened in Wilkes-Barre last week, establishes a record in the small number of breaker boys employed. The old breaker gave employment to about 250 boys, while in the new structure there are but 12, this being due to the patent pickers which are gradually driving the boys out of the breaker. The entire machinery is run by electricity.

N. M. Sweeney, a prominent member of the Mine Workers' Union, has taken the somewhat novel step of suing the Kingston Coal Co. for \$200, which he claims is due him upon yardage. This is a grievance which the anthracite award specified should be brought before the Conciliation Board. Sweeney has the approval of the union in the course he is taking. The only explanation is that the local committee has

failed to make a settlement with the company and that the proverbial delay of the law courts is not as great as that of the Conciliation Board.

There is great activity in the opening of new anthracite operations and the extension of existing industries. The old Evans colliery in Beaver Meadows is to be re-opened and will be connected with the Lehigh Valley railroad. The breaker at the High Point colliery of the Price-Glenn Coal Co., at Craigs, has been re-opened. The slope has been sunk to a depth of 140 ft. and the gangways are being turned. Several small veins of coal have been struck by the drill which has penetrated to a depth of 320 ft. at Buckville, west of Tamaqua, and will be kept in operation until a depth of 2,000 ft. has been reached. Two years will be spent by the Reading company in proving the veins before the shafts are sunk. Extensive work is in progress at the Thomaston colliery, in the Heckscherville valley, preparatory to re-opening that mine. In order to successfully operate the new Coal Castle shaft, near Shamokin, the Philadelphia & Reading Coal Co. has decided to pump the water from the abandoned Thompson, Richardson, Heckscherville, Mine Hill Gap and Repelier collieries adjoining. The Thompson colliery is also to be re-opened.

A new rule has recently gone into effect in the coal department of the Lehigh Valley Co. whereby the foremen of the various collieries are required to visit some coal operations other than that in which they are employed, once in two weeks. This is for the purpose of gaining new ideas that may be used to advantage in their own work, and at the same time detect weakness in management that may be guarded against. The foremen may visit other places more frequently than once in two weeks, but they are required to visit that often at least.

The resolutions of the miners' convention requiring that all old powder tins be destroyed rather than selling them to the powder companies for the sum of 8c. each went into effect last week. While observed by many, there were a number of miners who refused to obey it on the ground that their wives had ordered them "to take what they could get." They preferred to face the union than their wives.

The Shenandoah Powder Co. has been purchased by the Dupont Powder Co.

A. Pardee & Co., the well-known operators of Hazleton, have posted notices at their mines stating that they will resume the mutual death benefit plan for their employees, under which \$500 will be paid to the widow or family of any miner killed while at work. The company will donate \$50 when the levy is made and each miner will donate \$1, and every laborer, or other employee, 50c. The aggregate amount will net \$500. The plan was in vogue until the strike of 1902, when it was discontinued.

Secretary Dempsey, of the United Mine Workers, on Monday sent out the call for the joint convention of the mine workers to be held in Shamokin on Dec. 14 to consider the demands to be made on the operators upon the termination of the present agreement.

Toronto.

Nov. 3.

The provincial government of Ontario by a recently-issued order-in-council has reduced the area which will in future be granted to applicants for mining locations in Coleman township, the central portion of the Cobalt mining area, from 40 to 20 acres. The recording of mining claims in the four townships of Coleman, Lorraine, Bucke and Dymond was temporarily suspended Aug. 28 last. It is now provided that such applications may be recorded conditionally, the claims being held subject to any amendments or additions to the mining laws and regulations which may be made by the Legislature at its approaching session in regard to working conditions, taxation, etc. No reduction is made in the area of locations in other townships than Coleman. The provision for the resumption of the recording of applications does not apply to Cobalt lake, Kerr lake or the Gillies timber limit, which are not open to prospectors.

In accordance with the suggestion made by the Ontario government, meetings are being held throughout the mining districts for considering desirable changes in the mining laws, previous to the meeting of the Legislature. An important and largely attended gathering, representing the mining industry of Hastings county, was held at Madoc on Oct. 27. Among numerous resolutions adopted were recommendations that the title to minerals should be free from any rights or claims of lumbermen; that there should be no royalty nor mining tax; that the prospector's affidavit as to the finding of minerals should be sufficient without requiring other evidence; that a bounty should be given to the arsenic industry; and that an import duty of 75c. per ton should be imposed on iron ore.

Rupert Whitehead, an English oil expert who has been for some years in the oilfields of Siberia, has gone to Alberta in the interests of a number of English capitalists who own over 2,000 acres in the Pincher creek district. The accounts of recent discoveries of rich oil and coal deposits in Alberta have aroused interest in British financial circles, and Mr. Whitehead has been commissioned by the owners to inspect the property and report. Mr. Whitehead will also investigate some of the mines in the Rocky Mountains in which British investors are interesting themselves.

Large shipments of cement are being made by the Ontario Portland Cement Co. from its works at Blue lake, near Paris, Ont. The demand for cement is heavy

just now, as there has been considerable delay in the filling of orders by American manufacturers on account of the scarcity of cars.

Thomas H. Diamond, of Rochester, N. Y., one of the leading stockholders of the Bannockburn Gold Mining Co., has been visiting the mine at Bannockburn, Hastings county, arranging for additional machinery. The company has completed a new test mill and has let a contract for the sinking of the shaft, now 40 ft. in depth, for 50 ft. further.

Arrangements are being made for the resumption of operations at the Bruce mines, recently bought by an English syndicate. As soon as they can be unwatered they will be worked under the management of T. Carnegie Williams.

The following mining companies have been incorporated under the laws of Ontario.

The White Silver Co., Ltd.; head office, Toronto; capital, \$100,000; provisional directors, William F. White, Edward C. Hargrave, Wm. H. Wallbridge and John Shilton.

Victoria, B. C. Oct. 28.

Coast.—Last week a shipment of 1½ tons of silver bullion, from the Canadian Smelting Works, Trail, B. C., was made to the Orient from Vancouver. The silver is for minting purposes at Canton and Tientsin.

The manager of the Western Fuel Co., upon the recent settlement of the coal miners' strike at Nanaimo, Vancouver Island, addressed a letter to the Minister of Labor, Ottawa, acknowledging the efficient services performed by the Deputy Minister of Labor, W. L. Mackenzie King, in settling the industrial troubles.

Atlin.—The managing director of the British America Dredging Co., which has been operating on both Spruce and Gold Run creeks, has stated that the company has had a successful season. During the summer, 9 miles of transmission line were constructed, from the central hydro-electric power plant on Pine creek to Spruce creek, where, at Blue cañon, the company built a large dredge, with a capacity of 3,500 cu. yd. of gravel per day. This dredge has a digging range, up and down, of about 40 ft. It was started Sept. 10, and was run during the short period intervening between then and the close-down for the season. The dredge is of the Bucyrus type. The company previously put one in on Gold Run, which was stated to have done good work until, late in the season, the breakage of the main driving shaft necessitated a stoppage, and the dredge was then put into winter quarters.

Cariboo.—Announcement has been made that negotiations, in progress for several months between the Consolidated Cariboo Hydraulic Mining Co. and New York capitalists, for the acquirement by the lat-

ter of the hydraulic mine at Bullion, have been brought to a successful issue. Sufficient capital will now be available for bringing in more water, to the extent of about 5,000 miner's inches. The company's existing water system has a capacity for delivering at the mine 5,000 miners' inches, under a head of 420 ft., but this is inadequate. More than \$1,000,000 worth of gold has been recovered from the gravels of this mine since J. B. Hobson took charge of the property.

Similkameen.—The Daly Reduction Co. is applying for a record of 5,000 in. of water from the Similkameen river. Substantial additions to the number of stamps, concentrating tables, etc., at its mill at Hedley are under consideration by the management.

Drilling on the coal lands of the Vermilion Forks Mining & Development Co., at Princeton, has resulted in the encountering, at a depth of about 300 ft., of a 4-ft. seam of good coal. Drilling is being continued in the expectation that another seam will be met with some 40 ft. deeper.

Lardeau.—Returns from September's operations at the Eva Co.'s 10-stamp mill, at Camborne, Fish river, show a recovery of about \$5,000 in gold and \$1,000 in concentrate.

Trail.—At the Canadian Smelting Works, Trail, the capacity of the electrolytic lead refinery has been increased by the construction of more electrolytic depositing tanks and the provision of the necessary complementary plant to increase the output capacity of the refiner to 50 tons of pig lead per day.

London. Oct. 28.

Several copper companies are making important progress at present. One of the most promising is the Spassky Copper Mine, Ltd., which owns the Spassky and Yuspensky properties in the Akmolinsk district of Siberia. Since Mr. Fell described these properties in your columns two years ago, very important developments have been made. Suffice it to say at present that Mr. Fell's monthly report to the shareholders shows that the bornite and chalcocite occur in such bodies as to make the mine an unusually rich one. It is not to be wondered at that the shares in this company are active and that there is a demand for them at an advanced price. An interesting feature in the mining operations is that the old Siberian owners had excavated large amounts of chalcopyrite and other ore and had stopped working when they came to what they judged to be a slate. For years this great wall, with a slickenside surface, stood as a forbidding barrier, and it is not until recently that Mr. Fell's developments proved it to be solid chalcocite.

Another copper company that is carrying out important developments is the Famatina Development Corporation. This company was formed in 1903 to acquire

properties in the province of Rioja, in the Argentine Republic. After some preliminary work was done, Messrs. John Taylor & Sons were commissioned to examine and report. Their recommendations involved the expenditure of £100,000, but as the shareholders as a body could not find the necessary funds, some of them formed a syndicate called the International Copper Co. for the purpose of financing the Famatina. The capital of the Famatina Co. is £400,000 in shares and £100,000 in debentures. These debentures are being taken by the International Copper Co.; they carry 6% interest and are convertible into ordinary shares at the will of the holders. The various privileges, extra commissions and security of these debentures are somewhat complicated and need not be gone into here. The Famatina Co. has thus £100,000 new capital wherewith to erect smelters and other necessary plant. Messrs. John Taylor & Sons' report shows that the vein formation is extensive and that there are very large amounts of ore. The veins are irregular, varying from a few inches to as many feet, and the ore varies considerably in value. Over an extensive area the average of the ore appears to be about 3 to 4% of copper, 4 to 5 dwt. of gold and 10 to 15 oz. of silver. Messrs. John Taylor & Sons express themselves very favorably as to the prospects at these properties, but recommend that at first nothing but development work should be done, and that the erection of smelters should be postponed for a time, until the requisite capacity can be more definitely ascertained.

Another copper company that is receiving attention is the Cerro Muriano Mines, Ltd., of which John Taylor & Sons are managers. These mines are 10 miles from Cordoba, Spain, and were acquired by the present company two years and a half ago. William Frecheville is chairman of the company; R. E. Carr and Alfred Fellows are also on the board, while the Bede Metal & Chemical Co., of Newcastle-on-Tyne, has a large interest in it. Mr. Frecheville has recently visited the property and reported on the developments. There are about 20,000 tons of ore blocked out, averaging rather over 4% copper, over a thickness of 3½ ft.; and in three directions the body of ore is being rapidly developed in a very satisfactory manner. It is now proposed to spend £75,000 in erecting dressing and smelting works. H. F. Collins has been appointed manager to carry out the new plans.

During the last month the shares of the Djebel Charra Mining Co. have made their appearance on the London Stock Exchange. The company was formed two years ago to acquire lead and zinc mines in Tunis. Since then, with the money subscribed, an extensive dressing plant has been erected and is now treating 100 tons of lead ore daily, producing between 500

and 600 tons of 70% lead ore monthly. Exploratory work is now being undertaken on the Calamine ores. As far as my knowledge goes, this is the first English company to own properties in Tunis. Up to the present time, Tunisian mines have been owned locally or in France, and English interests have been confined to the presence of buyers of ores.

Mexico. Oct. 24.

Considerable excitement has been occasioned in El Oro, State of Mexico, by the recent strikes of rich, heavy sulphide ores in the property of the Esperanza Mining Co., causing the stock to go up. It is expected that the monthly gold output will now reach \$1,000,000, Mexican. It is also claimed that the same vein has been struck in the workings of El Oro Mining & Railway Co., adjoining the Esperanza on the south. So also on the Mexican market the stock of Dos Estrellas, adjoining the two former on the west, has jumped up several hundred dollars, though it is not thought the rich sulphide vein has yet been struck in Dos Estrellas workings. The Esperanza is an old property that has been working for over 100 years, while the other two were started in 1892, El Oro by the late August Sahlberg, who died last year, a rich man from its production, and Dos Estrellas, by Mr. Sahlberg's engineer, Frank Fournier, who is now a rich man as the result.

This recent strike and boom in stock will, no doubt, give an impetus for renewal of working on some of El Oro's many bankrupt or dormant companies, and result in considerable good for the camp, though, of course, harm will also be done by the wild-cats that always get in. In the Sultepec district of Mexico, about 3 hours distant from Los Arcos, the old Carbajal smelter is being put in condition to resume operations.

In the State of Jalisco, Ferdinand Sustersic, manager of the Amparo Mining Co., operating, among other properties, the Santo Domingo, near Etzatlan, has in operation at the mine a 30-ton experimental Croasdale reduction plant, which, if successful, will be increased to 100 tons. He has also introduced air drills in the mine and greatly increased the output of this old property. In Etzatlan, M. E. Raines, E. Finley and Barney Kearns have obtained possession of an old 25-ton smelting plant that has been lying idle there for some years, and expect to start smelting operations at that point before the end of this month under the name of the Etzatlan Copper Smelting Co. Carlos Romero, of Etzatlan, claims to have raised \$20,000 for the improvement of the wagon road into Hostotipaquillo, where he is working the Abaraden and the Tamara, with a 20-ton concentrating and cyanide mill on the latter; and he is also working to get a railroad into

this camp, for which he has a concession. In this camp, also, the Mazeppa Consolidated Gold Mining Co., with a capital of \$2,000,000, Mexican, under the superintendence of E. S. Graham, has taken up the Aguila mine, adjoining the famous Cinco de Mayo, with 53 pertinencias along the same vein, and will put in a 50-stamp concentrating and amalgamation mill.

In Chihuahua, it is stated positively that the American Smelting & Refining Co. has obtained from the Terrazas estate a smelter site very near the location formerly chosen on the Miller ground, which it was unable to purchase. But the new location, after the building of a few railroad spurs, will be just as desirable as the former, and it is understood that construction work will be no longer delayed.

In the State of Tamaulipas, many prospectors are drilling for oil and asphalt in the Huateca district. The Tampico Oil Co. has its derricks erected, and is drilling at the Tamiahua lagoon, south of Tampico. The Pan American Asphalt Co. is taking asphalt from near by, and a railroad is projected to Juan Felipe.

In Zacatecas, A. E. Stilwell and associates have started the unwatering of the old San Rafael el Grande mine, the workings of which underlie the larger part of the city of Zacatecas, and the water has been contracted for by the city for its uses. Between Zacatecas and Guadalupe, at Lake Pedrenalillo, dredges will be put in for raising and cyaniding the tailings that have accumulated there for years from the patio haciendas of Zacatecas, and the concession for this requires that work be started before the end of this year; and in the Mazapil district, the Badger State Mining Co., of Milwaukee, Wis., with \$200,000, gold, capital, has bought and will operate the Pico de Teyra mine.

Johannesburg. Sept. 4.

The Madagascar boom in gold mines is nearly over. The rumors that the Lecomte Concessions, the largest of the ventures, had been skillfully salted, were quite correct. I referred in my last letter to the extraordinary report from W. T. Pope, who was supposed to know something about mines, in which he declared that the Lecomte Concessions would prove one of the wonders of the age. Other cables from visiting engineers reached Johannesburg, stating that the ground had been "salted." These reports were cabled from Johannesburg to Pope, and a few days later the "mining expert" cabled that on re-examination he found he had been salted. After this message, the shares fell to pieces. As yet it is impossible to say who has swindled the public, but a number of people have been hit hard by this disgraceful affair.

Now that Madagascar has subsided, one

wonders what will come up next. Probably some stranger will arrive, with a proposition to float the gold mines of the moon. Lots of people in Johannesburg would buy the shares. His stories of the deposits of the lunar sphere could not surpass the preposterous statements of the man who brought the Lecomte Concessions to Johannesburg.

The visit of the British Association to the Witwatersrand was a great success. All the oversea members were entertained in private homes, by the mine people, and the city folk. Some of the papers were academic, but many were of great interest and utility. In the geology section the most important contribution was a report on the Victoria Falls, by a distinguished geologist sent out some months ago to study the formation. His contribution is probably the only thorough study of the district that has yet appeared. The idea that the Victoria Falls were formed by a volcanic vent across the Zambesi river is shown by this report to be untenable.

Subjects of vital importance to South Africa were discussed in the sectional meetings, special attention being paid to the diseases of cattle, and the hindrances to agriculture. Education as applied to the Rand was discussed by local masters, and experts from oversea.

Not only has the visit of the British Association for the Advancement of Science been of practical service to the Rand, but the political benefits to be derived from the sojourn of these distinguished visitors will be of increasing importance in the future. They have seen our difficulties, and will be able to refute the slanderous statements of ignorant individuals in the British Isles.

Amalgamation is the order of the day. The latest announcement is the amalgamation of the Village Deep mine, and the Turf Mines. The Village Deep, situated near the center of Johannesburg, is crushing with 100 stamps. The Turf Mines is a stretch of undeveloped country to the south. Two bore-holes, nearly 5,000 ft. deep, were put down to intersect the reefs in the Turf Mines. Briefly, the amalgamation scheme is that the Village Deep acquires the holding of the Turf Mines, Ltd., with a bit of intervening ground, making a mine of 540 claims (a claim is 150 by 400 ft.). The nominal capital of the new company will be about £1,100,000, the present Village Deep shareholder getting share per share in the new company. Just now the Village Deep is producing from two shafts, and it is considered that only one more shaft will be required for working the combined area. It is intended to increase the stamping capacity up to 200 stamps, and later on to 300 stamps. It is unquestionably the right policy to have a big area for these very deep propositions, and the Village Deep amalgamation is probably one of many that will come about in the future.

General Mining News.

Ogara Coal Co.—A consolidation under this name was effected, Nov. 2, among 17 companies operating 25 bituminous mines in the central States, with a combined output of 25,000 tons daily. The new company has a capital of \$6,000,000, and the merged companies were: Eldorado Coal & Coke Co., Diamond Coal Co., Harrisburg Mining & Coal Co., The New Coal Co., Clifton Coal Co., Morris Coal Co., Egyptian Coal Co., all in Saline county, Ill.; Greenridge Mining Co., Jefferson Mining Co., and the Big Mudd Mining Co., in the Springfield, Ill., district; Lincoln Coal & Mining Co., Vivian Coal Mining Co., Summit Mining Co., Staunton Mining Co., all in Indiana; Imperial Mining Co., at Cambridge, O.; and the Ogara Coal Mining Co., of Fairmount, West Virginia.

ALASKA.

The Little Windy Arm mining district, which is near the international boundary on the line of the White Pass & Yukon railroad, promises to be a busy center of attraction in Alaska next season. One sale has just been made of two claims near the Conrad properties, the consideration for 80% being \$103,000, of which \$5,000 was cash. High-grade silver ore has been taken from both the J. H. Conrad Consolidated and the J. H. Conrad Bonanza groups.

CALIFORNIA.**AMADOR COUNTY.**

Rhetta Consolidated Co.—This mine (formerly the Bay State) has again been started up under an arrangement with the employees, who will operate on some pay ore known to exist, by which the indebtedness will be paid.

CALAVERAS COUNTY.

Marshall.—This mine, at Angels, has been started up after some months of litigation. The mine is being unwatered. Robert Casey is superintendent.

Blue Jay.—This mine, at Jesus Maria, is being operated on a small scale at present, but the force of miners is to be increased.

Duchess.—This group of mines, at Vallecito, W. E. Emery, superintendent, is being started up, and will be run with full force as soon as a better water supply is available.

NEVADA COUNTY.

English Mountain.—Plans are being made to resume operations on this mine, 14 miles from Graniteville, owned by J. A. Holdsworth of that place. The mine has been closed down for 10 years, the owners at that time not having sufficient capital for necessary development.

Idaho-Maryland Mining Co.—The Maryland shaft is now down over 800 ft., and as soon as the 1,000-ft. level is reached the work of sinking the new shaft to the

1,900-ft. level will be commenced. The old shaft is being cleaned out. The old incline shaft will be abandoned.

SHASTA COUNTY.

Mammoth Copper Co.—Furnace No. 3 of this company's smelter, at Kennett, has been blown in. Water-jackets for furnace No. 2 are being placed in position, and machinery for furnace No. 1 is on the way from the East.

Old Diggings District.—The mines in this district are now shipping an average of 60 tons daily to the Mammoth smelter at Kennett. More mines are now in operation in the district than in 10 years past. In addition to the employed miners, a number of lessees are at work.

SISKIYOU COUNTY.

Blue Jeans.—This mine, on China gulch, owned by Hedley and Phillips, has been bonded by certain capitalists, who agree to commence development in 30 days.

Salmon River Mining Co.—This company, A. S. Graham, superintendent, are moving their pipe, giants and other appliances to the Petersburg property owned by them.

Medina Mining Co.—This company, at Oro Fino, have their shaft down 200 ft., and will go another hundred feet before crosscutting. The pay shoot, so far as prospected, shows up good values.

Eliza.—The new mill, at this mine in Humbug district, has been started up with electric power. Twenty miners are at work.

Black Bear Mining Co.—The first bullion from the new strike in this mine, at Black Bear, Ben. F. Daggett, superintendent, has been forwarded to the Mint in San Francisco.

Gold Bull.—This mine, at Hollin, after being in litigation for two years, is about to resume operations. The judgment to the Stephens Bros. is about to be paid off.

SIERRA COUNTY.

Alaska.—At this mine, Pike City, the new three-compartment shaft is being sunk to the 700 level, which will be 200 ft. deeper than the old one. When that point is reached they will drift for the old Alaska ledge.

South Fork Flume.—This flume, at Forest City, has been completed, and washing the gravel will shortly begin. Meantime the main tunnel is nearing the eastern rim of the channel.

SACRAMENTO COUNTY.

Cherokee Gold Dredging Co.—This company is at present prospecting the old Gray Wing drift mine, at Blue Ravine, above Folsom, and has about decided to build a dredge to work the gravel by that means instead of drifting. The mine at one time paid regular dividends, but the gravel channel "thinned out" in value.

TRINITY COUNTY.

Bonanza King.—From this mine, near Trinity Center, some rich specimen rock

is being taken. The pay shoot is yielding very high-grade ore.

Bear Tooth.—This group of mines, at New River, owned by Frank P. Burns, is to have a Huntington roller mill installed. There is already a Kendall mill on the property. The plant will be operated by water power.

TUOLUMNE COUNTY.

Dutch Mining Co.—A station is being located on the 1,720 level of this mine, from which a crosscut will be run easterly to tap the vein.

Horseshoe Bend.—Many improvements are being made on this property, among them the installation of electrical machinery for power.

SAN BERNARDINO COUNTY.

Bullion Mountains Copper Co.—This company, whose property is near Lavic, will start its mill this month. There is a sufficient reserve of ore to keep the mill running for a long time at its full capacity; the intention is shortly to commence active development and to increase the output of the mill.

COLORADO.**GILPIN COUNTY.**

Carr Group and Randolph Mill.—This property, situated in Gregory district, including the aerial tramway between mines and 50-stamp mill, was purchased by East-erners this week for \$50,000, the deal being a cash one. The property was formerly operated by an English and Belgian syndicate, but has been idle for about two years on account of financial difficulties. G. P. Goodier, Central City, made the deal, and his services as manager will be retained. Active development of the property is planned, as well as starting up of the mill on own and custom ores.

Imperial Gold Mining & Milling Co.—This company has absorbed the interests of the Cyrene Gold Mines Co., getting its interests in the Pine and Wisconsin districts. A good find of copper ores is reported from the Mackay mine, in Pine district. L. J. Mountz, Apex, Colo., is manager.

Derby Mining & Milling Co.—Denver parties have become interested in a group of eight claims in the Pine Creek district, and have formed this company, with capital stock of \$1,500,000, and will operate on a liberal scale and may decide to instal machinery. J. R. Moler, Apex, Colo., is manager.

CLEAR CREEK COUNTY.

Republican and Columbia Claims.—These claims have been sold for cash consideration of \$5,000 to Royal R. Graham, of Idaho Springs, and it is reported that a company will be formed to operate the property at Empire.

Banner Consolidated Mines Co.—A Rand 10-drill imperial compressor and 100-h.p. boiler has been delivered at their Rockford tunnel, near Idaho Springs.

Butler Mining Co.—Machinery has been

installed on their shaft in the Daily district, and good ore has been marketed. The ores are silver and lead, and Jesse R. Butler, Empire, Colo., is in charge.

Mexico.—It is reported that C. H. Morris, of Georgetown, has closed a deal for the transfer of this property to Eastern capitalists, and that machinery is to be installed at an early date, and several blocks of ground will be let out under lease.

St. Joseph Mining & Milling Co.—Pennsylvanians are interested in the organization of a new company to operate the St. Joseph group of claims near Gilson gulch, and Thomas O'Brien, Central City, will be in charge as manager.

Mazeppa.—A reorganization of the company has been effected, increased operations are to be carried on, and it is reported that Manager D. W. Shepard, of Georgetown, Colo., is contemplating the erection of a mill of fair capacity.

Lorella Mining Co.—Manager John Sandberg, of Georgetown, Colo., has ordered a plant of machinery, consisting of air compressor and Leyner water drills, and it is reported that an important strike has been made in the crosscut tunnel of this property in East Argentine district. A boarding-house and power building has already been constructed.

BOULDER COUNTY.

Caribou District.—Denver people have organized a company to operate the Idaho mine, which has a record of \$400,000 in silver. The Anchor machinery has been overhauled and a force of men put to work. The Isabel, owned by Donald Bros., has been leased and bonded in sum of \$20,000 to the Northwestern Mining Co., and machinery is being installed; also new shaft and other buildings. Stafford Bros., working the Cross mine, under a lease and bond calling for \$8,000, are taking out good ores and expect to soon take up the bond.

TELLER COUNTY—CRIPPLE CREEK.

Jo Dandy.—A rich strike is reported from this property on the bottom level. A considerable amount of ore has been shipped from the property recently by J. M. Wright, who is operating it. The property is situated on Raven hill and had been idle for some time until the present owners took hold of it. There was some talk of apex litigation between this property and the Eclipse No. 1, which adjoins the Jo Dandy. It is thought that some arrangement will be made, however, to prevent this.

Tribby.—This property has been sold recently by the Moose company to parties who think that they have a fortune in sight. The sale includes the Ben Harrison claim belonging to the same company.

Copper Mountain.—A strike of considerable importance has been reported from

the Bill Nye claim on Copper mountain. While it is a little too early to tell what it will amount to, it has had the effect of stimulating prospecting in that vicinity. It will be remembered that a number of years ago a considerable amount of ore was shipped from the Fluorine property which adjoins the Bill Nye claim.

IOWA.

DES MOINES COUNTY.

Electric Shot - Firing.—The Madison Coal Co., of Des Moines, is the first in its field to instal electric firing apparatus. Shots may be fired from the surface after part or the whole of the mine has been vacated. A dial indicator registers the holes so that no danger from missed shots can result. The method has already been installed in some mines in southern Iowa.

MISSOURI.

A Washington despatch says that, in the case of Cantwell and others, the United States Supreme Court has affirmed the validity of the Missouri law making eight hours a day's work for miners.

NEW MEXICO.

SOCORRO COUNTY.

Ernestine Mining Co.—This gold-mining company, whose office is in Pittsburg, Pa., Ernest Craig, president and general manager, is operating a 20-stamp mill, with concentrator and cyaniding plant, at its mine in the Mogollon district. The company is adding 10 more stamps, and will instal the Moore process. Dividends have been paid bi-monthly since July 1, and a regular monthly dividend of 5% is anticipated as soon as the plant is finished. The mine is on the extension of the Confidence mine, owned by Moffett & Graham, of Denver.

OREGON.

BAKER COUNTY.

Baker Smelter Contract.—Manager F. D. Fuller, of the Sumpter smelter, has just closed with the Ladd Metals Co. a contract amounting to 3,000 tons of copper ore. This is the largest deal ever closed in Oregon in a single bunch of ore, and there is much elation both here and in Portland over the success of the smelter in securing this business from Landore, Idaho.

Mattoon.—Workmen in the Mattoon mine have made a sensational strike of free gold ore in the drift in level No. 2, which has caused a stampede to the Pocahontas camp, where the mine is situated. Manager Butler has been doing development work all summer, and has been recently running a crosscut on the second level with the purpose of reaching the main ledge. Unexpectedly they cut through a blind ledge opening a vein of ore from 6 to 18 in. wide, in which the

gold is visible. The ore is kept under careful guard, and the vein will be recovered as rapidly as possible. The Mattoon is owned by capitalists in Mattoon, Illinois.

Conner Creek.—The re-habilitation of the old Conner Creek mine, 35 miles southeast of Baker City, from which \$500,000 was taken in years gone by, has been accomplished and stamps are again dropping in the mill. Pete Basche, of Baker City, has the lease on the property.

PENNSYLVANIA.

ANTHRACITE COAL.

A report of operations of the Reading Coal & Iron Co. during the three months ending Sept. 30, 1904 and 1905, shows the following comparison.

	1904.	1905.	Changes.
Receipts.....	\$6,590,972	\$6,691,480	I. \$100,508
Expenses.....	6,377,552	6,446,983	I. 69,431
Net earnings..	\$213,420	\$244,497	I. \$31,077

A year ago, September showed a deficit as a result of the month's work.

James E. Roderick, chief of the department of mines, has increased the number and changed the arrangements of the anthracite inspection districts. Numbers 1 to 5 inclusive cover the Lackawanna field; 6 to 11 inclusive cover Luzerne county; numbers 12, 13, 18 and 19 are in the Schuylkill region; 15 and 16 are in Northumberland county; 14 in Columbia; 17 in Carbon and 20 in Dauphin county.

The formal transfer of Coxe Brothers' property to the Lehigh Valley was made Nov. 5. President Thomas, of the Lehigh Valley, became also president of the Coxe Brothers Corporation and of the Delaware, Susquehanna & Schuylkill railroad, over which Coxe Brothers had hauled their output to junction with the Lehigh Valley. The price paid for the coal estate was \$18,400,000 and for equipment and rolling stock \$600,000. The transfer included coal lands and all property on it, the railroad, and a considerable bank account and other assets by which the net price was reduced to less than \$18,000,000.

BITUMINOUS COAL.

Uniontown.—The estate of W. J. Rainey has bought 15,000 acres of coking coal lands at \$100 per acre and will at once build 1,300 coke ovens with other improvements at a further expense of \$2,000,000.

SOUTH DAKOTA.

CUSTER COUNTY.

Saginaw Mining Co.—At a depth of 300 ft. in the main shaft a 4-ft. vein of ore was encountered. The same vein was found in a drift 80 ft. long at the 200-ft. level. The ore pans free gold and carries tellurides. The shaft will be sunk 500 ft. The surface carries a great many veins which come together, as shown by the diamond drill, at a 500-ft. level.

Chicago Lithograph & Mica Co.—A carload of mica was shipped this week to the Standard Oil Co. by this company,

netting \$150 a ton. If satisfactory, regular shipments will be made. This company was formerly the Black Hills Porcelain Clay & Marble Co., now reorganized. The new directors elected are Jas. Gall, John A. Tulman, J. J. Berry, R. L. Boyer, A. F. Doyle, E. A. Abbott, Chicago. The company will patent the lithograph, mica and marble properties before Jan. 1. A tunnel is to be driven 30 ft. into the lithograph stone this month. Blocks of this stone 2 ft. square have been taken out free from blemish.

Ruberta Mining Co.—A cyanide annex is being added by this company to the 10-stamp mill 4 miles west of Custer. W. W. Olds, of Custer, is general manager.

Four Mile Co.—A. J. Goldstein, of New York, has optioned a group of claims adjoining the Ruberta, the agreement being to expend \$25,000 in development work. A shaft is to be sunk.

LAWRENCE COUNTY.

Spearfish Mining Co.—This company treated 6,500 tons for the month of October, averaging \$2.40 per ton. The capacity of the mill has recently been increased. Ore has been encountered in the second contact, higher in grade than the first.

Queen of the Hills Mining Co.—The main shaft is 140 ft. deep, showing values in the face. The new mill is nearly completed.

Imperial Mining Co.—A new shoot of high-grade ore has been encountered in the Reindeer claim of this company. About 100 tons are being treated daily.

Wasp, No. 2.—This company will soon resume paying dividends. The mill has been increased and ore of a little higher grade has been encountered.

Homestake Extension Co.—At a recent meeting of the principal stockholders of this company in Chicago, \$100,000 was appropriated for a new stamp and cyanide mill, to be built and completed early in the spring at Deadwood. The company has opened up a large vein of ore paralleling the Homestake veins.

UTAH.

BOX ELDER COUNTY.

Southern Pacific.—This company has recently added new territory to its holdings. Development is being done by tunnel.

GRAND COUNTY.

Interstate Mill.—This plant is now making a test run. It is the first mill of any consequence ever built in the LaSal district. Fifty tons of ore will be treated daily. Elspass mills are used. J. H. Clark, Basin, Utah, is manager.

PIUTE COUNTY.

Sevier Consolidated Mill.—The construction of this new plant is progressing favorably. The Merrill process will be used and the initial unit will handle 100 tons of ore per day.

SALT LAKE COUNTY.

New England Gold & Copper Co.—This Bingham company has added the Saturn patented claim to its group. The mill is turning out a car of concentrate every four days.

SUMMIT COUNTY.

Silver King Consolidated.—At a depth of 850 ft. in the double compartment shaft, now sinking, the blue lode lime characteristic in the original Silver King mine just prior to the striking of the rich ore deposits, has been encountered in this property. This is considered significant.

Little Bell.—Two feet of high-grade shipping ore has been opened in the east drift from the tunnel level in this property.

Daly Judge.—The mill at this property, near Park City, is undergoing repair. Equipment to handle the zinc ores will be installed. John J. Daly, of Salt Lake, is manager.

TOOELE COUNTY.

Ophir Hill Mill.—The new slimes equipment is in service, which has increased the capacity 50 tons a day.

WASHINGTON.

FERRY COUNTY.

The mine-owners of Republic camp have met and discussed plans for treating ores from the various mines, and have decided on making tests at the Mountain Lion mill. Competent mill men will be engaged at the work. Wilfley tables and frue-vanning concentrating tables will be installed in order to save the sulphides contained in the ore, after the pulp has passed over amalgamated copper plates, to catch the free gold contents. After concentrating, the tailings will be cyanided. It has been stated by men who are in a position to speak from some experience that the ores of the camp can be treated by amalgamation, concentration and cyaniding for \$1 to \$3 per ton.

Pearl Consolidated Mining Co.—William M. Crummer has been retained as superintendent and has men now engaged in building a new blacksmith shop. Work will be resumed on the Lone Pine shaft as soon as it is finished.

Republic Mine.—W. G. C. Lanskaill, secretary of the Republic Consolidated Gold Mining Co., has written from Montreal that he will return to Republic shortly and resume operations in the mine on a limited scale. About 20 tons of excellent shipping ore may be extracted daily from different places in the mine for some time to come. There is good ore in several places, but the fate of the mine will rest on sinking and deeper development. The deepest point is 125 ft. below the adit level—in all, 731 ft. vertically below the apex of the vein.

Belcher Mountain Railway.—Orders have been given to resume grading on the right-of-way across the Indian allotments.

Belcher.—A new shaft has been started

in the cropping on iron oxide, said by the management to be of sufficient value for shipment to the smelters.

Morning Glory.—One man is engaged, under a lease, in chloriding above the adit level and getting out rich gold-bearing ore.

OKANOGAN COUNTY.

Q. S. Mining & Smelting Co.—The following were elected as a new board of directors at a meeting of stockholders, held at Spokane, Wash., Oct. 11: A. M. Dewey, Washington, D. C.; Stephen E. Barron, Conconulli, Wash.; Fred. S. Kom, Spokane, Wash.; William C. Drake, Milwaukee, Wis.; Frank S. Beavis, Spokane, Wash.; E. M. Thatcher, Republic, Wash.; J. F. Saylor, Spokane, Wash.; Samuel Crow, Spokane, Wash. The Q. S. group of claims is productive of low-grade gold-copper ore, said to average about \$14 a ton. The vein is talked of as being as much as 300 ft. wide. The group is situated about 12 miles south of Loomis. A tunnel has been driven 820 ft. and thought to be near the vein. At the meeting of stockholders, a proposition came before the board to instal a 500-ton smelter at the mine, to be ready within a year. After the meeting the board met and elected as executive officers: A. M. Dewey, president and general manager; F. S. Beavis, vice-president; F. S. Kom, secretary; and Samuel Crow, secretary.

Mr. Dewey, the president of the company, has visited the mine with L. K. Armstrong, of Spokane, Wash. The object of the visit was to make a thorough examination of the property.

Latest advices are that the tunnel has cut through a seam, supposed to be the footwall, from the fact that considerable water is flowing out of it, and sulphides of copper and iron are present in the rock. A contract has been let to drive the tunnel ahead 100 ft., and the money for the work has been placed in bank, settlements to be made upon the completion of each 25 ft. Mr. Dewey, the president, has gone to Spokane, where he will immediately call a meeting of the board of directors to devise means for the settlement of all outstanding indebtedness against the company without unnecessary delay, and also to consider the installation of an air-compressor plant, for which a site has been secured on the Sinlahekin creek.

Douglas Mountain Gold Mining & Tunnel Co.—G. E. Bazler, J. R. Francis, J. F. Nitschke, O. E. Knisely, J. H. Eutsler and G. L. Stephan, of Columbus, Ohio; O. P. Anderson and Dr. W. H. Christopher, of London, Ohio; and J. J. Bennett, of Loomis, Wash., have been elected as a new board of directors. (Mr. Bennett is in the East, and will not return to the mines before December.) The company owns 20 claims in a group, with veins traversing them in various directions from a few inches to 7 or 8 ft. in width. A promising vein on the group is one on the Little

Falls claim, about 2 ft. in width, striking northwesterly. A tunnel has been run on it about 50 ft., which exposes in the roof ore carrying galena and pyrite and assaying high. A shaft was sunk on the vein 127 ft., but is now filled with water. The value is chiefly in gold.

On the Eldorado claim a shaft has been sunk 30 ft. on a 12-in. vein, which strikes N 77° E. Some of the ore on the dump looks rich in gray copper. There is 15 ft. of water in the shaft.

One of the largest showings of ore on the group is on a vein 7 or 8 ft. wide on the Kinsey claim. A shaft has been sunk on it about 25 ft. The ore is a blue quartz, and is reported by the management to carry 9% copper and a trace of gold and silver. The vein strikes about N. 60° E. Another shaft, down about 20 ft. in wash, shows the apex of the vein in white quartz. The two shafts are about 200 ft. apart, and were originally intended for tracing the vein under the grass roots.

Palmer Mountain Tunnel & Power Co.—The flume has been advanced 500 ft. during the past week, and water is now running through it for 3,400 ft. There remains about 2,100 ft. of the flume to be finished. The pole-line for electrical service is under construction. The roofing of the concrete power-house is completed.

Grand View.—Four Wilfley concentrating tables have been received at the mill. The upper tunnel is in 270 ft.

Copper World Extension.—The superintendent reports a new body of ore coming in at the bottom of the shaft.

WEST VIRGINIA.

Pocahontas Field.—Mark Packard, of Buffalo, N. Y., has sold 2,249 acres of coal land to a syndicate of Detroit coal dealers for \$500,000. An immediate transfer of title was made and steps to increase output will be taken at once. Jewett, Bigelow & Brooks are the most interested. The sale involved about one-fifth of Mr. Packard's coal territory.

Foreign Mining News.

AFRICA.

RHODESIA.

An exhibition of diamonds and other gems was recently opened in the Gwelo branch of the Standard Bank of South Africa by Sir John Willoughby. In addition to the diamonds there are some fine specimens of amethysts, chrysoberyls, sapphires, alexandrites, and a large quantity of garnets, found at the diggings in the Somabula Forest. In the collection there are 43 diamonds, the largest being about three carats, one or two being especially clear and brilliant, while others have a decided green tinge, one being almost quite green. The collection of alexandrites is said to be especially fine, and apart from the diamonds, the chrysoberyls attracted

much attention. The majority are of a fair size, there being one very large one. The whole of the stones in the collection were found before June, since which time many other valuable gems have been unearthed. Extensive development work in search of the diamondiferous "pipe" is still going on.

ASIA.

JAPAN.

The new Japanese mining law which received Imperial sanction in July is now in force, superseding the old law of 1890. The law is under the administration of the Minister of Agriculture. In order to facilitate the exercise of its provisions the country is divided into five mining districts, each of which is supervised by a mining inspector, having an office within his division. The area of an ordinary metal mining claim is 5,000 tsubo (about 4 acres), and of a coal-mining claim 50,000 tsubo (about 41 acres); the maximum holding for a group of any kind of claims is fixed at 600,000 tsubo (about 490 acres). The ownership of mining claims is limited to Japanese subjects and to corporations formed in compliance with the laws of the Japanese Empire. Mining titles are classed with those of real estate and conform to the provisions of the laws relative to immovable property. Mining titles cannot be made subject to conditions other than those of succession, transfer, measures taken in consequence of non-payment of national taxes and royalties, and the non-execution of judicial decrees. Mining titles may, however, be mortgaged. The mining law contains provisions relative to mortgages on mining titles. It enables owners of mining land to borrow capital for development and operating expenses by mortgaging their mining titles. A government mining title gives the right (1) to the surface of the claim, (2) to underground operations, (3) to all the advantages possessed by real estate titles.

The duration of a prospecting license for searching for minerals on government land is fixed at two years from the time it is registered in the district mining office.

CHINA.

The Viceroy of Kiangsi has engaged a Japanese mining engineer to report on the mineral deposits of the districts of Yich'un and Pinghsiang (in Yuanchou subprefecture); Hsinyü and Chiachiang (in Lingchiang prefecture); Loping and Yükan (in Jaouchou prefecture); and Ch'ienshan and Kuangfeng (in Kuangsi prefecture). On receipt of the mining expert's report the Chinese authorities of Kiangsi province will begin the work of development without delay on the deposits which give the best prospects of yielding profitable returns.

Placer gold has been discovered at Lot'oying, a village which lies behind the Changli hills, seen from the train *en route*

to Shanhaikuan. Many natives began working it without any intimation of any sort to the government official. This gentleman, on learning the state of affairs, reported the matter to the authorities, with the result that the Salt Taotai has taken over control of the workings, leasing out to such people as are prepared to agree to the conditions that are being enforced. So far as can be learned from the natives the new management is much more satisfactory than the old, inasmuch as now there is not the tendency to strife and contention that was formerly observable.

INDIA—BURMA.

Emeralds of good quality are reported to have been discovered in a granite formation in the Toungoo district, Lower Burma. Several prospecting licenses have been issued, and the ground will shortly be thoroughly tested.

AUSTRALIA.

NORTHERN TERRITORY.

The report on the mining affairs in the Northern Territory for the year 1904, by C. J. Dashwood, recently Government resident officer, states that the total area held under mineral lease was 2,094 acres, as against 2,014 acres for the previous year. These figures are exclusive of the area held under lease in the Alice Springs. Nine applications for mineral leases, comprising 413 acres, were granted during the year. The revenue derived was £182, against £214 for the previous year. The following comparative statement shows the output for minerals for the years 1903 and 1904:

Mineral.	1903.		1904.	
	Tons.	Value.	Tons.	Value.
Tin ore.....	171	£10,772	366	£27,085
Copper ore..	3	55	60	960
Silver lead..	—	—	167	1,387
Cop'r matte.	—	—	286	24,150
Wolfram ...	—	—	28	2,724
Gold (oz.)...	19,179	61,381	14,361	40,764
		£72,208		£197,070

The area held under lease was 3,887 acres, at an annual rental of £1,998; as against 3,802 acres, at an annual rental of £1,901, for 1903. The gold won by the Arltunga battery and cyanide works, Macdonnell Ranges, and forwarded to Adelaide, was 1,821 oz., valued at £6,859, for the year 1904; as against 2,212 oz., valued at £8,265, for the year 1903—making a total yield of gold by the Northern Territory 16,182 oz., valued at £47,623, for 1904; as against 21,391 oz., valued at £69,646, for the previous year, showing a decrease of 5,269 oz., or £22,033 in value.

MEXICO.

SAN LUIS POTOSI.

Hitherto the enterprise of the Compania Metalurgica Nacional has been largely limited to the working of the "Cobrizo y Anexas" property, located about seven miles from Matehuala. But the success of

the operations has been such that the company has just constructed a 200-ton copper smelter at Matchuala. This smelter will be blown in in the course of a few days.

The company will secure additional water-power from La Maroma, about 35 kilometers from Matchuala. The company will not only provide water for its own smelter in this way, but will furnish the township of Matchuala—a boon which the citizens have long needed.

The transportation of the ore from the mine to the smelter has been a matter of concern to the company. But as the Matchuala Railway Co. has been induced to extend its line $1\frac{1}{2}$ kilometers connecting with a jig-back built by the mining company, the trouble in transporting ore will become minimized. It is thought that the transportation facilities from mine to smelter will be complete within 90 days.

TEPIC.

It is reported that John Hart, formerly in charge of the Esperanza mine in El Oro, who recently denounced considerable mineral land in the municipality of Amatlan de Cañas, Tepic, has struck a ledge of rich gold ore. Mr. Hart's holdings adjoin those of the El Dorado Mining Co., which was recently organized in the City of Mexico by José Julian Mendez.

Coal Trade Review.

NEW YORK, Nov. 8.

ANTHRACITE.

The hard-coal business shows continued strength. A shortness has developed in some quarters, and every producer disposes of his output in short order. Trade in the New England harbor points is exceedingly brisk, and the same is true of all-rail trade.

Prices remain at the old level: \$4.75 for broken and \$5 for domestic sizes. Steam sizes: \$3 for pea; \$2.25@\$2.50 for buck-wheat; \$1.45@\$1.50 for rice and \$1.30@\$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

The demand for soft coal along the Atlantic seaboard seems to increase, and shippers are unable to keep up with orders. If it were not the belief that a large proportion of present shipments are going into stock for the winter, producers would fear that the present supply would not go around. Outside of the heavy regular demand, last orders to ice-making ports are taking large amounts of available coal. This activity will naturally soon be suspended, with a consequent relief to shippers. Car supply has not improved, to the disappointment of producers, who are prevented from sending forward as large an output as they could. Present appearances seem to indicate that no relief in car supply can be expected this year.

Prices for spot coal are strong; any-

thing that is black will sell for \$2.50@\$2.60 f. o. b. New York harbor shipping points, while the ordinary steam grades secure around \$2.70@\$2.75, and the better coals get prices ranging upward from this. Indeed, to a shipper having a cargo to spare, the price is a question of special negotiation, and it depends largely upon the needs of the consumer.

Trade in the far East is consuming a large amount of coal, the demand largely exceeding the supply. The Sound is calling for more coal than can be supplied, shippers holding contractors down to their monthly proportion. Boats to this region are scarce and rates are advancing. New York harbor is short of coal at shipping points, and boats are put in by consumers who are glad to have them wait. All-rail trade is cut down as much as possible; \$1.50 at mines is being asked for shipment, and orders are discouraged as much as possible. Car supply is variable, according to territory; some shippers say they get only one-quarter of their needs. All mines are cut off to some extent. Transportation is good, which assists the situation to a large extent.

In the coastwise market, small vessels are scarce, but the large ones are in fair supply. Rates are the same as were quoted last week.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Oct. 28, in short tons:

	1904.	1905.	Changes.
Anthracite.....	3,694,062	3,744,726	I. 50,664
Bituminous..	22,230,326	24,334,596	I. 2,104,270
Coke	7,017,076	9,100,705	I. 2,083,629
Total.....	32,941,464	37,180,027	I. 4,238,563

Coke continues to supply nearly half the gain in tonnage this year.

The Chesapeake & Ohio Railway Co. reports coal and coke traffic over its road, for the three months ending Sept. 30, as follows, in short tons:

	1904.	1905.	Changes.
New River.....	1,300,028	1,329,381	D. 29,353
Kanawha.....	491,276	601,803	I. 110,527
Kentucky.....	21,637	22,231	D. 594
Connecting lines....	33,164	98,320	I. 65,156
Total carried.....	1,846,105	2,051,735	I. 205,630

Of the coal originating on its own lines in 1905, 801,172 tons were carried west, 281,623 tons were shipped east and 870,620 tons were sent to tidewater.

Coke tonnage for the same months was:

	1904.	1905.	Changes.
New River.....	43,484	71,322	I. 27,838
Kanawha.....	6,285	26,784	I. 20,499
Connecting lines .	522	612	I. 90
Total.....	50,291	98,718	I. 48,427

Of the coke originating on its own lines in 1905, 45,751 tons were carried east and 52,355 tons west.

Birmingham. Nov. 6.

There is no change in the conditions at the coal mines in Alabama. The production shows but little, if any, improvement. The State mine inspector's assistants re-

cently made a thorough inspection of the mines in which State and county convicts are employed. More than 2,500 convicts are employed in mines at Pratt City and Flat Top. The mines are in first-class condition and the best of appliances are used. The safety of the men employed is good, as far as mining work goes.

There is a good demand for all the coal that can be mined. It is given out that the Sloss-Sheffield Steel & Iron Co. has leased one of its mines and that employment will be given by the lessor to any union or other miners who may apply.

Chicago. Nov. 6.

In nearly every branch the coal trade shows firmness and comparatively high prices. The shortage of supplies, attributed by dealers to scarcity of cars, keeps bituminous coals from both Western and Eastern mines firmly up to circular prices, and in some cases above. Demand is increasing with the coming of cold weather, for both bituminous and anthracite.

Western bituminous, so long in over-supply, is now coming forward in only about half the volume of a year ago. This condition, dealers expect, will exist all winter and may become worse. Meantime coal prices have fluctuated from day to day in consequence of the uncertainty of receipts.

Illinois and Indiana coal now brings \$2.50@\$2.85; run-of-mine, \$2@\$2.20, and screenings \$1@\$1.30. The price, as has been said, varies a good deal, and these figures are too low on many sales, by 10@25c. The demand for fine coals is least strong, but these also are coming up.

Smokeless leads Eastern coals, with prices firmly up to circular and the demand increasing. Run-of-mine brings \$3.30; lump and egg, \$4.30. Hocking is greatly in demand and is advancing in price. Lump sells at \$3.15@\$3.50, the former being the circular price. Premiums are being volunteered by consumers of this, as other coals, to get prompt shipment, and the car situation is the cause of much complaint. Youghiogheny is advancing in sales outside of contracts, both as to demand and prices. Three-quarter is quoted at \$3.25@\$3.50, with very little coal coming forward.

Anthracite business is reported good throughout Chicago territory, and increasing rapidly. Nut and small egg are mostly in demand.

Cleveland. Nov. 7.

The coal market is still struggling with a car shortage. Prices, in consequence, are a little stronger on all grades. Run-of-mine steam coal is selling at \$1.10 at mines in Ohio and Pennsylvania, with local consumption showing a steady improvement. There is also a good demand for slack. The shorter supply, which is expected when the lake movement stops,

is beginning to be in evidence. Prices have changed but little, Ohio slack being quoted at 75c. to 80c. at the mines and Pennsylvania slack at 70c. to 75c. at the mines.

The coke market is getting much stronger. The best grades of 72-hour foundry coke are now selling at \$4 flat at the oven and the best grades of furnace coke are selling at \$3.25 to \$3.50 at the oven.

The demand for lake three-quarter coal is strong at the present time. The prices are holding firm at \$2.10 at dock, Lake Erie ports. Lake rates have been booming during the past week, the demand for tonnage for grain setting the pace. The market is therefore strong, with shippers paying 65c. to Lake Michigan, 60c. on hard coal from Buffalo to Duluth and 40c. on bituminous coal from other Lake Erie ports to the head of the lakes.

Domestic coal is still strong, with prices firm at \$2.10 at mines for selected lump, and reports abroad that another advance may soon be expected.

Pittsburg. Nov. 7.

Coal.—The demand is greater than a week ago, but the supply is less, due to the car shortage. Prices were being shaded by some operators until a few days ago, and now the rate of \$1.20 a ton for run-of-mine at the mine is firmly established. The usual 10c. differential prevails for other grades. Slack has advanced to 80c. a ton and likely will go higher. Many railroad mines are idle this week, on account of the scarcity of cars, but the river mines are in full operation, there being plenty of empty coal boats and barges. Coal is being rushed to the lake ports as rapidly as possible, as the lake navigation season closes on Nov. 15.

Connellsville Coke.—Premiums are being paid for prompt delivery of furnace coke, and it is impossible to buy for shipment this year at less than \$3 a ton. All contracts for delivery in the first quarter of next year are at \$3 a ton. Foundry coke is quoted at \$3.50 a ton. The production for the week amounted to 267,997 tons in the Connellsville field and the shipments to 11,724 cars distributed as follows: To Pittsburg and river tipples, 4,247 cars; to points west of Pittsburg, 6,218 cars; to points east of Everson, 1,269 cars. This was an increase of 84 cars compared with the previous week. The total shipments in the Connellsville and Masontown fields aggregated 340,168 tons.

San Francisco. Nov. 2.

J. W. Harrison's circular, of this date, says: "Since our last there has been only one arrival from Australia, with 2,330 tons. This is the entire receipt of Australian coal in October. The same month last year there were nine vessels, which delivered 23,719 tons. This shows a very pro-

nounced shrinkage this year. The arrival of coal from all sources for the month of October this year is 28,652 tons less than October, 1904. There are but very small stocks of Australian grades now here in yard; still there appears to be no change in the asking prices for the little that is here, although the Fall demand is now beginning; and, to make good the deficit, three steamers have been chartered to bring Newcastle coal, which should arrive here during the month. New steamer engagements have recently been made for the transportation of British Columbia fuel to this port. These, with shipments from other Coast ports, will supply nearly all immediate requirements for our winter trade. Harmony again prevails among the Nanaimo coal miners, and the output promises to be materially augmented. Freight rates from the Colonies are quoted at an advance, making Australian products cost somewhat higher. The output of fuel oil is not decreasing, and there is no perceptible change in values, although producers are demanding higher prices."

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

Foreign Coal Trade.

Nov. 8.

The official statement of the coastwise coal traffic of Great Britain for the year 1904 is as follows, in long tons:

	Shipments.	Receipts.
England and Wales.....	19,414,836	14,290,604
Scotland.....	2,737,870	1,185,713
Ireland.....	50,943	4,416,010
Total.....	22,203,149	19,892,327

As compared with 1903, there were increases of 728,558 tons in shipments, and of 854,067 tons in receipts.

Iron Trade Review.

NEW YORK, Nov. 8.

The iron market continues extremely active, and there is no cessation in the demand for almost all kinds of material. Many furnaces and mills are well sold up, not only for the remainder of this year, but for the first quarter of 1906, and well into the second quarter. They are accordingly, not in a position to take orders.

Higher prices for coke for next year have already been established. So far as there are any indications, furnaces buying Lake ore will have to pay an advance of

50c. per ton for next year's deliveries. These items will make up a material advance in the cost of pig iron to the merchant furnaces.

Reference has been made heretofore to the re-opening of old iron mines in the East. The Dean iron mine, near Fort Montgomery, in the Hudson River district, is to be worked on a large scale, and a new company is now being organized.

While full figures are not yet available, the October shipments of iron ore from the Lake Superior district were large enough to bring the total up to that of 1902, and to indicate that this season's shipments will exceed all records.

Exports and Imports.—Exports of iron and steel, including machinery, from the United States for September and the nine months ending Sept. 30, are valued by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1904	1905	Changes
September.....	\$11,136,815	\$12,136,378	I. \$999,563
Nine months....	92,551,947	104,904,857	I. 10,352,910

The gain over last year in August was 9%; for the nine months it was 11.2%. The principal items of the iron and steel exports for the nine months were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron.....	\$36,428	\$36,206	D. \$222
Billets, blooms, etc....	262,626	151,976	D. 110,650
Bars.....	42,138	41,489	I. 649
Rails.....	273,746	219,248	D. 53,498
Sheets and plates.....	33,792	51,420	I. 17,628
Structural Steel.....	37,312	56,180	I. 18,868
Wire.....	81,144	98,866	I. 17,722
Wire-rods.....	14,042	4,445	D. 9,597
Nails and spikes.....	30,297	37,985	I. 7,688

Exports of pipe and pipe fittings, not reported separately in 1904, were 36,131 tons this year. There were decreases in several items, the more important being in billets and blooms, in rails and in wire-rods. The chief exports of rails were to Canada, Mexico and the West Indies; but European countries took 17,474 tons.

Exports of iron ore were 129,740 tons in 1904, and 160,203 tons in 1905; an increase of 30,463 tons. Most of this ore went to Canadian furnaces.

Imports of iron and steel, including machinery, into the United States were valued as follows for September and the nine months ending Sept. 30:

	1904.	1905.	Changes.
September.....	\$1,838,037	\$2,154,127	I. \$316,090
Nine months....	16,598,505	19,565,755	I. 2,967,250

The increase in September was 17.2%; for the nine months, it was 17.9%. The chief items of the imports for the nine months were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron.....	61,220	153,051	I. 91,831
Billets, blooms, etc....	8,849	10,505	I. 1,656
Bars.....	15,784	26,196	I. 10,412
Rails.....	34,231	14,288	D. 19,943
Wire-rods.....	12,034	12,732	I. 698
Tin plates.....	66,035	54,982	D. 11,053

There was an important increase in pig iron. Imports of iron ore for the year were 297,212 tons in 1904, and 650,286 tons in 1905; an increase of 353,074 tons. The greater part of this ore is from Cuba, but some ore comes from Canada and Newfoundland, and some from Spain.

Imports of manganese ore were 66,608 tons in 1904, and 211,564 tons in 1905; an increase of 144,956 tons this year.

Birmingham. Nov. 6.

Alabama pig-iron manufacturers have very little iron they can sell. During the past week, according to good information, one consumer wanted no less than 15,000 tons of iron and was willing to pay a fairly good price therefor. The buyer discovered 1,000 tons, delivery yet this year, and paid for this at the rate of \$14 per ton, No. 2 foundry. The larger producers of iron are just looking on, the demand still being active and the quotations improving. No. 2 foundry is selling at \$14 per ton by the companies who can sell any iron at all.

The delivery right now is greater than the production, the railroads making a strenuous effort to handle all the iron that is offered them. The stocks on hand in this district are beginning to wear down, and it will not be many weeks before empty yards can be seen in this section. The car shortage is not so pronounced in this district. The concerted effort on the part of the railroads to handle the iron and other products promptly and supply all the cars needed is having its effect.

The following quotations prevail: No. 1 foundry, \$14@14.50; No. 2 foundry, \$13.50@14; No. 3 foundry, \$12.50@13; No. 4 foundry, \$12; gray forge, \$11.50; No. 1 soft, \$14@14.50; No. 2 soft, \$13.50@14.

The steel plant at Ensley, during the month of October, manufactured more than 23,500 tons of steel, the greater portion of which went into rails. This is the largest month's production since the plant has been in operation.

Cast-iron pipe works in this district are busy, and shipments of their products are strong. Many orders are on hand. Official announcement is made of the erection of two new cast-iron pipe works in this district during the next year, one by the Tennessee Co. and the other by the American Cast Pipe Company.

The plant of the Coosa Soil Pipe & Foundry Co., at Gadsden, Ala., is being enlarged, and the capacity will be materially increased.

Chicago. Nov. 6.

Sales of iron have been heavy in the last week, and everything points to a strong market for the rest of the year. Prices have advanced and are advancing on both Northern and Southern pig iron, with iron products of nearly every sort so strong that optimists predict the greatest two months for closing the year 1905 known to the history of the local trade.

Northern iron is greatly in demand, so that little can be had at the ruling prices of \$18@18.50. Southern is strong at \$14@14.50, Birmingham, or \$17.65@17.15,

Chicago. The demand for both Northern and Southern is on contracts for the first half of 1906, but there is little iron available for the first quarter of the year. Spot iron is not so prominent as two or three months ago, the tendency being to reach out for supplies as the market advances in strength.

Advances in prices as well as demand are predicted by strong local interests. The imaginary boundary line between years apparently is not being considered by either buyers or sellers this year; there will be, to all appearances, a strong and steady market up to Jan. 1. What spot iron there is in the market commands 25c. @ \$1 premium.

The great increase in the use of iron products and recent heavy sales of bessemer and malleable, make local dealers in iron strongly of the belief that a genuine boom, of strong foundation, is on, that may last without break up to the middle of 1906.

Coke is very strong, and signs point to greater strength through increased demand and the car shortage up to at least January 1.

Cleveland. Nov. 7.

Iron Ore.—Shipments of ore during October were 4,257,009 tons, an increase over October a year ago of 222,228 tons. Shipments to Nov. 1 were 29,730,615 tons, an increase over 1904 of 12,073,456 tons. The best total for any one year up to this time was 27,500,000 tons in 1902. Shipments in October were not quite as heavy as expected, due to the freezing of the ore in the upper lake pockets and the congestion of boats incident to that, and to a car shortage at the lower lake ports. Some ore has been sold for next year's delivery at an advance of 25c. over prices for the current year. The belief is that the basis when established will be 50c. above present prices.

Pig Iron.—There is a lull in the foundry trade for the time. Most buyers are satisfied and furnaces are not anxious to sell. There is less talk of \$17 iron in the Valleys, and most of the material is sold at \$16.50 for No. 2 in the Valleys for all deliveries. The market is strong at that price. Steel-making irons are \$16.50@16.75 for bessemer, basic and malleable at Valley furnace, with a strong demand for basic. The market is quiet, but firm otherwise.

Finished Material.—Two new ships were ordered on the lakes during the past week, and other orders are coming. This increases the demand for structural shapes and plates. At the same time it is an indication that the buying movement in those materials is not over. Shapes for quick shipment are selling at 2.50c. out of stock, except for a few sizes which are selling at 3c. Plates are commanding a premium, but this does not seem to be generally in favor. Bar steel is just steady, with some mills in position to make quick

shipments. Prices are steady at 1.50c. Pittsburg. Bar iron is strong at 1.75c. to 1.80c. Youngstown. Billets are scarce and in good demand.

New York. Nov. 8.

Pig Iron.—Business continues active, and furnaces are generally asking higher prices. Buyers find it hard to get the deliveries they want. The higher prices for coke are still used as an excuse for putting up iron, and there are predictions of \$20 iron before long.

Prices are higher. For Northern iron in large lots, we quote: No. 1X, \$18.25@18.50; No. 2X, \$17.75@18.25; No. 2 plain, \$17.25@17.50; forge, \$16.50@17. Basic is still in demand; \$17.75 is asked for Alabama, and 25c. less for Northern. Virginia foundry is held around \$18 for No. 1 and \$17.50 for No. 2. For Southern iron, on dock, quotations are higher: No. 1 foundry, \$18.25; No. 2, \$18; No. 3, \$17.25; No. 4, \$16.75; No. 1 soft, \$18.25; No. 2 soft, \$17.75; gray forge, \$16; No. 2 foundry and No. 2 soft are still rather scarce.

Business in warrants has been better. Latest prices for December are \$16.85 bid, \$17.10 asked, for regular warrants; \$16.90 bid, \$17.50 asked, for foundry warrants.

Cast - Iron Pipe.—Business continues good. Quotations are: \$27.50 per net ton, carload lots at tidewater, for 6-in. pipe. Higher prices are expected.

Bars.—Business is good and prices higher. Iron bars are 1.795c., tidewater, for plain, and 1.845c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price, but 2.50c. is probable soon.

Plates.—Steel plates are in strong demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are asked, depending on the necessities of buyers.

Structural Material.—Small orders continue to come in, and deliveries uncertain. Prices are unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery.

Steel Rails.—No change in standard sections. Light rails are in demand, prices ranging from \$23.50 for 35-lb., up to \$29 for 12-lb. rails.

Old Material.—Demand is strong, and prices are firm. No. 1 railroad wrought is \$22@23; No. 1 yard wrought, \$20@21; machinery cast, \$14.50@15; heavy steel melting scrap, \$17@18. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Nov. 8.

The surprising feature of the pig-iron market during the past few days has been the magnitude of the demand for various

kinds of iron all the way from bessemer and basic down to forge. The requirements for casting purposes are very heavy, and as the producing capacity of furnaces making this quality of iron is pretty well sold up, the anxiety of buyers is increasing to secure enough to cover work in hand. Large requirements for tunnel castings are in sight. Liberal purchases of both No. 1 and No. 2 foundry have been made for mid-winter delivery. Some inquiry is on hand to-day which will likely terminate in business for delivery of material late in the spring. New requirements are springing up, and it looks as though the furnace capacity would be tied up until toward midsummer. Under this condition of things prices, or at least quotations, are steadily hardening, and it is stated authoritatively that a good deal of business has been done during the past few days at an advance amounting to as much as 50c. per ton. The standard quotations as given today are: Basic iron, \$17.50@18; low phosphorus, \$23.50; standard gray forge, \$16.50; No. 2X, \$18 to \$18.50; No. 2 plain, \$17.50, and Southern No. 2, \$18.

Muck Bars.—Two or three lots of muck bars sold yesterday at \$28 at mill.

Billets.—The oversold condition of billet mills constitutes a very annoying condition of things to several concerns who are anxious to place orders. Quotations are from \$28 to \$30, and for forging billets business was taken this week at \$33.

Bars.—The rule now is to charge premium prices for refined iron. Sales of steel bars have been made at the standard quotations, but steel is likely to advance within a week, not officially but in way of premium. It is a difficult matter to place large orders.

Sheets.—The producing capacity of our Pennsylvania sheet mills is enormous, and buyers are promptly supplied. The manufacturers are cautious in the acceptance of business, leaving gaps for emergencies.

Pipes and Tubes.—The tube market is very active, and the mills are not prompt in the acceptance of orders. Premium prices are still the rule on small business.

Merchant Pipe.—Very little business is being done in this territory, but at outside prices.

Plates.—The plate situation is peculiar. A moderate estimate of the business that has been done during the past week would look like an exaggerated statement. When large orders are placed, reasonable quotations are given, but on all small business advances are readily paid.

Structural Material.—Orders keep piling in from the American Bridge Co., from contractors and others. The feature of the week has been the inquiry from contractors who are preparing to push through winter work for office buildings, warehouses and the like.

Steel Rails.—We have had another big week in steel rails, and with but one ex-

ception all of the orders are for next year's delivery.

Old Rails.—Old rails are quoted at \$25, and the only business heard of this week has been in the way of exchanging old iron rails for new steel rails.

Scrap.—The yards are cleaned out of good scrap, and there are buyers for everything that can be had. Machinery scrap has been contracted for at as high as \$16.50 and railroad scrap commands \$23.

Pittsburg. Nov. 7.

Bessemer, basic and foundry No. 2 pig iron sold during the week at \$17, Valley furnaces, but the tonnage was limited to small lots. What little bessemer iron that remains unsold is chiefly in the hands of middlemen, and they are not particularly anxious to dispose of it even at the present prevailing high price. There is a fair tonnage of foundry iron available for delivery this year, but the producers will only sell in small lots to old customers, as the market is advancing. Southern foundry iron, No. 2 grade, is held firmly at \$14, Birmingham, equal to \$18.35, Pittsburg, and it is doubtful if any could be bought at that figure for shipment this year. Gray forge also has advanced, and sales this week were made at an advance of \$1 a ton over the high price last week. It is estimated today that the sales for the week of all grades of pig iron exceed 10,000 tons. This includes 4,000 tons of basic iron, which was sold several days ago at a trifle under the price now ruling. There are many inquiries for bessemer iron for next year, but if any sales have been made, strict secrecy is being maintained by both producer and buyer. The producers do not care to quote prices at present for future delivery, as there is every indication of a stiff advance. More iron will be needed by the United States Steel Corporation for this year, and it is understood that it has options on all iron produced by the Bessemer Pig Iron Association and W. P. Snyder & Co. in excess of the tonnage contracted for with these interests last week. It is reported, but not confirmed, that options have been taken on iron for the first quarter. It is generally believed that the bessemer pig-iron market will not stop until the price has advanced to \$20 at the furnaces, and may go higher after the opening of the new year. Sales of several million tons of Lake Superior ore are reported to have been made for next year at an advance of 50c. a ton over the rates for the season just closing. Mesabi bessemer ore is selling at \$4 a ton, f. o. b. lower lake ports, but some grades are offered at a trifle less, and for the best grades a higher rate is being paid. The movement of ore from the Lake Superior region this season promises to reach 32,000,000 tons, against the record of 27,500,000 tons in 1902. The production and shipment next year likely will be about 35,000,000 tons. Ferro-

manganese also has advanced, and small lots sold during the week at \$63 for delivery during the rest of the quarter. For prompt shipment, \$65 can be obtained. There is not likely to be a decline in prices, as it is reported that foreign producers are well sold up for the first quarter of next year.

The market for finished steel products is unusually active, although there has not been a great deal of new business placed. Specifications are coming in so rapidly that mills cannot fill them, and many are from four to six weeks behind. The car shortage is becoming more serious and is affecting deliveries of finished material. If this condition of affairs continues it will be necessary to curtail production, as there will be no room to pile the material. Premiums are being offered in a number of lines, particularly steel bars for prompt shipment. Some relief is expected when the lake season closes, as more cars will be available for the Pittsburg district. The bar-iron market is becoming stronger, and the price has almost advanced to 1.80c., the rate recently fixed by the Republic Iron & Steel Co. The American Sheet & Tin Plate Co. has started more idle mills, and is reported to have booked a number of good orders, including some for the rebate trade. During the past week the company drew on the Amalgamated Association of Iron, Steel & Tin Workers for a large amount in the rebate fund to apply to rebate orders that had been filled.

Negotiations are on for the purchase of the properties of La Belle Iron Works, at Wheeling and Steubenville. This concern is capitalized at \$7,000,000, and double that amount has been offered. Options are being taken on the stock at the rate of \$200 a share, and are being made out in the name of E. N. Ohl, a director of the Republic Iron & Steel Co., who is also identified with Valley pig-iron interests. The stockholders are offered \$1 a share a month from Dec. 1 during the life of the options. There is considerable speculation as to what interests are concerned in the proposed deal. Officers of the United States Steel Corporation have denied that it is contemplating the purchase, and A. W. Thompson, the retiring president of the Republic Iron & Steel Co., also denies that he is interested. The report that John W. Gates and Charles S. Guthrie, who appear to be in full control of the Republic Co., are behind the movement, has not been denied, and seems to be generally believed.

Pig Iron.—Sales for the week of all grades of pig iron aggregate about 10,000 tons. The minimum price of bessemer, basic and foundry No. 2 is \$17, Valley furnaces. Gray forge has advanced to \$16.85, Pittsburg, but this price might be shaded. This is an advance of \$1 on forge during the week.

Steel.—A few small lots of bessemer

billets sold at \$26, and open-hearth billets are nominally quoted at \$27@28, but no sales are recorded. Sheet-bars are nominally \$27. Plates are firm at 1.60c., and sheet-bars are still quoted at 1.50c., but for prompt delivery premiums are readily paid.

Sheets.—Business seems to be improving, but prices are still low. Black sheets are quoted at 2.30c., and galvanized at 3.30c. for No. 28 gauge, but sales are known to have been made at a lower figure.

Ferro-manganese.—The minimum price is now \$63 a ton, and for prompt shipment \$65 is asked. Some large sales have been made into the first quarter of next year, and the high prices are likely to continue.

Cartagena, Spain. Oct. 21.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 1,300 tons manganiferous ore, and one cargo, 1,800 tons dry ore, to Great Britain. The market is firm, but shipments are limited by high freight rates.

Quotations for iron ores are unchanged. Ordinary 50% ore is 7s. 6d.@7s. 10d.; special low phosphorus, 8s. 2d.@8s. 6d.; specular ore, 58% iron, 11s.; S. P. Campanil, 9s. 6d. per ton. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

Heavy Chemicals and Minerals.

NEW YORK, Nov. 8.

Heavy chemicals sturdily hold their general strength, but with a stronger market for several products. American sulphur is of course master of the domestic situation, and shows a tendency to raise the price, an advance of 1/8 of a dollar per ton being the last announcement. We note herewith the prices for the American product. Sicilian recently has been quoted the same for Atlantic ports as the Louisiana sulphur, presumably on the basis of some tacit understanding.

Pyrite continues unchanged and in steady demand, the production being constantly absorbed, mostly by the acid-makers.

Nitrate of soda reports the same prices as in the advances noted recently, with a market which still continues very strong, and which is liable to present significant changes.

Sulphate of copper, in its slight advance of recent date, seems to be in sympathy with the metal.

Phosphate companies still report the same peculiar situation. This amounts to strained relations between seller and buyer, largely on account of the rigorous freights. The sellers seem unwilling to

place large sales, preferring to wait for the higher prices (which may not materialize for some time). Actual prices show no decided changes from those quoted last week.

Tin crystals are quoted at the same price as last month (22c. per lb.); tin bichloride is quoted for the month at 10c., a slight advance over quotation for last month.

PRICES.

Sulphur.		
Louisiana, New York, Boston or Portland.....	ton	\$22.50
Philadelphia or Baltimore.....	"	22.75
Pyrite.		
Domestic, furnace size.....	Unit	11c.
Fines.....	"	10c.
Imported, lump, At. ports.....	"	10@11c.
" fines " " " " " " " " " "	"	9 1/2@10c.
Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.		
Acids.		
Boric, crystals.....	per lb.	.10
powdered.....	"	.10 1/2
Carbonic, liquid gas.....	"	.12 1/2
Hydrofluoric, 30%.....	"	.03
48%.....	"	.05
60%.....	"	.06
Nitric acid, 36%, 100 lb.....		\$4.75
38%, 100 lb.....		5.25
40%, 100 lb.....		5.50
42%, 100 lb.....		5.75
Oxalic acid, com'l, 100 lb.....		\$5.00@5.25
Sulphuric acid, 50%, bulk, ton.....		13.50@14.50
60%, 100 lb. in carboys.....		1.05
60%, bulk, ton.....		18.00@20.00
66%, 100 lb. in carboys.....		1.20
66%, bulk, ton.....		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb.....		\$5.35
Nitrate of Soda, 100 lb.....		2.25@2.30
Sulphate of Ammonia, per 100 lb.....		3.10@3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain & Europe.
*Fla., hard rock.....	\$7.25@7.50	\$10.67@11.85
land pebble.....	3.75@4.00	7.70@8.40
†Tenn., 78@80%.....	4.35@4.40	10.27@10.67
78%.....	3.75@4.00	
75%.....	3.40@3.50	
68@72%.....	3.00@3.25	
‡So. Car. land rock.....	3.75@4.00	
river rock.....	3.50@3.75	6.33@6.61
Algerian, 63@70%.....		7.04@7.71
68@63%.....		6.15@6.60
Tunis (Gafsa).....		6.00@6.60
Christmas Isle.....		13.28@14.11
Ocean Isle.....		13.60@14.45
Somme, Fr.....		11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C. §These figures are slightly higher owing to the advance (one-quarter penny) plus slightly higher freights

The English market reports shipments as well sustained on a good scale for most of the heavy alkalis, caustic soda being particularly well sold. It is noteworthy that nitrate of soda is reported as less active, the recent slight advance having checked sales.

Metal Market.

New York, Nov. 8.

Gold and Silver Exports and Imports.

At all United States Ports in Sept. and Year.

Metal.	September		Year.	
	1904.	1905.	1904.	1905.
Gold				
Exp	\$2,744,448	\$1,412,904	\$83,059,988	\$42,677,921
Imp	4,241,025	5,499,685	68,694,670	80,395,595
Exc	E. \$1,496,587	L. \$4,086,781	E. \$14,345,238	E\$12,982,326
Silver				
Exp	8,878,775	5,527,499	89,129,920	39,443,210
Imp	2,005,936	2,803,940	19,677,231	24,470,938
Exc	E. \$1,375,739	E. \$1,723,519	E. \$19,452,689	\$14,972,277

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

Gold and Silver Exports and Imports, N. Y.

For the week ending November 11, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$4,725	\$24,076	\$813,464	\$9,131
1905.....	34,430,003	10,405,053	29,319,712	3,805,597
1904.....	81,804,981	5,545,822	31,389,360	904,344
1903.....	31,557,990	6,713,228	26,896,246	3,136,539

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

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Nov. 4 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts.....	\$1,139,879,500	\$1,058,272,400
Deposits.....	1,196,152,400	1,052,778,500
Circulation.....	42,585,500	54,358,500
Specie.....	231,299,800	190,464,600
Legal tenders.....	77,850,700	75,084,300
Total reserve.....	\$309,150,500	\$265,548,900
Legal requirements.....	299,038,100	263,194,625
Balance surplus.....	\$10,112,400	\$2,354,275

Changes for the week this year were increases of \$16,453,000 in loans and \$10,686,200 in deposits; decreases of \$5,594,000 in specie, \$1,810,500 in legal tenders, \$531,600 in circulation and \$10,076,650 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated.....	\$190,404,600	
England.....	157,548,700	
France.....	680,500,315	\$219,070,535
Germany.....	148,910,000	49,635,000
Spain.....	74,865,000	112,845,000
Netherlands.....	32,999,500	29,895,000
Belgium.....	15,860,000	7,930,000
Italy.....	125,000,000	15,736,000
Russia.....	576,850,000	21,620,000
Austria.....	227,705,000	60,275,000

The returns of the Associated Banks of New York are of date Nov. 4, and the others Nov. 3. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Oct. 26 are as follows:

	1904.	1905.	Changes.
India.....	£8,158,898	£4,959,221	D. £3,199,677
China.....	372,722	784,246	I. 411,524
Straits.....	58,103	38,299	D. 19,804
Totals.....	£8,589,723	£5,781,766	D. £2,807,957

Receipts for the week this year were £186,693 from New York. Exports were £1,100 to Egypt, £123,300 to India and £15,000 to Japan; £139,400 in all.

Indian exchange remains strong, and all the Council bills offered in London were taken at an average of 16.03d. per rupee. The Indian government is taking some silver for coinage, and the general demand from India is increasing.

There is still talk of gold exports from New York this month, but nothing definite has developed up to date. Sterling exchange is a fraction lower this week, and probably gold will not go out unless special inducements are offered from Paris and Berlin; both are reported to need gold.

The silver market continued steady, with all offerings placed; presumably the bulk of purchases are on Eastern government account.

Nov.	Sterling Exchange.	Silver.		Nov.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
2	4.8650	62½	28½	6	4.8665	63½	29½
3	4.8660	62½	28½	7	.....	.....	.....
4	4.86½	63	29	8	4.8660	63	29½

New York quotations are for fine silver, per ounce, Troy. London prices are for sterling silver, .925 fine.

	Bid.	Asked.
Mexican dollars.....	\$0.48½	\$0.49½
Peruvian soles and Chilean pesos..	.44½	.46½
Victoria sovereigns.....	4.85½	4.87½
Twenty francs.....	3.87	3.90
Spanish 25 pesetas.....	4.78	4.82

Nov.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
2	16½	16½	71½	83	5.15	6.10	5.90
3	16½	16½	71½	83½	5.15	6.10	5.90
4	16½	16½	.....	83½	5.15	6.10	5.90
6	16½	16½	72½	83½	5.15	6.10	5.90
7	.....	.....	72½	.....	.....	.....	.....
8	16½	16½	73½	83½	5.15	6.10	5.90

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic.

Copper.—Manufacturing centers still report an undiminished amount of business in all branches. Buyers are covered for this year, and, generally speaking, are not quite prepared to place larger orders beyond that period. However, enough business has been done to give the market a firm undertone, and it closes steady at 16½@16½ for Lake copper; 16½@16½ for electrolytic in ingots, cakes and wirebars; 15¾@16c. for casting copper.

A scarcity of prompt standard warrants has again made itself felt on the London Exchange, and standard brands close at an advance, the quotations being £73 5s. for spot, £71 10s. for three months.

Refined and manufactured sorts we quote: English tough, £75 10s.; best selected, £76; strong sheets, £84; India sheets, £79; yellow metal, 7½d.

Exports of copper from New York for the week were 2,166 tons. Our special correspondent reports the exports from Baltimore for the week at 476 long tons of fine copper.

Tin.—The demand for this metal has been on a very large scale, and a fair volume of business has been done at advancing prices. Spot tin is scarce and commands a premium. Quotations are 33@33½, depending upon deliveries.

The London market, stimulated by the large buying from here, shows quite an improvement, and closes at £150 7s. 6d. for spot, £149 15s. for three months.

Lead.—Notwithstanding the fact that the leading interest has advanced its prices to 5.15 New York and 5.07½ St. Louis, there is no let-up in the demand for this metal at these figures.

On account of a scarcity of spot metal, the London market is very firm, and closes at £15 2s. 6d. for Spanish lead, £15 5s. for English lead.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Oct. 21 that silver has been 14.50 reales per ounce. Local price for pig lead has been 79 reales per quintal, equal, on current exchange—32.30 pesetas to £1—to £13 13s. 6d. per long ton, f. o. b. Cartagena. Shipments for the week were 495 tons argentiferous and 300 tons desilverized to Marseilles; 330 tons desilverized lead to London.

Spelter.—Consumers are pretty well supplied for the balance of the year, and hold back with new purchases, so that the market rules somewhat quieter. Quotations are nominal at 6.10@6.15c. New York, 5.90@5.95c. St. Louis.

The London market closes at £28 7s. 6d. for good ordinaries, £28 12s. 6d. for specials.

Zinc Sheets.—Sheet zinc is quoted at \$7.50 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, \$7.25; January 7, 1905, \$7.50; May 12, \$7.25; June 1, \$7; July 29, \$7.25; August 10, \$7.50. The demand is reported active.

Silesian Spelter Market.—Spelter is selling freely at constantly rising quotations. Arrivals on the market are quickly disposed of, and already large lots at good prices are engaged for delivery to the first quarter of 1906. Present quotations per 50 kg., f. o. b. Breslau, are 28.15@28.25 marks for the ordinary, and 28.50@

28.65 marks for the special brands; these are equivalent, respectively, to 6.09@6.11c., and 6.17@6.20c. per pound.

Zinc sheet is selling at 61 marks per 100 kg. (6.6c. per pound).

Zinc dust, in lots of 10,000 kg., sells at 49 marks per 100 kg. (5.3c. per lb.), f. o. b. Stettin, packing included.

Imports and exports of zinc in Germany for the eight months ending September, 1905 and 1904, were, in metric tons:

	Imports.		Exports.	
Spelter.....	16,624	21,286	45,984	47,013
Zinc sheet.....	108	41	12,382	13,454
Zinc scrap.....	1,542	1,976	3,137	3,625
Zinc ore.....	68,712	92,477	28,867	29,288
Zinc white and zinc dust.....	4,158	4,940	13,691	14,038

Austria-Hungary and England receive most of the spelter. Exports to Japan have increased greatly this year.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Oct. 21, that prices are unchanged at 95 fr. per ton for blende, 35% zinc, and 72 fr. for calamine, 30% zinc. Mines are doing well, and talking of further advances. Shipments for the week were 500 tons blende to Swansea.

Antimony.—There is nothing new to report.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at \$20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to \$1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, \$1 per gram.

Quicksilver.—The market is quiet. The New York quotation is \$40 per flask of 75 lb. for large orders, and \$40.50@\$41 for small lots. San Francisco prices hold steady at \$39 for domestic orders, and \$37.50@\$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn.....	275
No. 2, 28% Mn.....	180
No. 3, 20 to 25%, with 2 to 4% iron.....	165
Manganese tin, No. 1, 55% Mn., no iron.....	400
No. 2, 56% Mn., some iron.....	280
Manganese nickel, No. 1, free from iron.....	450
No. 2, traces of iron.....	270

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and

their alloys, wholesale prices are f. o. b. works:

	Per lb.
Aluminum.	
No. 1, 90% Ingots.....	33@37c
No. 2, 99% Ingots.....	31@34c
Rolled Sheets.....	4c. up.
Aluminum-Bronze.....	20@23c.
Nickel-alum.....	33@39c.
Bismuth.....	\$2.10
Cadmium, f. o. b. Hamburg.....	77c.
Chromium, pure (N. Y.).....	80c.
Copper, red oxide.....	50c.
Ferro-Molybdenum (50%).....	95c.
Ferro-Titanium (20@25% N. Y.)..	75c.
Ferro-Chrom. (74%).....	12½c.
Ferro-Tungsten (37%).....	29c.
Magnesium, pure (N. Y.).....	\$1.60
Manganese (98@99% N. Y.).....	75c.
Manganese Cu. (30@70% N. Y.)...	40c.
Molybdenum (98@99% N. Y.).....	\$1.75
Tantalum acid (N. Y.).....	40c.
Thallium, f. o. b. Breslau, Germany.	65@70c.
Phosphorus, foreign.....	45c.
Phosphorus, American.....	70c.
Tungsten (best), pound lots.....	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Nov. 4.

The highest price reported paid for zinc ore was \$55 per ton for three bins of Joplin ore. The assay basis was \$50@52 per ton of 60% zinc, a general advance of \$1 per ton on all grades of blende. The average price for all grades of ore was \$45.84.

Lead continued steady at the advance of the previous week, the highest price paid being \$66.50 per ton, with 80% grades selling at \$66. The average price of all grades was \$65.40 per ton.

The value for the year to date this week reached \$11,147,610, a sum nearly equal to the total value of 1904, indicating that the year's value will exceed \$13,000,000, an approximate gain of \$2,000,000 for 1905 over 1904, with a decrease in the shipment of 4,000 tons of zinc and 1,600 tons of lead.

A little better weather prevailed this week, and the output was augmented by probably 300 tons. The large shipment, however, will reduce the reserve stock.

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

	Zinc, lb.	Lead, lb.	Value.
Cartersville-Webb City..	2,669,590	574,000	\$81,875
Joplin.....	2,740,140	180,300	74,530
Galenia-Empire.....	1,110,330	109,640	28,050
Duenweg.....	933,260	45,930	23,440
Aurora.....	995,700	34,900	18,590
Badger.....	594,790	.....	13,670
Alba.....	506,820	.....	13,170
Granby.....	420,000	12,000	6,895
Prosperity.....	227,110	37,640	6,570
Carthage.....	249,080	.....	6,470
Neck City.....	159,270	.....	4,140
Central City.....	143,350	.....	3,150
Baxter Springs.....	125,080	.....	2,750
Oronogo.....	95,620	17,440	2,665
Spurgeon.....	67,090	4,440	1,530
Beef Branch.....	66,270	20,130	1,450
Reeds.....	42,950	.....	1,030
Zinc, Ark.....	50,830	.....	1,020
Scott City.....	42,110	.....	1,010
Wentworth.....	44,240	.....	880
Totals.....	11,283,630	1,036,420	\$292,685

44 weeks.....427,866,080 52,241,920 \$11,147,610
Zinc value, the week, \$258,670; 44 weeks, \$9,587,570
Lead value, the week, 34,015; 44 weeks, 1,560,040

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.....	33.33	52.00	Jan.....	55.55	61.50
Feb.....	33.63	52.77	Feb.....	56.37	57.62
March.....	35.40	47.40	March.....	57.20	57.20
April.....	35.75	42.58	April.....	58.10	58.00
May.....	34.87	43.31	May.....	57.77	58.27
June.....	32.93	40.75	June.....	56.60	57.80
July.....	33.37	43.04	July.....	53.00	58.00
August.....	37.55	48.83	August.....	53.00	58.00
September.....	40.18	46.75	September.....	53.50	63.50
October.....	43.65	47.60	October.....	53.50	63.86

Wisconsin Ore Market.

PLATEVILLE, Nov. 3.

Buyers were quite active during the week, bidding all the way from \$48 to \$51 for 60% zinc, with few sales reported. The Empire sold 60 tons of low-grade ore at a price that was startling to the producers of that grade of ore, it being much higher than has ever been paid before, for the same grade of ore. The advent in the market of a new buyer of zinc ore had considerable to do with the unsettled price. The production of the last six months has equaled that of the 12 months previous to July 1, 1905. By this time next year it is estimated that there will be 50 producing mills in the district. In spite of the rapid increase in production, there is no surplus ore in the bins at the mines.

Lead is still scarce, selling flat at \$30.50 per 1,000 lb., with a good demand.

Mining Stocks.

New York. Nov. 8.

High rates for money have again operated to check dealing in stocks, but the tendency is rather strong. The holiday makes this a short week, but there is little about the election to affect the stock markets this year.

Copper stocks seem to be in special favor. Amalgamated stays between \$82 and \$83, closing at the higher figure. On the outside market there were heavy dealings in Boston Consolidated, which closed at \$19. United Copper closed at \$34, with \$74¼ for the preferred. British Columbia sold at \$8¼; Granby, \$9½; Tennessee, \$34; Utah Copper, \$25½. Greene Consolidated closed at \$26, showing only small changes.

The industrials were strong, as a rule. Copper Smelting & Refining touched \$140 for the common, while the preferred sold at \$125. Colorado Fuel & Iron sold at \$45; Tennessee Coal, Iron & Railroad at \$92¾. United States Steel brought \$37½ for the common, \$105¼ for the preferred. The persistent trading in Steel common between \$37 and \$39 has suggested "pegging" to many operators.

Lehigh Coal & Navigation has declared a 4% semi-annual dividend; this with the May dividend, makes 8% for this year, as compared with 7% for last year.

Boston. Nov. 7.

Activity in this market turned from the Lake copper shares to the Western mining group this week, largely those of the Bingham camp. It is argued that the market for these shares has been on orders from New York, Chicago, Pittsburg and Michigan points, and that profits from the Lake mining stocks have been turned to North Butte and the Utah stocks. It is certain that the old New England crowd, which has been active in the past, has done comparatively little, although it is felt certain that they will before the movement is over. Firmer money and the decline in the New York market caused a lower level of prices for most of the stocks, yet it has not detracted interest in them.

Boston Consolidated has steadily advanced until it touched \$19.12½ Monday on the Exchange, and sold at \$19.75 today on the curb, as the Stock Exchange was closed. The close a week ago was \$14.50. The demand, it is said, is just as urgent at the latest prices, as it was below \$10 a little over three weeks ago. In fact, the American Smelting people are claimed to have gained control through purchases here, in London and on the New York curb. President Newhouse issued a circular advising stockholders not to sell their stock, as it was worth a great deal more.

Centennial sold off over \$2, on reports of an impending assessment, but President Fay put a quietus on this, claiming that by next January the company should have \$300,000 cash on hand. The company's notes of some \$300,000, given for the Arcadian stamp-mill, have been sold for close to 100 cents on the dollar, which is certainly a favorable argument.

Bingham and Utah Consolidated have had good spurts, the former to \$34.50 and the latter to \$48.25. Atlantic fell \$4.25 to \$22 during the week on free offering, and Allouez fell \$5.25 to \$39.75 on the reaching of stop orders. Both have recovered a little. Michigan rose \$2 to \$16.50, and Arcadian, after selling off \$1 to to \$5.37½, rallied to \$6.37½. Strange as it may seem, the latter is going to sink a shaft to ascertain if there are any riches in its territory. The stock sold as low as 30c. at one time. North Butte went off \$3.50 to \$53.75 on realizing sales. Utah Apex has been the most active stock on the local curb, selling up to \$7 per share.

Colorado Springs. Nov. 3.

Cripple Creek stocks have not been moving very rapidly on the local exchange during the past week, and in the majority of cases prices have remained practically stationary. During the week there has been reported a strike of unusual proportions on the Strong mine, owned by Colorado Springs parties. It is said that the values and size of ore-shoot will exceed anything thus far discovered this

year. The total production of the Cripple Creek district for the month of October amounts to \$1,956,787. This is \$110,487 in excess of the previous month.

El Paso has gained a point or two and sold today for 65 $\frac{1}{2}$ c. Findley has lost about the same amount, selling on today's market for 81 $\frac{1}{2}$ c. Elkton holds to the same quotation of one week ago, 51c. Isabella has gained half a cent and is selling for 26 $\frac{1}{2}$ c. Portland has sold during the week for \$2.12 $\frac{1}{2}$. On the prospect list Mary Nevin has been unusually active and sold up on today's market from 5 $\frac{1}{2}$ to 7c. on a reported strike.

San Francisco. Nov. 2.

The demand for Consolidated California & Virginia subsided this week, and that stock receded in price, most of the other Comstocks following. The stock named sold down to \$1.65, while Ophir was quoted at \$5.62 $\frac{1}{2}$, and Mexican at \$1.45.

The Tonopahs were generally steady and sold well. Montana Tonopah was quoted at \$2.55; Tonopah Belmont, \$1.40; Red Top, 64c. per share.

Oil shares continue quiet, with light dealings. Claremont brought Soc.; Monarch, 15c. per share.

Dividends.

Company.	Payable.	Rate.	Amt.
Amalgamated Copper.....	Nov. 27	\$1.25	\$1,937,500
International Salt.....	Dec. 1	1.00	187,500
Old Dominion.....	Dec. 15	0.50	144,000
Rocco-Homestake.....	Nov. 25	0.02	6,000
St. Eugene Con.....	Oct. 30	0.02	64,040
U. S. Cast Iron Pipe & Fdy.....	Dec. 1	1.00	125,000
U. S. Steel, pf.....	Nov. 30	1.75	6,305,497
Vindicator.....	0.03		33,000
United Copper, pf.....	Nov. 15	3.00	150,000

*Monthly. †Bi-monthly. ‡Quarterly. §Semi-Annually.

Assessments.

Company.	Delinq.	Salv.	Amt.
Caledonia.....	Nov. 17	Dec. 8	\$0.01
Confidence.....	Nov. 12	Dec. 4	0.20
Crown Point.....	Nov. 14	Dec. 5	0.10
Dudley, Cal.....	Oct. 30	.....	0.01
Hale & Norcross.....	Nov. 2	Nov. 28	0.10
Justice.....	Nov. 16	Dec. 9	0.05
Mexican.....	Oct. 30	Nov. 20	0.15
Rose Kimberly.....	Nov. 30	.....	0.02
Savage.....	Nov. 8	Nov. 29	0.10
Sierra Nevada.....	Nov. 2	Nov. 23	0.10
Union Con.....	Nov. 13	Dec. 4	0.10
Utah Con., Nevada.....	Oct. 31	Nov. 21	0.05
Yellow Jacket.....	Oct. 17	Nov. 22	0.10

LONDON. (By Cable.) Nov. 8.

	£	s.	d.
Camp Bird.....	1	16	6
Consolidated Gold Fields.....	6	3	9
De Beers.....	17	15	0
Dolores.....	1	18	9
East Rand.....	7	6	0
El Oro.....	1	17	0
Esperanza.....	5	7	0
Modderfontein.....	8	3	9
Band Mines.....	8	0	0
Rio Tinto.....	8	1	3
Simmer and Jack.....	62	2	6
Stratton's Independence.....	0	9	3
Tomboy.....	1	9	3

*Furnished by Wm. P. Bonbright & Co., New York.

St. Louis. Nov. 4.

	High.	Low.
Adams.....	\$.40	\$.25
American Nettle.....	.10	.02
Center Creek.....	2.00	1.50
Central Coal & Coke.....	65.00	64.00
" " " pf.....	80.00	79.00
Columbia.....	1.00	.25
Con. Coal.....	32.00	51.00
Doe Run.....	147.00	145.00
Granite Bimetallic.....	.21	.21
St. Joe.....	17.00	15.75

STOCK QUOTATIONS.

NEW YORK.		Week Nov. 8.	
Name of Company.	High	Low	Sales
*Amalgamated.....	85	81 $\frac{1}{2}$	83
Anaconda.....	121 $\frac{1}{2}$	117 $\frac{1}{2}$	120
British Col. Copper.....	8 $\frac{1}{2}$	8	8 $\frac{1}{2}$
Federal.....	119 $\frac{1}{2}$	119 $\frac{1}{2}$	100
Federal, Pf.....	99	98 $\frac{1}{2}$	98 $\frac{1}{2}$
Greene Copper.....	26 $\frac{1}{2}$	25 $\frac{1}{2}$	26
Greene Gold.....	4 $\frac{1}{2}$	4	4 $\frac{1}{2}$
Mitchell.....	8 $\frac{1}{2}$	8	8 $\frac{1}{2}$
Tennessee Copper.....	34 $\frac{1}{2}$	33 $\frac{1}{2}$	34
Union Copper.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$
United Copper.....	34 $\frac{1}{2}$	33 $\frac{1}{2}$	34
United Copper, Pref.....	75 $\frac{1}{2}$	74	74 $\frac{1}{2}$
White Knob.....			2,074

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.....	142 $\frac{1}{2}$	138 $\frac{1}{2}$	139 $\frac{1}{2}$	231,230
Am. Smelting & Ref., Pf.	128 $\frac{3}{4}$	123 $\frac{3}{4}$	125	40,930
Colorado Fuel & Iron...	46 $\frac{1}{2}$	44 $\frac{1}{2}$	45	13,900
National Lead.....	54 $\frac{1}{2}$	50 $\frac{1}{2}$	51 $\frac{1}{2}$	142,200
Pittsburg Coal.....	15 $\frac{1}{2}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	900
Republic I. & S.....	26 $\frac{1}{2}$	24 $\frac{1}{2}$	25 $\frac{1}{2}$	14,960
Republic I. & S., Pf.....	96	94 $\frac{1}{2}$	95 $\frac{1}{2}$	5,000
Tenn. C. & I.....	94 $\frac{1}{2}$	90 $\frac{1}{2}$	92 $\frac{1}{2}$	75,800
U. S. Red. & Ref.....	29 $\frac{1}{2}$	29	29 $\frac{1}{2}$	1,600
U. S. Red. & Ref., Pf.....	69 $\frac{1}{2}$	68 $\frac{1}{2}$	69 $\frac{1}{2}$	2,200
U. S. Steel.....	38 $\frac{1}{2}$	37	37 $\frac{1}{2}$	218,500
U. S. Steel, Pf.....	105 $\frac{1}{2}$	104 $\frac{1}{2}$	105 $\frac{1}{2}$	105,313
Standard Oil.....	70 $\frac{1}{2}$	690	690	326

BOSTON.

Allouez.....	45 $\frac{1}{2}$	39 $\frac{1}{2}$	42 $\frac{1}{2}$	9,491
*Amalgamated.....	85	81 $\frac{1}{2}$	83 $\frac{1}{2}$	23,635
Atlantic.....	24	22	24	6,866
Bingham.....	34 $\frac{1}{2}$	31 $\frac{1}{2}$	34 $\frac{1}{2}$	17,549
Boston Consolidated.....	19 $\frac{1}{2}$	14 $\frac{1}{2}$	17 $\frac{1}{2}$	71,948
Calumet & Hecla.....	684	675	680	10
Centennial.....	32	28	29 $\frac{1}{2}$	7,936
Mercur.....	.63	.61	.62	3,090
Copper Range.....	75	72	73 $\frac{1}{2}$	7,485
Daly-West.....	14 $\frac{1}{2}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	911
Franklin.....	18	16	16	2,333
Granby.....	9 $\frac{1}{2}$	9	9 $\frac{1}{2}$	2,704
*Green Con. Copper.....	27	25	25 $\frac{1}{2}$	5,328
Isle Royale.....	26 $\frac{1}{2}$	24 $\frac{1}{2}$	24 $\frac{1}{2}$	2,035
Mass.....	10 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	1,515
Michigan.....	16 $\frac{1}{2}$	14 $\frac{1}{2}$	15 $\frac{1}{2}$	11,286
Mohawk.....	60	58	58	827
North Butte.....	56	58 $\frac{1}{2}$	53 $\frac{1}{2}$	5,841
Old Dominion.....	31	29	29	4,251
Oscuela.....	112	109 $\frac{1}{2}$	109 $\frac{1}{2}$	1,616
Parrot.....	27	26	26	381
Quincy.....	107	107	107	35
Phoenix.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	220
Rhode Island.....	7 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{1}{2}$	125
Santa Fe.....	3	2 $\frac{1}{2}$	2 $\frac{1}{2}$	600
Shannon.....	7 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{1}{2}$	3,370
Tamarack.....	0	0	0	0
Tecumseh.....	14 $\frac{1}{2}$	13	13	1,889
United Copper, com.....	34 $\frac{1}{2}$	31	32 $\frac{1}{2}$	5,000
United States.....	37 $\frac{1}{2}$	35 $\frac{1}{2}$	36	11,119
Utah.....	48 $\frac{1}{2}$	46 $\frac{1}{2}$	47	8,470
Wolverine.....	128	125	125	95

PHILADELPHIA.

Cambria Steel.....	29	28 $\frac{1}{2}$	28 $\frac{1}{2}$	8,014
Philadelphia Co.....	53 $\frac{1}{2}$	48 $\frac{1}{2}$	53 $\frac{1}{2}$	44,596
Tonopah.....	13	12 $\frac{1}{2}$	12 $\frac{1}{2}$	526

PITTSBURG.

Crucible Steel.....	13 $\frac{1}{2}$	13	13 $\frac{1}{2}$	380
Crucible Steel, Pref.....	67 $\frac{1}{2}$	67 $\frac{1}{2}$	67	1,931
Tonopah Ext.....	6.00	5.95	5.95	800

COLORADO SPRINGS.

Name of Company.	First	High	Low	Cig.
Elkton.....	50 $\frac{1}{2}$	51 $\frac{1}{2}$	50	51
El Paso.....	63 $\frac{1}{2}$	67 $\frac{1}{2}$	63 $\frac{1}{2}$	67
Isabella.....	25 $\frac{1}{2}$	26 $\frac{1}{2}$	25 $\frac{1}{2}$	25 $\frac{1}{2}$
Portland.....	210	210	210	210

SAN FRANCISCO.

Beat & Belcher.....	1.45	1.65	1.30	1.40
Bullion.....	.38	.38	.37	.37
Caledonia.....	.40	.40	.39	.40
Confidence.....	.70	.70	.70	.70
Con. Cal. & Va.....	1.65	1.80	1.50	1.65
Gould & Curry.....	.20	.25	.19	.22
Hale & Norcross.....	1.25	1.25	1.15	1.15
Mexican.....	1.40	1.60	1.30	1.45
Occidental Con.....	.87	.87	.87	.87
Ophir.....	5.50	7.50	5.35	6.37 $\frac{1}{2}$
Savage.....	.44	.57	.44	.55

* Ex-dividend. † 1st Installment Paid. ‡ Assessment Paid. § 2d Installment Paid.

Monthly Average Prices of Metals.

Month.	NEW YORK.		LONDON.	
	1904.	1905.	1904.	1905.
	January.....	57.005	60.690	26.423	27.930
February.....	57.592	61.023	26.665	28.047
March.....	56.741	58.046	26.164	26.794
April.....	54.202	56.600	24.974	26.108
May.....	55.430	57.932	25.578	26.664
June.....	55.673	58.428	25.644	26.910
July.....	58.095	58.915	26.760	27.163
August.....	57.806	60.259	26.591	27.822
September.....	57.120	61.695	26.349	28.528
October.....	57.923	62.034	26.760	28.637
November.....	58.453	.....	26.952	.....
December.....	60.563	.....	27.930	.....
Year.....	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.		1904.	1905.
	1904.	1905.	1904.	1905.		
Jan.....	12.410	15.008	12.553	15.128	57.600	68.262
Feb.....	12.063	15.011	12.245	15.136	56.500	67.963
March.....	12.299	15.125	12.551	15.250	57.321	68.174
April.....	12.923	14.920	13.120	15.045	58.247	67.017
May.....	12.758	14.627	13.000	14.820	57.321	64.875
June.....	12.269	14.673	12.399	14.813	56.398	65.881
July.....	12.380	14.888	12.505	15.005	57.256	66.887
Aug.....	12.943	15.664	12.468	15.725	56.562	69.890
Sept.....	12.495	15.965	12.620	15.978	57.645	69.667
Oct.....	12.993	16.279	13.118	16.332	60.012	71.406
Nov.....	14.284	.....	14.456	.....	65.085	.....
Dec.....	14.661	.....	14.849	.....	66.384	.....
Year.....	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.....	28.845	29.325	July.....	26.573	31.760
Feb.....	28.087	29.262	August.....	27.012	32.866
Mar.....	28.317	29.523	Sept.....	27.780	32.095
April.....	28.132	30.525	Oct.....	28.596	32.481
May.....	27.718				