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Wire-rod and Nail Production.

The American Iron and Steel Association reports the ouput of nails in the United States as below, in kegs of 100 lb. each. The statistics of cut nails and cut spikes embrace only standard sizes of nails and spikes cut from plates. They do not embrace railroad and other forged spikes, wire nails of any size, machine-made horseshoe nails, cut tacks, or clout, basket, shoe, or other small sizes of nails. In the statistics cut spikes are always included with cut nails.

	1904.	1905.	Changes.
Cut nails, iron...	395,687	434,579	I. 38,892
" " steel...	887,675	922,970	I. 35,295
Total cut nails.	1,283,362	1,357,549	I. 74,187
Wire nails, steel.	11,926,661	10,854,892	D. 1,071,769
Total.....	13,210,023	12,212,441	D. 997,582

There was an increase of 5.8 per cent. in cut nails, but a decrease of 9 per cent. in wire nails, and a loss of 7.6 per cent. in the total. Of the nails made in 1905, cut formed 11.1 per cent., and wire 88.9 per cent. Of the total 3.6 per cent. were of iron, and 96.4 per cent. of steel. All the wire nails were of steel. Of the wire nails last year 7,175,418 kegs were made by works owned by the United States Steel Corporation.

Exports of cut nails in 1905 were 176,741 kegs; of wire nails, 802,734 kegs. This is a decrease of 30,979 kegs of cut nails, but an increase of 68,180 kegs wire nails, as compared with 1904. Imports were very small, only 273 kegs cut, and 538 kegs wire nails last year.

The American Iron and Steel Association also reports the output of wire-rods for two years past as follows, in long tons:

	1904.	1905.	Changes.
Steel.....	1,697,862	1,807,407	I. 109,545
Iron.....	1,166	1,281	I. 115
Total.....	1,699,028	1,808,688	I. 109,660

The increase last year was 6.4 per cent. Pennsylvania made the largest quantity of wire rods in 1905, its production amounting to over 32 per cent. of the total for the whole country. Illinois was second, Ohio third, and Massachusetts fourth. Eight other States, Indiana, Kentucky, Colorado, New York, New Jersey, Alabama, Rhode Island, and Connecticut, also rolled wire rods in 1905 in the order named. All the States mentioned also rolled iron or steel wire rods in 1904.

Exports of wire-rods were 20,073 tons in 1904, and 6514 tons in 1905; a decrease of 13,559 tons. Imports were 15,313 tons in 1904, and 17,616 tons in 1905; an increase of 2303 tons last year.

The Pueblo Lead Smelters.*

BY O. PUFAHL.

At the Pueblo plant, ores containing over 10 per cent. lead are not roasted, but are added raw to the charge. For such material as requires roasting there are in use five Brückner furnaces. The charge is 24 tons for 48 to 60 hours; the furnaces make one revolution per minute and roast the ore down to 6 per cent. sulphur. There are also two O'Harra furnaces, each roasting 25 tons daily, and 10 reverberatory furnaces 75 ft. in length, each roasting 15 tons of ore daily down to 4 per cent. sulphur.

The charge for smelting is prepared from roasted ore, together with Idaho lead ore, Cripple Creek gold ore, briquetted flue dust, slag and limestone. There are seven water-jacketed furnaces, which smelt, each, 150 tons of charge per day. The furnaces have 18 tuyeres, blast pressure 34 oz., cross section at the tuyeres 48x148 in. They are charged mechanically by a car of 4 tons' capacity.

The output of lead is 11 to 15 tons per furnace. The matte, which is produced in small quantity, contains 8 to 12 per cent. lead and the same percentage of copper. It is crushed by rolls, roasted in reverberatory furnaces, and smelted with ores rich in silica. The matte resulting at this stage, running 45 to 50 per cent. in copper, is shipped to be further worked up for blister copper.

The work-lead is purified by remelting in iron kettles, the cupriferous dross being pressed dry in a Howard press, and sent to the blast furnaces. The work-lead is sent to the refineries at Omaha, Neb., or Perth Amboy, N. J.

To collect the flue dust the waste gases are passed through long brick flues. The chimneys are 150 to 200 ft. high, and 15 ft. in diameter. They stand 75 ft. above the ground level of the blast furnaces. The comparatively small proportion of flue dust produced (0.9 per cent. of the charge) is briquetted, together with fine ore and 5 per cent. of a thick paste of lime. For this purpose a White press is used, which takes six briquets at a time, and handles 10 tons per hour.

According to a tabulation of the results of five months' running, the proportion of flue dust at several works of the American Smelting and Refining Company was as follows:

Globe Plant, Denver....	0.5 %	of the charge.
Pueblo Plant, Pueblo...	0.9 %	" " "
Eiler's Plant, Pueblo....	0.5 %	" " "
E. Helena Plant, Helena,	0.3 %	" " "
Arkansas Valley Plant, Leadville.....	0.2 %	" " "
Murray Plant, Murray, Utah.....	1.2 %	" " "

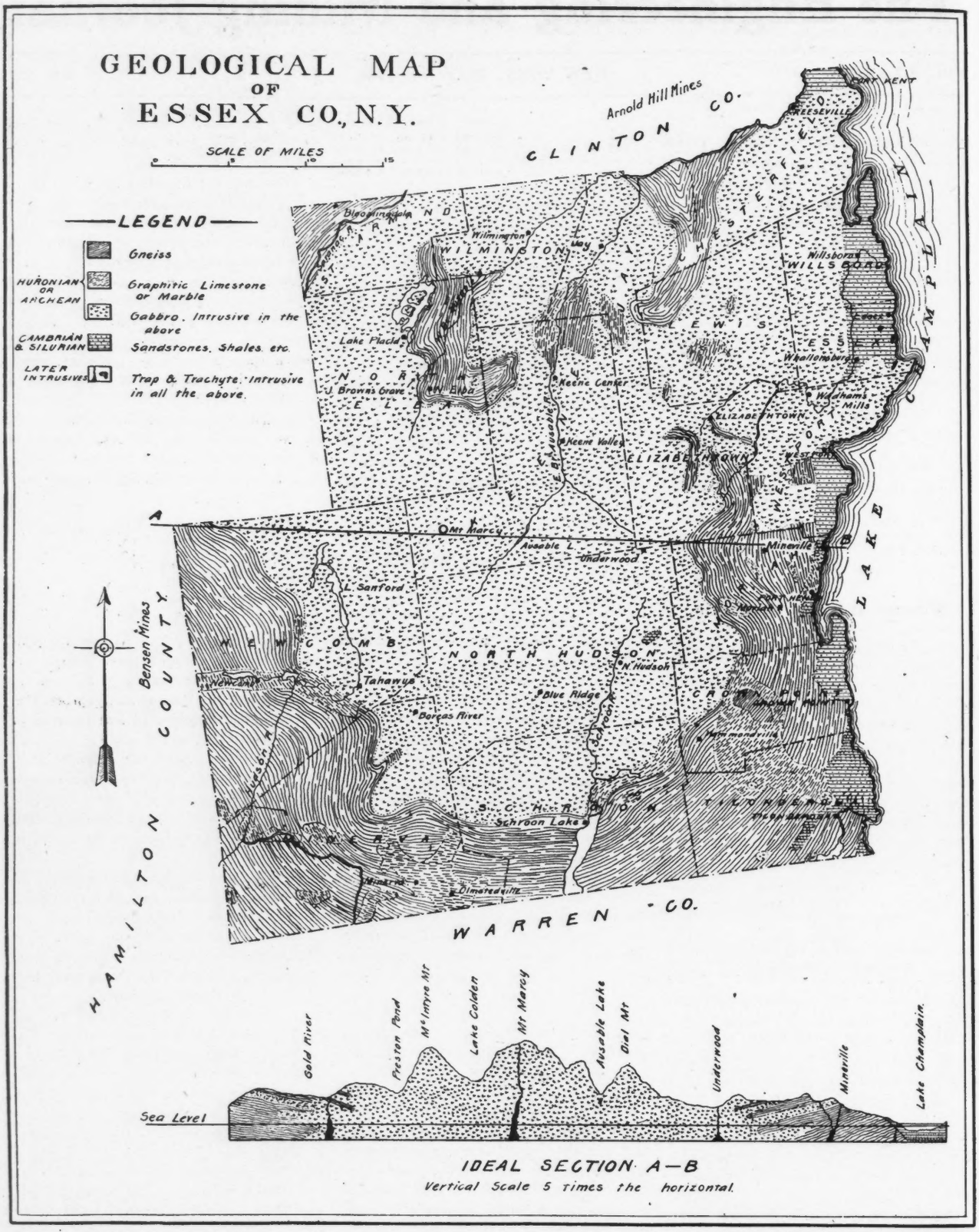
The fuel used is of very moderate quality. The coke (from beehive ovens) carries up to 17 per cent. ash, the coal 10 to 18 per cent. The monthly production is 2300 tons of work-lead and 150 tons of copper matte (45-50 per cent.).

At the Eilers plant all sulphide ores, except the rich Idaho ore, are roasted down to 5 to 7 per cent. S in 15 reverberatory furnaces, 60 to 70 ft. in length, each furnace roasting 15 tons per 24 hours, in six charges.

The flue-dust is briquetted together with fine Cripple Creek ore, pyrites cinder from Argentine, Kan., Creede ores rich in silica and 10 per cent. lime. The residue from the zinc smeltery (U. S. Zinc Company), which is brought to this plant (600 tons a month containing nearly 10 per cent. lead), is taken direct to the blast furnaces. Of the latter there are six, each with 18 tuyeres, which handle per 24 hours 160 to 180 tons of charges, containing on an average 10 per cent. of lead in the ore, with 10 per cent. of coke, figured on the charge. The average monthly production of a furnace is about 360 tons of work-lead, which is purified at the Pueblo plant. The furnaces are charged by hand. Of the slag, 30 per cent., as shells, etc., is returned to the charge. The monthly production of work-lead is 2000 tons, carrying 150 oz. of silver and 2 to 6 oz. of gold per ton.

The matte amounts to about 8.3 per cent., and contains 12 per cent. copper. It is concentrated up to 45 per cent. Cu, which is shipped (150 tons a month) for smelting to blister copper.

*Abstract from a paper in *Zeit. f. Berg.-Hütten. u. Salinenwesen im Preuss. Staate*, 1905, LIII, p. 439.



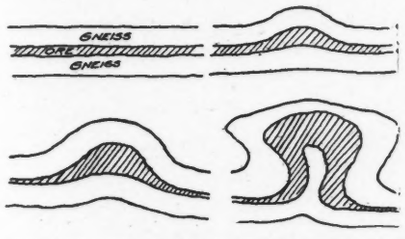
Magnetite Deposits and Mining at Mineville, N. Y.—I

BY J. H. GRANBERY.

The geological formation of this region has been the subject of much discussion, and has given rise to such diversity of opinion that the opportunity now afforded (through the more advanced stage of the mine workings) to arrive at a reasonably definite conclusion as to the nature and origin of these deposits has been taken advantage of in this series of articles.

The topography shows a valley, ascending gradually from Port Henry on Lake Champlain, in a northwesterly direction until, at Mineville, it is 1200 ft. above the lake. A high ridge to the south separates this from Crown Point in an adjacent valley. Abrupt ridges and narrow passes, with some isolated peaks, are found on the west; and on the north other high

ridges separate Mineville from the valley on that side. At the northeast of the mine workings is Bald Peak, with an altitude of 2055 ft.; and Mt. Tom, 1620 ft. high, is at the south. Barton Hill, comprising a portion of the older workings, is to the northwest of what are now known as the Old Bed and New Bed workings, and between them and the Smith mine, farther to the north. The country is rugged and sparsely inhabited. All the ore bodies of the region appear to dip to the west, and where they occur in the gabbro, so far as known, they are titaniferous.



FIGS. 2 AND 3. FORMATION OF THE ORE DEPOSIT.

There are many ore beds scattered through and around this immediate district. Some of them were formerly important as far as production is concerned but most of these are not at this time available for investigation.

According to Kemp[1] the ore in the gabbro is almost entirely titaniferous magnetite, with dark green plagioclase crystals enveloped in it. The area studied is made up of a series of gneisses, associated with which are white crystalline limestones, ophicalcites, hornblende-schists, and, to a minor degree, other schists. These are penetrated by intrusions of dark and massive gabbro, showing, in places, a strong gneissoid structure.

The dip of the gneiss is variable and ranges from northwest to southeast, averaging westerly. Drift is deep and widespread through the district, and is of the character frequently known as "hard pan and boulders." The ore body extending from the Mineville group toward the Smith mine is described as a series of huge pods with their long axes in a parallel northeast direction with a general pitch to the southwest, but with dips that on the southeast of the center line are southeast, and on the northwest of it, northwest. Parallelism to this axial alinement and pitch shows in the Barton Hill mines. These are not at present worked, but the dip is known to be, in all cases, northwest. There is some faulting in the "21" mine and much complexity of form. Witherbee, Sherman & Co., whose practice has been carried to a high state of development, have in their office a local collection of specimens from the Mineville mines. Some of these show great perfection in crystallization, and the variety of these forms renders them of peculiar interest.

The minerals of this district are noted by Kemp, substantially as follows: Albite is found in the coarse pegmatite of "21" mine, with beautifully formed zircons associated with it. Allanite is found at the Cook shaft of the Smith mine; good crystals occurring in abundance, in a gangue of quartz and orthoclase, together with rosettes of green needles supposed to be actinolite. Amphibole, in the form of dark green and black hornblende is common, this and the apatite being removed from the ore in the Mineville plant by magnetic separation; the apatite itself is in great quantity, in irregular grains, not often over 0.1 in. in diameter. Arsenopyrite occurs rarely in the coarse pegmatite of the lower workings of "21" mine. Biotite is met frequently in the coarse hornblendic aggregates on Barton Hill. Calcite is rare. The chief feldspars present are orthoclase and albite. Microcline has been noted in gneiss. Fluorite, of massive character, ocurs in some abundance in the "Lover's Pit," in the Barton Hill workings. Garnet occurs in the north and south pits on Barton Hill. Hematite occurs in the pegmatite of the "21" mine. It gives the characteristic red streak, but breaks up parallel with the faces of the octahedron. It is practically martite. Jasper has been found, but only in small quantity. Lanthanite is found in small crystalline plates. Magnetite is of mineralogical interest, chiefly because of the occurrence of remarkably large and perfect combinations of the octahedron and rhombic dodecahedron in the Lover's Pit in a chamber now worked out; this furnished the remarkably rich ore referred to subsequently. The crystals were buried in granular magnetite, from which they were easily broken out. Other minerals of the district are molybdenite, pyrrhotite, pyrite (rare), augite, pyroxene, hypersthene, olivine, siderite, titanite, wernerite and zircon.

The accompanying map of Essex county is by W. L. Cumings, to whom I wish to make acknowledgment for its use, as well as for other information. In the eastern portion of this map, near Port Henry, is Mineville, where the characteristic formation is most marked, and where are located the famous magnetite deposits operated by Witherbee, Sherman & Co. for the last 60 years. The mine workings have been carried on to their greatest extent at this place, and superior opportunities are, accordingly, available for the observation of the many interesting features presented.

These different theories have been advanced to account for the presence of the ore in its peculiar formation:

(1) The sedimentary rock theory; the ore having been originally deposited from a water solution; changes in the composition of the ore and in the manner of its occurrence being due to subsequent eruptive action, and the intrusion of igneous rock.

(2) The contact action theory; that the gabbro brought up the ore in a molten or vaporous condition and deposited it along certain contacts, the liquid or vapors having been condensed into ore along the contacts with the gneiss above and below it.

FIG. 4. THE "PETRIFIED SNAKES."

(3) The pegmatite vein theory; that the ores occur in what are similar to quartz-pegmatite veins. This supposes an igneous eruption in combination with deposition from solution. According to this view, a combination of intense heat, together with the presence of water vapors, is responsible for the action. To fulfil these conditions the magnetite would crystallize from a solution, while the pegmatites were in a pasty condition. The deposits would thus be similar to quartz veins which follow the bedding of the con-

[1] "Geology of the Magnetites near Port Henry, N. Y." *Trans.* Am. Inst. Min. Eng. 1897, p. 146.

taining rocks. This does not account for the presence of the lean ore, or for the gneiss containing disseminated magnetite.

The Adirondack mountains, to which the geological formation belongs, are made up of an igneous core of eruptive rock, surrounded by a fringe of metamorphic and sedimentary rocks. Mt. Marcy, the highest of the range, has an altitude of 5344 ft. The mountains are formed of a gabbro, containing pyroxene, garnet and magnetite. The sedimentary rock underlays Lake Champlain in the form of Cambrian and Silurian sandstones and shales, which extend for some distance into the surrounding country.

of the action, and the type of the principal vein (at least in many instances) as it is shown by the present workings. The gabbro is believed to have intruded while this folding was in progress. The intrusion of the gabbro forced the ore along the bedding planes of the sedimentary deposits (see the profile, Fig. 1, near the west shore of Lake Champlain).

The rock most closely associated with the iron ore is a whitish or grayish gneiss, containing large quantities of quartz, together with feldspar and more or less magnetite. This is commonly called the granitic or acid gneiss. The other of the main divisions (the gradations between these two give rise to a large variety) known as basic gneiss, contains iron, magnesia, hornblende, biotite, and apatite. Small crystals of pyrite are also encountered.

with the gabbro, making it difficult to tell where gneiss stops and gabbro begins. The titaniferous ores are component parts of the gabbro which were brought up with it in its eruption. Magnetite, especially titaniferous magnetite, is common in gabbros. Here the line between rock and ore is often quite clean cut; it is possible to break off a specimen, one-half of which is titaniferous magnetite and the other half a gabbro containing little or no magnetite. The space between the ore and the gangue is sometimes made up of a narrow rim of garnet. Similar ores are also known in the Lake Superior region, also in gabbro; and in Sweden.

Hole No. .....

FORM 47-500-3-05

Witherbee, Sherman & Co., Inc.

Mineville, N.Y.

DIAMOND DRILL RECORD

Location (from Monument 20) N ..... S. 857.35E ..... W 935.61 Elev 1143.0 Angle -15° Azimuth 238° 15'

Description Hole in Miller Pit in foot wall on west side of skip track.

Begun March 21 1906 Finished April 19 1906 Drilled by John Grogan.

Remarks Object - To test for relation of Miller Pit & New Bed

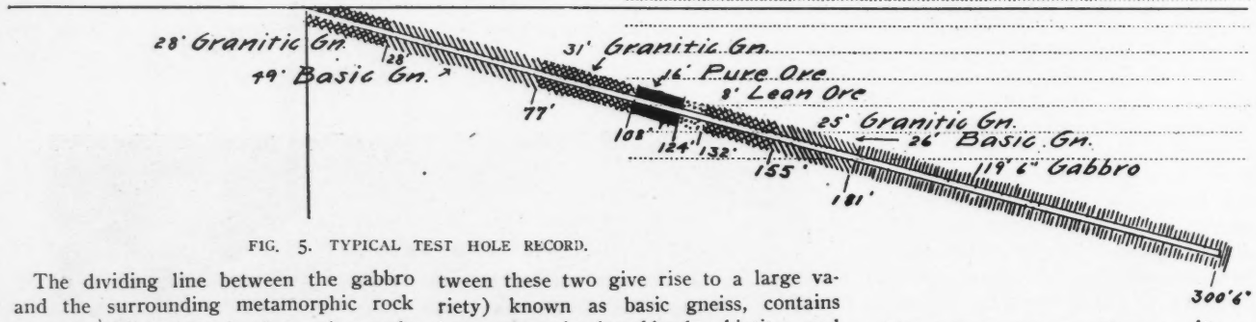


FIG. 5. TYPICAL TEST HOLE RECORD.

The dividing line between the gabbro and the surrounding metamorphic rock is not definite, but the latter is nearly always found in the form of gneiss. This contains the iron ore. Graphite (especially that of the famous Ticonderoga deposits) is found in the limestone associated with the gneiss, as well as in the latter. The limestones lie in strata with the gneisses.

If the deposit be regarded as sedimentary, the ores would probably be similar in origin to the hematites, if indeed, they were not, when deposited, hematites; afterward altered. The fact that so great a portion of the local rock was undoubtedly sedimentary in origin, and the known intrusive action of the gabbro, both point to the first of the three theories as most reasonable; the investigations carried on during the process of mining the ore, and the number of test cores taken, all point conclusively to the original deposition of ore and gneiss, as a sedimentary rock. The characteristic form of the deposit is folded, such folding having begun before the eruption of the gabbro. The original stage of the sedimentary deposit, and the beginning of this folding action is shown in Fig. 2. Fig. 3 shows the continuation

Limestone is found in small areas, except that there are two large beds near Crown Point and Minerva respectively, and a few small beds scattered through the gneiss. This is usually crystalline and contains graphite, biotite, and often tourmaline and titanite. The "petrified snakes," shown in Fig. 4, are an example of the folding action and its effect upon the limestone. This is in the immediate neighborhood of Port Henry, and shows dark bands in the limestone, folded into the form indicated; it is probably one of the finest examples of a severe fold that is exposed so completely.

Narrow sheets or dikes of trap rock are found in some localities; two of these occur in the workings at Mineville, they are the latest form of rock in terms of age. The order of age is, therefore, from the oldest to that most recently formed: Gneiss, sedimentary deposits, and trap. The gabbro intruded along the bedding planes of the gneiss, and on the contact the latter is so changed as to grade

The largest mine workings in this region are those of Witherbee, Sherman & Co., 71 Broadway, New York. The engineering staff of this company is engaged in constant study, not only of the engineering questions, but also of the geology of the surrounding country. For this purpose, two diamond drills are in constant use. The cores (⅞ in. diam.) are preserved in boxes 4 ft. long by 14 in. wide and 1 in. deep, divided by narrow wood strips placed just far enough apart to receive the core in the same order as taken from the hole. At the end of each shift a block of wood is inserted on which is written the number of the hole and the depth attained. These core boxes are arranged on shelves in a special building, where they can be referred to at any time.

Daily reports are made of the character of material drilled through and from these, a plot is made of each hole, ordinarily on a scale of 1 in. to 50 ft., on a card 8x12 in., giving full data, as shown in Fig. 5. One hole drilled through showed 212 ft. of solid ore.

The heavy glacial drift, (or "hard pan

and boulders") on the "Old Bed" property as well as the Harmony Mines, requires so much time to penetrate, that where borings can be put down from the workings they are always so executed. About 50 per cent. of the drilling is thus done underground. The drift is from 75 to 150 ft. in depth and when required is penetrated by means of an ordinary churn drill before setting up the diamond drill.

A typical drill hole record is shown in Fig. 5; this illustrates the characteristic material and its geological relations, as well as the method of recording. On the mine maps accompanying this article, the diamond drill holes are indicated by a number and a circle, or by the letters D. D. H. These are located with reference to a central meridian.

The deepest of the drill holes is 1139 ft. deep. This was put down with a nominal 800-ft. machine made by the American Diamond Rock Drill Company, 95 Liberty St., New York, under the direction of Matthew Garvey. This machine is of the oscillator type, with ball bearing trunnions and hydraulic feed. The work was started Sep. 14, 1905, and finished Jan. 3, 1906, during this time no repairs to the machine were required. The drift first penetrated was 58 ft. in depth, and then, in descending order, the material encountered was: Granitic gneiss, basic gneiss, then the two alternating, ore, the two gneisses again in the same order, ore, granitic gneiss, hornblendic gneiss, and gabbro. A little pegmatite was found in the last.

Brass or bronze solutions quickly corrode an anode with a green slime, and consequently require frequent cleaning.

The Sutton-Steele Process.

BY R. C. CANBY.*

About a year and a half ago, I examined the Sutton-Steele dry concentrator in operation. This is not a pneumatic table in the usually accepted significance of the word, as the air does not produce a blowing effect, but simply serves to cushion the ore on the deck of the table, giving a mobility greater than that of a liquid; the reciprocating motion of the table, much as on a wet table, producing the separation.

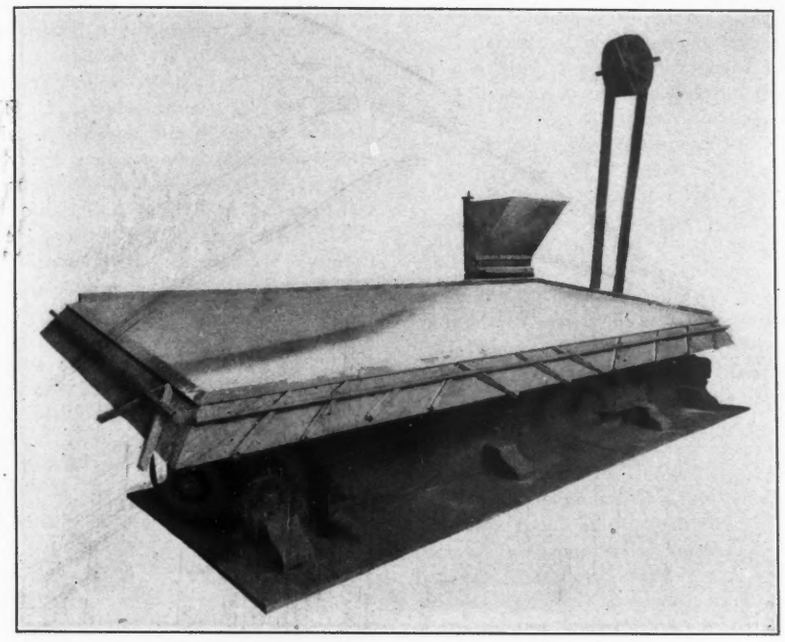


FIG. 1. SUTTON-STEELE DRY CONCENTRATING TABLE.

The deck of the table is pervious, and the air, under about 0.5 oz. pressure, causes the ore to pass over the table as hot roasted ore spreads over damp ground when dumped on it. The table makes over 400 reciprocations per min., and owing to the greater mobility of the ore, has three times the capacity of a wet table and makes much sharper separations. They were, at the time of my examination, making and shipping a 75 per cent. lead concentrate, a zinc product 50 per cent. zinc and an iron product with less than 8 per cent. of zinc, in one operation, except that part of the middling was fed back upon the same table. Since that time, I have given considerable attention to this process, testing a number of ores at El Paso, besides witnessing the operations at a trial plant in Mexico, as well as at the original mill at which these tables were used, so that, in spite of the prejudice at first felt. I am convinced of the great possibilities of the process.

The table itself, having no heavy coil spring in the construction of its motion, and being perfectly balanced, requires the minimum of power, the driven pulley being easily and rapidly turned by hand. The air is supplied by a rotary fan of the American Blower Company's type. The riffles and deck arrangement can be quite varied. At first, a diagonally terminating riffle, having much the appearance of the Wilfley, was used, but it has been found that, for heavy lead ores, the zinc middlings were much freer from lead with the riffles the full length of the table. However, as seen by the illustration, Fig. 1, the concentrate streak takes a diagonal position, crossing over the riffles, the position of the diagonal streaks being dependent upon the relative inclination of the deck and the degree and number of

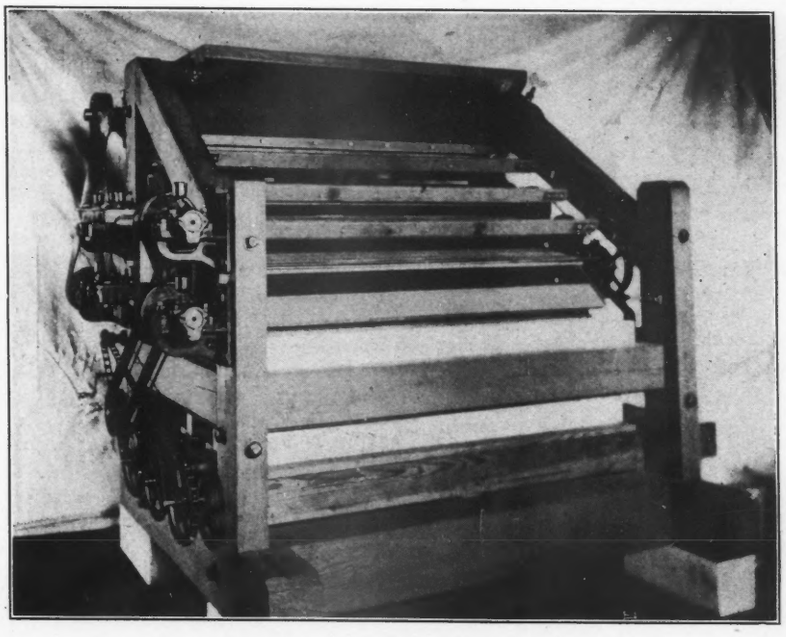


FIG. 2. SUTTON STEELE DIELECTRIC SEPARATOR.

*Mining and metallurgical engineer, El Paso, Texas.

strokes. Owing to the effectiveness of the separation, the tailings are also correspondingly cleaner.

The metal savings of the table exceed the savings of the wet table, some of the results being surprising, even where considerable percentages of oxide and carbonate are present. In copper ore from Arizona, with 50.6 per cent. of the copper present as carbonate, a saving of 81 per cent. of the copper was shown on 9 per cent. copper ore. Upon a 1.8 per cent. ore, a 76 per cent. recovery was made.

Upon refractory zinc-lead ores, recoveries of 80 per cent. of the lead and 60 per cent. of the zinc in a 45 per cent. zinc product, have been made. The comparatively high assays in the fine dust or slime tailings suggest that, in some cases, it might be profitable to re-treat this comparatively small quantity by flotation processes, whereas the treatment of the entire ore in such a manner would be unprofitable. The ease with which these dry tailings could be so handled is apparent. On all but the finest slimes, the table recovery leaves nothing to be desired.

The accessory questions of crushing and sizing are also proving by no means insurmountable. The "Imperial" ore screen, which is in use at El Paso, has given some remarkable records as to capacity and efficiency down to finest mesh, and the life of the screen cloth, for this dry work, is excellent, the original wire screen cloth put in last August still being in use. In practice, four sizes are made: 30 on 40, 40 on 60, 60 on 80 and through 80-mesh. On some ores, 20-mesh is used. The finer screening necessitates drying the ore, but with a shaft dryer with deflectors, this is done at little cost.

The pervious top is of closer weave for slimes than for coarse material, but either one of two grades will be suitable for any mesh. The tables could be adapted to use with Harz jigs by crushing dry to maximum jig size, then screening to minimum jig size and sizing below this for the tables, jig middlings being dryed and crushed to table size. This would do away with elaborate unwatering devices and slime tanks, and, owing to the greater capacity of this table, really simplify such a mill.

In addition to the dry table, the Sutton-Steele dielectric separator is also of great interest. It is for making separations such as chalcopyrite from zinc blende, in which the difference of specific gravity is so small as to make impossible a sufficiently clean separation depending upon gravity. This dielectric separator, unlike other well known static or high tension separators, does not depend upon the difference in electric conductivity of the substances to be separated, but upon inducing dielectric hysteretic impedance in the particles to be separated. This is induced by several different methods of interrupting or reversing the current, in conjunction with a convective discharge through the mass of material onto the separating roller. Fig. 2 illustrates the general appearance of the machine, which consists essentially of the separating rollers 5 ft. long and 1 15/16 in. diam., with a row or comb of points so arranged as to discharge onto the roller. The mechanism shown at the side is for agitating the feeders, and the sprocket wheels at the bottom are for screw conveyors.

The principle is capable of as exact mechanical application as the best forms of magnetic separators; the adhering particles remain attached continuously, regardless of time of contact, necessitating their being brushed off on the opposite side of the roller.

Two minerals have been rarely encountered which could not be separated; in some cases, however, the separations are much sharper than others, but by having two or three rollers for successive treatments, even substances of slight differences of susceptibility are separated, chalcopyrite from zinc blende, and fluorspar from zinc blende are separations which are of especial interest.

Sutton, Steele and Steele, the inventors, were proprietors of a machine shop and foundry in Dallas, manufacturing principally electrical machinery and were called upon to make a magnetic ore separator. They have shown remarkable inventive genius in their work. They also discovered the effects of hysteretic impedance, of which advantage is taken in their dielectric separator. The dry table was devised incidentally to prepare material for their original magnetic separator, but upon the ore (galena, iron, pyrites, zinc blende), for the treatment of which they were building the magnetic separator, the table filled all requirements, and work upon the electrical line for that ore was suspended. The inventors have, besides, a so-called dry jig, embodying some novel features, for coarser material than table size, and for dry placer work.

The El Paso Foundry and Machine Company, of El Paso, Tex., has the agency and manufacturers' rights for the United States and Mexico, for the Sutton-Steele machines. All of the foreign patents have just been taken over by a well known metallurgical syndicate of London.

E. J. Dunn, State Geologist, of Victoria, who has studied the field for many years, recently expressed himself, with regard to mining at Bendigo, to the effect "that if the enterprise of 50 years is examined by its work on these lines of reef it will be seen that it bears only the smallest relation to its possibilities in the future. One is quite justified in predicting that there are centuries of work ahead for Bendigo. This is quite apart from the side lines to the east and west. The great strength of Bendigo lies in the fact that its base is so well established that the industry will go on automatically."

A Remarkable Specimen of Zinc Blende.

BY W. R. INGALLS.

I received recently from L. H. Davis, Esq., of El Paso, Tex., a specimen of zinc blende, which exhibits triboluminescence in a remarkable degree. Upon scratching it, in the dark, with the point of a pen-knife, or tapping it lightly with a blow-pipe laboratory hammer, streaks and sparks of light, resembling electric flashes, are brilliantly developed. This property, which is due to what is called triboluminescence, is not a new discovery. It is manifested by certain specimens of blende found in Arizona and California; also by specimens of dolomite, and even ordinary argillaceous schist; possibly it is possessed also by other minerals; however, this new specimen of blende is the most brilliant of any I have seen.

According to Mr. Davis, the triboluminescence of this blende was discovered by Thomas D. Johnson, U.S. assayer at the port of El Paso. The discovery was made while passing the ore through the crusher in the assay office. As Mr. Johnson described it, "the electric display resembled a miniature thunder storm." The assay of the ore showed 30 per cent. zinc. The specimens were obtained by Mr. Johnson in sampling car-loads of ore originating in Mexico, probably in the State of Chihuahua.

The specimen which I have received is extremely interesting, representing apparently the full width of an ore streak, and exhibiting well-marked crustification This specimen is 5 in. in width. One side shows plainly the selvage between the ore and wall. Then comes a band of blende and galena, about half an inch in width, next to which is a band of blende pyrite, chalcopyrite and calcite, the last showing one large and well-formed crystal. Next is a mixture of blende, with a little pyrite and calcite. Next a band of chalcopyrite, and after that a band of blende mixed with calcite, showing galena on the outer face, which may, or may not, be the edge of the seam. The blende is of grayish-brown variety, which would be commonly designated as "resin blende," while there are some small crystals of ruby blende, as brilliant as those which occur at Joplin, Mo.

So far as I am aware, the reason for this property of triboluminescence in minerals has not been satisfactorily explained. Radium is, of course, suggested, but its presence has not been proved; in fact, its absence has been positively shown. In another explanation, the property is attributed to cleavage, the sudden splitting of the grains of blende causing an emission of light. "Triboluminescence" signifies "luminescence from rubbing." It is a queer phenomenon, and is not well understood.

Bucket-Loading Device.

BY E. C. MUSGRAVE.*

The device shown in the accompanying illustration, Fig. 1, was put in to do away with the inconvenience and awkwardness of detaching shaft buckets and running them up to the face of workings on trucks. The labor of lifting the broken rock up to the bucket standing on a truck is saved, and instead of having a topheavy load to push out to the shaft, a small mine car can be used, and numerous upsets thus avoided. In British Columbia, where this device is in use, the mining laws require that where hoisting with a bucket is done. a crosshead and guides must be used. The shaft where this device is used has a 4x4-ft. hoisting compartment, and a 4x3-ft. man- and pipe-way. The buckets are 3 ft. high and 2 ft. 4 in. diam. at the top, and 2 ft. 2 in. diam. at bottom. The bale is fastened 2 ft. from the top of the bucket, and is never detached from the cable, being dumped at the surface by withdrawing a pin which holds a clevis on the bale.

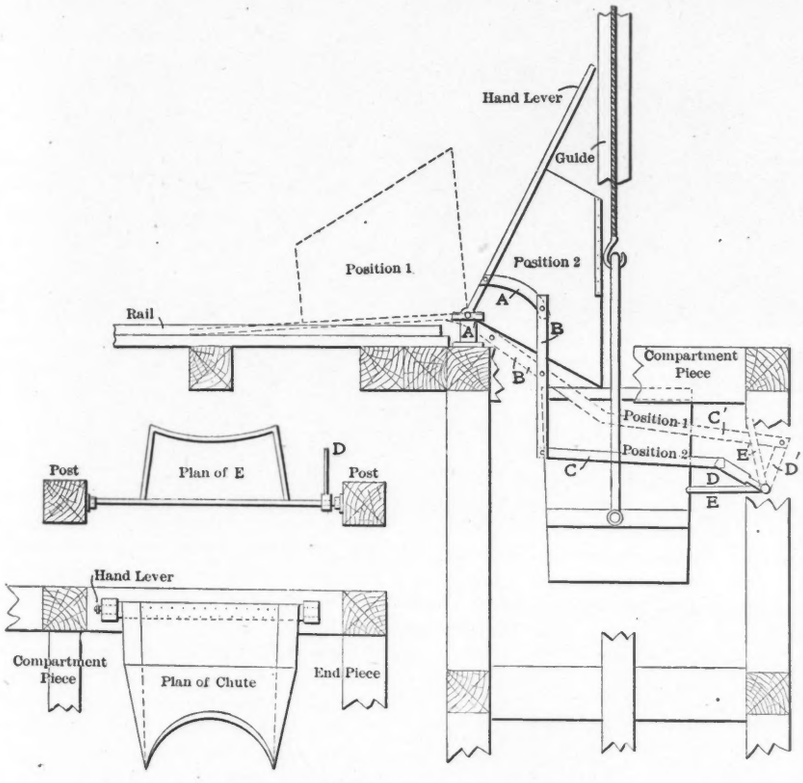


FIG. 1. A BUCKET-LOADING DEVICE.

When hoisting from one level, the system of levers shown is not used, but the bucket is lowered on to planks placed across the timbers below the station, and the chute with the hand lever attached, only, is used. Scoop cars, of the same cubic capacity as the bucket, are used from the headings to the shaft. When the car gets to the shaft, the chute is in position 1, and the mucker, using the hand lever, throws the chute into position 2. He then dumps his car, gives the hoisting signal, and goes back to the face. As soon as the bucket is raised, it catches the chute, and throws it back into position 1, thus automatically insuring that the chute can never be left in the shaft, to be struck by a descending bucket. This worked well when hoisting was being done from one level, but later on when the shaft was sunk deeper, an addition had to be made at the upper levels; for the waste being dumped into the bucket, made it swing about in the shaft, and to obviate this, the addition of the levers, and of the bucket rest, marked *E* on the sketch was made.

One end of the lever *A* is pivoted to the hand lever, which is keyed to the shaft on which the chute works. The other end is pivoted to one end of the lever *B*. The latter is pivoted near its center to the compartment piece, and its other end is pivoted to one end of the lever *C;* this is offset to pass behind the guide, and is pivoted at its other end to the end of lever *D*. The other end of *D* is bolted to the shaft on which the bucket rest *E* works. When the chute is in position 2, *E* projects into the shaft, and fits against the bucket, and effectually stops its swinging when the waste is dumped. When the bucket is raised it throws the chute into position 1, as before, and the levers assume the positions shown by dotted lines in the sketch, and thus leave the shaft perfectly clear. By this means we have been able to work without difficulty from two levels; hoisting alternately from each, and without a single hitch. Neither has any waste ever been spilled into the shaft, although the device has been in constant use for several months. The whole thing was made in a local blacksmith's shop for a nominal cost. The levers are made of 2x½-in. iron, and there is nothing in connection with it which any ordinary mine blacksmith cannot make. The waste can be hoisted in a much shorter time than when using shaft buckets on trucks, and fewer men can do the work. When timbers are being let down to the levels, the chute can be lifted out of its bearings, and replaced in a few minutes.

*Mines superintendent, Tyee Copper Company, Mount Sicker, Vancouver, B. C.

Blende Roasting.

According to J. Krutwig (Congrès de Chim. Pharm., Liège, Sec. II., 419) when blende or precipitated zinc sulphide is heated in a stream of air, decomposition begins at about 450 deg. C. with the former, and 327 deg. C. with the latter; in a stream of oxygen the respective temperatures are 366 deg. and 280 deg. C. At temperatures above these, the decomposition of the precipitated sulphide is always more rapid, and proceeds farther than that of blende, and is, indeed, more rapid in air than that of blende in oxygen. In no case is the proportion of sulphate formed considerable; its absolute amount increases with the temperature, though but slightly (to 6-8 per cent.), but the ratio of sulphate to oxide is smaller at high than at low temperatures. This is in agreement with the work of Hofman, who gives the temperature of initial decomposition of zinc sulphate as 532 deg. C., but finds that decomposition goes no farther than 50 per cent. after 26 hours' heating at 836 deg. C. The rate of decomposition slackens as the residue grows more basic.

Exchange Rates at Singapore.

Consul-General Wilber, of Singapore, reports that the high rate of exchange in the Straits Settlements has resulted in the legislative council passing a bill fixing the maximum charge. He writes: The new bill authorizes the commissioners to receive tenders of gold and in return issue notes like those now in circulation, payable in silver at a rate fixed by the Governor. This official at once fixed the rate at 2s. 4d. for each dollar silver on London. Many claim that the cost of living is 20 per cent. higher in Straits currency than it was two years ago, when the exchange rate was down to 1s. 9d. The high exchange rate has caused some loss of trade to Singapore, as it caused the Bangkok and other merchants to order foreign goods direct from Europe.

The deepest shaft in Germany at the present time is the No. 3 shaft of the Morgenstern colliery at Zwickau, which is 1082 m. deep.

Arizona and Sonora.—I.

BY DWIGHT E. WOODBRIDGE.

The production of copper in Arizona in 1906 will probably reach the following figures, per month. The estimates are based on actual knowledge of precise conditions at many properties; on known results and anticipated betterments at others; and, in the case of the Jerome district, on the best estimates obtainable. Jerome is so uncertain a district, and is so liable to interruptions from strikes, fires, caves and all other irregularities, that it is a difficult matter to gage closely its production from month to month.

Section.	Pounds.
Bisbee district	12,500,000
Arizona Copper Co. (Clifton)	3 000,000
United Verde Co. (Jerome)	3,000,000
Globe district (not incl. Mex. Ores)	2,500,000
Detroit Copper Co. (Morenci)	1,750,000
Shannon Copper Co. (Clifton)	1,250,000
Silver Bell camp (Sierrieta)	500,000
Arizona Smelting Co. (Humboldt)	400,000

The above figures correspond to a total of 300,000,000 lb. for the year. In addition to this amount, there is smelted in the works of the Territory, a volume of concentrates (from Nacozari and Cananea, Sonora), equivalent to, say, 1,500,000 lb. of copper per month. These concentrates are treated at the plant of the Old Dominion Copper Company at Globe, which is at present short of sulphide ores, and at the Copper Queen works, at Douglas. Later, with the development of ores of this class at the Globe mines (a change which is now confidently expected), these concentrates two or three times multiplied in tonnage, will all be treated at the Copper Queen works.

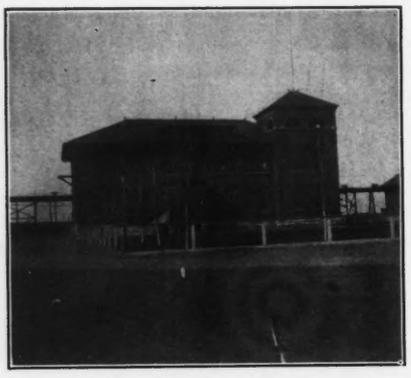
The copper production of the Territory for a term of years is given herewith; the comparison is interesting and valuable from the progress it shows, a jump the like of which has not been made by any other district in the world, and which has already made it second only to Butte:

Year.	Pounds.
1900	105 640,000
1901	126,184,000
1902	119,841,000
1903	153,591,000
1904	191,602,958
1905	222,866,024
1906, estimated	300,000,000

The more important copper districts of Arizona are located as follows: At and near Bisbee, which is close to the Mexican line in the southeast; at Jerome, on the Verde river in the center of the Territory; at Clifton-Morenci, in the southeastern portion; and at Globe, a short distance east from Clifton.

Minor fields are in the Sierrieta and Santa Rita mountains surrounding Tucson; portions of Yavapai county, south from Jerome; possibly the Paradise district in Cochise county; and the Pinto creek country, west from Globe.

In all these fields important explorations are under way, which will be more fully described in later communications. Briefly, those at Bisbee include, the sinking of numerous deep shafts by various companies of the so-called "Bonanza Circle"; the running of extensive drifts and levels by the same companies; and the tracing out of geological conditions by a competent and considerable force of engineers. With the exception of the Calumet & Arizona Mining Company, all of these various af-



OFFICE BUILDING, COPPER QUEEN CONS., DOUGLAS, ARIZ.

filiated concerns are in the exploratory stage. In all of these mines ore has been found; and in several there are large explored deposits; but, broadly speaking, their lands have been merely scratched, and they must be classed as "explorations" for some years to come. In addition to the development of new ground by these companies, several others are at work in

MEXICAN MINER'S DWELLING IN CLEFT OF GOSSAN, METCALF, ARIZ.

their vicinity including the Denn-Arizona, the American-Saginaw, the Warren, the Cochise, and a few less important ones. Most of these are in portions of the Bisbee field that present indications favorable for prospecting. Outside of this immediate section little work is now under way in the entire Warren district, the furore for indiscriminate exploration having burned itself out, since two years ago.

Little interest has been taken in the Clifton-Morenci-Metcalf district by any companies, excepting the three large ones interested there (the Arizona Copper Company, the Detroit Copper Mining Company, and the Shannon Copper Company). But within the last few months outsiders have become interested and several promising claims have been bonded by them. As yet little or no work has been done on these claims, but the probabilities are for an early beginning. The district is broadly mineralized and covers a considerable area of porphyritic rock, and explorations outside of present opened areas may have good results.

At Globe there has been marked activity during the last few months. Engineers of high standing have gathered together a large area in close proximity to the mines of the Old Dominion, United Globe and Arizona Commercial Copper Company; and development, on a considerable scale and under most scientific direction, is now beginning there. A number of small mines on the west side of Pinal creek and north of Bloody Tanks are operating more extensively than in the past. These include the Live Oak, Gibson, Inspiration and Black Warrior. Most of them are shipping as much of their silicious ores as the Old Dominion smelter can utilize, and as much as teaming facilities will permit. The district is largely silicious; the outside mines are from 6 to 15 miles from the smelter, and roads are not the best.

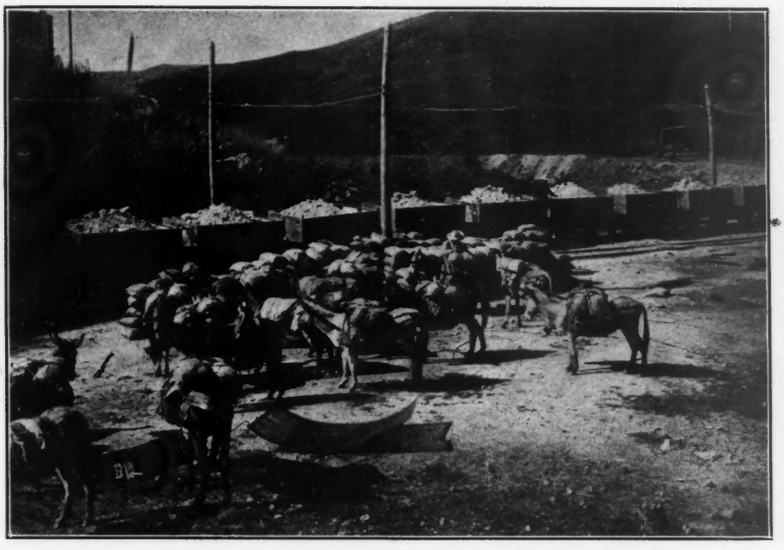
Explorations are in progress through parts of Yavapai county in which copper is likely to be found. These include the district between the Hassayampa and Agua Fria rivers, south of Prescott, and a small portion of the Black Hills near Jerome. In the latter there is, just now, a sort of paralysis on account of the action of larger interests. The completion of the custom works of the Arizona Smelting Company, and the company's entrance to the ore-buying field, however, is having a very considerable enlivening effect on the mining interests of Yavapai county and vicinity.

In the neighborhood of Tucson, especially to the southeast and southwest, considerable developments are under way. These are at Helvetia and Silver Bell. The latter is the once famous "Old Boot" mine, and is shipping steadily to the smelter at Douglas, while the former is making matte. The success of these two companies is attracting some money and attention, and exploration is becoming quite active, though generally in a small way, and with little capital involved.

In the Paradise district, in the southeastern corner of the Territory, exploration has been under way on a large scale for two years or more. So far this has not been especially successful, and the first large concern in the field has been unable to find much copper. Others seem to be doing fairly well, however, and it may be that in time the faith in great surface out-

croppings there will be justified by results.

At practically every smelting plant in Arizona, enlargements are under way, and still further additions to capacity are planned. The Territory has in the smelting works of the Copper Queen Consolidated Mining Company the second largest (and perhaps the most modern) copper-smelting works in North America. In 1906, these works will turn out at least 100,000,000 lb. of copper, though running on leaner ores than has been their previous practice. Were the copper tenor like that of two years ago, the production would be very high.



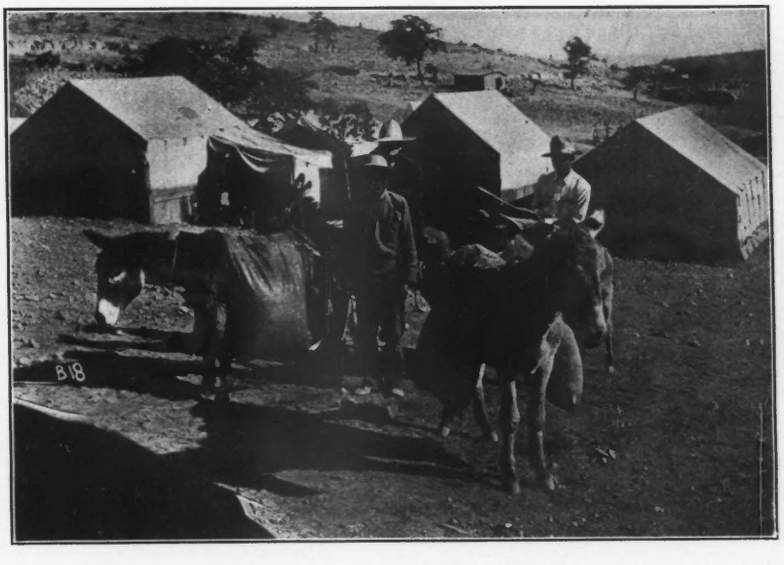
ANCIENT AND MODERN ORE TRANSPORT IN THE SOUTHWEST.

The works of the Calumet & Arizona Mining Company, of the Old Dominion, of the Detroit, and of the United Verde are all adding blast furnaces or reverberatory furnaces.

In the Clifton-Morenci district, vast additions are now being made to concentrating capacity by both the Detroit and Arizona copper companies, which will demand corresponding increase in smelters. Arrangements are being perfected for the erection of works of considerable size for the Imperial Copper Company of Silver Bell; and additions to the present matte-smelting works of the Helvetia Copper Company are in contemplation. The plan for works to be located at Naco (and backed by the Mitchell Mining Company of Guerro) has probably fallen through. A smelter may be erected near Bisbee for the Shattuck-Arizona Mining Company which, within the last year, has developed large and rich ore bodies at that place; but it may be a year or so before this company can safely erect a large plant.

It can readily be seen, therefore, that the present production of copper in Arizona is not the maximum; and that, as time passes, the Territory will come still nearer the record of its only rival, the Butte camp. Many, indeed, believe that the relative positions of the two great districts will be reversed in a few years, and that Arizona will lead in the production of the red metal; but Butte is also undergoing a period of expansion, and is far from its maximum.

In mines, mills and smelters of the Territory, and of the adjacent districts of Sonora, Mex., many interesting and important mechanical and metallurgical experiments are now under way; the features of which will be more or less fully described in the JOURNAL in forthcoming issues. It seemed best, therefore, before proceeding to detail, to touch briefly on the general situation of the Territory as a whole.



WATER WORKS ON THE ARIZONA DESERT.

At a recent meeting of the South African section of the London Chamber of Commerce a resolution was adopted placing on record the meeting's "great anxiety that nothing should be done to limit, under proper control, the supply of labor, on which the prosperity of the whole of South Africa so largely depends."

Easy Erasures on Tracing Cloth.

The draftsman, of whom it has been said that he possesses no rights which any one is bound to respect, has at last been favored by the invention of an erasing fluid that will materially lessen the number of sore thumbs (as well as sore heads) developed in the processes of altering drawings.

The invention is a fluid which will quickly dissolve lines, figures, etc., which have been drawn with black waterproof ink. The fluid is applied with sponge or cloth, and the dissolved ink is then removed with another clean sponge. E. G. Soltmann, 125 E. Forty-second street, New York, is placing the eraser upon the market. We have tried it, and it seems to work well.

Magnesite in the Transvaal.

The production of magnesite is about to be undertaken in the Transvaal. The mines are situated 300 miles from Johannesburg and 87 from Delagoa Bay. The property is being mined by the Magnesite Mines of South Africa, Ltd., whose engineer, J. B. Garbe, estimates that at the point now being worked there are about one million tons of the mineral. Kilns to treat 40 tons of magnesite per day have been erected. The milling plant which is driven by a suction gas plant, is capable of dealing with about 100 tons per day, and further capital is being raised to erect the additional kilns needed to work the plant to its full capacity.

The Krupp Company, of Essen, Germany, has purchased the entire mining properties of Prince Solms-Braunfels, situated in the dictrict of Wetzlar-on-Lahn, and comprising large deposits of undeveloped manganese ore. A large force of men has already been put to work opening the mines.

The Courrieres Catastrophe.

SPECIAL CORRESPONDENCE.

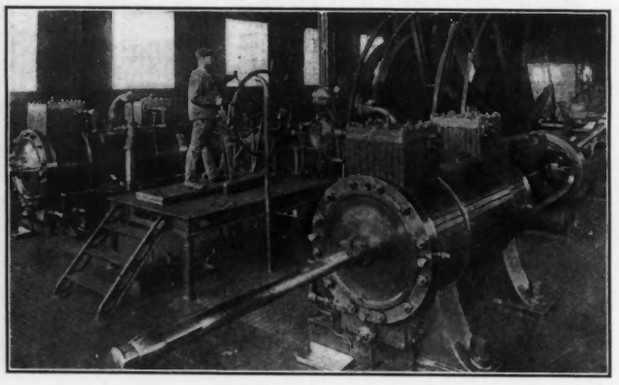
The recovery of a living miner from the Courrières colliery, 25 days after the accident there, caused much excitement. The recent events have not been allowed to pass without governmental notice. Questions were asked in the French Chamber, and a whole sitting was given over to the debate on the accident. The Government was not backward in recognizing the gravity of the situation and in fact has now given formal promises that the engineers and persons found responsible for the accident or negligence in connection therewith shall be punished, with due regard to the law. The penalties attaching to this class of misdemeanor in France are a maximum of three years' imprisonment, a money fine and certain disabilities in respect to civil rights.

In addition, the Government has stated that it will, should negligence be proved against the company, take away its concession and force a bankruptcy. It will be remembered that the company is charged with neglecting vital interests of the miners in order to avoid temporary stoppage of the mine, and the expense connected with the proper safeguard for combating the fire. It may be said that this is the first time in the history of France, and probably of any country, where a modern government has applied such drastic measures. A motion to immediately take away the company's charter was negatived until the result of the various inquiries are made public.

There is one detail which looks very ugly against the company, or its servants. On the day following the catastrophe the current of air passing through the mines was reversed and certain of the pits were blocked at the entrances in order to effect attempts at life saving from another pit—No. 3 was shut up, for instance. The 13 "escappé", as the survivors are called, state that on their meanderings around the base of the shafts they at first noticed a certain number of corpses, and they are emphatic in their statements that the next time they returned to the same shafts (those blocked, as above stated) they discovered several more dead bodies than at first counted, and this at intervals of several days after the catastrophe. If the evidence of these men is accepted it will prove that for days there were living men in the various galleries and at the bottom of the shafts, which had been blocked from the top, vainly awaiting deliverance, and who either perished of hunger or the bad air.

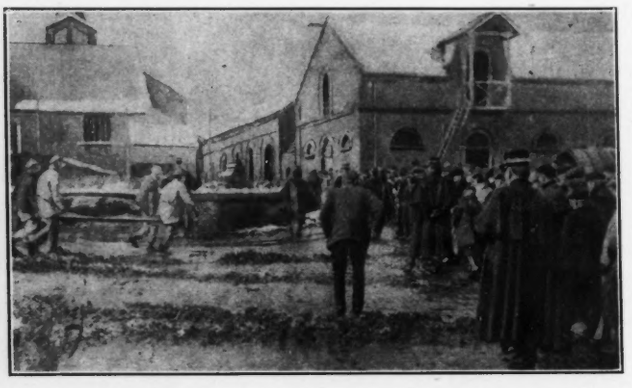
The accompanying illustrations show some interesting scenes in and around the colliery where the catastrophe occurred.

STATIONS AT 300 M. LEVEL, ASCENT OF MINES.



HOISTING ENGINE.

LANDING CARS.



RECOVERY OF THE VICTIMS.

Holding a piece of tar soap on the inside of a belt while it is running will prevent, for the time at least, its slipping.

Coal in Belgium.

Consul McNally, of Liège, reports that the Belgian Government's award in March of contracts for the furnishing of coal to the State Railways, shows an average increase of about 72c. a ton over that of the last adjudication. The average price of all sorts included in the bids was about $2.89 a ton. The rise in price is due first to the general scarcity of coal for industrial purposes, and secondly to the catastrophe in the coal fields of Courrières and the strikes resulting therefrom. Germany is exporting to France all the coal she can spare, and the connecting lines of railways have recently held a conference, and agreed to furnish all the cars possible to carry the German coal.

The demand on the German producers is great, for certain industies in Belgium, such as glassworks and certain ironworks, bought from France a special gas-producing coal for their industrial purposes, which supply being shut off by the strikes, the German coal is called for to meet the emergency. The lowest English bid was 15c. above the lowest Belgian bid. Coke, which in 1905 was $4.82 a ton, is now $6.36. Coke used in blast furnaces has gone up $1.35 since March of last year.

The finer grade of coal for the making of coke, imported from Germany, has risen in price also.

Don't stand dynamite in front of or near a fire.

Proper Methods for Thawing Dynamite.

The DuPont Company, Wilmington, Del., prints an illustrated brochure under the title of this article. The information, coming from this source, is authoritative, and is therefore printed in full.

Dynamite freezes at a temperature between 45 and 50 degrees F., and should not be used in a frozen or chilled condition. It is therefore necessary when frozen, to thaw it out, or to warm it properly when chilled. A properly constructed house for thawing dynamite, with a capacity of 500 lb. is shown in the detailed plan Fig. 1. The thawing house proper is 4 ft. 7 in. by 8 ft. 0 in. in plan; the hight at front inside, is 5ft. 6in., and the hight at back inside, is 4 ft. 6 in.

SHAFT NO. 4 COURRIERES MINE.

It is built of studding, sheathed inside and outside with 1 in. plank, the outside being covered with corrugated iron. On the front are four doors opening out. Inside these doors are five tiers of drawers, each tier being four drawers wide, in all twenty drawers, each drawer holding 25 lb. of dynamite, a total capacity of 500 lb. Bottoms of the drawers are perforated to allow hot air to circulate through the dynamite.

Back of the drawers is a baffle, extending down from the ceiling to within one foot of the floor. This divides the thawing house into two rooms or chambers; the front room containing the twenty drawers; the back room, a hot water radiator. The radiator has a curb or baffle, made of sheet iron, around it to throw the hot air up inside the baffle, whence it goes down, outside under the center baffle and thence through the drawers containing the dynamite. There is a small door in the back of the house to allow a man to enter if necessary to repair radiator or pipes, but for no other reason.

The advantage of the above design is that it makes it impossible for the powder man to get into the room where the thawing is done, thus avoiding the too common practice of having priming done in a thawing room, because of its comfortable temperature.

The houses can be set on a brick floor, doing away with all foundations and floor except sills. A thawing drawer can be run into a sleeve of wood made just large enough to receive them, and thus carried to the blasting face; or the thawed cartridges can be taken from the drawer and placed in a tight box, the thawed cartridges to be covered with sawdust, a woolen cloth, or other covering to prevent freezing.

A small detached heater house is set about 10 ft. from the thawing house. The heater house is 4ft. by 4 ft. in plan, containing a small hot water heater such as that made by the American Radiator Company, No. 101, 17½ in. diameter by 33¼ in. high, with expansion tank. The heater house is simply a studded frame covered with corrugated iron.

The temperature in dynamite thawing houses heated by hot water can be satisfactorily regulated to an exact temperature by the use of a regulator, such as Powers, Tagliabue's or Hohmann and Mauer's. It is desirable that the temperature be so regulated that the maximum temperature of the thawing room will not exceed 80 degrees F.

This arrangement can be adapted to the dynamite thawing house. A thermostat should be placed on the wall of the thawing house on the inside, above the drawers, and on the side toward the doors. A small hydraulic pump is set in one corner of the building, back of the drawers, with a compressed air tank on the wall in one corner of the thawing room, above the pump. This should be operated from the same water system that is used with the hot water heater.

Compressed air at 15 lb. pressure is led from the air tank through the thermostat, in armored lead tubing, and through a diaphram valve, replacing the elbow on the hot water supply line to the radiator, opening and closing this valve as may be necessary to maintain the temperature desired; or, the air may be carried back to a diaphragm in the boiler house, where it would operate a damper in the draft door of the boiler, as well as a check draft in the smoke connection, and increase or decrease the temperature of the circulating water by the operation of these dampers.

THE 13 SURVIVING MINERS FROM THE COURRIERES DISASTER.

Details of the system may be obtained from the offices of the Powers Regulating Co., at Chicago, New York or Philadelphia.

If the foregoing device is too expensive, it is suggested that a small building heated by steam or hot water pipes, or radiators, be constructed 50 ft. or more away from any other building or mine workings.

The pipes or radiators should be placed in one end of the room, and encased in such a manner that it will not be possible for any one to put dynamite where it can touch these pipes, or where any

drop of nitro glycerine, which might possibly exude from the cartridges, could come in contact with the pipes or radiators, and so cause an explosion.

At mining plants, or other works, where steam is used, a good thawer can be provided by building a small house, in one end of which are coils of pipe through which exhaust steam from the engine passes. Because of the fact that the steam is not confined, it is impossible to create dangerously high temperatures in such a room. The temperature of the thaw house should not exceed 80 degrees F.

Along the sides of such a room away from the heater, shelves should be placed where the cartridges to be warmed should be laid on their sides until thoroughly thawed.

When large quantities of dynamite are required on temporary work, an excellent device is to place the cartridges in a large, dry milk can, water tight, the bottom of which is covered with sawdust—the can to be placed in a cask or barrel containing water which has been previously heated by a jet of steam, or if steam is not available, the cask may be filled with warm water as often as necessary.

If the water in the cask is to be heated by a jet of steam, the milk can containing the dynamite must always be taken out of the cask while the water is being heated. The cask should be covered with insulating material to retain the heat.

Manure is frequently used to thaw dynamite, and is fairly satisfactory, provided always, that it is fresh. The cartridges should be laid on their sides in a box embedded in the manure where they should remain until soft. Under no circumstances should the cartridges be allowed to come into contact with the manure since they may absorb moisture.

For temporary use where only a small amount of dynamite would be required, no improvement has yet been made over the old fashioned double kettle, which is simply a large kettle containing warm water, in which is placed a smaller kettle containing the dynamite. The water should always be warmed in a separate vessel, and poured from that into a larger kettle, and fresh warm water should be used for each thawing. Neither of the kettles should ever be placed over a fire or other radiator.

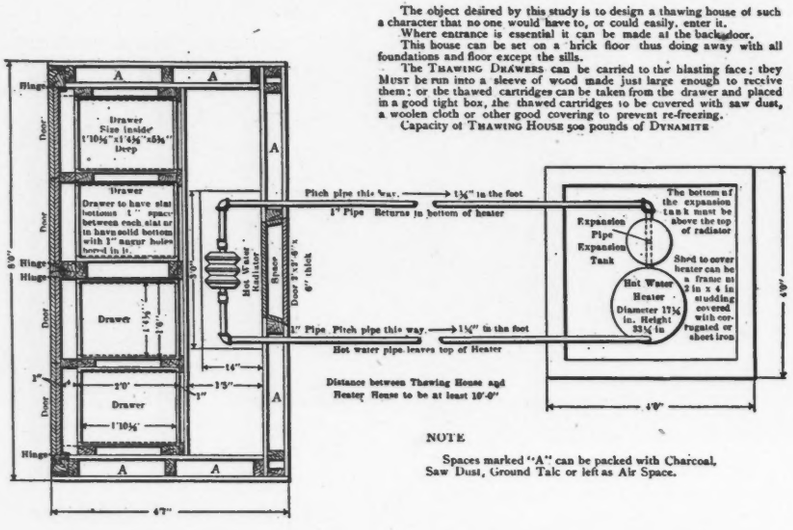
The nitrate combination has been renewed, 99½ per cent. of the producers having joined the new organization.

Gold Milling in South Africa.

The new milling equipments of the Meyer & Charlton and New Goch mines have now been working for several months, and it is reported that they are proving definitely the increased efficiency of the fine grinding and filter-pressing methods, with continuous cyanide circulation, introduced at those mines. It is stated that about 97 per cent. extraction of gold is now being made. The proportion of gold recovered from the sands and slime works is now much greater than it was before fine grinding was adopted, and recovery from the plates is correspondingly less. Whereas formerly 60 per cent. of the total gold was recovered from the plates at the Meyer & Charlton mill, in January last only 48 per cent. was thus recovered, while at the New Goch the mill's yield was only 34¼ per cent. of the total. At the New Goch, working costs were 19s. 10d. per ton, and at the Meyer & Charlton 21s. 11d. per ton.

Dutch metal is composed of 11 parts of copper and two parts of zinc. It is a deep rich gold color, and is used extensively in place of the real gold leaf.

DYNAMITE THAWING HOUSE WITH DRAWERS AND HOT WATER RADIATOR.
CAPACITY 500 LBS. OF DYNAMITE.



BILL OF MATERIAL, THAWING HOUSE.

2 Pieces 2 in x 8 in x 8 ft-0 in sills
2 " 2 in x 8 in x 5 ft-0 in "
30 Ft. B. M. 1 in Flooring M. & D. Floor (Blind nailed)
2 Pieces 4 in x 4 in x 5 ft-6 in Door Posts
2 " 1 in x 4 in x 5 ft-6 in Corners
5 " 2 in x 4 in x 6 ft-8 in Studding above Front Doors
5 " 2 in x 4 in x 6 ft-9 in " below " "
2 " 2 in x 4 in x 5 ft-8 in "
2 " 2 in x 4 in x 5 ft-0 in "
8 " 2 in x 4 in x 4 ft-6 in "
2 " 2 in x 4 in x 3 ft-9 in For doors to close against
8 " ¾ in x 2 in x 1 ft-9 in " " " "
2 " ¾ in x 2 in x 3 ft-9 in " " " "
1 " 4 in x 6 in x 3 ft-9 in " " " "
4 " 2 in x 6 in x 3 ft-6 in Above and Below Front Doors
5 " 2 in x 4 in x 5 ft-6 in To Support the Drawers
5 " 2 in x 4 in x 5 ft-6 in " " " "
5 " 1 in x 4 in x 5 ft-0 in " " "
40 " 1 in x 2 in x 2 ft-0 in Drawer rests
70 Ft. B. M. 1 in M. & D. Stuff for Front Doors
There are four Front Doors. Two of size 1 ft-9 in x 3 ft-9 in x 2 in thick and two of size 1 ft-7½ in x 3 ft-9 in x 2 in thick. Each door is made of two 1 in thicknesses battened on.
12 Ft. B. M. 1 in M. & D. Stuff for Back Door
2 Pieces 1 in x 6 in x 2 ft-6 in Part of Back Door.
2 " 1 in x 6 in x 2 ft-0 in " " "
2 " 2 in x 6 in x 3 ft-0 in Above and Below Back Door.
60 Ft. B. M. 1 in Boards 5 ft-0 in long outside Sheeting
52 " " " 1 in " 8 ft-0 in " " "
44 " " " 1 in " 4 ft-0 in inside "
35 " " " 1 in " 7 ft-0 in " "
160 " " " 1 in " 10 ft-0 in Sheeting roof inside & outside & boxing
28 " " " 1 in " 7 ft-0 in Baffle
5 Pieces 2 in x 4 in x 7 ft-0 in Rafters
5 " ¾ in x 2 in x 7 ft-0 in Pieces above front of tops of Drawers
20 " ¾ in x 6 in x 1 ft-6 in Front of Drawers
20 " ¾ in x 6 in x 1 ft-6 in Back " "
40 " ¾ in x 6 in x 2 ft-0 in Sides " "
30 Ft. B. M. ⅞ in Stuff 2 ft-0 in long Bottom of Drawers
1 Piece 1-16 in Sheet iron 1 ft-6 in x 5 ft-4 in Baffle
It will take 2½ Squares of corrugated iron to entirely cover the outside of the building, including roof and boxing. Or if roof (including boxing) is covered with tin it will take for roof 1 and 2-10 Squares tin, for rest of building 1 and 3-10 squares corrugated iron.
(NOTE—Do not let metal rub on metal anywhere, as for example at doors.)
Hinges and Nails.

HEATING APPARATUS.

1 Hot Water Heater.
3 Sections Hot Water Radiator, 38 in high.
1 Expansion Tank with Gauge.
1 Detroit Valve.
1 Union Elbow.
32 Feet 1 in Pipe.
20 Feet Asbestos moulded covering for 1 in Pipe.
6 Feet 3-4 in Pipe.
1 Comp Key Air Valve.
1 Key for Above.
2 Valves for 1 in Pipe.
3 Elbows for 1 in Pipe.

SHED TO COVER HEATER.

12 Pieces 2 in x 4 in x 4 ft-0 in Studding } Frame.
6 " 2 in x 4 in x 8 ft-0 in "
3 " 2 in x 4 in x 4 ft 8 in Rafters.
2 " 2 in x 4 in x 2 ft-0 in Door.
2 " 2 in x 4 in x 5 ft-0 in.
1½ Squares Corrugated Iron
Floor of this shed to be of brick, clay or any suitable material to be had without extra expense.

Powdered Coal Firing for Steam Boilers.

BY GEORGE C. MCFARLANE.*

Burning powdered coal with an air blast has several advantages; among these are perfect combustion with consequent absence of black smoke (the chimney gases at most showing a faint brown or white tinge); as little excess air is required for perfect burning, furnace temperatures are higher, and proportionately less heat is carried off by the chimney gases. Its successful application to firing steam boilers, however, is governed by several factors, and it may be stated in a general way that the practice developed by the portland cement mills in preparing and handling the powdered coal for clinker burning should be closely followed.

The coal after being dried and crushed should be ground in a tube or other suitable mill until 95 per cent. will pass 100-mesh. Conveyors and elevators employed in handling the product should be inclosed in steel casings and no more than a 24-hour run of dust should be kept in the bins, the latter should be practically air tight. The boiler feed water should be purified, unless exceptionally free from incrusting solids, and the boilers cleaned frequently because if any thickness of scale is allowed to form the intense heat will soon burn the tubes.

The boiler settings should be arranged so that the mixture of coal and air leaving the nozzles shall have 12 to 15 ft. of unobstructed travel before encountering any bridge or baffle walls. With most types of boilers it will be necessary to place a fire-brick retort or combustion chamber from 5 to 8 ft. long in front of the boiler, a portion of the regular front being cut away to connect with the mouth of the retort. The retorts may be built on trucks so they can be rolled back out of the way. When an auxiliary combustion chamber is used, the mixture of coal and air leaving the nozzle of the blast pipe has a chance to ignite and expand into a mass of flame before entering the fire box proper. Where the combustion space is free from sharp turns and abrupt baffle walls for 12 or 15 ft. from the front, it is only necessary to blind the grates with fire-brick and tap the blast nozzle just above the fire doors. In starting, the blast is ignited by building a small wood fire a few feet from the nozzle; after the brick get hot they will hold sufficient heat to re-ignite the blast after a shut-down of an hour or more.

A fuel mill for drying and grinding the coal can be operated economically only when handling a fairly large daily tonnage. Where the daily consumption of coal averages less than 25 or 30 tons it would hardly pay to install a fuel mill unless coal was exceptionally high in price.

The Burt portland cement plant at Bellevue, Mich., is using powdered coal for firing a battery of five 400-h.p. boilers. The fuel mill was designed by O. Button, manager of the works, who previous to this had successfully applied powdered coal to firing a battery of Wickes boilers at the Wyandotte cement works and to firing rotaries drying a very wet marl at the Hecla plant near Edwards Lake, Michigan.

Fig. 1 shows the general plan of the fuel mill and boiler room at Bellevue. The chimney gases are first drawn through a rotary dryer in which the boiler coal is dried, as is also the coal for firing the cement kilns. Where it is only necessary

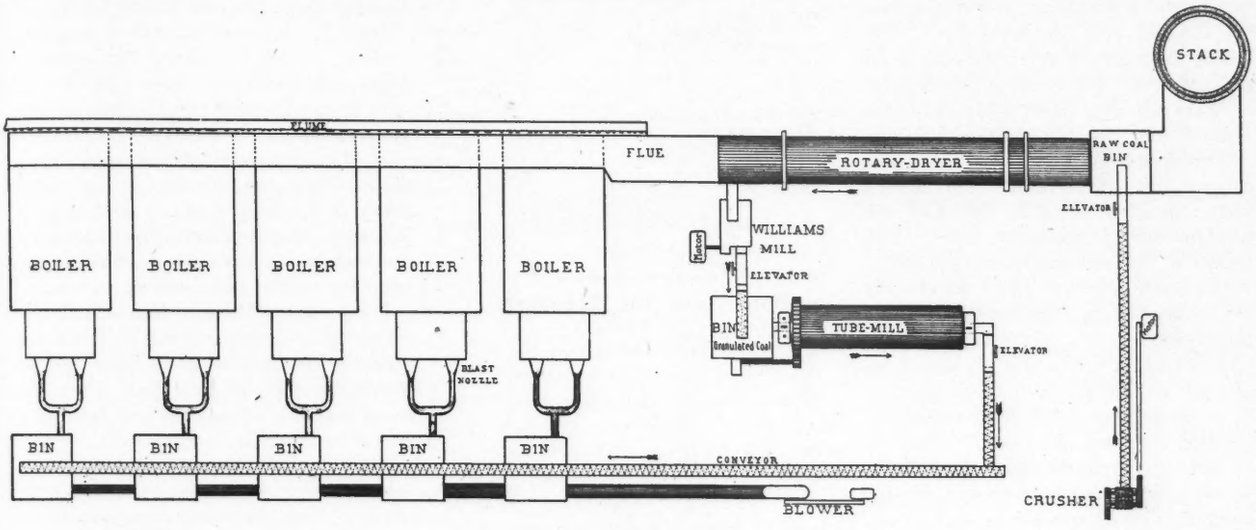


FIG. 1.

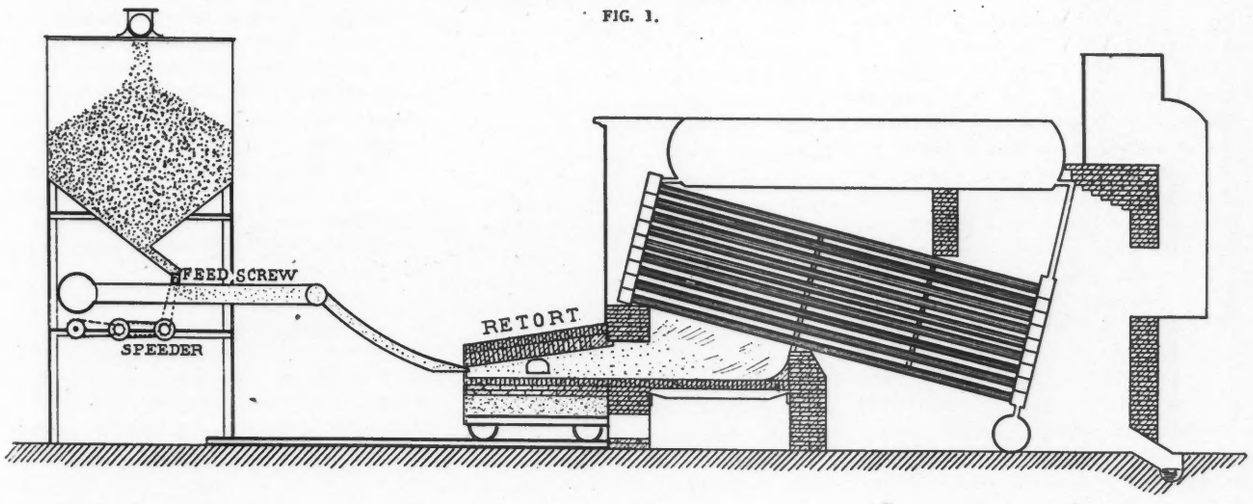


FIG. 2.

*Mining Engineer, Bay City, Mich.

to dry boiler coal I believe it would be advantageous to use a much smaller hand-fired dryer as only 1 to 1½ per cent. of the coal will be needed to fire it.

Where chimney gases are used for drying the dryer must be of large diameter so as not to obstruct the chimney draft; the gases must leave the boilers at a higher temperature than if they were discharged direct into the chimney. As shown in the plan, the coal is first passed through toothed rolls and is then conveyed and elevated into the dryer bin. After passing through the dryer the coal is fed into a Williams mill where it is reduced to the fineness of granulated sugar. It is then elevated into the bin feeding the tube mill, the feed being so adjusted that 3 tons will pass through per hour. This gives a product 95 to 98 per cent. of which will pass through a 100-mesh sieve. This product is elevated and discharged into a 12-inch screw conveyor which delivers the dust to the steel storage bins in front of each boiler.

Air is furnished by a Buffalo blower capable of delivering 15,000 cu.ft. per min. at 7 in. water gage. A 10-in. riveted sheet-iron pipe furnishes air to each boiler. A few feet away from the boiler this branches into 7-in. pipes capped with nozzles having orifices 20 in. wide by 1¼in. deep.

Fig. 2 shows the arrangement for burning powdered coal. The dust is fed into the blast pipe with a 4-in. screw conveyor driven from a small line shaft through a speeder consisting of two pair of conical disks connected by a leather belt reinforced with wood blocks and arranged so that when one pair of cones is spread, the other pair draw together. The cones can be adjusted to give any desired speed to the feed screw. The fine residual ash settling on the tubes is occasionally blown back, with a jet of steam into the smoke box; from there it is washed into a flume and conveyed outside the building. The machinery is driven by a.c. motors of the following rated capacity: Dryer, 5 h.p.; crusher, 10 h.p.; Williams mill, 25 h.p.; tube mill, 75 h.p.; blower, 25 h.p.; conveyors and elevators, 5 h.p.; the total consumption of power averages 120 h.p. About 145 cu.ft. of air is required to burn 1 lb. of coal, and when in normal operation the chimney gases show 1 to 1½ per cent. free oxygen. When coal is burned in the powdered form ½ lb. less coal is required per h.p.-hour, a gross saving of 18 per cent., but as 1.5 per cent. is required for drying and 5.5 per cent. to generate power for crushing, pulverizing and burning, the net saving amounts to about 11 per cent.

At Bellevue, the machinery for the powdered-coal installation cost $11,500, to which should be added $1200 for the increase in the size of building required, and $2800 as the fuel mill's portion of the main engine and generator.

Experience in cement mills shows the life of this class of machinery when run night and day, to be about seven years. Writing off $2500 per year to amortize the initial investment, we can make the following comparison between the two methods of firing:

Hand Firing.

Daily expense.	
65 tons coal @ $2.40	$156.00
2 water tenders @ $2.00	4.00
6 firemen @ $1.60	9.60
	$169.60
Yearly expense, 320 day run	$54,272.00

Powdered Coal Firing.

Daily expense.	
58 tons coal @ $2.40	$139.20
2 water tenders @ $2.00	4.00
2 fuel mill men @ $2.16	4.32
	$147.52
Equal to a yearly expense of	$47,206.40
Adding—amortization	2 500.00
Interest 6% on $15,500.00	930.00
Repairs, oil, etc	800.00
Total	$51,436.40

A net annual saving of $2831.60 in favor of powdered coal firing.

Notes from the Transvaal.

SPECIAL CORRESPONDENCE.

Some weeks ago the Aurora West mine closed down. There are one or two other mines not far from closing down. The margin between profit and loss is very small. Given a sufficiency of unskilled laborers, thereby permitting the working of the narrow reefs by hand labor, and the management is able to show a profit. But, unfortunately, some of these poor mines have to depend upon Kafir labor for their supply. Just now there is a shortage of Kafirs, and in order to keep the mill running, it is necessary to work the narrow stopes with machines. This means a serious fall in grade, and expenditure becomes greater than the output. Unless these struggling mines can obtain sufficient laborers, either Chinese or Kafirs, one or two of them will be forced to close down.

One group has commenced rather drastic retrenchment by discharging a number of men. There have been one or two amalgamations of adjoining properties lately, causing the dismissal of a number of men. All things considered, the industrial outlook for the man out of work is far from bright. Many of the unemployed are helped by their comrades along the Rand. There is a lot of unostentatious charity on the part of the men employed in the mines. They frequently provide food and shelter for a less fortunate comrade until he can find an opening on some mine. Many men are seen walking from mine to mine with their bundles looking for work.

Quite an interesting discussion was started recently by *South African Mines*, on inefficiency in general on the mines of the Rand. Not only has the artisan been hauled over the coals, but those responsible for the management have come in for a lot of criticism. After reading the leading articles and the correspondence they elicited, one comes to the conclusion that the white labor on the Rand is on the whole the highest paid and probably the least competent in the world. Of course there are many hard-working, conscientious miners here, but the proportion of incompetents is surprisingly large. One explanation is that after the war hundreds of unskilled white men were employed at 5s. per day in the mines. After working a month or so, these men obtained blasting certificates, and posed as expert miners. A few of these men gradually became competent miners, but many of them will not be first-class underground men if they remain here for the rest of their lives.

Most underground work is done on contract. The prices are set for men fairly skilful at machine work or hand stoping. When an expert miner comes along, he makes big wages on the contract prices, from £60 to £70 per month.

The great trouble is to eliminate the incompetent underground man. Should 100 skilled miners arrive on the Rand tomorrow, they could not get a start right away, for it takes some time to oust the "half-way miner."

According to *South African Mines* much of the inefficiency is due to the mine officials. It is mentioned that some mine managers do not go below more than once a month. When the head is as slack as this, no wonder his subordinates follow his example. The most successful managers put in nearly half of their time underground.

It would appear that the paper has ample justification for its crusade against inefficiency, and it is to be hoped that this discussion will help toward better work in the future.

Spanish Mineral Traffic.

Exports of ores and minerals from Spain for the two months ending Feb. 28, are reported by the *Revista Minera* as follows, in metric tons:

	1905.	1906.	Changes.
Iron ore	1,036,606	1,584,365	I. 547,759
Copper ore	164,480	187,296	I. 22,816
Manganese ore	5,459	9,717	I. 4,258
Zinc ore	22,091	22,419	I. 328
Lead ore	1,519	611	D. 908
Pyrites	92,487	157,971	I. 65,484
Salt	63,060	61,151	D. 1,909

Exports of metal for the two months were: Pig iron, 7580 tons, against 10,675 tons in 1905; wrought iron, 5706 tons, against 416; copper, 1262 tons, against 1117; copper precipitate, 3838 tons, against 2661; zinc, 56 tons, against 334; lead, 22,875 tons, against 23,583 tons last year.

The tendency to make frequent changes is the bane of many technical men, remarks H. J. Hapgood. Not only does it detract seriously from their value to employers, but it injures the men themselves by scattering their energies without making them masters of any one thing.

A Sand Dryer.*

BY W. BOARDMAN REED.

The New York City Railway Company has built a plant for drying sand for use in the operation of its lines that is, perhaps, the most complete that has been installed for this purpose. The details of the dryer are somewhat like those used in metallurgical practice, and are suggestive, with the figures given, of improved practice in such work.

For drying the sand for this purpose, a bin fitted with steam pipes was first tried, but this was an exceedingly slow and expensive method of handling the matter. Sand-drying stoves were then tried and used for some years. These are practically cylindrical stoves, surrounded with a conical sheet iron hopper. The wet sand shoveled into the hopper comes in contact with the hot surface of the stove and dries, then running through small holes at the bottom of the hopper. Where small quantities are handled, this method of drying seems to be economical and is generally satisfactory. If, however, the capacity of sand-dryers of this type is overtaxed and a hot fire used, overheating of portions of the sand results, Sand thus dried must be handled several times, and the cost for fuel used is considerable. Furthermore, in drying there must necessarily be a circulation of air and with this method the only circulation obtained is that caused by the rising of heat through the sand, so that it is very sluggish.

An investigation of the various types of dryers used led to the adoption of a gravity dryer, with forced circulation, so arranged that all heat from the fuel should come in direct contact with the sand, but only at such a temperature as was necessary, with the aid of the circulating air, to remove the moisture. The object sought was not to raise the temperature of the sand above 150 deg. F. Dryers of this character are used in drying magnetite for magnetic separation; and by plaster mills for drying sand. Some modifications from any arrangement in use were made, however.

The first of these was erected at Ninth avenue and Fifty-fourth street, in the spring of 1903. The available space being limited, and the machine being of an experimental nature, only a small dryer was erected. It was found that with the single stack first constructed about 75 cu. yd. of sand could be dried in a day of ten hours. In general, the details of this dryer were the same as those of the dryer erected at Sixty-fifth street and Second avenue, which is described and illustrated later. The results obtained warranted the erecting of additional apparatus, and this was done in 1904. Unfortunately, this addition had been in operation only a few weeks when a large portion of the building was destroyed by fire. The dryer is still in operation, but the facilities for loading are not as good as formerly. The expense of drying and handling sand from the wet sand bin into cars was as follows:

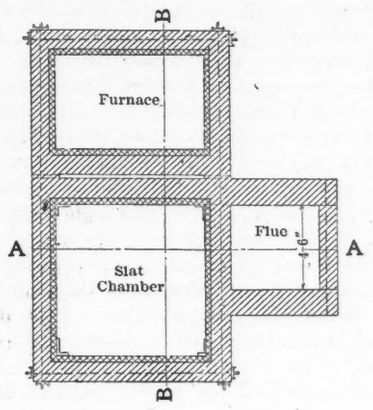
1 Foreman	@ $2.50	$ 2.50
2 Laborers	@ 1.50	3.00
½ gallon oil	@ .50	.25
1 ton coal	@ 3.00	3.00
Power, 20 h. p.	@ $.0225 per h. p. hour	4.50
		$13.25
Interest on $5,000	$250.00	
Depreciation and repairs, $500; equals $2.00 per day.		2.00
		$15.25

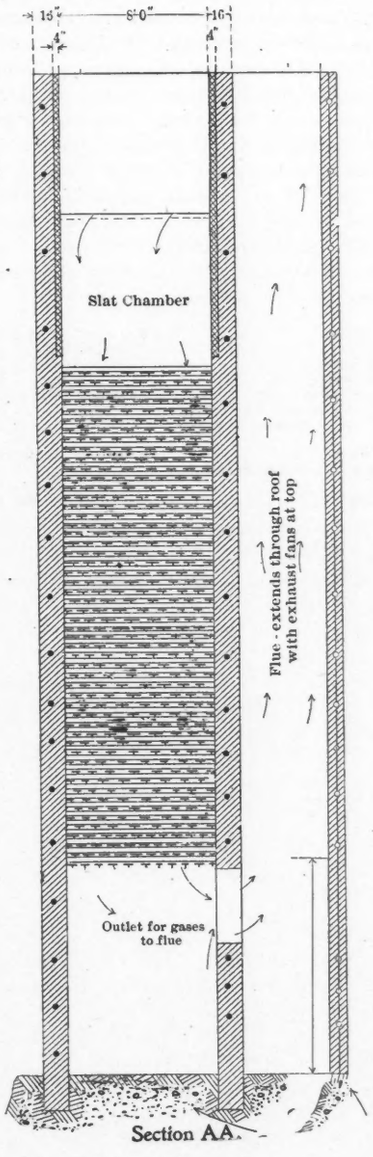
making the cost for handling and drying 20 1/3c. per cu. yd. of sand.

After the additional stack was added, the cost per yard was decreased, this, together with other changes made, bringing this cost to about 18c. per cu.yd. of sand.

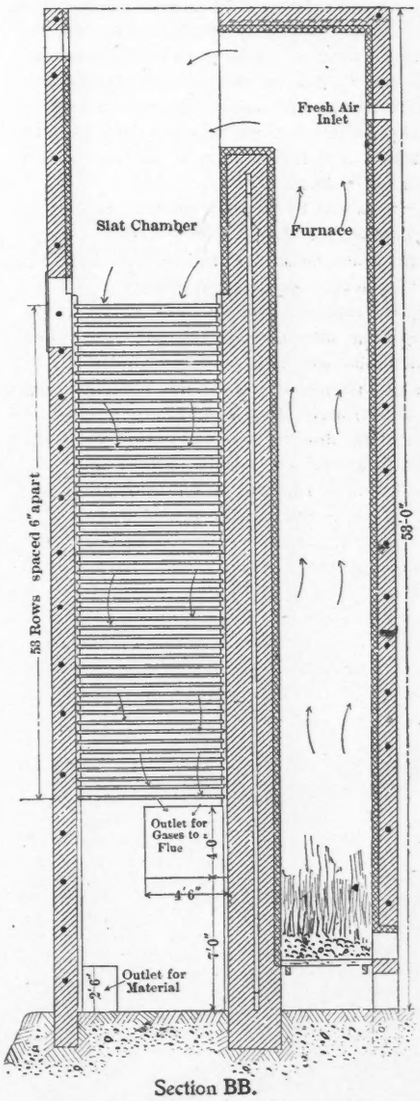
The figure last mentioned does not include any allowance for rental for the space occupied, which would be approximately the same, no matter what system of drying was used.

Although the dryer at Fifty-fourth street and Ninth avenue was able to handle in the aggregate a quantity of sand equal to the total amount used, it was not conveniently located for serving all the lines of the system. Hence, in 1905, an additional plant was erected on Second avenue, between Sixty-fifth street and Sixty-sixth street. The building used was





Section AA.



Section BB.

*Abstract of a paper in the *Street Railway Journal*, Mar. 30, 1906.

formerly a boiler house, with coal storage bins on the second and third floors. These bins were utilized for sand storage and had a capacity of about 5500 cu.yd.

The arrangement of the drying machinery and storage bins and the method of distribution at the plant located at Second avenue and Sixty-fifth street are as follows: The wet sand is hauled from the river front to the ground floor of the building, where it is dumped from carts direct into the elevator boot. From this it is carried by elevators to the top of the dryer and dumped into a hopper, located at the top of the slat chamber. The slat chamber is about 8 ft. square and the hopper is located about 58 ft. from the ground floor. The sand then falls through the space between the hopper and the slats, a distance of about 15 ft. The slats consist of 3½ x 2½-in. T's and are placed 6 in. between centers, with the leg upward, the rows about 6 in. apart vertically. In placing the slats care is taken to stagger them. The sand, falling upon the top row, is diverted to the row beneath and so the successive rows are reached until the sand falls into the chamber below and passes through the opening in the bottom of the slat chamber, where a valve is located to control the speed of flow.

Adjacent to the slat chamber is the fire chamber, or flue, about 5 x 8 ft., inside, the grate being the full size of the flue. The heated gases pass upward from the grate through this flue and through the opening into the slat chamber, mingling with the wet sand in this chamber on its way through the slats, the gases passing out through the opening at the bottom into the flue. From this latter point the gases are drawn upward by four 48-in. exhaust fans, running at a rate of about 600 r. p. m., located at the top of this flue.

The dry sand, running through the opening to the elevator boot, is carried to a belt conveyor, located above the roof of the building. From here it is distributed through various chutes to the storage bins located on the second and third floors of the building. From these bins the sand can be drawn through chutes to sand cars located on the ground floor of the building. There is storage capacity in this building for about 5500 cu.yd. of sand. In building the fire chamber, an opening was left near the top of the flue, which is utilized when the blowers are not in operation to carry off the gases. When the blowers are in operation, the opening is used for supplying cold air, the amount being regulated by a damper.

The difficulty in using this type of dryer has been the feeding of sand into the slat chamber. In this installation a rocking grate is used, located at the top of the chamber and consisting of 2¼-in. square steel bars, rounded at the ends, to which levers are fastened which are operated by an eccentric on the shaft. The speed of flow can be regulated by the amount of throw of these levers, or by the speed with which they are operated.

As the drying of any substance depends not only upon the heated air coming in contact with it, but upon the circulating of heating air through it, arrangements were made to draw a large volume of air through the sand. The arrangement of this dryer causes the hottest air to come in contact with the sand when it contains the most moisture and though the latter is drawn down with the sand, yet there is sufficient heat in the sand as it falls to the bottom to cause this slight amount of moisture to evaporate. The supply of cold air and the amount of fire is so regulated that the temperature of the sand as it leaves the dryer will not exceed 180 deg. F., and it is better to keep it at 150 deg. F.

This device is of sufficient capacity for the drying of from 250 to 300 cu. yd. of saturated sand in ten hours; the apparatus will easily dry 225 cu.yd. of sand in a day of between nine and ten hours, provided that the fire has been started and the blowers run for a sufficient time to get the surfaces of the chamber warmed up before the wet sand is started through it.

The cost of drying and loading the sand by this method is 17⅝c. per cu.yd.

The force and material necessary for the operation of the sand-dryer is as follows:

1 foreman	@ $2.50 per day	$ 2.50
1 oiler	@ 2.00 per day	2.00
1 fireman	@ 1.75 per day	1.75
2 laborers	@ 1.50 per day	3.00
4 tons coal	@ 3.00 per ton	12.00
Oil, grease and waste		1.00
40 h. p. of current	@ $.0225 per h. p.	9.00
		$29.25
Interest and depreciation		6.00
Total		$35.25

The conveying and elevating machinery, together with the exhaust fans, is operated with a 50-h.p. G.E. motor, although an average of less than 40 h.p. is used during the ten hours that the machine is in operation.

The amount of sand used is about 15,000 cu.yd. per annum, and the cost of installing the plant was about $25,000. Of this the elevators and conveyors cost $6,000, the dryer $15,000, the erection of the conveyors, etc., $2,000, the motor $600, and the enclosure for the conveyors, etc., and other necessary changes in building, $1,400.

Copper sheets are first hot-rolled from a copper cake. The cake is cast in an open mold and is left as it comes from it. The top side of the cake is rough and usually full of minute blow-holes. Dross or other imperfections are always found in this side. In this condition the copper is hot-rolled, tinned, and then cold rolled if required. Any blow-hole, piece of scale, or particle of dross becomes elongated in the rolling. The copper cake becomes elongated into a sheet of great length and the imperfection is elongated in the same proportion.

The Ontario Mining Law.

SPECIAL CORRESPONDENCE.

The government mining bill now before the Ontario Legislature, is in a fair way of becoming law, without any important alteration in its leading provisions, very few changes having been made during the preliminary stages of legislation. The feature which has been most severely criticized is the provision by which the purchaser of a claim secures thereafter, an indefeasible title. It is strongly contended that working conditions should be imposed as a means of preventing large areas being acquired for purely speculative purposes, and held idle. Those who take this ground point out that the indefeasible-title clause is in direct antagonism to other features of the government policy, such as the operation of the Gillies timber limit for the public revenue and the wholesale cancellation of mining franchises when mines are not being worked.

The other measure providing for the taxation of mines has not yet been laid before the House, but it is well understood that no royalties will be exacted on the output. A tax will be levied of 5c. per acre on mining locations in organized municipalities and 8c. per acre on locations in unorganized districts. This, it is contended by the opponents of the indefeasible-title provision, will be altogether insufficient to prevent the evil of holding valuable properties by speculators and so retarding the development of the mining industry.

It is proposed that the revenue derived from the mining tax, and from the fees imposed under the mining bill, should be devoted largely to the encouragement of the smelting industry. The Government intends setting aside $60,000 per year for this purpose for five years, to be available for distribution among the different classes of refiners as follows: Nickel refiners $25,000; copper refiners, $15,000; cobalt refiners, $10,000; and arsenic refiners, $10,000. They will receive 6c. per ton for nickel, 1c. a ton for copper, 0.5c. a ton for arsenic, and 5c. per ton for cobalt ore smelted. Should the production in any of these lines call for an amount exceeding the appropriation, the latter will be divided among the claimants *pro rata*. The details of course may be considerably modified before the bill passes, but it is practically certain that the principle of the bill will be adopted.

Manufacturers of steam valves sometimes produce valves which have the appearance of being first class, and yet which leak steam through the body, when put under pressure. This comes, usually, from the blow holes in the metal which are often so small that they cannot be seen by the naked eye.

The Dust-Danger.*

BY W. H. PICKERING.

The importance of dust, as a factor in colliery explosions, is now so generally recognized and understood that there is no need to sketch, even in outline, the dangers which are inherent in it. The Royal Commission appointed to consider the dust-danger in mines issued a very valuable report, and it has also been the subject of many papers read before mining engineers. The practical result, so far, has been the introduction of provisions in the Coal-mines Regulation Acts regulating the use of explosives in dry and dusty places, and the issue of the Explosives in Coal-mines Order by the Home Secretary. In a few mines dust is systematically laid by watering, but no widespread effort has been made to strike at the root of the danger.

Permitted explosives are only relatively safe, for each one of them is capable of initiating an explosion under certain conditions, and it cannot be too often repeated and emphasized that a dust-explosion can be started in other ways than by an explosive. For example, an ignition of fire-damp may result from a naked light, from a damaged or defective safety-lamp, from a spark from a pick or from an electric spark, and this may be magnified by dust into a great explosion.

Dust also greatly increases the danger of underground fires. A few examples may be given to show how easily coal-dust can be ignited in favorable conditions. In a Lanasnire colliery sparks from the brake-rim of the drum on an inclined plane fired the dust lying on the floor; a fireman happened to be within 50 ft. of the place, but before he could reach it there was a ball of fire as large as two firsts in the dust; a bucket of water was dashed on it at once and the fire spurted in all directions; but it was soon extinguished. At a Yorkshire colliery similar sparks, from a brake-rim, fired the dust deposited on the bars of a main haulage-road, and there was a slight dull explosion. At another Yorkshire colliery the dust inside a hollow pulley carrying the tail-rope of an intake haulage-road took fire from the friction of the spindle, and a most serious fire would have resulted if a deputy, who chanced to be traveling outby, had not extinguished it.

Obviously the only radical way of remedying the danger is to keep the mines free from coal-dust by cutting off the supply, or by other means. One may therefore consider: (1) What are the chief sources of dust in mines? (2) where is it most dangerous? (3) present or suggested methods of dealing with it; and (4) practical difficulties to be overcome.

(1) *Chief Sources of Coal-dust.*—A little coal-dust is made at the working-faces in the process of coal-getting, and some is shaken from the tubs on the tributary roads. In main haulage-roads and in the winding shafts, the dust is shaken from the tubs or is swept off them by the air current during their passage. The full tubs usually meet the air-current, and in mid-shaft it often passes them with great violence, as the speed of the cages in mid-shaft in some deep mines varies from 40 to 50 miles an hour. A considerable quantity of dust is carried down the shafts from the screens by the intake-air.

(2) *Where the Dust is Most Dangerous.*—The dust at the coal-face and on tributary roads is usually mixed with stone and fire-clay dust, and is thus rendered somewhat less dangerous. There is not often much coal-dust in return-airways. The greatest danger lurks in downcast-shafts and on main haulage roads. Here, pure coal-dust is deposited on the roof, sides and floor, and the air is full of floating dust of most extraordinary fineness.

(3) *Methods of Dealing with Dust.*—At present, the principal methods of dealing with the dust are (*a*) by means of water-tubs, which water the floor and sometimes spray the water over the roof and sides; (*b*) by means of movable hose-pipes attached to water-pipes laid along the main roads; (*c*) by sprayed water, designed to saturate the atmosphere in the intake-air-ways and downcast-shaft; and (*d*) by watering the tubs before they begin their outby journey. The water is sometimes sprayed by means of compressed air, and salt water has been used with good effect.

(4) *Practical Difficulties and Objections.*—In some Welsh mines, the dust is thoroughly laid and rendered harmless by means of water-pipes laid along the main haulage-roads, and by means of water-tubs. There are mines where miles of pipes are laid and the water is applied with an unsparing hand. In one Yorkshire mine, the air is thoroughly saturated by means of sprays of water and compressed air: this mine is shallow and cool.

The first method could not be adopted in many mines, as such a liberal application of water would cause the floor to lift or heave, the roof and sides to crumble, and the timbering to fall or reel out, and the expense of keeping the roads from collapsing would be prohibitive to its use. Saturation of the air in hot deep mines, even if practicable, has grave objections.

Table 1, recording the readings of a hygrometer in Yorkshire mines, shows that the air in the intake-airways is often remarkably dry, and could only be saturated or the dust kept damp by a most liberal and constant application of water.

The watering of roadways in Westphalia has been held largely accountable for the spread of ankylostomiasis, and although recent observations seem to discount this theory, a hot, humid atmosphere is likely to affect seriously the health of those who work in it. The legislature has recognized that such an atmosphere is deleterious to health, and there are provisions in the Factory Acts prohibiting excessive humidity in factories. It would be futile to sacrifice health to safety.

I suggest that the following methods, used in conjunction, can be installed without undue cost, and would largely remedy the dust-danger: (1) The sides and bottoms of the tubs should be made dust-tight, so far as is possible. (2) The full tubs on the main haulage-roads should be watered or sprayed before commencing their outby journey. (3) The empty tubs should be watered before they are distributed to the tributary roads. (4) The full tubs should be sprinkled at the coal-face before they start on their outby journey. (5) The main roads should be frequently cleaned. (6) The screens should be watered and sprayed so as to prevent the dust from flying about the pit-top; or hoppers should be fixed and the dust collected by suction-fans, on the principle of seed-cleaners. This plan was suggested in the discussion of Mr. Mackey's paper on coalwashing,[1] and as two members declared their intention of trying it, perhaps they would now give their experiences.

These methods are all designed to cut off the supply of dust, without injuring the roads by excessive watering; but where the roads will stand it, they may be sprinkled as well. It may be added that custom is the only reason for screening and cleaning the coal near the pit-top. This plant could, economically, be placed at a distance.

TABLE 1.—HYGROMETER-READINGS IN SOUTH YORKSHIRE COAL-MINES.

Place of Measurement.	Temperature. Place of Measurement. Dry Bulb. Deg. Fahr.	Wet Bulb. Deg. Fahr.	Remarks.
I. Mine: 2,280 ft. deep—			
Surface	58	54	Wet morning.
Intake-airway: near the pit-bottom	69 2/5	62	
Intake-airway: 3,000 ft. inby	78¾	68¾	
Main return-airway	85½	74¾	
II. Mine: 1,791 ft. deep—			
Surface	51	45½	Fine bright day.
Intake-airway: near the pit-bottom	61	54¾	155,000 cubic ft. of air passing per minute.
Main return-airway	86	75½	

* A paper read at a meeting of the Institution of Mining Engineers, at Leeds, January, 1905.

[1] *Transactions* Institute Mining Engineers, 1904, XXVII, pp. 59 and 61.

As long as dusty roads are allowed in mines, the coal-industry is under the dark shadow of a coming great disaster. The looming danger is recognized by all, and I submit that this period of peace and immunity is the time to take practical steps to avoid the danger. I believe a discussion will show that it is reasonably practicable to keep most mines comparatively free from dangerous dust, and that this freedom will conduce to safety, and to health and comfort as well.

Notes on Southern Nevada.*

BY H. H. TAFT.†

It has long been known that the volcanic area south of Belmont, Nye county, Nevada, had mining possibilities. Some of the old-time prospectors knew that gold existed there. Its remoteness from any source of supplies, its long distances from water, the absence of game, and more, perhaps, the lack of grass for animals to subsist upon, has made this an unattractive region in which to search for mines.

The discovery of Tonopah by J. L. Butler, who located the Mizpah claim in May, 1900, attracted many people. As the boom declined, many went away, some scattering out into the surrounding country, and the population is now about 7,000. In the fall of 1902 a discovery of gold was made 23 miles south, in what is now known as the Sandstorm group, four miles NW. of Goldfield. In the winter of 1903-4 the Combination, January and Florence mines were discovered.

In January, 1905, Goldfield had 10,000 inhabitants. In June, 1904, rich gold-ore was found 85 miles SE., at the foot of the south end of the Kawich mountains, but this discovery was kept quiet until a re-location could be made.

On August 10, 1904, the Bullfrog claims, and a month later the Ladd mountain and neighboring claims, were located. The Shoshone group was located September 24. This district is from 60 to 80 miles SE. of Goldfield. In September, 1904, there was a stampede for Bullfrog and Gold Crater—the latter a small area 21 miles east of Goldfield. Two mining districts, called Beatty and Bullfrog, were organized under the laws of Nevada. Later, overflow migrations poured into the old and abandoned districts of Lida (or Allida), Tule Cañon, State Line and Silver Peak, and others more remote.

During the winter of 1904-5 the desert seemed full of people. All sorts of outfits traversed unfrequented roads—men afoot and alone, "burro men," carriages, wagons and automobiles. The inevitable reaction of such furore is no doubt deplorable; yet the rapid development of any new mining region depends upon the excited "tenderfoot" rather than the conservative mine-operator. At Goldfield, it was "a sight to see." There were hundreds of people walking over the hills, many with a canteen of water slung over one shoulder, while a small iron mortar hung to the other, and a pestle, a pick-and a 5-in. frying-pan constituted the equipment for sampling, grinding and testing. The rock is soft and the gold at the surface is free.

There is no very good map of this region. The best is that of the U. S. Geological Survey[1]; but this and the Land-Office maps are incorrect, particularly in the topography between the northwest arm of Death valley ("Lost valley") and Owens Lake. A good map showing the potable waters would save much suffering, and perhaps some lives. The springs should be marked by the Government. So far this year about 30 lives have been lost on account of thirst in that desert region.

Tonopah is 6,000, Goldfield 5,500, and the Bullfrog region from 3,500 to 4,000 ft., above sea-level. The climate at Goldfield is much the same as that at Pueblo, Colo., except that the rain-fall is less than half. The topographical variation is not great in Nevada, the summits of the mountain ranges are rarely more than 2,000 or 3,000 ft. above the surrounding deserts. Inyo county, Cal., is different, being remarkable for deep valleys and high precipitous mountains. The altitude of Owens Lake is 3,575 ft., and the Sierra Nevada, a few miles west, reaches an elevation of 15,000 ft., above sea-level. The Panamint peaks rise to 11,000 ft., while Death valley, opposite these peaks, and but a few miles east, is below sea-level. On the west, the Panamint valley is 1,100 ft. above tide, while Saline and Butte valleys are not far from sea-level.

Cord-wood sells in Tonopah and Goldfield at $16 per cord; at Bullfrog the price is $25.

The desert is often green with several varieties of brush having different local names,—a short stunted growth of no value which gives the valleys the appearance of being more fertile than they really are. A strange feature is the almost entire absence of grass. Along the water-courses, such as the Oasis valley, at Ash meadows, in the Death valley, Panamint, and others where there is water, salt and wire grass present a meadow-like appearance, but will barely keep cattle from starving. Sometimes there are in the valleys large areas devoid of vegetation, with the ground so hard that a wagon leaves but a slight track.

The traveler usually takes the "Overland Limited" to Reno, Nev., then the Virginia & Truckee railroad 41 miles to Mound House, the Carson & Colorado 137 miles to Sodaville, and the Tonopah railroad 66 miles to Tonopah. The Carson & Colorado is a narrow-gauge road with light rails and limited equipment. It was completed to Keeler, Inyo county, Cal., in 1881, and was a barren investment until lately, when the Southern Pacific Co. obtained control of it, just in time to reap the benefits of the Tonopah rush. From Sodaville to Tonopah is also narrow gauge. From Tonopah to Goldfield there are both stages and automobiles running,—the latter making the distance of 27 miles in 2 hours. All this will soon be changed, and the traveler will be able to leave the main line of the Central Pacific in a broad gauge car that will take him through to Goldfield.

Surveys have been made and there is much talk of railroads from the south. A factor in this situation is furnished by the large deposits of colemanite (calcium borate) between Amargosa and Death valleys.

The outfit for a trip through this section requires as a usual rule, 1 lb. each of vegetable and animal food per day per man, and 14 lb. of hay and 12 lb. of grain per horse per day. A larger amount of alfalfa, with a smaller amount of barley, can be fed. Mules are preferable to horses, because they are more hardy and eat and drink less. In a country where evaporation is so great a team of horses will require about 15 gal., say 120 lb., of water per day; in the heat of the summer more. Where there is running water in the winter there is nothing but a dry "arroyo" in the summer, indeed, in a channel where there is a stream of running water in the morning sufficient for stock, it may be dry and even dusty at sundown.

A good assaying-equipment sufficient for 1,000 assays will weigh 500 lb. and require five cases of gasoline. A portable balance, sensitive to 0.005 mg. can be had, and is best in that it enables one to reach a desired degree of accuracy with less fluxes and smaller weight of crucibles.

The people are very kind about giving information as to water and roads; but such information is often inaccurate. Nye county, Nev., has had sign-boards put up at cross-roads; and some of the freighters, also, are thoughtful enough to leave some mark or sign.

Electrolysis in Cleveland destroyed 24 service pipes in 1904, according to Supt. E. W. Bemis, of the water department. Of the 32 breaks, 24 were from settlement of sewer trenches.

Water gages on drip pockets are valuable in high-pressure steam piping in order to indicate whether the trap is draining regularly or not. For this purpose automatic or chain-closing gages should be used, as this would enable them to be closed from a distance if the glass should break.

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* From advance proofs (subject to revision) of the *Transactions* of the American Institute of Mining Engineers.

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[1] *Bulletin* No. 208, United States Geological Survey.

THE ENGINEERING AND MINING JOURNAL

Contents.

*Illustrated.

The Tin Market.

The price for tin continues its upward course in a sky-rocket way, 44.5c. per lb. having been quoted this week. Tin comes near to being an indispensable metal, i.e., one for which there is no substitute, and the corner being evidently a close one and the shortage in the supply definite and acute, it would be folly to predict that the top has yet been reached. The conditions being as they are, it is worth while to emphasize the possibilities which exist in the tin deposits of the United States, to which we have previously called attention. At the antipodes, mining men are fully alive to the enhanced value of low-grade tin deposits, as is manifested by the extensive plans to develop those of Tasmania and elsewhere, in which the great Mt. Lyell company among others is participating. American capitalists should certainly direct their attention to South Dakota, Virginia and the Carolinas.

As to the cause for the shortage in supply, we must look to the Dutch East Indies, and especially to the Federated Malay States. The cost of production in the latter has been recently increased both by the rise in the value of the silver dollar, which makes labor and supplies cost more, and the exhaustion of the richer alluvial mines. These factors have been the fundamental cause of the recent increase in the value of tin, and they are so real that it is said, on good authority, that if an increase in the supply from other sources should force down the price of tin below the level of 1905, many of the mines in the Straits would have to be abandoned.

It appears quite plain that the gradual increase in the price of this metal, which has taken place during the last year, has been due to natural and legitimate causes, and inasmuch as no important increase in the supply is to be anticipated in the immediate future, we may safely expect a high range of values for some time to come.

Copper Prices.

All of the Lake companies, which publish detailed reports of their operations, now having made their statements to their stockholders, covering the year 1905, in accordance with our usual custom we make comparison of the prices actually received for their outputs of copper during the year, with the average for the year as shown by the market reports of the JOURNAL. Omitting those companies which, so far as we are aware, based their sales in any way on the quotations of the JOURNAL, and also a few companies which did not begin to produce until the latter part of the year, or greatly increased their output during the latter part of the year, the following table shows the figures given by the Lake companies, which have published their reports:

Company.	Pounds.	Value.	Per Lb.
Adventure	1,606,208	$ 252,572	15.73c.
Centennial	1,446 584	230,129	15.91
Isle Royale	2,973,761	461,687	15.53
Michigan	2,891,796	453,683	15.69
Mohawk	9,387,614	1 457,588	15.53
Osceola	18,938,965	2,942,239	15.54
Quincy	18,827,557	2,981,121	15.83
Tamarack	15,824,008	2,448,240	15.47
Trimountain	10 476,462	1,620,893	15.47
Totals	82,372,955	12,818 152	15.597c.

The average price for Lake copper in 1905 as reported by the JOURNAL was 15.699 cents per pound. It will be observed from the above table that only three companies realized an average in excess of our figure. These were the Centennial, which on a small output made to a larger extent in the second half of the year than in the first, realized 0.21 cent per pound more than our average; the Quincy, which realized 0.13 more, this however, including its receipts from the sale of silver as well as of copper; and the Adventure, which realized 0.03 cent more. The average price received by nine companies on the sale of 82,372,955 pounds of copper was 15.597 cents.

The Allouez company produced 1,167,957 pounds of copper during the last five months of the year, realizing an average of 16.67 cents, our average for the same months being 16.64 cents.

There are comparatively few producers of electrolytic copper which report their production and sales, and in the cases of those which do so report, the fiscal year frequently does not coincide with the calendar year. The figures which have been published are as follows, our own average for the corresponding period being stated in brackets immediately afterward: Greene Consolidated, year ending July 31, 1905, sales 77,991,946 lb., average (freight deducted) 14,117c. [14.252]; Calumet & Arizona, year ending Sept. 30, 1905, 31,772,896 lb., average 14.932c. [14.82]; North Butte, year ending March 31, 1906, sales 30,954,788 lb., average 16.47c. [16.38]. The Tennessee Copper Company states its production, but does not publish a report of its sales; by comparison, however, of the reports for

1904 and 1905, it can be figured that the sales in 1905 amounted to 8,796,042 lb., at an average of 14.93c. This copper was shipped as bessemer pig.

Figures of the Lake companies are particularly valuable, because they cover so large a proportion of the production of Lake copper. Differences in the receipts of the several companies are to be explained in a variety of ways. The copper is not all of the same grade; it is not all sold with the same skill, and mistakes may be made in forecasting the market; large sales on the higher fluctuations and small sales on the lower affect the results, as do also an increasing production on a generally rising market. A comparison extending over a whole year, however, for a number of companies, and reduction to a general average tend to equalize the variations.

The facts thus presented hardly require any further comment. In spite of criticisms, we have aimed always to represent the wholesale market as it is actually shown by the large transactions of the producers, on the uniform basis of the net cash price for New York delivery. This course has enabled us to give a record of the metal markets, which has been, in the main, correct. We say "in the main" because no man can always avoid mistakes. Comparison with the actual receipts is the best check of accuracy.

The Anthracite Settlement.

After a suspension of work lasting six weeks, the mine workers in the anthracite collieries will resume operation on May 14, under the agreement which has been in force since the Anthracite Strike Commission made its award in 1903. This agreement has been renewed for a further period of three years; and will accordingly govern the relations of operators and miners until March 31, 1909. The result of negotiations extending over two months and the suspension of work for three-fourths of that time has been the continuance of the old condition of work and wages. The formal agreement—which will be found on another page—is brief and sufficiently simple in its terms. It puts an end to what was, at one time, a threatening situation.

The first demands of the miners were for an eight-hour day; an increase of from 10 to 12½ per cent. in wages; the weighing of coal instead of its estimate by car-loads; and, finally, the adoption of the check-off system, that is, the collection by the companies of the miners' dues to the union, this collection being enforced by the deduction of any arrears of dues from the monthly pay-roll of those miners who are members of the union. Though not clearly expressed in terms, the restriction of work to union men was implied. The continued negotiations, which followed the rejection of these proposals, included modified demands, and arbitration, either by a new board, or by the Strike Commission, to be re-convened for the purpose. The operators throughout insisted on their willingness to abide by the award of 1903; they also insisted on the maintenance of the "open shop" which was implied in that award. In the end they have succeeded, the miners accepting their terms, and even conceding the point of making the new agreement for a term of three years; thereby yielding the strategic advantage of having the contract expire in the year of a Presidential election, when strong political influences might be brought to bear on the miners' side.

The only apparent concessions made by the companies were that no discrimination shall be exercised in employing men, except in the few cases where they have been concerned in riot, violence to persons, or destruction of property; and in signing a contract with the representatives of the union—which does not, however, involve any concession to the "closed shop" system. It is to be noted that there has been no formal strike. The men ceased to work on April 1, when the old contract expired by limitation; but it was, in terms, a "suspension" only, and negotiations continued without interruption.

The causes that led to the practical surrender of the union claims are somewhat complex. Among them must be placed a recognition of the strength of the opposition to be met in case the union demands were insisted upon, and a formal strike ordered. There is no formal agreement or combination among the anthracite companies; but by community of ownership and interest they constitute the strictest and strongest monopoly in this country, with possibly one exception. There is no likelihood of any weakening or withdrawal in case of a contest. Every indication was that preparations had been fully and carefully made for a long fight, should it come; and there is little question that the union leaders believed the preparation on their own side insufficient. It is extremely probable, too, that they realized that public opinion was not with them. Undoubtedly there was some justification for the strike of 1902; but it has been generally believed that the award of the Strike Commission was fair to the men. Under it they had the nine-hour day; a fair wage-scale; the sliding scale, giving them advantages of any rise in coal prices; and the conciliation board for the settlement of minor differences. Under the award the miners have generally done well; especially as, during the past three years they have not suffered from what was formerly the great trouble in the region—irregular work, owing to frequent stoppages at collieries. The operators, on their side, have also recognized the advantages of having public opinion with them, and have avoided the serious mistake they made three years ago. Mr. Willcox, rather than Mr. Baer, has been their spokesman, and they have sought to conciliate the consuming public, instead of bullying it. The results are manifest.

The remaining, and possibly the determining consideration with the union leaders was the doubt whether they could hold the large foreign element among the miners. This element—made up of Poles, Hungarians, Italians and others—has been uneasy under the suspension. They have not recognized any necessity for it, and have resented the loss of wages, with no compensating gain in any other direction. In fact many of them have actually gone to work, when the chance has been given them at open collieries or washeries; and there was little doubt that many more would do so. It is this element which is hard to manage and hold in the union. It is this element also which is easily led to those violent outbreaks which discredit the union so seriously with the general public.

The union leaders have acted wisely in giving way. The action may make it difficult to maintain the strength of the organization for a time; but there was the alternative that an unsuccessful strike might disrupt it altogether. It is said to be largely due to John Mitchell, who has not favored a strike, that the present conclusion has been reached.

The public is to be congratulated on the avoidance of further trouble. It has not really suffered as yet, since the possibility of trouble was recognized so far ahead, that large stocks of coal were accumulated; sufficient to avoid any real scarcity during the suspension of work.

Spelter Statistics for 1905.

BY W. R. INGALLS.

I have endeavored to collect for 1905 statistics of the spelter industry of the United States, showing where the ore was produced, and where it was consumed. The investigation has been, on the whole, successful. Reports have been received from all the smelters, and from a large proportion of the consumers. My thanks are due to the producers and consumers who have aided in this investigation by their co-operation. All tons stated in this article are of 2000 lb.

Production of Ore—Statistics of the production of zinc ore in Missouri and Kansas (Joplin district) and New Jersey are available for a long series of years. Up to a few years ago these were sufficient, inasmuch as nearly the whole spelter output of the United States was derived from those sources. In 1899 zinc ore from Colorado began to appear in the market, and during the last two or three years that ore, together with ore from other States and Territories west of the Rocky Mountains, and from British Columbia and Mexico, has been figuring largely in the market. It is, therefore, important to know definitely as to the production of these sources of ore supply. Such statistics respecting them as have previously been published are incomplete, and of doubtful accuracy.

Statistics of zinc ore production indicate directly the magnitude of the mining industry, by showing the tonnage of ore produced and moved. In connection with spelter production, however, it is necessary to examine them with knowledge of what they represent.

The ore production of the Joplin district is of two classes, viz., blende and calamine. The former averages about 58 per cent. zinc; in round numbers, two tons of this ore make one ton of spelter. The calamine of the district is entirely zinc silicate. It may be assumed as averaging a little better than 40 per cent. zinc, three tons of ore being required, roughly, to make one ton of spelter. The total production of zinc ore in the Joplin district in 1905 was 252,435 tons. No attempt was made to classify this as blende and calamine, but in recent years the output of the latter class of ore has amounted to 10,000-16,000 tons per annum, and it may be reasonably assumed that the production in 1905 was something between those figures.

A small amount of calamine, both carbonate and silicate, is produced in southeastern Missouri, especially by the Valle mines. This ore goes chiefly to St. Louis, and amounts to 3000-6000 tons per annum.

The zinc ore produced in the States and Territories west of the Rocky Mountains is both blende and calamine, the latter being chiefly zinc carbonate, produced in Mexico and New Mexico. The production of Colorado, Utah, Idaho, Montana, and British Columbia is chiefly, if not entirely, blende. This ore varies generally in grade from 30 per cent. to 50 per cent. zinc. In a few cases, as at Creede, Colo., and the output of hand-sorted, lump ore of one mine in British Columbia, it exceeds 50 per cent., the Creede ore (mill-concentrate) in fact being almost as high in zinc as the average Joplin product, but although low in iron it is higher in lead than the Joplin ore. The average zinc content of the western ore, both blende and calamine, may be assumed at 38 per cent. From 3⅓ to 3 tons of this ore are required to produce one ton of spelter. This sulphide ore is comparatively high in iron and lead; some of it is very high in those elements. It is mostly produced as a concentrate from mixed sulphides, the lead product being shipped to the silver-lead smelters. The Iron Silver Mining Company, however, ships a good deal of hand-sorted lump ore from its Moyer mine, at Leadville.

Wisconsin produces a blende concentrate, which after magnetic separation, is practically as high in zinc as the average Joplin ore, and when well prepared is comparatively low in iron and lead, the blende itself being only slightly ferruginous and the iron content of the marketed ore being chiefly intermixed marcasite. Wisconsin also produces carbonate ore, which is used at Mineral Point for the manufacture of zinc oxide.

The large output of zinc ore in New Jersey is entirely from the Franklin mine of the New Jersey Zinc Company. It is the mixed franklinite-willemite, averaging about 20 per cent. in zinc, which is separated into one product (willemite) for spelter manufacture and another product (franklinite) for the manufacture of zinc oxide and spiegeleisen.

Of the Western zinc-mining districts, the most important single district is Leadville, Colo. Other important districts are Creede, Colo., Magdalena, N. M., Park City and Frisco, Utah, Monterey, and Las Plomosas (near San Sostenes, on the K. C., M. & O. Ry., Chihuahua) Mexico, and the Slocan, British Columbia. Outside of these districts, the zinc ore production west of the Rocky Mountains comes from many scattered localities. In New Mexico, besides Magdalena, Hanover is a small producer, and there are several other promising districts. In Montana, Butte is the principal source. In Idaho, the Wood River district is the most important, although some ore was obtained in 1905 from the Cœur d'Alene. In Utah, the Daly West Mining Company, of Park City, and the Horn Silver Mining Company of Frisco have large zinc resources; the former did not produce in 1905, but the latter shipped 8445 tons. In Colorado, besides Leadville and Creede, zinc ore is produced at Rico, and by many small mines in Clear Creek and Summit counties. In Mexico the Calera mine, of the State of Chihuahua, was a considerable shipper of mixed sulphide ore to Pueblo, Colo. Arizona and Nevada both figured as small producers in 1905. The ore of Magdalena, N. M., was shipped chiefly to Missouri, Kansas, and Wisconsin, for the manufacture of zinc oxide. Other western ores are shipped to Mineral Point, Wis., for the manufacture of zinc oxide.

The statistics of ore production by States are given in the following table. It will be observed that the figures for 1905, in the case of certain states, differ from those which have been published in the newspapers. Discrepancies are to be accounted for, to some extent, by the difference in methods of stating the figures. From some districts, especially Leadville, a good deal of ore is shipped to separating plants outside of the district, which magnetically and otherwise separate the ore into lead ore and zinc ore. In some cases the shipments of crude ore are entered simply as zinc ore, which is, of course, misleading. My statistics are based on the production of zinc ore in marketable form, from the standpoint of the zinc smelter, as shipped to and received by the zinc smelter. A certain quantity of low-grade ore, treated at Cañon City Colo., for the manufacture of zinc-lead pigment, is enumerated separately.

PRODUCTION OF ZINC ORE IN THE UNITED STATES.

State.	1904.	1905.
Colorado	*a* 94,000	105,500
Idaho	Nil.	1,700
Kentucky	*d* 958	*d* 414
Missouri-Kansas	*b* 273,238	268,500
Montana	Nil.	2,000
New Mexico	*c* 21,000	*g* 20,000
New Jersey	*d* 280,029	*d* 361,829
Utah	Nil.	9,265
Wisconsin	*c* 19,300	32,690
Other states *f*	*a* 4,500	*e* 6,000
Totals	693,025	807,898

a, Estimated. *b*, Production of Joplin district, plus output of southeastern Missouri, the latter as reported by the State mine inspector. *c*, According to H. F. Bain, "Contributions to Economic Geology," 1904. *d*, Report of State Geologist. *e*, Partly estimated. *f*, Arizona, Nevada, Arkansas, Illinois, Iowa, Tennessee and Virginia. *g*, Partially estimated, and subject to revision.

IMPORTS OF ZINC ORE INTO THE UNITED STATES.

Source.	1904.	1905.
British Columbia	2,100	8,561
Mexico	?	*a* 32,164
Totals	?	40,725

a, The actual tonnage of ore imported was somewhat greater than this figure, but it included some mixed ore, which for statistical purposes has been reduced to the zinc ore equivalent.

There was a small importation of zinc ore from Mexico in 1904, the business with that country having been inaugurated in that year, but statistics concerning it are unavailable.

The total supply of zinc ore in 1905, so far as can be enumerated, was 807,898 tons from domestic sources and 40,725 from foreign, a total of 848,623 tons. The situation is clarified if the production of New Jersey be deducted, leaving 486,794 tons, to be compared with the production of 190,294 tons of Western spelter. The

Rocky Mountain ore used for the manufacture of spelter amounted to 160,000 tons.

The total—807,898 tons—understates the actual production of ore to some extent, certain ore consumed for the manufacture of oxide being omitted. The deficiency is chiefly in the representation of the outputs of Wisconsin and "Other States."

The United States Smelting Company, at Cañon City, Colo., treated 33,000 tons of ore, averaging 22.7 per cent. zinc, and 8.8 per cent. lead, all of which, except 800 tons from Arizona, was obtained from Colorado. This ore, used for making zinc-lead pigment, has not been included in the above statements.

The exportation of zinc ore from the United States in 1905 was 30,448 tons, against 35,333 tons in 1904. This was chiefly New Jersey willemite. There was also exported in 1905 zinc dross to the amount of 5,318 tons. This is galvanizers' waste.

Production of Spelter—The total production of spelter in 1905 was 201,748 short tons. The following table shows the distribution of the production according to States. Of the total, 190,294 tons was Western spelter; the remainder was Eastern spelter, being largely the high-grade brands produced by the New Jersey Zinc Company at Bethlehem and Palmerton, Penn., and by the Bertha Mineral Company, at Pulaski, Va. These companies produce, however, second and third grades of metal, as well as the first grade. The Western metal, also, is produced in different grades, although their values do not cover so wide a range as in the case of the Eastern spelter. "Glendale refined," which ordinarily commands a premium of about 1¼c. per lb. over ordinary prime Western is produced by the Edgar Zinc Company from selected ores. This is used largely in the manufacture of brass. The remainder of the Western spelter is marketed as "specials", and ordinary "prime Western." The specials are the first of the three draws made daily from the furnace, and this being the spelter distilled at the lowest temperature, is lower in lead, and higher in cadmium than the second and third draws. The special brands ordinarily command a premium of 10 to 15c. per 100 lb. over ordinary prime Western.

PRODUCTION OF SPELTER.

State.	1904.	1905.
Colorado	4,906	6,599
Illinois	47,607	45,357
Kansas	103,721	114,948
Missouri	12,056	11 800
East and South	13,513	23,044
Totals	181,803	201,748

In the production of prime Western spelter, a few of the smelters continue to use nothing but Joplin ore, but the majority use ore from west of the Rocky Mountains in connection with the Joplin ore, and several of them use it exclusively. The ores from the far West when properly smelted furnish a good grade of spelter, which meets the requirements of galvanizers and the manufacturers of some grades of brass.

There was a large increase in the smelting capacity in 1905, the Caney Zinc Company, of Caney, the Chanute Zinc Company, of Chanute, and the Cockerill Zinc Company, of Altoona, Kansas, and the Grasselli Chemical Company, of Clarksburg, W. Va., whose plants were constructed in 1904, having a full year of operation in 1905. The Caney Zinc Company and Cockerill Zinc Company each added two new blocks of furnaces (608 retorts per block) to their plants in 1905. No other additions to plants were reported, except that the Granby Mining and Smelting Company had under construction one new block (of 320 retorts) at its works at Neodesha, Kansas, which was to be completed about Jan. 1, 1906. Several new plants are, however, now under construction, the most important being those of Hegeler Bros., at Danville, Ill., which is to comprise 1700 retorts, and the large plants which the Mineral Point Zinc Company is erecting at Depue, Ill., which will have 4800 retorts. Both these plants are to make sulphuric acid, as well as spelter. The Depue works will be equipped with Neureuther-Siemens regenerative furnaces, similar to those employed at Peru, Ill. The Danville plant will employ a modification of the Hegeler furnace. The Danville plant should come into operation before the end of 1906. It will probably be toward the end of the year before the works at Depue are completed. The New Jersey Zinc Company is also making a large extension to its plants at Palmerton, Penn., the number of furnaces being increased from four to twelve. Upon completion of the addition these works will have two Siemens furnaces, and ten Convers & DeSaulles furnaces, the latter having 200 retorts per furnace.

Several new works are now contemplated, but it is not likely that any of them will come into operation during 1906. It is reported that the United States Zinc company will build a new plant at Pueblo, Colo., of the same type and capacity as its present plant which has six Overpelt furnaces (1440 large retorts). At least one new plant is under consideration for erection in Illinois. The Northern coalfield of Illinois now seems destined to be the great center of Western zinc smelting, it being close to the Wisconsin mines, which are rapidly increasing in production, able to command ore from the Joplin and the far West on good terms, and at no great disadvantage in fuel, as compared with Kansas, since the cost of gas in the latter State has increased materially. However, it appears probable that the manufacture of sulphuric acid as a by-product may be temporarily overdone, although it is the general experience that when a supply of that important commodity is offered, a demand for it rapidly develops.

The Wenona Zinc Manufacturing Company, of Wenona, Ill., which owns a small plant of direct-fired Belgian furnaces, discontinued operation shortly after the middle of 1905. The Cockerill Zinc Company lost two months' operation of two blocks through a fire at its Altoona plant. The extension in the operations of the Cockerill Zinc Company was a feature of 1905. This company now operates the smelters at Altoona, Kan., La Harpe, Kan. (formerly La Harpe Smelting Company), Gas, Kan. (formerly Cherokee-Lanyon Spelter Company), Pittsburg, Kan., and at Rich Hill and Nevada, Mo. The resumption of operations by this company at one of the old coal smelters at Pittsburg, Kan., was a noteworthy feature of the year.

The aggregate capacity of the Western smelting works is now very large, but it is to be remarked that the treatment of the large quantity of comparatively low-grade Rocky Mountain ore requires considerably larger furnace capacity than the high-grade Joplin ore.

I estimate that out of the 190,294 tons of Western spelter produced in 1905, about 124,000 tons was derived from ore mined in the Joplin district, about 12,294 tons from ore mined in Wisconsin, Kentucky, southeastern Missouri and Arkansas, and about 54,000 tons from ore mined west of the Rocky Mountains, including British Columbia and Mexico. The quantity of spelter originating in the far West certainly shows a remarkable growth for an industry that is only five years old. In 1904, about 128,000 tons of spelter was derived from Joplin ore. The total production of Western spelter having largely increased in 1905, the relative position of Joplin was materially reduced.

It must be explained why the output of 54,000 tons of Rocky Mountain spelter, which would correspond to only about 162,000 tons of crude ore does not agree with the statistics previously given by States. This is chiefly because a good deal of that ore was consumed for the manufacture of zinc oxide. The figure—162,000 tons—agrees satisfactorily, however, with that previously stated—160,000—as the known consumption of this class of ore for spelter-making.

The total production of zinc oxide in 1905 was 65,403 tons, which represents 52,322 tons of spelter. Part of this was derived from New Jersey ore, part from Wisconsin, Kentucky and other ore, and part from Rocky Mountain ore. The producers of zinc oxide are few in number and further analysis of this industry would be impossible without betraying individual interests.

There was also a production of zinc-lead pigment to the amount of 7200 tons, which required the smelting of 33,000 tons of ore, as previously noted.

Consumption of Spelter—The stock of spelter. in the hands of smelters at the beginning of 1905 amounted to about 6500 tons. The production during the year was 201,748 tons. The imports amounted to 521 tons. The total supply was consequently 208,769 tons. The exports of spelter during the year were 9515 tons. The stocks in the hands of smelters at the end of the year amounted to 4000 tons. The domestic consumption was consequently 199,254 tons.

I have made an attempt to distribute this consumption according to use. So far as I am aware, this has not previously been attempted in a systematic manner, and there are but few data with which to make comparison. In 1892 it was estimated by W. H. Seamon that out of a total consumption of 78,040 tons, the galvanizing trade used 35,000; the brass-makers, 20,500; the rollers of sheet zinc, 15,500; the desilverizers of lead bullion, 3500; while the remaining 3540 tons were employed for miscellaneous purposes. In 1898, according to statistics which I had occasion to collect, out of a total consumption of 105,000 tons, the galvanizers used about 55,000 tons (52 per cent.); the brass-makers, 24,000 tons (23 per cent.); the rollers of sheet zinc, 20,000 tons (19 per cent.); the lead desilverizers, 1500 tons (1.5 per cent.); and miscellaneous consumers, 4500 tons (4.5 per cent.). In *The Mineral Industry*, Vol. VIII, it was estimated that of the consumption of spelter in the United States in 1899, about 50 per cent. was used in galvanizing, 15 per cent. in brass-making, 20 per cent. in the form of sheets, and 15 per cent. for other purposes. The agreement between those figures and my own for the previous year is very close with respect to the galvanizing and sheet zinc industries. With respect to brass and consumption for other purposes, I am disposed to consider that *The Mineral Industry* underestimated the former and overestimated the latter.

For 1905 I received direct reports from consumers accounting for 163,562 tons of the consumption during the year. Twenty-one galvanizers reported the consumption of 92,766 tons. Seventeen brass-makers reported the consumption of 32,888 tons. The rollers of sheet zinc, of whom there are six, made reports with two exceptions, enabling the estimate of 34,000 tons as the consumption for this purpose to be made with close approximation to the truth. The consumption of spelter for the desilverization of lead is estimated on the basis of the desilverized lead produced, a consumption of 0.8 per cent. of spelter being reckoned.

The statistical reports are undoubtedly most incomplete with respect to brass and the consumption of zinc for other purposes than those enumerated above. There is a large number of small brass-makers in the United States who consume from 5 to 250 tons of spelter per annum, many foundries being conducted in connection with other manufacturing enterprises. Among the consumptions of zinc for other purposes are the use of the metal in making castings, in connection with which a good deal of high-grade spelter is employed, and also for such purposes as the manufacture of battery zincs, for which virgin spelter is remelted and molded. Spelter is also employed for the manufacture of zinc chloride, zinc sulphate, and other chemical products. For all these purposes, however, a good deal of scrap from the cutting of sheet zinc is utilized, even certain galvanizers being purchasers of that material.

My reports indicate that the consumption of spelter in 1905 may be classified approximately as follows: Galvanizing, 50 per cent.; brass-making, 26 per cent.; sheet zinc rolling, 17 per cent.; lead desilverizing, 1¼ per cent.; other purposes, 5¾ per cent.

Incidentally this gives a rough idea of the consumption of copper for brass-making. If 52,000 tons of spelter were used for that purpose, there must have been employed at least 104,000 tons of copper for the same purpose. This figure corresponds to about 34 per cent. of the domestic consumption of new copper in 1905.

The great center of the American brass industry is the Naugatuck valley, Connecticut; of the galvanizing industry, the center is western Pennsylvania and eastern Ohio, within the districts commanded by Pittsburg, Penn., Wheeling, W. Va., and Youngstown, Ohio. A large proportion of the spelter produced in the United States is consumed in those districts.

The Sault Ste. Marie Canal.

The final report of Superintendent Joseph Ripley, of the Sault Ste. Marie canal contains figures which show the extent of the great traffic which passes between Lake Huron and Lake Superior. Some of these figures are given in the table below. A careful account is kept at the Sault of all vessels passing through the canals and their cargoes; probably no traffic record anywhere is so nearly complete.

The importance of the Sault canals to the mineral industry is shown by the following statement of the mineral freights passing through them during last season: Iron ore, 31,332,637 tons; pig and manufactured iron, 237,696 tons; copper, 106,520; building stone, 10,899; coal, 6,509,056; total, 38,196,808 tons. The mineral freight was 86.3 per cent. of the total; iron ore alone was 70.8 per cent. The estimated value of all freight was $416,965,484.

The following table shows the total number of vessels passing through the canals, with the freight carried and other notes of the traffic:

No. of vessels	21,679
Freight carried, tons	44,270,680
Average cargo, tons	2,041
Ton-miles of freight	36,892,797,973
Average distance carried, miles	833.3
Average rate per ton-mile, cents:	0.085

Of the total freight carried 88 per cent. passed through the American canal, and 12 per cent. through the Canadian canal. The American canal was open to navigation from April 14 to Dec. 16, or 246 days; the Canadian canal from April 10 to Dec. 20, or 255 days. The maximum traffic for a single day was on June 19, when the two canals passed 148 vessels, carrying 300,752 tons of freight. Of the vessels passed during the season, 17,197 were steamers, 3263 sailing vessels and 1219 small unregistered craft.

The following table shows the origin and destination of freight passing the canals; the east-bound freight coming from Lake Superior ports, and the west bound being destined to those ports:

	East-bound, To	West-bound, From
Lake Michigan ports	3,316,970	42,651
Lake Huron ports	11,182,208	372,721
Lake Erie ports	21,883,178	6,970,998
Lake Ontario ports	396,382	105,572
Total	36,778,738	7,491,942

The west-bound freight was 16.9 per cent., and the west-bound 83.1 per cent. of the total tonnage.

Of individual records, we find that the steamer "E. H. Gary" is credited with the largest single cargo, 12,368 tons of iron ore. The steamer "A. B. Wolvin" carried the largest quantity of freight reported by any registered vessel—274,401 tons of freight during the season; her ton-mileage being 249,038,482. The greatest mileage was made by the "Duluth," which traveled 41,374 miles during the season; equal to about 25 round trips between Duluth and a Lake Erie port, or a round trip in 10 days.

The size of Lake vessels is shown by the statement that of the registered vessels using the canal 84 were under 100 ft. in length; 198 from 100 to 200 ft.; 293 from 200 to 300 ft.; 184 from 300 to 400 ft.; 118 from 400 to 500 ft.; while 23 were from 500 to 600 ft. in length. The new boats now under construction are all of the largest class, over 500 ft. in length.

Welsh Tin-plate Industry.

London *Commercial Intelligence*, in a report on the tin-plate industry in South Wales, says: The tin-plate trade seems to be going from bad to worse. American competition is being severely felt, and though some of the Welsh makers are quoting under cost price to secure Canadian orders, they are being undersold to the extent of about 6d. per box, with the result that American deliveries into Canada are going up by leaps and bounds. In other markets, too, the Americans are entering into fierce competition with the Welsh markets.

Colliery Notes.

If it is desired to dispose of the waste rock or slate in the mine, let the brattice be first built, and the gob piled against it.

Crushing and pulverizing a coal before charging, will generally increase the hardness of the resulting coke, and enable it to carry a heavier burden.

The use of common black powder has been prohibited in the Dominion Coal Company's collieries, Nova Scotia. In future only high-grade safety explosives will be employed in mining work.

All brattices separating the main intake from the main return airway should be substantially built of brick or stone, and never of planking or other temporary and insecure material, such as gob or waste rock.

Although there are exceptions to the general rule, it is considered that a coking coal should run from 20 to 33 per cent. volatile matter; from 60 to 70 per cent. fixed carbon; and from 5 to 10 per cent. ash.

A coal having higher fixed carbon than 70 per cent. makes too dense a coke; when the fixed carbon is below 60, and the volatile matter above 33, the coke is too spongy and brittle and the coal more adapted for gas purposes.

Not only do temporary brattices leak and prove wasteful of the air current, but they are most dangerous in case of a local explosion, and may cause the loss of lives from an unnecessary derangement of the ventilating current.

At a colliery in the north of England, the output per man is said to have been increased from four tons to over 10 tons by introduction of the coal conveyor system at the face in working a thin seam of coal by the longwall method.

It may be assumed that there are practically four common sources of danger from explosion in coal mines, which are as follows: The ignition of a body of firedamp; the ignition of powder in cans; a blown-out or windy shot; the ignition of fine dust and coal in suspension in the air.

It is being generally proved that coal tamped before or after it is charged into the oven, improves the quality of the coke. The hardness of the cell walls forming the coke structure is in part dependent on the compactness of the coal in the oven.

In order to determine the coking qualities of a coal, there are no general fixed rules that can be observed. Chemical analyses will not satisfy, and the usual form of laboratory test known as the crucible test is not as safe as to test a complete charge in a regular oven.

The coefficient of friction of a ventilation current is the pressure required to overcome the resistance due to friction for each square foot of rubbing surface exposed to the air when it is traveling at a uniform rate of 1000 ft. per minute. It is commonly expressed in pounds per square foot, or in inches of water gage.

In the development of any coal property where extensive operations are proposed, it is always best to establish a true meridian base, and connect the surface and underground surveys to this fixed line. For general purposes, and especially where the transit has no solar attachment, the observation on Polaris at elongation will be found more satisfactory than a solar observation.

Danger from explosions in collieries is greatly lessened by the strict enforcement of the mining law with reference to ventilation and the blasting of coal, handling of powder, by proper provision of safety lamps; by removing and preventing dust; and enforcing a regular system of watching over the gassy conditions of the workings by a sufficient number of competent men. Eternal watchfulness is the price of immunity from such dangers.

In the Cape Breton collieries, Nova Scotia the Ackroyd & Best safety lamp is largely used. This lamp is lighted and unlocked electrically. Relighters are placed in the mine at convenient points along the entries, and are composed of a storage battery incased in a small metallic box. The compartment in which the lamp is placed to be lighted is just large enough to admit one lamp. A lamp having been placed in position in it, the door is closed tight, and a button is pressed which makes an electrical connection and lights the lamp.

The extent and force of any explosion that may occur will always be less where there are no accumulations of fine coal and dust at the working faces, and on the roadways. This condition can only be accomplished by the enforcement of strict regulations in regard to the loading out of fine coal and keeping the mine cars in good condition. Strict measures should always be adopted to regulate the toppng of cars and the prevention of overloading. In dry and dusty mines and especially where the coal is soft and inflammable, a uniform system of spraying the entries and the working face should be adopted.

The fan shaft should always be located at a sufficient distance from the hoisting shaft to be isolated in case of fire or other accidents in the hoisting shaft. It is generally most convenient also to reserve one compartment of the hoisting shaft for a manway and for steam and compressed air pipes and water columns, and the wires used for conducting electric power into the mine. The location of the fan at a distance from the hoisting shaft affords better air than when the fan is located at or near the hoisting shaft, as there is then no danger that the same air coming out of the mine will be forced back into the mine.

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.

Refractory Uses of Bauxite.

Sir—To the instances quoted by A. J. Aubrey, in your issue of Feb. 3, 1906, may be added that of matte smelting reverberatory furnaces using wood fuel. At this mine we burn the usual Australian hardwood in our furnaces, which makes an ash consisting principally of caustic lime. This is particularly hard on the inside of the fireboxes, and we have found bauxite bricks superior to any others for lining the firebox of such a furnace. They also last well in the flue wall at the skimming end of the furnaces, and for both this and lining the fireboxes we find them far superior to chrome bricks, which we have used also in the same connection. EDGAR HALL.

Silver Spur Mining Company, Silverspur, Stanthorpe, Queensland, March 19, 1906.

Underground Surveying.

Sir—I have read with interest Mr. Burr's correspondence on this subject and, as my discussion of his original paper does not seem to have been sufficiently clear, I will state that the inaccuracy in the string method, when I have myself used it, has been largely due to the fact that in the passages, and in the openings between and around gob-piles in mines, it is not usually practicable to get a long stretch of the cord, nor is it easy to obtain angles that are nearly right angles in running the cord. The farther the angle extends either side of 90 deg., the more difficult is measuring to the intersection, where the cords cross; I have myself found it difficult, especially when the angle is over say 160 deg. or less than 20 deg., to measure to the point of intersection. In small lengths, such as are necessarily used in work of this sort, one slight error in a dimension of this length is apt to introduce complications that, where the workings are extensive, will throw out the entire survey.

Personally I have always found it easier to apply this method to work on the surface than to mine surveying, and obtain much more accurate results, even when the wind is high. Mr. Burr's system of averaging should give good results, though I have been unable to put it into practice since reading his discussion. His method of stretching an auxiliary string and measuring the sub-divided angle should also tend to produce more accurate results, but this introduces additional calculation, additional measurement, and

presents additional opportunity for error. The results given by him in the table are something which I have never been able to approach in my own practice by the use of this method.

With reference to the triangles referred to in the closing sentence of my discussion of Mr. Burr's paper, I would say that years ago in laying out the roof slopes on buildings I worked with roofs at ⅜ pitch, giving the sides of the triangle 3, 4, and 5; and at a later date, for easier slopes, used triangles with sides of 5, 12, and 13; corresponding to a pitch of 5/24. From this practice I developed and have since used in survey work, for roofs, and for laying out various classes of work, a series of triangles, whose bases and hypotenuses have the constant difference one, and whose respective altitudes have the difference two. A moment's consideration and a few minutes' work with the pencil will serve to show the great saving of time that may be effected by this method for certain classes of work; to which its application is more apparent as one begins to practice its use.

Take, for instance, the triangle whose sides are 3, 4, and 5; the next triangle in the series is one whose sides are 5, 12, and 13; the next one's sides are 7, 24, and 25. The next has its sides 9, 40, and 41. Omitting specified cases for the time being and referring to the four given triangles, it is seen that the difference between their altitudes in progressive order is always 2, and the altitude is always an odd number. It is also seen that the difference between the bases is always a multiple of 4, and that it increases each time by 4; in the cases given, the differences being 8, 12 and 16, and the bases being always in even numbers. The difference between the base and the hypotenuse of any one triangle in this series being invariably one, the differences between the respective hypotenuses are also the same as the differences between the bases, and the several hypotenuses are accordingly all odd numbers.

Another interesting note that I have seen referred to somewhere is the fact that the square of the altitude of any triangle having a difference of one between its base and hypotenuse is one less than twice the hypotenuse.

NIMMO BOUSH.

New York, April 3, 1906.

The imports of gold, silver, tin and cobalt into France during the last three years have been much about the same. On the other hand, those of lead and copper have almost doubled, and zinc and manganese have considerably advanced. Nickel ore is particularly remarkable; from 13,932 tons in 1903, the imports increased to nearly 50,000 in 1905. Antimony imports have fallen off considerably as the mines of Auvergne and Mayenne are amply sufficient

The American Electrochemical Society.

SPECIAL CORRESPONDENCE.

The ninth general meeting of this society was held at Ithaca, N. Y., May 1, 2 and 3. The meeting was a decided success every way; whether considered from the standpoint of the attendance and the earnest and sustained interest of the visitors, the abundance and variety of the papers, or the bounteous and hearty hospitality of the University.

The formal sessions (which were held only in the morning) were in the large lecture room of the University Chemical Laboratory (Morse Hall). After lunch, which was most courteously served by the University, the afternoons were utilized in inspection of the various chemical, physical, mechanical and engineering laboratories, as well as the unique power plants, filtering equipment, etc., not to mention neighboring manufacturing plants, the Remington Salt Company in particular.

Among those present were H. W. Wiley, of Washington; E. A. Ashcroft, of London; C. E. Acker, of Niagara Falls; C. Hering, of Philadelphia; A. H. Cowles, of Cleveland; E. G. Acheson, of Niagara Falls; M. Toch, of New York; W. L. Miller, of Toronto; J. W. Richards, of Bethlehem; W. H. Walker, of Boston; J. L. Wills, of New York; C. F. Burgess, of Madison.

There were 34 papers listed on the program, in addition to several others not listed. Nearly all of them were read by abstract, some at length; and discussion on them was energetic and instructive. Some of the most practical or elaborate of these papers were: "Electrolytic corrosion of copper-tin alloys," B. E. Curry; "The electric vacuum furnace," W. C. Arsem; "The cadmium standard cell," G. A. Hullett; "Some principles of the resistor-furnace design," C. L. Collins; "Electro lytic sodium," E. A. Ashcroft; "Electrolysis of caustic soda," J. W. Richards, etc.

It will be impossible for the JOURNAL to present more than a very small fraction of these papers; but the number of papers presented, their prevailing practical character, and the conscientious attendance of visiting members were features which gave evidence that the American Electrochemical Society has passed through the preliminary stage of a mere struggle for existence, and has entered on the period of permanent growth and prosperity.

The success of the meeting was due, in no small degree, to the cordial hospitality which was skilfully directed by the patient and courageous thoughtfulness of Professor Bancroft, the retiring president. The incoming president is Carl Hering, the well known electrical engineer of Philadelphia, a man who stands prominently as a type of the trained practical engineer; a man who invites confidence by the thoroughness of his learning as well as by the superb common sense and modesty of his method.

The matter of holding annual or semi-annual meetings is still under discussion; and it is evident that the wealth of practical papers produced by the small army of young investigators in the society contributes a practical problem, the solution of which will call for no small skill on the part of the board of managers.

Connected, incidentally in time, though not officially, with the meeting, were two lectures; one on "Discovery and Invention," by E. G. Acheson; the other on "Foods," by Dr. Wiley.

New Publications.

"Mine Inspection in Austria" (for 1902). The Bureau of Agriculture. Pp. 498. 6 by 9 in.; paper. Vienna, 1905: State Press.

"Railways in the United States in 1902." Part II. By the Auditor of the Commission. Pp. 207. 8 by 12 in.; cloth, $3. Washington, D. C., 1903: Interstate Commerce Commission.

"Railways in the United States in 1902." Part IV. By the Statistician to the Commission. Pp. 415. 8 by 12 in.; cloth, $3. Washington, D. C., 1903: Interstate Commerce Commisson.

"A Dictionary of Altitudes in the United States." Bulletin No. 274, U. S. Geological Survey. By Henry Gannett. Pp. 1072-11. 6x9 in., paper. Washington, D. C., 1906: U. S. Geological Survey.

"Progress of Steam Measurements," during 1905. Water Supply and Irrigation Paper No. 167, U. S. Geological Survey. By N. C. Grover and John C. Hoyt. Pp. 128 + 11, illustrated. 6x9 in.; paper. Washington, D. C., 1906: U. S. Geological Survey.

"Geology and Water Resources of the Eastern Portion of Texas" (Water Supply and Irrigation Paper, No. 154, U. S. Geol. Survey). By Charles N. Gould. Pp. 64; illustrated. 6 by 9 in.; paper. Washington, D. C.. 1906: U. S. Geological Survey.

"Ebensburg Folio" (No. 133, U. S. Geol. Survey). By Charles Butts. Pp. 9, with 5 charts. 18x22 in.; paper. Washington, D. C., 1905: the U. S. Geological Survey.

This folio describes coal lands in Cambria and Blair counties, in the southwestern part of Pennsylvania.

"Muscogee Folio" (No. 132, U. S. Geol. Survey). By Joseph A. Taff. Pp. 7, with 3 charts. 18 by 22 in.; paper, 50c. Washington, D. C., 1906: The U. S. Geological Survey.

The district covered by this folio is in the eastern part of Indian Territory, including parts of the Ozark plateau and the Prairie plains.

"Valve-gears for Steam Engines." By Cecil H. Peabody. Pp. 142 +V; illustrated Octavo, 6 by 9 in.; cloth, $2.50. New York, 1906: John Wiley & Sons. London: Chapman & Hall, Ltd.

Contents: Plain slide-valve. Shifting-eccentrics. Link-motions. Radial valve-gears. Double valve-gears. Drop cut-off valve-gears. Appendix.

"Coals of Maryland." By Wm. Bullock Clark. Pp. 651+XV; illustrated. 7 by 10 in.; cloth, with map inserts, $4. Baltimore, 1905: Maryland Geological Survey.

This is an excellent volume, prepared in a thorough manner, and published sumptously. It reflects great credit upon the Maryland Geological Survey, and especially the author and his collaborators.

"Iron, Steel and other Alloys." By Henry Marion Howe. Second edition. Pp., 495; illustrated. 6x9 in.; cloth, $5. Cambridge, Mass., 1906: Albert Sauveur.

Contents—Introductory. Cooling curves. Freezing point curves. Constitution of binary alloys, which form no definite chemical compound. Other series curves of binary alloys forming no chemical compound. Cooling curves and freezing point curves of series containing definite chemical compounds. Variations in electric conductivity and other properties of series of alloys. The metallography of iron and steel. The heat treatment of steel and cast iron. The phase rule. Progress in the manufacture of iron and steel between 1880 and 1900. The blast furnace. Metallurgical gas furnaces.

This is a second, and slightly revised edition, of the well-known work by Professor Howe, which was originally published in 1903. As explained in the preface to the original edition, the heterogeneousness of the book is due to its being intended for several different, though related classes of readers. It is in fact a treatise on the metallography and properties of iron and steel and their alloys, supplemented by notes, beginning on page 384, on the metallurgy of iron and steel, in so far as the latter relates to their production. The entire work is extremely valuable, although the first portion is far more complete than the second. However, the latter is a very concise presentation of the subject, which is far more useful than a good many works of more pretentious character. This, indeed, was to have been expected of Professor Howe, who possesses in a remarkable manner the art of digestion and generalization of metallurgical subjects.

It is unnecessary for us to call further attention to the features of this well-known and highly valuable work, with which our readers are already well acquainted. Besides making a few minor corrections and other changes, the most important additions in the new edition are the classifications and definitions of iron and steel made by Professors Howe and Sauveur, for the International Association for Testing Materials; a description and discussion of the Roe puddler; the Mond gas producer (which, however, is treated very briefly); and the Gayley dry blast process, which is discussed at considerable length. Those who are already familiar with Professor Howe's illuminating discussions of Gayley's important invention, will be glad to have his latest views in this convenient form.

Abstracts of Official Reports.

Broken Hill Proprietary Company.

The report of the Proprietary Company for the half-year ending Nov. 30, states that the alterations in the smelting furnaces at Port Pirie have been completed, and the recoveries of both lead and silver materially improved, the cost of bullion production being reduced by about 3s. 6d. per ton. The refinery treated 1300 tons of bullion per week, giving a total production of 33,504 tons of soft lead, the stocks at the close of the half-year being 4500 tons. Shipments of lead to China, Japan and India amounted to 6250 tons, and the tonnage consumed in the Commonwealth and New Zealand 3050 tons, while the remainder was disposed of in the European markets.

At the mine, the most important developments were on the 1100-ft. level, where the lode has been proved to be 65 ft. wide, assays giving 17 per cent. zinc, 19 per cent. lead and 13 oz. of silver, which is slightly in advance of the general average of the mine.

The profit per ton of gross ore treated was 12s. 10d.—the highest obtained for eight years. The gross profit for the half-year amounted to £227,299 17s. 8d., which, after deducting £30,340 8s. 5d. for depreciation upon the various plants, leaves a net profit of £196,959 9s. 3d.

The total output of silver was 2,986,585 oz., as against 2,705,929 oz. for the preceding six months. Soft lead produced was 34,479 tons, against 34,747 tons, while the price obtained gave an average of £12 10s. 6d. per ton against £11 6s. 4d.

The general manager states that 309,971 tons of ore of the usual lead and silver contents were raised as against 296,730 tons during the previous half-year; 94,767 tons mill tailings were treated by the zinc concentration plant as against 41,292 tons during the previous half-year. This plant is now capable of handling 6000 tons per week; 738 tons of 100 per cent. sulphuric acid were produced; 44,024 tons of slimes were despatched to the sintering works, and 52,194 tons of sintered material sent down to the smelters. The tonnage of ore treated at the Port Pirie smelters was 15,618 tons less than the previous half-year; the production of refined lead was 309 tons in excess; the grade of ore handled in the two periods being practically similar.

The refinery dealt with 34,692 tons of bullion producing: Silver (fine), 2,481,381 oz.; gold, 1511 oz.; soft lead, 33,504 tons; antimonial lead, 303 tons. The building in connection with the manufacture of spelter is nearly completed, and the first furnace will be built during 1906.

Broken Hill South Company.

The Broken Hill South Company, during the half-year ended Dec. 31, paid two dividends, amoumting to £35,000. A contract has been entered into with the Zinc Corporation for the sale of the accumulated tailings, estimated at about 700,000 tons; also for the production for nine years. The Corporation has until March, 1907, wherein to erect plant and start operations. One hundred thousand tons of tailings (the first delivery to be made) has been paid for in cash, and a deposit of £10,000 has also been received, which is to remain with the company during the currency of the contract. Not less than 200,000 tons have to be taken delivery of or paid for every twelve months.

The mine gives promise of increased productiveness. Operations at the 975-ft. level are being commenced. The new mill, which is being erected near the present plant, is being pushed.

The tonnage and metal contents of the crude ore treated during the last two half-years were:

ASSAY VALUE.

Half-year ending	Tons.	Pb. %.	Ag. Oz.	Zn. %
Dec. 31	95,269	16.2	6.1	11.9
June 30	96,647	16.9	7.3	12.7

METAL CONTENTS.

Half-year ending	Tons Pb.	Ozs. Ag.	Tons Zn.
Dec. 31	15,414	585,628	11,344
June 30	16,365	705,693	12,314

The tonnage, assay value, and recoveries were as follows:

ASSAY VALUE.

Half-year ending	Tons.	Proportion.	% Pb.	Oz. Ag.	% Zn.
Dec. 31	16,420	17.2	68.2	19.1	7.4
June 30	17,201	17.8	69.2	22.2	7.2

METAL CONTENTS.

Half-year ending	Tons Pb.	Ozs. Ag.	Tons Zn.
Dec. 31	11,197	313,848	1,199
June 30	11,896	382,421	1,245

RECOVERIES.

Half-year ending	% Pb.	% Ag.	% Zn.
Dec. 31	72.5	53.6	10.6
June 30	72.7	54.2	10.1

The costs per ton of crude ore raised were: Mining, June 30, 1905, 10s. 2.1d.; Dec. 31, 10s. 10.4d.; development, June 30, 8s. 1d.; Dec. 31, 1s. 2.4d. The cost for filling depleted stopes, which is included in the above figures for the last half-year, was 1s. 5.76d. per ton of crude ore raised, against 1s. 5d. for the previous half-year. The concentrating plant treated all ore during the past two half-years at the following costs: June 30, 3s. 9.4d.; Dec. 31, 4s. 1d. The total mine costs per ton of crude ore were: June 30, 14s. 7.6d.; Dec. 31. 16s. 1.8d.; per ton concentrates

produced, £4 2s. 2.9d., and £4 13s. 8.6d. The estimated tonnage and average assay value of the accumulated heaps of tailings were: 774,062 tons; assay, 6.6 per cent. lead, 4 oz. silver, 18.2 per cent. zinc; and of slimes, 116,553 tons, assay value, 13.5 per cent. lead, 6.5 oz. silver, 17.8 per cent. zinc. The net profit earned per ton of ore was 14s. 10d., and per ton of concentrates, £4 6s. 6d., against 10s. 10d., and £3 2s. 4d. earned during the preceding six months.

Questions and Answers.

Mill Efficiency.

What is the proper method of making mill tests in ore concentration, and especially the method of taking the sample of the crude ore delivered to the mill, and the sample of tailing and slime discharged?

Answer—The precise determination of the extraction of mineral in a concentrating mill is not an easy matter, unless the mill be provided with a thorough equipment for the purpose, which few mills have. The correct method of determination is comparison between the mineral contained in the ore delivered to the mill, and the mineral that is produced by the mill as a marketable product.

The crude ore must be weighed. The weighing of a certain number of cars or tubs, to determine their average weight, and then keeping count of the number of cars or tubs delivered to the mill will show the tonnage approximately, but not precisely, and results that are based upon such a determination are likely to start with an error of more or less degree.

The extent to which an error in the weight of the orignal ore will affect the result may readily be computed. For example, suppose that it had been determined by assay that the ore contained 10 tons of zinc blende, then 100 tons of ore would contain 10 tons of blende, and if the concentrate contained 7 tons of blende, the extraction would be 70 per cent. If however, the actual weight were 102 tons, instead of 100 tons, the crude ore would contain 10.2 per cent. of blende, and the extraction would be 68.6 per cent.

A moisture sample should be taken of the ore immediately upon weighing, and should be kept in an air-tight can until the necessary portion can be weighed out for determination. The sampling of the ore for determination of its metal contents cannot be done accurately, until after the ore has been crushed to a certain degree. In order to obtain a regular check on the mill work, it would be best to cause the ore leaving the jaw crusher to pass through a mechanical sampler, like the Vezin sampler, or the new Brunton sampler. Merely for making a single test run, the best method would be to discharge the crushed ore on a platform, and cut out the sample by the alternate shovel method. The methods of sampling are described in several good treatises and technical papers. There is no reliable way of determining the mineral content of the ore which goes into the mill, except by sampling it in the way that is outlined above. A common method of concentrating mills is to determine the grade of the mill-feed by periodically holding a scoop under the stream of ore coming from the crusher. In principle this is the same as the method of sampling by alternate shovels, but practically it cannot be strictly accurate unless the samples are taken with great frequency. Whenever ore mixed with water is to be sampled, the whole stream must be taken, and the water must be carefully allowed to settle, before it is decanted. This direction applies also to the sampling of tailing and slime. The correct principle is to take the whole stream for a brief period of time at regular intervals. This corresponds to taking a cut out of a stream of dry ore. It is not necessary to sample tailing and slime with the same frequency as the mill feed should be sampled, because the tailing and slime are lower in grade and thoroughly mixed. However, the determination of mill-efficiency should not be based upon tailing and slime assay. Besides the mill feed, the other factor is the mineral concentrate. It is not necessary to go into details as to the proper sampling of the latter.

It is not to be understood that tailings and slime should not be sampled and assayed. That should always be done, because it is a valuable guide in locating losses, but as stated above, it should not be employed as the basis for determining the ultimate efficiency of the mill.

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 May 1, 1906.

819,042. UNDERREAMER FOR MINERAL BORING.—Alexander Cummings, Los Angeles, Cal. Filed Feb. 25, 1905.

819,043 REVERBERATORY FURNACE.—Matthew Cummings, Boston, Mass. Filed Feb. 6, 1905.

819,045. APPLICATION OF HEAT IN METALLURGICAL AND OTHER FURNACES. Byron E. Eldred, Brookline, Mass., assignor to Combustion Utilities Company, New York, N. Y., a corporation of New York. Filed Sept. 9, 1904.

819,046. MEANS FOR CONTROLLING GAS VELOCITY IN REVERBERATORY FURNACES.—Byron E. Eldred, Bronxville, N.Y., assignor to Combustion Utilities Company, New York, N. Y., a corporation of New York. Filed Feb. 8, 1905.

819,063. SAND AND CAVINGS PUMP.—Howard R. Hardenburg, Saginaw, Mich. Filed Sept. 21, 1905.

819,093. ORE SEPARATOR. — Edwin A. Sperry, Denver, Colo., assignor of one-third to Wylie G. Wilson, Denver, Colo. Filed Jan. 9, 1905.

819,154. MINER'S TOOL. Robert W. Minerd, Pittsburg, Kan. Filed Nov. 1, 1904.

819,183. FURNACE.—John C. Telier, Minneapolis, Minn. Filed May 23, 1905.

819,219 and 819,222. MANUFACTURE OF CARBIDE.—Herman L. Hartenstein, Chicago, Ill., assignor by mesne assignments to Electro-Chemical & Development Company, Pierre, S. D., a corporation of South Dakota. Filed July 23, 1902.

819,220. METHOD OF PRODUCING CARBIDE.—Herman L. Hartenstein, Chicago, Ill., assignor, by mesne assignments, to Electro-Chemical & Development Company, Pierre, S. D., a corporation of South Dakota. Filed July 23, 1902.

819,221. PROCESS IN THE PRODUCTION OF CARBIDE.—Herman L. Hartenstein, Chicago, Ill., assignor, by mesne assignments, to Electro-Chemcal & Development Company, Pierre, S. D., a corporation of South Dakota. Filed July 23, 1902.

819,223. LINING FOR ELECTRIC OR OTHER FURNACES AND METHOD OF PREPARING THE SAME. — Herman L. Hartenstein, Chicago, Ill., assignor, by mesne assignments, to Electro-Chemical & Development Company, Pierre, S. D., a corporation of South Dakota. Filed July 23, 1902.

819,224. ELECTRIC FURNACE. — Herman L. Hartenstein, Chicago, Ill., assignor, by mesne assignments, to Electro-Chemical & Development Company, Pierre, S. D., a corporation of South Dakota. Filed July 26, 1902.

819,228. FURNACE. — Alfred E. Johnson, Denver, Colo., assignor to The Johnson Furnace and Engineering Company, Colorado Springs, Colo. Filed July 1, 1905.

819,252. COAL SEPARATOR.—James Pollock, Wilkes-Barre, Pa. Filed Nov. 9, 1905.

819,261. APPARATUS FOR TREATING HEATED METAL UNDER PRESSURE.—William A. Wood, Ansonia, Conn., assignor to The Coe Brass Manufacturing Co., a corporation of Connecticut. Filed July 25, 1905.

819,262. PROCESS OF CONCENTRATING DILUTED NITRIC ACID.—Otto Baither, Griesheim, Germany, assignor to Chemische Fabrik Griesheim Elektron, Frankfort-on-the-Main, Germany. Filed May 22, 1905.

819,560. METHOD OF PRODUCING A CONSTANT MAGNETIZATION BY MEANS OF ALTERNATING CURRENTS.—Marius C. A. Latour, Paris, France, assignor to General Electric Company, a corporation of New York.

GREAT BRITAIN.

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

Week Ended April 21, 1906.

5710 of 1905. HAULAGE CLIP.—T. Lancaster, Maryport. An improved haulage clip and means for attaching it to the endless ropes used in collieries.

5947 of 1905. BORING TOOL.—W. Fuliard, Plainfield, N. J., U. S. A. An improved boring tool, for use in connection with coal cutting and similar machinery.

5970 of 1905. FILTER-PRESS CLEANER.—C. W. Merrill, Lead, S. D., U. S. A. In filter presses, using a jet of steam or gas for clearing out the solid deposit, instead of having to open the whole machine, and removing the deposit by hand labor.

6556 A, B and C of 1905. GRAVEL WASHER.—J. Hutchings, London, England. Improvements, in detail, in the inventor's portable apparatus for washing gold and diamond gravels, in which the products of concentration are specially protected from theft.

14,024 of 1905. ORE CONVEYOR.—R. Sutcliff, Wakefield, Eng. Improvements in conveyors used in carrying excavated coal or ore from the working face to the wagons.

26,384 of 1905. ANNEALING METALS.—Siemens Brothers and Company, Charlottenburg, Germany. A method of forming rods, tubes, etc., of high electrical conductivity, and of great mechanical thermal and chemical resistance, by mixing the material with silicon and silicon carbide and heating in an atmosphere of nitrogen.

26,788 of 1905. SILICON MONOXIDE.—H. N. Pottter, New York. The manufacture of silicon monoxide (SiO), by fusing silica by means of a graphite rod, which introduces a current of electricity, and in a reducing atmosphere.

693 of 1906. ROCK DRILL.—H. J. C. Keymer, Yarmouth, Eng. Improvements in rock-boring machines, in which the drill rotates and receives intermittent blows.

Personal.

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

Matt W. Alderson, of Montana, is a visitor in New York.

A. A. Talmage, manager of the Blaisdell Company, of Los Angeles, Cal., is at the Hotel Ansonia, New York.

G. E. Alexander has returned to Denver from a trip to California on professional business.

O. H. Fairchild is at present examining properties in the Derrington mining district, Washington.

J. W. Malcolmson, of El Paso, Texas, passed through New York last week, on his return from a business trip to London.

Robert Mc F. Doble has removed his office as consulting engineer from San Francisco to Colorado Springs, Colorado.

A. L. Queneau, of Bethlehem, Penn., sailed from New York for Europe on May 3, on the steamship "La Provence."

John Dern, president of the Consolidated Mercur Mining Company, of Utah, has returned to Salt Lake from a European trip.

Anthony N. Brady has been chosen a director of the Tennessee Coal, Iron and Railroad Company, in place of Don H. Bacon, resigned.

Don H. Bacon has resigned his position as president of the Tennessee Coal, Iron and Railroad Company, and will make an extended foreign tour.

Elliott H. Wilson, formerly an engineer for the United Copper Company, is inspecting copper claims in the Funeral range, Inyo county, California.

Dr. F. R. Carpenter passed through Salt Lake City a few days ago on his way to Denver, after several weeks stay in southern Nevada, examining sulphur deposits.

Joseph A. Coram, who spent three weeks in Butte recently on business connected with the American Consolidated Copper Company, went to Utah, May 1, but will be in Butte again before long.

Kemp Richardson, consulting engineer of Liverpool, England, who was contractor for many of the large plants installed in the Kimberley diamond mines, is in Winnipeg.

William Beech, of Winnipeg, whose discoveries of valuable minerals near Hudson Bay last season attracted much attention, has gone north to continue his explorations.

F. W. Schofield, of St. Louis, has been appointed manager of the Utah plants of the American Smelting and Refining Company, reporting to general manager Charles W. Whitley.

Charles H. Cutting has resigned his position as assistant to the president of the Troy-Manhattan Copper Company, at Troy, Arizona. His present address is at Newburyport, Massachusetts.

J. Moore Elmer, consulting engineer to several mining companies operating in the Dawson district of Yukon Territory, has gone north after having spent the winter in the United States.

F. L. Wanklyn, vice-president of the Dominion Coal Company, has returned to Montreal from a trip to Glacé Bay and Sydney, Nova Scotia, and anticipates the best year in the company's history.

V. V. Clark, manager of the Bunker Hill Mining and Smelting Company, Index, Washington, is visiting New York on business in connection with the company. He expects to remain about a week.

J. W. Astley, late general superintendent for Le Roi Mining Company at Rossland, B. C., now resident at Bournemouth, England, has quite recovered from the illness that necessitated his leaving British Columbia.

John B. Farish was on the ninth floor of the St. Francis Hotel in San Francisco, at the time of the earthquake. He lost his baggage, but got out safely, and passed through Salt Lake City a few days ago on his way to Denver.

Paul Johnson, manager of the Alaska Smelting and Refining Company's smelting works, at Hadley, Prince of Wales Island, Southeast Alaska, has returned to Hadley from a business visit to Seattle, Washington, and to Crofton, Vancouver Island.

H. E. Carey, who has served the American Smelting and Refining Company as purchasing agent at Salt Lake for some time past, has been appointed assistant manager of the Ohio-Colorado Smelting Company, with headquarters at Salida, Colorado.

Erland G. Hadow, for some time in charge of the affairs of the Silver Cup Mines, Ltd., with mines and a chlorination mill near Ferguson, in the Lardeau district of British Columbia, will shortly return to that province after a year's absence in England.

Nanaghai Dayabhal Daru, of Surat, India, who was sent over by the Indian Government to examine Canadian mining conditions, and who has been for some time in the Eastern provinces, is in Toronto. He will shortly proceed to Cobalt and thence to the Pacific coast.

Lord Ernest Hamilton, chairman of directors of Le Roi No. 2, Ltd., at Rossland, B. C., and a director of the Hall Mining and Smelting Company, Ltd., near Nelson, B. C., has returned to London, England, after having visited the properties of his companies.

James Bennett has engaged with the Risdon Iron Works, San Francisco, to take charge of their department of smelting machinery and equipment, having resigned his position as assistant chief engineer of the Selby Smelting and Lead Company at Vallejo Junction, California, where he had been engaged for some years.

M. K. Rodgers, late general manager of the Yale Mining Company, owning the Nickel Plate group of mines, on Twentymile creek, and of the Daly Reduction Company, operating a 40-stamp mill at Hedley, in the Similkameen district of British Columbia, has returned to the province after having been some time in New York.

Arthur C. Carson has been appointed manager of the Cole interests in Butte, and George E. Moulthrop, for years foreman of the Pennsylvania mine of the Boston & Montana, and a well-known mining engineer, has been made superintendent of these mines, which include those of the North Butte and Red Metal, successor to United Copper.

J. B. Hobson, general manager for the Cariboo Hydraulic mines, of New York, which company lately acquired the big hydraulic gold mining property of the Consolidated Cariboo Hydraulic Mining Company, at Bullion, Quesnel Forks, B. C., has gone up to the mine to commence work on important mine development and water supply operations.

Elijah Heathcote, formerly of British Columbia, has been appointed an assistant coal mine inspector for Alberta, Canada. His district includes the coal mines of that part of the Crow's Nest Pass situated on the eastern slopes of the Rocky Mountains, and those at Lundbreck, Tabor, Lethbridge and other places along the Canadian Pacific Railway Company's Crow's Nest branch.

E. C. Musgrave, whose resignation as superintendent of the Tyee Copper Company's mine at Mt. Sicker, Vancouver Island, B. C., will take effect on June 30, next, intends thereafter practising as a consulting mining engineer, with offices at Victoria, B. C. He will be joined later by his brother, W. N. Musgrave, who recently opened an assay office at Windy Arm, Yukon Territory.

Arnold K. Reese, who several years ago went to Cardiff, Wales, to take charge of the blast-furnace plant of Guest, Keen & Nettlefolds, Ltd., at that place, and to introduce American blast-furnace practice, has recently been appointed manager of the whole Cardiff works, which include four blast furnaces, one 40-ton acid Siemens Martin furnace, one 160-ton Talbot continuous furnace, and a ship and boiler plate mill.

J. J. Fleutot, managing director of the West Canadian Collieries, Ltd., recently returned to Blairmore, Southwest Alberta, Canada, from France, where he had been for several months. This company,

which owns some 20,000 acres of coal lands in the Blairmore-Frank section of the Crow's Nest Pass coalfield, was organized in France by Mr. Fleutot in the spring of 1903, and is now operating the Grassy Mountain, Lille and Bellevue collieries, all situated near Frank.

Obituary.

Col. S. B. Milner, prominent in Utah mining affairs, died of heart failure at Salt Lake May 2.

Prince Charles Poniatowski died in New York, May 5, of pneumonia. He had just returned from a trip to Mexico. Of Polish descent, he was born in Paris; but he married an American girl and passed much of his time in the United States. With his brother, Prince Andre Poniatowski, he had large mining interests in Mexico, and also in California, where he was well known.

Henry Herschel Adams died at his home in Greenwich, Conn., May 6, as the result of an operation for the removal of his leg. Colonel Adams was born in East Cleveland, Ohio, in 1844, and was educated in the district schools and at Shaw Academy. In 1867 he married Helen E. Redington, of Cleveland. He served throughout the Civil War. After the war he entered the iron and steel business, and was president of the Old Sterling Iron and Mining Company, Algonquin Copper Company, Adams Gold and Silver Mining Company, Riverside Water Company of Connecticut, Adams Crucible Steel Company, and interested in many minor companies.

James McKay, of Pittsburg, died suddenly at his residence in that city, April 29. He was born 1829, in Ireland, and came to the United States in 1850, stopping for a short time in Philadelphia and locating in Pittsburg in 1851. He became actively engaged in business there, and when the discovery of oil in Pennsylvania began to attract attention he was one of the first to see the possibilities of the oil trade, and continued in it very successfully for a long time. He was also largely identified with mining operations in the West, being interested in gold mines in Colorado. He was the founder of the James McKay Company, chain manufacturer, having a large plant at McKees Rocks, Pittsburg, and was also one of the founders of the Redstone Coal, Coke and Oil Company. He was vice-president of the Duquesne National Bank, and was a large holder of real estate in the city and vicinity.

Societies and Technical Schools.

Syracuse University—During the college year just closing 2776 students attended this University, which now has a faculty numbering 201 members. The College of Applied Science offers courses in civil, electrical, sanitary and mechanical engineering and surveying.

Thomas S. Clarkson School of Technology—This institution, situated at Potsdam, New York, offers four year courses in chemical, electrical, civil and mechanical engineering. William Aldrich is director of the engineering division. The *Bulletin* for 1906-7 is now ready.

American Society for Testing Materials—The ninth annual meeting of this society will be held at Atlantic City, N. J., June 21 to 23. Announcements of papers to be read will be made in due time. The secretary, Professor Edgar Marburg, Philadelphia, notes that the next congress of the International Association for Testing Materials, with which the American Society is affiliated, will be held at Brussels, Belgium, Sept. 3 to 8, 1906. Of a total of 786 members of the American Society for Testing Materials, 240 are members of the International Association. Fifteen papers are scheduled to be read at the Brussels congress, the list including the following: "Methods for the Examination of Welding and Weldability," by Prof. Reinhold Krohn; "Report on the Progress of Metallography Since the Congress at Budapest in 1901," by F. Osmond and G. Cartaud; "Methods of Testing Pipes," by Prof. M. Gary; "Methods of Testing the Protective Power of Paints Used on Metallic Structures," by E. Ebert; "Raw and Boiled Linseed Oil," by A. Grittner.

Industrials.

The F. W. Braun Company informs us that it has opened temporary offices at 2513 Twenty-fourth street in San Francisco.

The Pacific Tank Company, of Los Angeles, Cal., lost its San Francisco office, but has established a temporary office at 518 Eleventh street, Oakland.

The Sullivan Machinery Company, of Chicago, has met the los of its San Francisco quarters by establishing an office at 1010 Washington street, Oakland.

The Risdon Iron Works is entering actively into the smelting field, and is prepared to handle any and all orders in such lines, having suffered little or no damage during the catastrophe that recently visited San Francisco.

The Risdon Iron and Locomotive Works inform us that the disaster at San Francisco left the works uninjured. They are now running with 1000 men employed, and with every prospect of running with a full force in a short time.

The Redwood Manufacturers' Company informs us that its office in San Francisco was destroyed, but its mills escaped, and are in good working condition. The company has established an office at First and Alice streets, Oakland.

The G. W. Price Pump Company informs us that it has opened temporary offices in Oakland, Cal., its works in San Francisco having been destroyed. Fortunately, it has a large stock of pumps and gas engines at Visalia and Los Angeles, California, from which it can fill orders with a fair degree of promptness. The company has already selected a site for new works and hopes to be in full running order very soon.

The Henry Bower Chemical Manufacturing Company, Philadelphia, gives notice that it has bought all of the assets, business and good will of the Ammonia Company of Philadelphia and Kalion Chemical Company, of Philadelphia, and of the Baltimore Chrome Works, of Baltimore, Md. The management of the manufacturing and commercial affairs of the business will be in charge of the Messrs. Bower and their associates.

Harron, Rickard & McCone, of San Francisco, inform us they were seriously damaged, but the loss was not as great as it might have been, and was fully covered by insurance. A large portion of the machinery is unharmed, but the offices and part of their machinery are completely destroyed. The warehouse was not reached by the fire. They have opened a temporary office at the warehouse, Seventh and Berry streets, San Francisco.

Notwithstanding the complete destruction of its San Francisco works the Pelton Water Wheel Company was fortunate. All drawings, books and cost records, so essential to a manufacturing concern, were saved, together with several years' correspondence. In addition, this company has had under construction for several months past new works in San Francisco. These were outside of the fire zone, and are being rushed to completion, so that they will be running as usual within a couple of months. In the meantime, the shops of the company in New York will be utilized to fill current orders. Temporary offices have been established at 1259 Alice street, Oakland, Cal., to which communications should be addressed.

Trade Catalogs.

Rceipt is acknowledged of the following trade catalogs and circulars:

Semet-Solway Company, Syracuse, New York. Pamphlet, Crysolite; Pp. 3, illustrated; paper, 6 by 9 in.

Broderick & Bascom Rope Company, St. Louis, Mo. Catalog No. 6, The Yellow Strand; Pp. 15, illustrated; paper, 7 by 10 in. March-April 1906.

Chisholm, Matthew & Co., Colorado Springs, Colo. Circular No. 4, A few independent opinions; Pp. 7, illustrated; paper, 6 by 9 in. Jan. 2, 1906.

National Fire Protection Association, New York City. Catalog, Standard Thread for Fire Hose and Hydrant Couplings; Pp. 14, illustrated; paper, 8 by 11 in. March 1906.

The J. Geo. Leyner Engineering Works Company, Denver, Colo. Advance Sheets. Latest Models; Pp. 19, illustrated; paper, 7 by 9 in. Catalog No. 8, Leyner Rock Terrier Drill; Pp. 31, illustrated; paper, 7 by 9 in. 1906.

The Ohio Brass Company, Mansfield, Ohio. Advance Sheets, Aikman Pressure Annunciator, Hand Power Grinding Machine, Naive Mine Feeder Wire Insulator, Trolley Wire Connector, Type C Mine Hanger; Pp. 5 illustrated; paper, 6 by 9 in.

Brown & Sharpe Manufacturing Company, Providence, R. I. Description and Specification No. 2, Plain Milling Machine; Pp. 8, illustrated; paper, 8 by 11 in. Description and Specification No. 3, Plain Milling Machine; Pp. 8, illustrated; paper, 8 by 11 in.

Construction News.

Joplin, Missouri—It is proposed to put up a concentrating plant on the Hatten-Young lease on the Cissna land, near Joplin. A. D. Hatten, Webb City, Mo., is in charge.

Breckenridge, Colorado—The Blue Flag Mining and Milling Company proposes to put up additional stamps at the Laurium mine. The company's address is at Breckenridge.

Raven, Virginia—The Red Raven Ash Coal Mining Company proposes to develop coal mines and will need hoisting, pumping and other machinery. M. R. McCorkle, Richlands, Va., is manager.

Blaney, South Carolina—The Southern Kaolin and Aluminum Company proposes to open kaolin mines and to put up plant for utilizing the product. Theodore Loder, Philadelphia, Penn., is secretary.

Monterey, Tennessee—The Obey River Coal and Coke Company will need hoisting and pumping machinery, drills and other mining machinery; also material for a short branch railroad. R. M. Dudley, Nashville, Tenn., is president.

Shelby, North Carolina—The North Carolina Mica and Monazite Company, of this place, asks bids and specifications for hoisting engines, pumps and a small mica mill. Address E. J. Fulton, of Lawndale, N. C.

Salineville, Ohio—The Ohio & Pennsylvania Coal Company will rebuild its large tipple at Salineville, which was destroyed by fire April 25, and will need materials and machinery. The company's office is in Cleveland, Ohio.

Sugar Grove, Virginia—A concentrating mill for lead ores and a power plant will be needed by the Chamberlin Mineral Company, which is re-opening the old Rye Valley lead mines. H. H. Green, 606 F street, N. W., Washington, D. C., is president and manager.

Coleman, Southwest Alberta, Canada—It is announced that the International Coal and Coke Company, Ltd., has decided to build at its colliery at Coleman, Southwest Alberta, 15 more beehive coke ovens, stone lamp house, oil house, powder magazine, and men's wash house, the last mentioned to accommodate about 165 men.

Bullion, Cariboo, British Columbia—The Cariboo Hydraulic mines is advertising for 100 mine laborers and axemen for its mines at Bullion, Quesnel Forks, Cariboo district of British Columbia; also for 500 laborers, accustomed to railway construction or excavation work. The latter men will be wanted on and after July 1. The company's mines are reached from Ashcroft, B. C., on the Canadian Pacific Railway, from which town they are 180 miles distant. Work during the open seasons of three years is promised to steady, industrious men.

Lillie, Southwest Alberta, Canada—The West Canadian Collieries, Ltd., recently completed the installation of a coal washery of the jig type, Luhrig pattern, having a capacity of 30 tons per hour, at its Lillie colliery, near Frank, Southwest Alberta. Further additions to plant are contemplated, these to be made during the ensuing summer and including more power installation to operate high-pressure compressor for locomotive haulage, and low-pressure for inside hoists, pumps and drills. Shops with modern equipment, to make provision at the mines for renewals and repairs, are also to be put in.

Bankhead, Alberta, Canada—The Pacific Coal Company, which has semi-anthracite coal mines known as the Bankhead colliery, situated near Banff, Western Alberta, Canada, has decided to install a briquetting plant with a nominal capacity of about 2000 tons per diem. It is stated that the requisite machinery has been ordered from a Pensylvania firm, which makes a specialty of that class of plant, and that it will cost about $85,000. The first part, which is the grinding and mixing plant, will have a nominal capacity of about 4000 tons per diem, but the remainder of the installation as now arranged for will only be equal to half that quantity.

Phoenix, Boundary, British Columbia—The Dominion Copper Company, Ltd., of Phœnix, Boundary district of British Columbia, has ordered from the Canadian Rand Drill Company, of Sherbrooke, Quebec, a tandem compound electric-driven air compressor, to have a capacity at the altitude of Phœnix of about 2300 cu.ft. per min. This machine will be rated at about 25 machine drills; it will be driven by a 400-h.p. electric motor. The same company has ordered from the Jenckes Machine Company, also of Sherbrooke, Quebec, a 150-h.p. motor for operating the hoist for use at the three-compartment shaft that is being sunk at the company's Idaho mine, at Phœnix.

Special Correspondence.

San Francisco. May 3.

The Northern California Mining Company has entered suit against J. S. Antonelle, H. Roylance, John Doe, McKenzie, Richard Roe, James Black, Herman Brown, Henry Green, John White, Jack Blue, John Smith, Joe James and Richard Haines. Plaintiff prays for judgment against defendants upon the grounds that much valuable timber is being cut down and destroyed and an undertaking on injunction is asked for in the sum of $3000.

The Mammoth Copper Company, of Shasta county, donated $10,000 to the San Francisco sufferers and considerable money is being realized in this city from the mining sections for the same purpose.

The Chloride Gold Mining Company, which is successfully operating the Samo mine at Chloride, Arizona, is to undertake extensive prospecting operations on the Iron Gossan group of 11 claims, situate in the northeastern corner of San Bernardino county, near the Nevada line. The company will sink a 500-ft. prospecting shaft, which will be equipped with a 15-h.p. gasolene hoist, and with pumping machinery, if water is developed in the quantity expected.

N. P. Ware, deputy county receiver of San Bernardino county, and postmaster at Goffs, says: "Within the past few months many Los Angeles and Nevada mining experts have been around my district, attracted there by some of the rich strikes reported in the Signal district, of which Goffs is the center. There are a number of mining men interested in Signal district and if certain information which I have now is backed up, a large force of miners will be thrown in the district in the immediate future and development work done on some extensive properties. It is only a matter of a few months until Signal district will be in the midst of one of these up-to-date automobile, wagon, and carry-all rushes for gold that will excite the wonder of many of the knowing ones in the mining world of California."

Butte. May 4.

The output of copper from Butte mines during April aggregated about 29,500,000 lb., the Washoe plant turning out 18,000,000, Great Falls 7,500,000, Red Metal 3,000,000 and Clark 1,000,000. The latter plant was not operated to capacity, and is not yet in full operation. The product of the Washoe included the copper in the ore of North Butte, East Butte, Raven, part of that of the Clark mines, about 1500 tons from the Pittsburg Company and miscellaneous shipments from smaller properties. The Pittsburg has been shipping 100 tons of ore a day from its mines since the close of the company's smelter, April 15, and will increase the quantity 25 or 50 tons as soon as better facilities for

dumping direct from the mines into railroad cars are provided, which will be in a few days. A shortage of railroad cars for transporting ore is interfering with shipments. The Butte, Anaconda & Pacific has ordered 100 new cars and they are due, but have not arrived. As soons as they are delivered, Boston & Montana will ship 500 tons from its mines to the Washoe plant, for the company is mining considerably more than it can treat in Great Falls. There is a possibility that the old plant of United Copper, which is now operated by Red Metal, will soon be abandoned and the ore of that company shipped to the Washoe. A movement with this object in view is in progress. As compared with the Washoe, it is considered of little use.

An eight-hour day for all miners and top men employed by Amalgamated, North Butte and Red Metal became effective today. In includes men in the smelters in Anaconda, Butte and Great Falls, some of whom have been working nine hours. Miners have had eight hours, but were raised and lowered on their own time; they will hereafter go up and down on company time. The change was made by the companies voluntarily, without a reduction of pay, and was announced May 1 by John D. Ryan, managing director of Amalgamated, and Arthur C. Carson, manager for North Butte and Red Metal, last night.

American Consolidated Copper has bought the interests of F. A. Heinze in the Davis estate property here. Through the sale Mr. Heinze becomes a stockholder in the company, but otherwise will have nothing to do with company affairs.

Original Consolidated has cut its vein at a depth of 1900 ft. and is crosscutting for it at the 2000. The vein on the 1900 is wider and the quality of the ore better than at any point above. It is 21 ft. between walls and is solid.

La France Copper began testing its large engine today with a view of using it in unwatering the lower workings of the Lexington property. It is thought that six months will be consumed in draining the mines. The engine was set up last fall, but negotiations for the sale of the United Copper properties, of which the Lexington was then an unpurchased asset, began and no attempt was made to place it in service.

Boston & Montana has received the first installment of its new engine for the Leonard property. The head frame is finished and the steel chutes connected with the ore bin. The new 1200-ft. shaft is also finished.

A 15-ft. vein of copper ore has been struck in the Bertha, a fractional claim east of the property of the Pittsburg Company. Its course is north and south.

Baker City, Oregon. May 4.

There promises to be a good deal of activity in the Greenhorn district, 35 miles west of Baker City, during the present season. Many of the old placers will be reworked, and operations have already been commenced on a number of vein mines. The mill on the Morning mine is crushing about 30 tons per day. The Maid of Erin is being developed by a tunnel which has now reached a distance of 150 ft. in the hill. The strike in the Mohawk mine is opening up well, and has encouraged the owners of adjacent claims to undertake more extensive development work. The Mohawk company will make a shipment to the Sumpter smelter shortly.

It is announced that the Midway mine in the Bourne district will re-open this season. Already work has begun in unwatering of the mine which has been idle all winter. The Midway hoist, which was installed last season, is one of the best plants in the whole camp. Manager Hendryx expects to put the property on the producing list this year.

The Gold Coin Company, operating in the Durkee district, is making preparations for receiving the new 100-stamp mill now being built in Portland by the Hammond Manufacturing Company. The company's mine is developing well, and good ore is being raised.

The Red Boy Company, in the Granite district 230 miles west of Baker City, is installing a hydro-electric power plant to operate its mill. The manager reports that the mine is producing good ore, and development work is being rushed in order to open up large reserves before the mill is re-started.

Salt Lake, Utah. May 4.

The new Waterbury system, recently installed for the treatment of copper ores at the Newhouse mines in Beaver county, promises to be a success. The first trial run was very successful.

The surface buildings at the Yankee Consolidated mine at Eureka, were recently destroyed by fire. While the damage amounts to about $20,000, the set-back will be slight and the buildings and equipment will be replaced at once.

Developments at the Bingham Consolidated continue good. The size of the Nevada stope, recently opened up, has not yet been determined, but it is one of the largest orebodies yet discovered in the camp. This ore is a ferro-sulphide averaging 5 per cent. copper, $4.40 gold and silver and an excess of 13 per cent. iron.

The Utah Apex, at Bingham, will soon be making increased shipments, owing to the completion of its new aerial tramway. The tram spans a distance of 2000 ft. between mine and railway, and has been erected at a cost of $40,000.

Active work will begin this week on the Rio Grande branch railroad between Sandy and Alta. With the assurance of a railroad and the advent of spring, Alta is undergoing a great awakening.

At the annual meeting of the Utah Consolidated, of Bingham, held in Jersey City during the week, the company re-elected the old board of directors. The management will undoubtedly remain unchanged.

F. Augustus Heinze, of Butte, was in Salt Lake recently, and visited the leading mines of Bingham. It is understood here that Mr. Heinze is now an important factor in the Bingham Consolidated, and it is rumored that the holdings of this company are soon to be consolidated with those of the American Consolidated Copper Company.

The plant of the American Smelting and Refining Company, at Murray, has been badly crippled in its operation by the strike which has been begun. The suddenness of the strike left but two of the eight furnaces in commission, and, with large contracts on hand, the company is facing a serious situation. The furnacemen demanded an advance of wages of 25c. a shift, which was denied by the management. The company hopes to be full-handed in a short time. So far there has been no disturbance, and the strikers have been quiet and peaceful. Most of the strikers returned to work the next week.

The contract for the structural steel to be employed in the construction of the new 5000-ton concentrating plant for the Boston Consolidated Company at Garfield, has been awarded to the Minneapolis Steel and Machinery Company. It is expected that the construction of this plant will be well under way within the next 30 days.

The transfer of a large group of Bingham properties has just been announced. The interests involved consist of three groups of claims known as the Giant Consolidated. Willard F. Snyder, H. R. Wilson of Butte, and several Eastern capitalists have acquired these claims at a cost of half a million dollars and intend to begin active and systematic development at once.

During the present distress in San Francisco an effort is being made to have the Mining Exchange of that city temporarily located in Salt Lake. At present the brokerage business is at a standstill there, and Salt Lake feels competent to take care of the membership of the Frisco board. At a meeting of the local exchange a committee of six was appointed to extend an invitation to the brokers of San Francisco, offering them free membership on the local exchange and free listing of all the stocks now quoted on the San Francisco board. The committee, consisting of the most prominent bankers and brokers of the city, has gone west to lay the matter before the Pacific exchange.

Persistent rumors are in circulation to the effect that the United States Smelting and Refining Company is negotiating for the purchase of the Honerine mine at Stockton. The Honerine has not been producing for some time owing to the construction of a long drain tunnel, which is now completed.

An agreement of consolidation between the California and the Comstock mines of Park City has been reported by an official of one the companies concerned. The consolidated company will be capitalized at $1,000,000 and mutual benefits are anticipated.

Denver. May 7.

On May 1 a very interesting meeting of members of the Western Association of Technical Chemists and Metallurgists, of which Denver is the headquarters, was held at Salt Lake City, Utah, with a view to taking preliminary steps toward the establishment of a separate branch organization. J. M. McClave presided. A number of leading men of the profession were present and the applications for membership were numerous. The meeting was held at the Commercial Club rooms and a temporary organization was effected.

The Senior class of the Colorado State School of Mines is at present taking an interesting trip through Utah, Montana and Colorado. Their number is 38 and they are accompanied in their special car by Professors Traphagen, Hoskins, Young, Patten and Haldane. They expect to return about May 21.

Leadville. April 29.

The Bohn shaft, East Second street, down-town section, opened up a body of chloride ore during the week. The ore was found to the south in virgin territory, 100 ft. above the parting quartzite and at a depth of 530 ft. The ore runs high in silver and carries a fair percentage of lead. In addition the mine is shipping a good tonnage of excellent grade iron. The same character of ore was struck in the western portion of the claim several years ago.

The sinking of the Mammoth shaft has been so hindered by the flow of dolomite sand that the management decided to cut a ring around the shaft toward the bottom to catch the sand. Enough work has been done to prove that it will be a success. In cutting the station at the bottom of the shaft the value of the orebody has increased and some native silver in a pinkish colored quartz has been found. The whole of the station is in ore. The shaft will be sunk another lift of 60 ft. to the flint, and well beneath the ore-shoot. A peculiarity about the dolomite sand is that it is pay dirt, carrying 5 oz. silver, 4 per cent. lead, 28 per cent. lime and 14 per cent. manganese.

Work on the orebody in the west drift of the Brattleboro proves that it stands vertical; it is being followed by winze and upraise. With development work the values do not diminish with the widening of contact that underlies the basin in which the claim is situated.

The output for the month of April was the same as March. This is accounted for from the fact that no ore to mention was hauled from any of the outlying districts on account of the impassable condition of the roads. It will take two weeks of dry weather to make the roads good.

A drift is being run from the lower level of the Ben Burb shaft, Rock hill, and during the week the lessees opened up a good body of ore and are driving on it to reach the main ore-shoot. The ground looks so well that the lessees have had several tempting offers to sell out, but refused. With the large body of ore in the Reindeer, and the ore in the Bessie Wilgus, the men believe that they have a good thing and will develop it. Prospecting is being vigorously pushed from the bottom of the Dome shaft.

With the strike in the Mammoth attention is now being paid to the ground of the New Elkhorn Mining Company, on the opposite side of the gulch. An English syndicate owns the ground, and when last worked the manager was of the opinion that the territory was no good. He spent $60,000 in development work, and when the funds were gone he came to the conclusion that the ground did contain a mine. In the face of this opinion he dismantled the property, and it is a question if the company will start up or even lease the ground.

Development work done during the winter at the Sunday mine has blocked out large ore reserves, and whenever the roads become passable shipments on a heavy scale will be started to the smelters. Other properties on Ball Mountain have ore stacked that will be shipped in a few weeks.

Work carried on during the winter on the old Iron Mask group of claims, Gilman, by the Pittsburg Gold & Zinc Mining Company, has developed one of the largest zinc ore bodies in that section, also a large body of oxidized iron. In a few weeks the mine will commence shipping at the rate of 150 tons daily.

The receiver of the Dolly B. property has received instructions from the court to make an examination of the mine report to be submitted to the court.

A number of the leading mining experts are in the city in attendance at the local land office in the case of the Clipper Mining Company, petitioners against the Eli Land and Mining Company, respondents. The land has been in litigation for nearly 30 years, and has passed through the local courts, State Supreme Court and the United States Supreme Court, all finding for the Eli Mining Company. In the decision of the United States Supreme Court the land office was permitted to reopen the case in so far as to making inquiry as to the character of the ground concerned. The land office at Washington issued the following which outlines the scope and extent of the present inquiry: "The hearing, while still directed to the question as to whether the land embraced in the placer location was placer or non-placer, in the patentable sense, as of the date of the application for lode patent, will be directed as well to the question of a sufficient lode discovery, if any, by the petitioners at and prior to the date of their pending application for lode patent." The Clipper Mining Company made application for patents on the lode claims Congress, Clipper, Castle and Capital in 1893, embraced in the original Searl placer owned by the Eli Mining Company, and was adversed in the local courts. The Searl interests contended that they had made a valid placer location in 1877, and as long as they continued to do the work according to law that the location was valid, and that the attempt of others to come in and look for lode claims amounted to a trespass. This contention was upheld by the courts.

Cripple Creek. May 5.

The new plant at the Portland mine will soon be in operation again. The new hoist is in place, and it is expected that it will not be long before ore is being hoisted. The hoist is a direct-connected one, and one of the best in the district. The buildings will not be complete for some time, but that will not make any difference with the hoisting of ore. In the mean time a large amount of ore is being hoisted from No. 2 shaft. The repair of damages at No. 1 shaft caused by the fire has been done very rapidly.

Considerable talk is being indulged in with regard to the drainage tunnel, but so far nothing certain has been given out as to the time of commencing work. That it will be commenced soon seems certain. A large amount of water is flowing from the present drainage tunnel from El Paso mine. El Paso is making a fair production from the levels above water. The Lambright lease on the Beacon Hill-Ajax of this company is making a great production.

The new plant on the Aileen is being gotten into shape, and it will soon be ready for use. The hoist is already in operation. Good progress is being made sinking the shaft, and some ore is being shipped.

A number of small leases are shipping some ore, and on the whole the outlook for the camp is very good. Just at present surface water is bothering a little. Several new milling enterprises are being gotten under way in the district.

The Vindicator quarterly report shows the company to be in a very good condition.

Breckenridge, Colo. May 4.

The Old Union mill is running steadily and making regular shipments of zinc, lead, and iron concentrates. The company is also shipping zinc ore of high grade direct from the main tunnel workings.

The Laurium mine and mill on Bald mountain, above Illinois gulch, have been bought by a new organization known as

the Blue Flag Mining and Milling Company. The mill will be started early next month and the supply of good mill dirt now on hand in the mine warrants the erection of additional stamps, which will be added almost immediately.

The 40-stamp mill of the Jessie Gold Mines Company is undergoing a thorough overhauling and renewal of worn parts. When this work is completed the mill will be started in operation on the mill ore which the management has ready broken for treatment.

At Frisco, the Excelsior mine is still making shipments of high-grade silver ore. The Square Deal Company is making a trial shipment of milling ore, as well as a lot of lead ore of smelting grade.

The King Solomon Tunnel and Development Company has run through another good looking lead ledge in the main tunnel. This is the best orebody yet cut in this tunnel, and is 6 ft. in width.

At Montezuma good work is being carried on in several of the principal properties. The Pennsylvania mine is making regular shipments of smelting ore via Keystone, and has a quantity of mill ore already in the mill and in the mine bins, awaiting the starting of the mill when sufficient water can be obtained.

The Sarfield property is being energetically worked and good-grade shipping ore sent to smelters. Campbell & Finotti are taking out lead and zinc ores from the Fisherman.

The Blanton, Jumbo, Little Jumbo, Silver Eagle, Clarion, and several other properties are also being worked.

The Rothschild Tunnel in Cooper Mountain is now in 3800 ft. in all.

At Robinson, substantial development work is going on. The Kreuger-McCoy Company is developing the Wheel of Fortune mine.

In the Eldora mine the extension of the Robinson mine shoots is found, and in places measures from 30 to 50 ft. wide. The Bonanza group, belonging to the Robinson mines, is now being worked by the Summit Mining Company.

The Felicia Grace has a powerful hoisting plant in position and the company is now sinking to reach the second contact. This group comprises the Champion, Homestake, and New York, all of which have been producers in the past.

McNulty Gulch is soon to be opened up for placer operations. This is an old placer tract. Other properties which will be worked this season are the Columbine, Cañon Point, Half Moon and Jersey Queen.

Joplin, Mo. May 4.

The Rich-Coon Mining Company, composed of a number of Joplin parties who recently began prospecting by drill on a sub-lease of the Granby Mining and Smelting Company's land near Chitwood, is still meeting with success. The drill encountered a good body of ore in the first hole, and this week has entered what seems to be the same run at a depth of 30 feet.

Robert Toutz and W. C. Glenn, of Webb City, who are prospecting a 10-acre lease of the Carter land, just west of the General Zinc and Lead Company's lease at Prosperity, this week made another strike in the third hole drilled, showing a 23-ft. face of good zinc-bearing ground. The showings made by the first and second holes, which were about 500 ft. south, were nearly as good. In each hole the drill encountered the ore at 160 ft. depth.

A. D. Hatten, of Webb City, Young Brothers, of Dayton, Ohio, and other Eastern parties, have encountered a body of ore on a sub-lease of the Mrs. Cissna land at Villa Heights, east of Joplin. If the lease shows up as well after more thorough prospecting, a modern concentrating plant will be erected.

A deal has been closed recently whereby the Ground Floor Mining Company comes into possession of the Randolph Mining Company's 40-acre lease on the Guinn land north of Webb City. The consideration was $40,000. A. E. Bendelari, of Joplin, a stockholder in the Ground Floor mine, promoted the deal.

The Ten Per Cent Prospecting Company, composed of Joplin parties, reports some showings made by drillings on its 10-acre lease on the Amazon Mining Company's land north of Joplin. The three holes have been put down and ore found in each of them at 130 ft., the run being about 12 feet in thickness.

John Durby, of Carterville, and a number of Eastern capitalists, composing the R. & C. Mining Company, operating at Alba, have found a deeper run of ore in their mines.

H. W. Putnam has secured a lease on 40 acres of the Baker land, between Duenweg and Prosperity, on which he will begin prospecting at once. This land lies in the line of proven tracts and development will be watched with interest.

Platteville, Wis. May 5.

Voak & Tabor are operating the Consolidated mill and mines, at Montfort camp, under option, and report satisfactory progress with the incline shaft. It is thought that a roaster will be needed as the ore carries some sulphur. The mill at this place is equipped with three sets of jigs 8 cells each, two Overstrom tables, the usual trommels and crusher, three sets of 24-in. rolls, two 100-h.p. boilers, five-drill Ingersoll-Rand compressor and Cornish lift pumps.

In the Red Jacket mine, near Highland camp, development work shows good results. The ore is of good quality. The management has expressed itself ready to equip for a small capacity, sufficient to handle the amount of ore that can be broken with the present development.

The creditors of the Wicklow Mining Company have concluded to throw the concern into bankruptcy so as to clean up everything. It is expected that those who have faith in the property will buy in the mine and machinery and put in enough money to properly develop the ground. It was at this place that some $30,000 was spent on machinery, trusting to luck to find the orebody as soon as drifting from the shaft was begun.

An interesting test of the efficiency of the Sunset mill, at Rewey camp, is being made. This mill is one of the crudest in the district, consisting of one 8-cell jig, crusher, two sets of rolls and trommels, and is an exact counterpart of the Enprise mill before the Overstrom table was installed there. A similar test of the Enterprise showed an 86 per cent. efficiency with less than 1 per cent. of lead in the zinc ore. Arrangements are also being made for a test of one of the most modern mills equipped with Overstrom tables.

The strike in the first hole at the Beacon Light, near Platteville, proves to be more than a vertical sheet, as at first it was thought to be, by the finding of just as rich ore in the third hole some distance from the other two.

There is talk at Platteville of organizing a drilling company for the purpose of proving up the lower runs, which are supposed to underlie the present known ore-bearing zones. The theory is that the country rocks dip at such an angle as to bring the rock—known to have contained lead ore in paying quantities near the Wisconsin river to the north, when it outcrops—some 400 ft. below the surface at Platteville.

Henry Martin, of Platteville, reports the finding of a good quality of ore in the tunnel at Stitzer, not far from Lancaster. This is the first zinc ore of any consequence in that locality.

Duluth. April 29.

The coming summer will be the most active in the history of the Marquette range. Although boats are not yet arriving in any great numbers, the docks are all full, and preparations are made for handling a greater quantity of ore than has ever been moved, both from Ishpeming, Negaunee, and from other smaller and newer developments, such as the Cascade district, Palmer, Austin, and other locations in the tributary region. Cars have been delivered to many mines and some steam-shovels have been started in stocks of ore piled up during the winter. Stockpiles at most of the shafts are larger than they have been at any May 1 previously, but at other mines, from which shipments have been made to furnaces during the season, these are small. More ore has been shipped all-rail during the winter to interior furnaces than in any previous season since the beginning of operations in this region.

The Cleveland Cliffs Iron Company, with its accustomed energy and farsight-

edness, has taken up a lot of lands near Marquette belonging to the Pittsburg & Lake Superior Iron Company, and will explore them at once. These lands are known to contain a large tonnage of lean bessemer and non-bessemer ores.

The Oliver Iron Company is stripping with three shovels at the Stephens mine, east of Biwabik. This mine was prepared for extensive shipments two years ago, and did send out some ore last year, but it is now being developed for very large work; it is understood that little or no ore may be sent out during 1906, unless present plans are modified.

Two extensive and serious caves have taken place at Lake iron mines the past week; one at Quinnesec, where a part of the town went into the pit, and the other at Lake Angeline, Ishpeming, which came under several houses and might have been very bad, if a lot of timber had not gone down and stopped the continued fall of earth. In neither case was there any underground damage to speak of.

At Negaunee, extensive improvements will be started at once, including an enlarged shaft at the Prince of Wales, of the Regent group, and the sinking of the shaft about 350 ft. further, to reach large orebodies that have been recently discovered. This mine has been shut down for several seasons, and the shaft has been idle since then. For the past two years all ore mined in the group has come out of the Blue and Queen shafts, and the improvements at the Prince will add materially to the capacity of the works.

At the Rolling Mill mine, of the Jones & Laughlin Steel Company, a large hoisting plant is to be installed in place of the temporary plant now on the ground. This new plant has been in use at the Lake Angeline and, was replaced there a few months ago by a larger and more economical one, which is now at work.

The Oliver Iron Mining Company has just given the Prescott Steam Pump Company, of Milwaukee, an order for four large and powerful compound and triple pumps to be placed at several of their large new mines in the Mesabi district. The Oliver Company now has a number of drills on the Cuyuna range, but is not making much progress in the discovery of anything better than the average low-grade ore that has been found there in the past year or two. It is sinking an exploration shaft there.

At the Baker property at Iron river, Menominee range, the shaft is now in ore and is making good progress. It was sand overburden running to nearly 90 ft., and the sinking was difficult and slow. The shaft is now 110 ft. deep. At the various explorations of the Buffalo & Susquehanna Company in the Iron River district, there is little in the way of ore to report, as the explorations are not, as yet, successful. Indications are still good, however, and while the drills are being moved about somewhat, they are sure to be continued in use for some time. At the Hiawatha mine, of this company, the shaft is unwatered and under ground developments are beginning. The Winifred Mining Company, in which late chief officials of the Republic Iron and Steel Company are heavily interested, is interesting itself in the Iron River district, and has taken one, and perhaps two, properties there. The first is the Morgan land, joining the Caspian mine, and it is to be explored at once. The second is the Youngs mine near Spring Valley, the precise disposition of which is not yet known, but which is supposed to be taken by the Winifred. This company has now plenty of capital and a good deal of experience in deals of various characters, and should be able to get together a considerable tonnage.

There is every reason to expect a lake strike May 1. Ore, contrary to statements of Cleveland correspondents, is moving forward very fast, and a big April business has been done through the Sault canals, but a short tie up on account of strikes will make many an outside furnace wonder where its stock is coming from.

Scranton. May 7.

As a result of the capitulation of the mine workers there seems to be a consensus of opinion that the United Mine Workers' Union, in the Anthracite region, will be dead for some years. The secret of the capitulation was the certainty that the foreigners would return to work, regardless of the results of the convention. Hundreds of them were already at work when the convention was called. Had a strike been ordered, it was recognized by the leaders that it would have been impossible to hold these men. Three years ago the foreigners were the backbone of the organization. This year they were determined not to stand by the union if any further idleness was ordered. A large percentage of the delegates to the convention were foreigners and a canvas made, it is claimed, showed that they were united in opposition to a strike. No sooner had the general delegates arrived in Scranton than it was evident that they were divided in opinion as to declaring a strike, and the foreigners were sufficiently numerous to form the balance of power. This was quickly realized by the leaders; hence the secret of referring the entire matter with power to act to the scale committee. But, previous to this reference, a significant speech was made by National Treasurer Wilson, who asked the men to consider seriously certain features of the controversy. In the first place they should weigh well the question whether there was any certainty of making any gain in case they went out on strike; whether there was not a danger that, if a strike was declared, it might last as long as nine months, and whether their funds were sufficient for such a long struggle. He intimated that they were not. Mr. Wilson's suggestions were pregnant. The men realized that there was little hope of securing any concessions from the operators and that the struggle would be a long one, once it was inaugurated.

It was, therefore, no surprise that the convention decided against a strike. A leading operator asked as to whether any difficulty will be experienced in connection with the men returning to work in those cases where their chambers were being worked by non-union men said, "That matter will be very easily adjusted. There are thousands of non-union men working in the various mines, but a very large percentage of them are working away from home, and it is but natural that they will be desirous of returning home and taking up their old places, thus surrendering the chambers which they worked during the strike. In case, however, that they desire to remain in their new chambers they will be entitled to that privilege, and will be allowed to remain no matter what might happen."

It is interesting to note the results of the "cessation" among the foreigners, especially in view of the surrender at the convention. It has always been understood among the foreigners, and they have been taught to expect it, that in the case of a strike they are to receive more wages. They do not understand the difference between a strike and a cessation, and cannot realize that they have been idle for five weeks for nothing. There is now a strong sentiment among them against the union, claiming as they do that they have, for the past three years, been paying their dues regularly, while the English-speaking miners have been negligent in this respect. They now receive no extra compensation, and no hope for any for three years. They state, publicly, that they will pay no more dues to the union.

The operators are confident that the coming summer will be a comparatively busy one in the anthracite districts. The balance of the month as well as a good portion of the month of June will find the collieries working full time, with a lull to follow until the usual normal conditions prevail during the fall.

Throughout the anthracite region the press is enthusiastic in speaking of the "victory of peace," but all are silent as to the effects upon the future of the union. Among the radical element there was a hope that the operators would concede the demand for the recognition of the union, together with the check-off system for collecting the dues from the wages of the men. The next important question for the officials of the organization is that of keeping it alive in view of the serious falling off in membership that is sure to happen. As late as last fall there were resolutions introduced at the district conventions calling for a reduction in the running expenses of the union, to be effected by a re-

duction of the number of men employed. This must now be done, as the falling off in the revenue will not permit the employment of the large force of organizers at present maintained. There are 10 men employed, at a standing salary, in each of the three anthracite districts. The revenues, it is claimed, will fall to about one-third immediately, so that one-half of these officials will be compelled to resign. Who will resign? Already this is one of the questions agitating the faithful. Some of the organizers were appointed to represent the Polanders, Huns and Italians. Owing to the large number of these men who returned to work during the cessation, there is a strong sentiment that all the foreign-speaking organizers should be dropped at the first opportunity, for failure to hold their men in the ranks. That will complete the cleavage among the members and cut adrift practically all the non-English speaking members. Left with the English speaking members, with many of these delinquents, the future of the union can easily be seen.

There are those who predict that John Mitchell will make but little effort to maintain the organization for the next two years, though it is thought that the men will be anxious to return to the fold, and be ready to pay their dues in the prospect of a strike in 1909.

Whatever the officers of the union may do, it is acknowledged that it will now be an uphill struggle to maintain the organization in the anthracite districts.

Victoria, B. C. May 4.

Rossland—March returns of Le Roi mine, as cabled to London, are as follows: Shipments amounted to 10,465 tons of ore, containing 4672 oz. gold, 7030 oz. silver, and 246,500 lb. copper. Estimated profit on this ore, after deducting cost of mining, smelting, realization and depreciation, $53,000. Expenditure on development work during the month, $12,000.

Le Roi No. 2 mine, owned and operated by the company known as Le Roi No. 2, Ltd., shipped during March 2040 tons. The net receipts, which include payment for part of February shipments, were $39,897 for 2112 tons of ore, and $665 for 33 tons concentrates; in all $40.561.

A. J. McMillan, general manager of Le Roi Mining Company, Ltd., recently visited Victoria for the purpose of endeavoring to arrive at a settlement of a long-standing dispute with the Government of British Columbia concerning the amount payable by the company under the law levying the 2 per cent. mineral tax. The Government claim, which covered a period of several years, was that Le Roi Company was only entitled to deduct the actual cost of smelting and the freight, etc., and pay 2 per cent. on the value of the ore shipped after these deductions had been made. The company contended that it was entitled to deduct the ordinary charge for custom smelting, thereby leaving it a profit on the smelting, maintaining that if it shipped its ores to a custom smelter the Government would not offer any objection to the deduction of the usual custom smelting charges. Finally the Government made a material concession and a mutually satisfactory understanding was arrived at, which involved a settlement of all matters in dispute in this connection up to the close of the last period for which the tax levy had been made. This arrangement obviates any necessity which might have arisen for a costly appeal to the law courts to determine the question at issue.

Prof. R. W. Brock, of the Geological Survey of Canada, has advised the secretary of the Rossland Board of Trade that he will arrive in Rossland with his party early in May to resume the work of making a structural geological survey of Rossland camp, upon which he was engaged last season. The director of the Geological Survey has announced through the press that a "Preliminary Report on the Rossland District" has been prepared by Mr. Brock; that it is now being printed, this preliminary report deals with the origin of the ore deposits and the chances of their value in depth; it discusses the probabilities of other ore deposits being found outside the area now being mined; it relates the methods now employed, or proposed, and touches lightly on the question of costs and profits. All these subjects will be dealt with exhaustively in the full report Professor Brock is preparing, and which will be freely illustrated.

Advices lately received from Ottawa are to the effect that the Geological Survey of Canada will have several parties engaged in field work in British Columbia and Yukon Territory the ensuing summer, as already noted in the JOURNAL.

Toronto, Ont. May 5.

A hydraulic plant is being installed by the Nipissing Mining Company, upon its property lying east and southeast of Cobalt and extending to Peterson Lake. It will be used for prospecting purposes, water being raised from the lake by a powerful pump to wash off the surface soil on the hillsides, leaving the rocks bare. Hitherto the practice of trenching down to the bed-rock has been followed, but it is claimed that the hydraulic system will be more thorough and less expense. The total area of the property is 1500 acres.

Development work is proceeding very rapidly at La Rose mine. From the level of the engine-house a shaft has been sunk to a depth of 210 ft. The first drifting was done at a depth of 90 ft. on either side of the shaft. Drifts were also made on the 200-ft. level horizontally, parallel with the first drifts, and a connecting shaft or winze is is to be drilled between them. In all 650 ft. of drifting has been accomplished, which gives an opportunity for an approximate estimate of the amount of ore in sight. Ore is not being shipped from this mine at present, but is being stored to await the establishment of the Hamilton smelter. So far only two grades of ore have been worked. The dump contains hundreds of thousands of tons, most of which bears visible traces of silver.

The Wright silver mine on the Quebec side of Lake Timiskaming, recently purchased by La Rose Company, is the oldest mine in Canada and older than any in the United States, being indicated on an old French map dated 1743, a copy of which will be given in the revised edition of Prof. W. G. Miller's report on the Cobalt mines, shortly to be issued. Henry Timmins, of La Rose Company, states that the galena ores of this mine may perhaps be susceptible of treatment in a smelter built for the refining of Cobalt ores, by the use of lead as a flux.

It has been announced that the Dominion government is about to enforce the law prohibiting the use of gas containing sulphuretted hydrogen for lighting purposes. This law, enacted before natural gas was found in Canada, has been a dead letter for years, and its revival is attributed to the fact that natural gas has come into competition with artificial gas at Hamilton. Recent tests place the sulphuretted hydrogen in the natural gas from the Welland county field at about 0.002 per cent. As Bridgeburg and other places in Welland county are largely dependent on natural gas for lighting purposes, the proposal to enforce the law has aroused strong opposition.

The Consolidated Lake Superior Company, of Sault Ste. Marie, has paid off $1,000,000 of the loan guaranteed by the Ontario government, and the Province has guaranteed for six months the renewal of the remaining $1,000,000. A proportionate amount of the securities of the company held by the Government has been released. R. Wilson Smith, a director of the company, has returned from New York, where he took part in the financial re-arrangement. He states that according to present result the net earnings for the fiscal year ending June 30 next will be betwen $1,000,000 and $1,250,000, the gross turnover being between six and seven millions per year. The steel rail mills are working to their full capacity, turning out from 600 to 800 tons daily, and with the addition of two new blast furnaces, the foundations for which have been laid, the capacity of the rail mills will be nearly doubled. The orders on hand will keep them busy for many months to come.

The Dominion Minister of the Interior

has formally notified six companies holding hydraulic mining concessions in the Yukon Territory that their leases have been cancelled. They will be allowed certain portions of the concessions upon which work has been done, provided they waive all legal claims to the property. The Brownson & Ray and Anderson concessions are among those cancelled.

Mexico. April 26.

Some months ago, when the Yaqui Indians in Sonora were causing so much disturbance in the State of Sonora, and soon after Mr. Mackenzie, of Chicago, was killed by them, so much unfavorable comment was made by the foreigners to the effect that the Mexican Government did not furnish sufficient protection to the foreigners interested in mining and other pursuits in the State of Sonora, that the President issued an order prohibiting foreigners from entering into any new mining enterprises or denouncing mineral lands. Since then, however, a number of the aliens placed in a better position to know, have shown clearly that ample protection is given when asked, and the State Department of the United States has given out that any American going into the Yaqui country or elsewhere in Sonora went at their own risk. If trouble occurred they could not expect assistance from the State Department. This rendering of the case and the placing thus of the Mexican Government in a more just light have caused President Diaz to withdraw his order, which he did last month. Now all are free to again enter and denounce land in Sonora as before. Ample protection will be given to all going into the interior when it is asked. As a consequence a new impetus has been given to the mining in that State. Of the new works under way may be mentioned a 200-ton mill to be erected by El Oro Maximo Mining Company, about 45 miles south of Cananea of which R. K. Clancy is manager; development work on a larger scale at the mines of both La Union Consolidated Copper Company, and the Brooks Consolidated Copper Company. Their new strikes, coming at about the same time as the President's rescinding order, have drawn many mining men to that district, which is 40 miles south of Douglas, Arizona, and some 17 miles southeast from Cananea. The new work on the Rey de Cobre mine of the Moctezuma-Arizpe Development Company has been rewarded by a find of copper ore in the shaft at a depth of 105 ft. The Alacran, near by, and owned by the same company, has begun shipment. Six miles north of Arizpe the North Star Mining Company is opening up an old supposedly "lost mine," which tradition says was worked some 70 years ago by the Franciscan monks; excellent gold and silver ore is being uncovered. The Pichaco mine, near the aforementioned El Oro Maximo, has been sold by the Phelps-Dodge Company to the Picacho Gold Mining Company, which was represented by R. K. Clancy. Work on a large scale will be started without delay. The Llano de Oro Company has obtained a large concession on placer ground near El Tiro in the Altar district. At the Boludo mines, four miles from El Tiro, a 50-stamp mill is being erected. Electric power will be used above and below ground, and it is stated that $1,000,000 Mexican will be spent on development work and improvements.

Zacatecas, Mex. April 27.

The Norris-Gilbert copper mine is a shipping property, located some three miles from Zacatecas City, and the same distance from the Mexican Central main line. To the westward, not over two miles the Bote has been operating for a century, and paying dividends without interruption for 60 years. The main vein in the Gilbert-Norris holdings has been known for years as the Refugio de Magistral. Opened in the early days of the Zacatecas district, the surface oxidized ores proved amenable to treatment by the patio process. The sulphides, encountered at a depth of 100 meters from the outcrop, yielded fair values in copper and silver. The mine production was utilized, until 15 years ago, in the manufacture of "magistral." This material found ready sale, at the various reduction works in the neighborhood of Zacatecas, for use in the milling of silver ores. As the mining was carried on by tributers, the output gradually decreased and finally ceased. Complete abandonment followed, leaving the mine open to re-location. While without legal owners, an occasional miner would try his luck in the dumps, in the unfilled workings or at the pillars. Only small bunches of silver-lead ore were found and marketed with the local ore-buyers. The first representative of the Furness-Lewis Company, a firm no longer existent, attracted by the copper contents of the purchased ores, undertook an investigation. He discovered in all the old workings, pending from the roofs, stalactites of copper sulphate. Arrangements were immediately effected for denouncing the mine. In consideration of the tributers' services, a quarter interest was alloted them. A studied examination revealed the existence of a small shoot, overlooked by the many tributers. The ore extracted, was shipped to Guanajuato, consigned to Dwight Furness. It consisted of oxides and carbonates, assaying some 15 per cent. copper together with 16 oz. silver. The search for other orebodies was discontinued, because of the restricted demand for copper. The majority interest was eventually acquired by a mining man of long and varied Mexican experience. Realizing the unquestionable value of the property, measures were taken to mine on a modern plan and upon a large scale. Broken health compelled this owner to return to the United States for professional advice. Acting upon the warning of a specialist, all his Mexican interests were sold at a sacrifice. In this wise, Norris and Gilbert acquired the ownership of the mine.

The first exploration performed was the sinking of a winze at the bottom of the lower tunnel. Pay ore soon rewarded the adventurers, who found eager buyers for their output. The Guggenheim people at Aguascalientes were then engaged in converting their plant from a lead into a copper smelter. Extraordinary inducements were offered for the delivery of ores suitable for the making of a high-grade matte. Since the Norris-Gilbert tonnage assayed high in both iron and sulphur, an excellent tariff was secured. The shipments for a period of years, averaged 150 tons per month of high-grade ore. The low-grade rock, or rejected material, was accumulated, for treatment in a concentration mill; quite an outlay was incurred in experiments, with this end in view. The mill built immediately under the dump proved unsuitable to the ore, and the idea was abandoned. The present high price for copper permits shipment of the low-grade ore to the smelters, realizing a small but steady profit. A temporary misunderstanding led the owners to divert the high-grade ore from Aguascalientes to the Torreon smelter. Although the distance is greater by 300 km., the returns are only slightly lower.

London. April 28.

Among the general destruction of life and property at San Francisco it is pleasant to be able to record that the new works of the Mountain Copper Company have escaped injury and that none of the company's employees suffered hurt. It will be remembered that owing to difficulties in connection with the fume question at Keswick the company started to move to the outskirts of San Francisco two years ago. The new smelting works commenced operations toward the close of 1905 and the acid and fertilizer works in January of this year. The company never intended to submit quietly to the injunction against fumes at Keswick, for it felt that it was prompted by politicians with some end in view. The first court of appeal has decided against the injunction, and it has not yet been decided by the law department of the State whether the case shall be carried to the final court at Washington. During the year 1905 the profit made by the company was £158,000. It is not proposed to redeem any more of the debentures at present until the financial requirements of the company are more fully ascertained, so that the capital of the company remains at £250,000 in ordinary shares and £750,000 in redeemable debentures. The company is undoubtedly in a strong position, both financially and as regards the future development of the business.

Some few years ago there was a fashion

in London for West African gold mines, but nowadays there are no booms and we hear little of what is going on in that quarter of the earth. Most of the quartz mines were of too low a grade, the climate was unsuited to the white race, and the local colored man was of rather too high a quality (though it is treason to say so) to make a good drudge. During all the depression in the West African mining market some really good work has been done in investigating the possibilities of the country as regards river dredging. This work has been chiefly in the hands of the African Gold Dredging and Mining Concessions, Ltd., which holds concessions extending for 70 miles along the Ankobra river, from near its mouth to the junction with the river Bonsa. Work has proceeded slowly, for it was highly advisable that some definite knowledge should be gained of the river bed before any considerable expenditure was decided on. Prospecting has shown that there are no big boulders to contend with, and that the gravel beds are unusually deep. Operations in sampling the river bed have been facilitated by the use of a specially devised deep borer, which brings up the sample complete, losing nothing by withdrawal through the water. Details of this apparatus I hope to send you before long. The company has now got to the end of its preliminary prospecting, and a number of dredges of the most approved pattern are being built. There is every expectation that the gold-dredging industry of West Africa will be of importance in the future.

Johannesburg. April 9.

The Tudor Gold mine, on the West Rand, has suspended operations. Two vertical shafts were being sunk on this property. One was stopped some time ago, on account of the scarcity of funds, and special efforts were made to push the other, or west shaft, down to the reef. At the annual meeting the other day, the chairman stated that the cash balance had sunk to £15,220. The board decided it would be unwise to continue shaft-sinking, with such a small cash balance. Money is required for licenses on claims, etc., and it was resolved to stop all work for the time being.

This curtailment of operations is not put into force as a protest against the deplorable policy with which the industry is being threatened in the matter of unskilled labor. At the present time it is difficult to raise money, especially for a company like the Tudor, situated in one of the poorest parts of the Rand.

The shafts at the Tudor were being sunk by hand labor, Chinese being employed for this purpose. The coolies have been transfered to other mines in the neighborhood. Unfortunately it was not possible to provide for all the white men. They will, most of them, be added to the number of unemployed on the Rand, whose management is already a grave problem.

General Mining News.

ARIZONA.

YAVAPAI COUNTY.

Rincon Mines Company—President W. C. DeArmond, of Philadelphia, has been for some time at the mines at Martinez, giving his personal attention to the work there. The company is now making regular shipments to the smelter at Humboldt, Arizona, which net about $100 per ton. The mill will soon be running on full time, 24 hours a day. It will treat about 60 tons of raw ore per day, concentrating 12 to 1, and turning out 5 tons of concentrate. There is now ore enough in sight to justify the doubling of this capacity. The main shaft is down 1058 ft., on an incline of 22 deg., and there is about 6000 ft. of development done in the levels, practically all in one.

CALIFORNIA.

AMADOR COUNTY.

Sulphuret Saving Plant—The sulphuret saving plant erected last summer in the cañon of Jackson creek, about half a mile west of the town, by Messrs. Chase & Boydston, has been temporarily abandoned. The machinery has been taken out and removed to Amador City. It is rumored that this does not by any means imply the permanent giving up of the undertaking. The plant was not on a sufficiently large scale to handle the mass of material flowing down the creek. In a few months, it is stated, a bigger plant will be put in.

CALAVERAS COUNTY.

North Star—This mine at Angels, operated by Otto Dolling, is giving most promising results. The mine adjoins the Gold Cliff, and has lain neglected for years. There is a five-stamp mill on the mine, and from a run of eight days just made $600 was cleaned up. A larger mill is to be erected at once, and the mine will be worked on a large scale.

NEVADA COUNTY.

Brunswick—For this mine, Grass Valley, C. H. Mallon, the superintendent, has ordered the lumber to make ready to house a new 20-stamp mill.

Delhi—At this mine, Grass Valley, the new compressor has been started up. A new nozzle, 1⅜ in. in diameter has been received, to be sent to the mine immediately. This nozzle will devlop 250 h.p., and will be placed in position as soon as possible after its arrival at the mine. With the new compressor in operation, the Delhi will continue for a long time as one of the steady producers of this county.

North Star Mines Company—This company, at Grass Valley, has declared another dividend of $50,000, or 2 per cent. on its capitalization, making 10 per cent. within the past year.

St. John Mine—At this mine, near Nevada City, the old buildings containing all the machinery have been destroyed by fire. The mine had not been in operation for years.

PLACER COUNTY.

Nickerson Copper Mines—The three copper properties of J. R. Nickerson, on Rock creek, have been sold to the Guggenheim interests for $60,000. The mines are to be pumped out and opened up.

SAN BERNARDINO COUNTY.

Rose Mine—The news comes from Victorville that preparations are under way for a resumption of operations on the Rose. For the first few weeks only a small force will be employed, but additions will be made as rapidly as the development work in the mine progresses, and it is expected soon to have both the mill and cyanide plant in operation.

SISKIYOU COUNTY.

Bonanza—This mine, near the confluence of the Klamath and Shasta rivers, has been sold for $20,000 by Seaman & Marston to J. H. Kreeps, of Los Angeles, president of the Golden Wonder Mining Company.

TRINITY COUNTY.

Bear Tooth—A. B. Cheney is putting in a gasolene engine for running a small stamp mill and Huntington mill at his mine. Mr. Cheney will also make some investigations about an electric plant, and will determine whether sufficient power can be developed to justify the putting in of a plant. The plan proposed is for a number of mine-owners in that section to form a company and develop the electricity to run the mines.

COLORADO.

BOULDER COUNTY.

Reppy Gold Mining Company—A new plant of machinery is being installed on the property at Sugar Loaf, and a new shaft-building has been erected.

Boulder Consolidated Mining Company—The C. W. Knox Machinery Company, of Boulder, has taken a contract for the erection of a 100-ton cyanide plant at Poorman hill, to replace the one destroyed by fire last fall. A large roaster will form a part of the equipment.

Good Morning Tunnel—A power house 60x22 ft. has been completed, and is ready for the installation of the power plant for driving this tunnel in the Sugar Loaf district.

Julia T. Group—This group, in the Grand Island district, has been sold to Easterners for $6400 cash through Doctor Blair, of Boulder.

Dalley—Omaha, Neb., people, who recently purchased this group for $6600 are going to install a complete hoisting plant of machinery.

CLEAR CREEK COUNTY.

Newhouse Tunnel—George E. Collins of Denver, a well known operator in Gil-

pin and San Juan counties, and agent of the California Mining Company, owning the California mines and mill in Gilpin county, has been appointed manager, with headquarters at Idaho Springs.

Fall River Mining Company—Idaho Springs and Eastern people are interested in this incorporation. The office is in Idaho Springs. The company will operate in the Fall River district, and intends to install machinery.

Mammoth—Dennis Gibbons, of Denver, has taken a lease and bond on this group near Silver Plume and will arrange for heavy developments.

Inflexible—Denver people have taken an option on this group on Saxon mountain from Daniel Roberts, of Silver Plume.

American Sisters—Manager J. J. White, of Georgetown, announces that machinery for a 50-ton concentrator has been contracted for. The work on the new mill and power plant is expected to be complete with 60 days.

GILPIN COUNTY.

Express Mining Company—Chicago people have taken a lease and bond on the Duchess, adjoining property, and will work it in conjunction. C. H. Karns, Central City, Colo., is manager.

United Metals Mining Company—Denver people interested have purchased the Justice and Evelyn mines in lower Russell district, and are arranging to start operations.

War Eagle Mining Company—Eastern people are interested in this incorporation, with capital stock of $100,000. They have taken hold of the War Eagle group near Perigo. W. H. Knowles, Rollinsville, Colo., is manager.

GEORGIA.

POLK COUNTY.

An option has been taken by the interests which recently acquired the Tennessee Coal, Iron & Railroad Company on the properties of the Alabama & Georgia Iron Company. The latter company operates Cherokee furnace, a charcoal stack at Cedartown. It draws its ore supply for this furnace from a mine at Grady, a short distance from the furnace. It also owns the extensive Frog Mountain deposits of brown ore, at Piedmont, Ga., which is probably the most extensive merchant brown ore mine in the South. It was particularly for the acquisition of the brown ore property that the option was taken by the Tennessee company interests.

INDIANA.

MORGAN COUNTY.

The mining of gold in Indiana is a reality. The Gold Creek Mining Company has commenced operations on Gold creek in Morgan county south of Martinsville. A Wishard placer-mining washer is in daily operation. Five teams and 20 men are kept busy scraping and hauling the dirt to the machine.

OWEN COUNTY.

The Coal City Block Coal Company has commenced sinking a shaft near Coal City. The vein is 4 ft. in thickness at a depth of 40 ft. and shows good quality.

MARYLAND.

Penn-Garrett Coal Company—Robert C. McCandlish, Clarence B. Guard. Walter W. Savage, Charles A. Mitchell and David S. Custer, all of Garrett county, Maryland, with Philadelphia associates, have incorporated this company at Friendsville, Md., with a capital stock of $100,000, for the purpose of developing 9000 acres of coal lands in Garrett and Alleghany counties. The company has authority to increase its capital stock to $500,000.

MICHIGAN.

IRON-MENOMINEE RANGE.

Iron Duke—This mine has been leased by the company owning it to the Cleveland-Cliffs Iron Company. The Iron Duke lands are 160 acres in extent, and adjoin the Cleveland-Cliffs Iron Company's holdings northeast of the city limits of Ishpeming. By the terms of the instrument the lessee agrees to pay the sum of 5c. a gross ton for all iron ore taken from the lands, payments therefor to be made each three months. The property was held in lease since 1899 by the Marquette Mining Company, of which D. R. Hanna, of Cleveland, is president, and the latter company's relinquishment of rights in the property was also made a matter of record at the time the Cleveland-Cliffs lease was filed.

OHIO.

The total coal production of the State in 1905 is reported at 25,834,657 short tons; an increase of 1,250,842 tons, or 5.1 per cent. over 1904. Coal was mined in 29 counties, Athens leading, with 3,848,440 tons. Of the total for the State, 6,825,125 tons, or 26 per cent., was mined by machine. The number of employees reported was: Pick miners and loaders, 29,737; inside day hands, 7,543; outside day hands, 4,286; machine runners, 2627; making total number 44,193. The number of men killed during the year was 114; injured, 543. This gives averages of 2.54 killed and 12.29 injured per 1000 employees.

PENNSYLVANIA.

BITUMINOUS COAL.

W. A. Stone, L. H. Frasher, W. E. Crow and Dr. W. H. Hopwood, of Uniontown, are organizing a new company, to be capitalized at $200,000, to manufacture coke. W. A. Stone has purchased the plant of the O'Connell Coal and Coke company, near Smock, Pa., for $70,000. The battery of 35 ovens will be increased to 150. The same party also purchased 150 acres of coal land from the Pittsburg Coal Company in the vicinity for $1,300 an acre.

Penwood Coal Company—This company has bought 1,500 acres of coal land in Somerset county, for $150,000. The land was owned by the Somerset National bank, and Captain Charles J. Harrison and Milton J. Pritts.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Branch Mint—Work on the 3½-mile railroad which will connect the hoist and the mill is almost completed. The bridges are all in and rails are being laid. Ore can be transported for not more than 10c. a ton. Three shafts have been sunk, one of which is 350 ft. deep and the other two 300 ft. They are connected by tunnels, and these, in addition to drifts run, make almost a mile of underground workings. In the Hoodoo shaft a 200-ft. vertical, averaging over $4 a ton has been encountered in the slates. Two other orebodies from 12 to 60 ft. wide, of porphyritic ore, are being developed. A 12,000-ton ore bin has been built at the hoist. The mill contains 120 stamps and will treat 700 tons of ore every 24 hours. The cyanide process will be used and the slimes will be treated by decantation. It is now planned to open the mill in July.

Victoria Extension—Nine men are at work on this property and the tunnel is in 250 ft., with good indications. A shaft 70 ft. deep is in ore, cyaniding quality.

Golden Reward—It has been decided by management to put in motors and operate both the mine and the mill by electricity. About $10,000 will be expended in making the change. Surveyors are now running the lines to both mine and mill from the plant of the Consolidated Power and Light Company at Pluma.

Golden Crest—The recent strike on this property was made in a winze near the water level. The orebody is from 4 to 7 ft. wide. A drift has been run in 900 ft., 500 of which is on the vein. Arrangements are being made to open up the 50-ton mill in May.

Homestake—Work on the slime plant in Deadwood is progressing satisfactorily. An order has just been given Vincent Kenny, of Omaha, for a 250-h.p. boiler, of a type on which he holds a patent, to be delivered in August. Work has begun on the first pier of the steel viaduct that will carry the slime pipe-line from Lead to Deadwood. Large shipments of lumber are being made from Cosmopolis, Washington.

Homestake Extension—Bids for the 120-ton mill for this company have been opened and are being examined by George Morthland, of the Homestake. Work is now going on in the mine in the eighth crosscut, which has penetrated 360 ft. without reaching the side walls.

Wagner & Ballou—Work will soon be

recommenced on this ground, which consists of 75 acres of unpatented land with excellent prospects. It lies one mile northwest of Central City and adjoins the Columbus Consolidated.

Yellow Creek—A one-tenth interest in a group of claims in this district has been transferred by Louis R. Ehrich to Benjamin Newgass, of London, England. The ground comprises 391 acres and lies 1500 ft. south of the Wasp.

PENNINGTON COUNTY.

Auburn—The Auburn Mining Company, with ground on Castle creek, is making preparations for this summer's work. Last year several miles of the flume and pipe-line were built, pumping plant was put in and arrangements made to work the placer.

TENNESSEE.

PUTNAM COUNTY.

Obey River Coal and Coke Company—This company has increased its capital from $100,000 to $800,000, and has absorbed the Mead's Gap Coal and Coke Company, owning a large area of undeveloped coal lands. The office is in Nashville, Tenn.; the officers are: R. M. Dudley, president; R. Houston Dudley, vice-president; F. C. Guthrie, secretary; W. A. Caldwell, treasurer. The directors are, in addition to the officers, A. W. Wills, Joseph Frank, R. J. Lyles, John T. Landis and Henry Sperry. The principal improvements now contemplated in the mining property consist of a branch railroad to be built from the 6000-acre tract to a point on the Southern Railway probably near Obey river, and about seven miles from Monterey.

MONROE COUNTY.

Work is being done on a copper prospect on the Tellico river, near Tellico Plains. C. F. Herford is making the developments.

TEXAS.

HARDIN COUNTY.

Saratoga—The production for the last week in March was doubled by the bringing in of the Guffey Petroleum Company's Nos. 4 and 5 each of which flowed 3000 to 4000 lb. for a few days and then sanded up. They will be good producers when pumped. Producers' Oil Company No. 1 came in a 1800-bbl. gusher.

JEFFERSON COUNTY.

Beaumont—Crude prices have again advanced 2c. Present output and prices are as follows: Sour Lake, 6500 bbl., 47c.; Saratoga, 5300 bbl., 38c; Batson, 6550 bbl., 37c.; Humble, 8500 bbl., 41c.; Spindletop, 3000 bbl., 54c.; Jennings, 34,500 bbl., 30c.

Jennings and Saratoga fields are receiving the most attention from operators, owing to large gushers brought in recently. Humble field has had some new wells which have temporarily stopped the declining output. Oil is going out of storage rapidly, and prices will advance, especially for crude suitable for refineries. The advance in March was from 5c. to 7c. per barrel.

NAVARRO COUNTY.

Powell—There are now 45 producing wells in this new field and 20 wells are drilling. The principal development has been along the northern and southern limits, while very little has been done in the central part. None of the wells are gushers and a 50-bbl. well is considered very satisfactory. The crude is sold to the refinery at Corsicana—to which a pipeline is now under construction—for 50c. per bbl. March 21, there were 15 producers completed and 6 dry holes.

VIRGINIA.

SMYTH COUNTY.

Chamberlain Mineral Company—This new company, with offices in Washington, D. C., proposes to operate the old Rye Valley lead mines, near Sugar Grove.

TAZEWELL COUNTY.

Red Raven Ash Coal Company—This company has been incorporated to open and work coal mines on the Norfolk & Western Railway near Raven, Va. It is announced that the company will equip its plant with the latest improved electric mining machinery, expecting to develop an output of 800 tons of coal per day within the next 12 months. The company's officers are J. N. Harmon, of Tazewell, Va., president; J. N. Harmon, Jr., Tazewell, secretary and treasurer, and M. R. McCorkle, of Richlands, manager in charge.

WASHINGTON.

OKANOGAN COUNTY.

Mineral Hill Mining Company—This company at Conconnully, E. P. Wheeler, superintendent, reports having struck molybdenite, lustrous and "in columnar and flaky forms" occurring "in pockets from 1 to 50 ft. in dimensions, throughout 150 ft. as crosscut at a depth of 850 ft." He also reports having been offered by a Philadelphia, Penn., firm, $100 a ton for the ore, and $600 a ton for the concentrates. Our correspondent writes: Small pinhead crystals occur in some of the gold-bearing quartz in that part of the country, which may be bismuth. But I doubt the occurrence of molybdenite. Some crystals from a discovery near Whitestone lake, in Okanogan county, were shown me, claimed to have been investigated by Eastern metallurgists and found to contain 35 per cent. molybdenum sulphide, but I procured some of these crystals and found them to easily melt to a bead in the flame of a candle. I have watched determinations in the laboratory, and the predominating metal was shown to be antimony. There may possibly be a small percentage of molybdenum.

STEVENS COUNTY.

Dominion Hill Mining Company—This company has taken two claims near Addy, which it has been operating. The sum involved is $12,000. A shaft is down 100 ft. on the vein, and shipping ore is being stoped on that level.

Easter Sunday—Trouble between the stockholders of the Waukegan & Washington Mining and Smelting Company, the owner, have become reconciled, and work will be resumed immediately.

Foreign Mining News.

CANADA.

NOVA SCOTIA.

Coal shipments from Nova Scotia mines for the three months ending March 31 were 656,648 tons; a decrease of 245,180 tons from the first quarter of last year. The shipments by companies this year were: Dominion, 410,538; Cumberland, 80,347; Nova Scotia steel, 55,703; Intercolonial, 37,846; Acadia, 51,510; Inverness, 18,192; Gowrie & Blockhouse, 2512 tons.

MEXICO.

SONORA.

Cananea Consolidated Copper Company—The reverberatory furnace commenced operations April 23, and is now going at full blast. It is giving all the results that were hoped for. This is a large furnace, the reverberatory chamber being 100 by 20 ft. with a fire-box of 16½ by 9 ft. in size. At present only the flue-dust from the smelter and other furnaces is being treated, but in the near future ore material will be handled in a fine-ground condition. Preparations are being made to treat the tailings from the reduction works and it is expected that these will be handled within a few weeks. Dams are being built to catch the waters running from the reduction works, and a plant is being erected to handle the water and save the copper which it contains.

Pilares de Terras Mine—The reports that this famous mine had been sold to an American syndicate have at last been confirmed, and it is known that a New York company has purchased the property for the sum of $2,000,000. This mine is in the district of Arizpe, and is a large producer. The plans of the American syndicate include installing a large mill at the property, and the commencement of work on a modern plan.

Fortuna Mining Company—Owing to recent strikes in the mine owned by this company it has been decided to erect a mill at the property as soon as possible. The mine is in the Sierra Azul mountains, about 20 miles south of Cananea, or about 5 miles from the border. The orebodies, under the increased development of the past year, have proved to be large. A carload of the ore was shipped to El Paso to be treated in the smelter there, in order to determine the process necessary to the

most economical extraction of the values. Using this test as a basis the new mill will be ordered.

Arizpe Mining Company—In the drift at the 100-ft. level of the Alacran mine, owned by this company, ore averaging as high as 200 oz. of silver and 8 per cent. copper has been found. The entire drift for a distance of 480 ft. is in ore. New machinery has been ordered for the Rey de Cobre mine of the same company, which has proved to be a large low-grade copper proposition. The property is 17 miles southeast of Cananea in the Manzanal mountains.

Cubana Consolidated Copper Company—Ore running high in value has been discovered in the main development shaft of the mine owned by this company. As this orebody is very extensive, and as the mine contains many orebodies of lower grade, the management has decided to put a 50-ton mill on the property as soon as possible. The mine is in Arizpe district, 40 miles south of Cananea.

Cananea-Duluth Copper Company—The mine of this company is located on the Cobre Grande ledge of the Cananea Consolidated Copper Company, and the property gives promise. Heavy machinery has been ordered for Shaft No. 1, and this will be followed by the installation of the same at Shaft No. 2, in which a body of black sulphide of silver has been discovered at the 95-foot level.

ZACATECAS.

Mazapil Copper Company, Ltd.—We are informed that an item published in the JOURNAL for March 31, referring to a consolidation of this company's interests with those of William Purcell, of Saltillo, was incorrect; our correspondent having been misled by articles published in the local papers. A company has been formed to manage Mr. Purcell's private interests, but those have no connection with the Mazapil Copper Company. The banking house of Mr. Purcell, at Saltillo, acts as financial agent for that company, and Mr. Purcell is, individually, a shareholder and director of the company. It is this which was probably the origin of the reports mentioned. The Mazapil Copper Company, Ltd., is a distinct organization, with headquarters in Manchester, England, and is sole owner of mines and smelters in the States of Zacatecas and Coahuila. The company also owns and operates the Coahuila & Zacatecas Railroad.

ASIA.

INDIA.

According to L. L. Fermor, the manganese deposits of the Vizagapatam district are due to the alteration of old manganese-bearing silicates like spessartite and pyroxene, the most general type being an apatite-spessartite-felspar rock, which was intruded in Archæan schists. He classifies the most prominent Indian deposits as follows: A. Braunite, psilomelane and pyrolusite associated with manganese-bearing silicates (such as spessartite, rhodonite, and less frequently piedmontite) occurring as bands and lenticles in the Archæan schists and gneisses. Examples of these occur in—(1) Narukot in Bombay; (2) Jhabua in Central India; (3) Balaghat, Bhandara, Chhindwara and Nagpur in the Central Provinces; (4) Ganjam and Vizagapatam in Madras. B. Psilomelane and pyrolusite superficially formed on the outcrops of rocks of Dharwar age—(1) Singhbhum in Bengal; (2) Dharwar and Panch Mahals in Bombay; (3) Jabalpur in the Central Provinces; (4) Sandur Hills in Madras.

The demand and high price of manganese has given an impetus to manganese mining in India. Recently a large shipment was made from Bombay direct to New York.

The Anantapur Gold Field Company is developing an old gold-field near Anantapur. The company's mining claims are situated in the Anantapur district of the Madras Presidency, about nine miles from the station on the Southern Mahratta Railway, being some 100 miles or a little more in a northerly direction from the Kolar gold-field. The properties together comprise 3070 acres, and cover, from north to south, a distance of nine miles, through which many quartz reefs run, which give evidence of having been largely worked in ancient times.

AFRICA.

TRANSVAAL.

A recently published table shows that three mines of the Rand have fallen below zero, so far as profits on operations are concerned. These mines are the Lancaster (loss £134 for February), New Unified (loss £724) and Windsor (loss £900). All of these mines are in the struggling section of the Rand, west of Johannesburg. The new Unified has been steadily getting worse. Compared with the December returns, there is a drop of £1592. The November operation showed a recovery of $6.48 per ton milled, December, $6.13, January, $5.94 and February $5.51 per ton. An improvement is expected at both the Lancaster and Windsor mines.

To show how mines vary on the Rand, it is interesting to compare the annual reports, just published, of the Ferreirra Gold mine, in the Central Rand, with the French Rand mine, in the western or struggling section. Both of these mines have 120-stamp mills. The value per ton of the rock crushed at the Ferreirra in 1905 was $12.02. the gross working profit being £313,545. At the French Rand the value of the rock crushed was $6.79 per ton, the gross working profit being £18,363. No greater proof than this is needed to show that, like all goldfields, the Rand has its distinct rich and poor zones.

AUSTRALIA.

NEW SOUTH WALES.

Trouble is still being experienced in the Broken Hill mines in consequence of fresh outbreaks of fire. The board of directors of the Junction and Junction North mines have resolved to flood their mines as the only certain means of extinguishing the fire in the former mine. This will also flood the North mine, causing a delay of from three to four months in production. All surface improvements will proceed as usual. The manager anticipates only a little damage will be caused to the mine. The directors feel that the course adopted is the best under the circumstances. There is no certainty otherwise when the fire in the Junction mine will be extinguished, and while it continues it is impossible to keep the gases out of the southern end of the North Broken Hill mine.

It is pleasing to be able to report that the fire in the Broken Hill Proprietary Company's mine, which at one time threatened to assume great proportions, is well in check. Much inconvenience is still occasioned by noxious gases, and the men have at times to be withdrawn from the mine, but there is apparently now no danger of the fire spreading beyond its present confines. The returns of the Broken Hill field for the quarter show that, notwithstanding the interruption of operations at the Proprietary mine for some four weeks, the output of crude products is in excess of that for the corresponding period in 1905. A recent return prepared at the instance of the Mines Department, New South Wales, emphasizes the results contributed by the mines on the Broken Hill field. It shows that since the commencement of operations the value of the production has amounted to £43,259,000, and that dividends and bonuses to the value of £12,834,000 have been distributed to shareholders. The directors of the Zinc Corporation and Australian Smelting Company have been engaged inspecting a number of sites with the object of deciding on the most suitable position for the erection of works for the smelting of Broken Hill ore and concentrate, and ore from other sources generally; also the production of zinc from Broken Hill tailing, the production of sulphuric acid, and the manufacture of fertilizers and other by-products. Present indications point to the site of operations being fixed in the vicinity of Newcastle, N. S W. The Zinc Corporation has entered into one of the largest mining deals within recent times. The capital of the company is £350,000, and £260,000 have already been expended in the purchase of tailing from the Broken Hill mines. So far 412,500 tons of tailing have been purchased outright, and an option secured over an estimated quantity of 3,547,500 tons, the total

metallic contents of which are estimated as: Silver 20,638,000 oz., zinc 729,520 tons, and lead 269,180 tons.

The Conrad tin and lead mines at Howell, in the New England district, have been purchased by the Conrad Consolidated Mines Ltd., of London, which proposes to operate them on an extensive scale. During the past 12 months 3,500 feet of driving and sinking work was done to prove the lode which is composed of quartz, carrying tin sulphide, lead, copper, zinc, gold, silver, cadmium and other metals in a complex ore. Experiments have shown that a marketable product can be obtained by concentration and magnetic separation. The ore opened up by development operations has been quite up to expectations, and face values have been running as high as 100 oz. silver and 50% lead for some distance in the lower levels. The stannine ore body has also been exposed in the lower levels, and face samples have travelled some distance with 60 oz silver, 5% copper, and 5% tin. It is believed that further development is contemplated before stoping and milling will be restarted. There are now considerable heaps of high-grade ore at grass from the development work, comprosing some 3,000 to 4,000 tons.

The complete returns of the mineral production of the States of New South Wales and Queensland show that the value of the output for the year 1905 was £7,017,940 and £3,726,275, respectively. These figures are the highest in the history of the States, and emphasize the strides that the mineral industry is making, and more particularly in the output of minerals other than gold. In Queensland the value of the copper won increased from £258,000 in 1904, to £504,000 in 1905, and the indications favor a still larger expansion during the year 1906. The new plant at the Mount Morgan mine is running quite up to expectations. In five weeks one unit treated 5000 tons of ore for matte containing upward of 150 tons of copper and 2000 oz. of gold, and it is computed that when the two units of the plant are in commission, the value of the product of this mine will be augmented by at least £40,000 a month. The advent of this company as a copper producer indicates that it will, as such, take rank in Australia next to the Mount Lyell Company. As regards the Mount Lyell Company, Tasmania, the end of another half-yearly period was reached on March 31 last, and although the official figures are not available at this date, the shareholders are assured that the results will be highly satisfactory. The output for the period referred to may be set down as 4400 tons, as against 4300 tons for the previous half-year. This will constitute a record for the present company, and should bring the net profit for the term up to £200,000. The annual report of the Wallaroo & Moonta Mining and Smelting Company, South Australia has afforded the shareholders satisfaction, as it shows that after two years of arduous strain in coping with the fire in the Wallaroo mine, which involved an expenditure of £144,000, the year closed with a credit balance of £38,648, of which £16,000 were allotted as dividends. The output of the smelting works for the year was: Copper (fine), 6515 tons; gold, 1747 oz.; silver, 5619 oz.; in addition 340 tons of bluestone and 5,312 tons of sulphuric acid were manufactured.

In common with the other branches of the mineral industry the gold yield contributed by the Eastern States for the first quarter of the year is in advance of that for the same period in 1905. The increase is particularly noticeable in respect to the Bendigo Field, Victoria, the yield being 61,318 oz., against 45,856 oz. for the March quarter last year. This is the best return from this field for the similar period since the year 1876.

TASMANIA.

The Mount Bischoff Tin Mining Company, Tasmania, has let tenders to the Goldfields Diamond Drilling Company, to drill two core bores to a minimum depth of 5000 ft., on the Mount Bischoff mine. This is the greatest tin mine hitherto discovered. It has been regularly operated since 1875, and to date has produced over 64,000 tons of cassiterite valued at about $11,000,000.

The recent advances in the price of tin has enabled the company to declare regular monthly dividends of $2.50 in place of the previous rate of $1.80. The officers of the company have also been paid four bonuses, three of 10 per cent. and one of 5 per cent.

The New Brothers Home No. 1 Tin Mining Company, Tasmania, during the half-year ended Feb. 28, treated 114,000 cu.yd. of drift for a yield of 164 tons of stream tin. The amount distributed to shareholders during the past term totalled £4500, and a surplus of £3966 has been carried forward. The dredges in the Tingha District, N. S. W., are recovering a good quantity of stream tin, and the high price ruling for this metal has given a stimulus generally to operations throughout the stanniferous areas.

VICTORIA.

The Long Tunnel Company, Walhalla, Victoria, has, after an interval of seven years, again appeared on the list of dividend payers. Up to April 1899, when the last dividend was declared, the company on its 2400 shares had paid £512 5s. per share in dividends, totalling £1,229,400. This stands as a record for the State of Victoria. The last financial statement of this company shows a surplus of £11,297, and regular dividends may now be expected.

NEW CALEDONIA.

Shipments of ores for February and the two months ending Feb. 28 are reported by the *Bulletin du Commerce,* of Noumea, as below, in metric tons:

	February.	Two Months.
Nickel ore	16,398	22,491
Cobalt ore	745	829
Chrome ore	7,903	15,220

The shipments included in February, 51 tons of nickel ore and 5169 tons chrome ore to the United States.

CANADA.

BRITISH COLUMBIA.

Rossland—The Consolidated Mining and Smelting Company of Canada, Ltd., owning the St. Eugene, War Eagle and Centre Star mines at Trail smelter, a recent consolidation of several mining and other companies operating in British Columbia, has declared its first dividend, of 2½ per cent. for the quarter ended March 31, payable May 1. As the capital stock issued totals $4,698,888, the amount to be divided is $117,472. Particulars of the operations of the above mentioned company's smelter at Trail and its St. Eugene mine, have been given in correspondence of recent date. The report of the directors issued a few weeks ago, from which that information was taken, also gives the following particulars of the company's Centre Star and War Eagle mines, situated at Rossland: Center Star: In the Centre Star Company's report for the year 1904, the ore reserves were estimated at 50,000 tons. Development work was consequently pushed, the expenditure upon this account during the calendar year having been $148,053, as compared with $53,287 in the fiscal year ended Sept. 30, 1904. The ore found on the ninth and tenth levels seems to justify the larger expenditure for development work, and the sinking of the main shaft to the eleventh level. Since the last report, 111,841 tons of ore have been shipped, having a gross value of $11.28 per ton, or a total value of $1,261,390. The net amount received by the company for this ore, after deducting all freight, smelting, refining and marketing charges, was $503,476, or $5.39 per ton.. The ore showing in the mine promises to yield over 100,000 tons ore of $10 gross value, which does not include the ore being opened up on the tenth level. The mine is now shipping about 9000 tons of ore monthly, averaging about $10 per ton gross value. Numerous surface improvements have been made and others are under comtemplation. The sorting of the ore, or the picking out of the waste, has yielded better financial results.

War Eagle: In the report for the year 1904, the ore reserves were estimated at 23,000 tons. An unusual amount of development work was performed, involving an expenditure of $128,046, which is $77,059 more than was expended in the previous year.

Coal Trade Review.

NEW YORK, May 29.

The Western coal trade furnishes little news this week. Conditions remain about the same, and there have been no new moves made by either operators or miners. The strike on the Lakes, stopping navigation for the present, removes any pressure for Lake coal, so that the markets are fairly supplied for the present.

In the East the anthracite suspension has been ended by what looks like a complete surrender of the miners. The only point gained was the signing by the operators of a formal agreement, the first of the kind ever made in the anthracite region. The demands for increased wages, then for a new arbitration were set aside, and finally the miners' committee gave up the last point, an agreement for two years only. The new agreement is for three years. The operators conceded the one point of agreeing to take all the men back, promising to make no discrimination, except in cases where men had engaged in riot or destruction of property while idle.

Following is the text of the agreement:

"Whereas, pursuant to the letter of submission signed by the undersigned in 1902, 'all questions at issue between the respective companies and their own employees, whether they belong to a union or not,' was submitted to the Anthracite Coal Strike Commission to decide as to the same and as to the 'conditions of employment between the respective companies and their own employees' and the said Strike Commission, under date of March 18, 1903, duly made and filed its award upon the subject matter of the submission and provided that said award should continue in force for three years from April 1, 1903, and the said period has expired.

"Now, therefore, it is stipulated between the undersigned in their own behalf in so far as they have power to represent any other parties in interest, that the said award and the provisions thereof and any action which has been since taken pursuant thereto, either by the conciliation board or otherwise, shall be extended and shall continue in force for three years from April 1, 1906, namely until March 31, 1909, with like force and effect as if that had been originally prescribed as its duration. That work shall be resumed as soon as practicable and that all men who have not committed violence to person or property shall be re-employed in their old positions.

"George F. Baer, E. B. Thomas, W. H. Truesdale, David Willcox, John D. Kerr, Morris Williams, Joseph L. Cake, John Mitchell, P. D. Nicholls, John Dempsey, W. Dettrey, John P. Gallagher, John Fahy."

The agreement of the committee has been accepted by the district convention. Some of the causes of the surrender of the mines are given in the letter of our Scranton correspondent, found on another page.

It is expected that there will be a general resumption of work on May 14, by all the collieries.

COAL TRAFFIC NOTES.

The total coal and coke traffic originating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the year to April 28 was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite..	1,447,683	1,374,430	D. 73,253
Bituminous.....	8,960,278	10,884,419	I. 1,924,141
Coke....	3,594,166	4,131,732	I. 537,566
Total.....	14,002,127	16,390,581	I. 2,388,454

Shipments of Broad Top coal over the Huntingdon & Broad Top road for the week ending May 5 were 2294 tons; for the year to May 5 they were 294,041 tons.

Shipments of coal and coke over the Chesapeake & Ohio Railway for the nine months of its fiscal year from July 1 to March 31, were as follows, in short tons:

	Coal.	Coke.	Total.
New River.....	4,133,003	250,963	4,383,966
Kanawha.....	2,215,687	88,160	2,303,847
Kentucky.....	82 545	.....	82,545
Connecting lines...	343,433	36,993	380,426
Total.....	6,774,668	376,116	7,150,784

The totals show increases of 939,656 tons of coal, and 149,846 tons of coke. The destinations of the shipments originating on the line were: Points west of mines, 2,707,527 tons coal and 196,387 tons coke; points east, 1,206,107 tons coal and 142,736 tons coke; tidewater, 2,517,601 tons coal.

New York. May 9.

ANTHRACITE.

The hard-coal market will now resume its arrested progress. The convention of miners at Scranton abandoned its belligerent intentions and re-submitted the whole matter to its scale committee. This met with the operators in New York, and decided to return to work at once, the operators promising to reinstate all striking workmen except those guilty of violence. This action was confirmed by the miners still in convention, who agree to return to work next Monday.

As a result of this settlement the operators have decided to grant the usual May discount of 40c. per ton on the prepared sizes; steam sizes are not affected. Prices during the remainder of this month will be: $4.35 for broken and $4.60 for domestic sizes. For steam sizes the prices remain: $3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice and $1.30@1.35 for barley f.o.b. New York harbor shipping points.

Following this action the New York retail dealers reduced their prices on domestic fuel by about 75c. per ton, current quotations now being: White ash, $6.25; red ash, $7. Steam sizes from yard are: Pea, $4.25; buckwheat, $3.75; No. 1 buckwheat, $3.25 per ton.

BITUMINOUS.

The Atlantic seaboard soft-coal trade is exceedingly dull. Even the few producers who are active are curtailing their shipments since the demand is nowhere equal to the supply. Prices are on the decline; ordinary grades can now be bought for $2.60 f.o.b. New York harbor shipping points. Speculative coal is entirely out of the market.

Trade in the far East is dull, but the Sound shows a slightly stronger demand. All-rail trade is also backward; car supply is good but transportation is somewhat slow.

Vessels in the coastwise market are in abundant supply and rates are falling. Current quotations from Philadelphia are: To Boston, Salem and Portland, 65c.; to Lynn, Newburyport and Gardner, 75c.; to the Sound, 60c.; to Portsmouth and Bath, 70c.; to Saco, 75c.; and to Bangor 75@80c.

Birmingham. May 7.

There is no slack work at any of the coal mines in Alabama, as far as can be learned and every ton of coal being mined is in demand. The railroads are unable to give all the cars they are requested to for the prompt handling of coal. The car shortage is something remarkable for this period of the year.

The Pratt Consolidated Coal Company is said to be after extensive properties in Walker county.

Chicago. May 7.

Notwithstanding the continuance of the strike in the western bituminous fields, with no certainty or immediate prospect of settlement, coal is still a dull commodity in the Chicago market. Nearly all the fuel supplies from the Illinois and Indiana mines have passed into the hands of speculators, who hold it for profit, of course, but who are likely to lose through the slacking of the supplies in store. The stocks of manufacturers and railroads are not yet exhausted, though greater demands are made each day on the stores of the speculators. Prices so far are a disappointment to those that have bought hoping to realize large returns. Western and eastern coals are not exorbitantly high, and they do not seem likely to rise greatly.

Much Hocking is being received from non-union mines, and smokeless is plentiful. Anthracite is not in the market except for western stores, but these are selling slowly. The prevailing prosperity and the popular feeling that the coal troubles will be settled before the coming of cold weather again, account for this lethargy

The release of coal from Illinois and Indiana mines seems to be a disappointment to dealers, who say coal is as low

as it has been at any time in the last six months. Quotations said to represent actual sales do not bear out this theory: Western run-of-mine is said to bring $2.25@2.75; $2.50@3 for lump, and $2@2.50 for screenings. It is impossible to state prices accurately for general business, owing to the large speculative element. Eastern coals continue about as reported last week.

Cleveland. May 8.

The movement of coal up the lakes has been at a standstill for the past week, due to the lake strike. A few feeble efforts have been made to load boats by the officers of the dock companies and they have succeeded in placing a number of untrimmed cargoes in holds. But the amount of coal handled in this way was small as compared with the amount normally moved during this period of the year. At the beginning of last week the railroads placed embargoes on the movement of coal to lake ports. This has been in force now for a week. This supply has been fed out to the local market and has eased prices a little, bringing mine-run steam coal down to $1 at mine. Slack is still strong with a good demand, at 75c. at the mine.

Coke shows a heavy demand from the furnaces and no evidence of any abundant supply. The market is therefore strong, but on the same basis as a week ago, Froundry coke is quoted at $3, and furace coke at $2.25@2.50 at the ovens.

Pittsburg. May 8.

Coal—All the mines in the Pittsburg district are in full operation this week and less than a dozen mines in the outlying districts are idle. While all are under the jurisdiction of the Pittsburg organization of the United Mine Workers, special scales are required and some are not adjusted. The latest settlement was made with the Great Lakes Coal Company, operating five mines at Kaylor in the Mercer-Butler field. The 1903 scale was accepted, with some concessions favorable to the miners, and the 1200 miners employed returned to work yesterday. The only important concession made by the miners was to grant a nine-hour day and to permit tipplemen to work longer, if necessary to load all the coal mined. The strike of the longshoremen has seriously affected the Pittsburg Coal Company, and its shipments to the lake docks have been greatly curtailed. The company has some men at work at the Cleveland docks and is operating two loading machines. All of its mines are running, but shipments are being made to other quarters, as there is an unusual demand for coal. Prices remain at $1.15 a ton for mine-run coal, but in some instances a much higher price is obtained. The railroads are furnishing all the cars required and shipments from this district have never been so large. The mines in Indiana and Illinois and in some districts of Ohio are still idle, the operators refusing to pay the 1903 scale. A general meeting of the operators of the three States has been called at Chicago tomorrow and will be held in the Auditorium Annex Hotel. The Ohio operators are holding a meeting in Columbus today. They have received a telegram from President John Mitchell, of the United Mine Workers, rejecting the arbitration proposal and it is likely some action may be taken at the meeting tomorrow looking to the re-opening of negotiations with the miners' leader. The reserve supply of coal in the three States is being exhausted, and some of the steel mills are crippled.

Connellsville Coke—The demand continues good and prices are firm, furnace coke being quoted at $2.60@2.75 a ton and foundry at $2.90@3.10 a ton. The production in the Connellsville field for the week amounted to 271,464 tons and the shipments aggregated 12,475 cars distributed as follows: To Pittsburg and river points, 4470 cars; to points west of Pittsburg, 6603 cars; to points east of Everson, 1402 cars. The combined shipments from the Connellsville and Masontown fields amounted to 360,437 tons.

Foreign Coal Trade.

May 9.

Imports of fuel into Spain for the two months ending Feb. 28 were 365,830 tons coal, an increase of 59,161 tons; 36,627 tons of coke, an increase of 9835 tons over last year.

Exports of coal from Newcastle, New South Wales, for the quarter ending March 31 were as follows, in long tons:

	1905.	1906.	Changes.
Australian ports	336,217	397,967	I. 61,750
Foreign ports	271,912	363,801	I. 91,889
Total	608,129	761,768	I. 153,639

The total increase this year was 25.3 per cent. The Australian shipments this year were divided as follows: Victoria, 174,782 tons; Queensland, 14,620; South Australia, 71,815; Western Australia, 35,040; Tasmania, 25,289; New Zealand, 76,421 tons.

Iron Trade Review.

New York, May 9.

The trade continues active, and sales are large in most lines. For pig iron, most furnaces are covered for the first half of the year, with many contracts running over into the third and fourth quarter. There is some anxiety about the Lake situation. If a settlement of the labor troubles is not reached soon, there may be a shortage of ore which will compel some furnaces to bank for a time. The receipts of nearly 1,500,000 tons at lower Lake ports in April, before the strike began, may help the situation.

Orders for rails continue to come in, and the mills are now practically full for 1906 deliveries. Some of them have orders running over into 1907, and more are expected. Other railroad orders are also heavy. The Pennsylvania is negotiating for 20,000 steel cars, only a small part of which can possibly be delivered this year. These orders mean a heavy demand for plates and shapes.

New business will develop as the result of the San Francisco fire, but it is too soon to expect much from this source. Other orders for structural material are only moderate just now; partly because it is impossible to secure deliveries wanted.

The German steel syndicate has raised prices, in anticipation of heavy orders from this country, it is said. So far, however, there is little business going abroad, and most observers here do not anticipate large imports.

Birmingham. May 7.

While there has been no startling amount of business transacted in pig iron in the Southern territory during the past week, conditions are still reported satisfactory. Some nice inquiries have been received lately in this district indicating that there will be need for iron during the last half of the year. The shipments of pig iron from the Southern territory are somewhat under what they were before March 1, but there is no complaint, the home consumption being steady. One furnace at Woodward was blown in during the past week, while another, the Southern Steel Company's furnace at Gadsden, has been closed down. The Alabama Consolidated Coal and Iron Company has entered into an agreement with the Southern Steel Company to manufacture basic iron, which will be turned out at Gadsden furnace and transferred directly to the steel plant of the Southern Steel Company. This will take from the open market something like 300 tons of iron a day. The furnace of the Woodward Iron Company blown in at Woodward will manufacture about 200 tons of iron a day.

Positively no change is reported in the quotations in the South. No. 2 foundry iron is being held firmly at $14 per ton. There are no indications either that the prices are going to advance in the near future.

There is no change in the conditions with the steel plants. The Tennessee Coal, Iron and Railroad Company has been accepting business lately for delivery on steel rails during 1907. The Republic Iron and Steel Company will in the next few days be making steel from its two 50-ton open-hearth furnaces at the Birmingham rolling mills site.

The rolling mills in this district are still doing nicely and as far as can be learned there is no intention of closing down for any length of time during the summer.

No charcoal iron is yet being manufactured in this State, though announcement has been made that the Shelby

Iron Company is making efforts to get charcoal with which to start up the furnace. A. Griggs, heretofore superintendent of the Alabama Great Southern Railroad, has taken service with the Georgia & Alabama Iron Company as president and general manager, and will take up the work just as soon as he can be relieved by the railroad company. The Georgia & Alabama Iron Company has a charcoal iron furnace in operation at Cedartown, Ga., besides ore mines.

Chicago. May 7.

Notwithstanding the prospect of labor troubles, the iron business continues firm, and sales are such as to indicate an increase in the price of pig iron soon. Consumers must have iron—that is the interpretation placed on the situation by selling agents, who see no check to the increasing prosperity of the furnaces. Certainly the business is firmer for the first week in May—a season when the summer dulness may ordinarily begin to be felt—than was expected a month or two months ago.

Present sales are for deliveries in the third and fourth quarters of the year, with a good share of the business still done in emergency lots for delivery in the next 60 days. On quick-delivery business, prices are somewhat above those on contract iron, which range $18.75@19.25 for Northern and $14@14.50 Birmingham for Southern ($17.90@18.40 Chicago). On small lots 25@50c. premium is paid; on large orders for quick delivery—though these are few—the smaller quotation probably represents the ruling figure. The trouble with emergency lots, especially as regards Northern iron, is that the furnaces have little to sell.

Coke is plentiful and Connellsville brings $3@3.50 at ovens.

Cleveland. May 8.

Iron Ore—The movement of ore, partially interrupted by the lake strike, is expected to be resumed in full blast by the end of this week, through a break up of the strike. The longshoremen's union is going to pieces through dissensions. The settlement of this difficulty will permit the unloading of boats at this end of the line. Boats have been loaded at the head of the lakes all along, since the docks there are run by non-union labor. The movement of ore during April was 1,447,386 tons, thus relieving the difficulty which was expected from a possible shortage of ore. All ore moved so far has been in contract tonnage.

Pig Iron—The movement of pig iron during the week has been lively. Sales have continued heavy and the aggregate tonnage placed for third-quarter delivery is large. At the same time buyers are showing an increased disposition to cover their needs through the fourth quarter of the year. This strengthens prices, although there has been no material change during the past week. Buying is still done on the basis of $16.50 in the Valleys for No. 2, although some few furnaces are holding for higher prices. The market for bessemer and basic is strong, on the basis of $17.25 in the Valleys.

Finished Material—New orders are coming in for structural shapes, entailing deliveries during the second half of the year. It is also evident that specifications against old contracts are heavier. Plates are stronger, due to some buying by car companies. Mills have now inquiries for material for 20,000 cars, the wheels for which were sold during the week. Billets are still scarce, with forging quality selling at $35 at the mills, and bessemers at $30. The strength of steel is the only thing that is keeping the sheet market up, since orders are lighter than they were earlier in the year. Bar steel is easier and bar iron is weak. Both are selling at 1.50c., Pittsburg.

New York. May 9.

Pig Iron—No large contracts are reported, but there are plenty of inquiries and a considerable volume of sales in small lots. There has been no change in prices. New England foundries are good customers, and are, apparently, stocking up for a large summer business.

For Northern iron in large lots we quote: No. 1 X foundry, $18.50@19.25; No. 2X, $18@18.75; No. 2 plain, $17.50@18; forge, $16.25@16.75. Southern iron is held firmly by the larger companies on the basis of $14 Birmingham for No. 2. For large lots on dock, New York, prices are: No. 1 foundry, $18@18.50; No. 2, $17.50@18; No. 3, $17@17.50; No. 4, $16.25@17; No. 1 soft, $18.25@18.50; No. 2 soft, $17.50@18; gray forge, $16.25@16.50. Basic is held at $19 for Virginia, $18.50 for Alabama and $18 for Northern.

Cast-Iron Pipe—Prices are steady, the present basis being $30.50 per net ton for 6-in. pipe in carload lots, at tidewater points. The foundries have a heavy business in hand, and several large contracts are pending.

Bars—Business is fair only, but prices are steady. Sales are at 1.645c. for common iron bars, and 1.695c. for refined iron. Steel bars are 1.645c. tidewater. Store trade is more active at 2c. delivered.

Plates—Steel plates are in steady demand. Tank plates are nominally 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745@1.845c. according to width. Sales here are chiefly in small lots.

Structural Material—Prices are nominally unchanged. Beams under 15 in. are 1.845c. for large lots; over 15 in., 1.895c.; angle and channels, 1.845c., tidewater delivery. Jobbers ask a considerable advance on small orders. Less business is reported for the week, but there is plenty in sight.

Steel Rails—No change in standard sections. Light rails are in steady demand, prices ranging from $27 for 25-lb. up to $33 for 12-lb. rails. The demand for trolley rails is good. The price of $28 for standard sections is being accepted for orders running into 1907 deliveries.

Old Material—Business is rather quieter though dealers are stiff in their views. No. 1 railroad wrought is $18.50@19.50; No. 1 yard wrought can be had for $17@18; machinery cast, $14@14.50; heavy steel melting scrap, $16@16.50. These prices are on cars, Jersey City or other terminal delivery.

Pittsburg. May 8.

Bessemer pig iron has become firmer, and if the strike of the longshoremen is prolonged, higher prices will prevail, as some furnaces will be forced to suspend. By the deal closed last week the United States Steel Corporation gets all the unsold bessemer iron of the Bessemer Pig Iron Association for May delivery, and the Shenango Furnace Company, the leading independent interest, is sold up to July 1. Many of the merchant furnaces are short of ore, bessemer ore being particularly scarce, and if a new supply is not received within the next two weeks the result may prove serious. The steel interests appear to be well supplied with iron and the strike will not affect the Steel Corporation, as it will be able to get ore from the Conneaut docks, which, it is reported here, are free from labor disturbances. Iron ore has never before been so badly needed at the opening of the lake season as at the present time. Several new ore vessels have gone into service and all are on their way with large tonnages to meet the urgent requirements, but their cargoes will be tied up at the docks until the strike of the longshoremen is settled. Unless prevented by a lack of ore, the association will have about 30,000 tons of bessemer iron for June shipment. It is understood that this iron is being held at $17.50, Valley furnaces, which is now the minimum price for May delivery, and the Steel Corporation has agreed to take all the unsold iron at 25c. a ton less. The demand for foundry and gray forge is stronger and prices are firmer than for several weeks.

The leading event of the week was the inquiry of the Pennsylvania Railroad for 20,000 steel cars for delivery in 1907, or for this year, if it is possible for the car-making concerns to turn them out. The bulk of this order will go to the local interests, the Pressed and the Standard Steel Car Companies, and most of the plates will be furnished by the Carnegie Steel Company. This company has been asked for estimates on the steel and it is likely the car contracts will be placed in a short time. The early action of the Pennsylvania is likely to bring other railroads into the market, and the car companies may have many large orders for

1907 before the end of this year. Other inquiries for plates are being received and prices are remarkably firm. Some new business in structural material is being booked, but it is of little importance, the general market being uneventful. The strike of the structural iron and bridge workers is still on, but the strikers have met with some success, as several small erectors have signed the new scale, giving employment to about 50 union men. The Pittsburg Erectors' Association, composed of the large interests, is determined to establish the open shop, but so far no effort has been made to bring non-union men into the city, except by the American Bridge Company.

Orders for steel rails continue to be booked, the new business placed during the week amounting to about 35,000 tons. The scarcity of steel is seriously affecting the sheet and tin-plate mills, and the leading interest is not able to operate more than 80 per cent. of its mills. Owing to the stiff advance in the price of pig tin, the recently established price of tinplate is being maintained and it is reported an advance may be ordered. The present price is $3.60 a box, f.o.b. Pittsburg, for 14x20 100-lb. coke plates.

The thirty-first annual convention of the Amalgamated Association of Iron, Steel and Tin Workers is in session at Cincinnati and discussion on the wage scale began yesterday. According to reports received here, the association will not make any extravagant demands, and it is confidently believed that the wage scales for all branches for the year beginning July 1 will be satisfactorily adjusted. The bi-monthly examination of the sales sheets of bar iron of the Republic Iron and Steel Company, on which the wages of the iron workers for May and June will be determined, will be held this week. It is believed the average will be one point lower than at the previous examination, which will mean a reduction of 25c. a ton in the puddling rate to $5.75 a ton, and a cut in the pay of the finishers of 2 per cent.

Pig Iron—A few small lots of bessemer pig iron were sold during the past few days at $17.50, Valley furnaces, which seems to be the minimum rate for prompt and June shipment except on large tonnages. Basic iron is firm at $17, and foundry No. 2 at $16.50@17, Valley furnaces. Gray forge is firm at $16.50@16.75 Pittsburg.

Steel—Billets continue scarce and prices are unchanged, bessemer billets being quoted at $27 and open-hearth at $28. Plates are strong at 1.60c., and merchant steel bars at 1.50c.

Sheets—The market is considerably stronger and new business is developing every day. Black sheets are quoted at 2.40c. and galvanized at 3.45c. for No. 28 gage.

Ferro-Manganese—Prices are a trifle lower, and for prompt shipment $105@110 a ton is quoted. For June and July delivery $90@95 a ton is named.

Cartagena, Spain. April 21.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were two cargoes, 11,300 tons Calasparra ore, one cargo, 1600 tons dry ore, and 12 tons iron oxide, to Rotterdam; one cargo, 3100 tons dry ore, one cargo, 2850 tons colorado, and two cargoes, 6050 tons manganiferous, to Great Britain. Business is good. Freights continue low.

Quotations are 8s. 6d.@8s. 9d. for ordinary 50 per cent. ore: 9s.@9s. 4d. for special low phosphorus; 12s. for specular ore, 58 per cent. iron; 10s. 2d. for S. P. Campanil. Manganiferous ores range from 11s. 8d. for 35 per cent. iron and 12 manganese up to 18s. 2d. for 20 per cent. iron and 20 manganese. All prices are f.o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are quoted at 10s. 6d. per ton, f.o.b. shipping port.

Metal Market.

New York, May 9.

Gold and Silver Exports and Imports.

At all United States Ports in March and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Mar. 1906..	$4,618,627	$5,625,529	Imp. $1,006,902
" 1905.	2,392,784	5,133 592	" 2,740,808
Year 1906..	18,846,622	10,310,921	Exp. 8,535,701
" 1905..	34,015,264	9,222,202	" 24,793,062
Silver:			
Mar. 1906..	5,213,811	3,507,532	Exp. 1,706,279
" 1905..	4,191,632	2,531,796	" 1,659,836
Year 1906..	19,165,608	12,674,692	" 6,490,916
" 1905..	12,592,452	6,515,356	" 6,077,096

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 and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending May 5, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$220,000	$7,490,693	$ 884,591	$ 46,128
1906.....	4,300,036	21,051,103	23,217,624	701,808
1905.....	32,881,125	4,950,256	11,137,981	1,212,281
1904.....	30,484,556	1,731,980	15,128,135	274,464

Imports of gold for the week were chiefly from France and Great Britain; of silver from the West Indies. Exports of gold were to Panama; of silver, chiefly to London.

The inward gold movement, which has been a prominent feature, seems to be suspended for the present. Immediate needs have been satisfied, but there is a possibility that more gold may come during the month.

The statement of the New York banks—including all the banks represented in the clearing house—for the week ending May 5, gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts..	$1,092,121,900	$1,042,110,960
Deposits.....	1,143,897,900	1,027,273,500
Circulation.....	44,537,600	50,844,200
Specie.....	220,303,700	183,146,600
Legal tenders.....	84,400,200	79,571,300
Total Reserve.....	$304,703,900	$262,717,900
Legal requirements....	285,974,475	256,818,375
Surplus reserve.....	$18,729,425	$5,899,525

Changes for the week this year were increases of $2,900,400 in loans; decreases of $3,587,700 in specie, $1,232,600 in legal tenders, $1,409,700 in deposits, $294,200 in circulation and $4,467,875 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.	Total.
New York.....	.....	.....	$183,146,600
England.....	$162,523,600	.....	162,523,600
France.....	597,717,525	$211,477,585	809,195,110
Germany.....	182,615,000	60,870,000	243,485,000
Spain.....	75,555,000	120,665,000	196,220,000
Netherlands...	27,346,500	29,616,500	58,963,000
Belgium.....	16,160,000	8,080,000	24,240,000
Italy.....	141,800,000	19,435,000	161,235,000
Russia.....	450,315,000	24,570,000	474,885,000
Austria.....	231,285,000	64,400,000	295,685,000

The returns of the associated banks of New York are of date May 5, and the others May 4. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver in London to the East are reported by Messrs. Pixley & Abell as follows for the year to April 24:

	1905.	1906.	Changes.
India.....	£ 2,514,190	£ 6,152,678	I. £ 3,638,488
China.....	23,070	.....	D. 23,070
Straits..	2,800	.....	D. 2,800
Total.....	£ 2,540,060	£ 6,152,678	I £ 3,612,618

Receipts for the week were £257,000 in bars and £11,000 in Mexican dollars; £262,000 in all, from New York. Exports were £400,700 to India.

Indian exchange has been steady, and all the Council bills offered in London were taken at an average of 16d. per rupee. The demand for silver on Indian account is somewhat better.

The Treasury Department's estimate of the amount and kinds of money in the United States on May 1 is as follows:

	In Treasury.	In Circul'n.
Gold coin (inc. bullion in Treasury).....	$210,234,297	$ 672,524,404
Gold certificates.....	49,995,480	500,696,389
Silver dollars.....	7,499,809	80,424,056
Silver certificates.....	5,069,530	467,574,470
Subsidiary silver.....	7,425,119	109,494,665
Treasury notes of 1890....	20,961	7,640,039
U. S. Notes.....	9,550,695	337,130,321
Nat. Bank Notes.....	11,880,323	544,765,959
Total.....	$301,676,204	$2,720,250,303

Population of the United States May 1, 1906, estimated at 84,428,000; circulation per capita, $32.22. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as

assets of the Government. The statement of money held in the Treasury assets of the Government does not include deposits of public money in national bank depositaries, to the credit of the Treasurer of the United States amounting to $93,063,281. The amount in circulation on May 1 shows an increase of $43,745,515 over April 1; and of $142,243,617 over May 1 of last year.

Silver has reached the highest price touched in the latest advance. It is believed the rise is owing to Bazaar buying for India. The market closes today at 31d. in London, 67c., New York.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.51	$0.52¼
Peruvian soles and Chilean	0.46½	0.48
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.86	3.89
Spanish 25 pesetas	4 78	4 80

SILVER AND STERLING EXCHANGE.

May.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	May.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
3	4.84	66⅛	30 11/16	7	4.84¼	66⅛	30 11/16
4	4.84	66⅛	30⅝	8	4.84¼	66¾	30⅞
5	4.84	66⅛	30 11/16	9	4.85¼	67	31

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

Other Metals.

Daily Prices of Metals in New York.

May	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
3	18⅜ @18¾	18¼ @18⅜	83⅛	40¾	5.60	6.05 @6.10	5.90 @5.95
4	18⅜ @18¾	18¼ @18⅜	83¼	41⅛	5.60	6.05 @6.10	5.90 @5.95
5	18⅜ @18¾	18¼ @18⅜	....	41¾	5.60	6.05 @6.10	5.90 @5.95
7	18⅜ @18¾	18¼ @18⅜	83⅛	43	5.60	6.05	5.90
8	18⅜ @18¾	18¼ @18⅜	83⅛	44	5.60	6.05	5.90
9	18⅜ @18¾	18¼ @18⅜	83⅞	43¾	5.60	6.05	6.05

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. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—The market is unchanged. Business has been rather quiet as the early requirements of consumers are filled and they are apparently not ready to anticipate their future wants on a heavy scale. Small lots for early delivery continue to be sold at a slight premium. Prices remain 18⅝@18¾ for Lake copper; 18¼@18½ for electrolytic in ingots, cakes and wirebars; 18@18⅜ for casting copper.

The excitement which prevailed in the London speculative market up to the latter part of April has subsided. Transactions on this account are on a smaller scale, and the close is cabled as £83 17s. 6d. for spot, £82 17s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £88; best selected, £88 10s.; strong sheets, £94.

Exports of copper from New York for the week were 1073 long tons. Our special correspondent reports the exports from Baltimore for the week at 1476 long tons of fine copper.

Tin—A heavy speculation is going on in London on the bull side of the market, which has been facilitated by the small tonnage of visible supplies. Prices have been driven up further from day to day and the close is near the top at £197 5s. for spot, £188 10s. for three months.

The quotations here have closely followed the London parity, being at the close 43½@44¾c.

Lead—The American Smelting and Refining Company has advanced its schedule $2 per ton, and orders are now being billed at 5.60 New York, 5.52½ St. Louis.

The European market is somewhat firmer and closes at £16 15s. for Spanish lead, £16 17s. 6d. for English lead.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 21 that silver has been 13.75 reales per ounce. Exchange has been 28.93 pesetas to £1. Pig lead is 75.75 reales per quintal; equal, on current exchange, to £14 13s. 3d. per long ton, f.o.b. Cartagena. Shipments were 65 tons desilverized and 352 tons argentiferous to Marseilles; 660 tons argentiferous lead to Newcastle.

Spelter—Reports from Joplin indicate a weaker ore market, presumably brought about by the increasing supplies of ores from other producing districts. This probably explains the weakness in the spelter market, the metal being quoted at 6.05 New York, 5.90 St. Louis.

The London market is also somewhat easier, and closes at £26 7s. 6d. for good ordinaries, £26 12s. 6d. for specials.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 21, that the market has a firmer tone. Exports for the week were 70 tons calamine, and 500 tons blende to Antwerp.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars for Lasalle and Peru, in 600-lb. cases for gages 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 Jan. 1, 1906, have been as follows: Jan. 6, 1906, $8; Feb. 5, $7.75.

Antimony—The condition in the antimony market amounts almost to a corner. Prices in London have been advanced a few pounds almost daily. Cookson and Hallett's brands are quoted at 25@26c., while the other makes are offered at somewhat less.

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 48c. up to 60c., also according to size of order and deliveries.

Platinum—The current quotation in New York is $25 per ounce. The price, however, is subject to fluctuations, on account of variable supply. Demand is strong and steady.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to $43.50@44 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 7s. 6d. per flask, but jobbers ask £7 10s. for moderate lots.

Aluminum—List prices of the chief maker are as follows, for ingots: No. 1, over 99 per cent. pure, 38c. per lb. in less than 100-lb. lots, 36c. in lots of 100 lb. up to one ton, and 35c. in ton lots; No. 2, over 90 per cent., 35c., 43c. and 33c., as above. Granulated metal is 1c. per lb. over price of ingots. Rolled sheets from 44c. up, according to size.

Missouri Ore Market.

JOPLIN, May 5.

Zinc sold as high as $44 per ton on an assay basis price of $40 to $41 per ton of 60 per cent. zinc.

Lead price advanced 50c. per ton, highest $79, and 80 per cent. grades $78 per ton. Average price, $76.52 per ton.

The shipment of zinc for the week was the second heaviest of the year, and the fact that practically all of the reserve ore has been purchased at current prices is accepted as indicating that price reductions have reached an end. Prices have declined $10 per ton since the announcement three months ago, that an import duty of 20 per cent. ad valorem would be assessed on Mexican carbonate ore, and the decline has cost the district over a third of a million dollars, besides the $10,000 subscribed to defray expenses of

carrying the fight through the courts, if necessary. The effort to restrain prices from declining was costly and unfruitful. Curtailment of output won several victories for the producers, but that every departure from this fundamental principle has proven abortive, is the record of fifteen years' effort on the part of three successive organizations of producers.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,351,830	204,880	$78,173
Carterville-Webb City	1,911,400	605,370	62,386
Duenweg	1,163,690	153,650	29,592
Galena-Empire	968,390	245,270	27,840
Badger-Peacock	958,970	1,930	20,220
Aurora	776,620	.....	14,700
Neck City	543,110	.....	11,676
Oronogo	543,670	.....	10,868
Baxter Springs	369,140	104,510	10,370
Prosperity	170,920	151,760	9,269
Alba	380,610	.....	8,182
Granby	430,000	35,000	7,970
Carthage	193,150	.....	6,727
Stott City	159,560	.....	3,350
Springfield	62,970	.....	1,320
Sherwood	57,390	.....	1,200
Zincite	47,850	.....	1,030
Spurgeon	76,980	6,200	985
Totals	12,166 250	1,508,470	$305,858
18 weeks	180,957,970	25,348,270	$4,910,811

Zinc value, the week, $248,131; 18 weeks, $3,966,726.
Lead value, the week, 57,727; 18 weeks, 944,085.

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

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	$2.00	47.38	January	61 50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	....	May	58.27	....
June	40.75	....	June	57.80	....
July	43.00	....	July	58.00	..
August	48.83	....	August	58 00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, May 5.

An uncertain market characterized this week. Prices stiffened the first part of the week, and one lot of ore sold on a $43 basis. The ruling price, however, for 60 per cent. zinc was $41. There was considerable competition among the buyers of low-grade ore and the prices, consequently, were a little higher than last week.

Lead continues steady and there is no surplus in the bins at the mines. The same is true of drybone and sulphur. If the roads continue good, the surplus zinc will have been cleaned up in another week.

The Sunset had about 100 tons of cleaned ore, but refused to sell, as the price offered was so much lower than expected. The Empire ore is being piled up for treatment on the roaster, which will probably be completed the latter part of this month. The taking from the market of this ore, makes considerable difference in the Platteville camp's shipment.

The camps of the district report ore loaded as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	197,750	.....	.....
Linden	229,540	.....	.....
Shullsburg	200,000	.....	.....
Buncombe-Hazel Green	140,700	32,600	.....
Highland	60,000	.....	.....
Rewey	55,000	.....	.....
Galena	47,200	.....	.....
Cuba City	44,000	.....	.....
Livingston	40,000	.....	40,000
Benton	36,000	.....	.....
Total	1,050,190	32,600	40,000
Year to May 5	22,563,930	1,291,960	2,251,400

Mining Stocks.

NEW YORK, May 9.

After the fall last week the stock market quieted down, and there has been comparatively small movement, with only a moderate recovery from the lowest point. Amalgamated Copper closes at $103½; American Smelting common at $149½. The industrials have been fairly steady. Tennessee Coal, Iron and Railroad closes at $146¾; United States Steel at $38¾ for the common, and $106½ for the preferred. The market was largely professional.

Trading on the curb was rather sluggish, and prices not too firm, though some dealers claim that there is a better undertone. The coppers were not active, and close rather weak, though a little above the lowest, as a rule.

On the Consolidated Exchange dealings in mining shares were on a moderate scale, with prices rather weak. Ophir was dealt in at $5; Comstock at 13c.; while 44c. was paid for Elkton, and 95c. for Sandstorm. The range of stocks presented is rather narrow, and trading would be better if the list were lengthened.

Boston. May 8.

Mining shares had another sharp decline late last week, but have recovered and the market now seems to be on an even keel. North Butte presented another spectacular effect, and made its record price today at $93.50. It dipped to $83 last week and closed at $92.50 tonight. There is a good deal of profit taking from time to time, but there seems to be a persistent demand on reports that the next dividend payment will be $2. This stock was first traded on the local curb about a year ago, starting at $15. Amalgamated, after falling almost $4 to $96.87½, got back to $105.75 today, and Copper Range ran off over $5 to $69.75, but is back to $76.50. Osceola spurted $6.50 from the low price to $105. Utah, after breaking $2.50 to $56, is back to $60.62½ again. Old Dominion, which yielded $2.25 to $35.75, spurted to $41 today.

Shannon continues in good demand, and sold to $8.87½, a $1 advance for the week. The latter company is now increasing its output, and seems to be on the mend after a long period of depression. Bingham fell $2.50 to $30, but recovered to $35 today. The annual meeting was not held, but instead, a special meeting will be held May 16. The Heinze ownership will not be represented on the board for the present. Parrot, which yielded $1.50 to $31, rallied to $34.50 today. United States Smelting is $5 net for the week to $59.75, and Mohawk, after running off $3 to $56, is back to $60.50. Boston Consolidated has advanced to $1.75 to $24, and Centennial $2.25 to $24.50. Daly West is up $2.75 to $18; Isle Royale $2.50 to $21, and Tecumseh $1 to $10. The curb has been quiet, but today Butte Coalition became active and rose to $35, against $31 a few days ago.

Colorado Springs. May 5.

Trading has been rather light during the past week, and the tendency has been to fractionally lower prices. El Paso has been the principal trader and sold today for 51c., a few cents below last week. Findley has shaded off a half cent, selling on today's call for 74½c. Elkton has made a slight gain, selling today for 45c. Isabella sold down to 24¼c. during the week, with but little changing hands. Portland sold for $1.91, and Vindicator for 93½c. today.

There has been a meeting of the directors of the local exchange to consider the advisability of listing Nevada mining stocks, and other Colorado mining stocks outside of the Cripple Creek district; also Colorado industrials. No action has yet been taken, but it is quite possible that other Colorado stocks, both mining and industrial, will be listed.

San Francisco. May 3.

The San Francisco Stock and Exchange Board and the San Francisco & Tonopah Stock Exchange have refused offers to be housed in other cities, prefering to remain here. The exchange buildings were destroyed, but temporary quarters are being prepared. This morning the members of the San Francisco Stock and Bond Exchange meet in executive session at the residence of I. Strassburger, 2112 Jackson street, to consider important business affecting the interests of the Exchange. Mr. Strassburger, chairman of the governing committee, stated yesterday that a number of the leading members will support a suggestion that all the San Francisco exchanges unite in one exchange based on the plan of the New York Stock Exchange. The San Francisco Stock and Exchange Board has already appointed a conference committee on this subject. These two committees will carefully consider all the features of a proposed consolidation, and later report to their respective bodies. Such a coalition, it is contended, will not only work for the individual interests of the members of the

exchanges, but will develop into a representative institution which will be a credit to the new San Francisco. The Stock and Bond Exchange Board has about 80 members. In the event that union is decided upon, a temporary structure will at once be erected in the business section for use as a board room, and the stocks, bonds, and mining shares will be called in regular daily sessions. Later it is proposed to erect a handsome building which will be a credit to the stock brokers as well as an ornament to the city.

Dividends.

Company.	Payable.	Rate.	Amt.
Amalgamated Copper	May 28	$ 1.75	$2 712,500
Am.Smelters'Sec'ties,B pfd.	June 1	1.25	375,000
Arizona Copper, pref.	May 1	0.24	53,916
Granby Con.	May 15	0.30	400,890
Shelby Iron	May 15	5.00	50,000
U. S. Steel, pfd.	May 31	1.75	6,305,487
United Copper, pfd.	May 15	3.00	150,000

Assessments.

Company.	Delinq.	Sale.	Amt.
Arrow, Utah	May 7	June 1	$0 005
Brewer-Harrison, Utah,	May 10	June 1	0.01
Bullion	Apr. 30	May 21	0.05
Congar, Utah	May 29	June 10	0.00½
Crown Point, Nev.	Apr. 25	May 16	0.10
Idaho-Tonopah, Idaho.	Apr. 25	May 14	0.001
Justice	May 7	June 12	0.05
Kismet, Cal.	Apr. 20	May 21	0.01½
Loon Creek, Utah.	May 12	May 31	0.01
Overman	May 18	June 8	0.10
Scorpion	May 3	May 21	0.02
Sierra Nevada	May 7	May 28	0.10
Victoria, Utah	Apr. 24	May 15	0.00½
Yellow Jacket	Apr. 20	May 15	0.10

Tonopah Stocks. May 7.

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

	High.	Low.	Last.
Tonopah Mine of Nevada	19.00	18.75	18.87½
Tonopah Montana	2.65	2.63	2.63
Tonopah Extension	10.62½	10.50	10.62½
Tonopah Midway	2.04	2.00	2.04
Tonopah West End	3.20	3.10	3.15
Goldfield Mining Co.	.52	.49	.49½
Jumbo Mining	1.52	1.50	1.52
Red Top	1.65	1.65	1.65
Sandstorm	.90	.80	.85
Montgomery Shoshone Cons.	16.50	16.00	16.00
Eclipse-Bullfrog	1.06	1.03	1.05
Denver-Bullfrog	1.78	1.75	1.75

St. Louis. May 5.

Adams, $0.40—$0.25; American Nettie, $0.15—$0.10; Center Creek, $3.00—$2.00; Central Coal and Coke, $61 00—$59.50; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil. $60.00—$55.00; Columbia, $1.30—$0.50; Con. Coal, $27.00—$17.50; Doe Run (old stock), $325.00 - $300.00; Granite Bimetalic, $0.27—$0.20; St. Joe (old stock), $32.00—$30.00.

LONDON. (*By Cable.**) May 9.

Dolores, £1 18s. 9d.; Stratton's Independence, £0 7s. 0d.; Camp Bird, £1 2s. 6d.: Esperanza, £3 17s. 6d.; Tomboy, £1 7s. 2d.; El Oro, £1 5s. 0d.; Oroville, £0 17s. 6d.; Arizona Copper, pf., £3 13s. 6d.; Arizona Copper, def., £3 12s. 0d.

*Furnished by C. Schumacher & Co., New York.

PHILADELPHIA.

Cambria Steel	34	35	34¾	34¾
Philadelphia Co.	50	51	49¾	50¾
Tonopah	18¾	19¼	17¾	18¾

PITTSBURG.

Crucible Steel	13	13¾	12¾	13⅝
Crucible Steel, Pref.	78½	79⅝	77⅞	79⅝
Tonopah Ext.	10⅜	11	10⅜	10⅜

STOCK QUOTATIONS.

NEW YORK. Week May 8

Name of Company,	High	Low	Clg.	Sales
Amalgamated	106	93¾	103⅜	1,319,080
Anaconda	251½	226	239½	331,900
Boston Copper	24	21⅜	23	13,465
British Col. Copper	7	6¼	6⅞	5,510
Federal	165	155	165	900
Federal, Pf.	98½	92⅝	97½	8,950
Greene Copper	29¾	26⅞	29	31,600
Greene Gold	4⅛	2¾	3	12,185
Mitchell	8	7⅛	7⅛	9 650
Tennessee Copper	45	40	42¾	3,000
Union Copper	2	1¾	1 1/16	9,600
United Copper,	61½	57	59½	20,259
" " pfd.	100	92	92	102
Utah Apex	5⅛	5⅛	5⅛	2,375
Utah Copper	27	23¾	26	4,340

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	152⅝	138½	149⅛	451,910
Am. Smelting & Ref., Pf.	118¼	115⅛	117⅛	12,250
Col. Fuel & Iron	49⅜	40½	48	96,010
Pittsburg Coal	14⅜	13⅜	14¾	700
" " pfd	55	55	55	100
National Lead	79	66	76½	47,245
Republic I. & S.	28	22¼	26⅞	26,950
Republic I. & S., Pf.	100	91	97	17,400
Tenn. C. & I.	149	133⅛	146	11,550
U. S. Red. & Ref.	35	26	34½	3,400
U. S. Red. & Ref., Pf.	74¾	67⅛	73	7,360
U. S. Steel.	40¾	36¾	39⅛	660,220
U. S. Steel, Pf.	105⅝	102	104⅝	233,000
Standard Oil	618	597	612	
Bethlehem Steel	27	24⅝	25½	

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Bamb. Delamar, 6½—7; Butte Coalition, 31½—35; Cumb. Ely Min,, 5¼—5⅞; Greene Gold-Silver, 2⅜—2⅝; Mont. Shoshone, new, 16½—16¾; Nevada Con. Copper, 17⅛—19¼. (Boston) Adventure, 5¼—7; Montana C. & C., 3½—3⅝; Nevada, 17⅞—19⅜; Trinity, 9—10; U. S. Oil, 10¾—12; Wolverine, 133—135; Wyandotte, 1⅛—1¼.

BOSTON.

Allouez	39	33¼	36½	3 510
Amalgamated	105⅞	95⅝	103⅜	101,271
Atlantic	18¾	16	17¾	3,095
Bingham	35¼	30	34	10,450
Boston Consolidated	24	21¾	23½	6,170
*Calumet & Hecla.	690	675	690	101
Centennial	24½	21¾	23½	1,710
Con. Mercur	64	60	64	1,800
Copper Range	76¼	69¾	74½	20,765
Daly-West	18	15⅛	16½	3,312
Franklin	16¾	14½	16¼	1,763
*Granby	13⅛	11¾	12⅛	1,991
Green Con. Copper	29½	27	29	11,265
Isle Royale	21	18	19¾	1,585
Mass.	7½	7	7¾	495
Michigan	12	11½	12	370
Mohawk	60½	57¼	59½	1,552
*North Butte	93½	83	92	35,429
Old Dominion	41	35¾	39	4.185
Osceola	106	98¾	105	2,884
Parrot.	3s¾	31	34	4,574
*Quincy.	98½	95	97	447
Rhode Island	5	4	5	620
Shannon	8⅞	7½	8¾	12,422
Tamarack.	102	97	102	165
Tecumseh	9½	8½	9½	4,171
United Copper, com	61½	57	59½	5,410
" " pfd.	92	90	92	40
U. S. Smg. & Ref.	59¾	54	58	4,971
" " pfd.	46	43¾	45⅞	3,628
Utah Con	60¾	56	60¼	20,438
Victoria	8	6½	7¼	1,751
‡Winona	6¾	6	6	505

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg
Elkton	45	45½	43	43¾
El Paso	51	51½	50¼	51
Isabella	24½	25	24	24¼
Portland.	192	195	180	185
Vindicator	94½	95	92	93

SAN FRANCISCO.

(Business suspended for the present; last figures left for reference.)

Best & Belcher	1.25	1.25	1.15	1.15
Bullion	.31	.31	.25	.29
Caledonia	.37	.44	.35	.44
Confidence	.90	.94	.90	.90
Con. Cal. & Va.	1.35	1.35	1.30	1.30
Gould & Curry	.28	.28	.27	.27
Hale & Norcross	1.20	1.20	1.05	1.10
Mexican	1.15	1.15	1.15	1.15
Occidental Con	.96	.96	.85	.95
Ophir.	5.37½	5.50	5 25	5.25
Savage	1.00	1.00	1.00	1.00

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid

Monthly Average Prices of Metals.

SILVER.

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

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	New York.				London.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.416	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March.	15.125	18.361	15.250	18.641	68.174	81.111
April.	14.920	18.375	15.045	18.688	67.017	84.793
May.	14.627	.....	14.820	.....	64.875	.....
June.	14.673	.....	14.813	.....	65.881	.....
July.	14.888	.....	15.005	.....	66.887	.....
Aug.	15.664	.....	15.725	.....	69.830	.....
Sept.	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year.	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

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

Prices are in cents per pound.

LEAD IN NEW YORK.

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

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton; February, £ 16.031; March, £ 15.922; April, £15.859.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April.	5.817	6.078	5.667	5.931	23.813	25.781
May.	5.434	.....	5.284	.....	23.594	.....
June.	5.190	.....	5.040	.....	23.875	.....
July.	5.396	.....	5.247	.....	23.938	.....
Aug.	5.706	.....	5.556	.....	24.675	.....
Sept.	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov.	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.882	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.