

MINING WORLD

AND
ENGINEERING

With which is Incorporated The Mining World Index of Current Literature

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JUNE 10, 1916.

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WHERE AND HOW THEY ARE GATHERED



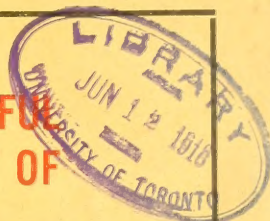
NATIVES WASHING FOR CARBONS AT THE MINES, BAHIA, BRAZIL

UNIVERSITY OF TORONTO

JUN 18 1916

DEPT. OF
MINING ENGINEERING

A WONDERFUL
SHIPMENT OF



CARBONS

[BLACK DIAMONDS]

FOR CORE DRILLS

AFTER the outbreak of the war we were the sole operators in Brazil who continued purchasing, hence our large and choice stock permits us to assure our customers that

OUR PRICES WILL NOT BE ADVANCED

THE SHIPMENT



15,591 GRAINS OF CARBONS

TO the left is portrayed our latest shipment arrived by the Lloyd-Brazileiro Steamer "Sao Paulo". This consists of

15,591 GRAINS OF CARBONS

[BLACK DIAMONDS]

THIS SHIPMENT of practically THE CREAM OF BRAZILIAN BLACK DIAMONDS now makes ours THE LARGEST STOCK OF CARBONS OF ANY DEALER IN THE WORLD and

OUR PRICES ARE RIGHT

WIRE AT OUR EXPENSE OR WRITE FOR PRICES AND FULL INFORMATION

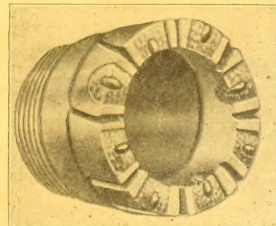
THE DIAMOND DRILL CARBON COMPANY

IMPORTERS OF AND DEALERS IN CARBONS, BORTZ AND BALLAS

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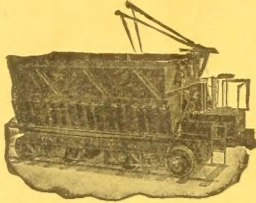
HOW THEY ARE USED



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THE ATLAS CAR & MFG. CO.

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The Expense

of handling ore can be reduced to a minimum by using

High Efficiency Cars and Electric Locomotives

If you require a Special Car let us design it for you.

No. 163-E—Electric Ore Car, with pneumatic door opening device and air brake.

SEND FOR CATALOG 1

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A great many tests have been conducted on the lubrication of mining machinery. Without exception Albany Grease has proven itself to be a lubricant without equal. Does a saving of from 40% up interest you? We'll gladly send a quantity of Albany Grease and an Albany Cup at no charge to you. Try Albany Grease out. Why not write—now.

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Write for Catalog M-4, prices and references.

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and for Melting Gold, Silver, Nickel, Cobalt, Brass, Copper, Aluminum, Etc.

We guarantee a saving of 60%, using oil and gas instead of coal or coke, in the

Steele-Harvey Crucible Tilting Melting Furnace

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We manufacture the Rockwell Double and Single Chamber Cyanide Bullion Melting Furnaces for oil or gas.

The Monarch Engineering & Manufacturing Co.

1200-6 American Bldg., Baltimore, Md., U. S. A.

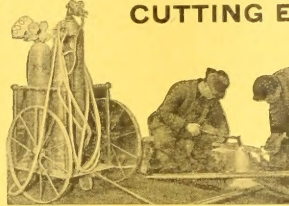
We also build Tilting "Coal and Coke" Crucible Furnaces.



K-Q WELDING & CUTTING CO., Inc.

556 West 34th Street, New York City

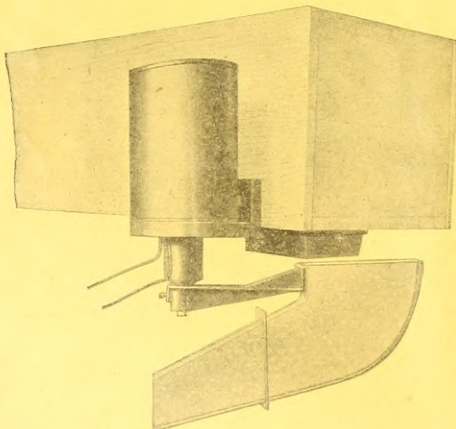
OXY-ACETYLENE WELDING and CUTTING EQUIPMENT



This apparatus is particularly adapted to the mining and engineering field and no mine should be without one.

Write for Book!

Flood Automatic Sampler



Sampler Attached to Bottom of Launder.

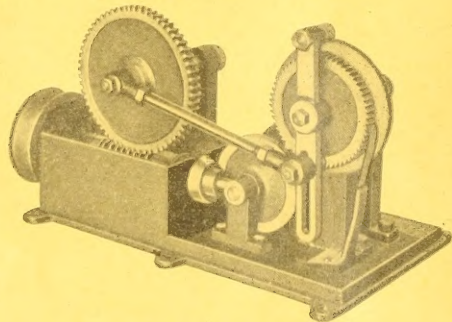
The Timing Device shown here is run by belt from the mill line shaft. It need not be near the Sampler. It can be placed outside of the building if necessary.

Will Find Where the Losses are in Your Mill.

Flood Samplers will automatically sample your ore or tailings at any predetermined intervals.

Works by electricity and controlled by a belt driven timing device.

They are simple and accurate. No trouble to install. No attention required to operate.



Hendrie & Bolthoff Mfg. & Supply Co.
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Hoist Operated by Hydraulic Turbine

(Sectionalized for Muleback Transportation When Desired.)

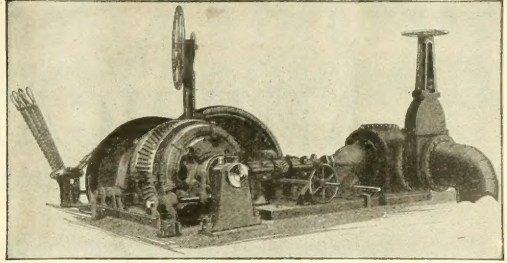
It is sometimes found desirable in mining operations to drive the hoist by water power, at least in the earlier stages of development. We illustrate herewith a very compact and efficient hoist operated on this principle.

This hoist is driven by a 9" bronze turbine at 1600 RPM, running continuously, and controlled by a governor; the drum being reversed at will by the ingenious arrangement of bevel gears and friction clutches shown in illustration.

Our satisfied customer reports as follows:

"The hoist was tried out in December just as I was leaving the mine, and worked without a hitch. It has been running in service ever since and is reported by the mine management as being perfect. It certainly is a handsome piece of machinery and we are grateful to you for the attention given to make it so."

Send us details of your requirements.



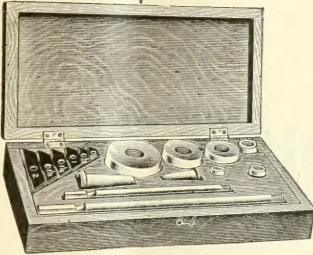
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18



—And here's the Valve Reseater—

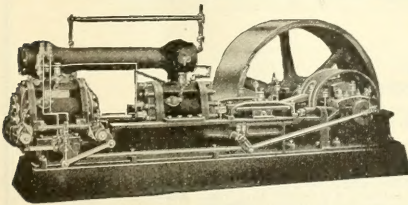
Last time we spoke of the saving in reclaiming old valves by cutting taper seats on them.

But the big saving with this tool is the regular daily use in keeping *all* valves tight.

A *real* valve reseater with sheer cutters for flat and taper seats at \$17.00 or \$25.50, according to size up to 2" or up to 3". Send for booklet.

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Modern Air Compressor

Variable Capacity

Constant Speed

Uniform Pressure

Starts with no load. Regulated by hand. Runs full load, part, or no load, according to the demand. Regulated automatically by air pressure. Unloads both stages of a compound compressor in same proportion, thus preserving at all degrees of load the proper division of work in the air cylinders. Not a superheating Squeeze-Off or By-Pass, but an entire dropping of load, running light, free and cool with no fuse-blowing or belt-breaking labor in resuming work. Picks up load progressively.

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Efficiency means dollars saved—particularly now when prices of all metals are highest. For years we have maintained that the greatest efficiency is obtained from machinery of ample size and substantial construction.

Accordingly we were first to produce (dates given below)—a 10' diameter tube mill—72" diameter crushing roll—12' diameter Great Falls type converter—60' x 84" Superior jaw crusher.

First to Build These Giant Machines

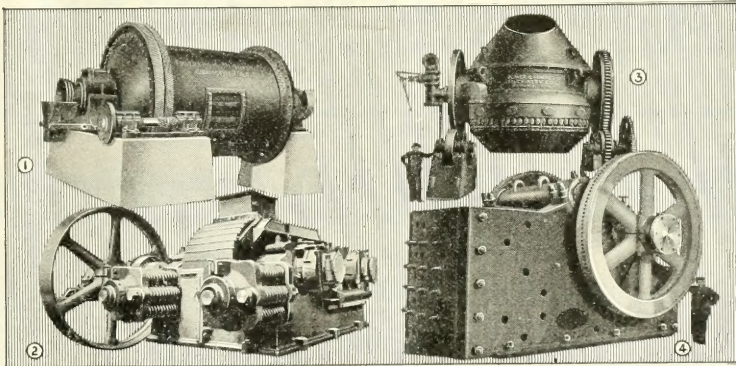


Fig. 1. 10' diameter Tube Mill, Dec. 1912. With the large diameter tube mill a marked increase in efficiency is obtained. Leading plants are discarding the small diameter mill in its favor.

Fig. 2. 72" diameter Garfield Crushing Roll, May, 1910. Built for the Utah Copper Company. Known the world over.

Fig. 3. 12' Great Falls Type Converter, March, 1912. First built for the market by the Power & Mining Machinery Co., and installed at the Great Falls plant of the Anaconda Copper Mining Company.

Fig. 4. 60' x 84" Superior Jaw Crusher, November, 1909. On the market three years before this type began to be copied. Within the past three months we received orders for five Superior jaw crushers of this size.

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New York Office: 115 Broadway

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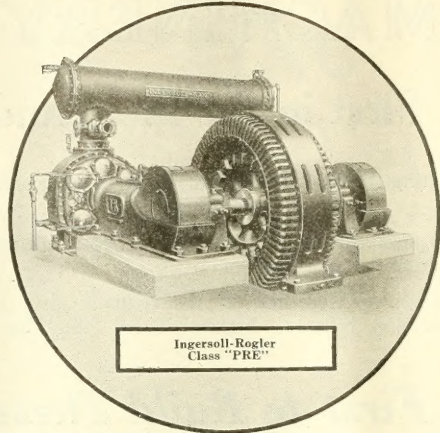
M 370.8

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It is the ability to go along, day after day, year in and year out, performing their full duty without a hitch—and more often running at a decided overload—that has made Ingersoll-Rand air compressors so acceptable to the trade.

The IR line of compressors is the most complete and extensive. Every type of drive available and all classes of service can be met.

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Ingersoll-Rogler
Class "PRE"

Bulletin 3026 Describes the Duplex Electrically Driven Type Illustrated above.

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Lubrication
at
Minimum Cost.

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is the Strongest Proof
of
Their Lubrication Value
and
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Every Drop Counts

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Polarine
FRICTION REDUCING MOTOR OIL

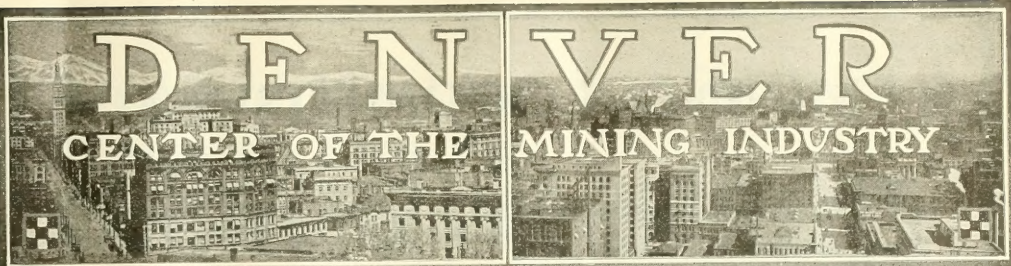
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Motors

Manufacturers of MINING AND DOMESTIC CANDLES
and MINER'S SUNSHINE

STANDARD OIL COMPANY

(AN INDIANA CORPORATION)

CHICAGO, ILLINOIS



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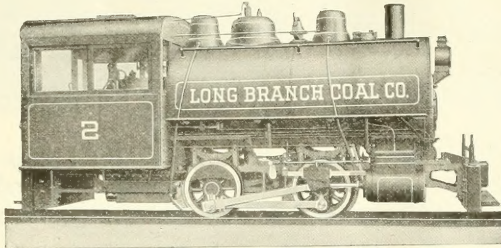
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Save Money and Time, insure the efficiency of your plant and Secure Repair Parts immediately, when needed, by ordering from DENVER.

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The Dorr Company, 1009 17th St.
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The designs have been as carefully considered and the locomotives are as good as they can be made. Every bit of material is carefully selected and tested. Interchangeable parts are kept on hand at our Works for prompt delivery.

We have a number of standard sizes of locomotives in stock and can make immediate shipment.

AMERICAN LOCOMOTIVE COMPANY

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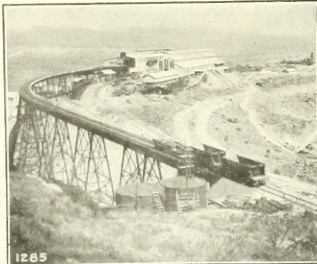
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Manufacturers of Steel Structures of all classes particularly **BRIDGES AND BUILDINGS**



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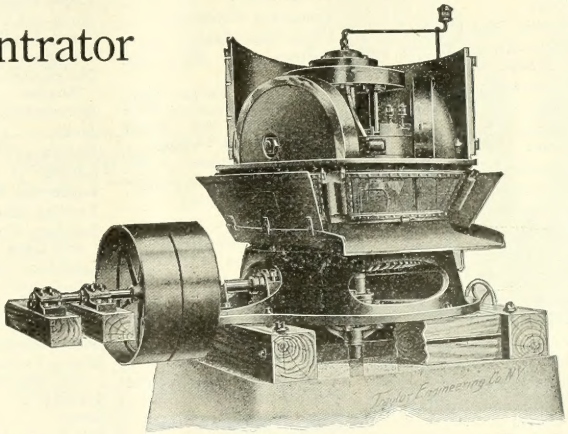
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An Ideal Machine For Preparing Tungsten Ore For Concentration

A Six Foot **TRAYLOR** CHILIAN MILL

Put Your Concentrator
In Operation
At Once.

We Can Ship This
Mill **NOW** Saving
You a \$1,000.00.



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A Cast Steel Spider.
Rigidly held Axles.
Dust Proof Bearings.
Self Adjusting Main Shaft or
Spindles.

IT CAN

Be oiled while running at full
capacity.
Be relieved at once, while in
operation, should it become
choked.
Be purchased for 80% of pres-
ent selling price.

IT WILL

Deliver an ideal feed for con-
centrating tables or jigs.
Crush from $\frac{1}{2}$ " to 40 mesh at
maximum capacity.
Produce maximum tonnage for
minimum horse power.

THE WHY

This mill was made for one of our very good cus-
tomers as part of a complete equipment for a
supposed zinc mine.

Our Engineer was asked to make an examination
of this mine and after doing so, he advised against
the erection of the mill for which we had received
the order for the entire equipment, including the
Chilian mill we are now offering you.

We prefer to lose an order any time to having
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If so, let us quote on your requirements. We buy from mill or factory on the best possible terms and can have direct shipments made to you, in large or small lots, at prices below what you are probably paying. Our sales include:

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Concrete Reinforcement	Grinding Machines and Wheels	Plates—Iron and Steel	Twist Drills
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"It's a Waugh"

*That's all you need to
Know about a Stoper*

THE first successful air feed stoper was a "Waugh"; and the "Waugh" drills have ever since been recognized as the standard type of stoping drill. With "Waugh" drills in your stopes you insure the greatest economy of repairs obtainable, rapid drilling, minimum of steel breakage, and contented drill runners—due to the ease with which these drills operate. They are designed in different sizes for all classes of rock, so you can be sure of getting one suited to your requirements.

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DENVER, COLO.

New York El Paso Salt Lake City Seattle San Francisco
Houghton, Mich. Joplin Butte Melbourne Johannesburg
Canadian Rock Drill Company, Ltd., Toronto, Ont., Selling Agents

L-14



One Man That's All



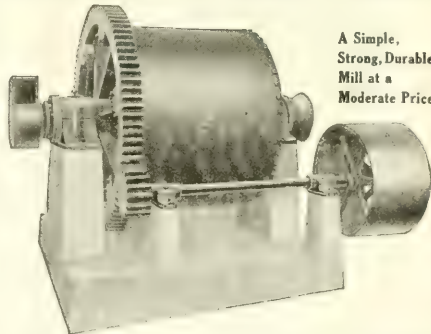
ONE man at the loading station entirely operates a B & B Two-Bucket Aerial Tramway. This man controls the filling of buckets as well as the power or brake levers for operating the line. Buckets dump automatically at the discharge end. Where the fall is sufficient, a gravity operation can be secured. A Two-Bucket Tramway will transport your ore at a cost of a few cents per ton. It is simple—safe—efficient. Let us show you the saving in Aerial Haulage as applied to your proposition. **Write for Catalog No. 36.**

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Manufacturers of High
Grade Wire Rope

St. Louis, Mo.

Standard Ball Mills



A Simple,
Strong, Durable
Mill at a
Moderate Price

Lining made of spiegelized iron, self-locking, no bolts through shell. Scoop feed, trunnions, equipped with spiral feed and reverse spiral on discharge end.

The capacity and horsepower can be varied from above, depending on the steel ball charge, and is based on 1½ to 2-inch feed, and product 12-mesh and finer.

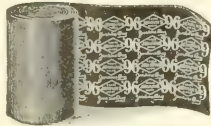
Capacity, Tons per Hour	Diameter Mill, Feet	Width Mill, Feet	Revolutions per Minute	Horsepower	Balls to Charge, Pounds
20.....	6	6	25	65	9,000
13.....	6	4	25	48	6,000
17.....	5	6	27	55	7,000
15.....	5	5	27	45	6,500
12.....	5	4	28	40	6,000
10.....	4	5	29	38	5,000
8.....	4	4	32	15	2,500
8.....	4	3	32	12	2,300

The Morse Bros. Machinery & Supply Company

1732 Wazee Street, Denver, Colorado

Tell the advertiser you saw it in the Mining and Engineering World.

Use Jenkins '96 Packing



For Making Tight Joints

the market for many years, has been subjected to the severest tests, and the remarkable success which it continues to enjoy is proof that it is all that is claimed for it.

Jenkins '96 has enough flexibility to conform to all irregularities in the surfaces. When used in a steam joint the temperature of the steam causes it to vulcanize or harden without becoming brittle or disintegrating, and it forms a joint that is hermetically sealed and therefore absolutely steam tight. It has ample strength to prevent blow-outs.

As for price—it actually costs less than many lower priced packings, owing to its light weight. Regularly made in sheets 36 inches wide, or in gaskets cut to any size or shape.

Jenkins '96 can be obtained through regular dealers.

Write direct for sample and booklet: "MECHANICAL RUBBER GOODS"

Jenkins Bros. New York Boston
Philadelphia Chicago

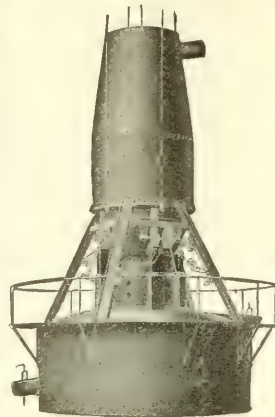
Jenkins Bros., Limited, Montreal, P. Q., and London, E. C.

11

JENKINS '96 is a high-grade rubber sheeting particularly valuable for making tight steam joints, adapted to high or low pressures and the most difficult places. It has, also, a wide range of uses, as it is unaffected by acids or acidulous and alkaline waters and is therefore very suitable for packing joints in mining service.

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June 10, 1916.

Mining Possibilities in Colombia, South America—II

By MATT. W. ALDERSON.

Until I visited South America I had supposed that most of the world's good placer ground had been worked out long ago. I knew there were still a few places in Montana where good pay might be found by going down after it, but Montana was the latest state wherein gold was discovered, and mining has been done there for but little over 50 years.

It is 350 years since the Spaniards took possession of South America, and at that time the Indians had valuable gold ornaments, so it is not known for how many centuries the mines of South America have been worked. I rode over one tract in Colombia with father and son. The former, an elderly gentleman, pointed out where he had mined ground worked by his father; other ground worked by his grandfather, and ground that had been mined before members of his family had acquired the property.

I have always understood that the residents of that part of the world were adepts at mining, and I would not have anyone infer that they have not long since worked out every inch of ground that was known to carry gold that could be mined with simple facilities. In some ways these people are world-beaters. They have the patience to do an enormous amount of work for small pay. They do good work in their small way. I have known men in Montana who were adepts with the gold pan, but their work was crude in comparison with that of the natives of Colombia with the batea. But where extensive, deep working was called for they were unequal to the demand, failing most certainly in lack of the necessary means, and possibly in the necessary skill.

In some instances good placer ground is practically untouched. These are in low lands, where one cannot sink to any depth without encountering water. More places are covered with tailings of surface work, and the ordinary individual would not think of looking there; he would not imagine that rich ground often lies below what he will be told is ground that was worked for such gold as it contained long, long ago.

No placer ground is at all likely to be found where small capital will win returns. The opportunities are for persons who go at matters in an intelligent, up-to-date way. Men have been known to put in years of effort, and to expend thousands of dollars on placer propositions in entire absence of definite knowledge as to the value of the ground, and the lay of the bedrock. Occasionally, because of a fortuitous combination of circumstances, success eventually crowned their efforts. But in very many instances the result was failure, and in some cases great financial loss.

Here in South America one of the most prominent of the successes of recent years achieved its success without observing any of the necessary precautions. It worked low-ground alongside of a stream at immense profit. Then the river was turned out of its channel, and work was commenced on the ground underneath. The owners had expected richer ground than ever under this river bed. Instead, they found ground that they could not work at a profit. A little intelligent prospecting before hand would have shown what was discovered afterwards at great expense and disappointment—that the old channel with its rich values was at one side of and not under the modern channel.

One operator found in working his ground that the Indians had worked out a very large block clear down to bedrock, which in this instance was over 25 ft. Only because the Indians were compelled to narrow their hole, as they drove stakes and paddled the sides, saved the modern worker. They left enough rich ground around the edges so that the last man got out enough to pay for his work.

One company here found after the expenditure of hundreds of thousands of dollars that its tunnel was not sufficiently low to enable it to work the richest part of its ground.

There are persons in South America, some of whom tack on E. M. after their names, who have not yet learned that it does not pay to sample a placer property with a monitor or with a dredge.

The testing of a placer property is a comparatively

simple proposition if one is properly fitted out for the work. With a good drill he may determine exactly just what the character of the ground is beneath the surface, and what its contents in gold may be. The drilling can only be expected to give approximate results, but when it is carefully done, dependence may safely be placed upon them.

One engineer in Colombia who knew the value of his ground, measured its cross-section, kept a record of the rainfall, figured the water he would be likely to have and the yardage he could move in a given time, never missed anticipating the value of his clean-up as much as \$50 in any one month. The recovery of another carefully managed property was 2% above

The man who needs an encouraging prospect before he will dig comes to South America. He goes out into a drain on a hillside and obtains good colors in every panfull of earth he takes. He immediately jumps to the conclusion that if the ground is so rich on the surface there must be a fortune in working what is beneath. He learns that for ages the natives have made money by carrying bateas full of this material to the nearest water and washing out the gold. What further proof does he need that there is an immense fortune here for the man who will work this ground on a large scale?

Very many thousands have been expended in endeavors to work deposits of this character. It is the



NATIVES OF COLOMBIA DREDGING FOR GOLD WITH BATEAS.

the estimate. In other words the drilling estimate for 31 acres worked was \$607,245 and the actual recovery \$618,883. Could anything be more satisfactory than work of this character? Why can we not have more of it?

The belief that "you cannot see beyond the point of the pick" has cost investors in mines in Colombia millions of dollars, as it has cost persons in other parts of the world. Gold is the most universally distributed of all metals. That doesn't say that wherever it may be found it will pay one to mine for it. If it did we wouldn't need to go to South America or to any other country. We would mine the sands under the City of Philadelphia, or get the metal out of the waters of the ocean.

kind of material from which placer deposits are made, but it has not been concentrated down except in the few places where the natives go after it. As a general rule it will not quite pay to work even on a large scale and with the cheapest kind of labor. There are large bodies of this kind of ground in some localities that will average from 1 to 2 cts. a cu. yd. The gold itself is infinitesimally fine, and so light that as one man says: "It takes a bushel of it to weigh an ounce." Working such ground is always doubly disappointing. It is hard work to save the gold, and when it is saved one hasn't what its appearance would lead him to expect.

On Dec. 8 last, one of the fests days of this country, I was in a mining town of about 4000 popula-

tion, and was shown by one of the merchants of the place a horn tray containing \$750 worth of gold. I was told that this gold was purchased that day from over 100 persons. The purchases ran from a few cents per individual to one of about \$20. He said that for the past 4 years his purchases had run from \$1200 to \$1800 a month. This is a wonderful record for a country that has been mined for so long a period. And what is more surprising is that a large proportion of the gold is obtained from ground that it really does not pay to work. But, at the same time, nothing demonstrates more definitely the mineral character of the country.

The Colombian placer miner uses the bed of his stream as his sluice box. He washes the gravel into it and then rakes it out on the sides. He cleans up the gold from what we may call an imitation of nature's sluice box by panning in his batea the fine stuff left in the sluiceway. Where he finds rich ground he goes down into the water after the gold with his batea, working in this way as deep in water as nearly up to his neck. Sometimes for this work they make bateas of great size and with long handles. The illustration herewith gives a clear idea of work of this kind on a large scale. Of late years many attempts have been made to go even deeper. At one place a huge batea was made, resembling very largely a good sized wash tub. This was placed over a man's head and tied down to his shoulders. With this arrangement he was able to work for some little time under water. In very deep water a rock would be placed on top of the improvised "diving bell" to hold the worker down. Great excitement was created by one of these men this past year when he brought up from a deep working \$143 in one batea and \$80 in another. But the scheme is not a success, for it is not possible to handle any great quantity of material, and a small hole to bedrock will fill up about as rapidly as it may be dug.

It may be set down as an assured fact that very few of the old-time workings are more than 5 or 6 ft. below the drainage level. In a tract of ground where I drilled 96 holes and the average depth to bedrock of the pay ground was 37 ft., there was an average of 10 ft. of old tailings or other barren material before one came down to the pay. There was good ground on the property where the natives had never found pay, but the pay in this ground was close to bedrock, under from 7 to 10 ft. of wash that was practically barren.

With all their skill in placer mining the natives do not show more intelligence in their work than do their supposed-to-be superiors of the north. I personally knew of a party of four who went to great expense and did an enormous amount of work in an effort to get what they believed would be fine pay. I had put a drill hole down close to where they were working. It showed that when they had done their utmost, they would still be 8 ft. above bedrock. The

rich ground they hoped to open was just beyond their reach. They quit disgusted, not knowing why.

The golden opportunities in quartz mining in our own country are in properties where one must go down under water. But, is it possible to get persons to put their money into such ventures? Hardly. It is the same with placer mining in Colombia. I know men who have put down hundreds of holes in testing placer ground in Colombia, with not one single hole under a flowing stream. The owner of one mine here found the gravel on his property had been mined long ago, because the lay of the ground was such that the natives could get down to bedrock. But he has never put a hole down under the stream that flows across his property, though he could turn the stream, and under the stream is the place for him to look for gold, for it is the one place where the old-time miners couldn't get at it.

Colombia has been a great producer of placer gold. It is easy to see where she will produce millions of dollars a year for the next 20 years. It is also easy to see where millions more may be secured for a hundred or more years to come. But to recover these millions she must have a type of miner who can see "beyond the point of the pick" and he must be backed by capital and have the skill to master unusual conditions.

(To be continued.)

Foreign Visible Copper Supply.

The copper visible supply in England, France, and afloat thereto decreased 46 tons from May 15 to June 1, being 15,310 tons on latter date. Recent figures of visible supply compare as follows:

	1916.	1915.	1914.	1913.
Jan. 1.....	20,064	30,309	21,034	40,359
Feb. 1.....	17,646	30,002	16,865	38,228
Mar. 1.....	16,734	29,252	18,559	36,176
Apr. 1.....	12,501	23,833	17,323	32,291
May 1.....	16,046	26,214	20,260	30,467
June 1.....	15,310	28,917	24,352	29,634
July 1.....	.....	22,558	27,258	28,172
Aug. 1.....	.....	35,063	27,774	28,171
Sept. 1.....	.....	34,991	27,771	27,888
Oct. 1.....	.....	28,441	27,771	27,888
Nov. 1.....	.....	24,835	31,443	21,888
Dec. 1.....	.....	20,895	30,626	21,341

A Nickel-Tantalum Alloy.—The resistance of nickel to acids is bound to be considerably increased by the addition of 5 to 10% of tantalum. An alloy of nickel with 30% tantalum can be boiled in aqua regia or any other acid without deterioration. The alloy is tough, easily rolled, hammered or drawn into wire. Combined with tantalum, nickel loses its magnetic quality and the alloy has the advantage over pure tantalum in that it can be heated in the open air to a high temperature without oxidizing. It is produced by mixing the two metals in powdered form, compressing them under great pressure and bringing them to a high heat in a crucible or quartz tube in a vacuum.

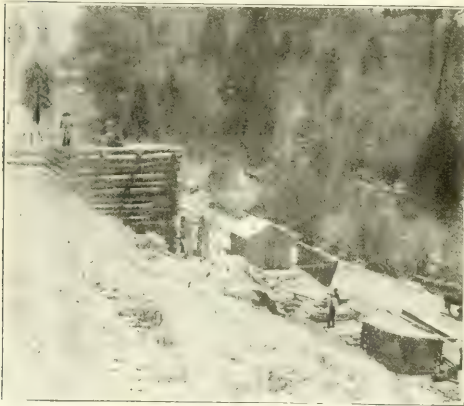
Lithopone consists of about 68% barium sulphate, 30.5% zinc sulphide and 1.5% zinc oxide. It is used in the manufacture of paints, oil cloths, etc.

The New Milling Plant for Nevada Tungsten Property.

By FRED L. MINER.

That there is more than one way of putting up a mill is being illustrated by the Consolidated Tungsten Co. in its operations on Williams creek, on the west slope of the Snake range, Nevada. Out on the hillside, a convenient distance above the bed of the creek, there is being assembled a most unique milling plant. A bin of large capacity has been constructed of logs, which represents the most there is in sight in the way of construction. At the head of this bin, a crusher has been installed into which ore will be fed before entering the bin. Below the bin is a set of 5 stamps, placed on a foundation consisting of two big logs, each more than 3 ft. in diameter and 7 ft. in length, set solidly into the ground, making a foundation which will stand up well under the pounding of the stamps.

From the stamps the ore will be fed to a Wilfley



CONSOLIDATED TUNGSTEN CO.'S MILL.

table and turned into high-grade concentrates. A steam engine will furnish power for running the mill.

Ore will be delivered from the mine workings to the mill by pack train and unloaded at the head of the bin convenient to the crusher.

In general appearance and uniqueness, this plant might easily remind one of an old-time moonshine still out in the Roanoke mountains, for it is equally as primitive at its present stage, but is expected to give satisfactory results in turning out concentrates as though it were enclosed in an expensive building when the wheels begin to turn. The directors of the company have figured that it was just as wise to start their mill in this way, and run it throughout the good weather before going to the expense of enclosing it, which can easily be done at any time.

Adjacent to the mill a good building has been constructed in which to store the concentrates, and this

is about the only signs of lumber and nails to be seen on the place

At the present time development is in progress at several points on the Big Four vein within 1200 ft. of the mill, and on the Gem vein on the opposite side of Williams creek an adit tunnel is being driven on from 3 to 4 ft. of good ore. These will be the principal sources of ore that will be worked for some time to come, as there is assurance that large bodies will be mined from here.

The main camp of the company, including boarding house, bunk house, etc., is situated up the creek about half a mile above the mill and is one of the most ideal camp sites along the entire Snake range, with an abundance of water and pine and quaking aspen timber all around.

Another interesting exposure of tungsten ore has been encountered in the Snake Range country on the property of A. C. Kirkeby and D. Lundgren, a short distance above the camp of the Consolidated Tungsten Co. On the south side of the creek a cliff stands up boldly about 100 ft. high, and the ore face of this cliff for a height of 80 ft., and running with it for 50 ft. is an immense vein exposed by the erosion of the quartzite which once covered it, and this entire face is high-grade hubnerite ore, much of which will run, broken down, 40 to 50%.

Considerable ore has already been mined from this cliff by blasting across a space of perhaps 15 ft. sq. and to a depth of about 1 ft. into the vein. The best streak is apparently from 6 to 8 ins. in thickness, but no work has yet been done that will prove how well disseminated the values may be through the rest of the vein, which is from 6 to 10 ft. in width. This vein has a northerly and southerly course almost paralleling the slope of the mountain, and is entirely encased in quartzite. The remarkable ore exposure referred to has been made by quartzite on the outer side of the vein eroding away and leaving the vein exposed like a smooth wall.

On another claim which endlines at the southwest, a very promising showing has recently been developed, there being from 3 to 4 ft. of high-grade hubnerite ore with which is associated from 4 to 6 ins. of silver ore, from which assays have been obtained running as high as 800 ozs. silver. Large quantities of float can be picked up from surface in this neighborhood. There are 11 claims in this group.

New Norwegian Blast Furnace.—The establishment of a blast furnace and steel plant near Narvik, Norway, has been recommended by a committee appointed by the Polytechnic Association and the association of Norwegian Civil Engineers. The proposal is that the furnaces use Kiruna ore first and later Norwegian ores. The estimated production is a minimum of 50,000 tons of iron and steel per year. The committee also advised that the coal necessary, about 125,000 tons a year, be imported from the United States.

Statement on Flotation Oils—Market Situation Regarding Flotation Oils

By O. C. RALSTON.*

The sudden development of the art of flotation has brought about peculiar conditions in the oil market. A few years ago there was considerable expansion in the wood-distilling industry throughout the south on the hope of selling turpentine at not less than 50 cts. per gallon. This hope was never realized and the industry became demoralized, owing to excessive production and the efforts of some plants to keep going even at a loss. Pine oil, which previously has had little sale, is a by-product from this industry and has been found one of the best of oils for flotation purposes. At the time of the introduction of the flotation process into the country a stock of pine oil that had accumulated was for sale at an attractive figure.

This supply of pine oil and its derivatives has been largely exhausted, and we are having to depend upon current production for the present supply. Hence the price has soared, and some of the pine oil on the market has been adulterated. Pine oil is also proving to be a valuable antiseptic and it is doubtful whether it will ever again be sold cheaply. Furthermore, turpentine is now about 50 cts. per gallon, and the fractionation of the wood distillate is being made in favor of a high yield of turpentine.

During 1915 the principal investigation in connection with the flotation oils was conducted for the purpose of finding a substitute for pine oil now costly. Most of the wood creosotes have proved acceptable and are now being sold at lower prices than the pine oils. How long this condition will continue is a matter of conjecture. The creosotes have proved to be good preservatives of wood, especially of railroad ties. However, coal creosotes excel wood creosotes for preserving timber, so that flotation will probably cause most of the wood creosote to be diverted from timber preservation. Further, the starting of many large flotation mills during the coming year, and the enlargement of many that have been operating in an experimental way, may create such a demand for wood creosote that the cost of this oil may equal that of pine oil.

In view of such a possibility, considerable work has been done to determine whether coal tar and coal tar creosote could not be successfully used as flotation oils. In many instances it was possible to do so only after adding a small amount of one of the true wood oils. There is some difficulty in getting the thick heavy coal tar to mix well with the pulp, so that it is not the desirable medium, and for that reason the coal creosotes have met with more favor. Consequently, most of the gas plants throughout the country have

been able to contract for their output of creosote for some time to come. A similar condition prevails with regard to most of the wood oils. There has been somewhat of a rush in the mining industry for contracts for these products in order that proposed mills will be assured of being able to operate. When Germany gets into the coal creosote market again there will doubtless be lower prices for that particular product.

The petroleum men have not been slow to seek the flotation oil market, but their products have not as yet met with much success when used alone. It is possible to mix small amounts of pine oil or creosote with various petroleum products, such as stove oil, and to obtain flotation with some degree of success, but the general tendency of petroleum products is to float both gangue and mineral non-selectively. The petroleum products that have met with the most success are some of the crude oils, such as Texas crude, and especially certain high-sulphur crude petroleum, obtainable in Kansas and in California. "Stove oil" has met with some success in the copper-concentrating mills, as copper minerals do not have to be concentrated to the same degree of purity as do the lead and zinc minerals. It is probable that, for the wood oils, the copper mills will be able to use cheaper substitutes, such as petroleum products, than will the mills treating baser metals.

One other product that has met success has been the "kerosene acid sludge" from certain of the petroleum refineries. This material is the resultant of the removal of certain impurities with sulphuric acid and often consists of as much as 50% sulphuric acid. Not all of the acid sludge products have proven suitable, only the California sludge being sold at present.

Just how far all this substitution will be successful is not yet known and there is no way to predict. The test work of the coming year should go far towards solving this problem.

Cost of Flotation Oils.

The cost of flotation oils has varied so much, owing to the unsettled market, that it is almost impossible to give an idea of what they should cost. For a rough estimate it is possible to say that crude petroleum will cost the same as for other purposes. Many of the specialized products such as coal tar will cost about 5 cts. or less per gallon. The coal creosotes and the wood creosotes cost 15 to 30 cts.; the pine oils 45 to 60 cts., and Eucalyptus oil will cost \$1.50 or more. The effect of the ending of the war as regards coal tar and creosote in the American market is uncertain, but, so far as known, wood products will not be af-

*U. S. Bureau of Mines.

fect, and petroleum products for flotation will almost certainly be little affected. Flotation men do not like to have their oil costs go over 5 cts. per ton of slimes treated, and many costs are nearer to 2 cts., or possibly even less.

Oils Adapted to Certain Ores.

There can be no doubt that the higher grade pine oils and other wood oils are the best adapted to general flotation work, but the question of what is commercially feasible is entirely different. Thus, the wood creosotes are meeting much favor. Many of the special petroleum products, especially those high in sulphur, are adaptable for rough concentration of copper ores, but the most favored materials for such ores at present seem to be the coal-tar products in combination with topped crude petroleum, oils from which the lighter fractions have been removed by distillation. Coal tars and creosotes, with a small addition of pine oils, are being used a great deal in zinc work, and the wood creosotes find favor in the treatment of galena ores. Gold and silver ores seem to require much pine oil, although the pine oil can be diluted with some of the coal creosote oils.

It will be found that there is a considerable number of oils that will give good results on any given ore, if the mechanical treatment is adjusted to suit each given oil. The selection of the proper oil in any case is purely a matter of experiment. Local conditions, such as transportation, also influence considerably the choice of oils.

Consumption of Flotation Oils.

Following is a table showing the amount of flotation oils being consumed every month throughout the United States. These figures were collected at the beginning of 1916 by direct communication with the companies. The tonnage of ore being treated was also estimated, and proposed increases allowed an estimate of the probable tonnage by the end of 1916. Owing to the fact that some of the companies were secretive, on account of the litigation situation, the figures are probably in error as much as 20% in either direction and can probably be made more accurate as time goes on.

The products called "Pine oil" probably include a considerable amount of the lighter fractions of pine tar oil.

MONTHLY CONSUMPTION OF FLOTATION OILS IN THE UNITED STATES.

Type of ore	Monthly tonnage of ore	Monthly consumption of flotation oils, beginning of 1916, lbs.			
		Coal products	Wood products	Pine oil	Creosote
Copper	1,000,000	100,000	100,000	100,000	100,000
Zinc and complex	2,000,000	200,000	200,000	200,000	200,000
Lead	1,000,000	100,000	100,000	100,000	100,000
Gold and silver	1,000,000	100,000	100,000	100,000	100,000
Total	5,000,000	500,000	500,000	500,000	500,000

MONTHLY CONSUMPTION OF FLOTATION OILS, BEGINNING OF 1916, LBS.

Type of ore	Coal products			Petroleum	
	Oleic acid	Tar	Creosote	Crude	Fractions
Copper	677,000	403,000	8,340	73,000	1,702,000
Zinc and complex	5,820	10,670	46,560	157,000	41,000
Lead	.....	.....	9,250	.....	660
Gold and silver	.....	27,450	4,920	7,090	6,250
Total	5,820	715,120	493,670	243,090	1,749,910

New Shaft and Other Improvements at the United Verde.

United Verde Copper Co., Jerome, Ariz., has in progress the sinking of an interior 3-compartment shaft from the 1000-ft. level, this being the level on which the great transportation tunnel, with standard gauge tracks, connects with the underground workings, and through which the ore is hauled out to the smelter at Clarksdale. The collar of the new shaft is in close proximity to the tunnel, and the plan contemplates sinking 2200 ft. The equipment ordered for this shaft consists of an Allis-Chalmers mechanical hoist, with Westinghouse electrical equipment. It is described as a geared, double-drum hoist, driven by an electric motor set, adapted to receive alternating current, and to furnish direct current to the hoist motor and controlling apparatus. The hoist will have a speed of 1900 ft. per minute, and will be capable of operating to a depth of 3000 ft.; it will carry 7-ton skip loads and will be operated in balance. One of the most interesting features consists of the plans and equipment for handling the ore. The sheaves will be at the 800-ft. level, and the skip loads of ore will be raised and dumped, by means of automatic dumping cradles between the 800 and 900 levels, and conveyed through chutes to storage bins on the 1000-ft. level—one 1500-ton storage bin on each side of the tunnel, each one to be equipped with loading devices. The equipment is to be taken in through the tunnel. These storage bins will also receive ore from the higher levels. These plans were developed under direction of Will L. Clark, general manager, and R. E. Tally, superintendent of mines.

Plans to use steam shovels in stripping the surface ore bodies in the vicinity of the old smelter site has been under consideration some time, and it is understood they are well matured, though not actually adopted at the date of this writing. These plans involve the removing of 80 to 100 ft. of overburden, making it practicable to mine those ores from the surface down, instead of by underground operations adjacent to and within the fire area.

The Electric Smelting & Reduction Co., Portland, Me., has been incorporated with a capital stock of \$150,000 to do general mining, smelting and refining.

The word tungsten comes from the Swedish and means heavy stone. The element is found in combination with other elements.

Modern Ideas on Fireproof Construction

By S. M. FECHHEIMER.*

With all modern developments in fireproof construction tending towards economy and wide adaptability, it is safe to say that the coming years will see a radical reduction in the fire losses of United States, thus greatly conserving the resources of our country. In mine buildings, particularly, the tendency towards fireproofness has been most marked, and the use of inflammable materials is being generally eliminated.

The country at large has awakened to the fact that it is decidedly wasteful and expensive to burn up nearly a million dollars' worth of buildings every day. Business men realize that there is no economy in erecting inflammable buildings, even though their original cost may be slightly less. The insurance rates on such buildings are high, the cost of up-keep

today is extensively used in connection with standard type of fireproof floors. One of the earlier types of fireproof floors and still extensively used is hollow tile arches. In this construction the terra cotta tile are set between the steel members, and carry the load as a flat arch between the supports. Tie rods are used between the steel members to take up the thrust of the arch. This construction is suitable for only comparatively short spans.

The introduction of reinforced concrete opened up many new possibilities in fireproof construction. The combination of the tensile strength of the steel with the compressive resistance of concrete, made possible long span construction of comparatively light weight. The fireproofness of the construction was



1. STEEL FLOOR IN CONSTRUCTION.

is great and the depreciation rapid, besides, when there is a fire the loss cannot possibly be covered by insurance because of the crippling of operations, the inability to fill orders and the general demoralization of the business. The best way is to have a building that cannot burn, that is modern, daylight, sanitary in all respects. Fireproof construction has become standard for any building of importance; in fact, its popularity has even extended to residences.

The modern progress in fireproof construction really dates back to less than a decade ago when reinforced concrete started to be generally used in building construction. The very earliest forms of fireproof construction consisted of heavy brick arches, usually supported by structural steel girders. The great weight of this construction burdened down the floors, making it not only expensive in itself, but also in the supporting frame work. Structural steel played an important part in fireproof construction, and even

early demonstrated both in actual fires and by the most grueling tests. Both the steel and the concrete expand the same amount for a given change of temperature, so there is no danger of rupture between the two materials in case of intense fires.

Further than this, reinforced concrete was not only used in the slabs, but also in building the beams, girders, columns and foundations. This presented marked economies over the use of structural steel properly fireproofed. The reason for this is readily apparent, as in a reinforced concrete beam the steel corresponds to what would be the bottom flange of a structural steel beam, while the concrete takes the place of the compression flange. In this way only about one third as much steel is required in the reinforced concrete beam, while the amount of concrete is practically the same owing to the necessity of fireproofing of the structural steel.

Various systems of reinforced concrete construction have been developed to still further increase its

*Engineer, Trussed Concrete Steel Co.



2. KAHN SYSTEM SOLID CONCRETE SLABS AND BEAMS.

advantages. The earlier types of construction usually consisted of thin concrete slabs of comparatively short span supported by intermediate beams. Occasionally longer spans were used, but ordinarily the thickness of the concrete caused too great a dead weight in the construction. Another type of construction developed in the early days, and still extensively used, was the solid concrete flat ceiling type. In this construction the column is flared at the cap, and the reinforcing extends in all directions between the columns. The floor construction is cantilevered out from the column. A uniform slab thickness is used throughout, although in some instances a small panel around the column head has been built with great thickness. This flat ceiling type of construction presents a number of advantages, inasmuch as it gives a clear unobstructed ceiling for the attachment of shaft hangers or other fixtures. Its use is particu-

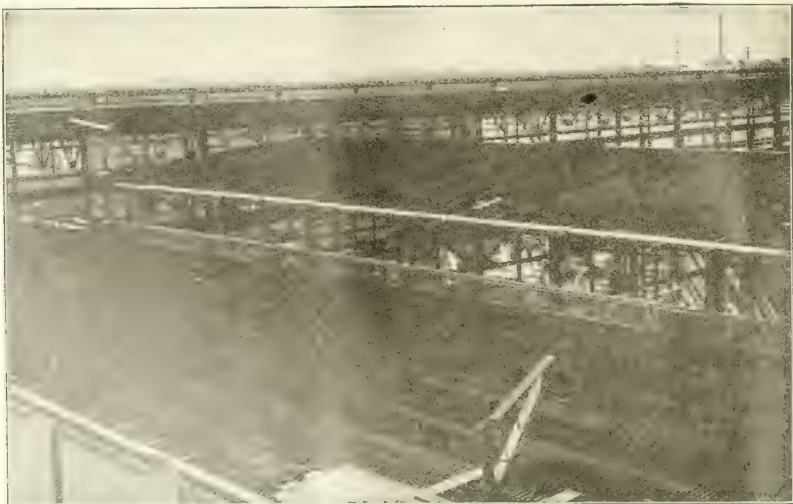


3 -KAHN SYSTEM FLAT CEILINGS.

larly economical in buildings that are heavily loaded and of comparatively large size.

Another type of floor construction that was developed in some of the earlier days is the combination of reinforced concrete joists with terra cotta tile. In this construction the hollow tile are separated by reinforced concrete joists, with a layer of concrete over the top of the hollow tile. The joists furnish the strength of the construction and carry the loads, while the hollow tile serve merely as fillers, reducing the dead weight of the concrete. By use of this construction wide spans can be obtained without requiring any intermediate beams, and at the same time obtain a floor comparatively light in weight. The construction has been extensively used in all types of buildings, both with structural steel and reinforced concrete framing.

Similar development is found in the steel tile con-



4. HY-RIB ROOFS BEFORE CONCRETING.

struction which is now so extensively used in large fireproof installations. The main feature of this construction is the large steel tiles which have a width of 20 ins. across the base and depths to meet requirements. Reinforced concrete joists extend between the tile, and there is a layer of concrete over them. In order to provide an absolutely flat ceiling, a ribbed metal lath is laid underneath the base of the steel tiles. This metal lath is plastered after removal of forms. This construction provides joists 2 ft. on centers, with a continuous hollow space between them. By its use spans upward of 30 ft. are built without any intermediate beams. The construction presents many other advantages, features such as light weight, sound proofness, simplicity of false work and ease and speed of erection.

Coincident with the other developments in fireproof construction has been the tendency to secure a light-weight construction which could be readily built without false work. This has led to the development of ribbed mesh reinforcement commonly known as Hy-Rib. In this construction the steel provides both the reinforcement and the forms for the concrete, the proper stiffness being provided by the ribs, and the special formed mesh preventing the concrete from going through. The construction is particularly adapted for light-weight concrete roofs where it spans between the purlions without intermediate supports. The spans ordinarily for this construction are not over 4 or 5 ft., but can be greater by the use of a simple temporary support. After the concrete above is poured, the underside is readily plastered.

The same metal is also used for building side walls. The rib-mesh spans directly between the side wall supports, and the plaster is applied to both sides, thus providing a solid monolithic wall about 2 ins. in thickness. For partitions the Hy-Rib extends directly from floor to ceiling. This material is also used satisfactorily for ceilings and furring also in arched forms for floors.

Manganese Ore Exports.

Manganese ore exports from India in December, 1915, are stated by the London *Iron and Coal Trades Review* to have been 41,897 gross tons, of which 38,397 tons went to Great Britain, 3000 tons to Italy and 500 tons to France. Indian exports of the ore for the first 9 months of the fiscal years, April to December, 1914 and 1915, were as follows, in gross tons:

Exported to	April to Dec. 1914	April to Dec. 1915
United Kingdom	38,397	38,397
Germany	11	11
Belgium	0	0
France	0	0
Italy	3,000	3,000
Austria-Hungary	0	0
Japan	0	0
United States	0	0
Total	41,897	41,897

The total imports of manganese ore into the United States in 1915 were 320,782 gross tons, practically all of it coming from Brazil.

The Production of Lead in 1915.

By C. E. SIEBENTHAL.

The production of primary lead in the United States in 1915 totaled 550,055 tons. This compares with 542,122 tons in 1914. Primary refined lead available for consumption was 426,751 tons as compared with 449,052 tons in 1914. The value of primary refined smelted or refined in the United States was \$51,705,000, as compared with \$42,286,000 in 1914.

Primary lead smelted or refined in the United States, apportioned in 1913, 1914 and 1915, according to source of ore, is given in the following table in tons:

	1913	1914	1915
Domestic desilverized lead	236,678	311,609	361,564
Domestic soft lead	131,867	158,249	161,361
Domestic desilverized lead	29,431	42,505	41,001
Foreign desilverized lead	76,882	29,328	45,020
Total production of refined primary lead	474,858	542,122	550,055
Production of antimimonial lead	14,667	16,698	20,224

PRIMARY REFINED LEAD AVAILABLE FOR CONSUMPTION.

Supply:			
Stock in bonded warehouses Jan. 1	10,492	5,310	7,668
Imports—			
For consumption	11,380	7,286	9,680
For warehouse	43,165	202,662	41,816
Increase by liquidation	11,858	542,704	507,026
Production from domestic ores	474,858	542,704	507,026
Total supply	551,553	506,442	568,440
Withdrawn:			
Exports of foreign lead—			
From warehouse	44,544	21,545	8,445
In manufacturers, with benefit of drawback	5,767	5,769	3,882
Exports of domestic lead	114	58,713	87,092
Decrease by liquidation	3,310	7,078	12,149
Stock in bonded warehouses Dec. 31	60,030	87,309	141,689
Total withdrawn	114,765	144,414	153,658
Available for consumption	436,788	462,028	414,782

PRODUCTION OF SECONDARY LEAD.

Base lead	32,100	29,337	36,300
Lead in alloy	39,293	31,725	35,000
Total recovered lead	71,393	61,062	71,300

In the following table is given the imports of lead, in ore, base bullion, and refined, by countries, 1913-1915, in lbs.:

Country	1913	1914	1915
Germany	4,131	51,111	182,296
United Kingdom	9,713	4,297,173	1,200,000
Other European countries	11,000	1,000	22,227
Total from Europe	24,844	4,348,284	1,404,523
South North America	8,800,000	8,800,000	4,500,000
Mexico	6,100,000	16,000,000	94,200,000
South America	8,700,000	11,141,000	6,700,000
Other countries	8,000,000	1,000,000	1,000,000
Total	17,944,844	20,249,284	103,804,523

The Alaska Engineering Commission, through its purchasing department, located at Bell Street Wharf, Seattle, Wash., has recently closed a number of deals for lumber, tugs and equipment of all kinds for use in connection with the Government railroad work under construction in Alaska. Included in the purchases were three tugs, aggregating \$54,500; two large line motors, and a track pile driver costing \$13,000. The commission's shipments to Alaska will shortly begin to add heavily to the coastwise freight movement.

*Adapted report U. S. Geol. Survey.

Lyon Investment Co.'s Review Joplin Lead and Zinc Industry.

The sales of zinc ore in the Joplin District during May were 56,630,294 lbs., amounting to \$2,463,422. The lead shipments during the same period totaled 8,802,590 lbs., which sold for \$420,920. Since Jan. 1 shipments of zinc ore have amounted to 315,838,974 lbs., which sold for \$15,597,154. During the corresponding period of last year the shipments were 244,335,275 lbs., which sold for \$7,417,597, thus showing an increase during the past 5 months over same period in 1915 of 71,503,699 lbs. in tonnage, and \$8,179,557 in value.

Lead shipments for the first 5 months of the current year amount to 46,497,042 lbs., which sold for \$2,116,104 as compared with shipments of 35,099,600 lbs., which sold for \$853,253 during the same period of last year.

May opened with the price of top-grade zinc rather weak at \$115, from which it declined to \$105 during the second week, with a further decline of \$5 each succeeding week, and closed at \$95, with the lower grades selling as low as \$70. During the same period last year the price varied from \$70, at the beginning of the month, to \$85 for top-grade ores during the last week in May. The price of lead ore during the past month eased off from \$98 at the beginning of the month, to \$93 at the close, as compared with a price of \$51 during May, 1915.

The decline of about 5 cts. per pound in the price of spelter during the past 6 weeks has caused the decline in the price of ore, but it is believed by those well informed regarding inside conditions of the metal market, that another buying movement is about due which cannot be long deferred. The absolute unreliability of spelter quotations has long been known, but at no time has this fact been more manifest than in the May 27 issue of the *Engineering & Mining Journal* which quotes prime western spelter at \$13.50 in St. Louis on May 24, while quoting the price in London at \$20.19 on the same day. The actual price in St. Louis on May 24 was \$14.87½ per 100 lbs. The difference between St. Louis and New York quotations is normally but 17% per 100 lbs. Does anybody for one moment imagine that there is a legitimate difference of \$6.50 per 100 lbs. between New York and London? In commenting on market conditions the same issue of this paper says:

"One thing is clear, that the (spelter) market has been falling of its own weight, there having been no manipulation. There has been a general desire to see how it would behave when left quite to itself."

This tacit admission, by a journal which is assuredly in a position to know, is quite interesting as it certainly displays an unexpected magnanimity on the part of those who have hitherto disclaimed any such thing as manipulation of the price of spelter, and both producers and purchasers of zinc products will

hereafter be doubly interested in observing how the manipulators will behave when left quite to themselves.

Meanwhile bona fide mining operations in this district are paying big profits. Enormous new orders for war munitions are being placed in this country, thus insuring a steady and heavy demand for zinc. Peanut pacifists may holler their heads off, but that war is going to continue until somebody is licked.

An Immense Coal Breaker Plant.

The New Loomis coal breaker of the D., L. & W. railroad, located at Scranton, Pa., embodies the last word in up-to-dateness in buildings of this type and is a mammoth among structures of its kind. Its capacity is 7500 tons per day, which is greater than that of any other. Working 250 days, it can handle 1,875,000 tons of coal in a year. No other breaker has been built with such large ideas in mind, and there is no precedent for some of the things done, but there is a large experience behind them. The first thing that one would notice is that the entire breaker above the pockets is glazed and there is no blind wall. The whole breaker is inclosed with Fenestra steel sash, which holds 22,000 panes of wire glass 13x24 ins. in size, and ¼-in. thick. There have been other "day-light breakers," but none so completely opened to light as this. Glass covers 93.5% of the surface. Artificial lighting will be needed only for short periods on some winter days. Increased carefulness in picking is anticipated, as well as higher speed. The building is of concrete up to the tops of the pockets, and the concrete work is unusually good. Above this it is of steel. There are in the building something over 2,000,000 lbs. of structural steel. Wood is not entirely eliminated, but it is used only for picking floors and chutes. There is almost no possibility of fire, but sprinklers will be installed. The floors are of concrete.

Recent Purchase of Brazilian Manganese Ore.

Makers of ferromanganese in this country are reported to have recently purchased from 10,000 to 20,000 tons of Brazilian manganese ore. The price is said to have been 40 cts. per unit at Rio de Janeiro, which, at current freight rates, is equivalent to between 60 and 65 cts. per unit, at Philadelphia or Baltimore. As far as known, this is the last sale of foreign manganese ore made to buyers in this country. Inquiries now are pending for one or two cargoes, but there is practically no ore offering, as the output of the Brazilian mines is sold up for a number of months. There have been some offers of foreign manganiferous ore, but buyers have not been interested in mineral of this quality at the prices quoted because domestic ore of this character is available at even a lower figure.

Business Men Cast Overwhelming Vote for Adequate National Defense

Business men want preparedness. They have voted for it in a referendum of the Chamber of Commerce of the United States. A majority of 120 to 1 was recorded. Those who have a definite stake in the country and must bear a large share of the burden of paying the bill for national defense have come out squarely for a comprehensive scheme involving the entire military, industrial and financial resources of the nation.

There has been propaganda of all kinds for preparedness and non-preparedness, including straw votes, newspaper campaigns, and the circulation of pamphlets and statistics. This, however, is thought to be the most thorough and complete effort yet made to ascertain country-wide sentiment on a question so prominently before the people and congress.

According to the vote cast, it is now said to be known exactly where the business men of the country stand on the general question of preparedness, and also what their views are for an adequate army, a largely increased navy, a thorough-going industrial preparedness, and the basis on which all these features must rest—universal military training.

The referendum on national defense is of further interest because it has brought out the biggest vote ever recorded from the commercial organizations which make up the Chamber of Commerce of the United States. The heaviest voting was on the general preparedness recommendation and resulted in 970 in favor as against 8 opposed, a proportion of 120 to 1. The lowest vote was on universal military training, 889 in favor and 50 opposed; but even here the proportion was more than 15 to 1. Forty three states were represented, the District of Columbia, Alaska, Hawaii, the Philippines and the American Chamber of Commerce in Paris, France.

Numerous plans have been advanced having to do with the army and navy, but it is said that heretofore there has been no serious attempt to look on preparedness for national defense as a nation-wide problem which could only be solved by mobilizing the entire resources of the country, both actual and potential. The referendum was based upon the report of a special committee of which Bascom Little, recently president of the Cleveland Chamber of Commerce, is chairman.

The success of any general scheme of national defense, according to the referendum to which the Chamber of Commerce of the United States is now committed, can only be realized under a system of universal military training. Senator Chamberlain has a bill in congress to provide for such a system, but it has not yet been introduced in the house. Nothing in the army bill which has just been passed by congress provides for any measure of universal training whatever.

It is, nevertheless, the belief of the committee of the National Chamber that the duties of every citizen, great or small, must be definite and that there can be no military organization in a great democracy such as ours which would be either desirable or safe, much less adequate unless it laid down for all time the principle that equal rights mean equal obligations, and that every citizen must not only be willing but also able and prepared to defend his country.

Whereas the essential question presented to the business organizations of the country was to ratify or reject a general plan of national defense, Elliot H. Goodwin, the secretary of the National Chamber, explained, the referendum itself was divided into 10 recommendations to facilitate balloting. The vote on the several questions which composed the comprehensive scheme, according to the preliminary count, was as follows:

	For.	Against.
1. For general preparedness.....	970	8
2. For a council of national defense.....	912	46
3. For a staff of industrial mobilization.....	925	17
4. For an adequate navy.....	952	10
5. For a general staff of the navy.....	946	19
6. For a regular army with trained reserves such as recommended by the general staff or council of national defense when established.....	946	21
7. For universal military training.....	889	56
8. For prearrangement with private companies for war supplies.....	940	5
9. For reserve supplies of war material.....	907	29
10. For additional commissioned and non-commissioned officers of the regular army and a properly trained officers' reserve corps....	960	9

In justifying the necessity for general preparedness the report of the committee on which the referendum was based stated that it was as futile to ask for what particular war the United States is to prepare as to ask a ship captain against what particular accident or storms his ship carries life boats. Moreover, it is the belief that in any great scheme of national defense there can be no question of rich or poor, privilege or non-privilege. According to the committee there can only be organization on the basis of each citizen's capacity to serve either in arms or in the industrial mobilization. It was the opinion that national defense must be based on the realization of every individual that he has a vital stake in the life of the nation.

With the above principle as the fundamental basis, the referendum sets forth a plan which calls first of all for the establishment of a body in the nature of a council of National Defense which can perform an advisory and co-ordinating function in obtaining a comprehensive view and arrangement of the vast number of elements which must be comprised in the defense of a nation of 100,000,000 people. This council would also be able to develop the army and navy in accordance with a continuous policy under the orders and advice of the President and congress.

As the council of National Defense will obtain a comprehensive perspective of the needs and policies of

the nation, so it is necessary to establish a staff of Industrial Mobilization so organized and maintained in time of peace as to insure the most effective use of the economic resources of the United States in case of war.

This body would include functions which no amount of "last hour" legislation can afford in providing complete reserve munitions and equipment for both the navy and the army and organizing a system to continue such supplies on an effective basis in time of war by a prearranged organization and training of all industrial and economic resources.

Industrial Preparedness.

It might be expected that business men would lay emphasis on industrial preparedness. The Chamber of Commerce of the United States is now committed to what is claimed to be the only practicable system which can be devised in a democracy for mobilizing the industrial resources of the nation by a definite system of prearrangement for war supplies. Since the war has become so much a matter of equipment and munitions, it is declared that the permanent efficiency of the army and navy must depend upon supplies.

The fundamental feature of the system advocated is to educate private industry in the manufacture of war material in time of peace under a mutually prearranged regulation of prices with private manufacturers rather than to trust to production in government plants alone.

This can be done, it is claimed, first by making a comprehensive industrial survey of the 30,000 or more plants in the United States immediately available for the production of war material. After such a survey is complete, the plan provides that the government should enter into contracts with each of these firms for a small annual supply of the material for which they are particularly equipped. These orders in the aggregate should be sufficient not only to supply current needs of the army and navy, but also sufficient to accumulate a reserve of material adequate to supply our land and sea forces from the beginning of a possible war until such time as the industries of the country can produce the vastly increased supplies then necessary.

Nothing appears in the army bill passed by congress which will allow for the establishment of a system of this kind until a time when, it is declared, it will be too late. It is not yet known what may be provided in this direction in the navy bill when it is finally passed.

Larger Army and Navy.

The business men who voted on the referendum are committed to an army such as that recommended by the general staff or a Council of National Defense when established. This would mean a larger force than that provided in the army bill this year and will, it is said, constitute a standard which the Chamber of Commerce of the United States and its members will

make an effort to have realized in subsequent legislation.

When it comes to the navy the referendum provides for the immediate undertaking of a building program which will restore the United States at least to its former position of second naval power in the Atlantic with a surplus in the Pacific sufficient to protect its coasts, its possessions, its trade routes, the Canal Zone and adjacent territory. This recommendation was adopted on the ground that if attacked the cheapest, most effective and safest defense of the country by the navy can only be obtained if it is strong enough to seek out and destroy the enemy at sea and certainly at a distance from our shores sufficiently great to render invasion impracticable. A general staff for the navy is also advocated as a logical necessity.

No Profit Interest in War.

The referendum lays special emphasis on the fact that there should be no munitions trust, or any possibility of arrangements which would make the real needs of the country subject to a profit interest in war on the part of anybody. The system of prearrangement for war supplies advocated will, it is claimed, remove all possibility of making capital out of the country's necessary plans for defense. It includes an industrial survey which will take in the 30,000 or more plants which are qualified in one way or another to furnish war supplies and will embrace so wide a field that any combination of interests will be impossible. Furthermore, the prearranged agreements with manufacturers will be on a cost plus or other basis which, while doing justice to stockholders and owners, will be absolutely insufficient to create any interest in war.

Chairman Hay, of the house committee on Military Affairs, with the approval of the President, introduced a bill into the house recently providing for a council of Executive Information which, it is declared, is much in the nature of a council of National Defense, with an advisory commission whose duties will closely approximate those of a staff of Industrial Mobilization. This council would appear to be composed exclusively of cabinet officers.

This throws an interesting light on the plan advocated in the referendum of which the keynote is coordination. At present the President and congress direct and maintain the army and navy. According to the referendum an intervening body in the nature of a council of National Defense whose membership should include business and civilian administrators, is needed to outline consistent policies of development, to advise and to plan. Furthermore, today the army and navy take care of their own supplies and munitions. It is claimed that an intervening body such as the staff of Industrial Mobilization should be created to organize the industries of the country and to assist in standardizing equipment and munitions for both the army and navy, so that full advantage can

be taken of the tremendous potential resources of the United States with a minimum expense and the least possible waste of time and energy. This whole plan, which includes a general staff for the navy like that which now exists for the army, is based on a system of universal training which will insure every citizen being held to perform the duty which he is best qualified to fulfill.

Alaska Surveys and Investigations in 1916.

The U. S. Geological Survey began its systematic investigations in Alaska in 1898. Since that time the work has been continued without interruption, and a large part of the territory has been mapped topographically and geologically, particularly those areas that are producers or prospective producers of minerals. However, much remains to be done, and during the coming summer 12 parties will be sent to Alaska to continue or extend the surveys already begun or completed. Four of these parties will work in southeastern Alaska, two will be sent into the Prince William Sound region, one will be in the lower Copper and Chitina valleys, one in the Nenana and Bonnifield districts on Nenana river, two in the Kantishna district, one on the lower Yukon, and one in the Fairbanks, Tolovana and Nome districts. Among all these different investigations those of the Juneau and Nenana districts are of special interest and importance.

In southeastern Alaska Theodore Chapin will continue the geologic surveys that he began last year in the Ketchikan district, and will study the mineral resources of this area, giving special attention to mining development and production. George H. Canfield will continue the investigation of the water resources. This work is carried on in co-operation with the Forest Service and was undertaken to supply the demand for information about the available water power. Juneau is the most important lode-gold mining district of Alaska and promises to become one of the largest gold-producing camps of the continent. D. C. Witherspoon will complete the detailed topographic map of the Juneau district on which he was engaged last year, and A. C. Spencer and H. M. Eakin will undertake an exhaustive study of the gold deposits.

J. W. Bagley will make topographic reconnaissance surveys in the Prince William Sound region. These surveys are made by the photo-topographic method, and will include the northwestern shore lines of the sound eastward from Passage canal, thus embracing the Port Wells district and connecting the work done in this area with previous work in the vicinity of Port Valdez.

B. L. Johnson will continue the study of the geology of Prince William sound, on which he has been engaged for a number of years. One of the

most important parts of this investigation is to map the geology and study the mineral resources of the northern part of Latouche island, in which is situated a property of the Kennecott corporation—one of the large copper-producing companies in Alaska.

The lower Copper River region, including part of Chitina valley, will be studied by Fred H. Moffit, who will extend the existing geologic surveys into some areas not yet covered and will visit the mining districts.

G. C. Martin, assisted by A. G. Maddren and R. M. Overbeck, will undertake a detailed study of the western part of the Nenana coal field, topographic maps of which were made by the General Land Office in 1915. This area is adjacent to the new railroad from Cook inlet to Tanana river. Its areal geology will be mapped, but special attention will be given to a study of the coal. It is expected that the gold placers of the Bonnifield district near by will also be visited.

S. R. Capps and C. E. Giffin will undertake reconnaissance geologic and topographic surveys of the Kantishna district. Capps will map the areal geology westward from Nenana river and will examine the gold placers and the antimony deposits of the Kantishna. Giffin will make a topographic survey of the area studied by Capps.

The lately discovered gold placers of the Tolovana district have not yet been visited by members of the Survey. J. B. Mertie will investigate them during the summer, visiting Livengood creek and the adjacent parts of Tolovana river and Hess creek and endeavoring to determine the relation of the placers to the physiographic history of the area. He will also visit the Fairbanks and Nome districts, devoting his time principally to an examination of the different lode deposits, such as gold and antimony, of both districts. Recent mining developments of these areas will also be studied.

R. H. Sargent will make topographic reconnaissance surveys on lower Yukon river, more particularly of the Marshall district, although it is expected that time will permit him to traverse a part of the Yukon between Anvik and Andreafski, and to map certain other areas adjacent to the river. Sargent will be accompanied by George L. Harrington, who will prepare a reconnaissance geologic map of the districts visited, but will pay particular attention to the gold lodes and placers of the Marshall district.

Alfred H. Brooks, geologist in charge of the Survey's Alaska investigations, will be engaged in office work in Washington until the middle of June, when he expects to start for Alaska to visit the Nome, Ruby and Juneau districts. He probably will not return to Washington until early in October.

Most of these field parties are now in Alaska or are on their way. All the field men required have been employed, and the necessary equipment, including horses and supplies, has been provided.

Direct-Current Generating Blower Set.

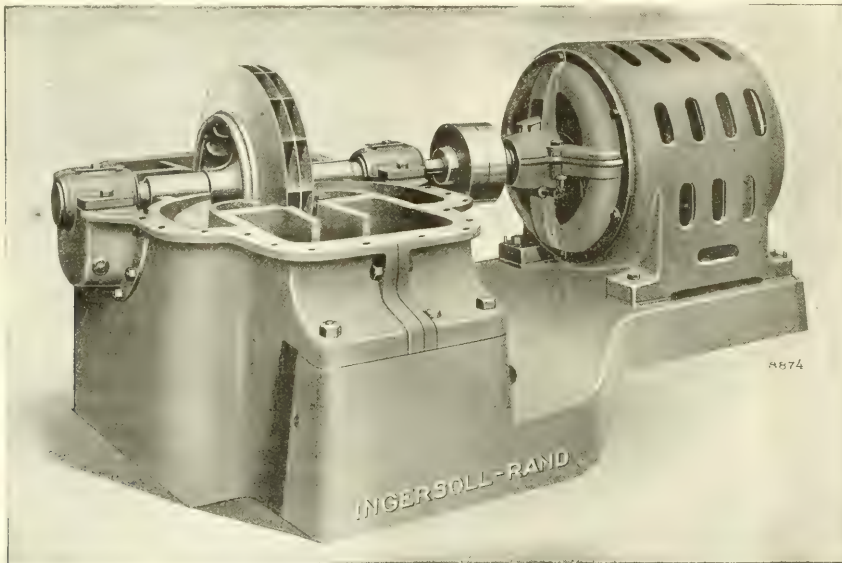
The generating set illustrated is for stationary service and is especially adapted for lighting or power service in small plants, and for exciters for large alternating-current generators in power stations. It consists of an American Blower Co. single or double cylinder, automatic steam engine, and a type SK direct-current generator made by the Westinghouse Electric & Mfg. Co., direct-connected to the engine shaft. For lighting or power service the standard voltages are 125 and 250 volts. For this service generators are furnished having the compound field windings so proportioned that the same voltage is obtained at full load and no load. For special systems where 125 volts are required for lighting and 250 volts for power, the larger sized generators are supplied for

parts and these are so designed that the wear is reduced to a minimum. The engine is very quiet in operation and has automatic lubrication by pump and gravity, with large cooling, settling, and filtering area. All wearing parts are easily adjustable, and perfect speed regulation is obtained.

This set is particularly well suited for use in isolated plants, stores, warehouses, mines, dredges, as well as for driving blowers, operating bucket elevators, screw conveyors, chain drags, hoisting apparatus, cylinder driers and centrifugal driers.

Wisconsin Iron Formations.

"Mineral Land Classification of Wisconsin" is the title of a book now being published by the state of Wisconsin from the pen of W. O. Hotchkiss, state



DIRECT CURRENT GENERATOR BLOWER SET.

3-wire service. These 3-wire generators will take care of any unbalancing of the two sides of the system up to 10% of full load.

The set is simple to operate and requires little attention. Even the oiling system is such that replenishing of the lubricant is necessary only infrequently. The generator is of forged open-hearth steel construction, with commutating poles and large non-leakable bearings protected from dust. It has automatic oiling lubrication, fixed brush position, is compact, strong and light in weight, has low-operating temperature, and requires no skilled attention.

The generator is mounted on the same base with the engine to which it is direct connected. The bearings, brushes and commutators are the only wearing

geologist of Wisconsin. The treatise shows iron formations in parts of Ashland, Bayfield, Washburn, Sawyer, Price, Oneida, Forest, Rusk, Barron and Chippewa counties in Wisconsin and gives the owners of lands in these districts a well defined idea of mineral possibilities in the acreage, so that they may either make explorations or protect themselves in conveying their lands by reserving mineral rights. The book will be mailed to any resident of the state upon receipt of postage.

Impure mercury can be detected by pouring a few globules out on to a glass plate. Pure mercury will at once assume a spherical shape, while an impure article will show a tail.

Iron Ore Production Fourteen Million Tons Increase in 1915

The iron ore mined in the United States in 1915 reached the great total of 55,526,490 gross tons, the greatest output made in any year except 1910 and 1913. The shipments in 1915, 55,493,100 gross tons, valued at \$101,288,984, were a little less than the quantity mined. The quantity mined in 1915 was an increase of 14,000,000 tons over the output in 1914. The increases in quantity and in value of iron ore shipped amounted to about 40 and 41%, respectively. The average value per ton in 1915 was \$1.83, compared with \$1.81 in 1914. Those figures, which are just made public by the U. S. Geological Survey, were prepared by E. F. Burchard, who states that the production of iron ore from the Lake Superior district alone in 1916 will possibly be 60,000,000 tons, and that there will probably be an increase in price of 70 to 75 cts. a ton for this ore.

Iron Mining by States.

Iron ore was mined in 27 states in 1914 and 23 in 1915. Three of these states, Idaho, Nevada, and Utah, produced small quantities of ore for metallurgical flux only; part of the production from California and Colorado was for smelter flux and part for pig iron and ferro-alloys; the remaining states produced iron ore for blast furnace use only except small tonnages for paint from Georgia, Michigan, New York, Pennsylvania, and Wisconsin. Five states, Minnesota, Michigan, Alabama, Wisconsin, and New York, which have in recent years produced the largest quantities of iron ore, occupy in 1915 their accustomed places. Only one of these states, New York, produced less than 1,000,000 tons in 1915.

IRON ORE MINED IN THE UNITED STATES IN 1914 AND 1915.

State.	(In Long Tons.)	1914.	1915.	Per cent of change in 1915.
Minnesota	21,946,901	33,464,680	+52	
Michigan	10,796,206	12,514,516	+16	
Alabama	4,828,959	5,209,354	+10	
Wisconsin	886,512	1,098,388	+24	
New York	785,977	836,815	+7	
Wyoming	566,062	434,513	-18	
New Jersey	350,135	415,234	+19	
Pennsylvania	406,225	363,309	-11	
Virginia	278,220	219,092	-21	
Tennessee	330,214	281,185	-14	
Georgia	67,722	115,701	+71	
North Carolina	57,667	66,453	+15	
Missouri	37,554	10,209	-73	
New Mexico	81,880	34,806	-58	
Colorado	10,464	.....	.....
Connecticut	9,119	.....	.....
Maryland	6,569	.....	.....
Nevada	.....	.....	.....
Massachusetts	7,600	3,300	-56	
Ohio	5,138	3,475	-32	
California	1,282	646	-50	
Kentucky	21,400	.....	.....
West Virginia	6,520	.....	.....
Other states†	40,800	23,650	-69*	
	41,439,761	55,526,490	+34	

*Less than three producers in Colorado and Connecticut in 1915 and in Nevada in 1914, and permission was not granted to publish state totals. Increases and decreases in 1915; therefore, included in "Other States." †1914: Idaho, Mississippi, Montana, Nevada, and Utah; 1915: Colorado, Connecticut, Idaho, and Utah.

Iron Mining by Districts.

The principal iron-mining districts in the United States, except the Adirondack district, are interstate, and statistics of production by districts are of more interest and importance than statistics by states. The Lake Superior district mined nearly 85% of the total ore in 1915 and the Birmingham district about 8.5%, or a little more than one-tenth as much as the Lake district. None of the other districts mined as much as 1,000,000 tons. The increase in production in 1915 was especially marked in the Lake Superior district, where it reached 40%; the Adirondack and Chattanooga districts each showed a large increase, namely, 28 and 25%, respectively; the total for a number of widely separated districts, including those in the western states, showed a decrease as compared with 1914.

IRON ORE MINED IN THE UNITED STATES BY MINING DISTRICTS IN 1914 AND 1915.

District.	1914.	1915.	Per cent of change in 1915.
Lake Superior*	33,510,403	46,341,251	+40
Birmingham	4,282,556	4,748,329	+11
Chattanooga	432,006	539,024	+25
Adirondack	544,724	699,217	+28
Northern New Jersey and southeastern New York	541,684	644,493	+19
Other districts	2,098,988	1,956,577	-7
	41,439,761	55,526,490	+34

*Includes only those mines in Wisconsin which are in the true Lake Superior district.

Lake Superior Iron Ranges.

All the ranges in the Lake Superior district mined a larger quantity of iron ore in 1915 than in 1914, the largest increases having been in the Mesabi and Cuyuna ranges—56 and 44%, respectively. The output of the Cuyuna range exceeded 1,000,000 tons for the first time.

IRON ORE MINED IN LAKE SUPERIOR RANGES* IN 1914 AND 1915.

Range.	1914	1915	Percentage of increase
	Gross tons.	Gross tons.	in 1915.
Mariquette (Michigan)	3,329,763	3,817,892	15
Mesconime (Michigan and Wisconsin)	3,671,499	4,665,465	27
Cuyuna (Michigan and Wisconsin)	4,601,240	4,996,237	9
Vermilion (Minnesota)	1,362,416	1,541,645	13
Mesabi (Minnesota)	19,808,114	30,862,109	56
Congaree (Minnesota)	75,661	1,120,666	141
	33,540,403	46,944,254	40

*Includes only such Wisconsin mines as are in the true Lake Superior district.

Consumption of Iron Ore.

The apparent consumption of iron ore, obtained by adding together the shipments of ore from the mines, the sales of zinc residuum, and the imports of iron ore, and deducting from the sum of these the exports of iron ore, was 56,286,058 gross tons in 1915, compared with 40,613,448 gross tons in 1914, an increase of nearly 39%. The ratio of pig iron produced

to iron ore consumed was 53.15% in 1915 compared with 57.45% in 1914.

Largest Iron Ore Mines.

There were seven mines that produced more than 1,000,000 tons of iron ore each in 1915, two more than in 1914. First place in 1915 was held by the Mahoning mine at Hibbing, Minn., second place by the Hull-Rust mine at the same place, and third place by the Red Mountain group near Bessemer, Ala. The production of these mines in 1915 was respectively, 2,311,940 tons, 2,307,195 tons, and 2,138,015 tons, compared with 1,212,287 tons, 458,468 tons and 2,008,465 tons in 1914. The Red Mountain group was thus the largest producer in 1914. The increase in production of the Hull-Rust is noteworthy—more than 400%; from practically a condition of idleness the Morris within a year yielded 1,167,421 tons, and the Burt moved from forty-first place, with a production of about 250,000 tons, to seventh place, with a production of more than 1,000,000 tons, in 1915. These records illustrate the rapidity with which the rate of output of mines in the Lake Superior district may be increased in response to demand. None but open-pit mines could be made to respond to such a degree.

Pig Iron.

The production of pig iron, including ferro-alloys, was 29,916,213 gross tons in 1915, compared with 23,332,144 gross tons in 1914, an increase of 28%, according to figures published by the American Iron and Steel Institute February 26, 1916. The pig iron, exclusive of ferro-alloys, sold or used in 1915, according to reports of producers to the U. S. Geological Survey, was 30,384,486 gross tons, valued at \$401,409,604, a gain of 36% in quantity and 34% in value. The average price per ton at furnaces in 1915 as reported to the Survey was \$13.21, compared with \$13.42 in 1914. At the close of the year, however, prices of pig iron had advanced 35 to 40%.

Active Demand for Asbestos.

The United States marketed in 1915 1731 short tons of asbestos of domestic production valued at \$76,952. Compared with the production of 1914, this represents a gain of 484 tons, or 39%, in quantity and 366% in value.

The asbestos of the world is supplied chiefly by Canada. Most of it is exported free of duty to the United States, the greatest manufacturer and user of asbestos products.

An order in council by the government at Ottawa, Canada, March 25, 1916, placed an embargo on the shipment of asbestos from Canada to other than British ports, but permitted shipments to the allied countries, France, Russia, Italy, Japan and Portugal, on special licenses granted by the British consul. As this order absolutely shut out the United States consumers

of asbestos and asbestos products, it was demonstrated to the government at Ottawa that a great hardship on American manufacturers and consumers would be entailed, and the embargo has been modified to the extent of permitting shipments of crude asbestos to enter the United States if guaranties are given by the manufacturers and their consumers that none of the crude or manufactured material will be re-exported from the United States, except as provided for in the original order.

The requirement that the exporter give a guaranty as to the ultimate destination of the asbestos exported has caused asbestos users in the United States to ask whether a supply is available in asbestos deposits of this country. This inquiry is answered by the U. S. Geological Survey as follows:

In 1915 there was a great increase in the production of high-grade asbestos in Arizona, the occurrence of which has been described in the reports on asbestos for 1913, 1914 and 1915. The lower-grade asbestos produced in this country comes mainly from Georgia. Both Arizona and Georgia are capable of increasing their output.

Some years ago (1911) Vermont had a productive mine, largely in the chrysotile variety of asbestos, in the same belt of rocks that contain the rich deposits of asbestos in Canada. For the last few years the mine has not been in operation, but as a result of the Canadian embargo it may again become a valuable source of supply.

Virginia in 1905 and 1906 produced a small quantity of low-grade asbestos that is still used in the manufacture of a local asbestos product. The fiber is of the amphibole variety and slip-fiber type. It was quarried near Body Camp and hauled 12 miles to a mill at Bedford City.

There has been much interest in the asbestos reported from the Casper mountain and other regions in Wyoming. Some mills have been erected, but although there has been as yet no commercial production, the quality of the fiber, in part chrysotile, is locally encouraging.

Idaho has in the Kamiah region large deposits of material like that of Georgia. California has produced asbestos, generally of low grade, at a number of points.

On the whole the encouraging outlook in Arizona, which includes also the Grand Canyon region, with the possible resumption of production in Vermont and an increased production in Georgia, may be expected to make up at least part of the loss by embargo in Canada.

British imports of manganese ore in March, 1916, were 30,476 gross tons, against 24,511 tons in February. To April 1, 1916, the year's imports were 87,098 tons, as compared with 86,605 tons to April 1, 1915, and 128,775 tons to April 1, 1914.

Copper exports from Atlantic ports for the week ended May 25 totaled 2902 tons. Since May 1, they were 13,971 tons, against 28,840 a year ago.

The World's Largest Concrete Mixers.

The accompanying illustration shows a concrete mixing machine which is said to be the largest ever built. It is designed to hold 4 cu. yds. of mixed concrete, or approximately 160 cu. ft. of loose unmixed material. It is mounted on steel skids and equipped with power tilt, clutch pulley and gated batch hopper, and the total weight of the equipment is 46,000 lbs. The mixer drum is made of $\frac{3}{8}$ -in. steel, and the inside diameter of the drum rings is 9 ft. 6 ins.

Two of these machines were used at Whitney, N. C., by the Southern Aluminum Co., a French concern, but shut down soon after the European war broke out, there being laid approximately up to that time, 100,000 cu. yds. of masonry, part of which was in the dam and part in the power house. In fact, the concrete work in the power house was complete. During the latter part of 1915, the property was sold by the Southern Aluminum Co., to the Aluminum Co. of America, who changed the design of work to some extent, requiring an entirely new power house, and making some other changes which they deemed necessary, requiring a total of approximately 425,000 cu. yds., of masonry to complete the work still to be done.

The Aluminum Co. desired this work complete within the shortest possible time, and the contracting company of Columbus, Ga., who are undertaking to do the work were the contractors engaged originally by the French company, and were equipped to place from 30,000 to 40,000 cu. yds. per month. An increased output being desired, the contracting company is erecting an entirely new and separate plant on the opposite side of the river, having approximately the same capacity as the old one, the principal difference being, the old plant contains four 64-cu. ft. capacity Austin cube mixers, and the new plant will contain two 4-yd. capacity Smith mixers.

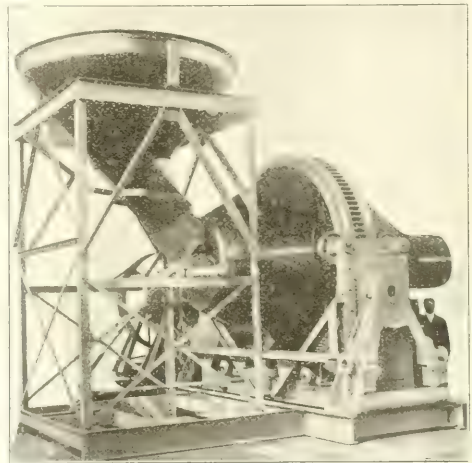
The outfit on the work includes a woodshop containing rip, band, cut-off saw and plainer, and machine shop containing lathes, drills and threading machines necessary for repair work; also numerous drill sharpening machines. The crushing plant No. 1 consists of initial breaker, No. 21 Gates gyratory, tailing six No. 6 Gates gyratory crushers. The concrete mixers include four 64-ft. capacity Austin cubes, with all necessary screens and elevators. To avoid delays on account of possible break-down, the contracting company is installing a 60x84 Superior jaw crusher over a No. 10 Gates gyratory, which can be used in place of the 21 K Gates, or vice versa, should trouble develop, which would not be surprising as the stone is very hard and tough.

The crushing plant No. 2 includes an initial crusher, 60 x 84 Superior jaw, set over two No. 8 Gates gyratory crushers, tailing two No. 6 Superior gyratories and one No. 5 McCully gyratory. For concrete two 4-yd. Smith mixers are used, with all neces-

sary elevators and screens. All the stone used in concrete is required to be held up by a 5/16-in. punching and pass through 2½-in. revolving screens, that portion passing through the 5/16 holds being used as sand in connection with the desired amount of river sand.

The rolling stock includes 23 standard-gage locomotives of the 4-wheel, saddle tank type, from 27 to 53 tons. There are also in service fully 50 standard gage flat cars, and 75 Western steel air dump cars, together with two 100 C. Bucyrus shovels, and four 70 C. Bucyrus shovels; also a Marion shovel and 20-ton capacity American and Industrial cranes.

The derricks consist of forty-five 20-ton capacity steel derricks with 100-ft. booms and 115-ft. masts, and forty-five 9x10 hoisting engines, with slewing at-



SMITH TYPE THE LARGEST CONCRETE MIXER EVER BUILT

tachments. The power, crushing plants, shops and supply pumps are driven by direct-connected motors with 2200 volt, alternating current, secured from Southern Power Co. The hoisting engines and drills are driven by compressed air, derived from a motor-driven Ingersoll-Rand air compressor, with a combined capacity of 17,200 cu. ft. free air per minute.

The work to be done includes the handling of approximately 300,000 cu. yds. earth and rock excavation, with 425,000 yds. cyclopean concrete. The dam is approximately 218 ft. from foundation to crest and 300 ft. long. It will develop 130,000 hp. to be used in the aluminum metallurgical plant.

Zinc oxide is manufactured by two processes, one known as the American and the other as the French process.

The average spelter produced in the west contains about 0.03% cadmium.

What the Mining Companies are Doing

Hollinger Gold Mines, Ltd.

It must be a cause for gratification to stockholders of the Hollinger Gold Mines, Ltd., to learn that its fifth annual report contains the pleasing information that gross profits of the company in 1915 totaled \$2,063,466.77, an increase of \$276,787.11 over the profits for the previous year. This increase in profits not only made it possible for the company to maintain its 4-week dividends of \$120,000, but enabled it to carry out extensive additions to plant (\$314,705.87) and development, without making any inroad upon its cash reserves.

The gold bullion produced during the year was valued at \$3,169,813.84, an increase of \$480,459.04 over the production of the previous year, in spite of the lower grade ore treated, the comparative values having been \$13.67 per ton in 1914 and \$10.11 per ton in 1915. Working costs, however, were reduced \$1.23 per ton.

Dividends during the year amounted to \$1,560,000, or at the rate of 52% per annum on the capital stock.

The principal work of the year consisted in mining and milling 334,750 tons of ore having a gross value of \$3,384,666.84 and an average value of \$10.11 per ton. Exclusive of taxes and depreciation, an actual working profit of \$6.16 per ton was made.

Estimated ore reserves have been increased from \$13,358,420 at the beginning of 1915 to \$16,031,600 at the beginning of 1916.

In the following table is shown the distribution of the working costs:

	Total.	Per ton ore milled.
General charges	\$ 30,370.83	\$0.091
Administration and management	49,027.66	0.146
Insurance	23,520.48	0.071
Clearing surface roads, etc.	10,233.44	0.031
Operating camp	17,160.36	0.051
Operating boarding house	3,813.60	0.011
Mining—		
Explorations	13,468.46	0.040
Development	145,098.64	0.433
Production	477,187.32	1.425
Milling—		
Operation	324,824.95	0.970
Alterations	9,724.51	0.029
Alterations to plant	1,115.35	0.003
Marketing bullion	12,341.70	0.037
Fire protection	6,203.80	0.019
Prospecting	219.29	0.001
Experimental account	2,642.46	0.008
Income tax	42,658.56	0.131
Legal service bonus	16,620.15	0.046
Total	\$1,186,231.56	\$3.543
Depreciation—written off plant	147,000.00	0.439
Grand total working costs	\$1,333,231.56	\$3.982

Mining Costs.

In the following table is shown the distribution of the costs of mining:

Account.	Labor.	Stores.	Totals.	Per ton of ore milled.
General mining charges	\$ 6,970.91	\$ 3,871.65	\$ 10,842.56	\$0.032
Superintendence	12,785.25	7,232.71	20,017.96	0.058
Diagonal drilling	5,792.24	7,676.22	13,468.46	0.040
Crushing	10,490.19	13,728.63	24,218.82	0.072
Drumming	8,006.43	6,433.99	14,440.42	0.043
Drumming	27,335.66	31,454.96	58,810.62	0.176
Roller	8,239.00	6,672.23	14,911.23	0.045
Wedge	8,463.69	5,222.07	13,691.76	0.041
Bar mill	302.79	291.59	594.38	0.002
Timbering and repair	6,511.29	12,339.67	18,850.96	0.056
Shaft	10,065.77	116,911.60	226,707.37	0.678
Scaling	8,552.24	8,552.24	17,104.48	0.052
Timbering and repair	24,629.77	13,052.57	37,682.34	0.113
Track laying	6,267.32	7,232.71	13,500.03	0.040
Tramming and haulage	6,267.32	1,256.16	10,494.82	0.031
Pipefitting underground	3,630.17	7,010.37	10,649.54	0.031
Mine drainage	3,570.97	6,679.39	10,250.36	0.031
Hauling	37,065.77	15,641.93	52,707.70	0.158
Landing and dumping	4,424.63	749.69	5,174.32	0.015
Drill repairs	2,471.67	15,799.49	18,201.16	0.054
Shooping steel	9,999.30	6,778.35	23,706.05	0.071
Collecting steel	966.737	99.94	10,151.31	0.030
Mine stamping	5,152.50	70.57	5,192.50	0.015
Assaying	1,117.40	70.57	1,787.97	0.005
Change house	991.71	70.57	3,518.24	0.011
Surveying	4,565.95	122.83	5,700.49	0.017

Account.	Labor.	Stores.	Totals.	Per ton of ore milled.
Mine lighting	326.81	5,117.33	5,443.64	0.16
Electric haulage	4,441.99	582.42	5,024.41	0.15
	\$42,132.66	\$288,598.19	\$731,090.85	\$2.183
Less credit for excess ore and waste rock broken			95,800.00	0.285
Net cost of mining			\$635,290.85	\$1.898

Milling Record.

Total ore milled	441,236 tons
Less Acme ore	106,486 tons
Tons of Hollinger ore milled	334,750
Average value per ton	\$10.11
Total values sent to mill	\$3,384,666.84
Values recovered	917
Per cent of possible running time	93.8%
Average tons per 24 hours of running time	978
Stamp duty tons per 24 hours of running time	14.72
Unrecovered values—	
Concentrates stored for re-treatment	\$81,763.00
Lost in tails	\$133,090.00
Total	\$214,853.00
Value per ton in tailings	\$3,169,813.84
Cyanide consumed per ton of ore	0.574 lbs.
Lime consumed per ton of ore	1.836 lbs.
Zinc consumed per ton of ore	0.487 lbs.
Acid consumed per ton of ore	0.0032 lbs.
Lead acetate consumed per ton of ore	0.0021 lbs.
Tons of solution precipitated per ton of ore	0.244 lbs.
Zinc added per ton of solution	\$5.074
Average value of pregnant solution	

Distribution of Milling Costs.

Account.	Labor.	Stores.	Totals.	Per ton of ore milled.
General milling charges	\$ 7,115.83	\$ 6,662.16	\$ 13,777.99	\$0.036
Sorting	10,193.84	2,356.81	12,550.65	0.038
Tailings disposal	3,364.23	2,356.81	5,721.04	0.013
Lighting	263.54	2,781.30	3,044.84	0.007
Heating	1,594.35	8,200.72	9,795.07	0.022
Shoveling in bins	3,444.55	1,246.66	4,691.21	0.014
Crushing	14,124.04	19,038.12	33,162.16	0.092
Conveying	10,659.67	8,484.97	19,144.64	0.053
Stamping	13,906.04	34,669.22	48,575.26	0.110
Classification and tube milling	11,142.92	77,709.27	88,852.19	0.202
Concentration	10,662.40	4,821.65	15,484.05	0.035
Handling concentrates	1,389.89	1,763.40	3,153.29	0.007
Treating concentrates	1,231.21	1,246.66	2,477.87	0.006
Thickening	4,621.18	6,420.08	11,041.26	0.025
Thickening and continuous decantation	2,471.40	1,803.66	4,275.06	0.009
Flotation	8,055.10	2,258.76	10,313.86	0.023
Neutralizing	10,002.30	10,037.87	20,120.17	0.046
Clarifying and precipitation	1,334.33	4,533.17	5,867.50	0.013
Refining	2,796.04	29,283.96	32,080.00	0.073
Pumping solutions	6,784.66	11,504.81	17,889.47	0.041
Cyanide	5,168.51	6,211.36	11,379.87	0.026
Cleaning mill	6,245.94	6,245.94	12,491.88	0.031
Alterations	3,337.98	4,386.53	7,724.51	0.022
Assaying	3,067.82	1,825.57	4,893.39	0.011
Maintenance of buildings	474.39	147.31	621.70	0.001

	\$145,329.13	\$305,299.54	\$450,628.67	\$1.022
Less cost of treating 106,486 tons Acme ore			116,079.21	0.090
Cost on 334,750 tons Hollinger ore			\$334,549.46	\$0.999

The cost of treating Hollinger ore amounts to almost exactly \$1 per ton and it is expected that the present year will record a somewhat lower cost. All milling costs have been charged to the ore treated, and no reductions in costs have been made on account of profits made by milling Acme ore, these having been credited by general charges. The alterations reported last year as being in progress were completed in April, since which time 100 stamps have been in regular operation.

The company is now installing extra tube mills and screening plant, by means of which it is proposed to relieve the stamps from the duty of further crushing on that portion of the ore which comes from the crushers in a condition fine enough for direct tube milling.

The continuous decantation plant is being increased by the addition of two rows of 40-ft. tanks. Six Dorr agitators, 26 ft. in diameter by 18 ft. deep, have been installed to secure a longer period of treatment for the ore. The concentrating plant has been rearranged to make room for the agitators, and a tube mill has been installed in circuit with two smaller agitators for treating concentrates. It is expected that by means of these alterations the capacity of the mill will be raised to 1900 tons per day, and that a slightly

improved extraction will be obtained owing to the increased agitation provided.

P. A. Robbins is general manager of the property and his staff are to be congratulated on the splendid results obtained.

Utah-Apex.

The increased quarterly dividend of 25 cts. declared by Utah-Apex will call for the payment of \$132,000, which is less than the profits for the single month of April. These are estimated at from \$140,000 to \$145,000, compared with \$107,000 in previous month. Present earnings are at the rate of over \$3 per share per annum on the 528,200 shares outstanding. Estimated April production compares with actual figures for previous month as follows:

	April.	March.
Lead, lbs.	4,000,000	4,104,813
Silver, ozs.	7,000	70,827
Copper, lbs.	300,000	260,072

Present production is the largest in the history of the company, with a daily shipment of from 550 to 700 tons. The mines are being operated on three shifts of 8 hours each, and give employment to 475 to 525 men.

Great Northern Ore.

From the balance sheet of the proprietary companies the following assets are shown:

Mine development and operations.....	\$3,465,525
Advance royalty disbursements.....	1,883,404
Securities owned.....	2,516,309
Advances under contracts.....	975,613
Total.....	\$8,871,457

The \$3,465,525 spent for mine development and operations came from surplus revenues, and may be regarded as an investment, largely liquidated as ore is mined. The advance royalty disbursements represent underlying royalties paid to owners of mining land, which the ore properties lease, and entitle the ore trust to take out a corresponding amount of ore.

Securities owned consist mainly of bonds and notes of outside mining companies with which the ore properties have contracts for sale of ore. Money was advanced these companies for development and operations and the bonds and notes, received as evidence of obligation, will be repaid by application of certain amounts per ton on all ore mined to principal of the securities. The advances under mining contracts totaling \$975,457 will be repaid in much the same manner.

Thus the ore properties have \$8,871,457, which represents perfectly tangible assets, in addition to \$4,563,650 net current assets, making a total of \$13,435,107.

Mineral lands and leases, etc., are carried at only \$1,516,794 on the asset side. This includes all ore-bearing land owned, and all leaseholds on ore-bearing land. It is figured there are about 300,000,000 tons of ore in Great Northern properties, and rating this at the low price of 50 cts. a ton, would mean an asset value of \$150,000,000.

Against assets is stock of the proprietary companies, all owned by the ore trustees, and totaling \$1,738,400, and various current liabilities deducted before figuring current assets of \$4,563,650.

All figures on the balance sheet indicate the strong financial position of the ore companies, and ability to pursue ore mining and selling with present capital. The trustees' account, which is separate from that of the proprietary companies, shows a liquid surplus of \$4,126,299, available for all purposes of the trust.

Miscellaneous Company Notes.

The annual meeting of the Greene-Cananea Co. is called for June 19 at Duluth, Minn.

The American Smelting & Refining Co. recently closed a deal for the purchase of three large steamships for their South American business. One steamer was purchased in this country and two in England. The vessels will be used in

transporting material for the Chilean mining properties, probably bringing ore on the return voyage for the Tacoma smelter.

The April, 1916, production of Goldfield Con. was 30,400 tons; net earnings were \$60,041. This compares with 30,000 tons and \$54,127 in March and 30,080 tons and \$60,315 in February.

The production of the Nipissing Co. for April has an estimated value of \$167,446, and estimated profit of \$101,875, compared with production of \$169,999 and estimated profits of \$105,511 in March.

The report to the New York Stock Exchange of the Utah Securities Co. for 12 months ending March 31, 1916, shows gross \$3,789,723; net after taxes, \$1,894,832; interest and discount, \$1,029,502; balance, \$864,880.

Net earnings of the Chief Con. Co. of Utah for April were \$69,000 and net for May will approximate that figure. For March the earnings totaled \$66,000 and for February \$62,000. On May 1 Chief Con. had a treasury balance of \$370,000.

A syndicate, including Fred Smith, James MacNaughton, John H. Rice, L. L. Hubbard, John Black, Joseph Bosch and John T. Reeder of the copper country, E. W. Decker of Minneapolis, Charles Deane of Chicago and John H. Johnson of Detroit has purchased the Norwich property comprising 1200 acres in Ontonagon county. Diamond drilling has already started.

The Tuolumne Copper Co. has purchased control of the Colusa-Leonard and the Butte Main Range companies, whose properties lie just east of Leonard mine and adjoin on the north the Tropic mine of Anaconda Co. in the Butte camp. Tuolumne gets two-thirds interest in Butte Main Range and 51% of Colusa-Leonard in consideration of certain amount of development work which is estimated to cost \$500,000. Both properties are partly developed, with shafts about 800 ft. deep, and have 80 acres of ground.

Subscriptions to the new stock of the Seneca Copper Co. are being paid. There is a large New York interest in the company which will be represented on the board of directors. The board will comprise strong financial and mining interests not at present represented in Lake Superior "coppers." General offices will be located at 120 Broadway, New York. Minority stockholders of the old Seneca Mining Co. will receive an offer of \$60 per share cash or four new shares for one old as soon as the subscriptions have been paid in, the property acquired from the Calumet & Hecla and organization of the new company completed.

The American Zinc, Lead & Smelting Co. has concluded negotiations under which it is assured of a supply of natural gas for fuel purposes for the use of its Kansas smelters. The Zinc Co. has obtained a lease of 180,000 acres of land in the gas fields of Oklahoma, owned by the Osage Indians, application for which was made last fall in the name of one of the company's subsidiaries. Hearings have been going on for 8 months before the secretary of the interior in Washington and finally the leases have been signed by the owners, the Indians, and approved by the secretary of the interior. The zinc company's smelters in Kansas and Oklahoma use natural gas as fuel, while the smelters in Illinois are run by producer gas. The American Zinc Co. has today cash on hand exceeding \$2,500,000.

Another quarterly dividend of \$1.50 has been declared by the Consolidated Interstate-Callahan Mining Co., which will make a total of \$3,952,415 paid to stockholders within 15 months. Profits of \$812,783 accrued from operations during the first quarter of 1916, comparing with \$721,749 in the closing three months of last year. There was mined during the first quarter 29,897 tons of ore. There was produced 12,972 tons of zinc concentrates, which averaged 49.12% zinc. Mill recovery averaged 88% against 82% in the preceding quarter. It is estimated that the company produced approximately 11,000,000 lbs. of zinc in the 3 months. President Percival says that the litigation in which the company was involved has all been favorably settled. It is understood application will be made for a listing on the New York Stock Exchange.



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The Situation in the Copper Metal Market—Labor Unrest.

American copper production in May totaled 190,000,000 lbs. and deliveries into American consumption were less than 130,000,000 lbs. For the current year it is estimated that the refineries will output not less than 2,100,000,000 lbs., an increase of 28% over the preceding year, making it the largest annual production on record.

One of the most vital factors in the domestic situa-tion, according to the American Metal Market, is the unsettled state of labor which has resulted in strikes at a number of manufacturing plants but has not af-fected refineries. Because of this fact some consum-ing interests have been selling spot copper in the open market and buying futures at lower prices; but even these transactions were small last week. There has been evidence for some time that consumers were over-bought just as some of the largest producers are oversold. These factors have been overbalanced by evidence that the output is now outrunning consump-tive requirements and with imports nearly double what they were during the corresponding time last year, the indication is that the production in July, and possibly this month, will be 200,000,000 lbs.

At the moment prices are largely nominal. Sec-ond hands are offering Electrolytic at 28¼ to 28½ cts. for nearby and at 27 to 27½ cts. for delivery over the last quarter of the year. Producing interests, however, are making no effort to sell on an unwilling market. The surplus is not embarrassing and can be applied on future contracts. The nominal asking price of producers for shipment over the last quarter of the year is 29 cts., but, of course, no business can be done on this basis for the time being.

The most important development abroad is that from now on all trading in copper will be confined to actual consumptive requirements. It is stated that no British dealer can buy from American selling agen-cies either here or abroad unless he has a consumer's order. Speculation is thus completely checked by order of the British government. American producers are not inclined to offer metal at lower prices on the exchanges and consequently the London market is not likely to continue to show the violent fluctuations that have marked the last few weeks. Since the first of June there has been no business in Standard which has been nominally quoted at £120 for spot and £118 for futures while spot American Electrolytic was held at £140.

Brimstone, Once a Terror to Evildoers, Now a Source of Wealth.

In days of old the hardened sinner had constantly before him the fear of condign punishment by being thrust into fiery brimstone depths, did he not mend

his ways, and it no doubt had a salutary effect on the habit of many a would-be wrong doer.

Today, and for 20 years past in the history of the Union Sulphur Co., we have a tale of riches that vies with the wonder-workings of Aladdin's mythical lamp. Organized in 1894 with a capital of \$400,000, but \$200,000 issued, it has been paying dividends claimed to be no less than 100% a month or \$2,400,000 a year. The stock is held by the second generation of four families—Frasch, Twombly, Hewitt and Severance.

The story of the company's undertakings as told by an authority, credits Herman Frasch, a German immigrant at 16, who later developed a method of purifying paraffin wax and desulphurizing petroleum, with organizing a syndicate to exploit the supposedly unworkable sulphur deposits in Louisiana. Measurements showed the deposit was a hill nearly circular, half a mile in diameter, at least 1100 ft. deep, and covered by 500 ft. of quicksand. Frasch drove down a 10-in. pipe through which was poured water at 335°, liquefying the sulphur, which then was pumped up.

In 1903 he produced 35,000 tons, and in 1904 enough to supply the American market and to ship 3000 tons to France, forcing the Italian and English interests, which owned Sicilian deposits and had had a monopoly, to lose \$1,500,000 and to come to terms on division of world markets.

A battery of 15 to 20 boilers heats water for each well, more than 1,000,000 bbls. of oil a year being burned. Water is obtained by canal from Houston river, 6 miles away. A well produces 400 to 500 tons a day for months, one well yielding 73,000 tons, worth \$22 a ton. Two or three great wells were brought in in 1914.

The sulphur is poured into bins, made of planks, 350 ft. long, 250 wide and 60 ft. high. Explosives are used to break up the sulphur after solidifying. Sulphur trains of 20 cars are sent to Sabine, Tex., on the Gulf, and the product shipped to Europe and the company's storage stations at Baltimore, Philadelphia, New York, Boston, Portland and Three Rivers, Canada. United States output in 1880 was 536 tons, worth \$39 a ton. In 1914 it was 328,000 tons, practically all by Union Sulphur Co.

The sulphur is practically pure, and needs no refining and little labor. Cost for labor, fuel, etc., is about \$2,160,000 a year, and revenue even at \$18 a ton must be about \$5,760,000, leaving net of \$3,600,000 on \$200,000 capitalization.

The Burden of Taxation.

The burden of taxation probably never can be so accurately adjusted as to insure its falling in equal measure upon all. Upon whatever general principle it may be based, it is always necessary to deviate from

that principle to secure even an approximation to justice.

For instance, a man has improvements on a mining property representing an outlay of \$20,000. As in the case of other property, the assessor values these according to the outlay. The mine is not paying expenses, and before the taxes are paid may have to be closed down, when the value of the investments in machinery, buildings, etc., suddenly drops to one-quarter, or less, of the outlay. The adjoining mine, with equal improvements, is paying handsomely. The tax for improvements is exactly the same. But the worst feature of this method is that it tends to discourage the development of properties. When a mine is not paying every added burden tends to dampen the investor's enthusiasm. He is putting his money into something which, if he succeeds, adds greatly to the community wealth. In so doing he should not only not have no burden to weigh him down, but should be offered every reasonable encouragement and aid in the power of the commonwealth.

On the other hand, the state is entitled to at least some proportion of the hoard stored by nature among its resources. When a mine is paying well its owner should be willing to give his tithe toward the advancement of the community whose resources make possible his prosperity. It, therefore, seems only right that the law should adjust taxation in such a manner as would work for the benefit of those unfortunate as well as the fortunate.

There are a great many who think it is an easy thing to find a good mine, and there are equally as many who are willing to risk their money on the say-so of someone "who is supposed to know," who had just looked at a mine, taken a few specimens therefrom and had them assayed. It is really astonishing how people will accept very meager evidence concerning mines and invest thereon, while a careful study is made and every fact weighed before investing in any other enterprise. In consequence, the general result of such credulity in mining ventures is failure, and the mining industry is accordingly injured in consequence.

Some of the plums of mining may be gathered without risking a large amount of capital in the purchase of mining property. Leasing has been and is a profitable business to lessees and property owners alike. Many leases on attractive properties are available in many of the new and also in the older camps. Lessees have made fortunes through their enterprise and others may do the same.

The limited means available for the opening of some mines has brought the ingenuity of the superintendents of these mines into active play, and the various devices improvised and applied to the work in hand is instructive, though sometimes amusing.

PERSONAL.

J. A. Dunn has joined the engineering staff of the Winona Copper Co.

Dr. Frank W. Traphagen, Golden, Colo., is in Chicago on professional business.

George Short, mining engineer, Butte, Mont., is at present in Wallace, Idaho.

E. F. Haug, mining engineer, who has been with the Ahmeek Co., has gone to Schurz, Nev.

Fred Close, in charge of exploration work for the White Pine Extension Co. in the copper country, has resigned.

Henry Higgins, formerly assayer at the Carson City, Nev., mint, has removed permanently to Tonopah, Nev.

L. C. Bayles of the Ingersoll-Rand Co.'s engineering department is now in the Lake Superior copper country.

Dr. H. W. Morse, research engineer with the Western Precipitation Co., has returned to Los Angeles from Michigan.

Charles B. Croner has recently examined a number of properties in the vicinity of Milford, Utah, for Pasadena capital.

A. J. Pickrell, field manager of the Commercial Mining Co., Prescott, Ariz., has recently returned from a trip to Los Angeles, Cal.

R. W. Schultz, a representative of the Minerals Separation Co. of San Francisco, is making a business visit to the Michigan copper country.

D. H. Walker, superintendent of the Alum-Potash mine at Blair's marsh, near Tonopah, Nev., has left on a visit to San Francisco, Cal.

F. Ward Paine, director of the Copper Range, Lake and other companies, has just returned to Boston from a trip of inspection of these properties.

J. H. Holden, Chelan, Wash., president of the Holden Gold & Copper Co., is now in Spokane, Wash., and will shortly leave on a mining mission to Alaska.

W. H. Seagrave, until recently manager of the Kennecott Copper Co.'s mines at Kennecott, Alaska, is now general manager of all of its properties in Alaska.

John G. Kirchen, general manager of the Tonopah Extension Mining Co., Tonopah, Nev., has returned from attending a meeting of the directors of the company in New York city.

W. E. McKie, chief mechanical engineer of the Calumet & Hecla Co., has been lately at Ishpeming, Mich., inspecting the mechanical equipment of the Chapin and other mines in that section.

F. W. Nichols of Houghton, Mich., agent for the St. Vary's Mineral Land Co. and director of the Hancock and other companies, is now in Boston and will visit Indianapolis and Duluth on his way back.

H. S. Emlaw, Grand Haven, Mich., who is operating a tungsten property in Bolivia, has recently returned to Spokane, Wash., and will immediately leave for the Kootenai district, British Columbia, where he formerly operated.

Edward W. Raab is now superintendent of the Tom Reed Gold Mines Co., Oatman, Ariz. He was formerly superintendent of the Tennessee mine, Chloride, Ariz., and is thus the successor to the resignation of S. S. Jones.

F. W. Libbey, formerly superintendent of Vulture mine, near Wickenburg, has purchased the laboratory and assaying business of J. S. Neall, Phoenix, Ariz., taking possession May 15. Mr. Neall, who is 75 years of age, has retired from business. The laboratory is well equipped for analyses and mill tests, and included in the property purchased are several

cabinets of ore specimens, typical of the west, many of them rare and valuable.

E. Percy Smith, until recently assistant general manager of the Federal Mining & Smelting Co., Wallace, Idaho, is now superintendent of the North Star-Triumph mines, Hailey, Idaho, for the American Smelting & Refining Co.

J. C. Devine was tendered a "smoker" on May 31 by members of the staff of the Ray Con. Copper Co. on the occasion of his severing his connection with the company, as superintendent of mines, to go to the Penal Copper Co. in charge of operations.

C. T. Sokup, recently engaged on metallurgical and mining construction work with the Canadian Copper Co., Copper Cliff, Ont., has resigned to accept a position in metallurgical construction work with the American Smelting & Refining Co., Kansas City, Mo.

James B. Uempleby, U. S. Geological Survey, is now in Kellogg, Idaho, inspecting the Wardner-Kellogg section. He is finishing the work started by F. L. Ransom in the Couer d'Alene district. After completing the Wardner-Kellogg section he will examine the Pine Creek section.

H. B. Slater, who has been for the 4 past months at the Winona mine in Michigan, supervising the construction of an experimental plant for the ferric-chloride process originated by him, is returning to Los Angeles. The tests have been successful and plans will soon be drawn for a plant.

Thomas Tucker has succeeded L. B. Weed as superintendent of the Colorado Fuel & Iron Co.'s property at Sunrise, Wyo. He will hereafter have charge of all of the company's iron and stone properties in the states of Wyoming, New Mexico and Colorado and will make Pueblo, Colo., his headquarters.

Chas. A. Smith has assumed the duties of assistant superintendent of mines for the Ray Con. Copper Co., Ray, Ariz., succeeding J. C. Devine. Mr. Smith, prior to 1913, had 6 years' experience as assistant manager for Phelps-Dodge Co., Nacozari, Sonora, and during 1914 and 1915 was mine manager for the Caucasus Copper Co., in the Russian Trans-Caucasus, leaving the work on account of war conditions. Since returning to the United States last year he engaged in mine examination work in California.

OBITUARY.

Donald Ferguson, pioneer mining engineer and mine manager operating in the Goldfield, Nev., section, died recently. He was employed for many years by eastern interests to operate in the eastern part of the Goldfield section and during that time made many trips to South and Central American countries.

Michael J. Drum died on May 29 near Bonnie Clare, Nev., while engaged in sampling work on the Orient mine, near that place. The mine, which he owned, was located in the early days and produced gold specimens which were awarded prizes at the Centennial Exposition, Philadelphia, Pa., 1876. About 1905 Drum relocated the property and had recently placed it under option to a San Francisco, Cal., syndicate. He was born in Ireland about 1840 and served in the Civil War of this country, after which he was in the newspaper business in Chicago for a short time. At one time he was sheriff of Fremont county, Colorado.

SCHOOLS AND SOCIETIES.

American Institute of Chemical Engineers.—The eighth annual meeting of the Institute will be held in Cleveland, Ohio, June 14 to 17.

American Mining Congress.—The 19th annual session of the American Mining Congress will be held at the LaSalle Hotel, Chicago, during the week of Nov. 13, 1916. The pur-

pose of the convention will be to inaugurate plans by which all branches of the industry may work together in the solution of common problems. A general meeting will be held each morning, and the convention will then divide itself into Precious Metals, Iron and Steel, Oil and Gas, Lead and Zinc, and Coal sections, each discussing subjects of special interest to that branch of the industry. The convention will occupy two whole floors of the LaSalle hotel, and such space as is not utilized for meeting places will be available for exhibits or reception rooms by those directly interested in the convention. A program of varied interest is being arranged and the largest convention in the history of the Congress is expected.

Michigan College of Mines.—Prof. F. W. Sperr, Assistant Professor G. P. Schubert and Instructor G. F. Johnson, with 27 students, have just returned from a 5 weeks' trip in the Marquette, Gogebic and Menominee iron districts devoted to the study of the many different methods of mining necessitated by the varying conditions—wide veins, narrow veins, those with little and those with great inclination, hard ore, soft ore, etc. The first year-book of the alumni, students and faculty of the college has been issued and is titled "The Engineer." It is dedicated to George Augustus Koenig, who was for many years, until the time of his death, professor of chemistry. Besides the several sections which are customarily found in a volume of this nature, a very appropriate memorial and brief review of his life is given. A. J. Houle, professor of metallurgy, in a reprint of the *Alumnus*, has written on the Koenig Memorial Fund.

American Institute of Mining Engineers, Nevada Section.—A section was recently installed at Reno, Nev., with a membership of over 90, and with the following officers: J. W. Hutchinson, Goldfield, chairman; F. C. Lincoln, vice-chairman; Henry M. Rives, Reno, secretary-treasurer. An executive committee was elected, comprising the chairman, vice-chairman, John G. Kirchen of Tonopah, Frederick Bradshaw of Tonopah, W. H. Blackburn of Tonopah, C. B. Lakanan of McGill, E. A. Julian of Reno, Governor Emmet D. Boyle of Carson and ex-Governor T. L. Oddie of Reno. Addresses were made by Governor Boyle, J. W. Hutchinson, W. L. Saunders, Charles Butters, Whitman Symmes and J. C. Jones. A banquet in the evening concluded the installation, at which Prof. Lincoln of the Mackay School of Mines delivered an illustrated lecture on the "Evolution of Mining." A trip to Virginia City was made the following day and a visit was made to the Union mine.

NEW PUBLICATIONS.

The Physical Geography of Wisconsin. By Lawrence Martin. Madison, Wis., State Geological and Natural History Surv. Bulletin 36: pp. 549; illustrated.

It has been the author's intention to give a vivid description of the geology and topography of the state, which will be of value to both the technical and non-technical alike, and in this respect he has fully succeeded. Chapters I and II describe the state in general and makes a subdivision of the state into several geographical areas. In the 16 chapters following these several areas are taken up separately and the geology, geography and topography described in detail.

The Sand Test for Determining the Strength of Detonators.

By C. G. Storm and W. C. Cope. Washington, D. C., U. S. Bureau of Mines. Technical Paper 175, pp. 98; illustrated. Obtained by the Mining World, 20c.

Many kinds of electric detonators and several containing different proportions of fulminate of mercury and potassium chlorate, were tested and the results compiled in this paper. Whatever may be the exact theory in regard to why the detonator explodes the secondary explosion, it is primarily because of the intense local action had on explosion of the detonator. The more violent this is the more efficient is the detonator. The sand test obtains the relative violence of this explosion by successively measuring the amounts of sand crushed by the explosion of the detonator in a suitable bomb

containing the sand. Before and after the sand is measured through the standard screens and the amounts in excess which will pass through the specified standard screens after the explosion are compared to get the relative efficiency of the detonators.

Coal Mine Fatalities in the United States, 1915. By Albert H. Fay. Washington, D. C., U. S. Bureau of Mines. Report; pp. 80. Obtained by the Mining World, 20c.

Tables are first given in which the accidents are given for each month during the year and classified according to the cause of the accident. Tables are then given which include only accidents which occurred in certain places or certain ways and in almost every case here the tables are followed by a short talk and discussion on accidents occurring in this particular way. The report is supplemented with a list of the permissible explosives, lamps and motors as found by tests made prior to Jan. 1, 1916.

Natural Gas Resources of Parts of North Texas. By E. W. Shaw, G. C. Matson and C. H. Wegemann. Washington, D. C., U. S. G. S. Bulletin 629; pp. 129; illustrated.

The bulletin is divided into three parts and these are designated as "Gas in the Area North and West of Fort Worth," "Gas Prospects South and Southeast of Dallas," and "Notes on the Gas Fields of Central and Southern Oklahoma." Topographic maps showing the land owned by the several companies are given of the Petrolia and the Mexia-Groesbeck gas fields. Besides descriptions of separate fields included within the area illustrations show the geological formation as revealed by drilling operations, and in many instances separate topographic maps of the small area being described are shown.

PATENTS RELATING TO MINING.

Engine for Coal-Boring Machines. James W. Evans, Denver, Colo., assignor of one-third to Samson Brothers. (1,181,126; filed Dec. 5, 1914.)

Declination Gear for Azimuth Instruments. Olaf Ohlson, West Newton, Mass., assignor to Horace S. Butterfield, Portland, Ore. (1,182,405; filed May 20, 1912.)

Conveyer Flight. Thomas A. Coleman, Vredenburgh, Ala., assignor of one-half to Peter Vredenburgh, Jr., Vredenburgh, Ala. (1,182,458; filed Feb. 10, 1915.)

Mining Machine. Frederick D. Buffum, Gary, W. Va., assignor to Edward O'Toole, Gary, W. Va. (1,182,453; filed Jan. 11, 1910.)

Ingot Mold and Feeder. Bloomfield H. Howard, Aspinwall, and Ernest J. Turner, Pittsburgh, Pa. (1,182,374; filed Sept. 11, 1915.)

Amalgamator. Joseph H. McNeil, East Saugus, Mass. (1,182,189; filed Jan. 11, 1912.)

Hoist. Victor-Degerstedt, Portland, Ore. (1,182,757; filed Feb. 10, 1913.)

Recovery of Thorium. Edward D. Campbell and Robert J. Carney, Ann Arbor, Mich. (1,182,880; filed Feb. 5, 1916.)

Process for Treating Rock Containing Alkali Metals. Frederic Ludwig Firebaugh, Berkeley, Cal. (1,182,668; filed April 30, 1915.)

Tilting Side-Dump Car. Charles H. Clark, Crafton, Pa., assignor to Clark Car Co., Pittsburgh, Pa. (1,182,643; filed Feb. 30, 1913.)

Ore-Flotation Apparatus. John M. Callow, Salt Lake City, Utah, assignor to Metals Recovery Co., Augusta, Me. (1,182,748; filed June 15, 1914.)

Process of Roasting Zinc Blende. Charles A. H. de Sautles, New York, N. Y. (1,182,417; filed Oct. 17, 1914.)

Gas-Analyzing Apparatus. Hugh K. Moore, Berlin, N. H., assignor of one-half to Josiah Quincy, Boston, Mass. (1,182,851; filed Nov. 29, 1910.)

Air-Cylinder-Lubricator System. Wallace E. Dunkerley, Charley A. Mattmiller and Joseph Brunker, Helena, Mont. (1,182,663; filed Jan. 28, 1916.)

Progress Made in the Manufacturing Industries

New Publication on Indicators.

The Trill Indicator Co. of Corry, Pa., has issued a new 56-page catalog, which is a most complete and up-to-date publication on engine indicators and indicating. The book is instructively illustrated and describes in detail the construction and purpose of the several parts of both the outside and enclosed spring types of indicators, including indicator reducing motion. Considerable space is given to discussion and data on indicator springs and full instructions on indicating and interpreting cards from all types of engines, high-pressure steam, gas and fuel oil engines, triple-expansion and compound engines and ammonia compressors. Detailed instructions are given on the application and use of the indicator and the planimeter, with easily understandable instruction on the few arithmetical calculations that are necessary. There are 15 pages illustrating and discussing the characteristic diagrams of the several types of engines, including the latest 4-valve engines of the new poppet valve type, the Uni-flow engine, high-compression, 2-cycle oil engine and the Deisel engine; also a large number of faulty diagrams, illustrating the characteristic faults of engines. A copy of this book will be sent upon request.

TRADE PUBLICATIONS.

Bronze Lever Throttle Valves. The Wm. Powell Co., Cincinnati, Ohio. Circular; illustrated.

A general description of three types of valves are given and to each brief description is added an illustration of the valve being described. The Titan, Giant and Iron Body throttle valves are the ones included and prices for the different styles and sizes are given in tabulated form.

Conveying Machinery. Link-Belt Co., Chicago. Booklet No. 267; illustrated.

The title of this booklet is "Moving Material Indian File." With illustrations the subject of conveying machinery and installations is taken up in a complete way. Different methods and kinds of installations for handling various kinds of materials are described and the adaptability peculiar to each is described at some length.

Stone Drills, Tools and Air Compressors. Chicago Pneumatic Tool Co., Chicago. Bulletin No. 192; pp. 24; illustrated.

A number of various tools for the working, dressing and cutting of stone are given. This includes the Hummer self-rotating hammer drill and several different types of smaller-sized air compressors driven by belt connection or direct connection to combustion engines.

Duplex Power-Driven Air Compressors. Ingersoll-Rand Co., New York. Booklet; pp. 29; illustrated.

"Industrial No. Duplex Power-Driven Air Compressors" is the title of this booklet No. 3312. The XB class of compressors may be either power or direct steam drive, but only the former type is described in this booklet. They are divided into duplex and two-stage cylinder types. The former will develop pressures from 15 to 100 lbs. and the latter pressures from 15 to 100 lbs. The construction, operation and detailed description of many of the parts making up the compressor are given, and in most cases sections or illustrations show. The compressor is adaptable to many varieties of work and may specially be ordered for gas compression.

"National" Pipe in Large Buildings. National Tube Co., Pittsburgh, Pa. Bulletin No. 25; pp. 87; illustrated.

Briefs of technical articles, tables, formulas and theory, and views of buildings in our large cities where "National" pipe is used are included in this complete bulletin. The first seven pages consist of briefs from different sources and

particular interest to users of metal piping. These briefs also dwell on properties and the best methods of manufacturing pipe. The following 46 pages are views of large buildings in which National pipe has been installed. The name of the several contractors and the architect are given in many instances. A reprint of a paper entitled "The Design of Hot Water Supply Systems to Minimize Corrosion" is then given. Tables and drawings are also given, showing the details and applicability of pipe. A theoretical treatise is then reviewed in regard to tubular beams, safety factors and flow of fluids through pipe. Complete tables of general use in making computations along the above lines are given in form identical with those found in the average book on the subject.

INDUSTRIAL AND TRADE NOTES.

The Merchants' Steel & Supply Co. is now located in its new offices in the Continental & Commercial Bank building, 208 South LaSalle street, Chicago.

The Borden Co., Warren, Ohio, manufacturer of "Beaver" square-end pipe cutters and easy-working die stocks, announces the appointment of W. A. Phillis as advertising manager.

Bigger, better business, coupled with the tendency of the electrical industry to center uptown has resulted in a new location for the Western Electric Co.'s retail store in New York. In its new quarters, in the Tilden building, 105 West 40th street, the store is situated but a stone's throw from Broadway, and is in the heart of a rapidly growing commercial section. Because of more commodious quarters, a larger assortment of electrical goods will be carried at the new location. A complete line of electrical supplies, both staples and specialties, is carried in stock.

The American Manganese Steel Co., Chicago, makes this announcement: "In order that we may give our customers the best service possible, we have found it necessary to provide increased manufacturing facilities. We have, therefore, purchased the plant of the Brylgon Steel Casting Co. at New Castle, Del. This is a large, up-to-date steel foundry, having a monthly capacity of approximately 400 tons of steel castings. We now have two plants at New Castle and one plant at Chicago Heights, Ill. The task of converting the newly acquired plant into a manganese steel foundry of the latest and most efficient type is progressing rapidly, and we expect to be producing therein by July 15."

S. Freeman & Sons Mfg. Co., who make a specialty of internally fired boilers—horizontal, vertical and marine types, as well as stand pipes, tanks, self-supporting smokestacks, etc., is extending its sales agencies so as to thoroughly cover the mining and industrial districts of the country. Those recently added include the H. F. Lyons Co., San Francisco, and J. U. Jones, Dallas, Tex., who for many years represented the Allis-Chalmers Co. in that territory. In addition to its branch offices in the Monadnock block, Chicago, the company also has the following sales agents: Wm. T. Doyle, 167 Twelfth street, Milwaukee, Wis.; P.-K. Engineers, Syndicate Trust building, St. Louis, Mo.; Southern Boiler & Tank Works, Memphis, Tenn.; Vincent Kenny, 414 McCague building, Omaha, Neb.; Poccock & Pollard Co., 208 Iron Exchange, Minneapolis, Minn.; Colby Engineering Co., 70 First street, Portland, Ore.; Industrial Equipment Co., 208 American Trust building, Cleveland, O.; R. B. Murray, 1521 Farmers' Bank building, Pittsburgh, Pa.; H. F. Lyons Co., 33 California street, San Francisco, Cal.; J. U. Jones, 3819 Rawlin street, Dallas, Tex. Inquiries can be taken up with any of the above and will be given the same prompt and careful attention as though addressed to the general offices and works located at Racine, Wis.

Late News From the World's Mining Camps

Editorial and Special Correspondence.

ALASKA.

Juneau.

Many recent finds on Mastodon and Boob creeks have caused quite a stampede to that section. Most of the stampede was from Ophir and Iditarod, the distance being around 40 to 50 miles. Hurst creek, a tributary of Mastodon creek, has also been included in this activity. Strandberg made pannings on No. 2 below, Boob creek, taking 3 pans from the dump and 3 from the bottom of the shaft. They gave a total of \$1.80, which would indicate a value of \$2.50 per foot. The gold is coarse. There is 3 to 4 ft. of gravel. Other pans from the same prospect gave similar results. J. S. Pitcher has pay in two shafts, one on the upper end of discovery and one near the upper end of No. 1 below. On the Emmet fraction they have better than \$3 per foot, and it is getting better, but nearly all prospecting is at a standstill. Schwartzdahl exhibited gold panned from his claim which was flat and heavy and had run through 3 ft. of gravel. His pannings show results from 10 to 50 cts. This was on shallow bench ground, averaging 10 ft. deep. The creek bed is wet, and there has been little or no prospecting there. Greer & McNulty, on Boob creek, have struck pay. Reports were that they had 3 ft. of gravel that panned from 6 to 35 cts. There are already about 20 men on that creek, with three small boilers. The ground was said to be all frozen, and there was a depth of 35 ft. to bedrock. Some reports state that a small gasoline boat can get within 4 miles of the strike. A townsite, known as Cooper, has been located at the mouth of Mastodon creek, and supplies will be taken there when navigation opens. Two large scrapers will be operated this next season, one by the Kuskokwim Commercial Co. and the other by Al Poormeister. The ground has been thoroughly prospected, and there is little doubt that they will make a good showing.

Cook & Co., in the Poorman district, near Ruby, have 6 ft. of dirt on the dump that will average 75 cts. per pan. Kickbush & Davis are working on ground that will go \$3 per ft., and good pay has been found on Spruce creek.

Katalla.

At present coal here is \$21 per ton and is obtained from British Columbia. W. H. Dugdell has obtained a permit from the Controller Bay Coal Co. to mine coal in the patented claim on Bering lake. A crew of men at the mine are getting it into shape for actual work. In 1907 T. P. McDonald expended \$175,000 developing a mine on this claim. About 150,000 tons were mined and comparative tests with Pocahontas coal proved it to be superior. Legal injunctions at about this time were the cause of its shutdown and it has remained dormant since about 1908. A. M. Keating, chief engineer of field work for Alaska Petroleum & Coal Co., is surveying a preliminary line for the railroad from the company's terminal on Controller bay to the mines. Two timber cruisers are looking over the supply of timber, for use in construction work, which will begin soon.

Skagway.

The American-Yukon Navigation Co. has made preparations to take all of the antimony ores produced in the Bear banks district. It has been said that all of the such properties will be operating during the coming summer.

The St. James is en route with 1500 tons of copper ores for the Tacoma smelter. The Yukon Copper Co. furnished 1500 tons and the remaining 300 tons came from the Graftier mine at Whitehorse.

According to E. C. Ballou, Pavey, the mines of the district are in good condition. At the Ruby Queen and Silver

Queen mines the boiler and compressor have been installed and a gang of men are driving the main shaft. A distance of 50 ft. will find the main ledge. He further believes that ore will be coming from the mine in good quantities by July 1.

Walter Thompson has struck an antimony lead on the right limit of Vault creek, across the creek from the Friedrichs mine. It is believed to be the same lead which is being worked on the Friedrichs ground and on Eagle creek. The ore is high grade, and where it was struck the lead is about 4 ft. wide. As Thompson has just come to the north, old prospectors term the find "a chieco's lead."

Treadwell.

Talk of consolidation of the companies on this island is in progress. The Treadwell Co. talks of discarding its stamps and installing a crushing plant in its stead to treat from 5000 to 7000 tons per day. It is proposed to sink the main shaft to 4000 ft. and equip it with an electric hoist, with a capacity for lifting 300 tons per hour, the largest of the kind thus far figured on. Jointly the companies operating have produced about \$60,000,000 and invested \$38,000,000.

ARIZONA.

Phoenix.

J. D. Gardner, Geo. D. Diehl and others, Phoenix, have opened a vein of ore 4 miles southwest of Tiptop, carrying hubnerite, wolframite, 2½ tons of which sampled 16% tungstic acid. This ore occurs in a porphyry lode, the latter cutting through the granite. A small concentrating plant has been erected at Peoria station, from where shipments to Denver and elsewhere may be reduced to concentrates running 55% tungsten.

Wickenburg.

Geo. B. Upton, Wickenburg, owner of Oro Grande mine and mill near that place, did 8000 ft. of development work several years ago, and milled 8000 tons of free-milling gold ore, running \$340, making a recovery of 98% by amalgamation. While he has a large tonnage blocked out, it is low-grade, and the property is not operating now. He is expecting to arrange for deep sinking, with the view to getting at the ore below the leached and oxidized zone.

The Monte Cristo, 10 miles east of Wickenburg, belonging to E. W. Thayer, Phoenix, has a 1000 ft. shaft, from which considerable lateral development is being done, under superintendency of Chas. Broan. Some of the ore runs high in native silver; other portions contain silver and sulphide of lead. A pump and an compressor operate by gas line connected to part of the equipment. Constellation post office is at this mine.

The Gold Bar Mining Co. has been organized to take over the mine and mill of the Interior Mining & Trust Co., located 14 miles northeast from Wickenburg. J. A. Twitchell, president, was at the head of the Interior Co. T. N. O'Brien, who was manager of the old mine, is its general manager for the new company. The plan is to sink to 900 ft. depth. The old shaft is down 750 ft., and water is being let down to the 700 level by pumping. The rock contains gold and silver, with some silver. The mill is equipped with Nissen stamps, plates and tables, and has the capacity of treating 2000 tons.

Burlough Development Co., New York, is at present sinking on a copper lode, in Big Horn mine, about 20 miles southwest of Wickenburg. The shaft being sunk on the lode has reached a depth of 550 ft., and the plan is to sink 1000 ft. below the surface. The lode, which occurs between walls of Pinal Schist, outcrops a distance of 1000 ft. The

ledge matter is limonite, quartz and hematite, and carries copper, gold and silver. Crosscuts have been made across the lode on the 100, 300 and 500-levels. Geo. B. Holderer, manager for the company, states that sinking is going on at the rate of 5 ft. per day. He employs 22 men.

The Dobler mine, 15 miles east of Wickenburg, has been sold by John Dobler to Hartley & Hutchinson, El Paso, whose plans are to develop the ore at greater depth. There is one vein containing gold ore and another bearing copper. Several small lots of ore have been shipped to the smelter.

Jerome.

Principal mining operations of the United Verde Extension are carried on through the company's Edith shaft, the Daisy shaft being used mainly for ventilation. The Edith has reached a depth of 1400 ft. It has three compartments—two being 4 by 1½ ft., the third being 1½ by 5 ft. It is timbered the first 200 ft. with 10 by 10 timbers, and below that with 8 by 8. The equipment is new and modern, consisting of a Nordberg double-drum, automatic control hoist, operated by a 250-hp. motor, and has been in use since Jan. 1; an Ingersoll-Rand air compressor, equal to 1300 cu. ft. of free air, and operating 10 to 15 Leyner and Sullivan drills, the compressor being driven by a 200-hp. motor. There is an Aldrich triplex pump at 1200-ft. station, and another at the 1400-ft., lifting 80 to 120 gals. of water per minute. The ore is hoisted and transported to loading bins on the Verde Tunnel & Smelter railroad, over a Leschen aerial tramway about a mile in length. This aerial line is erected on wood towers, set in concrete, the line carrying buckets of 1100 lbs. capacity each, capable of delivering 50 tons of ore per hour. The terminal at loading bins is about 650 ft. lower vertically than the mine terminal. The railroad mentioned, which extends from the portal of the United Verde tunnel to United Verde smelter and the Santa Fe tracks at Clarkdale is standard gauge. The United Verde Extension has erected a number of buildings, all covered with galvanized iron sheeting, including a change room for miners, warehouse, blacksmith shop and framing shed. The workings of Edith and Daisy shafts are all connected, the ores being shipped are copper sulphides, and about 150 men are on the payroll. James S. Douglas is president of the company; David Morgan is superintendent.

Jerome Verde Copper Co., for which H. P. Henderson, New York, is consulting engineer, has a property which is being explored and developed under superintendency of J. B. Harper. The old 1½-compartment, 700-ft. shaft is being enlarged to 3 compartments. The equipment includes a new Sullivan angle-compound air compressor, electrically operated, and a new Wellman-Seaver-Morgan electric hoist and Sullivan drill sharpener. The claims are in the vicinity of those of United Verde Extension, the collar of the shaft being 300 ft. lower than that of the former's Daisy. The idea is to prospect for a vein parallel to that of United Verde Extension.

Green Monster Mining Co., Neil Bailey, president; W. S. Humbert, vice-president, and Scott Linter, superintendent, has a group of 63 claims lying between the United Verde holdings and those of Copper Chief. Development began May 15, with 10 miners in three places, for exploration purposes. This work is to open a contact vein known to exist between diorite and quartz-schist. The outcrop consists of a partly leached quartz-diorite, which carries \$4 to \$8 gold. This contact zone is about 300 ft. wide, the lode material being altered diorite. Considerable shaft and tunnel work has been done by former owners. It is considered that a direct connection is traceable between the outcrops of this group and the developed ore bodies, both north and south of it, and with that theory in mind the Green Monster will be explored. The stock of the company was all taken up locally by practical and capable operators and miners of Jerome.

Wenden.

Desert Mining & Development Co. has 34 mining claims, located 9 miles east from Wenden station, on Wickenburg-Parker branch of the Santa Fe. The company is controlled by Jerome men, including Harrington, O'Brien, Prosser and others. The property has a conspicuous lode of copper sulphide ore, cutting through diorite. Two shafts have been sunk, 250 and 100 ft., respectively, and a crosscut driven at the bottom of the 250 ft. shaft is said to have cut through

40 ft. of ore. Samples taken assayed 5½ to 27% copper, \$5 gold and 16 oz. silver. Thos. J. Nagle is in charge of the work, camp buildings have been erected, an auto truck was purchased and 200 tons of ore have been shipped to a smelter.

Octave.

The Octave mine, now in control of Gibbs of Boston, is employing a few men. Recent work resulted in finding a new body of ore.

The Zieger mine, owned by Chas. Zieger, Congress Junction, contains an extension of the Octave ore zone, and is being opened by tunnels driven from Weaver creek, on the east side of Rich hill. The ore here contains free gold and gold in tellurium. Zieger contemplates equipping a 10-stamp mill and installing an air compressor on the property this year. He has equipment for the mill.

Casa Grande.

Great Eastern mine, near the old Vekol, south of Casa Grande, and owned by Arthur Elliott, is under option to the Union Leasing Co., Cripple Creek, Colo. J. H. Husted, Denver, manager for this company, has placed C. G. Jackson in charge of a small force on development work. The ores run well in zinc, lead and silver, and some shipments have been made. It is reported that a concentrating mill will be built.

Signal.

Arizona Centennial Mining Co., controlled by C. F. Stene and associates, is developing a silver-lead prospect 3 miles below McCracken hill. This is claimed to be a large body of low-grade ore. The camp is 30 miles southeast of Yucca.

The Stene Mines Co., in which R. M. Stene and David Cole are interested, has a group of claims on Bill Williams river, which they will develop as a copper prospect.

Stoddard.

Stoddard Mines Co., having a developed property at Stoddard, on Agua Fria river, 5 miles east of Mayer, estimates that it has 200,000 tons of ore that will run 4% copper, comprising sulphides, carbonates and oxides. Wm. H. Reynolds is president of the company and Celora M. Stoddard is vice-president and general manager. The Stoddard Milling Co. was incorporated some time ago to build and operate a mill, the officers being W. H. Reynolds, president; Louis Goldman, vice-president; C. M. Stoddard, treasurer and manager. The Stoddard Mines Co. owns 51% of the stock of the milling company, and the Copper Queen Gold Mining Co., 49%. The milling plant is being constructed after designs by H. Kenyon Burch, the construction work being under direction of C. B. Clynne, construction engineer. The mine is equipped with a double-drum electric hoist, a 10-drill air compressor and pumps. The mill is being equipped for oil flotation, and will have a capacity of 125 tons per day.

Oatman.

On the new 350-level of the Carter crosscutting operations from the station encountered the vein at a distance of 19 ft. The vein at this point had narrowed down to about 3½ ft. and drifting operations are now in progress. The drift is in about 25 ft. now, and the vein rapidly widened until the entire face of the drift is now in ore with only one wall in sight. The average values are said to be above \$30. The drift is being run to tap the downward extension of a shoot opened on the 250-level. Commercial ore was not expected until the drift had been run some 60 ft. further than its present face, and the ore now being developed seems to indicate that the shoot has materially lengthened.

The crosscut on the 500-level of the Ivanhoe is now out 285 ft. in a lime-shale formation. This formation has radically changed, and it is reported, although not verified, that the big rhyolite dike along which lies the main vein of the property, has been encountered. More water has likewise been developed. The vein is expected when the rhyolite dike is penetrated, and it is not believed by the operators that this dike should be more than 50 ft. in thickness. As these rhyolite dikes in some parts of the district have been found to contain ore-bearing veins, news of an important discovery is looked for at any time.

In the Fessenden property crosscutting operations are under way to the north and to the south on the 500-level. Both cuts are now out about 95 ft., with the mineralization in

the northerly crosscut rapidly increasing. Both of these faces are now getting into territory where the vein may be expected at any time, and on account of the nature of this ground and the splendid showing at surface, its development is being watched with a great deal of interest.

The United Western is drifting to the north of a 6-ft. spur vein of brecciated quartz which shows low gold values. It is believed, however, that considerable territory remains to be traversed before the main vein will be encountered.

It is understood that the Arizona-Tom Reed has been refinanced and is now in good condition. Development work on the 400-level from the Pioneer shaft continues, and the main junction point of several of the big veins which traverse the property is expected to be reached within the next month or so. Work of sinking the new main shaft continues, the bore now being down about 50 ft.

The new electric transformers for the electrically driven plant of the Big Jim Co. have been received and the plant is now in operation. Long delay in receiving these transformers held back development more than 30 days during the last 3 months. Compressed air for pumping had to be secured from the Tom Reed Co. adjoining, and this proved very unsatisfactory, and was not to be depended upon. Now that the Big Jim has its own plant running, its operations will be facilitated by at least 100%. Drifting operations on the 400-level continue to reveal ore ranging in average value from \$30 and \$500. The drift to the west is the one in which high values are found, while the drift to the east shows steady average values of between \$30 and \$40. On the new 485-level drifting operations are showing values of about \$30, which are steadily increasing as distance is gained.

The Iowa Gold Mining Co. has completed retimbering of its old shaft down to the 350-point, and with the new 35-hp. hoist and an Ingersoll-Rand compressor driven by a 50-hp. engine, has started deepening the shaft with the 500-point as its objective.

New machinery and equipment continues to arrive in the camp, and several new companies started operations during the week with good machinery equipment. It is estimated that more than 2000 miners are now employed in developing properties in the district, and that an average of about \$30,000 per day is being expended in labor, machinery and supplies.

CALIFORNIA.

Campo Seco.

Farmers owning 20,000 acres of land in Amador and Calaveras counties have filed suits in the U. S. District Court at San Francisco against the Fern Mining Co. alleging damage to crops by smelter fumes. Damages to the amount of \$300,000 are asked. The company operates the Campo Seco copper mines and Valley Springs smelter. In its answer to the suits the company asserts the unfavorable agricultural conditions are due to poor farming.

Island Mountain.

The Island Copper Co. is developing a large deposit of rather low-grade ore at this place and shipping 2 carloads per week to custom smelters. The mine was worked several years ago, but low copper prices prevented extensive operations. It is believed high-grade ore exists in the property and considerable new explorative work is being done.

El Dorado.

The Orum quartz mine, adjoining the noted Church-Union property, has been acquired by W. W. Hurt and Los Angeles capitalists. Sinking of the 290-ft. shaft to a depth of 500 ft. has commenced and a new mill will be erected in the near future. Good ore is showing in the old workings.

Nashville.

An ore body 20 ft. wide has been exposed on the 800 level of the Montezuma mine. About 7 ft. is stated to average \$10, and the balance carries milling values. On the 500 level a large ledge of \$5 ore has been opened. Sinking of the shaft to the 1000-ft. point is proceeding, and from this level extensive lateral work will be done to open the ore bodies exposed in the upper workings. The Montezuma is owned

by J. C. Heald of Nashville, and is being worked under bond and option by the California Exploration Co.

Atolia.

Following suspension of work at its Parr mine the Atolia Mining Co. has also closed down its East Union property. This has thrown 100 men out of work. The management states the drop in tungsten prices and poor ore showings in lower workings, brought about suspension of work. Local producers are planning to form an organization for regulation of production of tungsten, believing the present situation does not justify a heavy output of the metal.

Yreka.

The outlook for resumption of mining at the Blue Ledge copper property has been improved by the action of cities and towns in California and Oregon in co-operating for the building of a railroad into the district. The citizens of Medford, Ore., have ratified a proposition to bond the city for \$300,000 to aid in constructing a railroad into the Blue Ledge field, and Yreka, Eureka, and other California cities are also preparing to aid the work. The projected line will ultimately terminate at Eureka, a port on the Pacific ocean, and will open up a richly mineralized territory. Vast quantities of copper-bearing ore have been developed, also ores carrying gold. The Blue Ledge mine is largely owned by New York capitalists.

Forbestown.

The Zenith Chrome Co. has uncovered a new deposit of chrome ore and is sending large quantities to Oroville for shipment to eastern plants. Much of the ore is stated to be of excellent quality. From the main ore body shipments have been going out for several weeks; 50 tons are now being sent out daily. The company has also purchased a chrome mine near Swayze.

Heroult.

The Noble Electric Steel Co. is running two furnaces on manganese ore and shipping large quantities of ferromanganese. From the Woolley mine near Clipper Mills high-grade manganese is being shipped regularly to the Heroult plant. The mine is stated to be developing excellently, enabling the company to draw much of its crude ore from this point.

Plymouth.

A 4 ft. vein of good ore has been encountered in the new shaft of the Amador Star mine, according to news from the property. The discovery was made at a vertical depth of 27 ft. and about 200 ft. south of the tunnel. Sinking is proceeding steadily. Baylies C. Clark is manager.

Sutter Creek.

Following a thorough examination of the property by C. E. Julian, the owners of the Central Eureka mine are arranging to send the shaft deeper and to explore the main workings in hopes of intersecting two large veins demonstrated in nearby properties. An assessment of 5 cts. per share has been levied to finance the work. The mine is well equipped and lies between the Old Eureka and South Eureka properties.

Angels Camp.

A rich strike has been made in the Crossett property, 4 miles west of Angels Camp. The vein was uncovered at a depth of 30 ft. and assays \$17. Accompanying the milling ore are streaks of bonanza quartz. Drifting is proceeding to determine the extent of the strike under the management of Dan Mackey. Denver people have been interested and will purchase it if the present work continues satisfactory.

Forest.

Work has been resumed at the Pilgrim mine, owned by John R. Disposos and associates of New York. The mine was worked through a tunnel several years ago and a 125-stamp mill operated, but was subsequently closed down following loss of the rich shoot. James P. Clark, Jr., is superintendent.

Placerville.

The Oro Electric Co. is preparing to build dam No. 3 on the Mokelumne river, 2 miles northeast of Camanche.

Two boats are now in commission and earning good profits. The gravel deposits extend along the river and into adjoining lowlands, forming an excellent dredging proposition. The dredges are of medium size and are operated by electricity.

The Fink gravel mine at Pleasant Valley has been acquired by the Park Mining Co. of Salem, Ore. Unwatering of the shaft is proceeding, and extensive developments are to be prosecuted. The mine was a famous producer years ago. G. W. Davis is manager.

La Porte.

The Plumas-Grass Valley Mines Co. is developing the Quigley placer group of 100 acres at this point. The state has granted permission to the company to issue 100,000 shares of stock.

COLORADO.

Cripple Creek.

The C. O. D. Mining & Development Co. has commenced deep mining operations on company account in the C. O. D. mine, Poverty gulch. Supt. E. J. Williams has a force sinking a winze on the main C. O. D. vein from the 10th level. It has attained a depth of about 15 to 20 ft., and a good grade of milling ore is being saved. The Lacey-Bohana lease is working on the 900 level northwest of the main shaft. They started a raise on what appeared to be either a new vein or a feeder of the El Paso vein, entering the C. O. D. territory at no great distance northwest of the raise. The raise has proven the theory and the shoot now under development is found at the junction of the El Paso and a vein hitherto unknown. The body is 4 ft. wide. In cutting hitches prior to putting in an ore shoot, quartz showing sylvanite was found, in what had been considered the two walls, and until further work is prosecuted its full dimensions must remain undetermined. Grab samples of the ore are returning values of from \$12 to as high as \$73 a ton, while quartz showing a liberal sprinkling in the faces of sylvanite, would return more than double the higher value quoted. With the shoot constructed, ore will be hoisted from the lease and a shipment of high-grade ore will be ready for consignment to either mill or smelter by the first part of July.

The Yellow Bird Co. has purchased the Volcano group of claims, which adjoin their properties on the west side of Gold Hill mountains. This makes the entire area now held there by this company 40 acres. The Volcano main shaft has been sunk 250 ft. and the vein exposed in the two levels by the limited amount of development has varied from 18 ins. to 3 ft. wide. The vein has sampled uniformly pay values. The Volcano mine commenced production in 1900, and the initial shipment was settled for on a 2-oz. basis. The clean-up shipment made by the lessees recently was of milling ore of 1-oz. grade. No machinery is now installed and the Yellow Bird Co. proposes to commence work on improvements. An air line will be extended to the Volcano shaft from the Red Bird shaft, track will be laid in the levels, and a shaft house constructed. A hoist will also be installed later. The hoist at the Red Bird, or main shaft of the Yellow Bird, is at present operated by compressed air, but with the requirements of the new and larger drills, the 50-hp hoist at the Red Bird shaft will be connected up and the hoist operated by steam. The 6-drill electrical compressor will furnish air for the machine drills. The 400 level of the Red Bird has been cleared and rails laid preparatory to crosscutting in a north-south direction to the new Yukel vein, encountered early in the development from the 300 level of the Red Bird shaft.

The Gold Camp Syndicate, headed by William Y. Seaman of Denver, has been formed to operate the holdings of the former Des Moines Mining Co., the Humboldt Gold & Silver Mining Co., and the former Amer. Gold Mining Co., a total of 173 acres. The deepest shaft on the Grouse claim is 500 ft. and while rich, but reported running as high as \$17,000 a ton, was found on the property its source was not discovered. A few grades of milling ore has been mined. The Mud Hen and Bob Tail lodes have been but little developed by shaft and tunnel. No ore in paying quantities has

been mined. The vein exposed in the Mud Hen at 100 ft. was reported to show values and assays from "pockets" in the Bob Tail shaft 162 ft. deep, which ran up to \$500. Light production was claimed for the Emma-Aimee from shallow workings in the "camp days," but the mine has lain idle for a long time.

Boulder.

At the Cougar mine of the Primos Chemical Co. operations are being prosecuted on the 200 level. From an underhand stope a heavy production is resulting. Stopping is also in progress from the workings overhead and a good grade is being extracted. The ore is cobbled and milled into one class. Average settlement sheets show 18% tungstic acid contents. The streak varies from 2 to 4 ins. wide and about 6 tons of ore is being shipped per month. The Ralph Sutherland lease has been shipping from this mine for several weeks and is averaging net earnings of about \$4000 per month.

A drop of \$10 per unit in the price of tungsten ores since the week ended May 10 has made a rather dull market. Sellers are asking \$60 to \$65 per unit, while they are offered \$50 to \$55 per unit of 1%, or 20 lbs., on a 60% content basis. Part of the decline in prices offered is said to be due to the rapidly growing production. Many new plants are going up in the county and these, it is estimated, will bring the production to 380 tons. With this increase buyers feel justified in lower prices.

IDAHO.

Wallace.

Control of the Nipsic Mining Co., which owns the Nipsic mine, is reported to have been acquired by the Pohlman Investment Co. of Spokane, and it is rumored further that the purchasers are acting for the Consolidated Interstate-Callahan Mining Co. The Nipsic is capitalized for 1,500,000 shares, and it is said that practically all the issued stock has been acquired by the Pohlman interests. Recently the old directors of the Nipsic resigned and their places on the board have been taken by Edward Pohlman and J. V. Pohlman and their associates. The Nipsic holdings comprise 6 claims, the Nipsic, Father, Brittle Silver, Spokane, Kearsarge and Lackawanna Fraction, lying east of the Interstate-Callahan holdings and north of the Silver State group. Acquisition of these properties would enable the Interstate-Callahan to explore its holdings at considerably greater depth by tunneling from Beaver creek, and would afford exceptional transportation facilities when the proposed railway up Beaver creek is completed and operating. In former years the Nipsic was operated by the Father Lode Mining Co., which is said to have failed to develop anything of great value. Some ore of irregular occurrence was found, but the real value of the ground, if acquired by the Interstate-Callahan, probably would lie in the opportunity afforded for deep workings.

Kellogg.

Construction of the O. W. R. & N. railway spurs and storage yards for the new Bunker Hill & Sullivan \$1,000,000 smelter at Kellogg were begun this week, and the contract already has been let, according to Jules Le Barthe, of the engineering firm of Bradley, Bruff & Le Barthe, San Francisco, which has been commissioned to prepare plans for the plant and supervise its erection and equipment. "While the plans for the railway construction have been prepared by the O. W. R. & N. engineers and the contract let by them, the expense will be borne by the Bunker Hill & Sullivan Co.," said Mr. Le Barthe. "In addition to the system connecting the smelter with the railway, there will be an independent line, constructed and equipped by the mining company, connecting the mine and mills and the smelter. We expect to have the complete plant in operation about March or April, 1917. We have planned it to have a capacity somewhat in excess of the present rate of production of the mine and large enough, we think, for the next 3 or 4 years. There will be three furnaces, but we expect to keep only two of them continuously in operation. This should enable us to treat between 400 and 500 tons daily of Bunker Hill ore and concentrates, besides some custom ore. Mr. Easton will have full charge

of the operation of the smelter as well as the mine. His plans cannot be definitely settled until the plant has been thoroughly tried out, but in a general way it may be said that it is the intention to send some of the ore direct to the smelter from the mine and to concentrate most of it first, though not to a high-grade product as at present, the main object of the present close concentration being to save as much as possible on freight rates. When the smelter gets into operation it will employ between 200 and 250 men. It will utilize about 800-hp. of electric current. It will handle a good deal of ore besides that from the company's mines, and we expect it to treat also considerable ore which the company has not hitherto found it convenient or profitable to mill or market. Walter K. Mallett, until recently with the Anaconda Copper Co., will be superintendent of construction of the smelter."

Boise.

The United Gold Mines Co., capitalized for 2,500,000 \$1 shares, has been organized in New York by Jay Czizek, who maintains headquarters in Boise. The corporation plans to confine its attention principally to acquiring and operating properties in central Idaho. The old Reibold mine in the Warrens district is the first that the new company will work. In the past this property has paid well, but the workings were not deep. A tunnel will be driven to cut the vein at considerable depth. While but a few of the properties in that district have been mined deep, in each of them paying ore has been found.

The directors of the West Coast Mines Co., which owns the Pearl mine, near Boise, at a special meeting in Spokane recently elected C. E. Stables of Lansing, Mich., to fill a vacancy on the board, and he was chosen secretary-treasurer. The Pearl mine is a gold-silver property, and plans for extensive development are being outlined. William L. Haag of Lansing is president, H. J. Hibschman, Spokane, is vice-president, and they, with Stables, H. C. Wyman, Boise, and George H. Wyman, Jr., Wallace, compose the directorate.

Wardner.

Development work is being carried on by the Liston Mining Co., the holdings of which are located immediately east of the Bunker Hill and Sullivan mine, on Big creek, near Wardner. The Liston mine is no doubt an eastern extension of the Bunker Hill and Sullivan vein, and the immense outcrop is said to resemble it in every particular. Also underground the conditions resemble those of the early development of the Bunker Hill and Sullivan. The holdings of the Liston comprise more than 500 acres and the development carried on under the supervision of M. Baumgartner is thorough and extensive. In the lower tunnel strong seams of ore are being encountered, convincing local mining men that the Liston will soon encounter its main ore shoot.

LAKE SUPERIOR.

COPPER.

Houghton.

New Arcadian has completed its fourth mill test at the Franklin and has received the returns of 37½ lbs., as compared with 34½ from the third test. These tests are in no way made from selected rock, as the rock embraces all of that containing copper found in the exploratory work now being carried on. The quantity milled was 3191 tons, running as before very heavy in the better grades of the mill product. This property will have a paying mine, both in length and depth, it is thoroughly believed.

South Lake is hoisting from 75 to 100 tons daily and can increase this amount to 250 to 300 tons when the main ore is secured, as there is enough good ground ready for stopping; North lode No. 1 has over 1000 ft. of drifts, No. 3 about 500 and the Butler from 200 to 300 ft. Stopping is being done from all three of these lodes, and the results of the recent milling at the Franklin have not yet been learned, but it is thought that they will be better than that of the rock previously hoisted at this mine.

North Lake has finished the cutting of the plant and is now crosscutting southwest to the North lodes of the South Lake and northeast to the lodes discovered by the diamond

drill about 4 years ago. Two drills are being used on each level of the shaft on one shift. The assessment of \$1 just made and payable June 11 will provide the money necessary for the completion of the work planned, and also the development of the good lode that may be encountered.

Keweenaw is operating 15 drills. It is drifting on the 6th level, both east and west; on the 7th, east; on the 8th, east and west; on the 10th, west. When the plant is out on the 14th, which will be in a few days, the western drift will be started. This number is the limit of the compressor facilities at present. The 7th drift, which ran into good ground as soon as it passed through the old trestle (pressure is about 100 ft. beyond it, and has been, except for a few feet, in the high grades all the way. The timber for the trestle from the shaft to the Crest View park station has just arrived, and as there have been other delays, work will be about as soon as the mill test can be begun.

All mines are hoisting just about the same daily tonnage as for some time past—about 2000 tons—and will not raise this figure. This mine has on its payroll the largest number of trammers in its history, due to a system of mining that is more convenient and that requires less shoveling. The falling off in the average of the daily tonnage is not so great as expected, and, in fact, the Calumet & Hecla, and Franklin have been able to make something of an increase, while the Calumet & Hecla's subsidiaries, and some of the other mines, too, have maintained their record of the past 6 months. Only a few have shown a decrease. The outlying mines that are opening new shafts or striving to increase their tonnage are finding some delay in getting men.

Schlesinger interests, controlling the Newport mine at Ironwood, have been doing some exploration by trenching, north of Bessemer, on the southwestern edge of the copper-bearing series, and although they found some copper they have not yet encountered commercial values. A little copper has always been found in that region in spots, but nothing of merchantable grades, though it is possible profitable deposits may be disclosed at almost any time.

Mohawk and Wolverine have lost 4 days in forwarding their rock to their mills at Gay, beginning with Friday morning, but resumed shipping Wednesday morning. This loss of tonnage is due to a most severe storm which occurred Wednesday night, and at intervals Thursday, causing wash-outs.

The Copper Range has given a contract to Kishleigh Bros. of Houghton for the building of 25 new miners' houses, and the Alameda has contracted with Edward Useth of Calumet for the same number. It is probable that other companies will take advantage of the times and follow suit. These houses are all of a superior character and will, of course, be great inducements for families to settle and remain with the companies.

Indiana has in its diamond drill work at the 1400, the bottom level of its shaft, come upon a large bed of felsite, and is driving a crosscut along the contact between the felsite and the trap, as being the most likely place for such a deposit as was found about 5 years ago by the diamond drill holes Nos. 2 and 9.

Calumet & Hecla will build a new office building at an estimated cost of \$35,000 for the mills at Lake Linden, to be located close to the county road, north of the trestle and west of the Calumet mill. With the great growth of the mill plant, the crowded main office and the scattered subordinate offices, a new office, concentrating all the business of the mills, had become a necessity.

The leaching plant is really making the last step of concentration. The object of the plant is, of course, to extract as much of the copper possible from the sand after the slimes have passed through the regrading plant. The ore slimes are put into leachpans or small chutes provided with a series of pockets for their flow into the settling or dewatering tanks. After the sand is settled, it then goes to 8 Dorr classifiers to be separated from the slimes, from which it flows along into a distributor at the top of the leaching tank—the distributor acting on the same principle as a revolving sprinkler. When the sand is drained the hot water on, and the ammonia or solution used, descends from a constant level tank and flowing into the leaching tank at low places and does its work.

After the chemical action is complete the solution passes through the outlet at the bottom and is pumped through pipes in the old steam tunnel to concentrating tanks in the still house, where the copper is separated and the remainder of the solution returned to the leaching plant to be used again. The sand is washed out of the tank through six holes on the side and one in the bottom, and the tank is ready for a repetition of the process. The old boiler house has been used as the still house, and there is sufficient room for more tanks and stills to meet any further demand. Pumping is the greatest item of expense, but this will be very low when divided by the tonnage treated, or the pounds produced. The eight leaching tanks of a capacity of 1000 tons each will give a daily capacity of 2000 tons. The plant will be ready for operation about July 1.

Contact passed through 124 ft. of overburden, mostly sand, in drilling its fourth hole, and is now down about 330 ft. Nothing worthy of note has yet been encountered. The formations are occurring in the regular order and but little disturbance is noticed. The purpose of the drilling is to find Wyandot lode No. 8 mineralized if possible, as in the four holes already bored the lode has been found to be as good as any of those yielding copper in the district and commercial copper may appear at any moment. The same lode carries a very promising showing on the Wyandot.

Michigan is getting good copper both to the east and west of the shaft from drifts. These drifts are above the lode, and on the east side, simultaneously with the cutting out of the stringers, a crosscut was started to the Butler lode May 27. The quality of the copper on the stringers is the same heavy character as that met in the descent of the shaft, being for the most part mass and barrel work, with some coarse shot copper. Supt. Brady and Engineer W. W. Stockly both feel that the outlook is very promising.

Onondaga has on hand very nearly \$42,000 in cash, with all obligations paid up to date, so that any fears of an assessment being called for a long time to come on the present low rate of expenditure will readily be seen to be groundless. The ninth hole has been drilled and the drill moved for another hole, but is understood that no results of importance have yet been obtained. As the proper Nonesuch formations for the deposit of copper are being met with in all the holes so far, there is really no reason why the metal should not be encountered at any time. President R. C. Pryor has returned from Detroit to give the drilling his personal attention.

IRON.

Iron River.

Dead work at the Spies mine, operated by the Cleveland Cliffs Co., has been nearly completed. They have stopped sinking the shaft and are now crosscutting to the ore body relative to opening the ground and stopes for production. It is the present intention of the company to push these operations so that production will begin before the end of this season.

Ironwood.

The Oliver Iron Co. has used 7 and 8-ton skips for some time on this range. Now the Newport Co. intends to use two 10-ton skips in the Woodbury shaft. A single skip of this type was inaugurated a few years ago at Houghton by the Franklin Jr. Co., the skip being balanced by the compression of air, which was stored and used in conjunction with steam for hoisting. This made it possible to save about one-third of the energy, even up by the lowering of the skip, it being previously wasted. The skips to be sure make a big initial load, but are not impossible to handle. New auxiliary pockets for rapid loading are now being constructed at the Woodbury. They will not use the method of air compression for balancing.

Ishpeming.

Operations at the Iron Mountain Lake property are being held back because of considerable care being taken not to contaminate the water supply of this city, in handling the water from the location. The property is owned by the Jones & Laughlin interests and plans for the water disposal have been passed by the city officials, but further investigation is desired by the company. Mr. Kruse, Michigan mine manager for the company, gave his plan as directing the water to

Escanaba river, which is in the opposite direction from Iron Mountain lake. Plans for surface structures and arrangements have been completed and work of this nature will soon be commenced.

MISSOURI-KANSAS.

Joplin, Mo.

The C. M. & H. Co., holding a lease on the Glendale mine on the Continental ground west of Joplin, has started to open up the sheet ground or disseminated ores found below the 240 level. The ore, while not so good as the pockety runs at higher levels, is considered good enough to warrant development. The ore is found down to a depth of 200 ft. and the shaft will be put down immediately.

The Handford Mining Co., west of Joplin, on a lease of the Mayes Bros. tract, has taken another 30 acres. The company has put in a number of new improvements, and will hereafter be able to increase its capacity very materially. A new shaft has been sunk, mill haulage installed and increased capacity provided at the mill.

Southwest of Joplin, on the Fullhobber land, Watson and Miller have opened up what is believed to be an excellent prospect. In sinking the shaft a 12-ft. face of very good ore has been exposed and two drill holes sunk nearby show a 17-ft. face of ore. The ore is shallow, occurring at 40 ft.

The revival of operations on the 40 acres known as the Alladdin lease of the St. Paul Mining Co. promises to place the tract again in the producing ranks after a long period of inactivity. The Campbell Mining Co. started work in a shaft and at a depth of 115 ft. has opened up some very good ore. The ore is cleaned on hand jigs and the sales run from 30,000 to 60,000 lbs. per week. On the same land Bash, Moore, Kane & Co. rebuilt the old Alladdin mill, and have now made ready for immediate reopening of the ground. The ground being prospected is at the 115 level.

The installation of oil engines at the plant of the Flannery Zinc Co. at Sarcoux is proceeding. The three engines represent 425-hp. These power units will take the place of steam, and will be much more economical, as well as preventing a repetition of the delays incidental to coal burning. Many times last year the company was compelled to lose time and money when coal deliveries were delayed.

A small mill has been built at Ash Grove on a lease owned by the Ash Grove Mining Co. The lease has been supplying a small production from hand jigs, but its owners now anticipate a much larger output.

North of Seneca the Pennick Mining Co. is reopening the Pennick land, formerly a producer, with very promising results. The mine is producing about 12 tons per day of good grade of calamine, and all from one hand jig's operation. The ore is found at the 100 and the 120 level.

Near the Pennick the Dirty Deuce Mining Co. is opening up a similar run of ore, but with more success. Five hand jigs are being worked and the production is increasing. The ore at this place is found at 100 ft. The company holds a 10-acre lease on the Geo. Williams land. Dr. B. M. Henry and E. Larkins of Neck City are the owners.

Near Carthage, the Coahuila Mining Co. has made two drill strikes of importance on a lease of the Amsden land. The ore was discovered at 130 ft. and continued in it to 190, at which point the drill was stopped. On the Whitset land adjoining, another drill strike showed ore at 65 ft. which continued down to 101 ft.

Galena, Kas.

The Bailey-Poole Mining Co., which operated a mine on the Southside ground all of last year, has made one of the best records ever known from a mine equipped only with a steam hoist. The ore was mined and then milled over a custom plant. By this system of mining and milling the company paid in net profits \$45,000 to its three owners. The ore was mined from a depth of 190 ft. and milled over a custom plant, showing a recovery of 10½% zinc.

Stout, Hillhouse & Montgomery are opening up a new prospect on the ground of the New York Zinc Co., west of

Galena, which is showing ore running 10% zinc. The ore was discovered at a depth of 75 ft. The ground will be opened up as rapidly as possible, and a milling plant will be erected. During the preliminary development work the ore will be milled in a custom plant.

Developments by James McMichael, Charles Trombold and John Murphy on a lease of the Murphy land, just west of the Frisco railroad depot at Galena, seems to indicate a larger deposit of ore than was at first anticipated. The work is being done in an open cave, and dirt running from 3 to 7% is worked at the present time. A new shaft is being put down to a depth of 92 ft. and a 20-ft. stope will probably be taken up.

A revival of mining operations on the old Cull Baker tract, just west of the Black Hills lease, has been inaugurated. A group of Iowa men have taken the lease and will prospect and develop the land at once. A drilling campaign will be started to check up the records already obtained in an effort to demonstrate the further extent of the ore deposit. The drilling done has been very promising; in fact, so much so that the company has already started a new shaft while the other work is being done.

MONTANA.

Butte.

Unless there is delay in receiving the electrical machinery for Anaconda's new zinc refinery at Great Falls it will be ready for operation early in September, as planned some months ago. The building is practically complete now and in readiness for the installation of the electrolytic tanks and all the apparatus that is to go with these. The zinc concentrator at Anaconda is making splendid headway. Nearly all the machinery is on the ground for that. The Anaconda has its zinc mines ready to furnish 2000 tons of ores on a few days' notice. This is the amount that it is expected can be handled as soon as the new plants start up. From this amount it is estimated that from 700 to 800 tons of concentrates a day will be made ready for shipment from the concentrator at the Washoe plant to the refinery at Great Falls. At the Douglass (Idaho) the mine is in fine shape and with large amounts of ore blocked out and ready for mining. The roads, however, are in bad shape yet, but will be ready for transporting the ore in ample time. It is about 12 miles from the mine to the railroad spur at Pine Creek, where shipment of the Douglass ores will be made. At the Emma (Butte) the new engine is being installed rapidly and as soon as that is in, the sinking of the shaft from the 800 level will start. The crosscut from the Gagnon is proceeding steadily and there is about 600 ft. further to go before this crosscut will reach the point below the present bottom of the Emma shaft. There will be a further crosscut of 600 ft. from that point to reach the vein on the 1600 level as it slopes away toward the south. No mining has yet been done at the Alice. The shaft is in fine shape down to the 600 and the unwatering of it and timbering to the bottom of the shaft is going on steadily. At the Lexington ore is being taken out from the upper levels and as soon as the Washoe plant is ready, zinc ores will be shipped from there.

The sinking of the Butte & London shaft to the 1600 level has been completed. Crosscutting in both directions to run through the entire length of the property will follow. "We expect to have the crosscutting finished within 5 months," said W. W. McDowell. "When Mr. Cole was in Butte he made an examination of the work done and expressed himself as particularly well pleased with the change in the character of the rock through which the shaft ran in reaching the 1600 level." The 600-gal. electric pump that is to be installed on the 1600 level is on the ground and will be put into position as soon as possible. The shaft has been timbered all the way down to the lowest point where the sinking has been carried.

To arrange for the transporting of ore from the Boston-Montana mines in the Elk Horn and French gulch districts to the Anaconda smelter by means of auto trucks, three transportation engineers—Willard L. Morrison and J. Lawrence

of Melrose, Mass., and Chester W. Griffen of Greenwood, Mass.—arrived in Butte last week. When interviewed at the Butte hotel they said they would not determine whether the ore will be carried in auto trucks from the mine to the smelter, not only from the mines to the line of the Butte, Anaconda & French railroad, about 14 miles distant, until they had examined the topography of the country, the condition of the roads and similar elements. Two motor trucks, one a White and the other a Peerless, each with four trailers, have been shipped from Cleveland and should arrive in Butte next week. Each train will be capable of transporting 25 tons. Lawrence, Griffen and Morrison are employed by the Boston owners of the property.

It is reported that the showing at the North Moccasin mine of the Barnes-King Development Co. will be better for May than it was in April. During the first 2 weeks both the grade of the ore and the amount taken out made better returns. In April the amount of ore mined was comparatively small, while the bullion received showed that the ore was much leaner. There were fears expressed that the mine might be working out. However, the May showing will give some reassurances on that point. The checks for the second dividend of the company amounting to 7½ cts. per share, or a total of \$30,000, have been mailed. Reports from the Shannon mine indicate that good progress is being made to install the Riblet aerial tram which is to connect the mine with the Piegan-Gloster mill, and that in spite of the bad weather the work will be completed in July as planned.

Hugh I. Wilson and associates, who are developing a property in the Scratch Gravel district, report that the work has been started to sink the shaft 200 ft. deeper—to the 500. The Jackhamer drills just installed are giving excellent service, and with present force will be able to increase the amount of shipments and to make shipments steadily. Robertson, a mining engineer from Chicago, who made a thorough examination of the property during the past week, returned a few days ago and expressed himself as well satisfied with the outlook. His inspection was made on behalf of the Logan-Bryan interests of Chicago. After a trip to the Scratch Gravel, Wilson left for Alamogordo to inspect the Fleming and Steinbrenner property there in which he is also interested. At last accounts the property was making a good showing, and he was anxious to see for himself just how the work was progressing.

Thompson Falls.

The first shipment of antimony ore from the claims on Antimony hill on Prospect creek has been hauled here, and it is expected that regular shipments will be made from now on. E. S. Souglard, who, with George Burston of Thompson, J. M. Dixon of Missoula and W. E. Lundenborn of Great Falls own 12 claims in the district, has been busily engaged in building roads. The antimony deposits occur in blanket form on both the quartz and granite, and are as much as 4 ft. in thickness. The surface soil is being taken off with plows and scrapers, exposing the veins beneath.

Sheridan.

There is considerable activity in mining in the district. Mining men who are operating here believe there is a big future in the district. Roehl Bros., who formerly mined in the Neihart district, are developing a property. They have already done considerable work, and erected a 10-stamp mill. The higher grade ore will be shipped and the low-grade will be treated in the mill. Jake Steiner and Frank Sessler have secured a lease and bond on the Big Chief, a big low grade proposition. They have run a drift from the bottom of the 200 ft. incline shaft, and from the hanging wall toward the foot wall, a distance of 30 ft., it is all in ore. There is another vein in the mine which will run \$1 to \$5 in gold and 17 cts. in silver. In years gone by, in this same mine, silver ore has been taken out which has netted \$200,000 in silver, the ore being shipped to England. It is located 3 miles from Sheridan.

Helena.

The Spokane Mining Men's Club visited Helena this week. Large mining interests are represented by Spokane capitalists. It is not generally appreciated how large Spokane's interests in western Montana mines are. Aside from the Cruse mine, it was Spokane money which opened the first producer in the Scratch Gravel district, and brought that sec-

tion into public notice and favor. It was James Breen of Spokane who, by his persistent work in the Porphyry Dyke mine, made the Rimini district a center of important mining and development enterprises of late. Keffner and Johns are operating the only working mine in the Huddleston district, at the head of the Blackfoot, 50 miles from Helena, and they are building a mill on the Mike Horse which will put that property on a big producing basis this year. The old camp of Kendall owed its fame entirely to Spokane operators. Spokane companies are doing nearly all the mining that is in progress along the St. Regis, Clark's Fork and Kootenai rivers in the western part of Montana, and notably in the Troy district, where the new Snowstorm Co. is spending \$500,000 to put the Banner and Bangle and its neighbors on a large and permanent producing basis.

NEVADA.

Tonopah.

The Tonopah Mining Co. has started a drift on the eastern extremity of the Murray vein, recently encountered in the Sand Grass claim in the winze below the 1200 level. The crosscut shows a width of 8 ft. of good ore and the vein is 6 ft. wide at the narrowest point. The ore extracted in course of development has been of good grade. Drifting is also proceeding from this point to connect with the Tonopah Extension workings. From the Red Plume workings a raise is being driven to reach a vein exposed in the MacNamara; 77 stamps are dropping on ore averaging \$17.

The After All Mines Co. is being formed to operate a group consisting of the property of the Umatilla-Tonopah Mining Co. and the Little Tonopah, Little Tonopah No. 1, and a portion of the After All claims of the Montana-Tonopah Co. Stock of the new corporation will be held jointly by the Umatilla and Montana companies. Arrangements have been made whereby the property will be developed from the 1540-ft. workings of the Victor shaft of the Tonopah Extension Co.

Good ore continues to come from the 1200 and 1300 workings of the Halifax, and 150 tons are milled weekly at the West End mill. Crosscuts and raises are being driven on the ore body from the 1300 level. The temperature on the 1700 level has been materially lowered and conditions are rapidly being shaped for resumption of explorations from this point. J. W. Sherwin has been chosen superintendent to succeed the late J. W. Chandler.

Goldfield.

Equipment for the first 500-ton unit of the Goldfield Con. 1000-ton flotation plant is beginning to arrive. The management expects to have the entire plant in commission early in July, and practically all the ore produced will then be treated by flotation. Extensive developments are proceeding in the lower workings of the different mines with excellent results. Large quantities of copper are showing with deeper work. It is reported the company has taken options on two outside properties, and that several promising mines have been offered the company.

Sinking the Silver Pick shaft to the shale-latite contact has begun. The shaft is 700 ft. deep and will be sent 300 ft. deeper. Considerable importance attaches to this work, as the No. 1 drill recently cut what appears to be a new ore channel between the consolidated ore bodies. Exploration of the Phelan vein with the Calyx drill will be started soon.

At a meeting, by which time there will be afforded an opportunity to give an idea of the extraction and earnings from the placer workings of the Round Mountain Mining Co., the directors will meet, consider the matter of dividends and issue a statement covering general conditions, the yardage handled to date, and the price per yard. President I. D. Gordon, connected with the other officers at the annual meeting at Goldfield, states that bed rock cleaning has commenced, but that no definite conclusions from this source can yet be obtained. In a few months the officers and engineers of the company have devoted all their time to perfecting the augmented water supply, which includes the system purchased from the Round Mountain Water & Power Co. The Lett Creek and Jefferson Shoshone lines are both operating under a full head, with 3 shifts at work in the placer ground. So

far as can be estimated, the extraction has been satisfactory and the water supply gives every promise of holding out for an unusually long season. At the annual meeting the directors chosen for the next year were: J. R. Davis, W. H. Weber, L. D. Gordon, H. G. Mayer and W. H. Eardley.

From the north crosscut of the Merger Mines Co. several raises have been driven to the contact of shale and latite, but thus far nothing of importance has been revealed. A larger percentage of sulphide matter is showing, and the management is still hopeful of striking the extension of the Jumbo Extension ore body in the Sunflower claim.

Bonnie Clare.

Ore averaging \$35 is being shipped by the A. J. Cormack and W. T. Hargrove lease on the Butte Goldfield to the International smelter at Tooele, Utah. The ore is a lead carbonate carrying gold, silver and lead, with a small quantity of copper. Several properties in this section are again being operated and installation of flotation equipment at the Bonnie Clare mill is expected to facilitate treatment of low-grade ores hitherto unprofitable.

Pioche.

Ore shipments from the Prince Con. mine have been increased to about 3350 tons per week. At times shipments reach 3850 tons. New territory is yielding ore of excellent grade and much new development work is being prosecuted.

Midas.

The new mill at the Elko Prince is running steadily on gold-bearing ore and making an excellent extraction. Output of bullion is averaging \$93,000 per month. Shipments of high-grade ore are being made from the Missing Link property to the smelter at Murray, Utah. The district is showing the greatest activity since its discovery.

Jarbridge.

Eastern people have bonded the Long Hike mine and are operating with a force of 70 men. The same interests have taken options on 96 claims in this district. The Bluster mine is being examined by engineers said to represent the Goldfield Con. Co.

Rochester.

After having demonstrated the existence of a good ore reserve in both the central and northern portions of Crown Point No. 1 claim, the Rochester Mines Co. seems to be headed on a new tack with extraordinary results. The latest strike on the south extension of the West vein has widened out to 20 ft. of \$21 ore. It is now apparent that the West vein is the main fissure of Rochester hill. This find, which was reported more than 2 weeks ago, occurred in the south side of the old workings of the former Big Four lease occupying Block 1 of the Crown Point claim. Between the 150 and 100 vertical levels, or about 300 ft. on the dip of the West vein, a 6-ft. body of ore was encountered running as high as 150 ozs. silver, with appreciable gold values. Subsequent development to the south, which has progressed for 25 ft., has opened up a veritable bonanza. The vein has gradually widened until it has now reached an extent of 20 ft. with an average of \$21. Coincident with the evident development underground on the south extension of this fissure, it was found that the outcropping passed from the Crown Point into the Weaver ground of the Rochester, and could be traced 900 ft. farther than the known portions of the vein in the Crown Point. In other words, the vein is now known over a distance of 3000 ft. and is continuing strong on both ends. On the far north of the workings along the 150 vertical the miners are going ahead in 5 and 6 ft. of \$25 ore, having proceeded 55 ft. north of the old No. 2 raise of the Four J lease, and being within 50 ft. of the Zero raise, which will be the future outlet for that territory.

Seven Troughs.

"We are opening up a fine ore body between the 1500 and 1600 levels, and I don't think the mine was ever in better condition before," said L. A. Friedman, president and general manager of the Seven Troughs Coalition Mining Co., after a recent trip of inspection. The new development on the 1600 is meeting with most satisfactory results. According to the management the north drift on this level is now breaking 2 1/2 ft. of ore running over \$250. Occasionally higher grade ore is encountered. The north drift on the 1500 is breaking into the same ore body, with occasional high-grade

bunches, but maintaining an average over \$200. The winze from the 1500 is in the same ore shoot, and it is now generally conceded that one of the greatest deposits ever found in this property is about to be defined.

NEW MEXICO.

Fierro.

D. M. Barringer and Frank H. Brock, Philadelphia, officials of the Hanover-Bessemer Co., who own the Fierro iron mines, have recently visited the property. They recommended a large concentrator for the handling of the ores being mined by the Colorado Fuel & Iron Co., operating under lease the Fierro iron mines. Preliminary plans for the concentrator and other improvements are now being worked out preparatory to the beginning of work. The work will be completed this year and general manager B. E. McKechner of the Hanover-Bessemer will reside permanently in Silver City.

Steeplerock.

Ore from the Eclipse mine is being shipped by way of Duncan, Ariz., under the management of George A. Kalar. The shipment is the first to be made from this property in some time, and it is probable that shipments are to be continued. The ore will average \$75 or \$80. It comes from the 100 level, where a drift is being run on the vein at present, the ore being extracted in the process of development work. Kallar reports that conditions are favorable and that he soon intends to install an air compressor.

Three miles from the Eclipse the Carlisle is coming into its own. The last water in the mine has been pumped out of the winze from the 500 to the 600 level. The muck has been cleaned out of the dump and the drift on the 600 is being cleaned up. The new mill is now in operation and it will be but a short time before concentrates will be shipped regularly to the smelter via Duncan, Ariz.

OREGON.

Grants Pass.

Indications are that the Waldo copper mine will soon be an active producer. They have succeeded in unwatering the property and examination of the underground workings is now in progress. Operations in the lower adit level have been progressing for some few months, as it is through this tunnel that they will drain the mine. Small pockets of high-grade have been found in parts of the upper workings.

SOUTH DAKOTA.

Lead.

A recent good strike of tungsten has been made on the Wasp No. 2 property in the Yellow Creek district, but heavy rains have retarded its development. In many of the shallow workings work has to be suspended entirely. They are continuing, however, to take out ore, but have made no shipment since the record car, valued at over \$100,000, some months ago. They have accumulated another shipment, but on account of the unsettled condition of the market, have been in no hurry to make a sale. They will continue taking ore out and holding it for a more favorable market.

Custer.

The Great Western Marble & Granite Co. has been incorporated for \$150,000. Its officers are: President, M. M. Stannard; vice-president, Frank Rothleitner; secretary and treasurer, J. H. Banks. C. E. Smith will have charge of the operations at the quarries. It will operate serpentine and marble quarries near here. The company also owns granite quarries at Nemo, in Lawrence county. A small force of men are now at work cleaning ground for buildings and machinery. It is the purpose of the company to hasten the work of equipping the quarries.

UTAH.

Stockton.

The Stockton Standard Mining Co. has been organized and has 1,000,000 shares of 1 cent par value. There are 200,000 shares in the treasury. Officers are A. P. Davidson, president; David J. Lemmon, vice-president; W. N. Gundry, secretary and treasurer, and, with H. Roy Allen and A. C. Smoot, make up the directorate. The company owns 8 claims, 5 of which are patented. Operations have been commenced and from the bottom of a 200-ft. shaft the company is now running a crosscut to a north-south fissure. It is in 200 ft. and has 120 ft. to go to reach the fissure, provided it maintains its dip. This will secure a vertical depth of 500 ft. In a 70-ft. shaft sunk on the vein further up the hill ore was found all the way down. Samples gave returns of 41% lead and 22 ozs. silver. The bottom shows 5 ft. of gangue, with streaks of ore in it.

Beaver City.

Supt. Graff of the Paloma Co. states that 3½ ft. are being made daily in the incline shaft, which is looking well. A good grade of sand carbonate ore is being drifted on at the 400 level, where a station has been cut. The shaft is being sunk on the contact, from which good shipping ore is being taken as work progresses. A drift is also being started to intersect another parallel fissure, which is being opened on the surface 200 ft. north of the main shaft. Samples taken from this fissure show better than 60% lead, and run well in silver. Work at this place was started 2 weeks ago, and the present showing is gratifying to the management. Some pure galena is being sacked, and the vein, which shows a present width of 5 ft., gives indication of proving richer than the shaft fissure, upon which there has been extensive development.

At the Creole Co.'s property a new ore body was encountered on the 50-ft. level in the drift to the southeast. There is exposed a breast of ore about 8 ft. wide. It is a sulphide with the principal values in copper. There is an excess of iron which makes it an ideal smelting ore. The property has been opened by an incline shaft sunk 220 ft. The shaft follows the deposit along a contact between the limestone, and since the shipments were started from the property by lessees, G. H. Dern and C. C. Griggs, there has been sent out 30 cars. The company is now contemplating to operate on its own account. At present there are 11 miners on the ground and the last smelter settlement was for 5% copper, some gold and silver.

Eureka.

A main working shaft at the Tintic Standard was recently put down 40 ft. Developments on the 1600 induced the management to change the location to 1700 ft. east of the collar of this shaft. Here it is proposed to sink a double-shaft main shaft to make connection with the work from the bottom old shaft, which has been of mine up a high level, one between the 1000 and 1600 levels. It is the expectation to cost \$25,000. This will make a good start on sinking the new shaft to the 1400 level. It will take 200 ft. of drifting to make the connection. E. J. Raddatz, general manager, says: "It would only advantageously get at the big ore body we are in now the mine would readily pay for this work, as we have the ore there. This shaft is absolutely necessary, as the water in the mine on stormy days prohibits the men from entering the shaft at all." To date the Standard has shipped 27 loads of ore from the 1600 level and a station is being set there. The \$25,000 will be obtained in some form of a loan and assessments will only be made as a last resort.

The new plant of the Tintic Mining Co. has proven satisfactory, according to Manager G. H. Dern. It is the intention now to triple the present capacity by August. The plant treats low-grade by roasting and leaching. The mill has 3 Holt-Dern roasters. These are rectangular tanks in the bottom of which are parallel grate bars. The bars are fitted with teeth and each bar works on a concentric so that an opposite motion is given adjacent bars. This saws off the roasted cake. The roasting process moves up in the ore at the rate of 1 ft. per hour. Each roaster is handling 30 tons a day. The plant is handling 100 tons a day. There is leach-

ing capacity for 300 tons. Six new roasters, increasing the capacity to 200 tons daily, will be installed in about 2 months. The Christensen roaster, which was installed when the mill was built, broke down several days ago. This roaster is not so satisfactory as was expected. The management is now checking up costs, which show that the ores being treated, although not of high enough grade to be shipped, are giving excellent returns when treated at the mill. Sulphide from the Swansea dump is being used to get the proper mixture for roasting. Occasional shipments are also being made from the Eureka Hill dump, while the Dragon Con. furnishes most of the ore.

Promontory.

B. D. Siegfus, president of the United Promontory Co., says: "A better grade of copper has been encountered in the crosscut from the main shaft. The company has been operating the 6 claims for 8 years. A main shaft was sunk on a fissure to 125 ft. At the 45-ft. point a crosscut was driven over to the limestone, which forms the foot wall of the fissure, and high-grade copper was encountered. The ore body, however, was a small one, and the company decided to prospect for its downward extension. At 115 ft. in the shaft another crosscut was driven. When out 18 ft. ore began to show in the limestone. The foot wall has not been reached, but the officials are of the opinion that they are on the verge of opening a large body, from the indications in the crosscut. At the present time the ore is in bunches. The fissure on which the main shaft has been sunk is 20 ft. wide.

WASHINGTON.

Spokane.

The United Copper Mining Co., with properties near Chewelah, shipped 11 cars of crude ore and 11 cars of concentrates in April, according to official reports from the management, and smelter returns from 18 cars shipped to the Canadian Con. Co. at Trail, show settlements of \$25,351 above freight and treatment. It is estimated that the four other cars, principally concentrates, will give smelter returns of not less than \$7,000, which will make the total settlements for the month \$32,351. One of the principal stockholders of the company is authority for the statement that there is every reason to believe that dividend payments will be resumed in July, unless unforeseen conditions should develop at the property or the price of metals decline materially from present levels. He states that both development and extraction are progressing satisfactorily at the mine, and that the mill, recently increased to 225 tons daily capacity, is operating at the limit, saving a much higher percentage of the values than anticipated. Power difficulties at the station of the Stevens County Electric Light & Power Co., which provides current for both the mine and mill, have been overcome, and there now is assurance of sufficient energy being provided at all times. The crushing equipment in the mill was changed from rolls to stamps several months ago, and the full complement of 74 stamps are now in operation. A complete flotation system also has been installed, materially increasing recovery, and it is said that the product from the lower levels is increasing in value. The road from the mill to Chewelah, 5 miles, has been put in excellent shape for heavy traffic, and the management hopes to maintain operations at full capacity throughout the year. The company is capitalized for 1,000,000 shares at \$1 each, and control is held in Spokane and Seattle. Dividends to date amount to \$19,000, the last payment of 1 ct. a share having been made Dec. 21, 1912.

Shipments for May by the Norman Mines Co. will reach 22 carloads from the Great Western and Last Chance mines near Northport. These have been forwarded to the Kula Smelter Co., with the exception of 2 cars sent to Ozark Smelting & Mining Co. at Coffeyville, Kas. The company has purchased from Barbanks-Morse Co. of Spokane a 15-hp horizontal gasoline engine and hoist, with all necessary equipment. The present winze will be extended on the Great Western from the 85 level. All preparations have been made by Manager Peter Porter, and it is expected the hoist will be in operation within 10 days. The winze has been sunk on the main ore body and at the bottom shows 4 ft. of carbonate zinc ore, which has been followed from the tunnel

level. Stopping ground will be opened as quickly as possible and drifts run each way at each 100 level. Bad roads have continued to hold production down, but in June it is hoped that the maximum of 1000 tons called for in the Kula contract will be filled. Thirty men are now employed on both properties. One shift is working on an excellent ore body in the old Last Chance workings.

Reports received recently from Orient state that an important strike has been made in the Strawhun property, near Rockett, in the Kettle River district. It is said that Strawhun now is extracting ore that runs as high as \$200 in gold, and that a carload already is on the dump for shipment. A reliable Spokane engineer, who visited the mine last week, is authority for the statement that the ledge is 60 ft. wide, carrying a 6-ft. paystreak, and that the strike is the best ever made in northern Washington.

Oscar H. Hershey, chief geologist for the Bunker Hill & Sullivan Mining Co., is making an exhaustive examination of the Loon Lake properties, 46 miles north of Spokane, and will outline plans for development. Judge Turner states that the high-grade copper showing in the winze being sunk on the ore from the drift east on the 200 level of the Crane shaft has widened to 6 ft. of shipping ore. The force at the mine has been increased and the drift from the shaft is being extended to get under the No. 1 shaft, on the east side of Grouse creek, in the bottom of which it is said there are 5 ft. of high-grade shipping ore. A motor truck is now in operation between the mine and Loon Lake hauling ore to the railroad. A carload of high-grade was shipped recently to the Greenwood smelter and a second car will be forwarded soon.

Plans are under consideration by the Northwestern Mines Development Co., a recently organized Spokane corporation, to convert the old smelter at Keller into an electro-chemical plant for the treatment of ores of the Keller-Nespelem region. The smelter was built 7 years ago, when it was anticipated that the Colville Indian Reservation would be opened and a railway constructed into the district, but the furnaces never have been blown in. The plant, including the electric power station, cost approximately \$250,000, and it is said to be in excellent condition still, watchmen and caretakers having been in charge continuously since it was completed. It is provided with facilities for handling 100 tons of copper ore and 50 tons of lead ore daily. The property was taken over several months ago, which at same time acquired the Manila and Rebecca groups of copper-lead-silver claims nearby. William E. Malm, formerly with the Federal Mining & Smelting Co., is one of the chief stockholders and manager of the company and lives at Keller. William E. Johnson, a mining man of Nevada, is another large stockholder and is superintendent of the smelter.

WISCONSIN-ILLINOIS.

Deliveries of ore for the month of May were reported by districts as here shown:

District.	Zinc. Lbs.	Lead Lbs.	Pyrrites. Lbs.
Bonanza	18,720,000	189,610	88,000
Galena	4,992,000	175,000	.....
Moffitt	4,612,000	145,070	.....
Cuba City	4,158,000	.....	3,044,600
Hazel Green	3,088,000	.....	.....
Lafayette	2,600,000	154,130	.....
Clatsville	1,548,000	.....	.....
Shellsburg	620,000	.....	.....
Montfort	88,000	.....	.....
Trotter	71,000	.....	.....
General Point	66,000	.....	4,294,700
Totals	40,714,000	944,110	7,427,300

Net deliveries of ore to smelters for the month amounted to 11,583 tons. The Mineral Point Zinc Co. delivered 67 cars of high-grade separator product to smelter at DePue, 2449 tons. Heavy buying of all top-grade ore by the Granby Mining & Smelting Co. was a feature of the month's returns, the company being without a local representative. American Zinc Co. resumed buying during the month, and Edgar Zinc Co. and Eagle-Fisher Lead Co. were also included.

Highland.

Officials of the New Jersey Zinc Co. have been active of late inspecting company properties in this district. One new power and milling plant will be constructed; another is now

being remodeled, several tracts of land held in fee are being explored with drills, and it is reported a number of miners will come to the district in the near future.

Montfort.

The O. P. David mine, the only active producer in this camp, made shipment last week of 3 cars of concentrates to LaSalle, 124 tons. A slump in ore prices is responsible for much low-grade ore being carried over in nearly every district of the entire field.

Linden.

Shipments from this district for week ending June 3 were light, i. e., Ross Bros. and Saxe-Pollard. About 2500 tons of assorted grades of concentrates were carried over. The Linden Separating Co. also carried over several cars of refinery product.

Mineral Point.

Receipts of raw ore from local producers and company mines delivered to New Jersey Zinc Co. for week ending June 3 totaled 29 cars, 1000 tons. Shipments high-grade refinery ore to DePue, 17 cars, 667 tons. Heavy shipments of oxide zinc and commercial sulphuric acid are being made daily.

Miffin.

The Coker mines reported out 7 cars of zinc ore last week, 282 tons; Biddick mine to Benton Roasters, 3 cars, 122 tons; Rundell to Cuba, 18 tons; B. & M. Co. to LaSalle, 35 tons. Much low-grade ore is now held in bin. The Senator shipped 2 cars last week to the Wisconsin Zinc Roasters at Galena, but is holding several hundred tons. Local operators in the Mineral Point camp shipped a car of carbonate ore to furnace at Mineral Point, 21 tons.

Cuba City.

The National Separating Co. is running on low-grade ores, handling 150 tons per day. Shipments of finished product last week included 5 cars to Illinois Zinc Co., 208 tons; 1 car to Edgar Zinc Co., 42 tons, and 5 cars to Granby Mining & Smelting Co., 207 tons. Utt-Thorne Co. delivered 40 tons to Benton Roasters.

Platteville.

Shipments of zinc ore last week aggregated 122 cars, 4862 tons. Most of the low-grade zinc ores handled at separating plants came from affiliated producers. Only 2 cars of lead ore were shipped, 87,710 lbs. Pyrites came from the National Zinc Co. at Cuba—605,300 lbs. The gross yield raw ore amounted to 3800 tons. Net deliveries to smelter, 2400 tons.

The base price early in the week held at \$77 to \$78 for top grades, down to \$70 base for medium grades assaying 52 to 55% zinc. On the lower grades the discrimination was more pronounced, and buyers showed little desire to submit offerings. Lead ore held well at \$88 to \$90 for base 80% metal content. Pyrites slumped, every separating plant engaged in the field being compelled to hold. Carbonate zinc ore was bid in at \$40 to \$45, 40% base.

A new producer is on the Block-House Mining Co.'s project. Locals delivered ore from the Klar-Piquette, 86 tons; East End, 82 tons; Kistler, 44 tons, all to Galena for separation, and the Hodge, 5 cars, 214 tons, to separators at Cuba. Two Dings magnetic ore separating machines are being installed at the Enterprise Roasters and one at the Climax Mining Co.'s plant.

Hazel Green.

Shipments for week were confined to the Kennedy mine, 5 cars, 209 tons; Cleveland mine, 2 cars, 85 tons, all to Mineral Point Zinc Co.; Lawrence mine to Galena Roasters, 3 cars, 120 tons. Two new producers, with equipment, are ready to begin production and shipments.

Benton.

Frontier mining interests delivered 10 cars of ore last week, 400 tons; New Jersey Zinc Co., 3 cars, 220 tons; Fields Mining & Milling Co. to Galena Refinery Co., 11 cars, 170 tons; Vinegar Hill Co. from Blackstone, Martin and Kittoe mines, 11 cars, 460 tons; Wisconsin Zinc Roasters to Lanyon Zinc Co., 3 cars high-grade refinery product, 104 tons; Lanyon Zinc Co., 2 cars, 78 tons; Champion mine to Galena, 4 cars, 162 tons; total, 48 cars, 3,788,000 lbs. Much ore was carried over. Longhenry Mining Co. reported 5 cars held in bin. This new producer has five shafts in ore on a well-developed leasehold, but acknowledges handicap in production due to a small milling plant. Another new producer came into exist-

ence on the Acker project, where a new mill is complete to replace one last by fire. The Hoffman Mining Co. is on the same lease, known as the Miller lead range. Both have good prospects. Three local companies have signed the Barruel Mining Co.'s lease, having lowered the water level in the entire district so that shallow workings can be mined economically. A 20% royalty has been agreed on. Frontier Mining Co. is prospecting with drills on the Dawson or old Lead of Clubs, a one-time producer of low-grade ore. Drills are employed in the Blende lease, or Lanyon, land at one time during the nineties making high-grade lead selling at \$29 per ton. Two drilling machines are engaged on the Turnbull mine, now owned in fee by the New Jersey Zinc Co. The Benton Roaster Co. has installed electric track scale. The operation of the separating plant has been turned over to Wm. Webster, Jr., in charge of the Joplin Separators at Galena, has been promoted to handle the Skinner plant at New Die-

Shullsburg.

The Little Giant, with new equipment, began the milling of ore last week with success. Weekly shipment 3 cars last week to Galena, 87 tons; Rodhams Mining Co., 1 car to Lanyon Zinc Co., high-grade, 32 tons.

Galena.

The Black-Jack mine shipped 5 cars mine run last week to Mineral Point, 180 tons; Federal to Wisconsin Zinc Co., 5 tons; North Unity to Cuba, 44 tons; Wisconsin Zinc Roasters to LaSalle, 4 cars, 160 tons, high-grade; Galena Refinery Co. to Granby Mining & Smelting Co., 7 cars, 280 tons. New producers, with equipment complete and in operating order, are found on the Birkbeck for the Wisconsin Zinc Co., on the Graham for the Vinegar Hill Co., on the Dinsdale for the Cleveland Mining Co. Little Corporal is engaged in production also, with a reconstructed outfit.

WYOMING.

Douglas.

The Mewis mine has started shipping copper ore. Whisler and associates are mining high-grade tungsten ore on Mule creek, west of Laramie peak. They will ship from Medicine Bow. The North Laramie Mining Co. has installed an 80-hp. boiler and has the shaft down 110 ft. in high-grade copper ore. They have also opened up a body of oxidized copper ore on another of its claims. This property is located 26 miles south of Douglas.

CANADA.

BRITISH COLUMBIA.

Fernie.

On June 3 the Crow's Nest Pass Coal Co., with properties near Fernie and Michel, distributed its second quarterly dividend for the current year. It was 12¢ on the issued capitalization, or \$93,189, making the disbursements for the first half of 1916, \$186,378, and increasing the grand total to \$2,370,674.

Three Forks.

The Rambler-Cariboo Mining Co., which owns and operates the Rambler-Cariboo mine and mill at Three Forks, on June 15 will pay the second dividend for 1916 to stockholders of record June 5. The disbursement will be 2 cts. a share, or \$2000, making the payments for the current year \$34,000 and increasing the grand total to \$1,700,000. The company, according to figures in the preliminary statement for the 1915 annual report, to be submitted at the yearly shareholders' meeting on the 19th, earned \$127,500 in the 12 months ended April 30, 1916, of which \$52,500 were distributed in dividends and \$10,000 were devoted to liquidating outstanding indebtedness carried over from 1914. A cash deposit of \$1,000,000 aggregates \$16,500 and the remaining \$44,491 by ore and concentrates stored at the mine at a rate to the smelters. For a time during the cold period last winter it was necessary to shut down the mill and suspend shipments, but development of the property was continued during the interval, and

it is said that the ore reserves on May 1, 1916, were sufficient to assure capacity operation of the concentrator for not less than 2 years. The property produces lead, silver and zinc, the silver values running exceptionally high. Most of the product is reduced to concentrates for shipment, but some of the lead-silver ore is shipped crude.

Sandon.

Practically all the equipment purchased by the sale of \$70,000 of bonds of the Slocan Star Mining Co. will be in place by July 1, according to Dr. Harvey Smith of Spokane, a stockholder in the corporation, who visited the property recently. All the machinery now is on the ground, and installation is being rushed. It consists of a 15-drill compressor, a 1500-hp. electrical plant, a new flotation system and a mile long aerial tram, connecting the mine and mill with the shipping bins at Sandon. "When the new equipment is operating the monthly running expenses of the property will be about \$10,000, and we anticipate that the gross returns will be not less than \$50,000," said Dr. Smith.

Ainsworth.

The Wolverine Mining & Development Co. will ship its first car of ore in a few days, and J. C. Haas of Spokane, managing director, is at the property to outline extensive development.

"We have been doing a little development for several months, but it is only recently that weather conditions permitted getting things in shape for more active work," said Haas. "The ore we have ready for shipment will average about 60% lead and 20 ozs. silver, and the indications are that there is a considerable quantity of this grade of material available for immediate extraction. The company is controlled by eastern people, Jerry Madden of Rapid River, Mich., being president and J. F. Carey and myself the only Spokane directors. Carey arranged for the financing of the extensive plan of development and equipment with machinery which we have laid out to begin this summer. The property consists of 14 claims, extending from the shore of Kootenai lake west to the Highland mine of the Canadian Con. Co. and adjoins the Florence mine on the south. The main working tunnel will be driven from the lake shore."

ONTARIO.

Cobalt.

The National Mines, Ltd., has the King Edward shaft down 580 ft. Three 8-hour shifts are working. Sinking is at the rate of about 110 ft. per month and about 5 months should see the shaft to the desired depth of 1000 ft. Some delay was occasioned after the contract was taken in getting the equipment in shape. On the adjoining O'Brien property good results have followed development along the contact between diabase and Keewatin. The contact dips 30° northward. The depth to the contact is 1170 ft., as determined by diamond drill. The O'Brien shows that a mineralized zone extends 300 ft. above the contact, in the diabase. Beyond this the values appear to pinch out. As the O'Brien is getting good results in this zone National considers its chances good if they sink to a point near the contact and explore there. With this in mind the company proposes to sink the present shaft to the 1000 level, or within 70 ft. of the contact, and then run a crosscut. Keewatin formation, varying in thickness from 40 ft. to 60 ft., covers the property. Four 70-ft. shafts were sunk through this, and from these, together with ~~from~~ from the 160-ft. level and a winze from the same level, 500,000 ozs. of silver were shipped. In the tunnel on the 160 level from Cross Lake, 7 veins were located. Four of them produced good ore. The depth of the diabase at the point where the shaft is being deepened is about 1100 ft.

Schumacher.

For the first 3 months of 1916 the following report has been given out by the Vipond Mines, Ltd. Development on the 400 level opened the Davidson vein on Feb. 1. Drifts were started in both directions, and on March 31 a total length of 165 ft. had been developed. This section of the vein averages 6 ft. wide, and in value \$15. A raise on the shoot to the 300 level has been carried up 37 ft. With the exception of one small break no faults have been encountered. From the east drift a crosscut is being driven to a point vertically under the main shaft. The work of connecting the main shaft with the 100 level workings can be carried on

while the vein is being further developed. The main shaft will be completed to the 400 level by July 1. The crosscut on the 500 level is being driven toward a point vertically under where the vein was encountered on the 400 level. Approximately 50 ft. of crosscutting will bring it there. Every indication points to the continuation of the ore shoot opened on the 400 level. Two high-grade stringers of ore running at right angles to the vein, cut on this level in the course of development, will be prospected by diamond drilling. Development since Jan. 1 has demonstrated the continuation of the ore shoots to the 400 level. The course of the Davidson vein as far as prospected shows that the break between the Godfrey and Davidson veins is shortening. It indicates that in depth they will probably make one continuous vein. The stopes in the west end of the ore zone have now reached 100 ft. above the 200 level and have apparently passed out of the faulted section. The ore now being broken in this section is of better grade than heretofore, and should continue so to the surface, where the vein showed good values. The ore now being broken in this stope will be available for milling by July. In the east stope on the Godfrey vein, between the 200 and 300 levels, the proportion of waste rock to ore increased to such an extent that a large portion of the block has been eliminated from ore reserves as not profitable.

Porcupine.

Discoveries on the 700 and 1000 levels of the McIntyre Mines, Ltd., have added considerable to the company's reserves. The find was made in workings from the No. 5 shaft where on the contact 62 ft. of ore was cut. This ore assayed \$14.40. Drifts have been pushed west 40 ft. and 100 ft. east along the foot wall. Both faces are in good ore. How far this width carries has not been determined. The fact that in work at the 1000 level of the McIntyre Extension values began to improve after the incline shaft passed into McIntyre ground seems to prove the persistency of the deposit. A vein 25 ft. wide was cut from the Extension shaft and there is still much promising territory to be crosscut before No. 5 shaft is reached. The ore in this vein averages \$15.50 where cut.

MEXICO.

Property confiscated during the revolutions in progress for the past several years may be restored to the original owners. People having such property, it is said, will be permitted to offer evidence in a claim for restoration before the authorities. Consul Garcia made this statement in El Paso. He received this information direct from the de facto government in Mexico City. The government, according to the report to the consulate, has started a general movement throughout Mexico to stabilize the currency. Prices of necessities and wages of employes are fixed by the authorities. Anyone disregarding the official valuation of paper money will be dealt with by the de facto government.

According to the Review, the duty now paid by the Cananea Copper Co. amounts to about 21/10 cts. per pound, or about \$40 a ton. With the present output of about 80 tons a day the company is paying on the copper alone about \$1200 per day. The values of the gold and silver in the matte is not figured in this and would amount to considerable more. The decree just issued supplements the one put in force May 1 and makes a pronounced increase in the export duty on silver, copper, lead and zinc ores. The duty, which was to have been computed at 10% of the gross value of the ore according to the New York market quotation, is arbitrarily changed by the new decree. Silver ore, which would have been taxed about \$2.45 a kilo (Mexican gold) on May 1 ruling, has been increased to \$4.97 a kilo. About 33 ozs. are in one kilo of silver. The duty on lean ore has been increased to 1.65 cts. a kilo, or 22 ozs. (Mexican gold). Lead is worth about \$7.50 a hundred pounds. The duty on zinc has been increased to 3.82 cts. a kilo (Mexican gold). The most arbitrary increase, however, was made in copper. The export duty has been only 5 cts. a kilo, and the new decree placed the duty at 9.28 a kilo. These figures, payable in Mexican gold, are to be figured at one-half of the quotation to get the equivalent in American money.

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I. GEOLOGY

GEOLOGY AND MINERALOGY.

Geology

Allan, J. A.—*Geology of Field Map-Area, British Columbia and Alberta*. [A very complete description of the geology of the area is given. To date the lead-zinc-silver and copper deposits are of no noted importance, though some properties are operating there].—Canadian Geol. Surv. Memoir 55; pp 312*.

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Hodge, J. M.—*Coals of the North Fork of Kentucky River in Breathitt and Powell Counties, Kentucky*. [Each bed is taken separately and described. The subdivision of the area is very complete, so that a good detailed description is made].—Ky. Geol. Surv., Ser. III, Vol. III; pp 409.

Jenkins, O. P.—*Phosphates and Dolomites of Johnson County, Tennessee*. [The geologic history, mineralogy, occurrence, analyses of samples and geological structure of the country are all considered].—Res. of Tenn. April 1916; p 51; pp 56*.

Mellor, E. T.—*The Conglomerates of the Hattersdell, South Africa*. [A complete and detailed description of the conglomerates bearing gold in this area. Descriptions of the formation and theories regarding the correlation of the same are given. Also the method by which the gold was deposited].—Jnl. Chem. Met. & Mg. Soc. of S. Afr. Feb. 1916; p 144; pp 37*, 85c.

Reinecke, Leopold.—*Ore Deposits of the Beaverdell Map-Area, British Columbia*. [This area has been prospected but little. The ores are gold-bearing chalcopyrite and galena-sphalerite-pyrite silver bearing ores].—Canadian Geol. Surv. Memoir 79; pp 178*.

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Worth and Dallas, Tex., and southern and central Oklahoma fields are geologically described. Many topographic maps are shown].—U. S. G. S. Bull. 629; pp 129*.

Ore Genesis

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Sosman, R. B.—*Types of Prismatic Structures in Ironstone*. [Many theories on the genesis of these structures in large rock bodies are given].—Jnl. of Geol. Mag. 1916; p 134; pp 10*, 50c.

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(II) NON-METALS

(A) FUELS

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Hyde, M. L.—*Opening Shaft Mines* [Many suggestions on this method of working coal mines are given and two complete arrangements for the bottom are given].—Coal Age May 27 1916; p 910; pp 34*; 20c.

Lohman, K. B.—*The Park Development Problems in the Hard Coal Region*. [Treats on things which should determine the nature and design of a park of this kind and gives a proposed plan for one to be shortly adopted].—Coal Age May 27 1916; p 914; pp 34*; 20c.

Lomax, J.—*Micro-Chemical Examination of Coal in Relation to Its Utilization*. [From a paper read before the Manchester Geological and Mining Soc. The chemical properties as detected by the microscope are brought out, as also are the methods of preparing the slide].—Colly Guard. May 12 1916; p 909; pp 1; 35c.

Peasegood, W. G.—*Gob Fires at Leycett Collieries, England*. [A paper read before the North Staffs Branch of the National Assn. of Colliery Mng.].—I. & C. Tr. Rev. May 12 1916; p 546; pp 11*; 35c.

Coal Preparation, Marketing, Etc.

Wilson, E. B.—*Stocking Anthracite Coal*.—Coal Age May 27 1916; p 929; pp 1*; 20c.

Coal Dust, Fire Damp, Etc.

Peasegood, W. G.—*Gob Fires at Leycett Collieries, England*. [A paper read before the North Staffs Branch of the National Assn. of Colliery Mng.].—I. & C. Tr. Rev. May 12 1916; p 546; pp 11*; 35c.

Coke

Childs, W. H.—*The By-Products of Coke Making—I*. [A paper read before the American Iron & Steel Inst. A complete and authoritative report of the industry as it is today].—I. Tr. Rev. June 1 1916; p 1215; pp 34; 25c.

Dearle, G.—*Power from Coke Oven Gas*. [A paper read before the Yorkshire section of the Inst. of Elect. Eng. A very complete description is given on a combustion engine using this kind of gas. Lubrication, starting the engine, purifying the gas, gas composition and consumption and many other items of interest are given].—Colly Guard. May 12 1916; p 895; pp 2*; 35c.

Estep, H. C.—*How Steel Is Made in Alabama*. [Gives a complete description of the Gulf States Co's plant and de-

scribes its operation and products used and produced].—I. Tr. Rev. June 18 1916; p 1091; pp 8*; 25c.

Coal and Coke By-Products

Barber, C.—*Coking, the Recovery and Working-Up of By-Products*. [A paper read before the Sheffield Univ. Gas & Coke Oven Students' Assn. This part is on the manufacture of sulphuric acid as a by-product].—I. & C. Tr. Rev. May 5 1916; p 518; pp 23*; 35c.

Childs, W. H.—*The By-Products of Coke Making—I*. [A paper read before the American Iron & Steel Inst. A complete and authoritative report of the industry as it is today].—I. Tr. Rev. June 1 1916; p 1215; pp 34; 25c.

Dearle, G.—*Power from Coke Oven Gas*. [A paper read before the Yorkshire section of the Inst. of Elect. Eng. A very complete description is given on a combustion engine using this kind of gas. Lubrication, starting the engine, purifying the gas, gas composition and consumption and many other items of interest are given].—Colly Guard. May 12 1916; p 895; pp 2*; 35c.

Peat

Turina, I.—*Die Braunkohlenablagerung am Ligno-Podkraj und Zupanja*. [On the lignite deposits of Ligno-Podkraj, Germany].—Montanist Rund. Mar. 16 1916; p 159; pp 3; 35c.

Petroleum

Hager, Dorsey.—*Valuation of Oil Properties*. [Specific data, curves and description are given on the topic].—E. & M. J. May 27 1916; p 930; pp 12; 25c.

Shaw, E. W.; Matson, G. C.; Wegemann, C. H.—*Natural Gas Resources of Parts of North Texas*. [Areas about Fort Worth and Dallas, Tex., and southern and central Oklahoma fields are geologically described. Many topographic maps are shown].—U. S. G. S. Bull. 629; pp 129*.

Natural Gas

Shaw, E. W.; Matson, G. C.; Wegemann, C. H.—*Natural Gas Resources of Parts of North Texas*. [Areas about Fort Worth and Dallas, Tex., and southern and central Oklahoma fields are geologically described. Many topographic maps are shown].—U. S. G. S. Bull. 629; pp 129*.

(B) STRUCTURALS AND CERAMICS

Cement

Rankin, G. A.—*The Chemistry of Portland Cement*. [A paper read before the American Concrete Inst. treating on the chemical combinations, etc., had in the mixture at various temperatures during the process of manufacture].—West Eng. May 1916; p 172; pp 5*; 25c.

Clays, Ceramics

Greaves, Walker, A. F.—*The Design and Construction of Continuous Kilns*.—E. & M. J. Rev. May 16 1916; p 931; pp 37; 35c.

Riddle, F. H.; Glanville, A. L.—*Fire Insulating Tiles for the Sulfurates of Some Oil-Fired Sewer-Pipe Kilns*. [The curves are reproduced and accompanied with a complete description].—E. & M. J. Rev. May 16 1916; p 936; pp 37; 35c.

Concrete

Coleman, F. C.—*Ferro-Concrete Bunkers at the Franks Steel Works, Wrexham, England*. [Line drawings of the

bins for receiving the lime and iron ore from the trains are given].—Colly Guard. May 5 1916; p 516; pp 12*; 25c.

Constable, A. P.—*Manufacture of Portland Cement*. [Most of a paper read before the American Concrete Inst.].—Comp. Agr. May 1916; p 7982; pp 24*; 20c.

(C) OTHER NON-METALS

Acids

Barber, C.—*Coking, the Recovery and Working-Up of By-Products*. [A paper read before the Sheffield Univ. Gas & Coke Oven Students' Assn. This part is on the manufacture of sulphuric acid as a by-product].—I. & C. Tr. Rev. May 5 1916; p 518; pp 23*; 35c.

Fay, A. H.—*Coal Mine Fatalities in the United States, 1915*. [Besides tables and description regarding accidents lists are given of permissible explosives, electric lamps and motors, tested prior to Jan. 1 1916].—U. S. Bur. of Mines; pp 80*; 20c.

Potash

Gatlett, Charles.—*The Blast Furnace as a Potash Producer*. [From the Manufacturers' Record. Actual figures showing the potash waste are given].—Chem. Eng. May 1916; p 198; pp 21; 35c.

Heberle, B.—*Erfahrung mit dem Sprengstoff Flüssiger Sauerstoff (Flüssige Luft) im Kali bergbau*. [On the use of liquid-air for blasting in the potash salt mines of Germany].—Kali April 15 1916; p 113; pp 8½*; 35c.

Heimburger, L.—*The Potash Situation*. [Speaks briefly on many possible sources of this non-metal].—Amer. Fertilizer May 21 1916; p 21; pp 3; 25c.

Salines

Heberle, B.—*Erfahrung mit dem Sprengstoff Flüssiger Sauerstoff (Flüssige Luft) im Kali bergbau*. [On the use of liquid-air for blasting in the potash salt mines of Germany].—Kali April 15 1916; p 113; pp 8½*; 35c.

Miscellaneous Non-Metals

Jenkins, O. P.—*Phosphates and Sulphates of Calcium and Potassium*. [The geologic history, mineralogy, occurrence analyses of samples and general structure of the country are all considered].—Res. of Tenn. April 1916; p 61; pp 36*.

III. TECHNOLOGY

MINES AND MINING

Prospecting

Harling, W. K.—*Methods of Prospecting in Manitoba, Canada*. [But little prospecting has been done in this province. Some of the prospects and the processes are spoken of. Attention is made of the formation found in some places which tend to indicate the presence of valuable minerals, as well as a list of prospecting methods].—World. May 21, 1916; p 327; pp 32; 25c.

Surveying and Drafting

Dickenson, E. H.; Volker, H. J.—*How to Use the Transit*. [A complete and authoritative treatise on the use of the transit in surveying and drafting. It is the only book of the kind in the world].—E. & M. J. Rev. May 16 1916; pp 937; 35c.

Barber, C.—*A New Method of Locating Geological Features*. [Gives a method almost identical with the trian-

gulation method in surveying].—M. & S. P. May 29 1916; p 749; pp 24*, 26.

Explosives and Blasting

Fay, A. H.—*Coal Mine Fatalities in the United States, 1915*. [Besides tables and description regarding accidents lists are given of permissible explosives, electric lamps and motors, tested prior to Jan. 1, 1916].—U. S. Bur. of Mines; pp 80*; 20c.

Heberle, B.—*Erfahrung mit dem Sprengstoff Flüssiger Sauerstoff (Flüssige Luft) im Kalbergbau*. [On the use of liquid-air for blasting in the potash salt mines of Germany].—Kali April 15 1916; p 113; pp 8½*; 35c.

McDonald, P. B.—*Modern Blasting Practice*. [Details regarding the explosives used and methods of placing holes for large scale blasting at some of the copper properties in Nevada].—M. & S. P. May 27 1916; p 788; pp 2¾*; 20c.

Storm, C. G.; Cope, W. C.—*The Sand Test for Determining the Strength of Detonators*. [The test consists of placing the detonator in a bomb filled with sand and finding what amount of sand it will crush to a certain mesh by explosion. The results of some tests are given].—U. S. Bur. of Mines Tech. Paper 125; pp 67, 20c.

Pumps and Pumping

—*Annan River Company's Pumping Plant, Cooktown Tinfields*. [Detailed figures are given on this pump for a tin-dredging proposition in Queensland].—Queen. Govt. Mg. Jnl. April 15 1916; p 161; pp 1*, 35c.

Supports: Timbers, Props, Stowing

Mitchell, W. G.—*An Experimental Wood-Preserving Laboratory*. [A general description of a plant for testing with some details of the equipment].—Wood-Preserving June 1916; p 33; pp 3*; 35c.

—*Treating Ties for the G. R. & I. P. L. and P. M. Railroads*. [A brief description of the plant's equipment and a general description of their operations].—Wood-Preserving June 1916; p 27; pp 2¾*; 35c.

Lighting

Fay, A. H.—*Coal Mine Fatalities in the United States, 1915*. [Besides tables and descriptions regarding accidents lists are given of permissible explosives, electric lamps and motors, tested prior to Jan. 1, 1916].—U. S. Bur. of Mines; pp 80*; 20c.

Hoists and Hoisting

Hyde, M. L.—*Opening Shaft Mines*. [Many suggestions on this method of working coal mines are given and two complete arrangements for the bottom are given].—Coal Age May 27 1916; p 910; pp 3¾*; 20c.

Stone, F. L.—*Mine Hoist Calculations—II*. [A balanced slope haulage engine is considered, and the calculations and details and theory for making computations given].—Coal Age May 27 1916; p 903; pp 3½*, 35c.

Mine Sampling

Dickenson, E. H.; Volker, H. J.—*Samples and Their Interpretation*. [Methods are herein given of methods of sampling to show the value of the material in the ore. Specific tests for iron, zinc and copper data are also given].—M. & S. P. May 27 1916; p 997; pp 3½*, 35c.

Transport

—*Treating Ties for the G. R. & I. P. L. and P. M. Railroads*. [A general

description of the plant's equipment and a general description of their operations].—Wood-Preserving June 1916; p 27; pp 2¼*, 35c.

Haulage and Conveying

Hyde, M. L.—*Opening Shaft Mines*. [Many suggestions on this method of working coal mines are given and two complete arrangements for the bottom are given].—Coal Age May 27 1916; p 910; pp 3¾*, 20c.

Safety

Fay, A. H.—*Coal Mine Fatalities in the United States, 1915*. [Besides tables and description regarding accidents lists are given of permissible explosives, electric lamps and motors, tested prior to Jan. 1, 1916].—U. S. Bur. of Mines; pp 80*; 20c.

Sociological

Lohman, K. B.—*The Park Development Problems in the Hard Coal Region*. [Treats on things which should determine the nature and design of a park of this kind and gives a proposed plan for one to be shortly adopted].—Coal Age May 27 1916; p 911; pp 3¾*, 20c.

Production

Skinner, W. R.—*The Mining Manual and Year Book, 1916*. [Alphabetical list and description of the larger companies of the world. A list of mining men, definition of terms and tables showing the production of gold and crushed ores produced from countries of the British Empire are given].—Financial Times, London; book; pp 957; \$6.

Mining Costs

Feldtmann, W. R.—*The Mines of Ashanti Goldfields Corporation, West Africa*. [The history, methods of mining, geology and origin of the company are given. These arsenical ores must first be roasted and are then cyanided].—Mg. Mag. May 1916; p 257; pp 12*, 50c.

Hubbard, J. D.—*Cost of Drift-Mining*. [The figures are those obtained from an average of 1,000 shifts at the Nugget mine, California].—M. & S. P. May 27 1916; p 789; pp ¾*, 20c.

MILL AND MILLING.

Crushing, Grinding, Etc.

Hanson, Henry.—*Iron Grinding Stamps and Ball-Mills*. [A general talk on several points having to do with fine grinding].—M. & S. P. May 13 1916; p 701; pp 3; 20c.

Keiser, W. G.—*Dry Placer Mining on a Large Scale*. [A general account of placer operations in Yuma county, where dry concentration is employed. The plants used are known as Quenner-Stebbins plants].—Mg. World May 27 1916; p 999; pp 1½*, 10c.

Flotation

Anderson, R. J.—*Recent Progress in Flotation*. [From the Rev. of the Franklin Inst. A review of the recent history connected with the flotation process and tending towards its perfection].—Chem. Eng. May 1916; p 183; pp 5¾*, 35c.

Hamilton, Fletcher.—*Concentration of Quicksilver Ores in California*. [Tests are being made as to the applicability of concentrating before the thermic treatment. High extraction by water concentration and flotation is claimed].—Mg. World May 27 1916; p 997; pp 1, 10c.

—*Importance of Flotation in Metallurgy*. [A general

review and talk on the flotation process].—Mg. Cong. Jnl. May 1916; p 242; pp 2½*, 30c.

Concentration: Sorting, Sizing, Washing

Allen, A. W.—*Clay in Ore-Dressing and Cyanidation*. [A paper read before the Inst. of Mg. & Met. Brings out many of the detrimental points accompanying the presence of clay and offers some remedies for the same].—Mg. World May 27 1916; p 1001; pp 2; 10c.

Hamilton, Fletcher.—*Concentration of Quicksilver Ores in California*. [Tests are being made as to the applicability of concentrating before the thermic treatment. High extraction by water concentration and flotation is claimed].—Mg. World May 27 1916; p 997; pp 1; 10c.

Keiser, W. G.—*Dry Placer Mining on a Large Scale*. [A general account of placer operations in Yuma county, where dry concentration is employed. The plants used are known as Quenner-Stebbins plants].—Mg. World May 27 1916; p 999; pp 1½*, 10c.

Lang, Herbert.—*Quicksilver Reduction*. [The nature of the ores, methods of assay, concentration of ores, metallurgy and condensation of the metal and diseases caused from mercury are taken up].—M. & S. P. May 13 1916; p 707; pp 8*; 20c.

Martin, W. M.—*Glass Top Concentrating Tables*. [In the form of discussion information is given on comparative tests of tables with wooden and glass tops].—Mg. Mag. May 1916; p 271; pp 2; 50c.

Cyaniding

Allen, A. W.—*Clay in Ore-Dressing and Cyanidation*. [A paper read before the Inst. of Mg. & Met. Brings out many of the detrimental points accompanying the presence of clay and offers some remedies for the same].—Mg. World May 27 1916; p 1001; pp 2; 10c.

Feldtmann, W. R.—*The Mines of Ashanti Goldfields Corporation, West Africa*. [The history, methods of mining, geology and origin of the company are given. These arsenical ores must first be roasted and are then cyanided].—Mg. Mag. May 1916; p 257; pp 12*; 50c.

Chlorination

Ionides, S. A.—*The Dry Chlorination of Complex Ores*. [Speaks in particular of the system which was started but not finished by the Bunker Hill & Sullivan Mg. & Concent. Co., Ida. Lead and zinc sulphides were the principal ores].—M. & S. P. May 27 1916; p 781; pp 7*; 20c.

Mill and Smelter Costs

Hamilton, Fletcher.—*Concentration of Quicksilver Ores in California*. [Tests are being made as to the applicability of concentrating before the thermic treatment. High extraction by water concentration and flotation is claimed].—Mg. World May 27 1916; p 997; pp 1; 10c.

Lyon, D. A.; Keeney, R. M.—*Feasibility of Western Electric Metallurgy*. [Discusses the pig iron, steel, copper and zinc smelting in electric furnaces and gives costs on the same. It is concluded with a talk on the hydro-electric power question].—Jnl. Elect. Power & Gas April 29 1916; p 331; pp 3¾*; 35c.

Storey, O. W.—*Review of Progress in Electrolytic Iron*. [A paper read before the American Electro. Chem. Soc. Besides a review of the process and its possibilities an estimate sheet of a complete plant is given].—Chem. Eng. May 1916; p 178; pp 3¾*, 50c.

CHEMISTRY AND ASSAYING

Chemistry

Lomas, J.—Micro-Chemical Examination of Coal in Relation to Its Utilization. [From a paper read before the Manchester Geological and Mining Soc. The chemical properties as detected by the microscope are brought out, as also are the methods of preparing the slides.] Colly Guard. May 12 1916; p 309, pp 1, 3c

Analysis

Jenkins, O. P.—Phosphates and Dolomites of Johnson County, Tennessee [The geologic history, mineralogy, occurrence analyses of samples and geological structure of the country are all considered].—Res. of Tenn. April 1916; p 31; pp 56*

Assaying

Use of the Slide Rule in Calculating Base-Bullion Assays.—Met & Chem. Engg. May 15 1916; p 561; pp 1; 30c

METALLURGY

Electrometallurgy

Storey, O. W.—Review of Progress in Electrolytic Iron. [A paper read before the American Electrochem. Soc. Besides a review of the process and its possibilities an estimate sheet of a complete plant is given].—Chem. Eng. May 1916; p 178; pp 334, 35c

Vail, R. H.—Tin Smelting at Perth Amboy, N. J. [Bolivian concentrates are handled here and the first tin was produced on Mar. 7. The concentrates are first smelted and cast into anodes, after which they are electrolytically refined].—E. & M. J. May 27 1916; p 927; pp 234*, 25c

Vom Baur, C. H.—The Rennerfelt Electric Arc Furnace. [A paper read before the American Electrochem. Soc. Details of its construction and operation are given].—Chem. Eng. May 1916; p 191; pp 2*, 35c

Thermic Metallurgy

Feldtmann, W. R.—The Mines of Ashanti Goldfields Corporation, West Africa. [The history, methods of mining, geology and origination of the company are given. These arsenical ores must first be roasted and are then cyanided].—Ms. Mag. May 1916; p 257; pp 12*, 50c

Vail, R. H.—Tin Smelting at Perth Amboy, N. J. [Bolivian concentrates are handled here and the first tin was produced on Mar. 7. The concentrates are first smelted and cast into anodes, after which they are electrolytically refined].—E. & M. J. May 27 1916; p 927; pp 234*, 25c

Hydro-Metallurgy

Vail, R. H.—Tin Smelting at Perth Amboy, N. J. [Bolivian concentrates are handled here and the first tin was produced on Mar. 7. The concentrates are first smelted and cast into anodes, after which they are electrolytically refined].—E. & M. J. May 27 1916; p 927; pp 234*, 25c

POWER AND MACHINERY

Electricity

Fay, A. H.—Coal Mine Fatalities in the United States, 1915. [Besides tables and description regarding accidents lists are given of permissible explosives, electric lamps and motors, tested prior to Jan. 1, 1916].—U. S. Bur. of Mines; pp 80*

Hydro-Electric

Harris, J. C.—The Hydro-Electric Power of the United States. [A paper read before the American Hydropower Assn. A general description of the hydroelectric power in the United States is given, including a list of the largest hydroelectric plants in the country.]—U. S. Bur. of Mines; pp 1-100*

Combustion Engines

Deibel, G. P.—The Combustion Engine. [A paper read before the American Hydropower Assn. A complete description is given of a combustion engine using this kind of gas. Lubrication, starting the engine, purifying the gas, composition, and consumption, and many other points are mentioned.]—Colly Guard. May 12 1916; p 306; pp 1, 35c

Steam and Steam Engines

Clarke, A. V.—The Steam Engine at High Altitudes. [A general discussion of the losses on account of the generation of steam. Curves and formulae are given].—Comp. Air May 1916; p 7989; pp 134*, 20c

Gas Producer, Producer Gas

Trautschold, R.—Gas Producer Control. [On the vapor control, producer reactions, and water vapor cooling of the fuel bed].—Pract. Eng. May 11 1916; p 159; pp 134, 20c

Miscellaneous Power and Machinery

Losses of Power in Compressors. [Brings out causes which will make a mechanical loss in the air compressor].—S. L. Mg. Rev. May 15 1916; p 21; pp 234*

IV. MISCELLANEOUS

Miscellaneous Costs

Clarke, T. C.—The Present Status of the American Hydropower Industry. [Treats on costs and general distribution.]—Met & Chem. Engg. May 15 1916; p 601; pp 234, 30c

Testing

Atkinson, Leslie.—The Testing of the Corrosion of Steel. [A paper read before the Iron & Steel Inst. Several tests were made in this investigation and the metallurgically of steel as related to corrosion is given].—Lunge. May 1916; p 461; pp 1, 35c

Feldtmann, W. R.—The Mines of Ashanti Goldfields Corporation, West Africa. [A paper read before the Iron & Steel Inst. Experimental work is brought out, as also is the effects of manganese and carbon on the corrosion of steel].—Lunge. May 1916; p 445; pp 1, 35c

Hamilton, H.—The Hydro-Electric Power of the United States. [A paper read before the American Hydropower Assn. Tests are being made on the hydroelectric power of the United States, and a list of the largest hydroelectric plants in the country is given.]—U. S. Bur. of Mines; pp 1-100*

Martin, W. M.—The Hydro-Electric Power of the United States. [A paper read before the American Hydropower Assn. A general description of the hydroelectric power in the United States is given, including a list of the largest hydroelectric plants in the country.]—U. S. Bur. of Mines; pp 1-100*

McNeill, W. G.—The Hydro-Electric Power of the United States. [A paper read before the American Hydropower Assn. A general description of the hydroelectric power in the United States is given, including a list of the largest hydroelectric plants in the country.]—U. S. Bur. of Mines; pp 1-100*

Storm, C. G.; Cope, W. C.—The Sand Test. [A paper read before the American Hydropower Assn. The sand test is a method of testing the strength of a material which is used in the construction of a dam. The material is crushed to a certain mesh by explosion. The results of some tests are given].—U. S. Bur. of Mines; pp 1-100*

Atkinson, Leslie.—The Testing of the Corrosion of Steel. [A paper read before the Iron & Steel Inst. Several tests were made in this investigation and the metallurgically of steel as related to corrosion is given].—Lunge. May 1916; p 461; pp 1, 35c

Metallography

Atkinson, Leslie.—The Testing of the Corrosion of Steel. [A paper read before the Iron & Steel Inst. Several tests were made in this investigation and the metallurgically of steel as related to corrosion is given].—Lunge. May 1916; p 461; pp 1, 35c

History

Anderson, R. J.—Recent Progress in Flotation. [From the Jnl. of the Franklin Inst. A review of the recent history connected with the flotation process and tending towards its perfection in Chem. Engg. May 1916; p 184; pp 50*, 5c

Feldtmann, W. R.—The Mines of Ashanti Goldfields Corporation, West Africa. [The history, methods of mining, geology and origination of the company are given. These arsenical ores must first be roasted and are then cyanided].—Ms. Mag. May 1916; p 257; pp 12*, 50c

Jenkins, O. P.—Phosphates and Dolomites of Johnson County, Tennessee. [The geologic history, mineralogy, occurrence analyses of samples and geological structure of the country are all considered].—Res. of Tenn. April 1916; p 31; pp 56*

Financial

Bailey, M. L.—The Development of the Iron and Steel Industries. [Abst. from L'Information. The development of a syndicate, a new iron-ore region, the profits and sales of coal and coke and other items of financial interest are brought out.]—U. S. Bur. of Mines; pp 1-100*

Dunn, Gano.—The Water Power Situation, Issued by the American Hydropower Assn. [Points out facts which give the financial man the aspects he needs toward hydroelectric installations].—Bull. A. I. M. E. May 1916; p 306; pp 19, 35c

U. S. Bur. of Mines.—The Water Power Situation, Issued by the American Hydropower Assn. [Points out facts which give the financial man the aspects he needs toward hydroelectric installations].—Bull. A. I. M. E. May 27 1916; p 930; pp 145*, 25c

Skinner, W. R.—The Mining, Metallurgy and Smelting of Lead. [A historical and descriptive of the lead mines of the world. A list of mining mines, definitions of terms, and tables showing the production of gold and crushed ores produced from countries of the British Empire are given.]—Practical Chem. Engg. May 1916; p 507; pp 1, 35c

General Miscellany

Skinner, W. R.—The Mining, Metallurgy and Smelting of Lead. [A historical and descriptive of the lead mines of the world. A list of mining mines, definitions of terms, and tables showing the production of gold and crushed ores produced from countries of the British Empire are given.]—Practical Chem. Engg. May 1916; p 507; pp 1, 35c

Ore and Metal Markets; Prices-Current

New York, June 8, 1916.

Silver.—Quotations for silver per fine ounce at New York and per standard ounce at London for the week ending June 7 were as follows:

	New York, Cents.	London, Pence.
June 1	68 3/4	32 7/8
2	64 1/2	31
3	64 1/2	31
4	64 1/2	31 3/4
5	66 1/2	31 15/16
6	66 7/8	31 15/16
7	66 7/8	31 15/16

MONTHLY AVERAGE PRICES OF SILVER.

Month.	New York			London	
	High.	Low.	Avg.	1915.	1916.
January	57 5/8	57 1/8	56 7/16	48 8/16	26 8/16
February	57 1/2	56 3/4	56 7/16	48 4/16	27 0/16
March	60 1/4	56 1/2	57 3/16	49 5/16	24 9/16
April	72 1/2	60 7/8	64 4/16	50 6/16	31 3/16
May	77 1/2	68 1/2	73	49 7/16	34 1/16
June	77 1/2	68 1/2	73	49 7/16	34 1/16
July	.....	.....	.....	47 5/16	22 9/16
August	.....	.....	.....	47 1/16	22 7/16
September	.....	.....	.....	48 3/8	23 6/16
October	.....	.....	.....	49 3/8	23 9/16
November	.....	.....	.....	51 7/16	24 6/16
December	.....	.....	.....	55 3/16	26 2/16
Year	.....	.....	49 9/16	.....	24 4/16

Difference in domestic and foreign prices explained by the fact that the New York quotations are per fine ounce, the London per standard ounce 8 1/2 fine.

Copper.—The market to a large extent followed in the channels noted in the previous report. Demand was limited and price concessions by second hands appeared to give a weaker tone to the market, but on closer observation the fact that selling agencies had not lowered their prices proved that the market had lost none of its recent strength. Offerings of spot and nearby electrolytic at 28 cts. and forward positions at 27@27 1/2 cts. by second hands constituted the only evidences of weakness, and at this writing it is asserted that reselling is about ended. Prospects are for an early renewal in active demand. The consuming interests who have been selling were rather disappointed by the failure of the market to weaken under the liquidation. As has been pointed in these columns, the position of copper cannot be bettered. With producers holding orders that will take fully 80% of the output for the rest of the year, either or both reselling and inactivity can have little effect on the market. This was strikingly demonstrated last week when the selling agents announced the same quotations for delivery after August as those which prevailed toward the close of the recent buying movement.

Discussion has come up as to whether declining munitions production in this country can affect future copper. It is pointed out that the Allies are mainly buying steel and not placing orders for shells. One important copper authority says that copper must be used whether the shells are made here or abroad and that this change in war trade cannot exert a repressive influence on the red metal. Production of copper in May is estimated to have reached 190,000,000 lbs., of which 125,000,000 lbs. entered into domestic consumption, 30,000,000 lbs. into exports and 30,000,000 lbs. in refiners' stocks. Exports admittedly are small in contrast with foreign buying, but expectations are that the outward movement will greatly increase over the summer, so that whatever accumulation is now created will be quickly wiped out when England, France and Russia begin to send no larger copper shipments.

Early this week producers reported some fair inquiries from London for small lots for July and August shipment. Domestic demand continued quiet, and while producers' prices for the last 5 months are nominal, owing to the lack of business, it is not doubted that these prices will be paid as soon as domestic buying is resumed. For August delivery of electrolytic, sellers asked 26 1/2 cts. with September held at 29 1/2 cts., October at 29 1/2 cts. and November and

December at 29 cts. Casting copper for August delivery is quoted at 26 1/4 cts. and September at 26 cts.

At London the market advanced and then declined sharply last week, but opened the current week with an advance. Speculation at London is now curbed by government regulations effective June 1, all copper purchases now being first subject to permission from the Ministry of Munitions. Last week electrolytic declined to £140.

Quotations for copper per pound at New York for the week ended June 7 were as follows:

Month.	Lake.		Electrolytic.	Casting.
	High.	Low.	Avg.	Avg.
June 1	28 1/2	28 1/2	28 1/2	26 1/4
2	28 1/2	28 1/2	28 1/2	26 1/4
3	28 1/2	28 1/2	28 1/2	26 1/4
4	28 1/2	28 1/2	28 1/2	26 1/4
5	28 1/2	28 1/2	28 1/2	26 1/4
6	28 1/2	28 1/2	28 1/2	26 1/4
7	28 1/2	28 1/2	28 1/2	26 1/4

Quotations for copper per ton at London for the week ended June 7 were as follows:

Month.	Standard		Electrolytic.
	Spot.	Futures.	Avg.
June 1	£120 0 0	£118 0 0	£110 0 0
2	120 0 0	118 0 0	110 0 0
3	120 0 0	118 0 0	110 0 0
4	120 0 0	118 0 0	110 0 0
5	120 0 0	118 0 0	110 0 0
6	120 0 0	118 0 0	110 0 0
7	120 0 0	118 0 0	110 0 0

MONTHLY AVERAGE PRICES OF COPPER.

Month.	1916			1915.
	High.	Low.	Average.	Average.
January	25 5/8	23 0/8	24 1/10	13 8/11
February	25 5/8	23 5/8	27 4/17	14 7/12
March	28 5/8	27 2/8	27 9/11	15 1/11
April	30 0/8	28 5/8	29 4/10	17 3/18
May	29 7/8	28 2/8	29 0/5	18 8/12
June	.....	.....	.....	19 3/12
July	.....	.....	.....	19 4/12
August	.....	.....	.....	17 4/12
September	.....	.....	.....	17 7/18
October	.....	.....	.....	17 9/18
November	.....	.....	.....	18 5/18
December	.....	.....	.....	20 3/18
Year	.....	.....	.....	17 6/17

Quotations for electrolytic cathodes are 9 1/2 cts. per lb. less than for lake, ingots and wire bars.

Month.	New York		Casting Copper	
	High.	Low.	Avg.	Avg.
January	21 2/8	22 0/8	23 0/16	88 0/16
February	27 0/8	24 1/16	26 3/16	102 7/16
March	27 7/8	25 5/8	26 2/16	106 1/16
April	28 0/8	26 7/8	27 5/16	105 6/16
May	27 7/8	26 0/8	26 6/16	104 7/16
June	.....	.....	.....	82 3/16
July	.....	.....	.....	71 8/16
August	.....	.....	.....	67 2/16
September	.....	.....	.....	88 5/16
October	.....	.....	.....	72 5/16
November	.....	.....	.....	75 3/16
December	.....	.....	.....	80 1/16
Year	.....	.....	.....	.....

Tin.—A heavy market, caused by large visible supplies, continued to prevail in tin. Prices are receding, although slowly. Sellers report that business done in the past 3 weeks has not run over 600 tons, a condition that reveals the extent

of the inactivity, consumers realizing the comparative weakness of the market. Spot tin last week rounded 2 cts. to 47 cts. and opened the current week down to 46 1/4 cts., which figure some sellers were willing to shade.

Banka tin for prompt delivery was quoted at 43 cts. to a large extent the efforts to promote a market for Banka tin are responsible for the heavy market. Batavia interests, realizing the difficulty experienced in securing Straits tin, hope to supplant that tin in this market. Toward this end very heavy shipments of Banka tin have arrived here and are now afloat to this country.

The May statistics would have proved favorable to the metal were it not for the large Banka shipments which made up for the loss in Straits shipments and thus put the total visible supply down only 125 tons at 19,614 tons. American deliveries totaled 5455 tons, thus taking up the larger arrivals in May. Straits shipments in May dropped to 3,965 tons, with 4,498 tons Banka tin afloat.

With spot offered down to 4 1/2 cts., forward positions were also quoted lower this week, June being held at 44 cts., July at 43 1/2 cts., August at 42 cts., September at 41 cts. and October at 40 1/2 cts. Banka tin for these months was quoted at 2 cts. under these figures.

The weakness at London and Singapore is attributed to a bear campaign. Permits for Straits shipments direct to this country are not forthcoming, but are available for shipments to the U. K. This creates a surplus of tin in England and has aided in lowering the market. Straits tin at London declined £7 15s last week, with the Singapore market down £5. This week London opened £2 5s lower and Singapore £3 7s 6d lower.

Quotations for tin per pound at New York and per ton at London and Singapore for the week ended June 7 were as follows:

	New York		London	Singapore.
	Spot.	June.	Straits spot.	
June 1	45 1/2	47 1/2	£187 10 0	2180 0 0
2	45 1/2	47 1/2	188 0 0	189 0 0
3	45 1/2	47 1/2	188 0 0	189 0 0
4	44 1/2	46 1/2	187 0 0	185 12 6
5	44 1/2	46 1/2	187 0 0	184 0 0
6	44 1/2	46 1/2	185 0 0	185 19 0

MONTHLY AVERAGE PRICES OF TIN, NEW YORK.

Month.	1916			1915
	High	Low	Average	Average
January	45.00	40.87 1/2	47.881	41.296
February	47.00	41.25	47.631	37.711
March	50.00	46.25	50.18	48.933
April	50.00	45.00	47.50	41.78
May	52.00	45.75	49.809	48.841
June				49.771
July				37.401
August				31.288
September				33.151
October				33.077
November				33.251
December				38.735
Year				38.661

Lead.—As intimated in this report, the American Smelting & Refining Co. reduced its price with the opening of June, putting the quotation down \$10 a ton to 7 cts. New York and 6.92 1/2 cts. St. Louis. The cut, while for the present rendering the market easy, is expected to provide the basis for a firmer market, as many consumers have withheld buying until prices were lowered and are now likely to place their orders. Sellers in the outside market lowered their quotations to a parity with the principal producer. The demand for lead has been small and aside from one 200-ton order for a government arsenal little business appeared. The failure of the foreign governments to place new cartridge contracts upset some calculations of further heavy buying by small ammunition makers. At London the market has been erratic, with spot advancing and futures declining, and at times the reverse being the case. Last week spot advanced 1/8s. and futures declining 2s. 6d.

Quotations for lead per pound at New York and per ton at London for the week ended June 7 were as follows:

	New York		London	
	High	A. S. & R. Co.	Spot.	June 7
June 1	7.20c	7.00c	87 1/2	87 1/2
2	7.20c	7.00c	87 1/2	87 1/2
3	7.00c	6.90c	87 1/2	87 1/2
4	7.00c	6.90c	87 1/2	87 1/2
5	6.90c	6.80c	87 1/2	87 1/2
6	6.90c	6.80c	87 1/2	87 1/2
7	6.90c	6.80c	87 1/2	87 1/2

MONTHLY AVERAGE PRICES OF LEAD

Month.	1916			1915		
	High	Low	Average	High	Average	Average
January	81.00	75.00	78.15	77.00	75.00	75.00
February	82.00	77.00	79.50	77.00	75.00	75.00
March	87.00	82.00	84.50	80.00	78.00	78.00
April	91.00	86.00	88.50	85.00	83.00	83.00
May	92.00	87.00	89.50	85.00	83.00	83.00
June				85.00	83.00	83.00
July				85.00	83.00	83.00
August				85.00	83.00	83.00
September				85.00	83.00	83.00
October				85.00	83.00	83.00
November				85.00	83.00	83.00
December				85.00	83.00	83.00
Year				85.00	83.00	83.00

Lead Ore.—The average prices for lead ore in the Missouri-Kansas-Oklahoma district during the week ended June 3 saw a drop in price of another \$10 over the \$92 price of the previous week. No sound theory other than the dull market can be given as a primary cause. Most of the ore sold for \$82, though some changed hands at \$80. Better prices, however, were obtained in a few cases on Saturday. There were 1,688,370 lbs. of concentrates produced during the week, and the total for the year to date was 48,578,000 lbs. These quantities had respective values of \$79,156 and \$4,186,000. The production was off another approximate 300,000 lbs. for this past week.

MONTHLY AVERAGE PRICES OF JOPLIN LEAD ORE

Month.	1916			1915
	High	Low	Average	Average
January	81.00	75.00	78.15	77.00
February	82.00	77.00	79.50	77.00
March	87.00	82.00	84.50	80.00
April	91.00	86.00	88.50	85.00
May	92.00	87.00	89.50	85.00
June				85.00
July				85.00
August				85.00
September				85.00
October				85.00
November				85.00
December				85.00
Year				85.00

Zinc Ore.—In the Missouri-Kansas-Oklahoma district the same conditions of a week ago were prevalent during the week ended June 3. The top price was down \$1.10-\$1.00, while the price for poorer grades increased from \$60 of the previous week to \$65 for the past week. The market stiffened on Saturday, the last day of the week. There were produced during the week 11,658,610 lbs. of concentrates, which was slightly higher than the previous week. Total for the year to date was 392,665,781 lbs. and the respective value of each was \$427,766 and \$15,351,291.

Aluminum was in fair demand at from \$30 to \$37 1/2 per ton and there were produced during the week 141,250 lbs., bringing the total of the year to date at 17,968,950 lbs. These had values of \$4795 and \$677,424 respectively.

MONTHLY AVERAGE PRICES OF JOPLIN ZINC ORE.

Month.	1916			1915
	High	Low	Average	Average
January	40.00	35.00	37.50	35.00
February	40.00	35.00	37.50	35.00
March	40.00	35.00	37.50	35.00
April	40.00	35.00	37.50	35.00
May	40.00	35.00	37.50	35.00
June				35.00
July				35.00
August				35.00
September				35.00
October				35.00
November				35.00
December				35.00
Year				35.00

Spelter. After an extended period of uncertainty it appears that spelter has almost reached the turning point. It is believed that the government are starting to produce 3,411,000 lbs. of spelter, which will cause a sharp decline in the market. The market last week continued to recede, but toward the present week higher and fairly active on buying by both consumers and shippers. Spot spelter received by 13 cts. New York and 17 1/2 cts. St. Louis, and on Monday advanced by 1 cts. Producers had been considering curtailing night work in order to stimulate the metal market, and with the government producing in an entire year it is likely that some form of transportation that will compel higher prices and a probable return to a level that prevailed before the decline set in last April.

That large consumers felt spelter had seen its best days is evidenced by the easiness in galvanized and brass products, especially sheets. At London spelter declined sensationally last week, spot dropping £2 and futures £3, but on Monday the market came £3 higher, apparently on advices from this side.

Quotations for spelter per pound at New York and per ton at London for the week ended June 7 were as follows:

	New York	Spot	London	Futures
June 1	15	27 1/2	0	67 0/0
" 2	15	27 0/0	0	66 0/0
" 3	15	26 0/0	0	66 0/0
" 4	14 1/2	25 0/0	0	65 0/0
" 5	14 1/2	25 0/0	0	65 0/0
" 6	14 1/2	25 0/0	0	65 0/0
" 7	14 1/2	25 0/0	0	65 0/0

MONTHLY AVERAGE PRICES OF SVELTER

Month	New York			London		
	High	Low	Ave.	High	Ave.	Ave.
January	19 1/2	15 3/4	18 3/4	6 5/16	8 3/16	30 5/16
February	21 1/2	18 3/4	20 3/4	8 5/16	9 7/16	33 1/2
March	19 3/4	16 5/8	18 1/8	10 1/2	10 7/8	42 2/8
April	19 1/2	15 1/2	18 1/8	11 1/8	11 1/2	48 1/2
May	17 1/2	14 1/2	17 1/8	11 1/2	12 1/2	67 3/20
June				22 1/2		100 3/20
July				20 3/8		38 1/2
August				16 1/4		68 2/5
September				11 1/2		64 1/4
October				11 1/2		64 1/2
November				10 7/8		88 1/4
December				10 1/2		89 1/2
Year				13 9/16		66 9/16

*For the first nine months spot market nominal thereafter.

MISCELLANEOUS METALS.

Quicksilver.—Liquidation by banking interests continues to affect quicksilver and consumers are not making many purchases. Spot declined to \$74 per flask, which is the asked price, although it has been definitely established that sales have been made at \$70 per flask. The market is weak and heavy and further declines are in prospect.

Antimony.—The market continues weak and inactivity prevails. Sellers are offering good brands at 24@25 cts., but there is no telling what price a firm offer may yield. The market is wholly nominal and American producers who found conditions attractive when antimony was selling at 45 cts. are now planning to let down on output.

Aluminum.—Demand continues fair, with prices firm and unchanged. Sellers report some domestic buying of nearby delivery, with the leading interest still taking orders for 1917. Spot No. 1 virgin ingots are quoted at 59@60 cts., with pure 98 to 99% held at 57@58 cts. and No. 12 alloy remelted at 48@50 cts. For 1917 delivery the price continues at 35 cts.

Nickel.—Export business has been a feature of the recent market, sellers reporting considerable business done. Ordinary forms held at 45@50 cts., with electrolytic 5 cts. higher.

Finished Copper, Brass and Other Products.—Prices on full and cut lead sheets have been lowered by makers as a result of the easiness in the primary markets. Brass products have also been shaded, owing to the decline in spelter. Copper and aluminum are firm and unchanged. The following prices are all f. o. b. mill:

Sheet copper, 14	\$22 50/100
Sheet copper, 16	40 00/100
Sheet copper, 20	50 00/100
Sheet copper, 24	60 00/100
Sheet copper, 30	70 00/100
Sheet copper, 36	80 00/100
Sheet copper, 48	90 00/100
Sheet copper, 60	100 00/100
Sheet copper, 72	110 00/100
Sheet copper, 84	120 00/100
Sheet copper, 96	130 00/100
Sheet copper, 108	140 00/100
Sheet copper, 120	150 00/100
Sheet copper, 144	160 00/100
Sheet copper, 180	170 00/100
Sheet copper, 216	180 00/100
Sheet copper, 252	190 00/100
Sheet copper, 288	200 00/100
Sheet copper, 324	210 00/100
Sheet copper, 360	220 00/100
Sheet copper, 408	230 00/100
Sheet copper, 456	240 00/100
Sheet copper, 504	250 00/100
Sheet copper, 540	260 00/100
Sheet copper, 576	270 00/100
Sheet copper, 612	280 00/100
Sheet copper, 648	290 00/100
Sheet copper, 684	300 00/100
Sheet copper, 720	310 00/100
Sheet copper, 756	320 00/100
Sheet copper, 792	330 00/100
Sheet copper, 828	340 00/100
Sheet copper, 864	350 00/100
Sheet copper, 900	360 00/100
Sheet copper, 936	370 00/100
Sheet copper, 972	380 00/100
Sheet copper, 1008	390 00/100
Sheet copper, 1044	400 00/100
Sheet copper, 1080	410 00/100
Sheet copper, 1116	420 00/100
Sheet copper, 1152	430 00/100
Sheet copper, 1188	440 00/100
Sheet copper, 1224	450 00/100
Sheet copper, 1260	460 00/100
Sheet copper, 1296	470 00/100
Sheet copper, 1332	480 00/100
Sheet copper, 1368	490 00/100
Sheet copper, 1404	500 00/100
Sheet copper, 1440	510 00/100
Sheet copper, 1476	520 00/100
Sheet copper, 1512	530 00/100
Sheet copper, 1548	540 00/100
Sheet copper, 1584	550 00/100
Sheet copper, 1620	560 00/100
Sheet copper, 1656	570 00/100
Sheet copper, 1692	580 00/100
Sheet copper, 1728	590 00/100
Sheet copper, 1764	600 00/100
Sheet copper, 1800	610 00/100
Sheet copper, 1836	620 00/100
Sheet copper, 1872	630 00/100
Sheet copper, 1908	640 00/100
Sheet copper, 1944	650 00/100
Sheet copper, 1980	660 00/100
Sheet copper, 2016	670 00/100
Sheet copper, 2052	680 00/100
Sheet copper, 2088	690 00/100
Sheet copper, 2124	700 00/100
Sheet copper, 2160	710 00/100
Sheet copper, 2196	720 00/100
Sheet copper, 2232	730 00/100
Sheet copper, 2268	740 00/100
Sheet copper, 2304	750 00/100
Sheet copper, 2340	760 00/100
Sheet copper, 2376	770 00/100
Sheet copper, 2412	780 00/100
Sheet copper, 2448	790 00/100
Sheet copper, 2484	800 00/100
Sheet copper, 2520	810 00/100
Sheet copper, 2556	820 00/100
Sheet copper, 2592	830 00/100
Sheet copper, 2628	840 00/100
Sheet copper, 2664	850 00/100
Sheet copper, 2700	860 00/100
Sheet copper, 2736	870 00/100
Sheet copper, 2772	880 00/100
Sheet copper, 2808	890 00/100
Sheet copper, 2844	900 00/100
Sheet copper, 2880	910 00/100
Sheet copper, 2916	920 00/100
Sheet copper, 2952	930 00/100
Sheet copper, 2988	940 00/100
Sheet copper, 3024	950 00/100
Sheet copper, 3060	960 00/100
Sheet copper, 3096	970 00/100
Sheet copper, 3132	980 00/100
Sheet copper, 3168	990 00/100
Sheet copper, 3204	1000 00/100
Sheet copper, 3240	1010 00/100
Sheet copper, 3276	1020 00/100
Sheet copper, 3312	1030 00/100
Sheet copper, 3348	1040 00/100
Sheet copper, 3384	1050 00/100
Sheet copper, 3420	1060 00/100
Sheet copper, 3456	1070 00/100
Sheet copper, 3492	1080 00/100
Sheet copper, 3528	1090 00/100
Sheet copper, 3564	1100 00/100
Sheet copper, 3600	1110 00/100
Sheet copper, 3636	1120 00/100
Sheet copper, 3672	1130 00/100
Sheet copper, 3708	1140 00/100
Sheet copper, 3744	1150 00/100
Sheet copper, 3780	1160 00/100
Sheet copper, 3816	1170 00/100
Sheet copper, 3852	1180 00/100
Sheet copper, 3888	1190 00/100
Sheet copper, 3924	1200 00/100
Sheet copper, 3960	1210 00/100
Sheet copper, 3996	1220 00/100
Sheet copper, 4032	1230 00/100
Sheet copper, 4068	1240 00/100
Sheet copper, 4104	1250 00/100
Sheet copper, 4140	1260 00/100
Sheet copper, 4176	1270 00/100
Sheet copper, 4212	1280 00/100
Sheet copper, 4248	1290 00/100
Sheet copper, 4284	1300 00/100
Sheet copper, 4320	1310 00/100
Sheet copper, 4356	1320 00/100
Sheet copper, 4392	1330 00/100
Sheet copper, 4428	1340 00/100
Sheet copper, 4464	1350 00/100
Sheet copper, 4500	1360 00/100
Sheet copper, 4536	1370 00/100
Sheet copper, 4572	1380 00/100
Sheet copper, 4608	1390 00/100
Sheet copper, 4644	1400 00/100
Sheet copper, 4680	1410 00/100
Sheet copper, 4716	1420 00/100
Sheet copper, 4752	1430 00/100
Sheet copper, 4788	1440 00/100
Sheet copper, 4824	1450 00/100
Sheet copper, 4860	1460 00/100
Sheet copper, 4896	1470 00/100
Sheet copper, 4932	1480 00/100
Sheet copper, 4968	1490 00/100
Sheet copper, 5004	1500 00/100
Sheet copper, 5040	1510 00/100
Sheet copper, 5076	1520 00/100
Sheet copper, 5112	1530 00/100
Sheet copper, 5148	1540 00/100
Sheet copper, 5184	1550 00/100
Sheet copper, 5220	1560 00/100
Sheet copper, 5256	1570 00/100
Sheet copper, 5292	1580 00/100
Sheet copper, 5328	1590 00/100
Sheet copper, 5364	1600 00/100
Sheet copper, 5400	1610 00/100
Sheet copper, 5436	1620 00/100
Sheet copper, 5472	1630 00/100
Sheet copper, 5508	1640 00/100
Sheet copper, 5544	1650 00/100
Sheet copper, 5580	1660 00/100
Sheet copper, 5616	1670 00/100
Sheet copper, 5652	1680 00/100
Sheet copper, 5688	1690 00/100
Sheet copper, 5724	1700 00/100
Sheet copper, 5760	1710 00/100
Sheet copper, 5796	1720 00/100
Sheet copper, 5832	1730 00/100
Sheet copper, 5868	1740 00/100
Sheet copper, 5904	1750 00/100
Sheet copper, 5940	1760 00/100
Sheet copper, 5976	1770 00/100
Sheet copper, 6012	1780 00/100
Sheet copper, 6048	1790 00/100
Sheet copper, 6084	1800 00/100
Sheet copper, 6120	1810 00/100
Sheet copper, 6156	1820 00/100
Sheet copper, 6192	1830 00/100
Sheet copper, 6228	1840 00/100
Sheet copper, 6264	1850 00/100
Sheet copper, 6300	1860 00/100
Sheet copper, 6336	1870 00/100
Sheet copper, 6372	1880 00/100
Sheet copper, 6408	1890 00/100
Sheet copper, 6444	1900 00/100
Sheet copper, 6480	1910 00/100
Sheet copper, 6516	1920 00/100
Sheet copper, 6552	1930 00/100
Sheet copper, 6588	1940 00/100
Sheet copper, 6624	1950 00/100
Sheet copper, 6660	1960 00/100
Sheet copper, 6696	1970 00/100
Sheet copper, 6732	1980 00/100
Sheet copper, 6768	1990 00/100
Sheet copper, 6804	2000 00/100
Sheet copper, 6840	2010 00/100
Sheet copper, 6876	2020 00/100
Sheet copper, 6912	2030 00/100
Sheet copper, 6948	2040 00/100
Sheet copper, 6984	2050 00/100
Sheet copper, 7020	2060 00/100
Sheet copper, 7056	2070 00/100
Sheet copper, 7092	2080 00/100
Sheet copper, 7128	2090 00/100
Sheet copper, 7164	2100 00/100
Sheet copper, 7200	2110 00/100
Sheet copper, 7236	2120 00/100
Sheet copper, 7272	2130 00/100
Sheet copper, 7308	2140 00/100
Sheet copper, 7344	2150 00/100
Sheet copper, 7380	2160 00/100
Sheet copper, 7416	2170 00/100
Sheet copper, 7452	2180 00/100
Sheet copper, 7488	2190 00/100
Sheet copper, 7524	2200 00/100
Sheet copper, 7560	2210 00/100
Sheet copper, 7596	2220 00/100
Sheet copper, 7632	2230 00/100
Sheet copper, 7668	2240 00/100
Sheet copper, 7704	2250 00/100
Sheet copper, 7740	2260 00/100
Sheet copper, 7776	2270 00/100
Sheet copper, 7812	2280 00/100
Sheet copper, 7848	2290 00/100
Sheet copper, 7884	2300 00/100
Sheet copper, 7920	2310 00/100
Sheet copper, 7956	2320 00/100
Sheet copper, 7992	2330 00/100
Sheet copper, 8028	2340 00/100
Sheet copper, 8064	2350 00/100
Sheet copper, 8100	2360 00/100
Sheet copper, 8136	2370 00/100
Sheet copper, 8172	2380 00/100
Sheet copper, 8208	2390 00/100
Sheet copper, 8244	2400 00/100
Sheet copper, 8280	2410 00/100
Sheet copper, 8316	2420 00/100
Sheet copper, 8352	2430 00/100
Sheet copper, 8388	2440 00/100
Sheet copper, 8424	2450 00/100
Sheet copper, 8460	2460 00/100
Sheet copper, 8496	2470 00/100
Sheet copper, 8532	2480 00/100
Sheet copper, 8568	2490 00/100
Sheet copper, 8604	2500 00/100
Sheet copper, 8640	2510 00/100
Sheet copper, 8676	2520 00/100
Sheet copper, 8712	2530 00/100
Sheet copper, 8748	2540 00/100
Sheet copper, 8784	2550 00/100
Sheet copper, 8820	2560 00/100
Sheet copper, 8856	2570 00/100
Sheet copper, 8892	2580 00/100
Sheet copper, 8928	2590 00/100
Sheet copper, 8964	2600 00/100
Sheet copper, 9000	2610 00/100
Sheet copper, 9036	2620 00/100
Sheet copper, 9072	2630 00/100
Sheet copper, 9108	2640 00/100
Sheet copper, 9144	2650 00/100
Sheet copper, 9180	26

Dividends of United States Mines and Oils

Gold, Silver, Copper, Lead, Nickel, Quicksilver, and Zinc Companies.

NAME OF COMPANY		Dividends on Issued Capitalization					NAME OF COMPANY		Dividends on Issued Capitalization						
		Number Shares Issued	Par Val	Paid in 1916	Total to date	Latest Date Amt.			Number Shares Issued	Par Val	Paid in 1916	Total to date	Latest Date Amt.		
Acacia, g.	Colo.	1,438,989	\$1	\$.....	\$136,194	Dec. 25, '12	\$0.01	Golden Eagle, g.	Colo.	480,915	\$1	\$.....	\$8,000	Sept. '01	\$0.01
Adams, S. C.	Colo.	30,000	10	.....	75,000	Mar. 18, '09	.....	Golden Star, g.	Ariz.	400,000	3	.....	12,000	Mar. 18, '09	.....
Alameda Goldfields.	Alaska	2,000,000	25	1,100,000	4,500,000	Apr. 10, '15	5000	Golden Sun, g.	Ariz.	322,000	10	.....	2,000,000	Jan. 1, '10	.....
Alaska Mexican, g.	Alaska	150,000	5	.....	3,000,000	Nov. 28, '15	10	Goldfield Con.	Cal.	3,353,148	10	.....	2,000,000	Jan. 1, '10	.....
Alaska Mines Sec.	U. S.	500,000	25	.....	9,000,000	Apr. 1, '16	1.00	Grand Hope, g. S.	Cal.	500,000	100	.....	941,250	Jan. 1, '05	.....
Alaska Treadwell, g.	Alaska	200,000	25	2,000,000	15,750,000	May 29, '16	.....	Grand Star, g.	Utah	200,000	10	.....	1,000,000	Jan. 1, '10	.....
Alaska United, g.	Alaska	100,000	25	.....	2,045,270	Feb. 25, '16	30	Grand Star, g.	Utah	200,000	10	.....	1,000,000	Jan. 1, '10	.....
Alouez, g.	Mich.	100,000	25	250,000	550,000	Apr. 18, '16	1.50	Grand Star, g.	Utah	200,000	10	.....	1,000,000	Jan. 1, '10	.....
Amalgamated, g.	Mont.	1,538,129	100	.....	103,444,983	Aug. 30, '15	2.77	Granite, g.	Alaska	430,000	1	.....	5,000	Apr. 7, '16	.....
Am. Sm. & R. Co.	U. S.	500,000	100	.....	29,333,333	Mar. 1, '16	1.00	Gravel, g.	Cal.	100,000	10	.....	1,000,000	Jan. 2, '15	.....
Am. Sm. Sec. A. pf.	U. S.	150,000	100	.....	510,000	Apr. 1, '16	1.75	Hecla, S.	Idaho	1,000,000	0.25	.....	1,500,000	May 20, '16	.....
Am. Sm. Sec. B. pf.	U. S.	300,000	100	.....	1,210,000	Apr. 1, '16	1.50	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Am. Zinc & S. M.	U. S.	3,000,000	100	.....	1,000,000	Apr. 3, '16	1.25	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Andromeda, g.	Cal.	2,331,250	50	6,904,750	171,231,777	Apr. 10, '13	50	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Annie Laurie, g.	Utah	25,000	100	.....	439,301	Apr. 23, '05	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Argonaut, g.	Cal.	200,000	10	.....	1,000,000	Mar. 25, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Arizona, g.	Ariz.	100,000	25	.....	20,000,000	Apr. 1, '16	30	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Atlantic, g.	Mich.	100,000	25	.....	900,000	Feb. 21, '05	50	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bagdad-Chase, g. pf.	Mich.	84,819	5	.....	202,394	Jan. 1, '09	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bald Butte, g. S.	Mont.	100,000	10	.....	1,534,000	Apr. 1, '16	1.50	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Baltic, g.	Mich.	100,000	25	.....	7,950,000	Dec. 31, '13	2.00	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Beck Tunnel Con.	Utah	1,000,000	0.10	.....	840,000	Nov. 18, '07	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Big Four Exp.	Cal.	500,000	10	.....	1,000,000	Apr. 1, '16	1.00	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bigman's Haven	Cal.	228,659	5	.....	960,993	Dec. 20, '15	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bigman of Trade, z.	Wis.	120,000	10	.....	7,000,000	Jan. 15, '11	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bismark Res.	Cal.	300,000	10	.....	1,425,000	Oct. 28, '11	20	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bismark Reorganized	Neu.	969,455	5	2,299,571	29,871	Apr. 25, '16	10	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Boss, g.	Neu.	95,000	10	.....	400,000	Dec. 10, '14	10	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Boston & Colo. Con.	Cal.	100,000	25	.....	400,000	Oct. 1, '07	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bost. & Mont. Con.	Cal.	100,000	25	.....	622,000	Dec. 15, '13	1.00	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Breece, L. S.	Cal.	200,000	25	.....	3,935,000	Aug. 15, '13	10	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bruswick Con.	Cal.	300,000	10	.....	20,935	Sept. 15, '15	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bullion B. & Champ	Cal.	100,000	10	.....	2,768,000	Apr. 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bullwhacker, c.	Mont.	450,000	10	.....	1,000,000	Jan. 1, '07	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bunker Hill Con. g.	Cal.	200,000	10	.....	840,000	May 4, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Bunker Hill & Bull	Cal.	1,000,000	10	.....	17,427,000	Jan. 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Butte Alex. Con.	Mont.	75,000	10	.....	11,897	Jan. 10, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Butte-Balaklava, c.	Mont.	250,000	10	.....	125,000	Aug. 1, '10	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Butte Con. Con.	Mont.	1,000,000	10	.....	2,485,000	Apr. 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Butte & Superior, z.	Mont.	272,672	10	2,931,224	8,451,161	Jan. 1, '10	10.75	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Caledonia, L. S. c.	Idaho	2,005,000	10	.....	1,247,431	May 5, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Calumet & Ariz. c.	Idaho	1,000,000	25	.....	2,485,000	Apr. 20, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Cammet & Hecla, c.	Idaho	100,000	25	.....	13,000,000	Jan. 23, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Calvert, z.	Wis.	78,672	10	.....	3,320	Dec. 20, '10	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Campana, g.	Cal.	1,750,000	10	113,584	10,243,500	Jan. 1, '15	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Cardiff, L.	Utah	500,000	10	.....	125,000	Jan. 1, '15	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Carissa, g. S. c.	Cal.	600,000	10	.....	80,000	Dec. 1, '06	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Cass, c.	Cal.	100,000	25	.....	4,000,000	Apr. 1, '04	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Central-Eureka, g.	Cal.	100,000	10	.....	55,000	.....	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Central Eureka, g.	Cal.	100,000	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Central Eureka, g.	Cal.	100,000	10	.....	392,000	.....	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Champion, c.	Mich.	100,000	25	2,050,000	13,080,000	May 7, '14	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Chino Copper, c.	Cal.	877,048	1	87,704	18,356	May 7, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....	1,000,000	May 1, '16	.....	Helen, g.	Idaho	1,000,000	1	.....	1,500,000	May 20, '16	.....
Ch. & N. g.	Colo.	1,431,900	10	.....										

Dividends of Mines and Works—Continued

NAME OF COMPANY	Number Shares Issued	Par Val	Dividends on Issued Capitalization			NAME OF COMPANY	Number Shares Issued	Par Val	Dividends on Issued Capitalization		
			Paid in 1916	Total to Date	Latest Date Amt.				Paid in 1916	Total to Date	Latest Date Amt.
Petro, G. S.	500,000	\$ 1	\$	\$65,000	Aug. 9	06.04					
Pharmacia G. U. S.	1,500,000	\$ 1		91,500	Feb. 10	00.33					
Phelps, Dodge & Co.	500,000	100	2,700,000	48,371,527	Mar. 31	16.00					
Pioneer, E. A.	6,000,000	Mo.		2,041,528	Oct. 7	.03					
Pittsburg, I. Z.	20,000	100		20,000	July 15	.02					
Pittsburg Idaho, I.	1,000,000	100		249,104	July 15	.13					
Pitts Silver Pk.	2,700,000	100		840,600	Dec. 1	.34					
Platteville, I. Z.	500	60		175,500	June 15	30.00					
Plumas Eureka, G.	150,825	100		2,831,294	Apr. 8	.01					
Plymouth Coal	240,000	6		172,500	Dec. 29	.15					
Portland, Colo.	3,000,000	1	180,000	10,357,000	Apr. 20	.16					
Primo Cons. S.	1,000,000	2	75,000	200,000	Apr. 1	.16					
Quartette, G. S.	100,000	10		375,000	July 31	.37					
Quick Silver, P.	45,000	100		1,331,411	Apr. 8	.33					
Quip, G.	1,500,000	100		67,000	Feb. 1	.12					
Quincy, C.	10,000	25	320,000	22,107,500	Mar. 20	.19					
Ray Con. S.	1,450,804	10	774,404	5,355,001	Mar. 31	.16					
Red Bird, G. & C. I.	100,000	10		72,000	Oct. 3	.04					
Red Metal, C.	100,000	10		1,200,000	Apr. 1	.37					
Red Top, G.	1,000,000	10		128,175	Nov. 25	.37					
Reynolds, G.	1,000,000	6		85,000	Dec. 28	.10	.01				
Richmond, G. S. I.	54,000	10		4,453,797	Dec. 23	.90	.01				
Rocco Home, I. S.	300,000	10		157,500	Dec. 23	.06	.02				
Rochester Ld. & C.	4,000	100		190,845	July 1	.12	.50				
Round Mountain, G.	885,018	1		76,964	Aug. 25	.13	.04				
Sacramento, G.	1,000,000	100	572,100	10,620,248	Mar. 20	.16	.20				
St. Joseph, I.	1,454,798	10	1,120,000	6,080,900	May 29	.16	2.10				
St. Mary's M. L.	160,000	25		300,000	Sept. 20	.30	.20				
St. Michael's (Walm.)	10,000	10	20,000	20,000	Sept. 20	.30	.20				
St. Nicholas, G. & C.	10,000	10	20,000	20,000	Sept. 20	.30	.20				
Seven Tr. Ch. S. I.	1,453,007	1		25,741	Apr. 1	.18	.02				
Shannon, C.	300,000	10		750,000	Jan. 30	.13	.50				
Shattuck, A. C.	1,000,000	10	787,500	3,795,000	Apr. 16	.16	1.25				
Silver Hill, G. S.	108,000	10		88,200	June 24	.07	.03				
*Silver King Coal	1,250,000	5	375,000	13,938,885	Apr. 1	.16	.15				
Silver King Con.	100,000	10		250,000	June 16	.10	2.00				
Silver Mines Expl.	10,000	100		872,105	July 20	.13	.04				
Snow Cons. I. S. C.	745,329	1		365,000	Feb. 15	.06	.02				
Skidoo, G.	1,000,000	10		2,235,000	Nov. 22	.06	.03				
Slaughter, S. Z.	1,500,000	10		1,165,610	Oct. 13	.13	.01				
Showstern, C.	200,000	10		165,000	Jan. 7	.05	.30				
Somero, N. M.	277,500	5		1,346,784	May 15	.16	.16				
South Eureka, G. & C.	200,000	10		287,500	Jan. 3	.04	.01				
So. Swansea, G. S. I.	300,000	10		1,850,000	Jan. 7	.05	.30				
Spearfish, G.	1,500,000	10		5,274,408	Nov. 17	.13	.23				
Standard Cons. G. S.	178,300	10		690,000	Sept. 8	.05	.02				
Standard, C.	425,000	10		2,043,597	Dec. 31	.15	.00				
Standard, I. Z.	1,238,362	1		330,500	Sept. 6	.08	.03				
Stratton's Crisp, Ck.	1,000,000	10		5,028,568	Dec. 23	.06	.12				
Stratton's Ind.	1,000,000	10		691,250	Jan. 17	.16	.16				
Str'n's Ind. (New)	1,000,000	10	560,000	2,275,000	Aug. 6	.02	.02				
Strong, E.	1,000,000	10									

Corrected to June 1, 1916

*Includes dividends paid by Silver King M. Co. to 1907—\$10,675.00

Dividends of Foreign Lines and Works

NAME OF COMPANY	Number Shares Issued	Par Val	Dividends on Issued Capitalization			NAME OF COMPANY	Number Shares Issued	Par Val	Dividends on Issued Capitalization		
			Paid in 1916	Total to Date	Latest Date Amt.				Paid in 1916	Total to Date	Latest Date Amt.
Ajuchitan	50,000	\$ 5	\$	\$237,500	July 1	\$3.025					
Anasid y Concordia G.	9,000	50		429,500	July 15	08.128					
Ampero, S. G.	2,000,000	1	100,000	2,032,176	July 10	.16	.05				
Barrio de Medina MH	45,268	20		86,570	Dec. 31	.07	.12				
Beaver Cons. S.	2,000,000	1	600,000	650,000	Apr. 29	.16	.03				
Belle, G.	120,000	100		619,589	May 8	.11	.50				
British Columbia, B. C.	561,764	10		619,589	Jan. 5	.13	.15				
Buena Tierra, Mex.	330,000	5		1,603,340	Jan. 30	.15	.24				
Buena Vista, Ont.	1,000,000	10		2,757,500	July 14	.14	.03				
Canadian Oilfields	600,000	10		257,000	July 15	.14	.04				
Canada Central, Mex.	600,000	10		3,000,000	Mar. 1	.12	.60				
Central Coal	1,000,000	10		295,000	Sept. 1	.15	.08				
Cariboo-McKinney, B. C.	1,250,000	10		36,250	Dec. 2	.06	.02				
City of Montreal, Ont.	500,000	1		128,357	May 15	.09	.01				
City of Montreal, Ont.	4,781,500	1		192,845	Aug. 23	.09	.01				
City of Montreal, Ont.	2,000,000	10		46,000	May 24	.14	.02				
Coal & Iron, Ont.	1,500,000	1		31,000	Dec. 1	.08	.03				
Coal & Iron, Ont.	189,282	5		1,042,259	May 20	.14	.24				
Coal & Iron, Ont.	800,000	10	200,000	3,940,000	Feb. 5	.14	.35				
Coal & Iron, B. C.	58,000	100	230,352	6,107,240	Apr. 1	.16	.25				
Coal & Iron, B. C.	1,999,357	1		2,402,408	July 15	.15	.03				
Coal & Iron, B. C.	200,000	10		1,374,963	July 24	.14	.22				
Coal & Iron, B. C.	1,000,000	10	257,000	600,000	Mar. 1	.14	.50				
Coal & Iron, B. C.	300,000	10		1,600,000	Sept. 30	.13	1.50				
Coal & Iron, B. C.	1,000,000	10		1,374,963	July 24	.14	.22				
Coal & Iron, B. C.	1,147,500	10		9,135,447	July 11	.13	.24				
Coal & Iron, B. C.	250,020	25		10,100	Apr. 24	.11	.15				
Coal & Iron, B. C.	2,000,000	10		3,000,000	Apr. 28	.16	.35				
Coal & Iron, B. C.	1,000,000	10		12,521,250	Feb. 15	.10	.10				
Coal & Iron, B. C.	1,100,000	10		6,000,000	May 1	.16	1.50				
Coal & Iron, B. C.	1,000,000	10		1,000,000	Apr. 23	1.00	.00				
Coal & Iron, B. C.	1,000,000	10		10,444,000	Dec. 26	.16	.50				
Coal & Iron, B. C.	300,000	10		184,871	Mar. 28	.07	.40				
Coal & Iron, B. C.	540,000	10		4,600,000	Apr. 23	.08	.07				
Coal & Iron, B. C.	1,000,000	10		2,735,350	Jan. 3	.16	2.00				
Coal & Iron, B. C.	800,000	10	13,267.12	36,658,910	Jan. 1	.16	.00				
Coal & Iron, B. C.	1,000,000	10		1,881,000	July 5	.16	.50				
Coal & Iron, B. C.	1,000,000	10		888,000	Feb. 27	.16	.02				
Coal & Iron, B. C.	600,000	10		1,374,963	May 16	.21	.20				
Coal & Iron, B. C.	1,000,000	10		975,000	Oct. 21	.10	.00				
Coal & Iron, B. C.	1,000,000	10		8,000,000	Mar. 14	.14	.25				
Coal & Iron, B. C.	1,400,000	10		2,775,700	Mar. 31	.13	.30				
Coal & Iron, B. C.	1,000,000	10		1,000,000	Aug. 14	.11	.35				
Coal & Iron, B. C.	1,000,000	10	149,802	6,000,000	Apr. 20	.16	.05				
Las Cabrilas	1,040,810	\$ 1		\$591,400	June 3	\$2.12	10.00				
Le Roi No. 2, G.	120,000	25		1,435,220	Dec. 15	11.20	20.24				
Lucky Tiger	715,357	10	150,221	3,415,502	May 20	.09	.09				
McKinley-Darragh-Sav.	2,247,692	10	67,431	2,742,630	Jan. 1	.03	.03				
Mezican, I. P.	1,000,000	10		1,815,750	May 1	.12	3.00				
Mexico Con. S.	2,000,000	10		660,000	Mar. 10	.09	.25				
Mexico Mines of El Oro	180,000	10		4,375,000	May 27	.16	.86				
Minas Pedrazzini	1,000,000	10		497,500	Jan. 11	.06	.3				
Mines Co. of Am.	900,000	10		4,369,900	July 25	.13	1.72				
Mining Corp. of Canada	2,075,000	1		2,430,384	Nov. 16	.16	1.23				
Montezuma, I. P.	5,000,000	10		492,500	Nov. 22	.12	3.50				
Montezuma M. & Sm.	500,000	10		100,000	July 20	.10	.00				
Miller Lode	1,250,000	1		175,000	Jan. 3	.14	.11				

National Defense and International Peace



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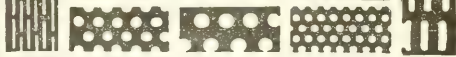
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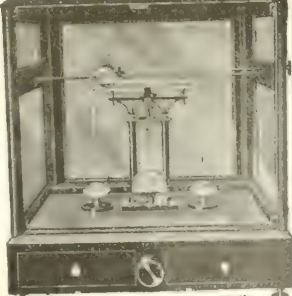
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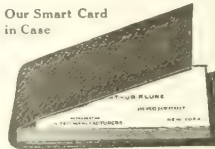
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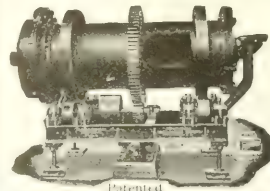


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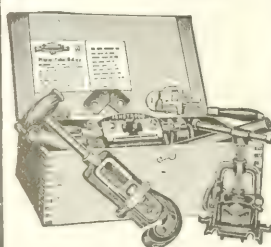
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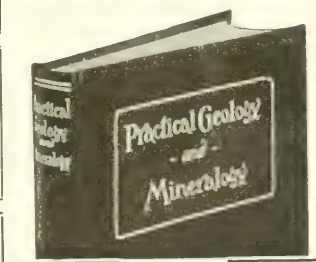
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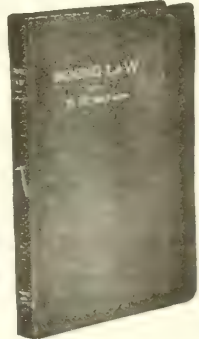
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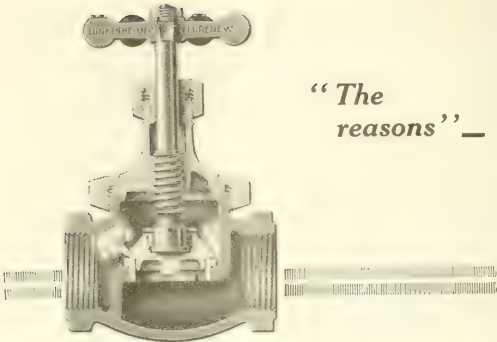
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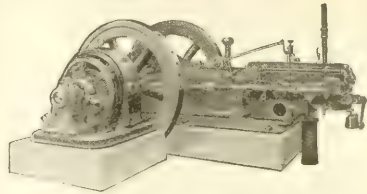
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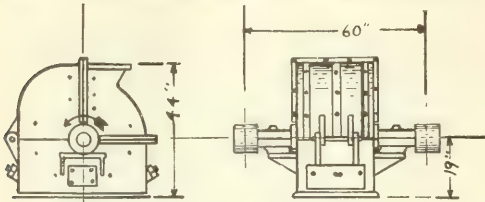
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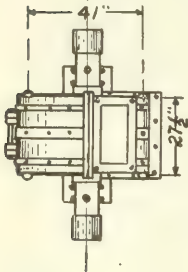
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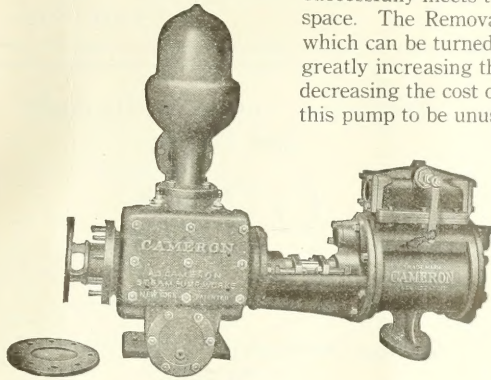
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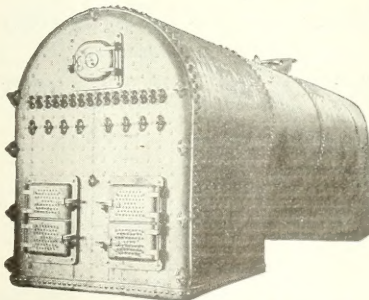
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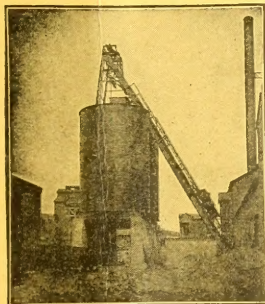
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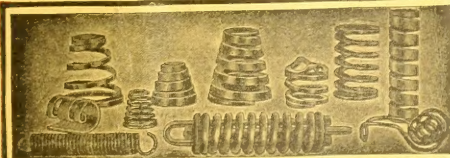
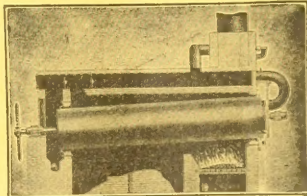
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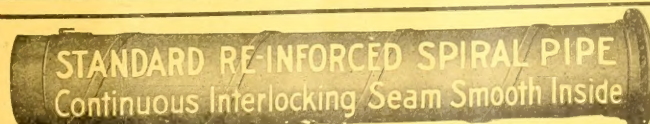
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