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\*Illustrated.

## American Institute of Mining Engineers

Members of the Institute received on the same day last week circulars from two parties, requesting proxies for use in the meeting on Oct. 7. We shall refer to these as the Corning party and the Eilers party, adopting the names of gentlemen to whom the proxies are to be made out, merely for convenience in this article, without implying leadership or especial responsibility in either case. The Corning party proposes to kill the pending amendments to the constitution. The Eilers party does not propose to carry them, but wants to keep them alive until the next annual meeting.

Among the pending amendments are those to change the name of the Institute, and to classify its membership. Neither of these has ever aroused much interest. In fact, there has been a general indifference about them. This being so, there is no good reason to keep them alive, and no doubt the best thing is to vote them down and be done with them.

The only pending amendment of consequence is that authorizing increase of dues to \$15. The Eilers party does not propose to carry this, but prefers to keep it alive for resort if necessary. The Corning party proposes to kill it and to substitute one authorizing an increase of dues for the specific purpose of liquidating the land indebtedness of the Institute and only for such time as will be necessary to do that. In our opinion this will be the more rational and satisfactory procedure. Anyway, there is so little difference between the two parties on this point that an agreement ought to have been reached in a 10-min. conference, saving all the trouble of circularizing and conducting warfare in which a victory by either side will be equivalent to "The Dutch have taken Holland."

The Eilers party has introduced a new issue in calling for a proper recognition of the services of Dr. Raymond. It seems

to us unfortunate that such a personal issue has been introduced. It is based obviously upon the idea that the report of the committee of five was designed to discredit the former management of the Institute, especially Dr. Raymond. We do not think that there was such an intention. The purpose of the committee of five was to give the membership information about its affairs, that ought to have been given by their council and board of directors, which had failed to do so. In fact, the committee of five did not find out anything to the discredit of anybody, except such carelessness or stolidity as an investigating committee might find in the affairs of any of us. The committee called attention to numerous things that might be done in a better and more economical way. The board of directors had previously discovered many of these things on its own account and was already in the course of correcting them; and, moreover, took up promptly the suggestions of the committee.

Unless the Eilers party reads into the report what is not there and contests what it supposes to be the spirit rather than the printed word, there is no reason that we can see in rushing to the defense of Dr. Raymond, who has not been attacked. However, the committee of five did make a suggestion that Dr. Raymond's honorarium as retired secretary might be discontinued as a measure of economy, a suggestion that we have previously characterized as indecent, and we are glad that his friends are giving the membership an opportunity to express themselves about this and reaffirm the recognition of the debt that the Institute owes to him.

The insurgent movement in the Institute crystallized on the matter of increasing the annual dues, but was based on the feeling that the Institute did not do for its members what it could and ought. It appears now that the dues need not be raised, except perhaps temporarily for the liquidation of the land indebtedness, which ought to be done as a matter of

honor, and insofar the insurgent movement has been justified, but as for developing any constructive program to satisfy the cravings that rallied so many members to their banners, the insurgent leaders have done nothing at all. Neither of the parties that is now asking proxies has any great issue, nor on the face of things is there any great difference between them; so wherefore all the trouble?

Yet the Institute never more needed the loyal and thoughtful attention of its members and the consideration of constructive measures. Its affairs have not been run in the best way and the spirit of its membership has waned. This has been fully realized and things to rejuvenate the organization have been done, but rather than to details should attention now be given to some broad principles of reform, among which are establishment of unity of interest among professional men, the concentration of the administration of the organization in a single body, and the popularizing of the organization by giving its members more to do about what is after all their own affair.

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### The Scarcity of Labor

From many quarters of this country come reports of scarcity of labor. These may be explained by the requirements of the expansion in industry that has lately been experienced, by the requirements of harvesting the bountiful crops of this year, and by the exodus to Europe of many men during the lean times following the crisis of 1907, who have not yet returned to this country.

The scarcity of labor is one of the elements in the economic puzzles of the present time. In many places sufficient men are not to be had, and wages have been advanced to attract them. In many places wages have been constantly advancing, with never any reduction, but the cost of living advances as rapidly. In other places, like Lawrence, Mass., there seems to be an oversupply of labor, low wages, and deplorable conditions generally.

If we import a further supply of labor from Europe to work in our mines, mills and factories, to build our railroads, etc., in the face of our halting agricultural development, what will be the effect upon the price of food and the cost

of living generally? The economic situation of the present time is confused and but imperfectly understood, and the feeling that there is something wrong somewhere is perhaps the explanation of the hesitancy in the stock markets of the world.

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### The Metal Markets

We have lately witnessed developments in the markets for all of the important metals that if suggested a year ago would have been received with incredulity. Who would have ventured to say during the gloomy days of September and October, 1911, that within a year we should be exporting manufactures of iron and steel, not to dump a surplus supply but because better prices could be realized abroad than at home? Who dreamed that in the face of an enormous increase in copper production there would be an advance of 5c. per lb. in the price for that metal? Would not all experts have pronounced as fantastic any prediction that America would import round lots of spelter, duty paid, and would be on the verge of exporting domestic lead to Europe? Yet all of these things have happened.

In general, the strange developments have been economically legitimate. We cannot be so confident about the situation in copper for the reason that the increased production has manifestly been delayed from the market in arbitrary ways, and we fear that the statistics upon which we have been accustomed to rely do not disclose the real situation, but there can be no doubt as to the soundness of the advances both in iron and in lead.

Nor can there be any doubt as to the real position of spelter, which we mention separately, because this has become really acute. In America new ore supplies have failed to be developed as expeditiously as expected, and smelting capacity has been strained by the gradual failure of natural gas in Kansas and Oklahoma, which seems to be going on more rapidly than new capacity can be provided in the coal fields of Illinois. Even in the case of new capacity that is available, there is more or less difficulty in utilizing it fully, owing to the scarcity of labor. These conditions have brought about an advance in the price for spelter, such as has not been witnessed in

many years, and finally made it possible for dealers to import substantial tonnages of foreign spelter and pay the duty of 1 $\frac{3}{4}$ c. per lb. These importations were made by houses who foresaw the culminating advance in the American market, purchased supplies in Europe a while back, put them afloat and had them ready for delivery here at the proper time, an operation which has been profitable, as it has turned out.

At the moment European spelter cannot be bought for profitable delivery in this country, because previous American buying, coupled with large buying at home, has advanced the European market and diminished the difference between the prices at London and New York.

The importation of spelter that has already been made has temporarily influenced not only our price but also our conditions of marketing. Aside from the spelter that is used in the brass industry in Connecticut and elsewhere, the bulk of the ordinary spelter is consumed by the galvanizers at Pittsburgh, Wheeling and in the Ohio valley, and being supplied chiefly by smelters situated to the west of St. Louis, the natural basing point for the spelter market has been St. Louis, the price at New York being the St. Louis price plus the freight of 15c. per 100 lb. The introduction of foreign spelter makes New York a basic market for the supply of Connecticut and other nearby points, but, of course, foreign spelter cannot be delivered profitably at Pittsburgh and vicinity in competition with Western spelter until the disparity between the American and European markets becomes greater than it has yet been this year.

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The high prices for tin which have now prevailed for some time have stimulated production in all the larger producing countries, and have drawn out larger exports from the Yunnan province in China. They have not, however, developed any important new sources of supply. The yield from Nigeria, from which much was expected, remains small. Tin discoveries are reported from time to time in different countries, but few or none of them seem to reach the point of actual production, and we continue to rely on the old-time producers for our supplies of this metal.



# Correspondence and Discussion

Views, Suggestions and Experiences of Readers

## Acetylene Lamps

The JOURNAL of Aug. 31, under "Correspondence and Discussion," contains a brief communication on acetylene lamps, by F. M. Lothrop, of Houghton, Mich., as follows: "That the prejudice held by a number of engineers against the use of acetylene lamps underground, is a matter of imagination, was clearly demonstrated to me recently when a prominent member of the profession, forced by circumstances to use an acetylene lamp, became its ardent advocate. . . . There can be no question but that the acetylene lamp has many advantages over other forms of underground lighting previously in use, and that for general purposes it is far superior to such devices as the old-fashioned candle and the newer 'sunshine' lamp." There is one line of underground work, however, in which I, personally, prefer the much-maligned candle, and that is, instrument work of any kind in mine surveying. I believe that many other engineers also hold the same opinion, and that a number of them will be found in the Michigan copper country. For almost any other sort of work, and especially for inspection work of any kind, a casual trip, etc., the acetylene lamp is a wonderful advantage. It may be that the "prominent member of the profession" was converted through just such a circumstance.

For an instrument man, the chief objection to the acetylene lamp in its awkward shape and bulk. Because of this it is impossible to work with such a lamp on one's hat. Many surveyors will doubtless recall the nervous-shocks they have suffered, when, after accomplishing a difficult set-up, they have carefully approached the eyepiece of the transit, only to have the lamp bump against the telescope with sufficient force to necessitate releveling. Whereupon, the first impulse is to attempt to manipulate things with the lamp in the hand. Neither does this work, as with one of these lamps in the hand, there is nothing left to adjust the level screws with. After no little practice under such circumstances, I have found the best results to be obtained by working with an ordinary candle, minus a candlestick. True, the grease drops around promiscuously, but it is easily removed and it is perfectly possible to keep it off the notes.

I do not wish it to be understood that I am advocating the abandonment of the acetylene lamp, nor even the barring of its use by surveyors. Quite the opposite,

for there should be at least one such lamp in every surveying crew. I know of nothing better for hunting up old survey points, examining roof conditions, timbers, etc., but for use in the hands of a transitman, my own experience has been that it is an unmitigated nuisance. For this purpose, and perhaps for this purpose alone, give me the time-honored candle.

SURVEYOR.

Calumet, Mich., Sept. 19, 1912.

## Practical Accuracy

The editorial, "Practical Accuracy," in the JOURNAL of Aug. 24, 1912, seems to indicate that the processes of assaying are, in many cases, mediævally imperfect. The fault would seem to lie with the costs, not with assay methods. To run down 10 or 15 assay tons of tailings in a big Battersea or French clay crucible is absurdly easy, both in principle and practice, until the bills for fluxes, crucibles and fuel begin to come in, after which most superintendents are more than anxious to have an assay run on 1/3 or 1/2 a.t., and to forego the delights of reports down to 0.001 oz. Perhaps the editorial means that the assayers should devise some cheap assay. Perhaps so, but I think here is a case in which one cannot have an omlet without breaking eggs, and that it is simply up to the superintendent to choose between expensive accuracy or inexpensive approximation, and that the assayer can deliver the goods, even with all his mediæval imperfections.

JAMES G. HORTON.

Colorado Springs, Aug. 28, 1912.

## Food Supplies for Miners

The recent articles on food supplies have been both interesting and valuable and I want to offer another contribution, plagiarized from Uncle Sam's Army Regulations, General Order No. 60, which seems to me to throw considerable light on the dark and grievous subject of providing miners with food. Nobody realizes better than those who have struggled with the problem of a mine boarding house that a miner has to be fed much differently than if he were under enlistment, but the fact remains that the army ration is not only sufficient to keep the men perfectly fit but is ample also to support the graceful *embonpoint* of the sergeant-major.

The time is at hand when many camps in our Northwest must be provisioned for the winter and I know of no better basis for the scientific handling of this difficult problem than the U. S. Army ration.

A scrutiny of the figures recently published on this subject in the JOURNAL reveals the fact that in the prime necessities, flour, potatoes, beef, coffee, sugar and butter, in only two instances are the mining-camp consumptions of items below the army ration and in the other instances they range from 30 to 800% higher. Certainly a chance for scientific study in the latter cases. The following table is made up from the figures published and is stated in ounces per man per day:

COMPARISON OF RATIONS

	Army Ration	Cobalt <sup>1</sup>	Candelaria <sup>2</sup>	Alaska <sup>3</sup>	Idaho <sup>4</sup>
Flour.....	18	14	16	23	19
Potatoes.....	20	28	48	28	27
Beef.....	20	28	24	22	28
Coffee.....	1.12	..	..	1.6	2.1
Sugar.....	3.2	..	8	6.8	6
Butter.....	0.5	3	4	3.4	2.2

<sup>1</sup> Eng. and Min. Journ. p. 837. Apr. 27, 1912.

<sup>2</sup> Ibid. p. 1022. May 25, 1912.

<sup>3</sup> Ibid. p. 1259. June 29, 1912.

<sup>4</sup> Ibid. p. 197. Aug. 3, 1912.

Hessy<sup>5</sup> states that a close record over 18 months showed that six to seven pounds of food supplies were consumed per man per day and by estimating certain amounts omitted from the Cobalt data above, the consumption there would be greater than this. Shockley<sup>6</sup> gives the average consumption per man per day at Candelaria as between six and seven pounds. The Army ration amounts to 4 1/3 lb., and one writer says that a man cannot eat more than 3 1/2 lb. per day. Using either of these latter figures the conclusion is obvious either that the miners in the above mentioned cases ought all to have had the gout or the cooks ought to have been fired. It is waste and not appetite in the boarding house which makes it generally a trying proposition to the one in charge of the property. Of course, the cook is about the hardest man on the payroll to be handled, but too often the superintendent has less idea about food supplies than any other part of his job; hence the increased vexation.

In Army parlance. A ration is the allowance for the subsistence of one per-

<sup>5</sup>Ibid. p. 974, May 18, 1912.

son for one day. The garrison ration is intended for troops, whenever practicable, in time of peace, also in time of war.

## GARRISON RATION

Component articles and quantities.	Substitutive articles and quantities.
	Mutton, fresh..... 20 oz.
	Bacon a..... 12 oz.
	Canned meat, when impracticable to furnish fresh meat..... 16 oz.
Beef, fresh. 20 oz.	Hash, corned beef, when impracticable to furnish fresh meat..... 16 oz.
	Fish, dried..... 14 oz.
	Fish, pickled..... 18 oz.
	Fish, canned..... 16 oz.
	Turkey, dressed, drawn, on Thanksgiving Day and Christmas, when practicable..... 16 oz.
	Soft bread..... 18 oz.
	Hard bread, to be issued only when the interests of the Government so require..... 16 oz.
Flour..... 18 oz.	Corneal..... 20 oz.
Baking powder..... 0.08 oz.	
Beans..... 2.4 oz.	Rice..... 1.6 oz.
	Hominy..... 1.6 oz.
	Potatoes, canned..... 15 oz.
	Onions, in lieu of an equal quantity of potatoes, but not exceeding 20% of total issue.
Potatoes b. 20 oz.	Tomatoes, canned, in lieu of an equal quantity of potatoes, but not exceeding 20% of total issue.
	Other fresh vegetables (not canned) when they can be obtained in a whole some condition, in lieu of an equal quantity of potatoes, not exceeding 30% of total issue.
	Apples, dried or evaporated..... 1.28 oz.
	Peaches, dried or evaporated..... 1.28 oz.
Prunes..... 1.28 oz.	Jam, in lieu of an equal quantity of prunes, but not exceeding 50% of total issue.
	Coffee, roasted, not ground..... 1.12 oz.
	Coffee, green..... 1.4 oz.
	Tea, black or green... 0.32 oz.
Coffee, roasted and ground. 1.12 oz.	
Sugar..... 3.2 oz.	
Milk, evaporated, unsweetened. 0.5 oz.	
Vin-gar..... 0.16 gill	Pickles, cucumber, in lieu of an equal quantity of vinegar, but not exceeding 50% of total issue.
Salt..... 0.64 oz.	
Pepper, black..... 0.04 oz.	
Cinnamon. 0.014 oz.	Cloves..... 0.014 oz.
	Ginger..... 0.014 oz.
	Nutmeg..... 0.014 oz.
Lard..... 0.64 oz.	
Butter..... 0.5 oz.	Oleomargarine..... 0.5 oz.
Sirup..... 0.32 gill	
Flavoring extract, lemon..... 0.014 oz.	Vanilla..... 0.014 oz.

a In Alaska, 16 oz. bacon, or, when desired, 16 oz. salt pork, or 22 oz. salt beef.

b In Alaska the allowance of fresh vegetables will be 24 oz. instead of 20 oz., or canned potatoes, 18 oz. instead of 15 oz.

Note.—Food for troops traveling on U. S. Army transports will be prepared from the articles of subsistence stores which compose the ration for troops in garrison, varied by the substitution of other articles of authorized subsistence stores, the total cost of the food consumed not to exceed 24 cts. per man per day, except on Thanksgiving Day and Christmas, when not to exceed 39 cts. is authorized.

PERCY E. BARBOUR.

Uwarra, N. C., Sept. 21, 1912.

## The Iodide Copper Assay

In the JOURNAL of Aug. 31, 1912, Arthur J. G. Smout, in his discussion of my previous remarks on the iodide copper assay, published in the JOURNAL of July 13, seems to have partially misunderstood me. This method is familiar to everyone, but perhaps I was not sufficiently explicit and I will try to make a little clearer what I meant in my last letter when I said the method must be correctly handled.

Mr. Smout says that for complete precipitation of copper with aluminum the solution must be free from hydrochloric and nitric acids. This is true but it is also true that these acids can be removed by fuming with sulphuric acid. Perhaps traces of chlorine may be found in the sulphuric acid after fuming, but if it is fumed hard in the free flame of a bunsen burner, or its equivalent, these acids will never be found in sufficient amount to have any effect on the precipitation of the copper.

He also doubts that copper can be completely precipitated with aluminum. From the opinions of many eminent authorities and from my own experience I believe that copper can be perfectly precipitated with aluminum. It is true that the precipitated copper is readily oxidized, on the sides of the beaker, etc., and will then go back into solution so that solutions tested will at times show copper, but this is a re-solution and not copper which has failed to be precipitated. This is easily overcome by washing the sides of the beaker with dilute hydrogen-sulphide water when it is removed from the hot plate. This not only precipitates any copper which has been redissolved but also prevents any further oxidation. If this addition of hydrogen-sulphide water causes a heavy cloud of sulphides to form which would render filtration difficult, the beaker is put back on the hot plate and the solution boiled for a few minutes longer. The solution will rapidly clear up and further addition of hydrogen-sulphide water will give no precipitation of sulphides. The copper can then be rapidly filtered off and must be washed with hydrogen-sulphide water.

While it is true that copper is precipitated more slowly from solutions containing arsenic, antimony, organic matter, etc., these substances do not offer any serious difficulty and if handled in the above described way a perfect, rapid and complete separation of the copper will result. There is no danger of the sulphuric acid becoming concentrated, for the time of the determination is not great enough for much concentration, but if it should become so it is a simple matter to dilute it.

I was not aware of the fact that hydrogen sulphide is ever passed after the precipitation with aluminum as most of the chemists of my acquaintance in this

country use the method somewhat as I have described it.

It seems to me the superiority of this method over the precipitation of copper as a sulphide lies in the fact that the resulting copper is almost all metallic, which is much more readily dissolved by nitric acid, and also it eliminates the formation of free sulphur, which might readily occlude copper.

Far from only being accurate to 0.1 or 0.2%, as Mr. Smout says, this method is readily accurate to 0.02 or 0.03% and that accuracy is not in any way limited by the chemistry of the method but wholly by the inability of the chemist to titrate any closer when starting with a sample sufficiently small to be conveniently handled.

These statements I have made are not the result of a few experiments carried on for the purpose of presenting a new method but are the outcome of many hundreds of determinations, umpire, control, etc., covering a number of years, many of them made in duplicate, triplicate, etc., and also in collaboration with other chemists. I have developed nothing new in this method but have had perfect satisfaction with it and my reason for entering this discussion was my desire to present this method, handled in this way, to those who might care to use it. The credit, perhaps not for the fundamental principles, but certainly for the perfection of manipulation of this method, is due to A. H. Low, of Denver.

In closing I wish to say again that this method as above partially described is quick, accurate and reliable in every way and is one of the best methods we have at the present day for the determination of copper.

R. L. HALLETT.

Brooklyn, N. Y., Sept. 14, 1912.

## Caving System in Chisholm District—II

In the second instalment of my article on the caving system in use in the Chisholm district of Minnesota, published in the JOURNAL of Sept. 14, I notice that the numbers referring to the illustrations have been changed so that in the text the figure numbers do not agree with those of the diagrams, and I doubt if the article will be readily understood.

In the first column, the reference to Fig. 2 should read "as shown in the plan, Fig. 1." The letters A and B mentioned on p. 511, do not appear on Fig. 3 and the references to the latter in the last two paragraphs should have been to Fig. 5. It might have added further to the clarity of the article to insert a reference to Fig. 2 in the sentence, "The drift is then breasted up, and the room blasted down," in the first paragraph of the next page.

L. D. DAVENPORT.

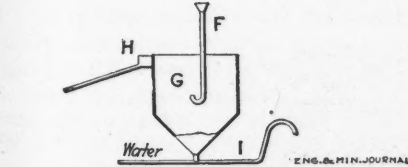
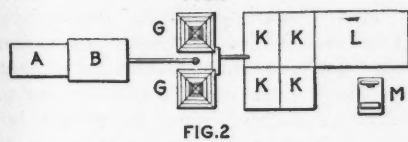
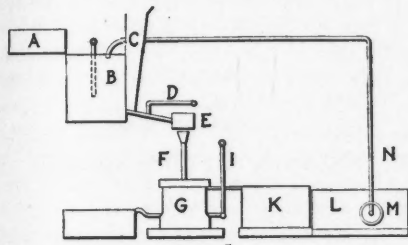
Mesaba, Minn., Sept. 16, 1912.



# The Leuschner Flotation Process

The Leuschner flotation process has already been commented on in the JOURNAL, p. 924, May 11, 1912. Additional details are given below, taken from *Glückauf*, Mar. 9, 1912. The process is a combination oil and gas-flotation process, the gas being generated by carbonates, which are added if they do not already exist in the ore. The method is only to be regarded as a complete substitute for magnetic- or wet-concentration methods on comparatively rich ores containing only one sulphide.

Details of the Friedrichsseggen practice have been given, while below in table I, are presented some results of tests made in the laboratory showing the possibilities of the process. In table II, results of larger tests or mill-runs in lots of 10 to 15 tons are recorded.



LEUSCHNER APPARATUS

The course of concentration by this flotation process is simple; the apparatus is small and simple. Figs. 1 to 3 show the arrangement of a plant which has been built for the Ludwigseck mine near Salchendorf, Neunkirchen County, Westphalia, and put into operation in the summer of 1911. The ore consists of galena and sphalerite associated with siderite; the vein matter is quartz and the country is graywacke. The galena is recovered by jigging, the zinky middlings are subjected to the flotation process.

The tank B (Figs. 1 and 2) contains the separating liquor which is prepared by running enough sulphuric acid from tank A into water heated by steam to 140° to 175° F., to produce a density of 1° to 2° Bé. The classified middlings are charged through a gutter C upon an inclined

Some further details of a combination gas and oil flotation process for separating metallic sulphides from a non-metallic gangue. Oil consumption low and directly proportional to sulphide content, and no attempt to recover the oil is made.

launder under the outlet of B. Near the outlet there is the oil feed pipe D. In the launder the separating liquor, the ore and the oil unite to a pulp and are run on the distributor E, a plain wooden box

tation tanks, and are placed so that the pulp will strike the center of the tanks.

### DETAILS OF OPERATION.

A unit contains two such apparatus fed by a common distributor. The flotation tank is a square wooden box made of 2-in. plank and lined with sheet lead. It is 5 ft. high by 4 ft. 3 in. square, and runs out at the bottom into an inverted truncated pyramid (Fig. 3). In this apparatus the separation of the sulphides from their barren concomitants takes place. On the way from the feed gutter to the flotation tank oil and pulp have had sufficient time to become intimately mixed. The bubbles of carbon dioxide

TABLE I

Kind of Ore	Prevailing gangue	Origin	Worked for	Metal contents in			Yield %
				Ore %	Concentrate %	Tailing %	
Copper pyrites.....	siderite, quartz	Siegerland	Cu	4.8 Cu	20.4 Cu	traces of Cu	97.7
Copper pyrites.....	diabase, quartz	Sauerland	Cu	7.2 Cu	21.8 Cu	tr. Cu	96.9
Galena and blende.....	barite, calcite	Harz	Pb, Zn	15.6 Pb 4.5 Zn	45.2 Pb 12.8 Zn	tr. Pb tr. Zn	97.0
Copper pyrites.....	hematite, calcite	Dill dist.	Cu	15.3 Cu	27.8 Cu	tr. Cu	99.0
Copper pyrites.....	siderite	Siegerland	Cu	5.1 Cu	24.9 Cu	.....	97.6
Galena and sphalerite.....	siderite	Siegerland	Pb, Zn	5.2 Pb 9.1 Zn	17.5 Pb 34.2 Zn	0.4 Pb 0.2 Zn	91.0 98.2
Galena and sphalerite.....	siderite	Siegerland	Pb, Zn	9.4 Pb 13.6 Zn	32.0 Pb 31.0 Zn	0.5 Pb 17 Zn	96.0 93.4
Boulangerite.....	hornblende	Westerwald	Pb, Sb	24.3 Pb 6.9 Sb	34.2 Pb 9.8 Sb	0.9 Pb tr. Sb	98.4
Boulangerite.....	hornblende	Westerwald	Pb, Sb	9.8 Pb 3.8 Sb	27.4 Pb 9.3 Sb	0.4 Pb tr. Sb	97.1
Blende.....	siderite	Siegerland	Zn	11.0 Zn	43.2 Zn	1.8 Zn	84.0
Blende.....	siderite	Siegerland	Zn	9.4 Zn	37.5 Zn	1.3 Zn	89.8
Blende.....	eruptive rock	Norway	Zn	9.2 Zn	30.8 Zn	1.0 Zn	90.0
Blende.....	siderite	Siegerland	Zn	12.5 Zn	41.6 Zn	1.5 Zn	90.0
Copper pyrites.....	siderite	Siegerland	Cu	4.16 Cu	23.4 Cu	0.2 Cu	95.6
Peacock ore.....	calcite	Africa	Cu	2.6 Cu	67.1 Cu	1.28 Cu	92.7
Blende.....	eruptive rock	Norway	Zn	29.2 Zn	58.5 Zn	1.2 Zn	98.5
Blende.....	eruptive rock	Norway	Zn	26.2 Zn	53.4 Zn	1.5 Zn	96.0
Copper pyrites.....	siderite	Siegerland	Cu	6.9 Cu	17.88 Cu	0.24 Cu	83.3
Boulangerite.....	hornblende	Westerwald	Pb, Sb	15.0 Pb 7.1 Sb	26.6 Pb 12.4 Sb	0.08 Pb 0.4 Sb	91.4

TABLE II

Kind of Ore	Prevailing gangue	Origin	Worked for	Metal contents in			Yield %
				Parcel of Ore %	Concentrate %	Tailing %	
Copper pyrites.....	siderite, quartz	Siegerland	Cu	1.3 Cu	14.8 Cu	0.08 Cu	81.3
Galena, sphalerite.....	barite, calcite	Harz	Pb, Zn	10.5 Pb 5.1 Zn	28.7 Pb 15.0 Zn	1.8 Pb 0.2 Zn	89.0
Galena, sphalerite.....	hornblende	Thuringia	Pb, Zn	0.8 Pb 2.9 Zn	8.4 Pb 24.7 Zn	tr. Pb 0.8 Zn	83.0
Galena, sphalerite.....	siderite	Siegerland	Pb, Zn	1.6 Pb 8.3 Zn	6.9 Pb 30.0 Zn	0.7 Pb 0.2 Zn	81.0
Copper pyrites.....	siderite, quartz	Siegerland	Cu	1.12 Cu	11.64 Cu	0.06 Cu	98.0
Copper pyrites.....	siderite, quartz	Siegerland	Cu	2.62 Cu	18.3 Cu	0.34 Cu	84.0
Copper pyrites.....	siderite, quartz	Siegerland	Cu	2.52 Cu	19.8 Cu	0.24 Cu	82.33

lined with sheet lead and having two openings at the bottom for distributing the pulp in the flotation tanks. If the ore is clayey or loamy or is apt to clot, a simple stirring device may be placed between the distributor and the outlet of tank B. The ores of Ludwigseck do not require any stirring. From the distributor the pulp runs through two lead pipes into the flotation tank G. These lead pipes are funnel-like at the top and bent upward at their lower ends to cause the pulp to run uniformly into the flota-

tion tanks, and are placed so that the pulp will strike the center of the tanks. The bubbles of carbon dioxide set free by the sulphuric acid from the siderite inclose the oiled particles of sulphide, causing them to rise to the surface and float there. By a continuous access of new pulp the separating liquor rises over the edge of the flotation tank and enters the overflow launder H which surrounds the former, carrying the floating ore particles with it. The barren matter sinks in the flotation tank to the pointed bottom and is sluiced out through the pipe I by means of a continuous jet of fresh water under pressure. The flo-

tation product, or concentrate, is run with the separating liquor into several settling tanks *K*, where it subsides, while the separating liquor runs into the storage tank *L*, from which it is pumped back by a pump *M* through the pipe *N* into the supply tank *B*, to recommence its circuit. The concentrate is shoveled out at convenient intervals, washed with water, drained and is then ready for the reduction works.

The tanks required for the flotation process are all made of wood and lined with sheet lead wherever there is any contact with the separating liquor. The centrifugal pump used for raising the liquor is made of hard lead. Power is only needed for driving the pump and the cleaning trommel; it amounts to 2 or 3 hp. per unit of the plant. Glover acid of 60° Bé. is used on account of its cheapness. The concentration of the separating liquor is as already stated, from 1° to 2° Bé., but depends upon the solubility of the carbonates and may be lower or higher. The consumption of sulphuric acid also varies and amounts to 40 to 60 kg. of Glover acid per ton of feed according to present experience at the Friedrichssegen dressing works.

Waste oils are used which can be had in large quantities. Their weight and viscosity are determining factors for their applicability. These properties are again dependent upon the condition of the ores to be concentrated. The consumption of oil is uniform if the ore is uniform. The more sulphide particles to be coated with oil the larger will be the consumption of oil. Hence it rises and falls with the metal content of the material. At Friedrichssegen where ore with 10 to 15% zinc is treated, the oil consumption amounts to 4 to 6 kg. per ton of ore. The recovery of the oil, which in other flotation processes is an important item, is not found necessary at Friedrichssegen on account of the small consumption. The oil adhering to the *schlichs* does not interfere with the subsequent reduction process.

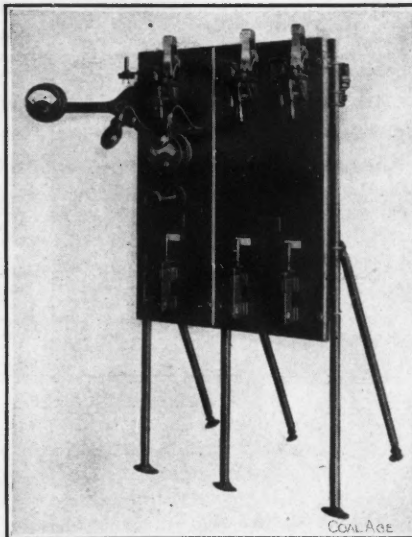
The heat required in the flotation process is at Ludwigseck generated by conducting live steam into the separating liquor, but exhaust steam or other substitutes for creating heat may be used. The steam is solely used for keeping the separating liquor at a fixed temperature. As the separating liquor is in constant circulation the loss of heat which is caused by the contact of the bath with the ore and the tanks has to be made up by fresh steam. The expense for furnishing heat is small; at Friedrichssegen it amounts from 7 to 17c. per ton of ore. The labor requirements of the process are also moderate; one unit (of 10 to 15 tons) requires the attendance of three men. If several units are operated in conjunction two will do.

The cost of moving materials, operating the plant, providing for power and counting in wear and tear amounts to from \$0.96 to \$1.42 per ton of ore at Friedrichssegen. The operating costs depend, however, on local conditions and the metal content of the ore. Rich ores require more separating liquor and the capacity of the tanks decreases. On the other hand there is a larger output of concentrate. With poor ores the expenses are less.

From the description of the Ludwigseck plant it may be inferred that its construction is inexpensive. Its cost may be assumed at from \$1250 to \$1500 per unit of 15 tons in 10 hours.

### Switchboards for Small Mining Plants

The equipment necessary for the control and distribution of electrical energy for small mining plants is simple, comparatively inexpensive, and in general, similar to that used in street railway systems using direct generators for power. Since one side of the system is grounded,



SWITCHBOARD FOR SMALL MINING PLANTS

the switching protecting the measuring apparatus is reduced to a minimum, it being necessary to take care of the generator and feeder circuits of a single polarity only.

However, to obtain safe and satisfactory service, there are a few features which are essential. The equipment should be of sturdy construction and good workmanship, and the panel supports should be insulated from ground to lessen the chance of short circuits. The circuit breakers in the generator circuits should be connected between the negative brushes and the series field to protect the machines from grounds, either internal or between the machine and the panel. The switching equipment should be such that when machines are run in

multiple, the series field of the incoming machine may be connected in multiple with those of the running machines and the voltage adjusted before closing the main switches, as this arrangement insures the correct polarity of the incoming machine and the least disturbance in paralleling.

Often, too, in small mining plants, a separate source of power is not always available for operating the station and switchboard lamps. This may be taken care of by a lighting switch and fuses on each generator panel, using lamps of the same voltage as the generators or of lower voltage and connecting them in series. The lighting circuits should be connected between the circuit breaker and the machine and not at the bus, so that the station can be lighted from any machine before the power is thrown on the line and also to prevent the station from being thrown in darkness should the breakers on all machines open. To meet these requirements the General Electric Co. is marketing a new line of 250-275-volt and 550-575-volt small mining-plant switchboards, illustrated in the accompanying engraving.

### Novelty in Openhearth Practice

According to a paper written by N. S. MacCollum, of the Phoenixville Iron Works, Phoenixville, Penn., for the Congress of Applied Chemistry, openhearth furnaces have for some time been limited in their output by the rate of tapping. Working a larger charge is entirely feasible, but to cast a great body of metal into small ladles means usually that the first of the metal is cast too hot, and the last, too cold. If bigger ladles are used, the ladle skulls are costly to handle.

The problem was solved by Mr. MacCollum by means of a bifurcated spout, which permitted tapping into two ladles at once. By means of this, he has increased the charge in a nominally 50-ton furnace to 100 and even 125 tons.

[The use of multiple spouts is by no means new in copper practice. It has been used for ingots since copper was tapped instead of ladled, and for wire bars since 1902. The problem was the same, to increase the capacity of the furnace by increasing the speed of tapping. —EDITOR.]

### Mineral Production of Peru for 1910

The Peruvian Government reports the following mineral production for 1910: Gold, 708 kg.; silver, 252,565 kg.; mercury, 350 kg.; copper, 27,347 metric tons; lead, 1866; antimony, 49; vanadium ore, 3130; bismuth, 24; tungsten ore, 12; borax, 2351; salt, 17,594; coal, 307,320; petroleum, 167,712 tons.



## American Institute of Mining Engineers

The following circulars, requesting proxies for the October meeting, are being sent to the members of the American Institute of Mining Engineers by the signatories.

New York, Sept. 10, 1912.

Dear Sir:

In February last we addressed a circular to the members asking for proxies to postpone action on the proposed amendments to the constitution and to have a committee appointed to study and report on the affairs of the Institute so that the members might be able to vote intelligently on these propositions. The responses were most satisfactory, over a thousand proxies having been received.

The committee was appointed and was purposely composed of men of very divergent views. Three were among the signers of the circular and two had been members of the board of directors of the Institute for many years. With a committee so constituted the report was necessarily a compromise and did not fully express the views of any one of its members. We hope, however, that it was full and explicit enough to serve the purpose for which the committee was appointed.

The proxies received were also used at that meeting in furthering the election of Messrs. George C. Stone, Charles F. Rand and E. B. Kirby to the directorate of the Institute. They were not voted at all in the matter of the secretaryship of the Institute. This was intended to indicate a suspension of judgment. Mr. Kirby was elected to the board in order to give the very large western membership at least some representation on that body.

At the adjournment of the annual meeting to be held Oct. 7, 1912, some decision should be reached in regard to the amendments proposed last year and probably action will be required on other matters referred to in the report of the Committee of Five. We therefore ask for new proxies to enable us to act on these questions as we do not feel that the old ones, although of sufficient general scope, should be used as they were really granted for a definite purpose that has been accomplished.

We agree with the opinion expressed in the report of the Committee of Five, that the present financial deficit may be met by the reductions which are possible in the expenditures of the Institute. It will, however, take some time to secure this, and it is necessary to provide now for the possibility that the reduction may not be sufficient for the purpose. Therefore:

We propose to offer an amendment to the constitution in the following sense; giving the board of directors the right to increase the annual dues, not to exceed \$5 per year, for such length of time as

may be necessary to pay off the land fund. The increase to be used solely for that purpose and the dues to recede automatically to the present basis of \$10 per year as soon as the object is attained.

It is our opinion: That all of the amendments to the constitution proposed last year should be rejected. That the meeting should be again adjourned to the date of the Cleveland meeting of the Institute. This is to allow of full discussion of any matters appertaining to amendments of constitution and by-laws brought up Oct. 7, before final action at the next annual meeting in February, 1913.

The present constitution precludes action on any amendments which have not been proposed in their final contents at a previous annual meeting.

We inclose a blank proxy, which, to be valid, must be signed, dated and witnessed. On the same sheet are blanks for noting how you wish the proxy to be voted. If no instructions are given we will vote in accordance with the opinions expressed above; and, if any unexpected questions come up at the meeting we will vote the proxies in accordance with the decision of the majority of the signers of this circular who are present at the meeting as we did on February last.

Lewis G. Rowand,  
James R. Finlay,  
George C. Stone,  
John H. Allen,  
J. Parke Channing,  
J. A. Van Mater,

Robert Peete,  
Edmund B. Kirby,  
Richard H. Vail,  
H. M. Chance,  
C. R. Corning,  
F. L. Garrison.

New York, Sept. 19, 1912.

Dear Sir:

At the last annual meeting of the Institute, in February, 1912, a Committee of Five was appointed to investigate all the affairs and operations of the Institute, to see whether an increase in the dues could be avoided, and to report to the board of directors, making such suggestions as they might deem best for the welfare of the Institute. This committee made an exhaustive examination and its report has been distributed to our members. As was shown in the report, the management of the Institute has been striving for some years to reduce expenses and increase efficiency. The suggestions of the committee, even those that seem to be unadvisable or impracticable, are being carefully considered by competent committees of board and council.

There are certain matters which will come before the adjourned business meeting on Oct. 7, 1912, to which careful, dispassionate consideration should be given.

(1) The report of the Committee of Five should be accepted and, with its accompanying papers, correspondence, accounts, reports, etc., be filed in the archives of the Institute, the committee be discharged with thanks, and the Institute be left to the management of its duly constituted authorities, the council and the board of directors.

(2) On the question of increasing the dues, even temporarily, the report of the Committee of Five does not justify a final conclusion.

We believe that our fellow members would neither wish to have the dues unnecessarily increased, nor on the other hand, see the means of the Institute restricted, or its work crippled. We have before us the important matter of paying off the balance of the land debt, and the plans of judiciously aiding the local sections and the professional divisions, on which we count so much to help the growth and widen the beneficial influence of the Institute.

We urge the postponement of action on this question, and also on the other constitutional amendments suggested last year, until the next annual meeting in February, 1913, when we shall have further light from this year's budget. By that time, present uncertainties will be cleared up as to routine finances, voluntary contributions to the land fund, and the amount of new resources coming from the somewhat rapid increase in membership.

(3) We believe that it is not a necessary preliminary to progress and to a solution of the new problems to attempt to throw discredit upon the past management of the Institute, or to belittle the debt of gratitude which the Institute owes to Dr. R. W. Raymond, who served it for so many years with distinction and rare devotion and self sacrifice, and who more than any other man brought it to its high place among the technical societies of the world.

(4) We believe that the membership at large should be given an opportunity to express its indorsement of the action of the board of directors and of the council when they recognized Doctor Raymond's lifelong services and devotion by unanimously electing him an honorary member, and to act affirmatively on the recommendation of the Committee of Five to make possible the conferring upon Doctor Raymond of the title of secretary emeritus.

(5) We believe that the membership at large should be given an opportunity thus to approve of and ratify the action of the board of directors when they took steps to secure for the future his aid in that part of the editorial work of the Institute which he is so eminently qualified to perform.

(6) We believe that the Institute should extend to Doctor Raymond, now that he has retired from the active direction of its affairs, suitable facilities for carrying out such work, with a proper annual stipend along the general lines as arranged by the board at the time of his retirement from active participation in the affairs of the Institute 18 months ago.

If these suggestions appeal to you, we ask you to sign, have witnessed in writ-

ing, and return before the date fixed for the adjourned meeting, October 7, and as soon as you can conveniently do so, the inclosed proxy, to be voted at the adjourned annual business meeting of the Institute, in support of the general policy outlined in the above.

You are entitled to sign this proxy whether you have previously signed another or not. A later proxy supersedes an earlier one.

If you desire to consider more fully the financial situation, the inclosed analysis by a past president of the Institute may be of interest to you.

H. S. Chamberlain,	Wheaton B. Kunhardt,
Ellsworth Daggett,	George F. Kunz,
Henry S. Drinker,	Benjamin B. Lawrence,
Arthur S. Dwight,	Edward P. Mathewson,
Anton Eilers,	Willet G. Miller,
Karl Eilers,	R. V. Norris,
B. F. Fackenthal, Jr.,	Eben E. Olcott,
John Fritz,	James J. Ormsbee,
James Gayley,	Walton T. Page,
C. W. Goodale,	D. M. Riordan,
William H. Howard,	Thomas Robins,
Alexander C. Humphreys,	F. W. C. Schiewind,
Robert W. Hunt,	E. G. Spilsbury,
John H. Janeway, Jr.,	Leonard Waldo,
William Kelly,	Warren A. Wilbur,
Charles Kirchhoff,	William H. Wiley.

#### FINANCIAL ANALYSIS 1912

An analysis of the "Comparative Statement of Receipts and Disbursements for the six years 1906 to 1911, inclusive," appended to the report of the committee of five (see pages 26, 27 and 28), may be useful, to show what the position, financially, of the Institute is now, and will be for the next few years, assuming that it continued at the same rate of normal receipts and expenditures.

The net loss shown by the accountant's statement, taking credit for interest received, amounted to \$12,696.72. During that period the Institute paid in rents and assessments:

#### RENT AND ENGINEERING BUILDING ASSESSMENTS

1906 (rent 99 John St.).....	\$2,500
1907 assessment for operating building.....	10,250
1908 assessment for operating building.....	6,700
1909 assessment for operating building.....	6,000
1910 assessment for operating building.....	4,500
1911 assessment for operating building.....	4,500
Total .....	\$34,450

At the present rate of assessment of \$4500 per year (under which the United Engineering Society is accumulating a fair surplus), the outlays would have been for the same period of six years \$27,000, so that the next period of six years should show a saving in that respect of \$7450.

The total payments for the interest on the Institute's share of the Engineering Building land mortgage for the six years aggregated \$30,462.99, as shown in an accompanying table.

At the present time the Institute is paying interest on \$68,000 net, or \$2720 per annum. Had the generous gifts of friends of the Institute to the land fund been received at the beginning of the period under review, instead of flowing in

at a later date, then there would have been a saving in interest of \$14,142.99, viz., \$30,462.99 less \$16,320 (six years' interest at the present rate).

#### PAYMENTS FOR INTEREST ON MORTGAGE

1906 .....	\$9,133.33
1907 .....	5,200.00
1908 .....	5,200.00
1909 .....	4,276.00
1910 .....	3,520.00
1911 .....	3,133.00

Total ..... \$30,462.99

In order to fairly judge of the ability of the Institute to meet its costs in the future, based on the normal expenditures of the last six years, there must be eliminated the two sums mentioned: \$7450 representing extraordinary building assessments, and \$14,142.99 in interest payments, which it need no longer face.

The two sums amount to \$21,592.99, so that deducting abnormal outlays now no longer a possible burden, the apparent net loss of \$12,696.72 is transformed, so far as the normal conditions of receipts and expenditures are concerned, into a surplus of \$8896.27. This surplus would have enabled the Institute to place to capital account the greater part of the sums received for life memberships, which aggregated \$10,500 somewhat irregularly distributed over the six years under review.

Under present conditions the Institute is not facing an annual deficit in its operating expenses. With an income based on \$10 dues, and normal receipts and expenditures on the scale of those of the period of 1906 to 1911, both inclusive, the Institute will be able not alone to carry on its work as well as heretofore—maintain the standard and volume of its publications—pay the regular annual assessment of \$4500 per annum for its share in the cost of operating the United Engineering Building—pay the interest on the present mortgage debt—and place to capital account hereafter the receipts from life memberships.

In 1907 the Institute had pledged itself under the founders' agreement to pay \$180,000 as its share of the land mortgage, which amount has now been reduced to \$68,000, and no payment will be due on this balance of \$68,000 until 1915. It is believed that through revenue received from the natural increase of membership as well as through further contributions to the land fund from friends of the Institute, this debt will be fully met.

It should be appreciated that such a settlement will give the Institute an unencumbered one-third interest in a property worth \$1,659,320, in which our equity today is not less than \$480,000.

CHARLES KIRCHHOFF,

New York, Sept. 14, 1912.

Jade is mined chiefly in Burma, says U. S. Consul Anderson at Hong Kong, though most of it is marketed from China.

## Steam Hammer Drills

By P. B. McDONALD\*

A contractor in Duluth, while recently excavating a trench 18 in. wide and 4 ft. deep in tough trap rock, found that he was losing money. He had eight drill crews of three men each, who drilled 18 in. per crew per day, or a total of 12 ft. per day. The contractor went to a mining-machinery man to talk it over. Obviously some small "plug" drills were needed. The job did not warrant buying an air compressor, and up to that time plug drills could not be operated by steam, as the valve mechanism expanded with heat and stuck. Beside, the small tortuous ports produced "wire-drawing" of the steam to which compressor air, being quicker, was not subject.

Fortunately a new plug drill had just been put on the market which could be



TRENCHING WITH STEAM PLUG DRILL

operated by steam, due to the advantages of the recently improved "Butterfly" valve. The contractor bought two of these drills and a 3-hp. portable boiler. For the remainder of the job two men, using the plug drills, drilled 6 ft. per man per day, or a total of 12 ft. per day; the other 22 men were dispensed with. The foreman having little to do, attended to the boiler, occasionally throwing in a chunk of coal. The fuel cost was less than \$1 per day. The deepest holes drilled during this work were 4 ft., but this was easily done, and 6-ft. holes could have been put down readily. Thus the drills proved to be the solution of what might have been a difficult problem.

Another use of plug drills which is receiving attention, is for secondary work, such as blockholing large masses which have been blasted by means of holes drilled with heavy reciprocating drills.

\*Mining engineer, Negaunee, Mich.



Under the old method, reciprocating machines on tripods were used to put in holes spaced closely enough to break the rock into small fragments, as hand drilling of chunks was slow work. Now it is possible to space the holes put in with the reciprocating drills so as to break large masses and slabs, which can then be broken up readily by plug drills. By this change of policy in breaking rock, higher efficiency can often be obtained.

On the Mesabi range, plug drills are now used in connection with steam-shovel work to break up boulders, hard pan, frozen ground or rock. The steam for operating can be obtained from the steam-shovel boiler. This method is rapidly superseding the old custom of hand drilling in pit work.

The butterfly-valve mechanism is shown in the accompanying drawing. When the valve has flapped to one side as in Fig. 1, the air supply is connected with the back end of the cylinder and the exhaust with the front end. When it has turned to the

mine. Cobalt district shows a slight falling off in output of silver, but there is a much greater recovery of byproducts. Nickel, copper and pig iron all touch high-water mark in this period.

### Rand Mining Notes

JOHANNESBURG CORRESPONDENCE

In the deepest levels of the Village Deep, on the Central Rand, the main-reef series after flattening to under 30°, is now dipping 40° and giving good assays. It is cheaper to mine on the steeper dip, as less shoveling is required in the stopes, but the highest rock temperature at which it is possible to mine will be reached sooner. At 7000 ft. vertical, a rock temperature of 97½° is expected. Roof pressures will likely prove the deciding factor in limiting mining in depth.

#### AIR-BLAST TROUBLES AT CINDERELLA

In the Cinderella Consolidated at a depth of about 4000 ft. vertical, much

mills, crushed 143,360 tons, against 90,734 tons developed. The ore yielded only 4¼ dwt. gold per ton. Working costs were 16s. 7d. per ton and profit only 1s. 2d. per ton, or £8400. Interest on debentures, etc., absorbed £13,819, and capital expenditure, including inclined-shaft sinking, cost another £10,359. A fire destroyed the joint crusher station of the Knights Deep and Simmer East mines. Another station was in course of erection and only one week's delay was caused. The Knights Deep mine is an example of how cheaply ore can be mined and treated when the reefs are large, where 30% of the ore can be mined from the foot and hanging walls of old stopes and where development is nearly completed. At this mine 270 stamps and six tube mills crushed 60,000 tons per month at a cost of 11s. 2d. per ton, 2d. per ton representing development costs. The ore mined is of about 17s. per ton grade.

The Voorspoed diamond mine made a working profit of £21,800 for 1911-1912; of this, £19,800 was written off for depreciation. The yield decreased to 14.1 carats per 100 loads.

### Southern Aluminum Co. Buys Equipment

The Southern Aluminum Co. is reported to have placed an order for \$400,000 worth of electrical machinery with the General Electric Co. According to press dispatches, the equipment purchased consists of seven 5000-kw. and two 2500-kw., 250-volt, alternating-current generators, with all necessary switchboard and control apparatus, and the contract is probably the largest single one ever given in the South for electrical machinery.

The company purchased from the old Whitney company the unfinished electrical development and 3000 acres of land at Whitney. The dam of the power plant has been finished and work is now progressing on the power house, while work is also being started on the aluminum works proper and 500 concrete cottages of different designs for the employees of the company. The aluminum works proper will consist of nine furnace rooms, 60x500 ft., and an electrode factory of like size. Plans are being made for the development of a second plant to furnish 35,000 hp. later. Bauxite will be secured from Georgia and the Middle West.

### Palladium Production

In 1911, according to the U. S. Geological Survey, 2390 oz. of palladium were produced, 300 oz. from crude foreign and domestic sands and the rest from the refining of copper ores and copper bullion. In 1911, 1218 oz. of palladium were imported, the value assigned being \$56,307. Palladium is chiefly used for certain alloys in dental work; also in

other end, the conditions are reversed. It is evident that the structure of this valve is better adapted for use with steam than are spool and tappet valves, which are likely to stick and which are fed through narrow posts. The Butterfly drills used in the above work are the product of the Ingersoll-Rand Co., 11 Broadway, New York.

### Ontario Mineral Output

The report for the Ontario Bureau of Mines for the six months ended June 30, 1912, for the mineral production of the province is as follows: Silver, 14,258,403 oz.; pig iron, 283,926 tons; nickel, 10,179 tons; copper, 5170 tons; cobalt, cobalt and nickel oxides, crude cobaltiferous material, 854,324 lb.; gold, 11,854 oz.; iron ore, 12,342 tons; lead ore, 17 tons. The items are arranged in order of decreasing value.

The gold is chiefly that from the Dome

trouble is being caused by so called "air blasts." Last month a nominal profit of only £1000 was declared, owing to five stopes of the mine being rendered unworkable for the time by collapses of roof. In this mine about 1000 tons of sand are being sent down for filling. At first attempts were made to send the sand down wet in pipes, but owing to wear of pipes and the great cost of pumping 4000 ft., this method was abandoned. The sand is now sent down dry through a wooden chute about 12 in. square. Jets of compressed air are used at bends to assist. The trouble seems to be that stopes cannot well be filled as worked, and that the effects of pressure act suddenly and unexpectedly. The system of mining may, however, ultimately be modified to deal with the conditions.

Another very deep mine, the Simmer Deep, is in a precarious condition, owing to the low grade of ore met with. Last quarter 135 stamps, followed by tube

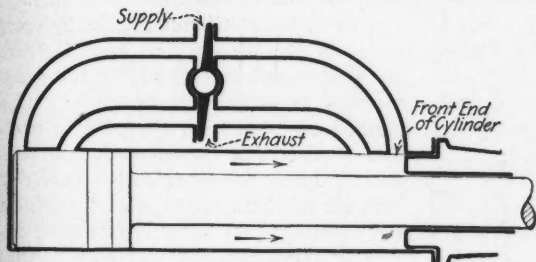


FIG. 1

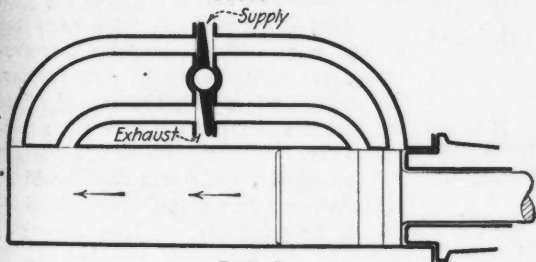


FIG. 2

BUTTERFLY VALVE

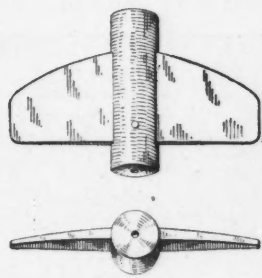


FIG. 3

ENG. & MIN. JOURNAL

the manufacture of astronomical instruments and watches and for soldering platinum metals. The demand is said to be greater than the supply.

### Labor Strike at Bingham

All the laborers at the mine of the Utah Copper Co., and most of the other properties in Bingham Cañon, went out on strike Sept. 18, because of the refusal of the mine owners to advance wages 50c. per shift and officially recognize the union. The men went out, it is said, in spite of the efforts of President Charles H. Moyer, of the Western Federation of Miners, to have work continue until an attempt at settlement without a strike could be made.

Most of the strikers, who number about 5000, are foreigners, Croatians, Greeks, Austrians and Italians predominating. They have organized themselves under crude military discipline, and are said to be ready to offer armed resistance to the entrance of strikebreakers into the region. Rifle pits have been dug on the mountain slope opposite the Utah Copper property, and a few days ago a party of deputy sheriffs was fired upon.

Sheriff Sharp informed Governor Spry that he was unable to cope with the situation with his force of deputies, whereupon the governor visited Bingham with the intention of suppressing disorder by calling out the militia. Since his visit the strikers have been less violent. The Utah Copper Co. increased wages 25c. per day about Sept. 1, at the instance of the miners. This lead was followed by the other mines, but the men were not satisfied with this advance of half what they had demanded, and they resented the company's refusal to recognize the union.

### Survey Work in Alaska

The scope of the field work of the U. S. Geological Survey in Alaska during 1912 has been announced to include a study of the gypsum and marble deposits in the southeastern part of the territory, and detailed surveys of the west end of the Chitina copper belt, as well as of the copper-bearing region adjacent to Galena and Landlocked Bays. The volcanic eruption that took place in the Alaskan peninsula in June caused the deposition of much material on the northern part of Kodiak Island and created much hardship among the settlers. This field is being jointly investigated by the Geological Survey and the National Geographic Society.

The study of the gold districts at Ruby Creek and Iditarod is to be continued as will the investigation of the water supply available for placer mining in the Yukon-Tanana region. A geologist of the Survey corps is accompanying the parties which are surveying the international boundary north of the Porcupine River.

It is expected that during 1912 the Survey will be carried through to the Arctic Coast and thus completed.

The delay in passing the appropriation bill has made it impossible to carry out all the field plans for Alaska that had been formulated for 1912, but the funds that became available by emergency appropriation made it possible to dispatch several of the smaller parties for a full season's work, and others started for Alaska as promptly as the appropriation permitted.

### Progress of the Panama Canal

According to revised estimates of the Panama Canal Commission, Oct. 15, 1913, is the tentative date set for the passage of the first vessel through the canal. Colonel Goethals, in charge of the construction, reports that the canal will be completed below the estimated cost of \$400,000,000. The total amount of excavation work involved in the canal is about 242,134,000 cu.yd., of which 90% has been completed up to Sept. 15. At the present rate of progress the digging should be completed before Sept. 15, 1913. The Gatun dam, locks and spillways show stages of completion varying

ing and heaving. Most of the so called slides were, properly speaking, breaks in the bank due to the inability of an underlying layer of rock to support the enormous pressure of the ground above it. This weight crushes the underlying material, forces it laterally, and causes it to heave in the bottom of the cut. Observations show that the material has heaved to a height of 30 ft. The material involved is not clay as commonly supposed, but argillaceous sandstone. The total area involved in slides, up to June 30, 1912, is 208 acres.

### Mc Dermott Underground Steam Shovel

NEGAUNEE CORRESPONDENCE

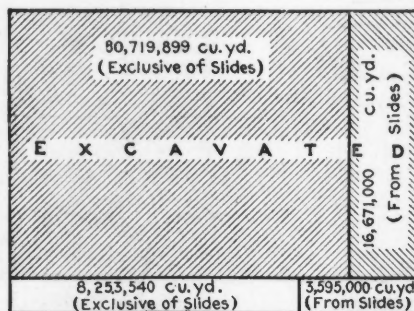
A demonstration was recently given at the Sheridan mine stockpile at Iron River, Mich., of the new underground steam shovel invented by Capt. Harry McDermott. The machine is of compact build for use in drifts underground or in tunnels, for loading muck into tram cars.

A lively interest is manifested by operators on the Menominee Range, where the economical mining of the low-grade deposits is always a problem. It is pointed out that with the present practice of shoveling broken rock into tram cars by hand, the labor cost is nearly as high for this item as the labor for drilling and blasting; that is, in approximate figures, it takes two men per shift to drill and blast a cut, and it requires two men shoveling for a shift to take away the broken rock. While constant improvements are being made in rock drilling, the method of getting the material into the cars has changed but little since mining began.

The underground steam shovel will be manufactured by the McDermott Machinery & Foundry Co. of Iron River, of which H. McDermott is president, C. T. Hampton, secretary, and Charles E. Lawrence, treasurer. A royalty will be paid to the McDermott Mechanical Co., which owns the patent. A model of the shovel was exhibited at a meeting of the Lake Superior Mining Institute several years ago, and it was desired to exhibit a full size machine at the meeting just ended, but delay in the manufacture prevented this.

### Mineral Production of New Zealand

The mineral production of New Zealand for 1911 was, according to the government report, as follows: Gold, 455,266 oz.; coal, 2,068,073 tons; kauri gum, 7587 tons; silver, 1,311,043 oz.; all other minerals, £22,200. Of the last figure, it is understood that over one-half was due to scheelite exports. Outside of the kauri-gum diggers it is estimated 7400 persons were employed in metalliferous mines and 4290 in coal mines during the year.



TOTAL ESTIMATED EXCAVATION AT CULEBRA CUT, JULY 1, 1912. THE UNSHADED PORTION IS YET TO BE EXCAVATED

from 75 to 90%. The concrete work of the Pedro Miguel locks is nearly 95% completed and that of the Miraflores locks over 92 per cent.

The accompanying diagram, drawn from data given in the *Canal Record* of Sept. 4, 1912, shows graphically the total estimated excavation at Culebra Cut inclusive of slides and also the total estimated excavation on account of slides as compared with the total original excavation in the canal prism in the cut; also it shows the estimate of total excavation remaining on July 1, 1912, giving separately the amount of excavation remaining on that date, due to slides.

The work of decreasing the pressure, where breaks and slides might be expected, by excavation with steam shovels, has continued uninterruptedly since January, 1911. The records show that while the lightening of weight has been beneficial, it has not wholly stopped the mov-





## Troubles with Mine Telephones

BY SIDNEY F. WALKER\*

The principal trouble involved in the use of electrical apparatus in metalliferous mines, arises from the fact that they generally carry an extraordinary quantity of water. Electric motors and generators, though the latter are not often used underground, have a much better chance of continuing to work than electric signals and telephones, because the wires employed in their construction are so much larger, that water does not easily attack them.

The great evil to be feared in connection with motors underground in metalliferous mines is the destruction of the insulation; evidently from the experience in the Rand mines, which were flooded during the war, it is possible to guard against that by suitable construction. In the manufacture of electrical apparatus care is now taken to abstract all moisture and air, from the insulating materials employed, and to impregnate them thoroughly with insulating varnish. If the varnish is properly applied, and is thoroughly baked after application, insulation troubles in metalliferous mines are minimized.

With telephones and electric signals the chief difficulty is in the corrosion of the connections, and the screws employed to make connections with leading wires, etc. In telephones, the induction coils are necessarily wound with fine wires, say No. 30 standard wire gage and smaller. The smallest drop of water upon the screw, under which the end of one of the wires from an induction coil is screwed, will cause the connection to be destroyed in a short time. In modern telephonic apparatus, the difficulty is overcome by carrying a larger wire for connecting purposes inside the body of the spool upon which the induction coil is wound and hermetically sealing up the whole thing, in something the same manner as with armature coils and field magnets of dynamos. The same danger arises with the wires forming the coils of electric bells used in signals; and it is to be overcome to a certain extent in the same manner.

The telephone has a number of connections inside the case, which contains the transmitter, switches, and now usually the receiver. If these connecting wires are small, they will easily be parted. In modern telephonic apparatus intended for mining work, all the connecting wires are made of No. 16 gage wire or larger. The trouble is not cured by using strips of brass or copper, because these expose larger surfaces to the electrochemical action which goes on whenever water is deposited upon them. The best results are obtained by solid wires of ordinary section, exposing as small

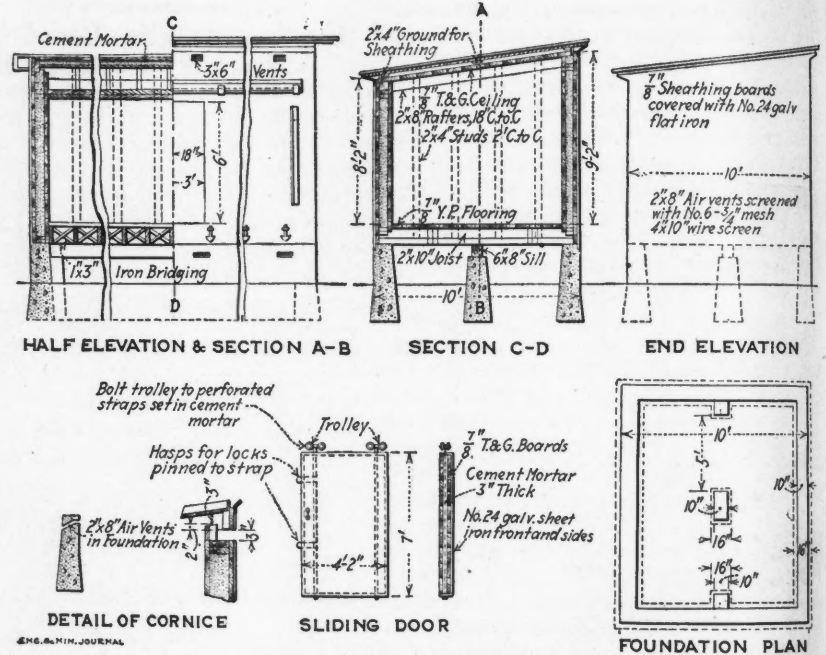
surface as possible for a given strength. The larger wires give a better chance of the connections not being broken, in case water is deposited upon them.

Further protection is afforded by inclosing everything within a metallic case, consisting of a single casting and a cover plate, plate, the joint between the body of the case and the cover being formed by wide flanges, carefully machined. Careful machining and a wide flange, are the two secrets for success in this matter. I have found that when moisture is present in the atmosphere where an electrical apparatus is fixed, it is difficult to keep it out. Water vapor will find its way through the smallest aperture between the cover and the telephone box, or the opening made when a signal button is pressed.

that manner, there should be provision for ventilation to carry off the moisture; otherwise there will be danger of the moisture merely being removed from one part of the apparatus to another.

## Powder Magazine and Thaw House

After an investigation of the methods of storing and handling explosives, the U. S. Bureau of Mines decided that cement-mortar construction was best for magazines and thaw houses for explosives. The magazine and the thaw house, shown in the accompanying engravings were built by the Bureau of Mines and are described in *Technical*



POWDER MAGAZINE RECOMMENDED BY U. S. BUREAU OF MINES

In modern telephonic apparatus, the telephone receivers are fixed on the inside of the containing box, the ear receivers being only acoustic tubes. Great care should be taken to make the joint between the receiver and the box perfectly water-tight. I have found that wherever possible, it is wise to have the connecting screws for the leading wires on the outside of the containing box so they can be seen and quickly cleaned. The terminal screws should be made large, so as to present plenty of surface, and the wires employed for connections between the bells, pushes, etc., should be as large as possible, to withstand for a longer time the effect of electrochemical action due to the presence of moisture.

The method described by L. H. Eddy,<sup>1</sup> by which a 4-cp. lamp was inclosed inside the telephone box, strikes me as a good one; but where heat is applied in

*Paper 18*, by Clarence Hall and Spencer P. Howell.

The cement-mortar magazine has a capacity of 20,000 to 30,000 lb. of explosives and was built at a cost of \$400. The outside dimensions are 10x14 ft. The salient features of the magazine are the cement-mortar walls, sliding door and roof. The cement mortar is 6 in. thick in all walls and 3 in. thick in the roof and the door. The door is secured by two substantial locks. No metal of any kind is exposed on the inside of the magazine. The ventilators above the floor are arranged to prevent the entrance of bullets or firebrands.

The means provided for ventilation were found to be adequate, therefore the storage conditions are favorable for keeping the explosives from deteriorating. The cement-mortar construction is effective in resisting the penetration of rifle bullets, and because of its friable nature offers an additional advantage for the reasons that, in the event of an ex-

\*Bloomfield Crescent, Bath, Eng.

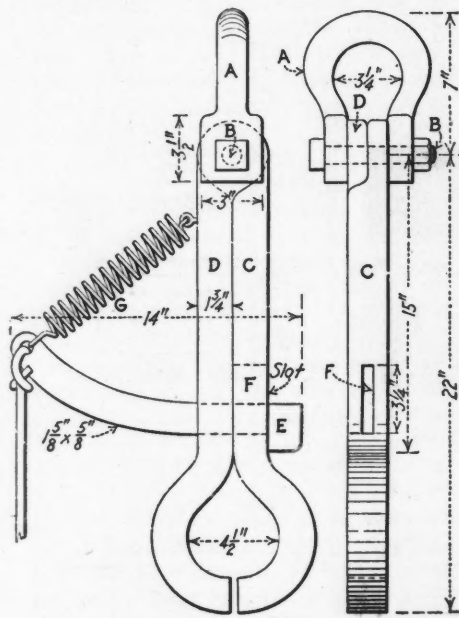
<sup>1</sup>Eng. and Min. Journ., June 8, 1912.





### Releasing Hook for Cage Testing

Usually, when testing the safety catches on skips or cages, the hoisting cable is attached to the cage by a hemp rope, which is cut when the cage is in the desired position. The inspection department of the Cleveland Cliffs Iron Co., in the Lake Superior region, tests all safety dogs once each month. A releasing hook is used instead of the hemp rope and has proved more satisfactory. The accompanying drawing shows the details of the hook, which is strong enough for a five-ton skip of the Kimberley type. The trigger *E* is pinned to the arm *D* and operates in the slot *F* cut in the arm *C*. The trigger catches on the lower back edge of this slot. The pin *B* of the clevis *A*, which fastens the cage to the shackle of the hoisting cable, is removed and the clevis attached to the releasing hook. The hook is now linked



CLEVELAND-CLIFFS RELEASING HOOK

into the drawbar of the skip or cage whose safety dogs are to be tested. When the cage has reached the proper position the rope attached to the trigger is pulled, allowing the arms *D* and *C* to separate and the cage to fall.

At the Cliff shaft of the Cleveland Cliffs Co., the safety-dog testing is done at the bottom of the shaft where actual working conditions as to slippery guides are more nearly duplicated than at the surface. This practice is open to objection, however, if the bottom guides are not worn as much as those higher up.

The danger due to the dogs cutting up the guides is better tolerated at the bottom of the shaft than at the surface. Should the dogs of a heavy skip refuse to work and allow it to fall on the stage at the collar of the shaft, damage might

be done to the shaft timbers; this danger is obviated by the use of the bottom of the shaft for testing purposes.

### Drift Round in Flat Sediments

In the JOURNAL of Sept. 7, 1912, various methods of drifting in the lead district of southeastern Missouri were described. In speaking of the center V-shaped cut used by the Desloge Consolidated Lead Co., making a drift 11 ft. wide and 6 1/2 ft. high, it is stated that this drift cannot be driven as fast as the smaller one, 6 1/2 ft. high and 8 ft. wide; we are informed by Superintendent F. V. Desloge, that this is incorrect. Two one-man machines, working in the large drift, drill 18 holes to the round, making about 100 ft. of hole. A round will square up 5 ft. of advance per shift and the average speed is about 90 to 100 ft. per month of 25 working days. About 50 lb. of dynamite is used to break the round; this is at the rate of 10 lb. per ft. of drift driven. About 25 to 30 tons of rock are broken per round per shift. At the Desloge mine the only extra expense in driving the large drift is the handling of the extra rock, and when working in ore or lean rock, this pays for the extra work.

In making typographical corrections in the article in the JOURNAL of Sept. 7, referring to small drifts, mentioned above, the second and the twentieth lines on p. 442 were misplaced. The sentences in which they appear should have read as follows: "A one-man machine will drill about 40 ft. of hole per shift in average ground, taking out the time required in setting up and loading and blasting." The other sentence should have read: "About 20 lb. of dynamite per foot is used in such a drift and about 12 to 18 tons are broken by a round." Mr. Desloge places the dynamite consumption at his mine at "about 18 lb." per foot of advance in these drifts. In connection with these figures it will be well to bear in mind that only 35% dynamite is used.

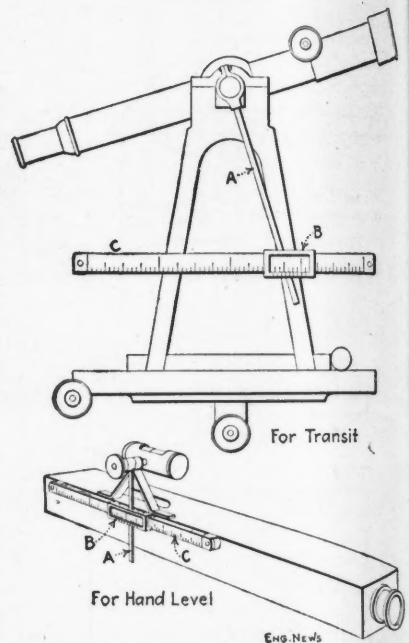
### Illuminating the Cross Hairs in Mine Surveying

In discussing practical problems in mine surveying with several engineers, says George M. Brown (*Coal Age*, Sept. 14, 1912), I find that many of them are still using sheets of white paper torn from note books, etc., to reflect the light upon the plumb bob in taking "sights" below ground. This method requires the illumination of the cross hairs in the instrument.

I find that a small piece of tracing cloth about 6x9 in., held 2 in. behind the plumb bob or string and illuminated from behind, will show good results in sighting up to 300 ft. (depending on power of telescope), and no illumination of cross hairs is necessary. They will stand out clear upon the illuminated tracing cloth. The cloth will easily last one or two days.

### Grade-Reading Attachment for Transits and Levels

The transit attachment illustrated in the accompanying sketch was patented by F. W. Austin, Hartford, Iowa, in 1909, states *Engineering News*. It was designed for the purpose of giving a direct reading of rates of grade by means of the inclination of the telescope. In this design, a rod *A* is attached to the telescope trunnion and extending below it passes through a sleeve on the back of a vernier *B*, causing this to slide along a fixed horizontal scale *C* as the telescope is oscillated on its bearings. The scale is attached to the standards supporting the trunnion bearings. The device is shown in the patent as applicable also to a hand level. In this case (which also is shown in the cut) the scale is attached to the side of the telescope, with space enough between them to permit the radial move-



TRANSIT AND HAND-LEVEL FITTED WITH GRADE-READING ATTACHMENT

ment of the rod, the upper end of which is attached to the trunnion of the spirit level; the radial movement on the rod, as this level is tilted, shifts the sliding vernier along the scale. The vernier is graduated in feet and decimals of a foot.

### Headframe Rolled Aside to Permit Shaft Repairs

At the Maas mine, one of the Cleveland Cliffs Iron Co. properties on the Michigan iron ranges, the headframe was removed by the Foundation Co., in order to gain freer access to the shaft while replacing the wooden lining with concrete. The steel headframe was mounted upon rollers and moved bodily to one side of the collar until the concrete work had been finished.



# Details of Metallurgical Practice

Records of Experience in Ore Dressing, Cyaniding and Smelting

## Esperanza-Federal Classifier

BY FREDERICK MACCOY\*

The Esperanza-Federal classifier, which is the joint invention of H. A. Guess, manager of the Federal Lead Co., Flat River, Mo., and Charles Hoyle, manager of the Esperanza Mining Co., of El Oro, Mex., is used in the El Oro district for separating the slime from the sand before tube milling. At Esperanza two batteries of these classifiers are used. The upper battery takes the stamp-mill product and separates the flocculent slime from the quartz sand, and sends the sand to the tube-mill plant for regrinding, and the slime to the upper Pachucas. The lower battery is working on the tailings dump which was built up in the days before the tube-mill plant was installed. This tailings dump contains a greater proportion of sand, as much of the original slime has been washed away.

The essential features of the classifier, to quote the description of same on which

where it is caught by the scrapers and elevated above the overflow level and discharged over the top of the inclined bed of the classifier.

Various ratios of classification are possible, by altering the speed of the drag chain, spacing of the drags, inclination of the classifier, varying height of overflow slime pan, sprinkling of the sand as it is elevated above the overflow, etc.

Various materials have been used at Esperanza for the scraper bars, such as slotted trommel plates, solid iron bars and angle irons, but the most satisfactory material has been found to be ordinary wooden slats, as they keep ground down to conformity to the bottom, and are inexpensive to replace when worn out. The metal bars develop a tendency to arch somewhat from continued use, and thereafter do not engage the bottom as well as do the wooden bars.

At the mill of the Mexico Mines of El Oro, Ltd., the classifier is made use

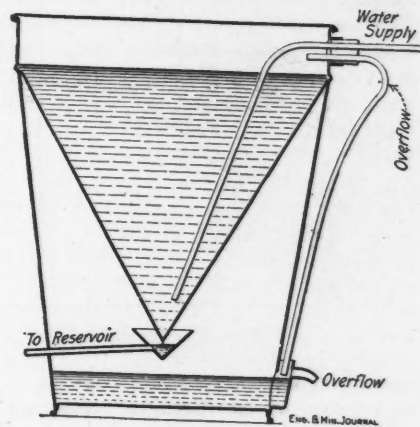
ceives the combined discharge from the stamp batteries and the tube mills. The slime is cut out, and the oversize from both sources is elevated by the drags to a point high enough above the feed end of the tube mill to flow in by gravity.

The classifier has been installed in all of the mills in the El Oro district, with slight variations in dimensions, etc., from the original as built at Esperanza. As indicative of the work which the classifier does, a resumé of tests under working conditions is given in the accompanying table. Samples were taken every 30 minutes.

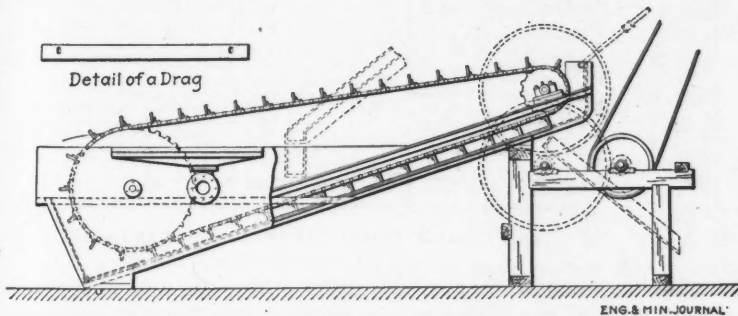
## Water Still

BY E. W. BUSKETT\*

An ingenious still is that in the Merrill assay office, Joplin, Mo. It possesses such qualities of cheapness and effi-



BUCKET CONDENSER



DRAG CLASSIFIER USED IN EL ORO DISTRICT MEXICO

U. S. pat. 565,801 was based, are: "The combination of a settling box having an inclined bottom extending above the overflow level, an extended overflow pan in said box spaced from the ends thereof and presenting an overflow edge, a conveyor in said box encircling the overflow pan in a vertical plane and comprising an endless series of transverse scrapers extending across said box and adapted to engage the bottom, said series extending along said bottom to above the liquid level."

As will be seen by the illustration, the sand and slime enter the classifier through the feed launder; the lighter slime overflowing into the slime-discharge pan and from there out through the slime-discharge pipe. The sand, being heavier, settles to the bottom of the box,

of as a combined classifier and oversize return on the tube mills. A classifier is placed alongside each tube mill and re-

### TESTS OF CLASSIFIER AT ESPERANZA MILL

Test Number	1	2	3
Tons treated.....	11,056	4653	17,035
Number of classifiers....	3	2	2
Screen Test on Feed .....	%	%	%
+ 40 mesh.....	7.4	5.3	1.9
+ 60 mesh.....	9.8	10.1	8.5
+ 80 mesh.....	8.3	10.0	9.2
+ 100 mesh.....	1.4	1.9	1.2
+ 150 mesh.....	21.4	23.0	23.9
+ 200 mesh.....	1.6	0.8	0.4
-200 mesh.....	50.1	48.9	54.9
Screen Test on Sand Product			
+ 40 mesh.....	15.1	15.3	9.1
+ 60 mesh.....	20.2	24.2	25.2
+ 80 mesh.....	15.9	18.4	20.6
+ 100 mesh.....	2.6	2.8	2.4
+ 150 mesh.....	31.3	30.0	32.4
+ 200 mesh.....	1.9	0.7	0.4
-200 mesh.....	13.0	8.6	9.9
Screen Test of Slime Product			
+ 100 mesh.....	0.5	0.8	0.9
+ 150 mesh.....	5.7	6.9	8.8
+ 200 mesh.....	1.0	0.5	0.4
-200 mesh.....	92.8	91.8	89.9

ciency that it should be of interest to all assayers and chemists.

It consists of an ordinary galvanized bucket, a condensing cone and connections and supporting brackets. The bucket cost 25c., the cone and tinner's work \$1.50 and the brackets 25c.

The cone is made of tinned copper, the tin being on the outside of the cone. The connections of water and overflow are of glass and pass through a cork or rubber stopper. The water tube is brought down near the point of the cone while the overflow is curved into the bottom of the bucket as shown. Here is an automatic overflow that keeps the water always at the required depth in the bucket. At the point of the cone is a smaller cone provided with a copper tube which leads the water from the

\*Chief engineer, Esperanza Mining Co., El Oro, Mex.

\*Metallurgical engineer, Joplin, Mo.

still to a carboy or other receptacle. The water is evaporated, condenses on the tinned outer surface of the large cone, is caught by the small cone, and is carried off to the reservoir.

### Air Granulated Slag

A method of granulating blast-furnace slag by means of an air-blast was described in a paper recently read before the Verein Deutscher Eisenhüttenleute, by G. Jantzen, manager of the Buderus Iron Works, where the installation has been in successful operation for over a year, with an output of 100 tons per day, says *Engineer*, Aug. 30, 1912. The slag is delivered from the furnace through a spout into a revolving iron drum about 6 ft. in diameter by 45 ft. long. As it enters the drum the molten slag is met by a blast of compressed air, delivered through a suitable nozzle. This jet of air sprays the slag and flings it against the sides of the revolving drum, the wall of which is kept cool by a flow of water de-

also said to be suitable for use as sand in cases where it cannot be used for cement.

### Chart for Determining Blowing Engine Speed

It often happens, states J. C. Watson in *Power*, that in blast-furnace work the air for the furnaces is supplied by two blowing engines of different sizes. As it is necessary for satisfactory operation to supply a definite amount of air to each furnace, this involves a calculation of the speed at which the engines should run to deliver the required amount.

A convenient way of determining these speeds without any calculation is by the use of a chart similar to the one shown herewith in Fig. 2. This chart is constructed as follows: Suppose that the blast furnace to be supplied uses not less than 30,000 nor more than 45,000 cu.ft. of free air per minute, and that the air is supplied by two blowing engines, one

ing 75 r.p.m., will pump 30,000 cu.ft. of air per minute, so the zero speed of the 350-cu.ft. engine lies somewhere on the line connecting these two points.

Now, if the 350-cu.ft. engine runs at 100 r.p.m., it pumps 35,000 cu.ft. of air per minute. So, if the zero point on the 400-cu.ft. engine line is connected with the 35,000 point on the volume line, it will be known that the point representing 100 r.p.m. of the 350-cu.ft. engine line lies somewhere on this connecting line. Likewise, if the 400-cu.ft. engine is running at 20 r.p.m., it blows 8000 cu.ft. of air per minute, and if this is added to the 35,000 cu.ft. blown by the 350-cu.ft. engine at 100 r.p.m., there is a total of 43,000 cu.ft. of air per minute blown by the two engines.

If, now, 20 is connected on the 400-cu.ft. engine line with 43,000 on the volume line, another line is located on which the point representing 100 r.p.m. of the 350-cu.ft. engine must lie. The intersection of A, Fig. 1, of the two lines determines the exact location of this

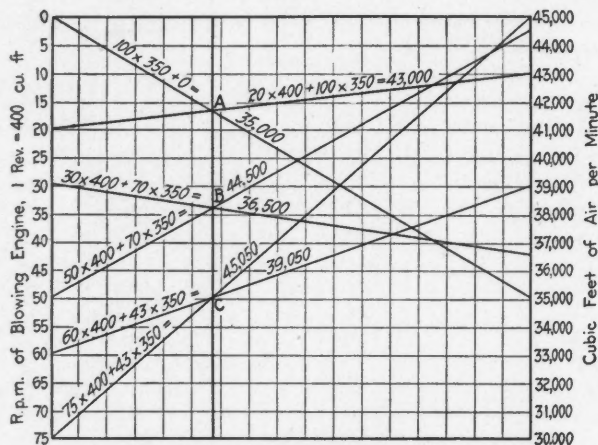


FIG. 1. METHOD OF LOCATING POINTS ON CHART

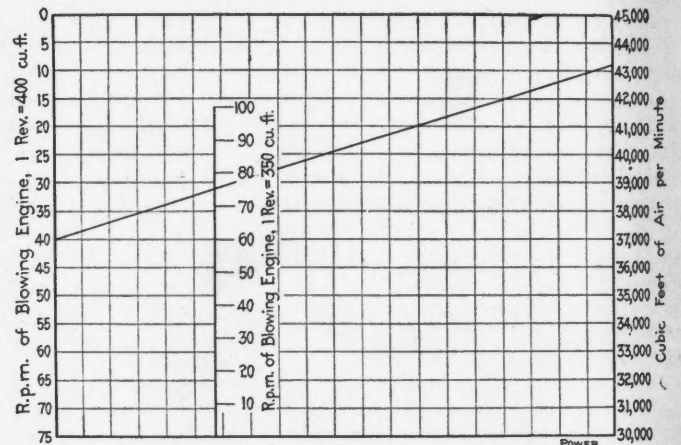


FIG. 2. FINISHED CHART, SHOWING VOLUME OF AIR PUMPED

livered over its outer surface. Owing to the rotation of the drum a fresh and cooled surface is continuously exposed to the shower of particles flung against it by the jet. Stationary scrapers are provided within the drum, which prevent the formation of lumps. The slag is ultimately delivered from the discharge end of the drum as a granulated sand, containing no large masses. As it falls it is received in the boot of an elevator and transported automatically into a storage bin, whence it is transported to the cement works. A chimney is provided at the delivery end of the drum, and carries off all fumes. For cement-making the slag sand thus formed has proved fully equal to water-granulated slag. The latter, however, contains a large percentage of water, which must be got rid of before the slag can be utilized for the production of cement. The air-granulated slag is dry when delivered, and is, moreover, much denser than the water-granulated variety, weighing about 2½ times as much, bulk for bulk. The material is

having a maximum speed of 75 r.p.m. and delivering 400 cu.ft. of free air per revolution, the other having a maximum speed of 100 r.p.m. and delivering 350 cu.ft. of free air per revolution.

Take a sheet of cross-section paper as shown in Fig. 1; divide the left side into 75 equal parts, with the zero at the top to represent the maximum, 75 r.p.m. of the 400-cu.ft. blowing engine. At the right side of the sheet choose another vertical line, and starting with the minimum number of cubic feet of air required per minute at the bottom of the sheet, divide this line into such a number of equal parts that the maximum number of cubic feet of air per minute will be shown on the sheet. It is immaterial whether this comes at the top line of the sheet or not; convenience in making the divisions will determine.

All that remains to be done to complete the chart is to determine the location of the line representing the 350-cu.ft. engine and the size of its divisions. In the present case the 400-cu.ft. engine, mak-

ing 75 r.p.m., will pump 30,000 cu.ft. of air per minute, so the zero speed of the 350-cu.ft. engine lies somewhere on the line connecting these two points.

It is better, however, to locate a few more points, as B and C, in order to check the accuracy of the work. The completed chart is shown on Fig. 2.

Suppose that 43,250 cu.ft. of air per minute is required by the furnace, and that it is desired to run the 400-cu.ft. engine at 40 r.p.m.; then connect these two points with a straight-edge, as in Fig. 2, and it will be found that it crosses the 350-cu.ft. engine line at 75. This means that in order to attain the required result, this engine must be run at 75 revolutions per minute.

A shallow sheet-iron pan filled with sand, and placed on the blacksmith's forge, will be found a valuable asset to an improvised chemical laboratory, when convenient fuels are not available. Care must be exercised in blowing the forge not to get the sand bath too hot in spots.



# The Cost of Doing Things

Data from Mining and Metallurgical Practice

## Iron Mining on the Menominee Range

The old Menominee iron range is situated in the southern part of Dickerson County, Mich., and extends from the Menominee River, the dividing line between Michigan and Wisconsin, east about 20 miles and almost parallel to the Wisconsin state line. To the end of 1910 the active mines had produced 41,568,439 tons of ore and had exposed above their bottom levels 9,177,348 tons of ore. Mr. Finlay, in appraising the mines of this district in 1911, added additional tonnage sufficient to bring the expected future output of the district up to 18,233,000 tons. The principal mines of the district are: the Cyclops, Norway, East Vulcan, West Vulcan, Curry and Brier Hill mines of the Penn Iron Co. These mines extend along the iron formation for about three miles and contain at least 21% of the ore estimated for the district. The Chapin mine of the Oliver Iron Mining Co. is the largest mine and is estimated to have 9,000,000 tons of ore in reserve or almost 50% of the entire tonnage credited to the district. Other mines ranking in the order named are: the Loretto of the Loretto Iron Co., Aragon of the Oliver Iron Mining Co., the Pewabic of the Pewabic Co., and the Mille belonging to the Des-sau Mining Co. The earnings for five years as shown in Mr. Finlay's report for nine companies operating at a profit were \$7,885,624, while two companies lost \$69,365. Basing the average value of the ore for the district at 100%, the cost of producing and delivering it at Cleveland, Ohio, for a five-year period, 1906-1910 was as follows: Mining 33%, exploration and development 2.64%; construction, shafts, machinery, etc., 2.97%; general expenses; including administration, etc., 2.83%; royalties, 7%; taxes, 2.34%; rail-freight, 11%; lake-freight, 15.40% and commissions, 0.02%; a total cost equal to 77.2% of the value of the ore.

## Nitrate Production

According to Diaz-Ossa (*Bull. Soc. Ind. du Nord de la France*, 1912, p. 359), the production of 100 kg. of nitrate of soda requires 80 to 150 liters of water, and 25 kg. of coal. To produce 5000 tons (metric) of nitrate of soda per month from 20 to 25% caliche, about 32,000 cu.ft. of dissolving tanks are required, and about 214,000 cu.ft. of

crystallizing tanks. Such a plant costs about \$500,000. The cost of production of nitrate, in sacks, f.o.b. Chilean ports, is about 0.9c. per lb., of which labor is about 19%, coal 11, other materials 6, general expenses 3, depreciation 9, transport and commissions, export duty 41 per cent.

## Unit Costs, Erie Consolidated

At the Erie Consolidated mines, Gaston, Calif., according to data furnished by S. H. Brockunier, general manager, the unit costs are as given herewith: The mine is operated through a tunnel and 25% of the ore is extracted from stull stopes, and 75% by the shrinkage system. Square setting was formerly carried on, but was found to be too expensive for the grade of ore mined. The vein rock mined consists of quartz and quartz-impregnated slate and the walls are of slate. Laborers are Americans, Italians and Austrians; on an average, 26 men are employed underground per day, including the shift boss and foremen. In the stopes 17 men are employed, eight breaking ore, seven tramming and two timbering; in development four men were employed in advancing and three in mucking and tramming. The daily output from the mine is about 145 tons of rock, 100 tons of which is ore and 45 tons waste. Approximately 80% of the ore and 55.5% of the waste mined comes from stopes and the remainder from development work. The development work consists of about 200 ft. of drifts, 200 ft. of raises and 600 cu.ft. of station pockets per month. According to these figures, four tons of waste are mined for every 10 tons of ore produced and 5.59 tons of rock or 3.85 tons of ore are secured per day per man employed underground. In stoping one ton of waste is mined for every 3.2 tons of ore produced, 6.18 tons of ore and waste are secured per day per man, or 4.7 tons per man engaged in breaking ore, tramming and timbering. Based upon the men breaking ore, 10 tons are secured per man per day and for men tramming the rate is 11.4 tons. One man is employed in timbering in stopes for every 40 tons of ore broken per day or for every 52.5 tons of rock taken out. The consumption of dynamite in stoping ranges from 0.66 to 0.9 lb. per ton of ore broken, and in development about four pounds per foot of advance.

Little timber is used since square setting was discontinued, about  $\frac{5}{8}$  linear feet of round stulls being used per ton of ore in stoping and  $\frac{1}{2}$  ft. per foot of advance in development. Ore chutes cost about \$30 each in place, or 5c. per ton of ore. No electric lights are used in the mine and candle consumption is reported as three per man per 8-hr. shift. It requires approximately one-half hour for men going on shift to get to working faces. Power is furnished by Pelton water wheels working under 330-ft. head of water obtained from the North Bloomfield ditch at a cost of 10c. per miner's inch, or \$3 per 24 hr. for compressor operations. No pumping or hoisting power is required. The average consumption of air in drilling is 360,000 cu.ft. per day, operating two piston and three hammer drills. The piston drills are C-110 2 $\frac{1}{4}$ -in. and B-9 2 $\frac{1}{2}$ -in. Ingersoll-Sergeant drills. In drifts it usually requires 1 $\frac{1}{2}$  hr. to muck back and  $\frac{1}{2}$  hr. to set up machine, two set-ups are made per shift and drilling rate is 55 ft. of holes in an 8-hr. shift. The oil consumption per machine is  $\frac{1}{2}$  pint per shift. In stopes 8-C, Waugh drills are used and the rate of drilling ranges from 36 to 54 ft. per shift. Two men are employed at sharpening drills by hand and sharpen on an average of 40 per day; the actual time required is 4 hr., if drills are in good condition. Air blast is furnished by a hand-operated fan; charcoal is used for fuel and it requires an average of 1 $\frac{1}{2}$  bu. for drills.

In drifting through slate and quartz stringers, a 5x7-ft. drift advances on an average of 4 ft. per shift, labor consisting of one driller, one trammer and one shoveler, with drilling time approximately 5 hr. This is equivalent to 5.84 cu.ft. per man-hour. In running a 5x7-ft. raise through the same kind of ground, one man will advance about 6 ft. per shift of 8 hr., drilling on an average of 5 ft. per shift, and using 4.4 lb. of dynamite per foot of raise.

A trammer shoveling from a rock bottom and loading a 1 $\frac{1}{4}$ -ton car will average 10 cars in 8 hr., tramming 1000 ft., which is equal to 1.6 tons per man-hour. Two men loading and tramming the same distance will average 15 cars, which is equal to 1.17 tons per man-hour. This would indicate that the efficiency of one man under these conditions is almost 36.8% greater than two men performing the same work. In a 100-ft. tram one man will average 14 cars of one ton each

in 8 hr., or 1.75 tons per man-hour. Loading from a chute and tramping a 1¼-ton car 1500 ft., one man averages 20 cars in 8 hr., which is equal to 3.12 tons per man-hour. The average length of tram for the mine is 1000 ft., and the average consumption of lubricating oil for tramping is about 8 gal. per car per month. Wooden-body cars last from six to eight months and car wheels from four to six months; up to date the iron-body cars in use in the mine have been operated for two years.

### Panama Canal Construction

The following costs were taken from a statement of construction expenditures on the Panama Canal to June 30, 1912. The figures include administrative and general expenses but not general items or expenditures for sanitation, hospitals or civil administration. On the Atlantic division the cost for excavating (prism) 31,054,558 cu.yd. averaged about 27.2c.

#### DRY FILL

Cubic yards.....	707,083
Clearing site.....	\$0.0001
Excavation.....	0.0945
Tracks.....	0.0903
Trestles.....	0.0002
Transportation.....	0.0763
Filling.....	0.0582
Maintenance of equipment.....	0.0523
Plant arbitrary.....	0.0710
Division Expense.....	0.0217
Total division cost.....	\$0.4646
Administrative and gen. expense.....	0.0354
Total Cost.....	\$0.5000

#### HYDRAULIC FILL

Cubic yards.....	559,610
Clearing site.....	\$0.0001
Clearing for dredge.....	0.0071
Dredging.....	0.1052
Relay pumps.....	0.0151
Pipe lines.....	0.0125
Wood flumes.....	0.0729
Power.....	0.0014
Small boats.....	0.0033
Maintenance of equipment.....	0.0549
Plant arbitrary.....	0.0850
Division expense.....	0.0084
Total division cost.....	\$0.3659
Administrative and gen. expense.....	0.0170
Total cost.....	\$0.3829

per yd., made up as follows: 2,181,998 cu.yd. of dry excavations at 66.67c.; hydraulic excavation, 29,605 cu.yd. at 39.42c. and 28,842,955 cu.yd. of dredging at an average cost of 24.12c. per cu.yd. On the Gatun spillway, dry excavation has averaged 70.99c. per cu.yd., preparations for foundations \$2.187, masonry \$7.85 and back filling 54c. per cu.yd. The Gatun dam cost to June 30 was \$7,668,405, consisting of 38,425 cu.yd. of dredging excavations at an average cost of 52.16c. per yd.; 10,061,800 cu.yd. of dry filling at 44.57c., 10,514,247 cu.yd. of hydraulic filling at 29.95c. and 40,411 cu.yd. of paving at 36.42c. per yd. On the Gatun locks 4,555,395 cu.yd. of dry excavation has cost 67.6c. per yd., 1,372,451 cu.yd. of dredging 27.75c. and excavating, preparing for foundations \$2 per yd. Dry filling around south approach wall cost 53.42c. per cu.yd., compared with 15.82c. for hydraulic filling.

On the Central division the cost of dry excavating (prism) averaged 80.84c. per cu.yd.; clearing canal line without excavation averaged \$62.02 per acre and masonry \$6.50 per yd. for 1271 cu.yd. On the Pacific division, dry excavation (prism) has averaged 80.6c. per cu.yd. compared with 24.18c. for dredging and 59.77c. for hydraulic excavating. A general average of excavating (prism) shows that 97,886,097 cu.yd. of dry excavation averaged 80.5c. per yd.; 1,127,878 cu.yd. of hydraulic work, 59.4c. and 61,314,214 cu.yd. of dredging averaged 24.2c. per cu.yd. of material.

A statement of the detailed cost per cubic yard for the quarter ended June 30, 1912, shows a comparison between dry and hydraulic filling on the Gatun dam as follows:

An article on steam-shovel work published in the *Canal Record* of Aug. 7 states that the best record made in the Central division was that of shovel No. 207, working 26 days in the Culebra district, which excavated 58,412 cu.yd. of earth, which is equivalent to about 2250 cu.yd. per day.

### Labor Output at the Republic Iron & Steel Co.

The Republic Iron & Steel Co. according to its annual report for year ended June 30, 1912, operates 19 iron mines. They are divided into two groups, viz: The Northern group consisting of the Cambria No. 1, Cambria No. 2, and Lillie mines at Negaunee, Mich.; Sherwood mine, Iron River, Mich.; the Franklin, Victoria; and Onondaga mines, Virginia, Minn.; Pettit, Mariska and Schley mines, Gilbert, Minn.; Willis mine, McKinley, Minn.; Monica mine, Pewabic, Minn.; Bray mine, Keewatin, Minn.; and the Kinney mine, Kinney, Minn. The Southern group consists of the Alfred group, four slopes; Raimund group, three slopes; and the Houston, Tannehill, and Spaulding mines all at Birmingham, Ala. During the year 1371 men were employed in the iron mines and the production of iron ore amounted to 1,722,495 tons, equal to 1250 tons per year per man. As published in a previous article in this department, the tonnage secured per man in 1911 was 1049 tons; 1910, 999 tons; 1909, 999 tons; 1908, 850 tons and in 1907, 611 tons of ore.

In the coke department which includes the coal mines, 619 men were employed at the mines and coke ovens of the Northern division and 1188 in the Southern division, making a total of 1807 men. The total production of coke was 861,761 net tons, an increase of 137,902 tons over 1911. The output per man per year was 476 tons, compared with 397 tons in 1911, 388 tons in 1910, 383 tons in 1909, 311 tons in 1908 and 306 tons in 1907. The Northern division of coal and coke

properties includes the Republic mine and 400 coke ovens at Republic, Penn.; the Atcheson mine and 138 ovens at Gans, Penn.; and the Martin mine and 246 ovens at Martin, Penn. The Southern division consists of the Warner mine and 100 coke ovens, the Thomas mine and 910 ovens, and the Sayreton and Thompson mines, all situated near Birmingham, Ala. The total capacity of the Southern division is 606,000 tons of coke per annum and the total of both divisions, 1,154,800 tons.

The total production of all products by the Republic Iron & Steel Co. and labor employed for the last three years is as follows:

	1912	1911	1910
Iron ore.....	1,722,495	1,861,185	2,050,224
Coke.....	861,761	723,859	670,018
Limestone.....	53,064	88,239	115,473
Pig iron.....	1,007,849	850,863	793,962
Bessemer steel ingots.....	655,673	597,991	681,884
Openhearth steel ingots.....	307,815	6,939	.....
Finished and semi-finished products.....	979,617	684,553	827,515
Total tonnage handled.....	5,588,274	4,813,629	5,139,076
Average number of men.....	11,723	11,588	12,066
Ave. tons handled per man.....	475	415	427

The total amount expended for labor during the year ended June 30, 1912, was \$8,798,160, in 1911 \$8,273,630, and in 1910, \$8,652,102. The average earnings per man were about \$750 per year in 1912, \$710 in 1911 and \$718 in 1910. The current rates are the highest that have been maintained within a decade and represent advances ranging from 25 to 30 per cent.

### New Goch Gold Mines

The 1911 annual report of the New Goch Gold Mines, Ltd., Transvaal, South Africa, states that 480,714 tons of ore were mined and 3679 tons added from the dumps, making 484,393 tons sorted, from which 138,131 tons or 28.52% were discarded as waste. The mill crushed 346,862 tons with 120 stamps in 337.9 days, which is equivalent to 8.55 tons per stamp per day. The cyanide department treated 347,340 tons of sand and slime consisting of 227,220 tons of sand and 120,120 tons of slime, from which 40.67% of all the gold recovered was obtained. The working cost was \$4.06 per ton, made up of \$2.36 for mining; 26c. for sorting, crushing and transportation; 41c. for milling; 32c. for cyaniding; 29c. for general mine expenses; 15c. for head-office expenses; 17c. for development and 10c. for permanent work. The value of the yield was \$5.85, which indicates a working profit of \$1.79 per ton milled.

It is estimated, says *Coal Age*, that every 8 to 12 tons of coal mined in this country requires one chamber prop. The cost of the props is from 10 to 20c. each, thus making the timber cost 1 to 2c. per ton mined.



# Launching a Steel Dredge Hull

By Lewis H. Eddy

The new steel hull of the 15-cu.ft. Natoma No. 8 dredge of the Natomas Consolidated of California was launched on Aug. 13, in the Natoma field of the American River district. The launching of large dredge hulls is not common practice in dredge construction in California. The usual method is to float the hull in the pit in which it is built by turning in the water at the proper time.

### A RECONSTRUCTED DREDGE

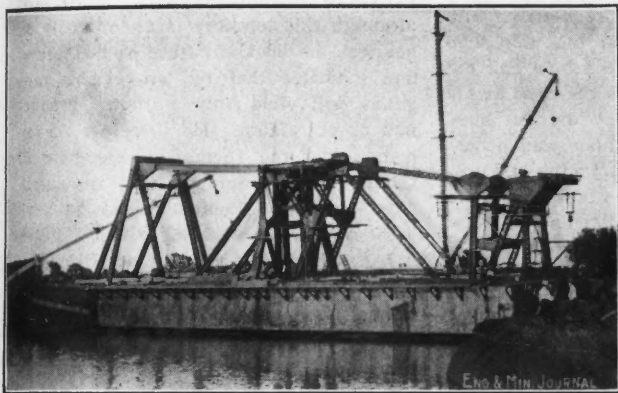
No. 8 dredge is being reconstructed. The original boat was built in 1910 and destroyed by fire in October, 1911. The recovery of the machinery was completed in February, 1912. Reconstruction was

The hull of the reconstructed Natoma No. 8 was assembled and subsequently launched sidewise into the dredging pond, thus departing from the usual method of floating the hull in the pit in which it is built. It was not considered economical to reconstruct this dredge in the old pit, which was 50 ft. deep and full of water.

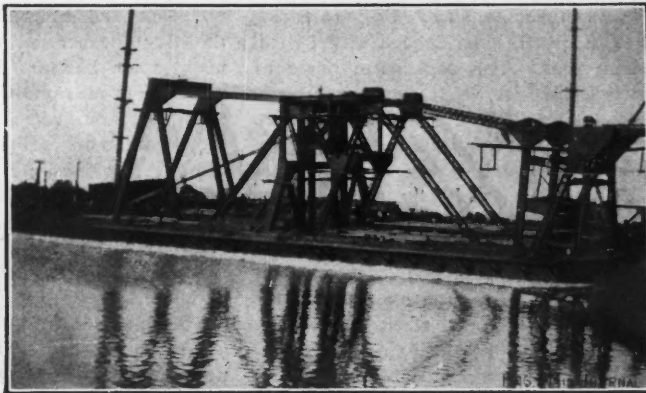
ings is built of wood enveloped by two sheets of iron, making a fireproof siding. They were set up in the shop yards in Michigan, then knocked down and shipped in parts. The machinery and all parts other than the hulls were built by the Yuba Construction Co. at the Marysville shops, and the dredge construction completed by that company.

### AUXILIARY CONSTRUCTION PIT USED

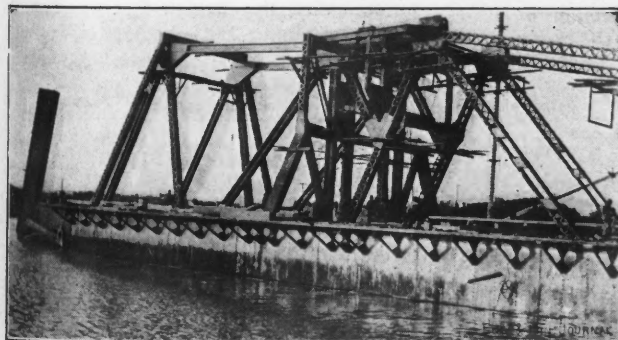
The pit, in which No. 8 dredge was set up and the hull and part of the superstructure completed in the field, was excavated in the bank of the flotation pond, about 160 ft. long and about 60 ft. wide. The trestle and cribbing on which the



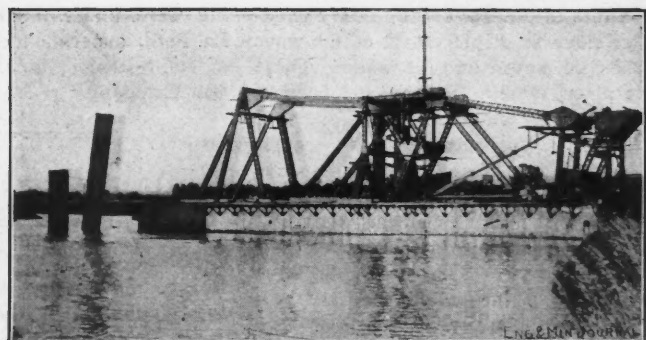
THE RECONSTRUCTED NATOMA NO. 8 ON THE WAYS



ENTERING THE WATER SIDWISE



THE REBOUND AFTER LAUNCHING AND THE HULL STRAIGHTENED IN THE POND



begun in June, 1912. A portion of the recovered machinery is being placed in the new boat. The pond in which the dredge had operated is 50 ft. deep, an impracticable depth for economic construction. So it was necessary to assemble the new hull in a sub-pit on shore at the edge of the flotation pond and to place it in the water by the method of sidewise launching.

The hull is 150 ft. long, 56 ft. wide and 10 ft. deep. When launched the main trusswork of the superstructure and the foundation of one winch were completed, and the planking and calking of the deck about 50% completed. The total weight

of the structure when it went into the water was about 600 tons. The total gross weight of the completed dredge will be about 1200 tons. This dredge and No. 10 dredge in the same field, which was nearing completion at the time of the launching of No. 8, are the first all-steel dredges to be constructed for placer mining in California. They are of the same design and capacity; but No. 10 is new in every part and No. 8 will be equipped with some parts recovered from the original boat.

Both hulls are built entirely of steel except that the decks, roofs and doors are of wood, and the siding of the hous-

bottom of the hull was laid, port side to the water, stood 10 ft. higher than the digging water line on the water side and 5 ft. higher than the water line on the land side. The ways were placed 8 ft. apart, on a grade of 1 in. to 1 ft., on the bottom of the pit. The lowering of the boat to the ways was begun on Aug. 6 and on Aug. 12 it was resting on the ways ready for the launching. The water in the flotation pond rose to a height sufficient to receive the boat on the afternoon of Aug. 13. The pit was not flooded, the water reaching only to and under the lower edge of the hull.

The boat was tripped loose and went

into the water sidewise at 6 p.m. The launching was direct and even, without the slightest jarring, straining or twisting, and without causing a "kick-back" of any of the ways. It floated about 200 ft. toward the center of the pond before being hauled to by men ashore with hawsers attached to bow and stern. A bulwark of heavy planks was lashed to the port pontoon for the protection of the hull from contact with the steel spuds of the original dredge which had been left in the position they occupied at the time of the fire. But the hull was hauled to before it had reached the spuds. The spuds will be picked up and placed on the new dredge, as they were not damaged by the fire.

#### BOAT PLACED ON WAYS

There were 8 ways, each about 80 ft. long, composed of skids and caps. The skids were each constructed of two sticks, 14x12 in., 40 ft. long, spliced with 1½-in. wooden pins. The caps were made of 2 pieces, 14x8 in., 40 ft. long, with 12x4-in. planks 40 ft. long bolted to the sides. The two lengths of caps were bolted together end to end, making a total exact length of 80 ft., while the skids were a little shorter, allowing for the splice. The caps of six of the ways were bolted to the skids at the land end. The caps of the two other ways, one toward the bow the other toward the stern, were each held in position by a tripping device attached by wire rope or cable to a deadman placed on shore outside of the pit. Seven sticks 8x8 in., 6 ft. long, were placed one each between two ways to act as buffers to prevent extraordinary twisting or sidewise displacement of the ways as the hull moved into the water. These were placed within 10 ft. of the ends of the ways at the water side of the pit. But there was no displacement of the ways.

So far as the eye could detect the skids remained in the same position after the hull had gone into the water as when first laid. The skids were greased with ordinary soap grease. The caps of the ways were lashed to the hull at both the port and starboard sides with ropes or wire cables, so that they were carried into the pond and afterward recovered. These ropes were of sufficient length to allow the caps to float clear of the bottom of the hull. To facilitate the movement of the hull when ready for the launching, in case it might be necessary, three sets of jackscrews were placed between the upper bank of the pit and the starboard side of the hull. There were four jacks in each set fore and aft and two jacks in the set at the amidship point. It was found necessary to jack the hull a distance of about four inches after the tripping devices had been loosened.

#### TRIPPERS AND JACKS USED

About an hour before the launching the cables attaching the trippers to the dead-

men were drawn taut by taking up the slack with derrick cables; and within the hour the caps of the six unattached ways were sawed off at the land end, releasing the caps from attachment to the skids, so that when ready for launching the hull while resting firmly on all the ways was held in place only by the two ways to which the trippers were attached. One man was stationed at each tripper and at a signal drove off the clamp by striking with a heavy iron bar, releasing the upper arm of the tripper. The caps of the two ways were thus simultaneously released. The men stationed at the jacks, when it was found the hull did not move instantly, were signalled to turn the screws.

The hull then moved slowly and steadily into the water, immediately righting on an even keel and floated rapidly toward the center of the pond. The entire performance was accomplished with precision and complete regularity, with the single exception that the men who manned the hawsers at the bow end did not haul to as rapidly as the men at the stern end; but when they did get busy they were more active than was necessary; this caused no damaging disturbance of the floating hull, which was made fast immediately. The boiler makers were sent directly into the hold to stop any leaks. These were found to be few and of no serious nature.

The ways and tripping devices were designed by L. D. Hopfield, assistant superintendent of the Natomas Consolidated, who has also general supervision of the construction work in this field. The details of construction and of the launching were under the direction of L. L. La Petit, superintendent of construction of No. 8 dredge, for the Yuba Construction Company.

### Mineral Development of North Borneo

Several years ago the British North Borneo Government made a concession to an exploration company for the sole right of exploring the territory of the State—31,000 square miles—and the possession of all minerals of every kind discovered. Consul Orlando H. Baker reports (*Daily Consular and Trade Reports*, Aug. 7, 1912) that a vast amount of money and labor have been expended, but nothing of value has been found, though there is hope expressed that valuable copper deposits have been discovered at Karang. The efforts of the company to find oil were unsuccessful, but under the encouragement of the government and better conditions, research is to be again commenced.

The report for 1911 states that the concession comprising the entire petroleum rights of British North Borneo has been extended until 1920. The British

North Borneo Government has granted the syndicate a 999-year oil-mining lease over 440 sq.mi. of territory on the Kilas Peninsula, west coast of Borneo, the rental being 25c. per annum and no royalty on production. Drilling operations were carried on in this territory until July, 1911, when they had to be abandoned, owing to a breakage of casing at the bottom of the well, after a depth of 1058 ft. had been reached. Before commencing further drilling, the directors decided to obtain additional expert advice upon the selection of the site of the proposed new well.

Meantime a concession had been obtained for the prospecting rights over 220 sq.mi. of territory in the state of Brunei, adjacent to Miri oil field, Sarawak, belonging to the Shell Transport & Trading Co. J. F. Falkowicz, an experienced oil-field expert, reports that although this territory is undoubtedly oil bearing, the broken nature of the formation indicates that the oil-bearing anticlines will yield only a limited production of petroleum. He therefore recommends that the further development of this territory be deferred until the output from the Kilas Peninsula can be dealt with to greater advantage.

It has been decided to proceed at once with the vigorous development of the Brunei territory and it has, therefore, become necessary to consider the means of further capital. The arrangements for effecting this will be to sell the whole of the assets and undertaking of the present syndicate to a new syndicate to be called the British Borneo Petroleum Syndicate, Ltd., having a capital of £120,000.

### Artificial Graphite

The manufacture of artificial graphite, according to a bulletin of the U. S. Geological Survey, is conducted by means of the electric furnace, an anthracite coal carrying small amounts of evenly distributed impurities being the material from which the ordinary grades are made.

For obtaining the purest grades of graphite, petroleum coke is substituted for anthracite. The process for the manufacture of graphite was patented in 1896 and its commercial development has been so rapid that at present the output of artificial graphite in the United States is greater than the whole domestic production of natural crystalline graphite.

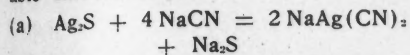
An alloy used for counterfeiting the Austrian florin was composed of: Al, 53.5%; Sb, 46.4%; Pb, As, Fe, a trace each. *Nature* comments that it is unusual for silver-counterfeiting alloys not to contain lead as their chief constituent.



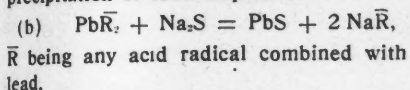
# Lead Salts in Cyanide Treatment

By J. E. Clennell\*

The addition of lead acetate in the cyanide treatment of ores containing silver sulphide has been practiced for several years. The theory of this procedure appears to be as follows. Silver sulphide is soluble in cyanide solutions, with the formation, at least momentarily, of a soluble alkaline sulphide:

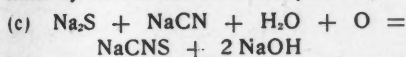


In presence of a lead salt, this alkaline sulphide is immediately removed with precipitation of lead sulphide:

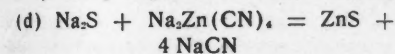


## SOLUBLE SULPHIDES NOT STABLE IN CYANIDE SOLUTION

Soluble sulphides can seldom, if ever, be detected in the solution, and it is probable that, even without the addition of lead salts, they are rapidly destroyed, either by conversion into thiocyanates,

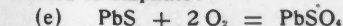


or by the precipitation as zinc sulphide



As, however, silver is precipitable from cyanide solutions by alkaline sulphides, and zinc sulphide is slightly soluble in cyanide, reactions (a) and (d) are, to some extent, reversible, and a state of equilibrium will be reached unless the soluble sulphide is removed by some such reaction as (b). Lead sulphide being more insoluble in cyanide than either silver or zinc sulphide, the addition of a lead salt disturbs this equilibrium, and allows a further quantity of silver sulphide to dissolve.

When the process is carried out in conjunction with aeration, as is usually the case, it is probable that the lead sulphide formed by reaction (b) is quickly oxidized to sulphate:



and is thrown out in the residues in this form.

Any lead remaining in the solution as a soluble compound would be precipitated during the subsequent treatment of the solution with zinc shavings or zinc dust, and even before zinc precipitation it is generally found that only a small proportion of the lead introduced as acetate or otherwise, remains in the solution.

## COMPARATIVE RESULTS WITH VARIOUS LEAD COMPOUNDS

At first sight it might be supposed that only a soluble salt of lead could be effective for the purpose described. Experience shows, however, that almost any lead compound, soluble or insoluble, acts

A study of the action of lead compounds on cyanide solutions as improving extraction and eliminating cyanicides. Lead seems to be especially active in precipitating sulphur before it does harm, but too much lead is as bad as none.

\*Cyanide chemist, Cia. Minera El Barreno y Anexas, San Luis Potosi, Mexico.

in the same way, the efficiency being determined in most cases entirely by the proportion of lead in the compound, and being quite independent of the nature of the acid radical. Even native galena, when finely powdered, was found to give the same action.

The only noteworthy exception to this rule was observed in the case of lead tartrate. Comparative tests made with quantities of lead acetate and tartrate containing equal amounts of lead showed a reduced extraction of silver in the case of lead tartrate, lower in fact than that obtained with solution to which no lead compound was added.

In a typical case, the following extractions were obtained. The tests were made with ordinary plant solution containing the usual impurities, and a sample of Mexican silver ore, containing silver chiefly as sulphide, and ground so that over 99% passes a 200-mesh screen. The other conditions of the test were similar in each case.

## INFLUENCE OF LEAD COMPOUNDS ON EXTRACTION

Lead Salt Added	Amt. Added per ton of Ore Kg.	Silver Extraction		
		Maximum %	Minimum %	Mean %
None.....	.....	87.2	85.4	86.4
Acetate.....	2.5	89.9	88.9	89.4
Oxide (litharge).....	1.71	.....	.....	88.5
Peroxide (PbO <sub>2</sub> ).....	1.84	.....	.....	88.5
Nitrate.....	2.55	.....	.....	88.8
Carbonate.....	2.05	89.2	88.8	89.1
Sulphate.....	2.33	.....	.....	87.5
Sulphide (native galena).....	1.84	89.1	88	88.5
Tartrate.....	2.73	84.1	83.3	83.7
Sodium Plumbate.....	2.73	.....	.....	87.3

The amounts of the various compounds in this series of tests were so chosen that the charges should contain approximately equal amounts of lead per ton of ore.

The bad effect of lead tartrate may, perhaps, be ascribed to some reducing action due to the acid radical. The rather different result given by sodium plumbate may possibly be connected with the fact that in this compound the lead forms

part of the acid radical. With regard to lead sulphate, which also gives a poor result, a test made with solution prepared from fresh cyanide and lime instead of mill solution, gave as good a result as lead acetate.

## EFFECT OF VARYING AMOUNT OF LEAD SALT

The amount of lead compound which must be added to produce the most beneficial effect is by no means a matter of indifference. Tests made with litharge and lead acetate showed that for each of these compounds, when added to a par-

## INFLUENCE OF VARYING AMOUNTS OF LEAD

### SERIES A

With Lead Acetate			With Litharge	
Added per Ton of Ore Kg.	C. P. Acetate Silver Extraction %	Commercial acetate Silver Extraction %	(Commercial) added per ton of Ore Kg.	Silver Extraction %
nil	98.5	89.5	nil	89.5
1	90.7	91.6	0.8	91.7
2*	91*	92.7*	1.6	90.5
2.5	90.5	91.8	2.4*	92.2*
3	89.8	90.6	3.2	87.7
			4	85.9

### SERIES B

With Lead Acetate (C. P.)		With Litharge	
Added per Ton of Ore Kg.	Silver Extraction %	Added per Ton of Ore Kg.	Silver Extraction %
nil	89.3	nil	89.3
0.4	91.4	0.4	91.9
		0.8*	93.6*
1.2*	92.3*	1.2	91.8
2	91.5	2	90.2
2.5	91.6	2.5	89.6
3	91.4	3	90.1

### SERIES C

With Lead Acetate (C. P.)		With Litharge	
Added per Ton of Ore Kg.	Silver Extraction %	Added per Ton of Ore Kg.	Silver Extraction %
nil	84.6	nil	84.6
0.5	83.6	0.5	85.8
1	87.4	1*	88.0*
1.5*	88.1*	1.5	86.8
2	85.5	2	85.6
2.5	85.5	2.5	84.3
3	84.2	3	81.9

\*Most favorable proportion of lead salt.

ticular ore, there is a certain proportion which assists the extraction of silver to a greater degree than any other. Any increase of the lead salt beyond this point is injurious, the extraction being progressively diminished by increasing amounts of lead until it is lower than that obtained without any lead compound.

The above bottle tests were made with mill solutions. In all tests in the same series, the ore, solution and all conditions of treatment were alike. The charge used was 250 grams ore and 500 c.c. solution, agitated for 72 hours. The

solution was made up to about 4% KCN and 1% CaO before treatment.

LEAD SALTS AND HYPOSULPHITES  
SERIES A

Without Lead Acetate*		With Lead Acetate* (2.5 kg. per ton of ore)	
Hypo. added per Ton of Ore Kg.	Silver Extraction %	Silver Extraction %	Improved Extraction due to Acetate %
nil	89.8	92.8	3.0
2	89.6	91.7	2.1
4	89.1	92.1	3.0
8	89.1	91.6	2.5
20	89.2	89.2	nil

\*Fresh solution used in all tests.

SERIES B

Without Lead Acetate			With Lead Acetate (2.5 kg. per ton)		
Hypo. added per ton of Ore Kg.	Silver Fresh Solution %	Extraction Mill Solution %	Hypo. added per ton of Ore Kg.	Silver Fresh Solution %	Extraction Mill Solution %
nil	93.3	89.8	nil	94.6	90.1
2	93.9	89.0	2	94.6	90.1
4	93.0	89.4	4	94.3	88.4
8	93.6	89.0	8	94.2	88.1
20	93.0	88.0	20	93.3	87.1

INFLUENCE OF LEAD COMPOUNDS ON REDUCING AGENTS AND CYANIDES

The addition of lead acetate was found to be beneficial in presence of various substances which ordinarily diminish the silver extraction.

EFFECT OF LEAD ON COPPER SALTS  
SERIES A (Fresh Solution)

Without Lead Acetate		With Lead Acetate		
Cu SO <sub>4</sub> . 5H <sub>2</sub> O Added per Ton of Ore Kg.	Silver Extraction %	CuSO <sub>4</sub> . 5H <sub>2</sub> O Added per Ton of Ore Kg.	Silver Extraction %	Increased Silver Extraction %
nil	93.3	nil	95.1	1.8
2	94	2	96.7	2.7
4	91.5	4	93.6	2.1
6	72.8	6	81.7	8.9
8	19.4	8	27.4	8.0

SERIES B (Fresh Solution)

Cu SO <sub>4</sub> . 5H <sub>2</sub> O Added per Ton of Ore Kg.	KCNS Added per Ton of Ore Kg.	Silver Extraction		Increased Silver Extraction %
		Without Lead Acetate %	With Lead Acetate %	
nil	nil	94.9	95.9	1.0
2	1.6	95.5	95.9	0.4
4	3.2	93.3	94.6	1.3
6	4.8	74.3	85.6	11.3
8	6.4	23.4	46.1	22.7

SERIES C (Mill Solution)

Cu SO <sub>4</sub> . 5H <sub>2</sub> O Added per Ton of Ore Kg.	Silver Extraction		Increased Silver Extraction %
	Without Lead Acetate Kg.	With Lead Acetate Kg.	
nil	89.1	91.4	2.3
1	84.7	87.9	3.2
2	77.7	84.7	7.0
3	71.3	83.1	11.8
4	66.2	81.5	15.3
6	50.8	71.6	20.8

In these tests it is seen that the addition of hyposulphite diminishes the extraction of silver to a slight extent, but in all cases, except the last three, the extraction is better in presence of lead acetate than in the corresponding test without. With mill solution the addition of lead acetate in presence of hyposulphite seems to be injurious.

These tests show the marked deleterious effect of copper on the silver extraction, but in all cases the extraction is better in presence of lead acetate than in the corresponding test without.

SOLUBILITY OF LEAD ACETATE AND LITHARGE IN WORKING CYANIDE SOLUTIONS

The following tests were made to determine what amount of lead actually goes into solution when lead acetate or litharge is added to the mill solution.

On adding acetate, a white precipitate, presumably basic cyanide of lead, occurs, which at first dissolves in the excess of solution, but when the acetate is added in the proportion used in these tests, a permanent precipitate remains. In each case the mixture was agitated over night, filtered, and the undissolved residue weighed:

Substance added	Weight taken, grams	Lead contents grams	Volume of mill solution c.c.	Weight undissolved grams	Lead found in solution grams	Per Cent. of Lead Dissolved
(1) Litharge (commercial).....	1	0.928	500	0.750	0.1075	11.6
(2) Lead acetate c.p.....	1	0.637	500	0.347	0.0965	15.1
(3) Lead acetate commercial....	1	0.637	500	0.290	0.0835	13.1

A considerable consumption of cyanide and also some consumption of alkali occurred in this test during agitation with lead compounds, as appears from the following titrations:

	KCN %	CaO %	Consumed per ton of solution	
			KCN Kg.	CaO Kg.
Original strength after agitation.....	0.31	0.09	1.00	.....
With litharge.....	0.21	0.05	1.00	0.40
With c.p. lead acetate.....	0.22	0.072	0.90	0.18
With commercial lead acetate.....	0.21	0.065	1.00	0.25

The consumption of cyanide is approximately 0.5 kg. for every kilogram of lead salt added.

EFFECT OF EXCESS OF LEAD IN THE ORE

Not only, as pointed out above, is there a limit to the amount of lead compound which can be added with beneficial results in the treatment of a given ore, but in some cases the ore itself may contain enough lead to exert a harmful effect on the treatment. Before using acetate or other lead compound on a working scale, tests should always be made to ascertain whether the addition of such compounds is beneficial or otherwise. Native carbonate of lead is soluble to an

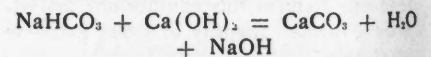
appreciable extent in cyanide solutions, and the lead thus introduced into the stock solution may cause trouble by the consumption of cyanide and by precipitating on zinc, giving rise to a base bullion which is troublesome to smelt and expensive to refine.

REMOVAL OF LEAD FROM SOLUTIONS

Cyanide solutions exert a "selective action" between lead and silver compounds; that is to say, by using a weaker solution it is generally possible to dissolve more silver in proportion to lead, and so to reduce the amount of base metal carried by the solution without materially diminishing the silver extraction. It is, however, possible to precipitate the lead from the solutions with tolerable completeness and at no great cost by adding an excess of an alkaline carbonate or bicarbonate. These reagents precipitate practically the whole of the lead and calcium from the solution, leaving it in good condition for further use, and without precipitating any of the gold or silver.

When sodium bicarbonate is used there is some loss of alkali and an apparent loss of cyanide. The latter is probably only due to the effect of diminished al-

kalinities on the silver-nitrate titration of free cyanide in presence of zinc, as the cyanide strength is restored when the alkalinity is brought to the original figure. The loss of alkalinity seems to be due to the reaction:



in which two equivalents of calcium hydrate are exchanged for one equivalent of sodium hydrate.

It is desirable to remove the precipitated carbonates by filtration or decantation, so as to avoid the possibility of the lead redissolving on continued contact with the solution.

ACCUMULATION OF FOREIGN SALTS IN THE SOLUTION

Under ordinary circumstances, as already pointed out, the lead added in the form of acetate or otherwise shows no tendency to accumulate in the solution, as it is rapidly converted into some insoluble compound. But it must be remembered that the acid radical with which it is combined is not, as a rule, precipitated. In the case of lead acetate, for example, the acetic acid remains in solution in the form of sodium or potassium acetate, and the question arises whether these compounds may not eventually accumulate to



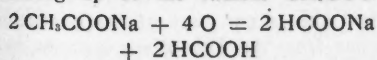
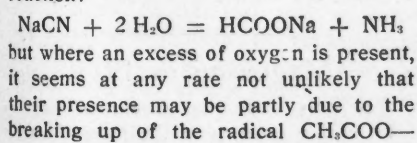
such an extent as to produce injurious effects.

A certain portion of such soluble salts is, of course, constantly discharged in the form of barren solution in the moisture of the residues, and occasionally in solution run directly to waste, but where the final washes are made with water there is a possibility that the amount of foreign salts daily introduced may exceed the amount discharged.

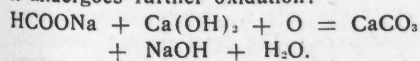
Experiments made by direct addition of potassium acetate showed that it had practically no effect on the silver extraction, injurious or otherwise. An examination of the mill solution, however, revealed the presence of other organic compounds, which may, perhaps, result from the gradual decomposition of the acetic-acid radical. These tests showed the existence of a substance, probably the formic-acid radical, which has a powerful reducing action on silver nitrate. When a quantity of the mill solution, in which the protective alkali has been exactly neutralized by addition of the re-

quired amount of  $\frac{N}{10}$  acid, is mixed with an excess of silver nitrate, the precipitate obtained is brownish, owing to the admixture of metallic silver thrown down by this reducing action. If the precipitate be filtered and washed, first with cold distilled water and afterward with 10% nitric acid, the latter dissolves the precipitated silver. By collecting the acid filtrate apart and titrating with thiocyanate, the amount of reduced silver may be determined. If the alkali in the mill solution is not neutralized as above, there is, of course, in any case a precipitation of silver oxide or hydroxide.

Formates may likewise be produced by hydrolysis of the cyanide itself, especially in warm alkaline solutions, by the reaction:



Sodium formate would act injuriously on the solution, owing to the ease with which it undergoes further oxidation:



In the case of litharge, although no acid radical is introduced, there may be impurities in the commercial article which in time would accumulate in the solution and might have injurious effects.

#### ESTIMATION OF LEAD IN SOLUTIONS

A rapid method of estimating lead in cyanide solutions is desirable in cases where lead acetate or other lead compounds are used in the treatment, or where the ore contains lead minerals liable to be attacked by cyanide.

The electrolytic method of analysis appears to give satisfactory results where small quantities have to be determined, but where the necessary apparatus is not available, I would suggest the following, modified from a method given by A. H. Low ("Technical Methods of Ore Analysis," 3d. Ed., p. 313. Appendix).

To 1.0 liter of the solution add sufficient sodium carbonate to precipitate completely the lead and calcium in the solution. Agitate thoroughly and allow to settle clear. Filter and wash with cold water. Dissolve the precipitate from the filter paper with a sufficient amount, say 50 c.c., of boiling 20% acetic acid. Add 5 c.c. of a 1% potassium-chromate solution, or sufficient to precipitate the lead, leaving an excess of chromate in solution. Boil five minutes, filter and wash with boiling dilute acetic acid. Wash the precipitate back into the flask in which the chromate precipitation was made, add 10 c.c. of 25% sulphuric acid. Boil thoroughly. Cool to room temperature. Add 5 c.c. acetic acid and a crystal or two of potassium iodide and titrate the liberated iodine with  $\frac{N}{10}$  thiosulphate, adding starch at the finish.

The thiosulphate should be standardized on pure lead foil, dissolved in nitric acid, evaporated to dryness, redissolved in acetic acid and treated with potassium chromate, etc., exactly as described.

#### Cortez Associated Mines

The Cortez Associated Mines has issued a report of the operations of the company since its organization in January, 1910. The report states the condition of properties up to July 1, 1912.

The properties of this company are situated in the northern part of the State of Hidalgo, Mexico, in the districts of Jacala, Zimapan and Ixmiquilpan, and consisted originally of 2307 acres, which have now been increased by purchase and denouncement to 4150 acres. The headquarters from which operations are directed is at Jacala, 72 m. north from Sayula, the nearest railroad station.

The properties of the company are said to include copper deposits in contact zones and silver-lead and zinc ores as replacements in limestone, all the ores carrying silver and some gold. The amount of new work performed up to July 1 of this year in drifts, tunnels, cross-cuts and shafts amounted to 17,327 ft., not including 1446 ft. of core drilling. The main tunnel, the Cortez, is 1652 ft. long.

The Pachuca-Zimapan Railroad, which will be of great service to the company, is about 25% completed and work is continuing slowly on it. The company has a staff of engineers at work surveying a railroad line through the mountain

section of the Moctezuma Valley with the idea of eventually making it part of a system which will reach the port of Tampico, about 130 miles distant.

The company's work has not been interrupted by the revolutionary troubles. The general offices of the company are at 53 State St., Boston. William Y. Rice is president and Olof Wenstrom, consulting engineer and general manager.

#### Platinum and Its Uses

The mineral called platinum is really a natural alloy of platinum, iridium, rhodium, palladium, and often osmium, with varying amounts of iron, copper, and gold, according to the U. S. Geological Survey. It is usually found as small nuggets, scales, and rounded or irregular grains; its color is steel-gray. The specific gravity of the crude platinum varies from 14 to 19. The percentage of the metal varies also within wide limits usually from 70 to 85%. In the United States, platinum is almost wholly produced in California and Oregon. The Rambler mine in Wyoming, also produces some platinum, there is a production from gold refining by the U. S. Mint, and one of the Eastern metal refineries is turning out a small amount.

Owing to its high melting point and great resistance to acids, platinum is extensively used for laboratory utensils. Platinum salts are employed in chemical analysis. In the manufacture of sulphuric acid the metal has been used in making large concentration kettles, but of late gold and glass have been substituted for it. In photography, dentistry, and electric installation much platinum is used.

Of late the manufacture of jewelry has consumed large quantities of it. It is extensively used for chains and for the setting of diamonds, as it is more resistant than silver and harder than gold; diamonds set in platinum appear larger than in any other kind of setting.

Owing to the high price demanded for platinum during the last two years, a great demand for a substitute has arisen. At one time much platinum was used in the manufacture of incandescent lamps and of sparking points, but it can be replaced by tungsten. Platinum triangles, used extensively in laboratories, have recently been replaced by similar appliances made of an alloy of nickel and chromium, but the use of this substitute is not recommended by the American Chemical Society's Committee on platinum ware.

The present extensive use of platinum in the manufacture of jewelry is unfortunate, since other metals can be there substituted for it, and this fad is undoubtedly one of the principal causes of the great increase in the price of platinum.

## Notes on Spain's Lead Mining Industry

BY E. MACKAY HERIOT\*

Spain for its size is the largest lead producer in the world, though as a country it takes second place, the United States coming first. On account of the present high prices of the metal a growing activity is noticeable in Peninsular leading-mining camps, the chief of which is La Carolina, with an output of 10,000 tons of concentrate per month.

### HIGH EXPORT TAX

The government levies an export tax of 10 *pesetas*<sup>1</sup> per ton on all lead ore shipped. By this means practically the whole output of the mines is smelted in the country. Yet even after this preventive measure competition is still possible. Lead ore is shipped to Belgium, and not long ago a continental firm applied to me for ore.

There are six smelters in the south of Spain; three at Linares, one at Peñaroya and two in the Cartagena district, Peñaroya being by far the largest. These works have formed a ring, and thus obviate unnecessary competition in the buying of ores, the latter being distributed according to agreement.

The value of Linares ore (75% Pb and about 180 grams Ag per ton) with lead at £19 may be taken as being 308 *pesetas*. Under ordinary circumstances the working cost in the chief mining centers is about 100 to 115 *pesetas* per ton of concentrate, which leaves a good profit. The government duty is 3% of the ore sold, and every influence is being used to reduce this to 2 per cent.

The practical way to calculate the ore underground is by taking one centimeter of solid ore as being equal to 50 kg. per square meter. To explain I will take a block of ore 100 m. long by 30 m. high, and estimated at 5 cm. solid ore. Thus we have  $100 \times 30 = 3000$  sq.m. @  $5 \times 50 = 250$  kg. per sq.m. Hence,  $\frac{3000 \times 250}{1000} = 750$  metric tons of ore.

This has been found to answer well in practice.

### HAND DRESSING USED BECAUSE CHEAP

It is a remarkable fact that both in the Linares and La Carolina districts no large outlay for the plant is necessary as far as ore concentration is concerned, because hand dressing is about half as costly as mechanical dressing. The ores are exceedingly clean, wages are low and the men expert at their work. A miner in the south of Spain gets 3.50 *pesetas* per day, a surface worker 2.50, and a dresser from 2 to 3.50 *pesetas*, thus hand labor can be profitably employed.

\*Mining engineer. 1 Queen Victoria St., London, E. C.

<sup>1</sup>One *peseta* = \$0.193 or 9 1/2d.

Many Spanish lead mines are worked on the "saca genero" principle. A certain portion of a mine is given to a tributer at, say, 20 to 28%. Although this system is ruinous for many properties, even large companies have employed it. Taken on the whole, Spanish lead mines have not been worked economically. One reason for this has been that a large number of the companies have been formed locally with insufficient funds.

If we except French, there is little foreign capital in this industry. While the British shareholders prefer to look for tin and gold in the furthest parts of the earth, the French are taking advantage of the promising outlook in these districts nearer home.

### MANY PROSPECTS BUT FEW MINES

Spain has still riches in lead and zinc as yet untouched for want of communications, and the La Carolina district, although covered with claims by people of small capital, has in spite of its great output, as yet few mines at work, although there are plenty of good looking prospects.

The word prospect reminds me that when examining such properties as an engineer often has to, it has been my wish to compare notes with other men from other districts, but such data were not easy to obtain. In Spain practically all workable silver-lead lodes must be considered by the magnitude of the old workings, because the Romans, with few exceptions, found everything worth exploiting. In the "filling" ore samples can be obtained. I have found that the silver content of these ores varies as the percentage of lead, thus an ore with 35% lead would assay 1000 grams silver per ton, while a 70% lead ore would carry 2000 grams per ton.

In the case of Roman workings one is never certain whether the mine has been worked out or not. In one mine I know of the old workings go down over 200 m. As regards other lead-ore outcrops in Spain, in some districts one encounters rich ores at surface, which do not continue in depth whereas in others it is just the contrary. In La Carolina rich lodes have been discovered by sinking on "cross" lodes containing ore.

In some of the great lodes of La Carolina the profitable orebody does not begin before 50- to 100-m. depth, whereas in Linares the ore in most lodes can be worked profitably near surface.

From the above it will be seen that a general rule cannot be laid down as regards the value of a prospect, each case must be examined in relation to working mines in the same locality, if there be such. It would be interesting to obtain more details pertaining to this question from other lead-mining camps.

## Gold in La Sal Mountains

A reconnaissance of the northern La Sal Mountains in Grand County, Utah, was made by James M. Hill for the U. S. Geological Survey in June, 1911. In the vicinity of Basin and Mesa, both gold-quartz prospects and placers have been worked, but the entire output would probably not exceed \$5000, the placers being the chief source of production.

The La Sal Mountains are in the Colorado Plateau region, which is characterized by long mesas cut by deep cañons with steep cliffs. Above this comparatively level plateau, which has a general elevation of 8000 ft., the northern group of mountains rises abruptly at Mount Waas to a height of 12,586 ft. The quartz prospects in this region are few in number and the value of the ore is low even at the surface, where many gold-bearing deposits in other districts are enriched. The veins, so far as they could be seen by Mr. Hill, are small and contain much barren quartz. The high charges for transportation to the railroad at Cisco, ranging from \$12 to \$15 for outbound and \$25 per ton for inbound freight, are an additional handicap.

The placers of Wilson Mesa are apparently of small extent. They contain only a small quantity of gravel, and all the gold in it cannot be saved by sluicing, because some of it is carried in boulders, which require crushing. They include so much barren material that it would hardly seem advisable to install expensive crushing and amalgamating machinery unless it were found practical to sort the ore from the waste by hand. Besides these unfavorable conditions only a small and uncertain supply of water is available for placer operations. The placers contain, however, some free gold that might be procured at a profit if the deposits are worked in a small way.

## Magnesite in 1911

The only state that produces magnesite in this country is California, where much the larger part of the production comes from the Tule River deposits, says the U. S. Geological Survey. In addition the deposit near Winchester, in Riverside County, and those near Sanger, on Kings River, Fresno County, were producers. The total output was 9375 tons, while imports amounted to 122,075 tons of calcined, and 12,974 tons of crude magnesite.

A new mine was opened at Iowa Hill, Placer County, but none of the product was shipped. A deposit was also developed at Bissell station, near Mohave, Kern County, which is unique among magnesite deposits of the United States, as it is clearly sedimentary, whereas all the other California magnesites are associated with, and derived from, altered basic, intrusive rocks.



# Surface Improvements at Ajax Mine

By S. A. Worcester\*

The improvements at the ore- and waste-handling plant of the Ajax mine, Victor, Colo., include changing the hoisting cages formerly used to self-dumping skips of two tons capacity; changing the tramping of mine cars from the cage to the ore house or waste dump, employing four or five men per shift, to the use of a two-ton electric-motor car operated by one man and having a much larger capacity than the former arrangement; also the following installation: A cableway, with a one-ton drag bucket, operated by a three-drum hoist, for reclaiming the mine dump; a large grizzly sorting table on which the bucket deposits the low-grade dump material for a rough re-sorting; a 100-ton milling-ore bin and a 60-ton waste bin beneath the grizzly; a three-ton skip for hoisting "ore-house waste," or waste from the sorting tables and dumping it on the re-sorting grizzly table mentioned, and for taking re-sorted waste from the 60-ton bin mentioned and dumping it into the two-ton motor car which takes it to the waste dump; a row of four 60-ton bins for receiving ore which goes from mine to mill without sorting; and a four-ton electric-motor car for carrying ore from these four bins and from the 100-ton cableway bin to the mill.

## TWO-TON MINE SKIPS ADOPTED

The capacity of the mine skips was fixed at two tons for the reason that the mine is operated mainly by a number of lessees whose ores must be kept separate in comparatively small lots. It frequently happens that five or six successive skip loads must go to as many different bins, for different lessees. Among the features of this skip may be noted the convenient arrangement for removing the skip box, the cast-iron boxes on which it swings having hinged caps held by cotter pins and easily swung open. The skip hanger is first hooked into the eye at the bottom edge of the skip body with the weight resting in the hanger. The box caps are then opened and the skip box, with its weight resting on the rollers in the dumping guides and suspended from the hanger, is swung clear of the skip frame. By placing a removable floor on the cross-bars the frame may be converted into a cage for handling men and timbers, shaft repairs, etc.

The guide shoes are simple flat plates and are easily renewed when worn. The  $\frac{3}{8}$ -in. skip bottom is reinforced by a  $\frac{1}{2}$ -in. steel liner. The safety appliances are of a simple and positive character. The dogs are so shaped as to be prevented absolutely from rotating beyond the proper arc of  $90^\circ$ , the projecting end of the dog encountering the steel frame and preventing further movement. Dogs of ec-

At the Ajax mine, Victor, Colo., hoisting cages were formerly used and the ore was trammed from cage to ore house or dump. Two-ton self-dumping skips are now employed and a 2-ton electric car distributes the ore and waste. The ore-house reject is hoisted in a 3-ton skip and dumped on a sorting grizzly. A 4-ton electric car conveys the ore from mine bins to the mill. A cableway with a 1-ton drag bucket conveys the rock from the old mine dump to ore bins.

\*Mechanical engineer, Victor, Colo.

centric shape, held by chain connections have been known to turn over, breaking the chains, and allowing the cage or skip to fall to the bottom of the shaft. The helical safety springs are in a protected position, yet can be easily removed, replaced and adjusted in case of accidental damage. I know from many experiences that the springs furnished by the majority of mining-machinery builders for occasional skips and cages are unreliable, and I use this spring frequently in my designs, knowing that it has been tested before leaving the factory and is reliable and that it can be easily and cheaply renewed at any agency of the International Harvester Co. It has an initial tension of 400 lb., and is a compact and powerful spring.

## SKIPS DUMP INTO LARRY

The slanting oil holes in the roller pins have the merit of being easily cleaned, catching little dirt and not losing oil except through the bearing. The dumping guides are made with two different radii, so as to begin the tilting movement of the skip gently and without undue strains. The upper guide is long so that the skip can be hoisted several feet above the usual dumping position without overturning. The two skips discharge their loads into a substantial steel hopper which directs the ore to the two-ton car beneath. The bottom slopes of the hopper are of  $\frac{3}{4}$ -in. steel plate stiffened by 4x4-in. angles and show no distortion from the continued impact of heavy rocks. The two-ton side-dump ore car was originally driven by a three-phase induction motor at 440 volts, using the overhead trolleys shown, but for various reasons this was later changed to a  $7\frac{1}{2}$ -hp. direct-current motor at 110 volts, the current being carried by the track rails and a light third rail to which connection

is made by a sliding shoe, the arrangement being similar to that used with the four-ton car which is shown in detail.

Since this two-ton car is not required to operate on a grade exceeding 1%, it handles the load easily at a travel of about 800 ft. per minute. It not only handles all ore and waste from the mine, but also rehandles the material from the waste skip before mentioned, taking it a distance of perhaps 600 ft. to the dump. The mouth of one of the row of ten crude-ore bins into which the car discharges the ore to be sorted, is shown on the general plan, above the grizzly, which is the almost invariable feature of ore handling in this district. One of these mouths is placed at the head of each of the ten grizzlies, to direct the ore properly from the motor car, the opening of which is much wider than the grizzly.

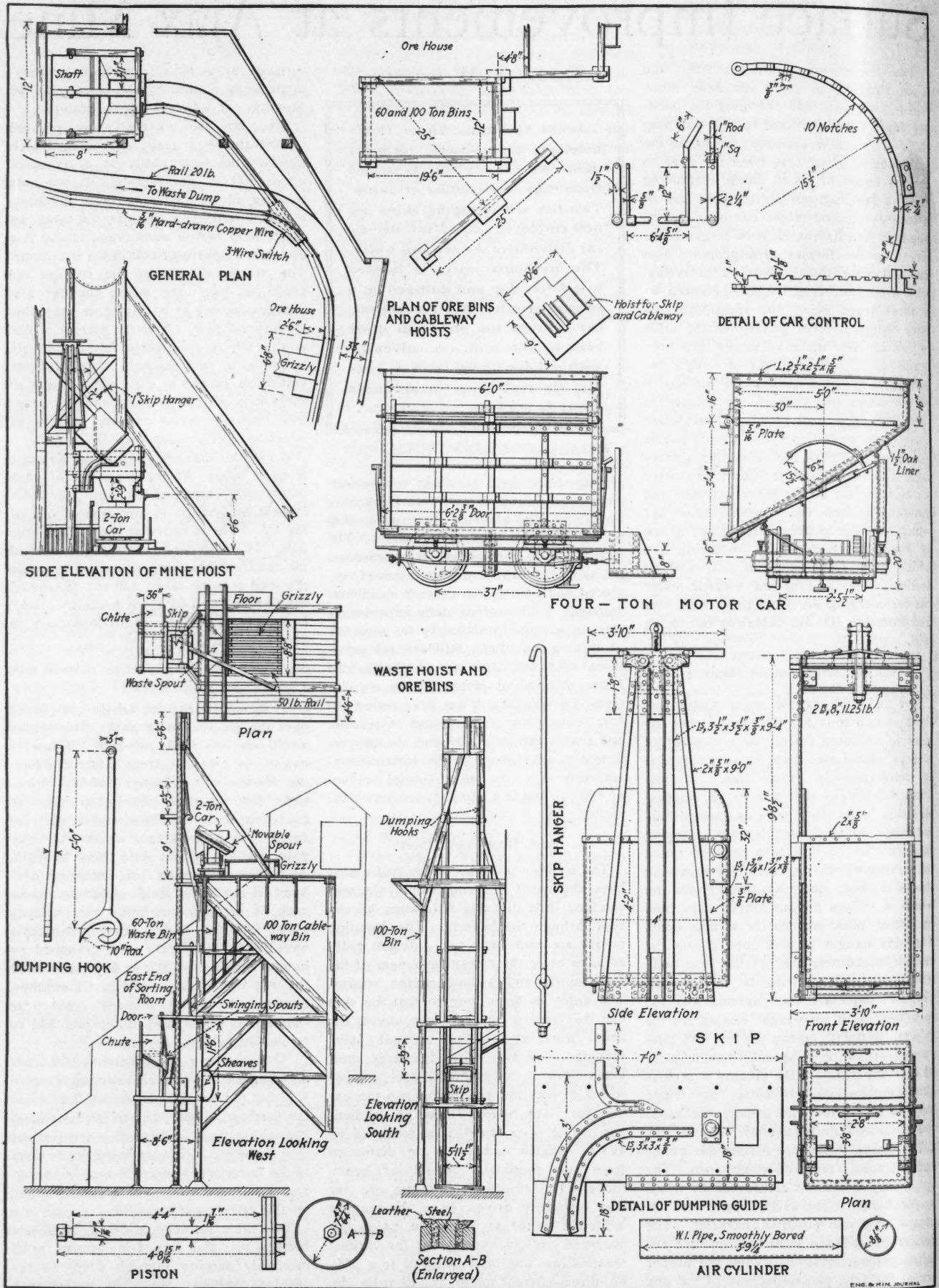
A circular dial about 12 in. in diameter is fixed below the top cross-bar of each of the mine skips and has a pointer which is held by friction at any desired one of the 20 or so numbers at the edge of the dial. The skip tender sets the pointer at the number indicating the place to which the load is to be taken and the motorman discharges the load at the place indicated, keeping careful tally of all loads sent to each number.

## SHIPPING AND MILLING ORE AND WASTE PRODUCED

In the ore house the coarse ore passes over the grizzlies with about 2-in. spaces and drops into crude-ore bins. Whatever passes the grizzlies drops to screens having about 1-in. openings and the rejections from screens also drop into the crude ore which discharges through lever gates to sorting tables, where the shipping ore is thrown into bins beneath, while the low-grade ore, carrying perhaps \$3 per ton in gold, including coarse rock, is scraped into mine cars holding about 1800 lb. Before the improvements were made these cars were trammed by hand a distance of 500 to 600 ft., most of the way out of doors and in all weather, over a bad track. Frequently cars were tipped over the sliding dump and had to be hauled back by horses.

With the new arrangement the cars are trammed a distance varying from 6 ft. from the nearest table to 110 ft. from the farthest, to the east end of the steam-heated ore house, where they are dumped into the chute which loads the waste skip. In the latter this low-grade rock is hoisted and dumped, through the movable spout, on the grizzly sorting table.

This table is made of 60-lb. rails held bottom up, and has 4-in. spaces. All materials passing through drops to the 100-ton cableway bin. The coarse rock is rapidly sorted, all that shows sufficient value being thrown into the cable-



DETAILS OF NEW SURFACE EQUIPMENT AT AJAX MINE, VICTOR, COLO.



way bin through an opening in the floor at the north end of the grizzly, while the barren rock is raked or thrown over the opposite end into a vertical spout passing through the floor of the 100-ton bin and into the 60-ton waste bin below.

#### MOTOR-DRIVEN CAR FOR WASTE

From this bin the waste rock issues through an air-operated gate to the skip, which hoists it and dumps it into the two-ton motor car. The movable spout is run out of the way and the car set in position to receive the skip load, which it then takes to the waste dump. The skip is dumped by means of the peculiar hooks shown, which engage the dumping rollers, first pushing until the skip is partly overturned, then pulling so as to prevent the box from becoming inverted. Stop blocks on the gallows frame prevent the skip from rising too far and being inverted. These hooks are used instead of the usual dumping guides because the guides would project so much further as to interfere with the cableway bucket. The main gallows-frame brace is also placed at one side to clear the bucket and grizzly.

The hoist for operating the cableway is placed on a concrete foundation and has three drums with friction clutches and brakes. One drum, not shown, smaller and in front of the two shown, is used for hoisting the waste skip. The engineer's levers are placed at the grizzly floor, on top of the cableway bin and connected to the hoist by wires, using an arrangement somewhat similar to that of the railway block signal and switch mechanism. This gives the engineer a view of the working of the cableway at all times and the skip discharges within a few feet of his station. The skip hoisting rope passes horizontally from the hoist to a sheave in the framing of the cableway bin and then almost vertically to the sheave at the top of the gallows frame. The chute leading from the ore house to this skip holds about three cars, or one skip load of rock, and is closed by a lever gate.

Swinging spouts which are thrown over the skip by a cam on the skip frame when the skip is at the loading positions at the chute and at the opposite bin gate above, prevent spilling when loading the skip. Lever connections, having rollers which engage the cams, throw the spouts out so as to project about 4 in. over the skip. The ends of the rods from which the spouts are hung engage the edge of the skip when it is hoisted, this movement being assisted by gravity, and swing the spouts clear. The movement of the skip for this short hoist of about 45 ft. is comparatively slow and the spouts are swung in and out as the skip passes, without any damage being done.

The bottoms of all bins are lined with  $\frac{1}{4}$ -in. steel plate and the air-actuated gates for the 100-ton cableway bin, the

60-ton waste bin and the four 60-ton mine bins are made of  $\frac{3}{4}$ -in. steel plate and have substantial steel guides. They are raised and lowered by 8-in. air cylinders which are shown in detail. They are controlled by brass four-way cocks with levers having each two ropes hanging within convenient reach. The five ore bins mentioned deliver to the four-ton side-dump motor ore car, which is shown in detail.

The car is of all steel and iron construction and well built for severe duty. It is propelled by two 5-hp. General Electric direct-current motors at 110 volts, which are geared with a single reduction, to the two axles. The car ascends without difficulty the  $4\frac{1}{2}\%$  grade to the sampling plant with a load exceeding four tons. Among the features of this car may be noted the babbitted half-boxes for the axles, which are easily removed and repaired. These boxes are held endwise by the grease cup, and are easily removed by unscrewing the cup and jacking up the frame slightly. Two extra half-boxes are kept as spares. The electric contact shoe has its shank guided by the wooden blocks which also insulate it; it rests or slides on the light-iron third-rail conductor. The brake is similar to the one on the two-ton car and is a simple lever arrangement with ample power for arresting the heaviest load in a short distance, with one hand. Wear of the brake shoes is compensated and adjustment maintained easily by set-screws in the brake beams and jam nuts on the rods. The car bottom, of  $\frac{3}{8}$ -in. steel, is reinforced by a  $\frac{3}{4}$ -in. steel lining which shows no perceptible damage from the impact of the heaviest rocks.

#### UNIQUE CAR-DOOR CONTROL

The door control used with these cars is, to the best of my knowledge, original, and has some special merits. When commencing the design of the two-ton car I observed that in dumping mine cars over grizzlies great care was exercised in order to prevent the dumping from being too rapid, it being important to accomplish as perfect screening as possible. I had also observed that at other mines where the doors of side-dump motor cars are held by ordinary latches and the entire load released at once, a great portion of the finer material which should pass grizzlies and screens is carried over with the rush of ore.

The lever which controls the doors of these Ajax cars is jointed in such manner that the handle can be made to engage the notched quadrant when the door is opened any desired distance, thereby preventing positively any further opening until the handle is disengaged. The door may be opened wide quickly to permit a large rock to escape, then partly closed quickly and held at reduced opening while finer rock passes out slowly. The door is held positively shut against

the heaviest load by allowing the controlling lever to drop to its normal position, slightly below the center line of the latch rod.

Doors not having this feature have to be held open with hand or foot while the fines run out, but this one lever performs all such functions effectively and easily. It is a convenience in discharging the four-ton car into the hopper of the gyratory crusher at the mill, where it is desired to see any wood which discharges and to pick it out. The general planning for the improvements described was done in collaboration with E. A. Colburn, Jr., general manager of the Ajax properties at Victor, while I worked out the details and supervised the work of installation.

## The Miner's Phthisis Compensation Act

JOHANNESBURG CORRESPONDENCE

The Miner's Phthisis Compensation Act has been passed by the Union Parliament, and it is the most important piece of industrial legislation yet passed in South Africa. It will be remembered that a commission was appointed which found that a large percentage of the underground workers on the Witwatersrand were suffering from this disease, which, though most common among rock drillers, was also likely to be contracted by all underground employees, the risk increased with the period of underground service.

All evidence has gone to show that it is not alone the dust produced by drilling upper holes that is dangerous; but also the dust circulated in the mines by blasting and by shoveling broken rock. This has indeed been recognized for some years and the government mining regulations have contained clauses adequate to deal with the matter had they been enforced. In the past, owing to the reluctance of the mining companies to spend money in providing proper underground water services and to the objection of the men to using jets or sprays when drilling, and to the slackness of the government in enforcing its own regulations, nothing effectual has, until recently, been done to check the disease.

#### PROVISION FOR EXISTING AND FUTURE CASES

The report of the commission and the legislation in Parliament have come as an unpleasant shock to the mining houses. The Act divided all cases of miners' phthisis into two sections. For existing cases in respect of which application will be made during the first two years after the bill comes into force a special compensation fund has been constituted. For cases that will arise after the expiration of those two years an insurance fund has been constituted. The government from its revenues from the Bewaarplaatsen will

contribute £100,000 toward the compensation fund and the mines are to bear the whole of the remaining costs, which is estimated at from £1,000,000 to £1,500,000. As one clause in the Act makes the liability to pay compensation extend to the dependents of any deceased miner who can prove that his death was due to miners' phthisis, the liability may even exceed these figures. The money will be collected every three months from the mines in proportion to the total number of underground employees employed during that term. The insurance fund which deals with new cases is to be formed by contributions from the mines and from the employees underground. For the first two years after the bill becomes law the mines are to pay a contribution equal to 5% of the wages of underground employees every month, from which one-half is deducted from the earnings of the employees. After the second year the mines pay 5% and the employees 2½ per cent.

#### NO COMPULSORY INSPECTION

There is to be no compulsory inspection of the employees to ascertain who are suffering and no restraint on anyone who is affected continuing work. All new employees on making application for a blasting certificate must be examined by a medical man and must show there is no weakness of the lungs. When cases that are not seriously affected apply for compensation they receive £8 per month for a year and are not allowed to resume underground work. Severe cases receive £8 per month for life or a grant not exceeding £400, and dependents may receive such payments as the Board who control the fund may decide. Some of the mines will be badly hit by this law and will have to spread the compensation payments over a number of years or reduce dividends.

#### ACTUAL PRECAUTIONS INSTITUTED

The most interesting question is, however, have the mining houses really decided to stamp out this disease and can they compel the miner to take precautions? I have lately been making private inquiries as to the real state of affairs. Several of the largest of the groups have, I am certain, at last awakened to the seriousness of the matter, and on many mines water pipes are laid to all working faces and managers have orders to dismiss any underground official found slack in enforcing the prevention of dust.

Even on these mines, the miners still in many cases refuse to suffer from wet clothes caused by using jets and sprays, and make only a pretense of doing so while officials are present. However, the use of some form of James water blast and the wetting of broken ore in stopes will undoubtedly reduce the danger greatly. At other mines the eight-hour law is being ignored where development work is

being done, and despite the presence of government inspectors adequate water services are not yet installed. Before the eight-hour day law was passed a developer on many mines was expected, working with two machines in a drive, to drill and blast a round of 13 or 14 five-to six-foot holes in a shift; and this is being done in certain mines today by neglecting to make any inquiries as to when the developer ceases work. At other mines the law is strictly enforced and the shift bosses are not allowed to leave the shaft head until every miner has replaced his check given him before going below. No doubt in future the law will be better enforced in these particulars and all mines will be brought into line.

#### RESULT OF MEASURES AT SIMMER DEEP

What can be done by a moderate expenditure of capital and a little care and attention to detail is shown in the case of the Simmer Deep mine. This mine is being worked by inclines from three vertical shafts, the central shaft being used almost wholly for ventilation purposes. At the surface of this shaft in 1911, there was installed a Sirocco fan capable of moving 350,000 cu.ft. of air per min. against a five-inch head of water. In the down-cast shaft the air is moistened by sprays from water rings and the air current is split at the various levels into about five courses along the working levels. The working faces are ventilated by stopping all unused box holes in the pillar along the top of the drives.

The dust in the mine comes from three sources, (1) dust from drilling, (2) dust from blasting, (3) dust from shoveling broken rock. Jets and sprays are provided at all drilling machines with water in pipes from an underground tank holding 24 hours' supply drawn partly from mine water and partly from water sent underground. At the end of the pipes in all development faces, water sprays are turned on just before blasting on the day shift and left on until turned off at night by the stope watering gang. These sprays are made by using a high water pressure with a No. 28 Roni acetylene burner, and two are found sufficient to make a screen of water spray through which all smoke and dust from blasting must pass. Broken rock in stopes is wet by a special gang which work at night and sprays are in use at loading stations in the shaft. What these measures have done to improve the health conditions of the mine and to make work more efficient is shown by the following figures.

With natural ventilation 105,700 cu.ft. of air circulated in the mine and at present the fan circulates 200,000 cu.ft. per min. The effect of this is shown at the twenty-third level now being developed, where the wet-bulb reading has dropped from 83° to 78°, and the dry-bulb from

84½° to 80°, and this at a spot several hundred feet below where the downward current reaches.

The lowest working stope on the twenty-first level at a vertical depth of 3939 ft. has had the wet-bulb reading reduced from 80° to 71°, and the dry-bulb reading from 82° to 74°, and the average of the mine from about 80° to 74°. As the efficiency of labor falls off greatly after the wet bulb reading reaches 80°, the gain in efficiency is obvious.

In 1907 the amount of CO<sub>2</sub> in the ends of drives was 0.57%, with a dangerous proportion of CO. It is now 0.15%, and in the upcast 0.17%. In 1911 the grams of dust per cubic meter were 0.28, 0.13, 0.10, in various places, in 1912 the grams per cubic meter were 0.021, 0.039, 0.014, or a reduction of 77 per cent.

#### Victoria 1911 Mineral Output

The mineral production of Victoria for the year ended Dec. 31, 1911, was: Gold, 542,074 oz. gross or 504,000 fine oz.; coal, 653,864 tons; copper ore, 1116 tons, from which was produced 36 tons of copper, 653 oz. of silver, 55 oz. of gold, and 184 oz. of platinum; antimony concentrate, 743 tons; tin, 33 tons; wolfram ore, 17 tons; gypsum, 591; infusorial earth, 400 tons; magnesite, 166 tons; kaolin, 371 tons; silver, 18,494 oz.; manganese ore, 8 tons; silver-lead ore, 1098 tons.

Alluvial workings furnished 172,330 oz. of gold, quartz mining 371,370 oz. Of the alluvial gold, dredging yielded 78,535 oz., and sluicing by gravity, 3059 oz. The average yield of the 95 dredging companies was 1.9 grains of gold per cu.yd. treated. The government of Victoria runs nine testing batteries for the benefit of prospectors; the total loss incurred on these during the year was £3036. In addition, 15 batteries were erected by the government, but are run by local trusts, without expense to the government.

There are two quartz mines in Bendigo over 4000 ft. deep, vertical: Victoria Reef Quartz, 4614 ft.; New Chum Railway, 4318 feet.

#### French Metal Smelting Industry, 1910

The output of the French metal smelting industry (*Min. Journ.*, July 27, 1912, abstr. from *Statistique de l'industrie minérale en France et en Algérie*) in 1909 and 1910 was as follows:

Metal	1909	1910
	Kg.	Kg.
Gold (fine).....	136	133
Platinum.....	5	3
Silver (fine).....	63,671	52,957
	Tons	Tons
Lead.....	26,927	20,226
Zinc.....	49,956	52,598
Copper.....	7,923	12,933
Nickel.....	1,600	2,100
Aluminium.....	6,092	6,425
Antimony.....	5,444	4,640
Manganese.....	.....	1,360



# Operation of Argentina Tramway

By C. A. Tupper\*

In the building and operation of the 22-mile Chilecito to Upulungos aerial tramway, for opening up the Famatina mining district, elevated over two miles above the plain, the government of Argentina has set a noteworthy example to the rest of the world. The construction of the tramway and the methods used in its erection have been already described. Of further interest, however, is the fact that this line is conducted merely as a part of the existing railway system, of which it was originally designed to be an extension in the form of a cog road.

## CHIEF FREIGHT IS ORE

The freight handled on the tramway consists of ore, principally copper, sent down from the mines at a maximum rate of 40 tons hourly; but material and supplies of various kinds, including mining tools and machinery, are sent up as needed, according to a regular schedule. Ordinarily the line is operated only during daylight, as the low temperature at these high altitudes and the frequency of unfavorable weather conditions for the greater part of the year impose hardships on the attendants at night; but increasing traffic will in time render a 20-hr. schedule necessary.

Thorough control is maintained over the traffic. Before the tramway is put in operation in the morning, which takes place from above, all of the stations have to report to an official dispatcher that the track is clear. As soon as this is understood, a light load, at speed much under normal, is loosed at the main station on the upper level, known as Bello Plan; then the ore buckets follow one another with gradually increasing weights and acceleration, until the line is loaded to its capacity, and the velocity of travel has attained the designed proportions.

Owing to the steep grades and long spans, it is desirable to obtain the requisite capacity with a minimum number of carriers in transit; therefore, it was decided to employ a speed of about 8.5 ft. per second, making the time intervals 45 seconds and the spacing of the carriers 375 ft. apart. When the tramway is fully loaded, the down operation proceeds practically of itself, except for the starting of the carriers, and at the lower terminal the loads are automatically weighed, recorded and discharged to bins. The automatic scale and the counter are shown in the accompanying half-tones. All special conveyances are also side-tracked at the lowest station, Chilecito, except the water tanks, which are always returned empty to an intermediate point where there is a good spring of water at which they can be refilled. Passenger cars are usually held in readiness at each station.

The government 22-mile aerial tram, between Chilecito and Upulungos, is operated during the day only. Each morning, after the line is reported clear, light loads are started at low speed from the main upper station. Both load and speed are gradually increased to normal; the normal rate is 8.5 ft. per sec., the interval between carriers being 45 sec. or about 375 ft. The operation is largely automatic. The tram carries ore principally, but is equipped to convey miscellaneous supplies, water, mail and passengers. The line is inspected daily.

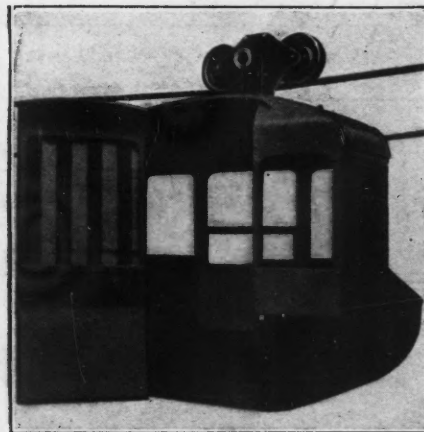
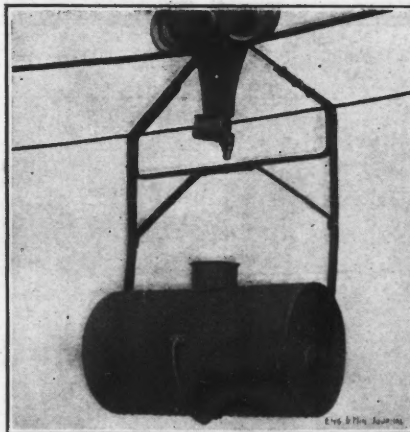
\*Consulting engineer, 389 Thirty-first Ave., Milwaukee, Wis.

The stations are so designed and equipped as to make the operation of the tramway as nearly automatic as practicable, so that little labor is required. At the eight intermediate stations the wheels of the carriers pass over rails from one

are known as "terminal shoes," a special form of saddle so designed that the transition of the carriers to and from the cables is without shock or jar. These shoes are provided with hinged steel hoods.

Arriving at the bottom and discharging, the ore buckets are loaded with material for above, or started up again empty, with as little delay as possible. Care is taken to balance the traffic both ways to the fullest extent permitted by conditions, so as to derive the advantage of the excess energy generated by the down loads for pulling others up and also to minimize the power required for braking, which is exerted by small high-speed automatic-engine plants at several of the stations.

An independent telephone line, strung on poles running alongside the tramway, enables the entire system to be kept in communication. The station attendants are thus notified of any supplies or other material intended for their use; and the receptacles, which bear large numbers on their ends, can be readily detected as they approach. Most of the stations have



WATER CASK AND PASSENGER CARRIER ON ARGENTINA TRAMWAY

track cable to the next and are self-coupled again to the traction cable, after automatically uncoupling and traversing the intervening space by their momentum. The station attendant's duties are to see that nothing goes wrong. When necessary, a light push is given to insure no delay in the passage.

Carriers which are intended for unloading at an intermediate station can be shunted to overhead rails of a double-head pattern, made especially for this purpose, by means of which they can be taken to the point of discharge, and thence to the opposite side, where they are attached to the traction cable and sent out over the line empty or reloaded as the case may be. At the points where the carriers enter or depart from a station, the shunt rails terminate in what

side tracks on to which carriers can be switched, as above described; but for two that are perched on the sides of steep declivities where there is little room, material is sent up at times when loads are far apart, so that they can be taken out and the carriers allowed to proceed. All buckets or other receptacles drawn out and emptied are put back with their carriages on the up line, so that rolling stock always makes the complete round trip and is available in each instance for reloading at either end. Only a limited number of special carriers, such as those shown in the accompanying half-tones, are, however, kept in transit, the remainder being held at Chilecito or returned there when not needed. Water casks are taken care of at the mountain station, where there is a filling plant.

The line is also used to a large extent for passenger traffic and mail. An accompanying halftone shows one of the four-seated passenger conveyances used, which is built of steel, with glass windows, and contains a water tank and other conveniences. By means of a special brake the velocity can be reduced, and the round trip usually takes about four hours.

#### ABOUT 700 CARRIERS USED

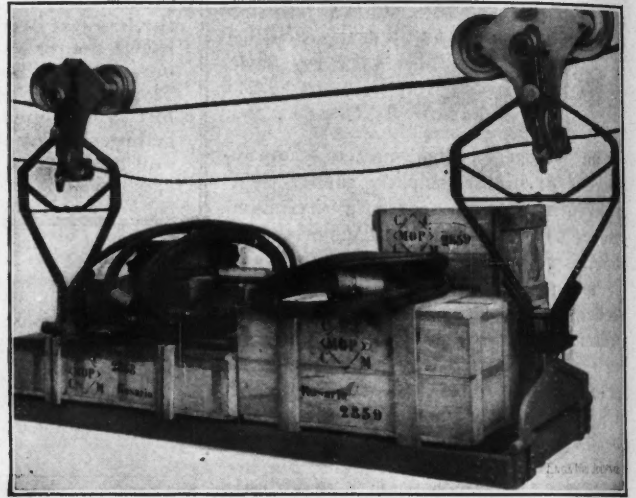
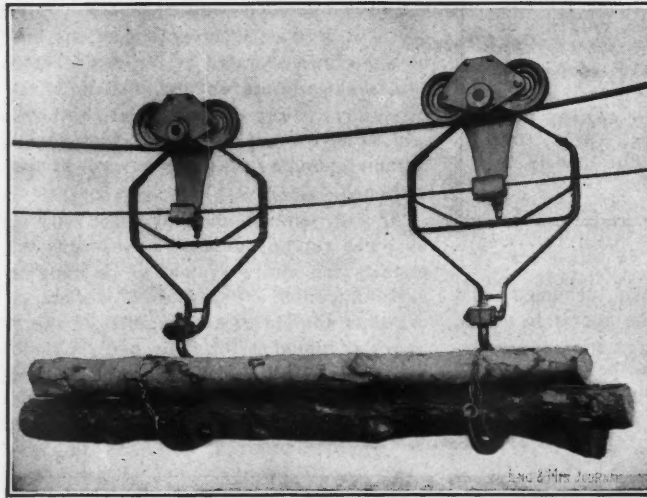
For the entire traffic of the system, as at present constructed, upwards of 700

The hanger pins are made of machinery steel. The grip is so designed that the weight of the carrier acts as the gripping force, which varies with the inclination of the cable. This construction possesses the advantage of being independent of any nice adjustment of the jaws, so that the grip automatically accommodates itself to irregularities in the wear of the traction rope.

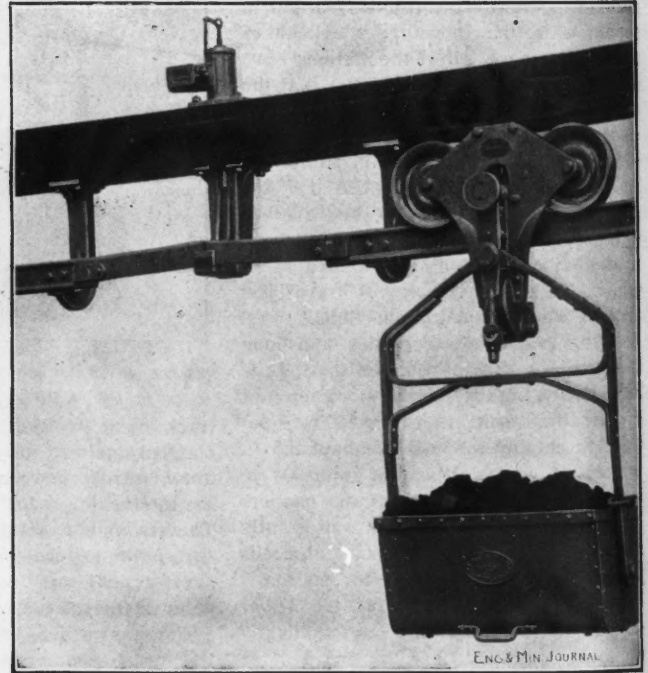
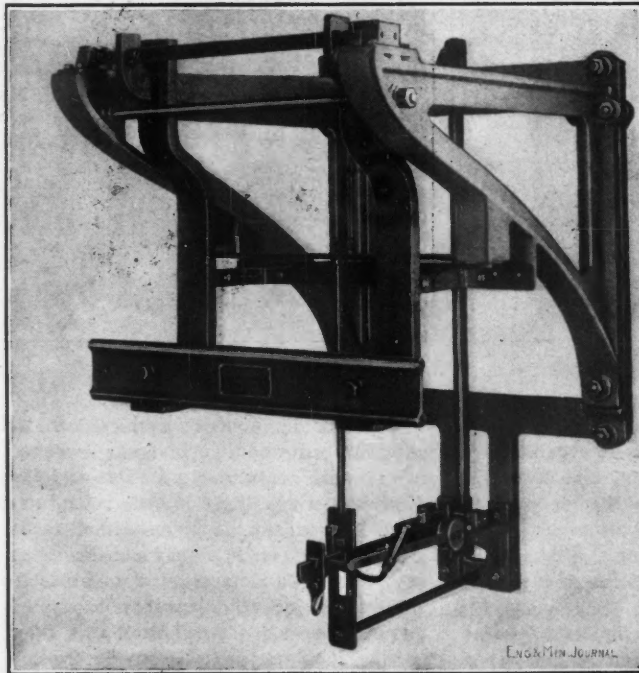
The mechanism operating the jaws is entirely inclosed within the main casting and is impervious to rain and snow, which makes it possible to operate the

should a carrier run off the cable, it must instantly detach itself from the traction rope automatically, which would take place with the type described.

The tramway is under the control of officials of the Argentina state railways, headed by a traffic manager; and a mechanical superintendent has charge of the maintenance of way and the rolling stock. At each station quarters are provided for a station master, a telegraph operator and assistant, three carrier and line attendants and usually an engineer and fireman. Each station has, further-



MINE TIMBER AND MERCHANDISE CARRIERS ON THE ARGENTINA TRAMWAY



AUTOMATIC SCALE AND AUTOMATIC LOAD RECORDER ON ARGENTINA TRAMWAY

carriers are used in transporting freight, passengers and mail. The carriage consists of two steel side plates, between which are mounted two cast wheels, fitted with phosphor-bronze pins, so designed that as the upper surfaces become worn, they can be turned around underside up.

trainway under the severe weather conditions above referred to. A slipping of the grip upon steep inclines on the long spans, when the cable is covered with ice, had to be especially guarded against, as the running wild of a single carrier would have serious consequences. Moreover,

more, its own line inspectors and repair men, who may also be partially those employed at an adjacent station. It is obligatory to go over the entire stretch carefully every day.

In Chilecito there is a large store house and repair shop, with machine



tools, iron fabricating equipment, etc.; a similar plant at the upper terminal, and tools for light metal work, line kits, portable telephone outfits, etc., at each intermediate station.

#### CABLES AUTOMATICALLY OILED

The lubrication of the track cables is automatically effected by a traveling oiler. The oil or special compound used is carried in a cylindrical tank, to which is attached a small rotary pump, driven from the carriage wheels by a belt and gears, that forces the lubricant up through a small pipe to the cable at a point just under the middle of the carriage, with a spraying effect. There is also a special device for coating the traction cable. This consists of a U-shaped receptacle containing the mixture used, which is suspended near one of the terminal guide sheaves. The rope passes over a small roller, which slashes it in the same manner as a ring oiler of a bearing, and brushes set just beyond in the receptacle wipe off the drip.

The enterprise of the Argentina government in building and providing for the systematic operation of this tramway, was marred at the outset by too great economy in providing various details; for, on the theory that the traffic would be light for some time, cables were ordered sufficient for a burden of no more than 10 tons hourly during a 10-hr. day, and only a limited number of carriers was purchased. The Famatina Development Corporation, Ltd., however, proceeded to build two smelting plants between Chilecito and the mountains, at Santa Florina, capable of treating 400 tons of copper daily, and the line could not be pushed in carrying capacity beyond 15 tons hourly.

In attempting to do more the light cables in service broke and the tramway was idle for a long period because no spares had been provided. This necessitated shutting down the smeltery. Since then, however, the damage has been repaired and heavier cables were ordered last year, although without consulting the tramway builders as to their construction and dimensions. The number of carriers has also been increased and a requisition for 250 additional was recently placed by the Argentina government, so that conditions now approach those for which the line was originally designed, as described in this and previous articles. The supports, station framework, power equipment, etc., were fortunately calculated and supplied in the beginning for the hourly capacity of 40 tons required.

The railway from Buenos Aires, which runs through Rosario and northwest in three divisions to Tucuman, with an extension beyond, has a number of spur lines to the foot of the Andes, including the one from Cordoba to Chilecito. Beyond these there are rich deposits of ore

in the mountains, but the barrier heretofore interposed has prevented their development on anything like an extensive scale. The construction of the Chilecito to Upulungos tramway is, therefore, of much importance, as showing a way to get at the riches of the Andes.

### The Parkes Process in the United States\*

The original Parkes process as practiced in England consisted in stirring into silver-bearing lead melted in a kettle from 1 to 2% of zinc, cooling, liquating the zinc scum in an iron retort, distilling the rich residual alloy in fireclay retorts to regain the zinc, and refining the desilverized lead at a low heat in a shallow cast-iron pan which formed the hearth of a reverberatory. If the lead was too impure it was first softened in a similar reverberatory.

The Balbach process liquated the softened bullion in a reverberatory with a cast-iron inclined hearth, the liquated metal flowed into a kettle containing the required zinc, with which it was thoroughly stirred, and was then cast into bars. These bars were then transferred to a second furnace, where they were heated to the melting point of lead, a desilverized lead flowing away, leaving the rich alloy behind. This was distilled in graphite retorts, the zinc condensed, and the lead cupelled. Thus the Balbach process as patented in 1864 had some of the features of the Parkes process of 1851, and about 1872 was so modified as to resemble it still more closely.

The commercial failure of the original Parkes process was due to the cracking of the cast-iron pans, and the failure of the fireclay retorts. By the use of firebrick furnaces and graphite retorts, the Parkes process was made an unqualified success.

The American works are all built with terrace construction, the softening furnace is on the highest level, the desilverizing kettle on the next, the refinery furnace below this, and last the casting floor.

#### SOFTENING FURNACE

The reverberatory softening furnace was early built with a riveted sheet-iron pan carrying an inverted arch of firebrick to act as the hearth. To counteract the corrosive oxides at the slag line, water cooling in various forms was resorted to. A 2½- or 3-in. water pipe was placed along the lead line next to the pan, or the sides and ends of the hearth were provided with water jackets, or the riveted pan was made double to act itself as a jacket. This last was eventually abandoned as increasing fuel consumption, while the use of magnesite bricks

along the lead line further allowed dispensing with water cooling. In some furnaces there is now no watercooling except under the skimming door.

The size of the furnace has gradually been increased from 10 tons up to 90 tons, which is the limit with hand charging. But by means of an endless belt which drops the pigs into a chute through a hole in the roof the 210- to 240-ton furnace at Omaha has been made possible. The time of refining is about the same in a large as a small furnace, and labor, fuel and repairs are less.

The important points in softening are to melt at a low heat and to remove the copper dross; then increase the heat and skim off the arsenic and antimony dross. In some works litharge free from copper is used to assist in oxidizing the arsenic. If the bullion is skimmed as it is poured into the ore-smelting-furnace molds, there is practically no copper dross to be removed. After softening the charge is flowed through a launder into the softening kettles.

#### DESILVERIZING APPARATUS

The first desilverizing kettles had a capacity of about 10 tons and were tapped through a spout in the bottom. Later a siphon was used, and now a motor-driven centrifugal pump is used for emptying the kettles.

Formerly the silver crusts were liquated on an inclined cast-iron hearth, or in a kettle with or without a spout. These methods have been superseded by the Howard silver-crust press. The earlier methods of stirring in the zinc, by hand or steam, have been superseded by a propeller blade stirring device, driven either by engine or motor.

In early days the zinc was added in three doses, stirring in each addition, and cooling and skimming until a ring of chilled lead formed around the kettle. Only the first crust was liquated, the second and third were used on the next charge. Some works took off four crusts, the first, the gold crust, taking off the gold and a little silver. The time for desilverizing was 15 to 20 hours. With the use of the Howard propeller stirrer the time has been reduced to about 10 hours.

The elimination of the zinc retained by the lead, 0.6%, is done by oxidation at a high heat in a reverberatory, or in a kettle by passing dry steam through the lead heated to redness. The refining furnace is similar in construction and size to the softening furnace. After the zinky oxides have been skimmed, the heat is raised and air admitted to remove the last of the antimony, or the removal of the antimony is accomplished by steaming without raising the heat.

The graphite retort was used as early as 1867 by Balbach. It was mounted in an inclined position in a coke furnace. A Fabre du Faur, in 1870, swung the furnace on trunnions, the pres-

\*Abstract of a paper by E. F. Eurlch, of New York, read before the International Congress of Applied Chemistry.

ent method. From a capacity of 250 lb., the retort charges have gradually increased to 1200 to 1400 pounds.

In the United States, cupellation has always been effected in the cupel furnace, the size of which has gradually increased from one to six tons. The use of boneash soon gave way to portland cement, portland cement and ground firebrick or limestone, limestone and fireclay, or magnesite. At present, dolomite and fireclay is most used. The test bottom may be either stationary or tilting, and may be water cooled.

It was formerly the custom to cast the rich lead from the zinc retorts and feed these bars into the cupelling furnace but now the charge is poured into a pot, and thence, still molten, into the test bottom.

## Concentration with Woodbury Classifier and Jigs

BY EDWARD T. WRIGHT\*

The Woodbury system of concentration, which is extensively used for preliminary work in the mills of the Lake Superior copper country, is designed to effect a separation of free "mineral" and middlings from a mixed or unsized feed. It is a type of plunger jig so arranged that the feed flowing on it parallels the currents of water caused by the plunger impulse. The unclassified pulp from the steam stamps (not coarser than  $\frac{3}{8}$  in.) is delivered at the head of the unit to the first compartment, the slime classifier.

This classifying jig has a plunger compartment at its head. The plunger is actuated by means of eccentrics which are given a differential motion resulting in a quick downward and slow upward motion of the plunger. The feed as it is delivered flows over a sieve of suitable mesh, which is supported on sieve bars. The plunger, of course, imparts to the water a differential pulsation up through the sieve. The pulp flowing over the sieve is thus lifted sharply and is allowed to settle through the water. This results in a stratification, heavy minerals going to the bottom followed by middlings, sands and slimes.

There are four discharges from the classifier: (1) Slimes approximately 60 mesh and finer; (2) sand, usually re-treated on jigs following; (3) coarse cup concentrates; (4) fine or hutch concentrates.

The slime-classifying device consists of a large brass shield adjustable vertically and so set that the pulp on the sieve seals it against the entrance of slimes. This suspended matter is carried around the shield, over the tailboard and away for future treatment, as shown in the accompanying drawing. By regulation

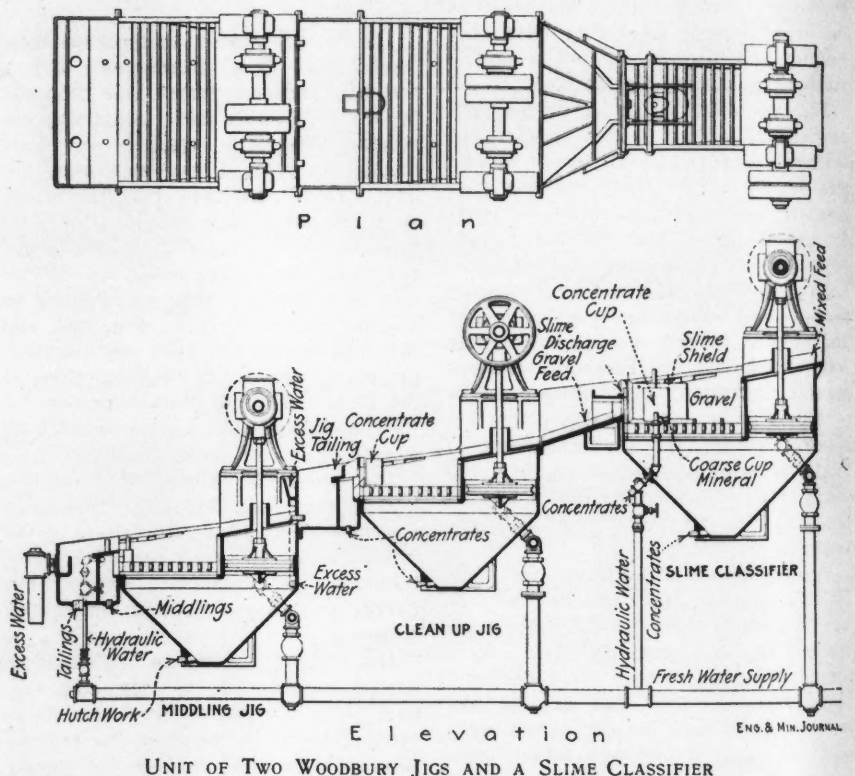
of the height of the tailboard, the mesh of the slime discharged can be roughly governed.

The pulp moving on the sieve bed is drawn along inside the shield toward an opening or slot a little lower than the slime discharge. This slot is controlled by a gate and may be regulated to suit the quantity of feed to be treated. The height of this opening, of course, regulates the depth of sieve bed. Another brass shield inside the large slime shield forms a cup for drawing off the coarse concentrates; this cup extends down into the bed of concentrates and discharges them through a pipe, as seen in the drawing. From the hutch plugs of the classifier are drawn the clean fine concentrates which have been jigged through the sieve bed into the hutch. The nominal capacity of the 24-in. slime classi-

controls the quality of the hutch product.

The middling jigs are equipped with a hydraulic middling discharge. An angle-iron shield is fastened across the tail of the jig and extends down into the middling stratum which seals it against the entrance of tailings. From under this shield openings placed at 6-in. intervals lead to a hydraulic compartment, where a fresh-water supply regulates the quantity and quality of middlings discharged through the openings into this compartment and out through plugs in the bottom. This hydraulic device gives a uniform discharge and discharges true middlings by holding back light mineral and tailings, with the hydraulic pressure.

The tailings from one jig pass over the angle-iron shield and hydraulic compartment into the "water lessener" of the next succeeding machine in the se-



UNIT OF TWO WOODBURY JIGS AND A SLIME CLASSIFIER

fier is given as 250 tons per 24 hr. and that of the 48-in. machine at 500 tons per 24 hours.

The slime-classifying jig is followed in the Lake Superior copper country by one or more compartments of Woodbury jigs to complete the separation of concentrates, middlings and tailings. This jig is constructed with a plunger compartment at its head of the same general type as the slime classifier. The feed flows on the jig over the plunger compartment. The discharge of concentrates is accomplished by means of a brass cup similar in operation to the one on the classifier. The discharge from the cup is adjustable; its height controls the depth of concentrate bed on the sieve and this

ries. This is a small dewatering trough diverting the excess water of the feed into the hutch of the succeeding jig. The nominal capacity of the 48-in. jig is given at from 250 to 500 tons per 24 hours. From 1000 to 1500 gal. of water are used on these units per ton of ore treated.

The material discharged from the hutches of the classifier and first jig is usually clean mineral, which is included in the general concentrates. The hutch product of the middling jigs is an enriched sand which is usually treated on tables. The tailings from the last jig are usually wasted. The Woodbury classifiers and jigs are now manufactured by the Power & Mining Machinery Co., of Cudahy, Wisconsin.

\*Engineer, Power & Mining Machinery Co., Cudahy, Wis.



# Mining and Metallurgical Patents

A Classified List of New Inventions

A copy of the specifications of any of these patents issued by the United States Patent Office will be mailed by "The Engineering and Mining Journal" upon the receipt of 25 cents. British patents are supplied at 40 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

## COPPER

**ALLOY**—Improved Alloy of Copper and Zinc. A. Schmid, Zurich, Switzerland. (Brit. No. 27,829 of 1911.)

**LEACHING**—Improvements in the Treatment of Copper Liquors. J. H. Thwaites, Peterborough, Eng. (Brit. No. 26,320 of 1911.)

**REFINING**—Process of Refining Copper. Walter S. Rokey and Hilliary Eldridge, New York, N. Y., assignors to Metallurgical Research Co. (U. S. No. 1,037,538; Sept. 3, 1912.)

## GOLD AND SILVER

**AMALGAMATION**—Separator and Collector for Metals, Samuel L. Boggs, Pittsburgh, Penn. (U. S. No. 1,037,114; Aug. 27, 1912.)

**CYANIDING**—Ore-Treating Apparatus. Alexander John Arbuckle, Johannesburg, Transvaal, assignor of one-half to Anglo French Exploration Co., Ltd., London, England. (U. S. No. 1,036,535; Aug. 27, 1912.)

**CYANIDING**—Precipitating Apparatus for Cyanide Solutions. Daniel Bosqui, Monahan, Wash., assignor to Merrill Metallurgical Co. (U. S. No. 1,035,941; Aug. 20, 1912.)

**CYANIDING**—Process of and Apparatus for Atomizing Metals, Etc. James Millar Neil, Toronto, Ont. (U. S. No. 1,036,689; Aug. 27, 1912.)

**GOLD-SAVING AND AMALGAMATING MACHINE**. Robert Beyrle, Los Angeles, Cal. (U. S. No. 1,037,195; Sept. 3, 1912.)

**GOLD-WASHING MACHINE**. James M. Carter, Pendleton, Ore. (U. S. No. 1,037,434; Sept. 3, 1912.)

**MINING SLUICE**. Pierre Bouery, Weaverville, Cal. (U. S. No. 1,036,430; Aug. 20, 1912.)

**STAMP MILL**. William B. Straub, Oakland, Calif., assignor of one-half to John J. Knight, Alameda, Calif. (U. S. No. 1,038,019; Sept. 10, 1912.)

## IRON AND STEEL

**ALLOY MANUFACTURE**. Robert B. Carnahan, Jr., Middletown, Ohio, assignor to The International Metal Products Company, Newark, N. J. (U. S. No. 1,035,948; Aug. 20, 1912.)

**BLAST FURNACE**. Arthur J. Moxham, Wilmington, Del. (U. S. No. 1,036,137; Aug. 20, 1912.)

**BLAST FURNACE CONSTRUCTION**. James Scott, Pittsburgh, Penn. (U. S. No. 1,036,350; Aug. 20, 1912.)

**BLAST-FURNACES**—Cleaning Device for Water-Cooled-Wall Furnaces. George J. Rennie, Aspinwall, Penn. (U. S. No. 1,035,050; Aug. 6, 1912.)

**FLUE-DUST**—Process for Briquetting Flue-Dust and the Article of Manufacture Produced Thereby. Robert Gubner, Elizabeth, N. J. (U. S. No. 1,038,370; Sept. 10, 1912.)

**FURNACE-CHARGING MECHANISM**. James B. Ladd, Philadelphia, Penn., assignor to Ladd & Baker. (U. S. No. 1,036,272; Aug. 20, 1912.)

**GAS-WASHING PLANT**. Homer D. Williams and William Ahlen, Duquesne, Penn. (U. S. No. 1,037,095; Aug. 27, 1912.)

**HARDENING**—Case-Hardening Compound. Patrick W. Brennan, Philadelphia, and Michael Meehan, Williamstown, Penn. (U. S. No. 1,036,435; Aug. 20, 1912.)

**INGOT MOLD**. John Power, Pueblo, Colo. (U. S. No. 1,036,333; Aug. 20, 1912.)

**MANUFACTURE**—Process of Making Steel. Fred B. Lamb, Bettendorf, Iowa, assignor of one-fourth to Albert B. Frenier, Davenport, Iowa. (U. S. No. 1,036,498; Aug. 20, 1912.)

**METALLURGICAL FURNACE OF THE OPEN-HEARTH TYPE**. Fred B. Lamb, Bettendorf, Iowa, assignor of one-fourth to Albert B. Frenier, Davenport, Iowa. (U. S. Nos. 1,036,499, and 1,036,500; Aug. 20, 1912.)

**OPEN-HEARTH FURNACES**—Process and Apparatus for Removing the Slags from Ingot Iron and Ingot Steel in Open-hearth Furnaces. K. Stobrawa, Gleiwitz, Germany. (Brit. No. 17,434 of 1911.)

**REFINING**—Improvements in Refining Molten Pig Iron for Steel Making and Other Purposes. T. Twynnam, Redcar, Eng. (Brit. No. 18,406 of 1911.)

**REGENERATIVE FURNACES**—Improvements in Regenerative Furnaces. Knox Pressed & Welded Steel Co., Niles, Ohio. (Brit. No. 8883 of 1912.)

**REGENERATIVE-FURNACES**—Improvements in Regenerative Reverberatory Furnaces. J. Maerz, Breslau, Germany. (Brit. No. 19,536 of 1911.)

**REGENERATIVE REVERSING FURNACE**. Luther L. Knox, Avalon, Penn., assignor to Keystone Furnace Construction Co., Pittsburgh, Penn. (U. S. No. 1,038,154; Sept. 10, 1912.)

**TREATED IRON ORE**. Edward F. Goltra, St. Louis, Mo. (U. S. No. 1,035,960; Aug. 20, 1912.)

**TREATMENT OF MOLTEN STEEL**. Joseph W. Richards, South Bethlehem, Penn. (U. S. No. 1,037,536; Sept. 3, 1912.)

## LEAD, ZINC AND OTHER METALS

**ALUMINA**—Process of Producing Alumina. David H. Childs, Alfred, N. Y. (U. S. No. 1,036,454; Aug. 20, 1912.)

**ALUMINUM**—Process of Producing Aluminum Fluoride. David H. Childs, Alfred, N. Y. (U. S. No. 1,036,453; Aug. 20, 1912.)

**ALUMINUM SOLDER**. Charles R. Erkens, New York, N. Y., assignor to Simplex Aluminum Solder Co., Inc., New York, N. Y. (U. S. No. 1,033,565; July 23, 1912.)

**BORON**—Reduction of Boron Compounds. Frank J. Tone, Niagara Falls, N. Y. (U. S. No. 1,035,919; Aug. 20, 1912.)

**TIN**—Improvements in or Relating to the Treatment of Tin, Tin-Containing Materials and Other Products. Elektrochemische Fabrik Kempen-Rhein, Dr. Brandenburg, Weyland, Kemper-Rhein, Germany. (Brit. No. 21,447 of 1911.)

**TIN**—Improvements in Tin Oxidizing Furnaces. K. von Olszewski, Dresden, Germany. (Brit. No. 23,267 of 1911.)

**ZINC**—Heater for Zinc-Reducing Furnaces. Carl Roitzheim, Cologne, Germany. (U. S. No. 1,038,205; Sept. 10, 1912.)

## MINING—GENERAL

**BLASTING IMPLEMENT**. Nicholas Ruschel and John F. Bodey, Federal, Penn. (U. S. No. 1,036,343; Aug. 20, 1912.)

**CAR-DUMPING MECHANISM**. Herbert S. Salmon, Bessemer, Ala. (U. S. No. 1,036,910; Aug. 27, 1912.)

**DRILL**—Rock Drill. William L. Brookings, Telluride, Colo. (U. S. No. 1,036,180; Aug. 20, 1912.)

**DRILLING**—Improvements in Re-boring Rock Drills Cylinders and the Like. J. Davidson and R. J. Richards, Johannesburg, Transvaal. (Brit. No. 19,181 of 1911.)

**DUMP-CAR LOCK**. Roy E. Cartzdafner, Columbus, Ohio, assignor to Kilbourne & Jacobs Manufacturing Co., Columbus, Ohio. (U. S. No. 1,034,418; Aug. 6, 1912.)

**EXCAVATOR**. Morton G. Bunnell, Chicago, Ill., assignor to Frederick C. Austin, Chicago, Ill. (U. S. No. 1,037,429; Sept. 3, 1912.)

**MINE DOOR**. Zenas N. Cox, Denver, Colo. (U. S. No. 1,034,693; Aug. 6, 1912.)

**MINER'S LAMP**. Edward C. Manglin, Colorado Springs, Colo. (U. S. No. 1,037,948; Sept. 10, 1912.)

**ORE HANDLING**—Improvements in Apparatus for Handling Ore. Brown Hoisting Machinery Co., Cleveland, O. (Brit. No. 19,676 of 1911.)

**ROCK-DRILL BIT**. Abijah S. Meguire, Chicago, Ill. (U. S. No. 1,036,673; Aug. 27, 1912.)

**SHAFTS**—An Improved Method of Forming Shafts for Mines and the Like. F. S. Ruckett, London, Eng. (Brit. No. 25,617 of 1911.)

## ORE DRESSING—GENERAL

**CLASSIFICATION**—Apparatus for the Separation of Ores. Henry Dallemagne, Clichy la Garnee, France, assignor to Compagnie d'Entreprises de Lavage de Minerais, Paris, France. (U. S. No. 1,035,864; Aug. 20, 1912.)

**CONCENTRATOR**—Ore Concentrator. George M. Gross, Chicago, Ill. (U. S. No. 1,035,874; Aug. 20, 1912.)

**CONCENTRATORS**—Method of Feeding Endless-Belt Ore Concentrators and Apparatus Therefor. Frank S. Card, Denver, Colo., assignor to Ritter & Ritter, Washington, D. C. (U. S. No. 1,033,302; July 23, 1912.)

**CONCENTRATORS**—Protective Covering for Concentrator Tables and Method of Applying the Same. Everest A. Baylis, Madera, Mexico. (U. S. No. 1,037,579; Sept. 3, 1912.)

**CRUSHING**—Roll for Crushing Machines. William A. Box, Denver, Colo. (U. S. No. 1,036,067; Aug. 20, 1912.)

**DRY ORE CONCENTRATOR**. Alfred H. Kidney, Orange, N. J., assignor to International Concentrator Co., New York, N. Y. (U. S. No. 1,036,260; Aug. 20, 1912.)

**MAGNETIC SEPARATOR**. Georg Ulrich, Broken Hill, N. S. W., Australia. (U. S. No. 1,037,563; Sept. 3, 1912.)

**PULVERIZER**. Edward H. Frickey, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., St. Louis, Mo. (U. S. No. 1,037,232; Sept. 3, 1912.)

**SLIME CONCENTRATOR**. Wilton E. Darrow, Sutter Creek, Cal. (U. S. No. 1,035,165; Aug. 13, 1912.)

**WASHING**—Improved Apparatus for Washing Coal, Ores of the Precious Metals and Other Ores and Minerals. J. Dodds, Glasgow, Scotland. (Brit. No. 24,406 of 1911.)

## METALLURGY—GENERAL

**CALCINING FURNACES**—Improvement in Gaseous or Pulverulent Fuel Fittings for Calcining Furnaces. Gebhard Bierhals, Berlin, Germany. (Brit. No. 2503 of 1912.)

**CONVERTER VALVE**. Prime Edward Gannon, Jerome, Ariz. (U. S. No. 1,034,993; Aug. 6, 1912.)

**ELECTRIC INDUCTION FURNACE**. Albert E. Greene, Chicago, Ill., assignor to American Electric Smelting & Engineering Co., St. Louis, Mo. (U. S. No. 1,036,996; Aug. 27, 1912.)

**MELTING FURNACE**. William Joseph Holzapeel, Eddystone, Penn. (U. S. No. 1,037,768; Sept. 3, 1912.)

**ORE TREATMENT**—Process of Treating Ores. Wilhelm Gunther, Cassel, Germany. (U. S. No. 1,032,400; July 16, 1912.)

**RETORT SETTING**—Method of Constructing a Retort-Setting. George W. Parker, St. Louis, Mo. (U. S. No. 1,037,516; Sept. 3, 1912.)

**ROASTING**—Securing Rabble-Arms of Roasting-Furnaces. Utley Wedge, Ardmore, Penn., assignor to Furnace Patent Co., Philadelphia, Penn. (U. S. No. 1,037,091; Aug. 27, 1912.)

**SCRAP**—Metal-Scrap-Compressing Machine. John Dunn, Streator, Ill., assignor to Vulcan Detinning Co., New York, N. Y. (U. S. No. 1,033,089; July 23, 1912.)

**SCRAP TREATMENT**—Receiving-Box for Metal-Scrap-Compressing Machines. John Dunn, Streator, Ill., assignor to Vulcan Detinning Co., New York, N. Y. (U. S. No. 1,033,091; July 23, 1912.)

## PERSONALS

Mining and metallurgical engineers are invited to keep *The Engineering and Mining Journal* informed of their movements and appointments.

Henry F. Lefevre left New York, Sept. 21, for Panama.

John M. Callow, of Salt Lake City, was in New York this week.

Kirby Thomas, of New York, is making some mine examinations in Ontario.

W. A. Carlyle, of London, England, has been in Mexico on professional business.

Robert Hay Anderson has returned to New York from Europe, and has gone to Mexico.

J. Gordon Hardy, of El Paso, Texas, is now at Clifton, High Craigmere, Bute, Scotland.

J. I. Hoffman, of Johnson & Hoffman, London, England, is in Serbia on professional business.

Charles S. Price, president of the Cambria Steel Co., has resigned on account of continued ill health.

M. G. Talcott, consulting engineer of the General Assets, Ltd., has been appointed manager of the Dome Lake mine at Porcupine.

G. C. Bateman has been examining claims for the Canadian Mining and Exploration Co., in Turnbull Township, near Porcupine, Ontario.

C. K. Colvin, of Denver, Colo., is at Forbestown, Calif., on a professional visit to the Gold Bank-Golden Queen and other mines in the district.

William G. Nickerson, of Boston, has been chosen president of the Kerr Lake Mining Co., in the Cobalt district, to succeed Julius Lewisohn, resigned.

A. L. Sweetser, of Denver, Colo., is at San Juancito, Honduras, on professional business, and expects to remain in Central America for several months.

Robert S. Lewis, of Stanford University in California, has been appointed associate professor of mining in the University of Utah at Salt Lake City.

Leighton Stewart, recently at the Mina Tiro General, Charcas, San Luis Potosi, is now at Minas Teçolotes y Anexas of the American Smelters' Securities Co., at Santa Barbara, Chihuahua, Mexico.

J. F. McKenzie, formerly general manager of the Dome Lake mine, Porcupine, Ont., which is owned by the General Assets, Ltd., of Toronto, has gone to the Superior Talc Co., Moretown, Vermont.

Alfred E. Kornfeld, until recently vice-president and manager of the Engineering News Publishing Co., returned from a four-months' trip in Europe, on Sept. 6. He has taken an office at 41 Park Row, New York.

The General Engineering Co., Salt Lake City, Utah, announces the addition of Karl Bernson to the engineer-

ing staff. Mr. Bernson will act in the capacity of constructing engineer, taking active charge of all construction.

Warren E. Hall, Atlanta, Ga., and formerly division engineer in the Porto Rico irrigation service, has been appointed district engineer of the U. S. Geological Survey in charge of stream measurements and investigation of water resources in the southeastern states.

Maxcy R. Hall, for the last 10 years district engineer of the U. S. Geological Survey, in charge of stream measurements and investigations of water resources in the southeastern states, has resigned and is now a member of the firm of Hall Brothers, civil and mining engineers, Atlanta, Georgia.

C. Morton Ayres for 11 years chief engineer of the Central Iron & Coal Co., and more recently engineer and superintendent of the Central Foundry Co., at Holt, Ala., has resigned to enter private practice as a member of the firm of Finnell, Ayres & Parsons, consulting civil and mining engineers, with offices at Tuscaloosa, Alabama.

Edward Dedolph has disposed of his patent rights for four European countries on his process for making zinc oxide out of low-grade zinc ore to the Metallurgische Gesellschaft of Frankfurt-am-Main, which is going to exploit it. Mr. Dedolph is at present at McGill University, Montreal, where he is engaged in research work on electric zinc smelting in behalf of the Canadian government.

C. Vey Holman, formerly state geologist of Maine, who lately finished revising for the U. S. Geological Survey a list of the economically important mineral deposits of Maine, and has still more recently been collaborating with Arthur S. Watts, of the Bureau of Mines, in an investigation of the feldspar deposits of Maine, is now professionally engaged in an examination of the crystalline lime deposits of Sussex and Warren Counties, New Jersey.

## OBITUARY

James Preston died at Titusville, Penn., Sept. 12. He was one of the best known oil operators in the Pennsylvania district.

Dr. H. F. Wiebe, of Charlottenburg, Germany, a prominent scientist and official representative of the Kaiser to the Eighth International Congress of Applied Chemistry, died Sept. 17 from heart trouble at the Hotel Netherland, New York, where he had been staying since the close of the congress. He had planned to sail for home on Sept. 25. Doctor Wiebe was born in Hamburg, Germany, in 1852, and was educated at the Academy and Gymnasium at Hamburg, the Technical High School, at Charlottenburg, and the University of Berlin. He won royal favor through his scientific experiments. He was the author of many

books and papers on scientific subjects, and was a member of a number of scientific societies. At the Congress of Applied Chemistry he presented a paper on "The Highest Efficiency Point of the Abel-Pensky Apparatus, Compared with the Pensky Flash-point Tester," before the section on fuels and asphalt.

## Societies and Technical Schools

*Association of Official Agricultural Chemists*—This association held its twenty-ninth annual meeting at the Raleigh Hotel, Washington, D. C., Sept. 16 to 18, 1912. Of interest to smeltery men is the adoption of official methods for lead-arsenate analysis. The work on potash and basic-slag phosphorus will be carried on for at least another year before a final report is made.

*Old Freibergers in America*—An enjoyable and enthusiastic meeting of old students of the Freiberg Bergakademie was held at the Hofbrau Haus, New York, Sept. 13. At this meeting it was decided to arrange for a dinner in New York near the Christmas Holidays and at that time to form a permanent organization. Among those present at the first meeting were Dr. F. Heberlein, of Frankfurt, and R. Hofmann, professor of Metallurgy at the Clausthal School of Mines, Clausthal, Germany. Both of these gentlemen are well known not only as old Freibergers but in the metallurgical world also. The organizers are having some trouble in getting correct addresses as mining and metallurgical men are a wandering crowd. All old Freibergers are therefore asked to send in their names and addresses, with others they may know of, to C. L. Bryden, 1015 Myrtle Street, Scranton, Penn., so that a notice of the next meeting can be mailed to them.

*Coöperative Safety Congress*—At the first annual convention, at Milwaukee, Wis., Sept. 30-Oct. 5, to be held under the auspices of the Association of Iron and Steel Electrical Engineers, the following are among the papers to be given: "Advantages to be Derived from the organization of a Coöperative Safety Society," by L. W. Chaney; "Safety as Standardized by the Interstate Commerce Commission," by C. C. McCord; "Safety Measures in the Mining Districts of Western Pennsylvania, Ohio, and West Virginia," by H. M. Wilson; "Accidents Attributable to the Carelessness of Employees and how Best to Prevent Them," by A. H. Boyd, Jr.; "What Labor Organizations are doing to Encourage their Men to be More Careful to Guard against Accidents," by Mr. Boone. An exhibition of all kinds of safety devices will be held in connection with the Congress. Further particulars may be obtained from L. R. Palmer, 5852 Douglas Ave. East End, Pittsburgh.



# Editorial Correspondence

From our Representatives at Important Mining Centers

## San Francisco

Sept. 19—The total value of minerals and metals produced in California in 1911, and reported by Charles G. Yale, statistician of the U. S. Geological Survey, was \$25,174,677, a decrease from 1910 of \$1,845,728, resulting chiefly from the closing of two of the large smelters. There was a slight increase in gold production, but the decrease from normal production was so much greater that the increase in total gold had no appreciable effect on the aggregate of all minerals. The decrease from normal was also due chiefly to the closing of the smelters. The same condition applies chiefly to the decrease in the production of silver and lead, and wholly to the decrease in copper production. The closing of the smelters was responsible for a loss in aggregate production of gold, copper, silver and lead of approximately \$3,250,000, and directly attributable to the agitation and complaints of the farmers of the state and the U. S. Forest Reserve. Taking into consideration the production of zinc and the increase in gold from the deep mines, and of gold and silver from the placers and gold from the dredges, an aggregate of \$395,763, and the losses in smeltery production, the total production of all minerals in the state for the year 1911 under normal conditions would have been approximately \$28,000,000, or an increase over 1910 of about \$1,800,000, instead of a decrease of an approximately like amount. The only actual decrease under such normal conditions would have been in the production of the drift and sluice placers. So it is plain that there was no diminution in the productive capacity of the mines, but rather an advancement. Production was reported from 1181 properties; 596 were deep mines, 585 were placers, an increase of 81 deep and 21 placers over 1910. The placer operations included 65 dredges, operated by 34 companies or individuals, 141 drift and 169 hydraulic plants and 210 ground-sluicing placers. The total included 522 gold mines, 11 silver mines, 31 silver-lead mines and 30 copper mines. The total mine production of gold in 1911 was \$19,738,908 from the following sources: Gold mills, \$9,709,319; placers, \$8,986,527; smelters, \$641,495; old and new tailings, \$401,555. The increase in gold production over 1910 was \$23,468. The total silver production was 1,270,445 fine ounces, valued at \$673,336, a decrease of 569,640

oz., or \$320,310. The copper mines produced 36,316,136 lb. of copper, valued at \$4,539,517, a decrease of 12,384,620 lb., or \$1,645,479. Lead decreased from 2,870,977 lb. in 1910 to 1,398,111 lb. in 1911, a decrease in value of \$63,468. The zinc production increased from zero to 2,807,035 lb., valued at \$160,001. The deep mines produced 2,944,188 tons of ore, an increase of 246,303 tons over 1910. The ore extraction included 2,443,274 tons of gold and silver ores, 494,281 tons of copper ores, 2008 tons of lead ores, 4625 tons of zinc ores. The total average value of ores yielding gold and silver in 1911 was \$4.54 per ton, a decrease of 61c. per ton from 1910. The total average value of all ores treated and sold in 1911 was \$5.49, against \$6.71 in 1910. The average value per ton of ores from which the gold was recovered as bullion in the mills was \$3.59. The gold and silver mills treated 2,156,950 tons of ore; the smelters 538,214 tons, yielding copper, gold, silver, lead and zinc. The dredges produced 38.84% of the gold production of the state in 1911, increasing the total \$116,207 over 1910. The aggregate production of the dredges in the state from 1899 to 1911, inclusive, was \$47,985,236, an average of \$3,691,171 per year, and increasing from about \$200,000 in 1899 to nearly \$8,000,000 in 1911.

## Denver

Sept. 21—The suit of Garwood & Garwood vs. the Colorado & Southern, Burlington, and Union Pacific railroads to obtain lower rates on coal from the northern coal fields is set for hearing Oct. 1. This case is correlated with the Consumers' League case against the same railroads for lower rates, to be tried in the Denver County district court, Oct. 1. In a hearing of the Consumers' case, the railway commission reduced the rates on coal haulage 25 to 30% and the railroads brought action.

The action of the Federal Government against the American Smelting & Refining Co. and the Exploration Co., Ltd., of London, to set aside patents issued on eight pieces of valuable coal land was heard before the United States circuit court of appeals yesterday. The corporations demurred on the ground that the statute of limitations makes court action null and void. The patents were issued late in 1902, and six years, it is

said, exceeds the statute of limitations. The court took the case under advisement. If the government wins, it believes it will recover lands worth \$3,000,000 and the importance of the decision in this case, in the opinion of Prosecutor Townsend, lies in the fact that if the court decides to establish the equitable rule as to recovery of land patents, the Southern Pacific R.R. will have to give up oil lands worth \$400,000,000 in southern California. It will change the aspect of all future coal and other land prosecutions and give the government a big advantage. The government, through B. D. Townsend, special assistant to the attorney general of the United States, seeks to have established a rule which will permit the government to recover lands obtained by fraud, long before the statute of limitations has begun to run under the present statute. The government wants the rule laid down that those who take lands by fraud cannot invoke the equity statute if they have concealed the frauds in order to permit the statute of limitations to run against the fraudulent entries.

## Butte

Sept. 18—At the Montana state fair, to be held at Helena, five mine-rescue teams will compete for four days in first-aid methods. They will come from Butte, Red Lodge, Roundup, Washoe and Roslyn, Wash. A government team of professionals will be on the ground to judge the events, but will take no part.

John D. Ryan, president of the Amalgamated Copper Co., arrived at Great Falls, Sept. 15, accompanied by Thomas F. Cole, of Duluth, and remained for two days, looking after his business interests, leaving for Butte, and Anaconda, Sept. 17. A consultation was held between Mr. Ryan and Henry A. Herrick, of Manchester, N. H., consulting engineer, concerning the proposed dam at the falls, after which the announcement was made that a crew of men would be put to work in about a week to determine the character of bedrock by making borings. Construction will be started next spring after the high waters, and plans for the dam will be prepared during the winter. Several claims in the Butte district have recently been acquired, and Messrs. Cole and Ryan will spend several days in Butte, during which time they will decide upon the advisability of beginning development work.

## Salt Lake City

Sept. 19—Zinc ores can now be shipped to the Kansas smelteries over the Denver & Rio Grande for \$7.30 per ton, the new rate, which affords a reduction of \$2.20 per ton, having gone into effect Sept. 16.

Negotiations are under way between the Utah Copper Co. and the new management of the Telluride Power Co. for a large increase in electrical power, looking to the Telluride Power Co. to supply all the power for the Utah Copper works. At present operations are being carried on by electric power, partly supplied by the Telluride company and partly by the steam plant at Magna. Under the new arrangement, the steam plant would be closed down, the machinery being left to stand for some time for use in case of an emergency. The Bingham & Garfield R.R. has been so constructed that it can be readily electrified, and, if it is found practicable, the steam shovels, especially those used in taking out the ore where the levels are more permanent than those in the overburden, will eventually be run by electricity. Steam-shovel builders are making experiments with electric power.

Announcement has been made that the monthly meetings of the Utah Society of Engineers, suspended during the summer, will be resumed. Talks on the following subjects will be given: At the first meeting, Sept. 20; "Weir Measurement of Water," by R. R. Lyman, of the University of Utah. At the first meeting in October; "Street Paving in Salt Lake City," by D. H. Blossom, city engineer, and John Dudor, assistant city engineer; at the second meeting in October; "Hydro-Electric Power Resources Tributary to Salt Lake City," by H. D. Randall, of the General Electric Co.; "Factors Determining Cost of Hydro-Electric Service," by Markham Cheever, of the Telluride Power Co.; "Continuity of Hydro-Electric Power Service," by Leonard Wilson, consulting engineer; "An Example of Modern Steam Relay Station," by C. A. Cohn, of the Utah Light & Railway Co., and "An Example of Modern Transmission Practice," by G. W. Riter, of the Utah Light & Railway Co. At the fourth meeting, in December, the subject will be, "The Principal Metal Mining Districts of Utah, Geology, Statistics and Future." The details have not yet been arranged.

## Negaunee, Mich.

Sept. 20—The Calumet & Hecla Mining Co., Oliver Iron Mining Co., Cleveland-Cliffs Iron Co., and Jones & Laughlin Ore Co. have announced that they will come under the provisions of the new Compensation Law which went into effect in Michigan on Sept. 1. The Cleveland-Cliffs Iron Co. has worked out a complete scheme for the administration of the law, and has notified the state in-

surance commissioner that it will pay all benefits from its own treasury.

The Cleveland-Cliffs Iron Co. is preparing a textbook and arranging courses for its night school for employees. About 150 men came out at first, but the attendance has dropped down to half that number. One of the reasons why the men are interested is that it is known that the company has undeveloped mines in the Gwinn district, at North Lake and Iron River, which will require shift bosses and mining captains.

## Spokane, Wash.

Sept. 20—Delegates and visitors to the American Mining Congress, to be held at Spokane, Nov. 25 to 30, will be taken to the Cœur d'Alene and Slocan districts, Saturday, Nov. 30. Spokane mining men are arranging these trips as a part of the entertainment, which also will include on Friday evening, Nov. 29, a visit to the Spokane state armory, where the settings will show a typical pioneer mining camp. Dr. Joseph A. Holmes, director of the Bureau of Mines, will give two illustrated lectures, one devoted to coal mining, and the other to an outline of his plan for metallurgical work in the West, for which Congress has appropriated \$50,000.

## Wallace, Ida.

Sept. 18—An engineer has been sent to Pottsville, about 10 miles east of Wallace, to survey all the available land suitable for agricultural purposes in, and near that place, extending as far east as the Silver Cliff mine. This land has already been covered by applications to the land office. The land is poor for agricultural purposes, as it is mostly coarse glacial till. Several groups of mining claims have already been located on this ground, but no patents can be obtained, owing to the strict regulation of the forestry department. The land is in forest reserve. Much development work has been done on the ground and more was planned. All future development and prospecting will be abandoned as far as the original locators are concerned, and all work which they have done will be a total loss. The vein of the Silver Cliff has been traced through this ground and the outcrops of several other veins are known. A quantity of ore has been taken from the Silver Cliff vein, east of the proposed agricultural locations.

## Porcupine

Sept. 20—The board for conciliation between the mine managers and miners of the Pearl Lake district, which has been in session for a week, adjourned Sept. 17. The mine managers have submitted evidence regarding the wage scale and hours of work, and the matter will be further taken up and settled in Toronto, Sept. 24. Indications seem to point to the matter being decided against the union as

there were practically no grounds for calling the board. The Pearl Lake mines simply reduced the scale of wages to conform to the scale at the Dome and Hollinger mines. This scale is higher than that in effect at the Cobalt mines. There is some talk among the men, of a strike, but the managers have intimated that if this strike takes place, a further reduction of 25 to 50c. per day will be made. The mines involved are the McEnaney, McIntyre, Vipond, Pearl Lake, Plenaurnum and Jupiter.

## Toronto

Sept. 20—A case of widespread interest to investors in Canadian companies comes up for hearing before the Canadian supreme court in October, arising out of an action brought by the Canadian Pacific Ry. against the Ottawa Fire Insurance Co. It involves the question of the right of provincial governments to license or limit the operation of federally incorporated companies, and the right of a company holding only a provincial charter to extend its operations beyond the province by which it is incorporated. The Canadian government and most of the provinces will be represented at the hearing.

## Chihuahua

Sept. 14—Mining throughout the state is being resumed as rapidly as safe conditions are assured and suitable mine labor can be obtained. On account of the daily wage of two pesos offered both by the federal and rebel armies, many of the better-class miners have enlisted and it is a hard task for operators to secure adequate and first-class Mexican miners. Coke and other fuel is being brought in as fast as the inadequate railroad service will permit, so that the smelting and mining plants may not be handicapped.

Among late mine transfers is that of the La Fé copper property, in the eastern part of the state reached via the Orient Ry., to James Artwin and associates, who have already begun active work, both in production and development.

The Compañía Minera de Naica, S. A., the largest operating company in the Naica lead-silver district south of Chihuahua, has resumed shipments and is to operate at normal capacity as fast as desirable Mexican miners can be obtained. J. Bovio is again in charge.

The Yoquivo and Concheño mining companies in the western part of the state are taking in supplies of all kinds preparatory to re-starting the cyanide plants about Oct. 1. The work of rebuilding and enlarging the milling plant of the Palmarejo Goldfields, Ltd., in the vicinity of Chinipas is also reported under way. The Batopilas Mining Co. is operating at partial capacity. The Sierra company at Ocampo has announced no operative plans. The Republica mill re-started but was forced to close down again.



# The Mining News

The Current History of Mining

## Alabama

Reports submitted to the clerk of the United States court at Birmingham by the trustees in charge of the operations of the Southern Iron & Steel Co. and the Alabama Consolidated Coal & Iron Co., show that the Alabama Consolidated has one blast furnace in operation together with coal and ore mines sufficient to furnish raw material; while the Southern company has one furnace in blast, together with mines and coke ovens and a steel plant, producing steel wire. Efforts are being made to relieve the companies from the legal situation.

*Sloss-Sheffield*—The iron-ore mines at Sloss, a short distance from Birmingham, met with some trouble this month when water broke into the slope again. An underground stream a few years ago broke through into the mines and for several months disturbed the operations. Recently there was slight seepage and this gave some trouble. It is announced that the new trouble has been conquered and the usual output will be maintained.

## Alaska

Belmore Brown, of Tacoma, and others have taken an option on a group of placer claims, on Quartz Creek, near Seward, and plan to install machinery next season.

It is reported that an English-French syndicate has purchased the Wonder and Ault groups, and other placers at Nome. According to present plans, two steel dredges will be sent to Nome in the spring and should be ready for operation by next autumn.

*Princeton Mining & Milling Co.*—This company, operating a mine near Dolomi, on Prince of Wales Island, is erecting a 10-stamp mill with slow-speed Chilean mill, which is expected to be ready for operation early in October. Last summer an additional 100-hp. boiler was installed, also an 8-drill air compressor to replace the smaller compressor which will be put in operation on another property. B. A. Eardley is general manager.

*Victory Mining Co.*—It is reported that Patrick Heaney and associates, who have a bond on this property, will make the first payment Oct. 1. The property is on Seal Bay, Gravina Island. The present development consists of a crosscut tunnel 2000 ft. long, in which seven veins have been cut. The greatest depth reached on the ore was 600 ft. The ore contains

copper and gold in commercial quantities and a little silver.

*Rush & Brown*—A third oreshoot has been uncovered on the surface. It is about 100 ft. from the working shaft, and appears to be parallel to and to have the same dip and characteristics as the sulphide shoot, which is now being worked. It is not yet known whether or not it will prove of commercial importance. Development is proceeding on the second level of the sulphide shoot, and a winze will be sunk on the ore from this level. Regular shipments are made to Tacoma. U. S. Rush is manager.

## Arizona

### GILA COUNTY

*Old Dominion*—Preparations are being made to move the old buildings near the main shaft to make room for the new crushing plant, sampling mill, ore bins, conveyor houses, etc. Excavation for the crushing plant has been started. A skip-pocket is being cut at the 14th level preparatory to replacing cages with skips for hoisting ore and similar pockets will be cut at the 8th, 12th and 16th levels. This work must be done and the change made in the method of hoisting without delaying or interfering with the hoisting of ore and therefore proceeds slowly, so that it will probably be eight months before the change is effected. About 1200 men are employed.

*Gibson*—This mine, nine miles west of Miami, is increasing its production and shipments for this month are expected to amount to five or six cars of about 16% copper ore as compared with four cars in August. The ore is all coming from the fourth level on the Pasquale vein, where five or six stopes are being worked and where some new oreshoots were recently opened. Drifting southward continues on the fifth level and a raise is being driven to the fourth, but no important oreshoots have been opened on this level, although the vein is mineralized and prospects are considered favorable, for cutting ore in both the drift and the raise. Three 8-horse teams are engaged in hauling the ore to Miami whence it is shipped by rail to the Old Dominion smeltery at Globe. About 35 men are employed. Tip Henderson is superintendent.

*Savage Group*—Patrick Savage, owner of this group of nine claims near the Gibson mine, has leased it to W. A.

Thompson, P. S. Carr and D. Prescott, who have started work on the property. The claims are traversed by several veins in schist similar to the formation at the Gibson, and the ground is opened by several tunnels and prospect shafts.

### MARICOPA COUNTY

A new company is preparing to sink a well for oil northeast of Agua Caliente. Colonel W. F. Cody is also having a well drilled.

*Kay Copper Co.*—This company is hauling ore from its mine, 50 miles north of Phoenix, to Glendale, 42 miles from the mine, by mule team. Glendale is on the Sante Fé railroad and Tisdale & Lewis have a contract for hauling 1000 tons of ore.

*Harris Copper Co.*—This company owns an extension of the Kay vein and a tunnel is being driven to cut the vein about 500 ft. south of the Kay company's shaft.

*Buffalo-Arizona Consolidated*—This company, operating a mine near Morristown, will install a 100-hp. gasoline engine.

*Red Rover*—This company, north of Phoenix, has been shipping regularly at the rate of four carloads per month.

### YAVAPAI COUNTY

*Pocahontas-Copper Queen Mining Co.*—Work is to be resumed and a new hoist and milling machinery will be installed at this mine, near Mayer.

## California

### ALAMEDA COUNTY

*Cedar Mountain*—It is reported that the Pacific Coast Steel Co. has secured a lease on the magnesite claims from the McLaughlin estate, and that a calcining furnace will be installed at the mine. The product will be used for furnace lining. The property is near Livermore. Magnesite has been mined at Red Mountain in the same vicinity, and shipped to San Francisco paper mills.

### AMADOR COUNTY

*Hardenburg*—It is reported that good milling ore has been found in the west drift from the 1000-ft. level in this mine, at the south end of the Mother Lode. The new west drift should strike the main orebody at about 200 ft. from the vertical shaft, now being used instead of the old inclined shaft. R. M. Kelsey, of Jackson, superintendent.

**Kennedy**—Repairs to the shaft and to the water tanks at the various levels are being made preparatory to deepening the shaft to 3700 ft. Webb Smith, of Jackson, is superintendent.

**Little Illinois Gold Mining Co.**—The capital stock has been increased from \$350,000 to \$700,000. A portion of the stock will be sold to obtain money for development. The property is at Drytown, north of the Fremont mine. J. W. Buchanan is president and manager.

**South Jackson**—The new vertical shaft was deepened 112 ft. in August. Driving will be started at the 500-ft. level, which will probably be reached by December.

**Central Eureka**—Thirty stamps are dropping. An electric air compressor will be installed. It is reported that a shoot of good ore has been disclosed in the 2800-ft. level. J. A. Davis, of Sutter Creek, is superintendent.

#### CALAVERAS COUNTY

**Granetti**—New machinery for working this gravel mine, at Douglas Flat, will be installed; 12 men are employed.

**Christensen**—Pay gravel is reported in this mine, on Stockton Hill, near the town of Mokelumne Hill. The shaft, which was sunk in the early fifties, is 180 ft. deep. The mine has been idle since then, and is being reopened by C. G. Nuner, of Mokelumne Hill.

**Boire**—The cleanup after 12 days' run at this gravel mine, at Railroad Flat, yielded \$2000. The mine is equipped with a Huntington mill. Boire brothers are owners.

**Ferraris Mining & Milling Co.**—Articles of incorporation have been filed and \$10,800 has been subscribed. The property is at Albany Flat, near Angels Camp. Stockton is the principal place of business. The directors are John G. Ferraris, of Angels. Richard P. Ricci, Samuel Sattui, Bernard Levy and Gordon A. Stewart, of Stockton.

#### HUMBOLDT COUNTY

A new gold discovery has been made near the mouth of Three Creeks, near the town of Blue Lake, by N. C. Halliday and others. The croppings indicate that there are two veins which are believed to extend from Horse Mountain. The discovery is not in the vicinity of the War Eagle, which caused excitement several years ago, and which did not make good, but gave Three Creeks district a bad name.

**Happy Tom Mining Co.**—Articles of incorporation have been filed and capital stock placed at \$100,000, for the purpose of mining in the northern part of the county. Principal place of business is Arcata. The directors are Lewis Orcutt, Charles M. Preston, Thomas B. Riley, Jr., and W. W. Reese, of Arcata, each subscribing to \$1000 of the stock.

## Colorado

### LAKE COUNTY-LEADVILLE

**Winthrop Gold Mining Co.**—This company has on the cars in the Colorado & Southern yards, a 100-hp. boiler, 180-hp. steam hoist, a four-drill compressor and four machine drills. The railroad company will put in a spur at once and then this machinery will be shipped and installed at the Copper Belle shaft and the portal of the Crescent tunnel. The properties will be worked steadily through the winter.

**Dunkin**—A boiler and small hoist have been erected at Dunkin No. 1 shaft on Fryer Hill by W. S. Jones who is mining some fair-grade iron ore.

**Robert E. Lee**—The lessees are getting out a good tonnage of iron ore which is increasing in silver content and yields a fair profit.

**Adelaide**—A small tonnage of ore is being shipped from this mine by Peck and Schert, lessees. It is operated through the Yak Tunnel.

**Long & Derry**—In this mine the lessees have a vein of silver-lead ore three feet wide and their shipments, it is said, net them \$100 per ton.

**Louisville**—About 75 tons of medium-grade zinc ore is being shipped daily through the Yak tunnel by Hannifen & Reynolds, and from their Penn lease on Breece Hill 50 tons daily of good-grade iron ore.

### MINERAL COUNTY-CREED DISTRICT

**Creede Mining Co.**—A new shoot of gold-lead ore was recently opened in the White Star lode. The Humphreys 300-ton mill, owned by the company, is treating 4000 tons per month, mainly from the new development. S. B. Collins, manager.

**Triune Co.**—This company is treating about 100 tons of ore per day in the Amethyst mill and is shipping the concentrates.

### SAN JUAN DISTRICT

The ore shipments from Telluride in August were 96 carloads of concentrates as against 88 cars, some of which was crude ore, for the same period last year.

In the carnotite mines there is increasing activity. The Swindler group in Long Park has been purchased by Thomas F. V. Curran, president of the General Vanadium Co. and two carloads of high-grade ore were loaded at Placerville. O. B. Willmarth is buying carnotite in the Disappointment Creek country; he has shipped five carloads from the Long Park district since March.

### TELLER COUNTY-CRIPPLE CREEK

A customs cyanide mill is to be erected in the Cripple Creek district and a company has been organized by Howard Shultz and others, of Denver, with a capitalization of \$500,000, the object being to

carry on a general milling and mining business.

**Strong Gold Mining Co.**—The Jolly Tar vein in the town of Victor, and adjoining the Strong vein, is owned by this company. Three carloads per day of rich gold ore are being shipped to the smeltery from a rich strike; it is said to be 16 ft. wide and all pay ore, but in the center, there is a streak 8 in. wide that carries 20 oz. gold per ton.

## Idaho

### CŒUR D'ALENE DISTRICT

**Hypothek**—A strike of rich lead-carbonate ore has been made at this mine at Kingston. The ore was encountered in a crosscut from the 520-ft. level. The ore cut was 12½ ft. wide, 3½ ft. assaying 2% lead, 3½ ft. 23¼% and 5½ ft. 35½%. The mine has been in operation for many years and all the work has been done on a vein carrying some copper. The second vein in which the strike was made, was known to exist, but no work had been done on it until the crosscut opened the lead ore.

**Duluth**—This company will start work at once on its seven claims in Cañon Creek. The surface showing and the location warrants a careful development of the property.

**Liston Mining Co.**—Individual control of this property, east of the Bunker Hill & Sullivan, has been secured by Mathew Baumgartner, of Spokane, by purchase of 174,000 shares from Mr. and Mrs. Patrick Crowley, of Osborn, Idaho. Mr. Baumgartner immediately issued orders for resumption of operations, which were halted to repair the compressor and to overhaul the plant. A new ventilating system is being installed and part of the lower tunnel is being retimbered. Mr. Baumgartner reports encountering in the lower tunnel an iron-lead carbonate of better grade than that exposed in the upper tunnel.

## Michigan

### COPPER

**Old Colony**—Drill hole No. 17 has encountered an amygdaloid formation carrying copper at a depth of about 1175 ft. The formations passed through in sinking this drill have tallied with the results obtained in holes 16 and 17 of the Mayflower drilling.

**Osceola Consolidated**—Operations are to be resumed at the No. 5 shaft of the old workings, Oct. 1. Production has gradually increased at No. 6 and there are now 16 drilling machines in operation in that shaft.

**Adventure**—The crosscut from No. 5 shaft has encountered the eastern sandstone formation at a distance of about 1075 ft. from the shaft. The No. 4 lode



is nearly 70 ft. wide at the point of intersection with the crosscut and drifting is revealing considerable mass and heavy copper. The formation lies in close to the sandstone.

**Hancock**—Shaft No. 2 is down about 3925 ft., the objective point being a depth of about 4000 ft. It is planned to crosscut from the 4000-ft. level into the footwall of the Pewabic lode and then to sink two winzes to work at depth. Electric hoists will be installed and the ore will be transported through the crosscut to the No. 2 shaft for hoisting. The crosscut at the 34th level continues in trap carrying copper in commercial quantities.

#### IRON

**Palms**—Operations for development have been started at this Gogebic Range property on which nothing has been done for several years. A new shaft will be sunk. The mine is just southeast of Bessemer, and between the Tilden and Anvil mines; it is owned by the Newport Mining Co.

**Presque Isle Iron Co.**—Machinery is being purchased by this new corporation for developing the Copp's property on Sec. 21, 47-43, at the eastern end of the Gogebic Range. Diamond drilling has been in progress for some time and a body of commercial ore has been discovered. R. J. Whiteside, W. G. La Rue and W. H. Cole, of Duluth, control the company.

**Cascade Mining Co.**—The site has been cleared for the 4-compartment shaft. The sinking of which will start soon. A diamond-drill hole has been drilled in the diorite dike at the shaft site, and a 2-in. core obtained showing the rock in which the shaft will be sunk. About 20 ft. of surface is anticipated; that part of the shaft in surface soil will be concreted. The work is being done from the rock surface up. It is planned to dig directly to bedrock even though a wide excavation has to be made. About 25 men are employed, under the direction of Capt. Thomas Nicholas. Diamond drilling in the ore formation is still in progress by the Longyear company, under direction of L. D. Cooper.

## Minnesota

### CUYUNA RANGE

**Iron Mountain**—There are 14 drill holes down on this ground, all in iron ore, the greater part of which is rich in manganese.

### MESABI RANGE

**Shenango**—This open-cut mine, after being out of commission for a year, has resumed shipping. At present two steam shovels are in operation and 300 cars of ore per day are being shipped.

**Leonard**—This pit mine, in the Chisholm district, recently broke the load-

ing record when one shovel loaded 180 cars in a 10-hr. shift, each car holding 45 tons. The nearest approach to this record on the Mesabi was made at the Coleraine, when 160 cars were loaded.

### VERMILION RANGE

A crew of men is at work on 63-9, exploring for ore. This property was formerly owned by Willis Cleveland, who has charge of the opening work.

**Consolidated Vermilion Extension Mining Co.**—The shaft is now practically free from water and the ore is rapidly being blocked out. A railway spur will be laid to the mine by spring.

## Montana

### BUTTE DISTRICT

**Anaconda**—The quarterly dividend was increased from 50 to 75c. per share at a meeting of the directors, Sept. 24. The change makes the dividend rate 12% instead of 8% on the \$25 par stock.

**Bullwhacker**—Experts have long been working to determine the most efficient method of treating this ore, which is low-grade carbonate and silicate containing about 3% copper. Patrick Clark, president of the company, is preparing to install an experimental 5-ton leaching plant. It is understood that the machinery has been ordered and work on construction of the buildings will begin in a week or two.

**Pilot**—A new hoist has been installed and sinking has been resumed. The shaft is 1325 ft. deep and the work will be continued to the 1800-ft. level, where a station will be cut and crosscutting started. The shaft will then be continued to the 2000-ft. level, where a station will be cut and development work begun. The company is amply financed to continue the work necessary to place the mine on a producing basis.

### BROADWATER COUNTY

**Butte & Radersburg**—According to an announcement made by the directors, operations will again be started at the property in the Radersburg district, after a shutdown of about two months. A promising vein, carrying gold, was opened on the 200-ft. level a short time before the shutdown, and drifting will be resumed on this vein.

### FERGUS COUNTY

**New Year**—Chicago men purchased this mine and mill at New Year some time ago, and are operating both steadily.

**Gold Acres**—A. S. Wright, who has for some time been negotiating with New York men for the sale of this property adjoining the New Year, has left for New York to complete the transaction. Ore is blocked out in this mine, and the prospective purchasers are considering plans for the erection of a complete cyanide plant.

## Nevada

### COMSTOCK LODGE

**C. & C. Shaft**—The new vertical centrifugal pump has been connected up at the 2500-ft. level, and is now doing regular service pumping hot water from the sump to the 2310 station pumps. From that place, the water is relayed to the Riedler pumps on the 2000-ft. level, and from there to the Sutro tunnel drain at the 1600 level. The No. 2 hydraulic elevator has been removed, and will be replaced by No. 2 vertical, after which No. 1 hydraulic will be taken out, giving two centrifugals in the sump. The hydraulics were installed in 1899, and have run continuously since, pumping out the north-end mines from the 1600 to the 2500. In this territory thus recovered, several millions in bullion have been extracted. The new pumping system will recover ground below the 2500-, and the 2900-ft. level will be the first objective point in order to prospect the new Mexican ore-shoot at that depth.

**Mexican**—A new development of interest was made on the 2500-ft. level when, 250 ft. in the north drift, a winze was sunk for 14 ft. in the vein. The quartz exposed is irregular and the ore spotty. Sampling shows that the best ore is on the hanging wall, and 21 tons taken out averaged \$17 for the entire width. Further work gives encouraging prospects, and the vein will be followed down at this place. The winze is more than 200 ft. south of the stope on this level, from which a large quantity of high-grade ore has been extracted. A shipment of bullion from the mill will be made soon. The financial statement of the company shows a cash balance in the treasury of \$50,000.

**Ophir**—The new cyanide plant is rapidly nearing completion, the following equipment being in place: Dorr classifier, Dorr thickener tank, stock tank, wash and sump tanks. Concrete foundations have been put in for the Butters' filter and for the heating plant.

### LANDER COUNTY

**Nevada Mining Co.**—This company recently began operations at Battle Mountain, and installed an 8x10-in. Sullivan compressor, driven by a Fairbanks-Morse gasoline engine.

### LINCOLN COUNTY—PIOCHE DISTRICT

**Prince Consolidated Mining & Smelting Co.**—The control of this property has passed from the control of the Godbe family to that of George Wingfield and associates. Several near-by mines and claims are under option to the same men. It is proposed to do much prospecting with a diamond drill, the aim being to produce 400 tons per day. A favorable contract has already been closed with smelters. A shrinkage system and backstopping methods will be followed to break

1200 tons of ore per day in order to be able to ship 400 tons of shipping ore. A. Y. Smith is manager.

#### NYE COUNTY

Shipments in tons from Tonopah mines to date and for the week ended Sept. 14, are as follows:

Mines	Week	Year to Date
Tonopah Mining.....	3,350	123,069
Tonopah Belmont.....	3,110	85,417
Montana-Tonopah.....	1,034	38,198
Tonopah Extension.....	1,071	36,759
West End.....	835	27,142
Midway.....	.....	420
MacNamara.....	465	13,225
North Star.....	40	170
Mizpah Extension.....	.....	40
Jim Butler.....	300	1,300
Totals.....	10,205	325,740
Estimated value.....	\$255,125	.....

For the month of August the Montana Tonopah, West End and Tonopah Extension mines exceeded all previous monthly records of production of ore and bullion and net profits earned.

**Jim Butler**—In this mine, the Fraction vein, which faulted on the third level, has been struck in a crosscut on the 600-ft. level. It carries very good ore. The property is shipping from the upper levels 300 tons weekly to the old Belmont mill.

**Tonopah Merger**—The drift on the 970-ft. level now shows four feet of good ore and shipments will be commenced as soon as possible.

**North Star**—This mine will shortly commence shipments from the ore recently opened on the 850-ft. level. The south drift on the 1250-ft. level has entered a large shoot of quartz containing good ore.

**Tonopah-Belmont**—The mill is treating an average of 500 tons of ore daily, averaging over \$20 per ton. The company recently shipped 8120 lb. of silver bars in one week. The mill is recovering more than 96% of the gold and silver.

## New Mexico

### SOCORRO COUNTY

**Ernestine Mining Co.**—Reconstruction work on a 10-stamp battery has been finished and the plant is now operating with 30 stamps.

**Oaks Co.**—From developments on the Pacific, Johnson and Susie claims, 128 tons of ore was recently shipped to the custom mills. The grade ranges from \$14 to \$25 per ton.

**Precious Metals Co.**—The tunnel, now more than 700 ft. long, is in good ore, and it is planned to increase the force to three shifts per day.

**Deep Down**—The shaft continues to yield a good grade of ore, which is being treated at Socorro Mines' mill.

**Treasure Mining & Reduction Co.**—Grading for new ore bins at the mines is in progress.

## South Dakota

### LAWRENCE COUNTY

**Victoria**—The mill has been started, and 100 tons per day is being dry crushed and cyanided. The plant will be worked up to 200 tons capacity as fast as practicable. The first few days' operations have been satisfactory. O. N. Brown, of Cyanide, is manager.

**New Reliance**—Operations have been resumed at this mill under the management of F. C. Bowman. Minor changes have been made in the plant. The mill is equipped with 30 stamps, and a good leaching plant.

**Trojan**—The mill is treating 180 tons per day with the first unit in operation. Everything is being put in shape for winter, and the capacity will probably not be increased soon. This is a close corporation, and results of operations are not made public. H. S. Vincent, of Deadwood, is manager.

**Minnesota**—Stockholders have paid off judgments amounting to a little more than \$20,000, which clears up the title to the property. Funds for development are now being raised, and work will be undertaken in the shaft within a few weeks. The shaft is 200 ft. deep, and in a northerly drift from this level some good ore has been developed in quartzite. E. Major, of Maitland, is manager.

**Bismarck**—General Manager Hitchings is authority for the statement that this plant will be in operation within 60 days. It will start with a capacity of 300 tons per day. It adjoins the Wasp No. 2 and the same process for handling ores, viz., dry, coarse crushing and cyanidation, will be used.

**Golden Gate**—E. J. Hoover has secured this property and has a crew at work cleaning out the old shaft preparatory to undertaking thorough development of the quartzite ores. The property has been shut down for 12 years, but previous to that time was a producer of what would today be rated as high-grade mill ore. Large quantities of medium-grade ore were untouched in former operations, and should pay a profit today.

**North Homestake**—Lateral work has been discontinued on the 600-ft. level, and within 30 days work will be commenced on the 300-ft. level. A drift will be run northerly to intersect the quartzite, which is pitching in that direction, and where oreshoots are known to exist.

**Golden Reward**—Good progress is being made in the erection of the Wedge roaster that this company is putting in at the Astoria mine. The plant will start with a capacity of 75 tons per day. Fuel oil will be secured from Casper, Wyo. The company's cyanide plant, at Dead-

wood, is operating steadily at full capacity, and richer ore is being sent to the smelters at Denver and Omaha.

**Wasp No. 2**—The steam shovel used for stripping is being pushed to full capacity, as every effort is being made to uncover enough ore to keep the mill busy all winter and shut down the shovel during the bad months; 10 to 14 ft. of overburden is being moved at the present time. The company recently installed a Donaldson tilting furnace, made by the Denver Fire Clay Co. for melting precipitates. Wyoming fuel is used with good results. Coke furnaces were formerly used.

## Texas

### BURNET COUNTY

Thomas & Barringer are developing a quartz property five miles from Burnet; twelve men are employed.

## Utah

### JUAB COUNTY

Tintic shipments for the week ended Sept. 13 amounted to 169 cars. The lowered output is due to the Knight companies having discontinued the mining of low-grade ores, pending arrangements for the storing of such ores for the proposed new mill.

**Colorado**—The quarterly dividend was passed at a directors' meeting, held Sept. 16. The earnings for the period amounted to about \$9000, and there is \$70,000 in the treasury.

**Gold Chain**—This company has declared its second dividend of 2c. per share.

**Iron Blossom**—The low-grade ore is being saved for the proposed mill. There is \$270,000 in the treasury, and it is thought that earnings will be sufficient to keep up dividends during the period of mill construction, which will be about six months.

**Lower Mammoth**—Copper ore is being mined on the 1800-ft. level, and zinc ore is exposed on the 1500-, 1700- and 1800-ft. levels.

**Swansea**—Ten cars of ore were shipped the week ended Sept. 13, the ore coming from the 940- and 850-ft. levels. The new electric compressor is in operation.

**East Tintic Development**—Shipments of zinc ore will begin soon.

**Chief Consolidated**—The output for the week ended Sept. 13 was 23 cars. Development is being done on 1000-, 1400- and 1600-ft. levels chiefly.

**Black Jack**—During the year ended Sept. 1, 1912, there were produced 1468 tons of iron ore and 771 tons of lead-silver and siliceous ores from leases, and 35 tons of silver-lead ore on company account, the whole netting the company \$1952.



## SALT LAKE COUNTY

**Ohio Copper**—A record of over 3100 tons in 24 hr. was made recently at the mill.

**South Hecla**—A report has been issued covering operations for the eight months from Jan. 1, to Sept. 10, 1912. The total indebtedness is \$10,700, and 75,000 shares of treasury stock have been offered the stockholders at 25c. per share, 12½c. to be paid by Oct. 5, and the remainder by Dec. 5, with a view to financing the company.

**Cardiff**—Preparations for winter work are being made. As soon as the shipping season is over, work on the upper levels will be discontinued, and operations confined to the lower tunnel, which is approaching the contact.

**Montana-Bingham**—Timbering has been necessary for 65 ft. near the face of this company's 1300-ft. tunnel. The soft ground shows considerable mineralization.

**Michigan—Utah Consolidated**—The stock of this company has recently been listed on the Boston Curb. Shipments are being made though they are somewhat restricted, owing to a shortage of ore teams. The towers on the tramway, which has recently been overhauled, are all in place, and the cables are being restrung. The tram is 4½ miles long. The output at present amounts to 20 tons of shipping ore daily.

**Alta Consolidated**—Sinking is being done in sulphide ore below the main level. Shipments are being continued.

**Columbus Extension**—Ore has been opened on the lower tunnel level in what is thought to be the Toledo fissure.

## SUMMIT COUNTY

Park City shipments for the week ended Sept. 14 amounted to 2,619,740 pounds.

**New York Bonanza**—The gross indebtedness at the end of the year ended Sept. 10, 1912, was \$4589, which, less \$600 worth of ore on hand, treasury stock, and bills receivable, gave \$3334 as the total of liabilities over assets.

**Daly**—A strike is reported in a raise from the 800-ft. level. This is said to be a new shoot in hitherto unprospected ground.

**Ontario**—It is expected that the mill, which is to be operated by the Mines Development Co. will be started in a few days. The capacity is to be 75 tons.

## TOOELE COUNTY

**Bullion Mines Coalition**—Monthly shipments of 1200 tons are being made from this Stockton property, half of the output coming from lessees; 100 men employed.

**Ophir Mill**—Regular shipments are being made over the new branch line to the Salt Lake route. The work of enlarging the mill from a capacity of 150 tons to 300 tons in progressing, and it is expected

that operations will begin in about two months. An electric line is being built from South Willow Cañon to the camp, a distance of 25 miles.

**Cliff**—Steady shipments are being made by an aerial tramway one mile long to the new branch road from St. John to Ophir.

**Lion Hill**—The Chloride Point ground is being developed, and ore, some of which is of shipping grade, is being mined 200 ft. from the surface. Development is being done in other parts of the property.

## UTAH COUNTY

**Union Chief**—September shipments from this property in the Santaquin district, so far amount to three cars of ore of good grade.

**Eva**—Nineteen men are mining from 10 to 12 tons of ore daily in this mine in the Santaquin district. Four cars were shipped during August. The ore is sent out over a new 2700-ft. tramway.

## Virginia

**Old Dominion Pyrite Co.**—This company, capitalized for \$150,000, will develop 100 acres of mineral property, at Mineral, Louisa County, about one mile east of the Arminius mine. A two-compartment shaft is being sunk in a lense of pyrite, which appears to be 60 ft. wide and to extend to within 5 ft. of the surface. William C. McIntire, of Washington, D. C., is president, and B. F. Hand, of Mineral, is manager.

## Washington

## FERRY COUNTY

Some good strikes have recently been made on Contention Hill, near Orient, and many prospectors are in the hills.

**Republic Mines Corporation**—This company, in the Republic district, earned \$42,737 for the stockholders during the fiscal year ended May 31, 1912, according to the report of General Manager J. L. Harper. The receipts were \$226,651, while the disbursements, including every item of expense incident to operating the properties, were \$183,914, leaving a surplus of \$42,737. The ore shipments for the year totaled 524 cars, containing 20,646 tons, valued at \$382,118. The treatment charges were \$105,674, and the freight was \$48,477, returning to the company \$227,967. The total extraction for the year, including 10,529 tons waste, was 31,175 tons, mined at a cost of \$183,914, making the ton cost \$5.98. The percentage of extraction was shown to be 66.2% and the cost of the ore milled and shipped to the smeltery was \$3.27 per ton.

**Jim Blaine**—Glen A. Collins, Republic, general manager of this mine, is making preparations for extensive operations in the near future.

**Republic Mines Corporation**—Plans are being drawn for rebuilding the assay office of this company at Republic.

**Blacktail**—The company owning this mine, in the Republic district, is considering the installation of a cyanide mill.

**North Washington Power & Reduction Co.**—The rearrangement of the crushing department of this cyanide plant, at Republic, has resulted in doubling the capacity, making it possible to treat 125 to 160 tons per day.

## KITITAS COUNTY

**Star Copper**—This property, better known as the Skookum Copper, is being examined by Louis Garbrech, of Los Angeles, with the view of a thorough prospecting of the property with diamond drills.

## STEVENS COUNTY

**Lead & Zinc Co.**—J. Jenson, of this company, at Metaline Falls, announces that a concentration mill will be built.

**Mineral Farm Co.**—Two cars of gold ore were shipped recently. Development work will be continued. Louis Jaquish, Meyers Falls, is manager.

**Jack Waite**—This company is having plans drawn for a concentrating plant, to be erected on the property at Waits. Fritz Marchante has charge of the work.

**Inland Lead Co.**—This company has been organized by C. S. Clute and others, of Spokane, and has taken over a claim near Metaline. Work is to be started at once.

## WHITMAN COUNTY

**Mizpah**—Some fine gray-copper ore has been encountered in the 400-ft. tunnel of this property, and a trial shipment will be made. This mine is in the Hoodoo district, near Palouse.

## Wisconsin

## FLORENCE COUNTY

**Florence Iron Co.**—This company is preparing to sink a shaft to develop an orebody found by diamond drilling near Commonwealth. It is expected that large shipments may be made next season.

## PLATTEVILLE DISTRICT

A local company has been organized to prospect the M. I. Schroeder land, four miles south of Platteville.

**Baxter**—This mine, at Cuba City, has been reopened under the management of J. H. Billingsley; the mine has been a producer and dividend payer.

**Merry Christmas**—The Mineral Point Zinc Co. has reopened this mine, at Mineral Point; the property was purchased a short time ago.

**Senator**—The Joplin Separator Co. has renewed the leases and will reopen this mine at Rewey.

**Crawhall**—In the last 30 days the Field Mining Co. produced and sold \$60,000

worth of ore from this new property at New Diggings; the raw zinc concentrates assay from 50 to 58% zinc. The mine is owned by Robert W. Hunt & Co., of Chicago, Ill.

**Frontier**—This company has installed a crosshead pumping equipment at the Hird shaft and is prospecting the Grotkin and Sedgewick leases.

## Wyoming

### CARBON COUNTY

**Fram**—Class, Stewart & Smelser are shipping a car of high-grade gold ore from this property on the Snowy Range.

### FREMONT COUNTY

**Mary Ellen Mining Co.**—A bunk house and office building are being built. The company purchased the old Helen G. mill at Lewiston, and will move it to the Mary Ellen mine. J. N. Smith is manager.

**Miners' Delight**—It is reported that this and the Carissa mine are to be examined. These two are the largest mines in the Atlantic district.

**Beck Mining Co.**—The cyanide addition to this mill is rapidly nearing completion. It is expected that the stamps will be dropping again in a fortnight.

**X. L. Dredging Co.**—Operation for the season has been suspended on account of shortage of water. The old Dexter ditch, which takes water from Christina Lake to Rock Creek, is being enlarged, in order to obtain a larger supply of water for next year.

**Hidden Hand**—This mine continues to produce high-grade ore, which up to the present time is being raised by a windlass. This property is near Lewiston. The ore is iron-stained quartz rich in gold.

## Canada

### ONTARIO

**Mond Nickel Co.**—Owing to the large amount of water encountered, something unusual in this district, shaft sinking on the Froude Extension property has been slow and expensive.

**Dominion Nickel Copper Co.**—This company will soon have five drills working on the Murry mine, besides two on the Cochrane and McVittie Blue Lake property. The company has secured an option on the Kirkwood mine where development work will soon be started.

**Canadian Copper Co.**—The Strathcona nickel property is under option to this company and three drills are at work upon it.

**Moose Mountain Co.**—The Gröndal magnetic-separation plant being erected to treat low-grade ore is about completed. Two separating units are completed, and the producer-gas plant and the briquetting kilns have been tested also. The briquetting press is not yet completed,

but a preliminary test of the plant will be made this month.

### ONTARIO—COBALT

Shipments of ore and concentrates, in tons, from Cobalt for the week ended Sept. 20, and for the year to date:

Beaver.....	244.26
Buffalo.....	864.57
Casey Cobalt.....	212.15
City of Cobalt.....	887.99
Cobalt Lake.....	663.65
Cobalt Townsite.....	47.65
Chamb.-Ferland.....	32.00
Coniagas.....	1,515.41
Crown Reserve.....	351.10
Drummond.....	330.30
Hudson Bay.....	538.47
Kerr Lake.....	529.92
La Rose.....	2,537.23
Lost and Found.....	15.00
McKinley-Darragh.....	1,919.88
Nipissing.....	1,630.72
O'Brien.....	453.31
Penn.-Canadian.....	29.70
Provincial.....	22.22
Right of Way.....	242.82
Timiskaming.....	28.03
Trethewey.....	27.65
Wetlaufer.....	381.54
Colonial.....	265.74
Colonial.....	63.14
Totals.....	382.65
	16,071.81

**Nipissing**—During August, the output of this mine was valued at \$226,613 net, and the shipments at \$170,213 net. The production of bullion was only 236,000 oz., the high-grade mill having been shut down for 10 days while the tube mill was being repaired.

**Hubert Lake Claims**—A Toronto syndicate represented by A. P. Seymour, formerly manager of the Cobalt Lake, has bought the claims situated at Hubert Lake in the Elk Lake district from Dr. C. W. Haentschel, of Haileybury, and Samuel Tongue, of Maltawa, for \$100,000.

**Jajola**—On this property at North Cobalt the shaft is down 200 ft. and will be sunk to reach a vein tested by diamond drilling.

### ONTARIO—PORCUPINE

**Crown Chartered**—The directors have decided to call a special meeting of shareholders to consider a reorganization proposal, which includes the liquidation of the company's indebtedness by an issue of bonds. Dissatisfaction exists among the shareholders, and as the result of a meeting held in Toronto, Sept. 11, a writ has been issued against the directors charging them with fraudulently conspiring to deprive the company of the Davidson Claims, by causing a transfer to be made without authority of the shareholders, and asking for an injunction to prevent the sale.

**McEnaney**—The character of the ore has altered with depth and it is probable that the final details of the mill will not be settled until the 400-ft. level is developed.

**Hughes**—The vein picked up on the 150-ft. level 50 ft. from the shaft has been found to show improvement both in width and grade, as compared with the upper levels. Plans are in preparation for a 10-stamp mill to be installed this autumn.

**Patricia**—On this property, adjoining the Hughes, a vein 6 ft. wide with good

showings has been uncovered. It is believed to be a continuation of the Hughes vein.

## Mexico

### GUANAJUATO

**Humboldt**—It is reported that the winze in the south breast continues through ore of improving grade. The shoot is apparently the same one that produced so abundantly in the Carmen.

### MEXICO

**Esperanza**—During August the mill was in operation 28 days, crushing 7024 tons of ore, and treating 16,845 tons of tailing. The estimated receipts were \$117,605; the estimated profit \$27,800.

### SONORA

The Thompson interests have a small force of men at work on their property 18 miles east of Cananea. A tunnel is being driven which will go through the hill which bisects the property.

**Minneapolis Copper Co.**—Owing to the presence of rebel bandits, this company has been obliged to stop work on the smeltery it was building near Cumpas. The pumping plant is being held at Tucson, Ariz., and several cars of lumber are across the line in Douglas.

### TAMAULIPAS

**Freeport & Mexico Fuel Oil Co.**—This company has been organized by New York men to develop about 700 acres of land in the vicinity of the Panuco River, about 20 miles from Tampico. Wells are now being drilled, and 55,000-bbl. tanks are being erected at Tampico and at Freeport, Tex. J. S. Mayberry, Tampico, is manager.

## Africa

### TRANSVAAL

Gold production from the Witwatersrand in August was 732,197 oz., and from the outside districts 32,540 oz.; a total of 764,737 oz., being 1601 oz. less than in July. For the eight months ended Aug. 31, the total output was 5,398,817 oz. in 1911, and 6,037,982 oz.—or \$125,549,208—in 1912; an increase of 675,165 oz. this year. In August there were 63 mills in operation, having a total of 10,063 stamps. On Aug. 31 there were 203,811 negro laborers employed in the Transvaal, 8766 at coal mines, 15,934 at diamond mines and 179,111 at gold mines. The total was 3445 less than at the end of July.

**Messina (Transvaal) Development Co.**—The production for August was 281 tons of 48% copper ore. Development consisted of 965 ft. of drifting and 18 ft. of shaft sinking. The face of the west drift, No. 5 level, is 75 ft. from the main crosscut and is in good ore all the way; over a width of five feet, an assay of 15% copper for a distance of 40 ft. is reported.



# The Market Report

Current Prices of the Metals, Minerals, Coal and Mining Stocks

## COAL TRADE REVIEW

*New York, Sept. 25*—The coal trade in the West is active and prices are strong. Car shortage is getting to be an important factor, and the approaching close of the Lake trade is also taking much coal, so that there is difficulty in supplying coal as fast as it is wanted.

In the seaboard bituminous trade, supplies are curtailed by car shortage and by the West Virginia labor troubles. Deliveries are behind and stocks cannot be filled. This is especially the case with the coastwise trade.

Anthracite producers have not yet made good the April-May shortage, and the collieries are being urged to their utmost to make the needed shipments.

It is announced that the New York Central Co. has made an agreement providing for exchange of traffic between its Pittsburgh & Lake Erie road and the Western Maryland. This will give a through line from the Pittsburgh district to tidewater at Baltimore, and an outlet for coal from that district to the seaboard.

Coal and coke tonnage of all lines of the Pennsylvania R.R. east of Pittsburgh and Erie eight months ended Aug. 31, short tons:

	1911	1912	Changes
Anthracite.....	7,649,696	6,452,287	D. 1,197,409
Bituminous.....	26,875,301	30,207,895	I. 3,332,594
Coke.....	6,962,313	8,597,730	I. 1,635,417
Total.....	41,487,310	45,257,912	I. 3,770,602
Total increase was 9.1% this year.			

## IRON TRADE REVIEW

*New York, Sept. 25*—The iron and steel trades continue strong and active, with a tendency to advancing prices, while producers are still holding back on long commitments. Contracts for the first quarter of 1913 are a good deal in evidence, and are generally at advances.

September has shown practically no change from August in the volume of finished-steel specifications passing to the mills. On an average the specifications are considerably in excess of current shipments, so that the mills are falling farther and farther behind. In sheets the mills have from six to 10 weeks' work in actual specifications, in tinplates from 10 to 12 weeks, and in bars, plates and shapes they have from six to 12 weeks actually specified, with definite engagements for specific jobs that practically fill them up for the balance of the year. On the basis of specifications actually in hand and certain to come in, barring se-

rious accidents, the mills in the majority of lines are filled for the remainder of the year, and they therefore regard it as settled that they will have full operation to Apr. 1 at least, for this would occur even should specifications undergo a very material shrinkage.

Export business is good and the fact that prices abroad are generally higher than here is helping it along. Both British and German steel makers are full of work, and are quoting above our level, which is rather an unusual condition.

Pig iron, which has been slower to develop activity than steel, is now in active demand and at advancing prices. Foundry and basic iron are especially called for. Some Alabama iron has been taken for export to Italy, but in small lots.

### Baltimore

*Sept. 23*—Exports for the week included 90,800 lb. tinplates, 66,805 lb. structural steel and 111,569 lb. miscellaneous iron and steel to Havana; 4,398,040 lb. billets and tinplate bars to Liverpool; 1,579,200 lb. steel billets, 1,833,695 lb. skelp steel to Glasgow. Imports included 250 tons steel scrap from Liverpool; 5050 tons manganese ore from Poti, Russia; 16,350 tons iron ore from Cuba.

### Birmingham

*Sept. 23*—Continued strength is to be reported in the Southern pig-iron market, the demand being strong and prices advancing. During the first three weeks of this month more than 100,000 tons of pig iron were sold by Southern furnace companies, the greater portion of it for delivery during the first half of 1913. The prices range between \$13 and \$13.50, for No. 2 foundry. Two of the furnace companies of the district are practically out of the market, having sold ahead as much as they desire to. Less than 35,000 tons of iron which can be resorted to on short notice are in the yards. The make will be increased shortly after the first of October. It is estimated that four furnaces will start up between now and the end of the year, two of them in October, one in November and the fourth during December.

Cast-iron pipe makers are melting more iron now than ever before. The Dimmick plant at North Birmingham, which was recently placed in operation again after having been thoroughly repaired, is mak-

ing some of the largest sized pipe. There is no end to the demand for pipe. Announcement is made that two more pipe foundries will be constructed at Annonston, which will bring the total production of pipe at that place to large figures. No change is to be noted in steel. The activity at the various plants is interesting, all shapes in steel being in demand, especially fabricated steel. Rails and wire, too, find a steady output and, the rolling mills are busy.

The scrap-iron market is still strong, while charcoal iron shows no weakening, though the production is light. Molders are still on strike, which affects the foundry business.

### Chicago

*Sept. 24*—Buying of pig iron has been of fair volume in the last week, though the aggregate tonnage has not been so high as in the previous week. Most sales have been of less than 3000 tons and some have ranged up to 5000 tons. The melters who use a medium amount of iron are coming into the market very generally now for their first-quarter needs, and there is still some iron to be sold to meet last-quarter requirements. Prices continue to advance, and there is now no difference in quotations for the last and the first quarters. Southern No. 2 foundry sells in most cases for \$13.50, Birmingham, or \$17.85, Chicago, with some available at 50c. less. Northern No. 2 foundry brings \$17@17.50, at furnace, which means \$17.50@18 with Chicago delivery, so that Northern and Southern are on about an equal basis as regards prices. Some melters are eager to cover for the whole first half, but furnace agents are not anxious to go beyond first-quarter sales on the lower quotations. Charcoal iron continues at \$16, furnace, or \$17.75, Chicago, with a very good demand.

The demand for finished materials continues large and business goes almost wholly to Eastern mills, because of the crowded condition of the local mills. Business for 1913 is being locally accepted, but most of it has been done with Eastern makers, and the pressure is so great that the rising prices seem not likely to check it. Bars are in large demand; railroad supplies and structural material show no falling off in the total of requirements; sheets, plates and wire goods have a wide and large sale. Much buying is being done for warehouse stocks, in all lines.

### Cleveland

Sept. 23—There is more demand for ore from furnaces. Wild boats are in some demand, 10 or 15c. advance being offered.

*Pig Iron*—Demand is strong and some large contracts have been placed. Prices have advanced sharply. Bessemer is quoted at \$15.90@16.40; No. 2 foundry, \$15.75@16, Cleveland delivery.

*Finished Material*—Large orders for bars and plates have been placed, running over into first-quarter deliveries. Local mills are full of orders.

### Philadelphia

Sept. 25—Comparatively little business has been closed this week, partly because furnaces are over sold, and prices have been advanced nominally at least, especially for next quarter's delivery. Even inquiries are few in number and most of this week's sales have been in small lots, chiefly in basic. A few fair-sized orders for forge have been placed, but many mills are postponing further ordering. Offerings of Southern irons are being made without any business worth noting. The few lots of low-grade iron have been taken by pipe foundries to piece out requirements. Activity in iron may develop any day, as it is recognized that the present upward tendency may become more aggravated. No. 2 X foundry is quoted today at \$17.25 as an outside price; gray forge, \$16.50; basic, \$16.50; with Southern forge of not best make offered at \$15.50 per ton.

*Steel Billets*—Forging billets are quoted at \$30@32, mill price, with two or three early delivery transactions at \$33. Rolling billets are quoted at \$27.90, with some business at premium rates.

*Bars*—Bars are active, with steel bars at 1.50c., iron 1.45c., with business easy to get.

*Sheets*—Some recent business offered at sheet mills has been temporarily declined, owing to oversold conditions. There appear to be a good many buyers hanging around the market who want small lots.

*Pipes and Tubes*—Tube work is urgent, but no large orders have been placed as yet. Merchant pipe is strong and prices have been advanced a trifle during the week on store sales.

*Plates*—Several large orders have just been sent to the mills, deliveries extending in some cases throughout the first quarter of next year. Inquiries for extensive requirements have reached the offices this week and quotations will be furnished within 24 hours. A batch of orders from shipyards has gone through successfully, including some business from Western points. The mills are gradually getting into a congested condition.

*Structural Material*—Orders, large and

small, are being taken at the mills with apparent ease, but at prices which are not given. The tone of the market is exceptionally strong and prices for delivery during the rest of the year have been marked up. For early delivery, quotations are given at 1.60@1.65c. Universal plates, 1.70c. for October delivery, with advances for later delivery.

*Scrap*—The scrap market is active, with a conceded advance of 50c. on the grades most in demand.

### Pittsburgh

Sept. 24—The market for the new year is gradually opening up in both raw and finished products. In the Pittsburgh-Valley district there has been heavy buying of bessemer and basic iron for first quarter. At the same time some Connellsville coke for first half has been closed, at about \$2.50, ovens. The sheet and tinplate mills have opened their books for first-quarter business, and season business in the case of tinplates for makers of packers' cans, with rather heavy buying of both sheets and tinplates for the new delivery. In bars, plates and shapes there is also some activity for the new year.

The shortage of box cars is being felt still more seriously. Mills are making every effort to keep up a supply and avoid having material accumulate in warehouses. More frequently than formerly they are making minor repairs to box cars at their own expense, to fit them for service, such repairs being usually by way of remedying leaky sides and roofs.

There has been no improvement in the labor supply, which continues scant, but an improvement from the mill viewpoint is likely as soon as the weather becomes unfavorable for outside operations.

*Pig Iron*—Bessemer pig iron has been advancing sharply, and sales are reported of 25,000 tons or more for first quarter at \$16, Valley, an advance of 50c. in the week, or \$1 in the fortnight. Sales of basic have been still larger, totaling not far from 75,000 tons, at steadily advancing prices, until the latest sales were at \$15 and \$15.25, Valley, the latter being somewhat exceptional. The furnaces have tried to avoid any stir being made over the heavy sales and advancing prices, as they are anxious neither to attract a speculative following nor encourage idle furnaces to blow in. Two of the Valley furnaces long idle, however, are now scheduled to blow in, Alice, at Sharpsville, this week, and Sharpsville, also at Sharpsville, on Oct. 1, the first on basic, the second on bessemer. Foundry iron has not been as active as steel-making iron, but is quotable 25c. higher. We quote: Bessemer, \$16; basic, \$15; No. 2 foundry, \$14.50@15; forge, \$14@14.50; malleable, \$14.75@15, all f.o.b. Valley furnaces, 90c. higher delivered Pittsburgh.

*Ferromanganese*—Prompt material is very scarce and while demand is relatively limited, premiums are readily obtained, \$60 and higher being paid on carload lots. The English makers do not seem to be working in entire harmony any longer, as some have made a \$3 advance while others are still quoting the old price, established Sept. 9. We quote contract at \$56.50 and prompt at \$60 to \$65, Baltimore.

*Steel*—The market for unfinished steel is hardly quotable, as the mills are almost all refusing to sell for this year, on the plea that they are sold up, while for next year they state they are not yet ready to figure. On small lots for guaranteed early shipment, brokers are frequently able to secure fancy prices. We quote higher prices by 50c. or \$1 a ton than last week, but would note that even the new prices are largely nominal: Bessemer billets, \$23@23.50; bessemer sheet bars, \$24; openhearth billets, \$24@25; openhearth sheet bars, \$25.50; rods, \$26.50@27, all f.o.b. maker's mill, Pittsburgh or Youngstown.

*Sheets*—The leading interest late last week advanced blue annealed sheets \$1 a ton to 1.55c., while three or four of the independents had already advanced to 1.60c., either because they could make early deliveries and felt the delivery entitled them to a higher price, or because they were so well sold up they wished to withdraw from the market. Yesterday the leading interest formally opened its books for sheet contracts for first quarter, and has booked considerable business in the two days, while the independents are also selling. Prices for first quarter are the same as have been ruling for this year. The mills on an average have at least half their respective make for the balance of the year actually specified, which makes it certain they will carry a large volume of specifications into the new year. Premiums are frequently obtained for early delivery. We quote, regular mill prices as follows: Blue annealed, 10 gage, 1.55@1.60c.; black, 28 gage, 2.15c.; galvanized, 28 gage, 3.30c.; painted corrugated, 2.35c.; galvanized corrugated, 3.35c., both per pound for 28 gage.

### St. Louis

Sept. 23—Business has been good and prices are firm. Southern No. 2 foundry brings \$13@13.50 Birmingham, or \$16.75 @17.25 St. Louis. Northern No. 2 is quoted around \$17@17.50. Business in finished products is also good.

Coke is quoted at about \$5.50, St. Louis, for good foundry.

### Iron Ore Trade

Sales are reported of about 100,000 tons of iron ore from Wabana, Newfoundland, to Eastern furnaces for 1913 delivery. The price is an advance of 25c. over this year's quotations.



Shipments of iron ore from the Lake Superior region by ports for the season to Sept. 1 are reported by the Cleveland *Iron Trade Review* as below, in long tons:

Port	1911	1912	Changes
Escanaba.....	2,418,251	3,240,011	I. 821,760
Marquette.....	1,200,748	2,001,400	I. 800,652
Ashland.....	1,509,841	2,865,397	I. 1,355,556
Superior.....	6,382,273	9,066,190	I. 2,683,917
Duluth.....	4,370,117	6,076,452	I. 1,706,335
Two Harbors.....	3,724,838	5,801,702	I. 2,076,864
Total.....	19,606,068	29,051,152	I. 9,445,084

The August shipments this year were 7,760,248 tons, of which 6,375,673 tons, or 82.2%, were delivered to Lake Erie ports.

### Foreign Iron Trade

**Australian Iron and Steel**—The Broken Hill Proprietary Co. has bought land at Newcastle, N. S. W., and is making arrangements to erect extensive iron and steel works there. David Baker, of Philadelphia, will act as consulting engineer for their construction. The iron ores for the plant will come from the Iron Knob and Iron Monarch deposits in South Australia, which are controlled by the company.

**German Iron Production**—The German Iron & Steel Union reports the production of pig iron in the German Empire in August at 1,487,448 metric tons, or 19,037 tons more than in July. For the eight months ended Aug. 31 the total was, in metric tons:

	1911	1912	Changes
Foundry iron....	2,627,748	2,138,977	I. 111,229
Forge iron.....	364,683	354,450	D. 10,233
Steel pig.....	1,152,784	1,403,024	I. 250,240
Bessemer pig....	234,726	256,806	I. 22,080
Thomas(basic)pig	6,478,746	7,226,834	I. 748,088
Total.....	10,258,687	11,380,091	I. 1,121,404

Total increase this year, 10.9%. Steel pig includes spiegeleisen, ferromanganese and all similar alloys.

### METAL MARKETS

**New York, Sept. 25**—The metal markets have been generally active and firm. Speculation in tin is still strong.

### Gold, Silver and Platinum

#### UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
<b>Gold</b>			
Aug. 1912..	\$ 2,498,472	\$ 5,576,900	Imp. \$3,078,428
" 1911..	480,799	4,105,331	Imp. 3,624,532
Year 1912..	43,159,972	34,589,111	Exp. 8,570,861
" 1911..	15,910,449	40,473,010	Imp. 24,562,561
<b>Silver</b>			
Aug. 1912..	5,574,644	3,952,279	Exp. 1,622,365
" 1911..	4,869,359	3,653,329	Exp. 1,216,030
Year 1912..	45,834,920	32,652,869	Exp. 13,182,051
" 1911..	44,587,570	29,534,724	Exp. 15,052,846

Exports from the port of New York, week ended Sept. 21: Gold, \$26,587; silver, \$1,358,403, to London and Paris. Imports: Gold, \$634,800; silver, \$132,740, chiefly from Mexico and South America.

**Gold**—The price of gold on the open market in London remains at the Bank level, 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. Several lots of gold, reaching a total of \$2,600,000, are reported taken in London for shipment to New York.

**Iridium**—No change is reported, pure metal being quoted at \$63@64 per oz., New York.

**Platinum**—Business is improving a little, as the demand for the jewelry trade is looking up. The market is well supported and there is no change in quotations. Dealers ask \$45.50 per oz. for refined platinum and \$48 per oz. for hard metal, up to 10% iridium.

Our Russian correspondent writes under date of Sept. 12 that in comparison with the last fortnight the market has revived; the demand became higher, but no large business has been made, as the prices of buyers do not satisfy sellers. The works of the starateli are developed and the offer of platinum by them is high. The prices remain generally unchanged. The quotations are: in St. Petersburg—37,300-37,500 rubles per pood; at Ekaterinburg, 9.80 rubles per zolotnik, for crude metal, 83% platinum. These are equal to \$36.65 and \$36.85 per oz. respectively.

**Silver**—The market shows some advancing tendency, aided by speculative purchases.

SILVER AND STERLING EXCHANGE						
September	19	20	21	23	24	25
New York....	63 1/4	63 1/4	63 3/4	63 3/4	63 3/4	63 3/4
London.....	29 1/4	29 1/4	29 1/4	29 3/4	29 3/4	29 3/4
Sterling Ex.	4.8550	4.8540	4.8545	4.8555	4.8550	4.8560

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Exports of silver from London to the East, Jan. 1 to Sept. 12, as reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India.....	£5,528,400	£6,953,200	I. £1,424,800
China.....	989,700	933,500	D. 56,200
Total.....	£6,518,100	£7,886,700	I. £1,368,600

Exports of gold from London to India, eight months ended Aug. 3, were £9,482,691, an increase of £2,278,666 over last year.

Foreign trade of the United States eight months ended Aug. 31 is valued as follows by the Bureau of Statistics, Department of Commerce and Labor:

Merchandise	1911	1912
Exports.....	\$1,259,702,687	\$1,416,522,431
Imports.....	1,007,745,541	1,188,233,756
Excess, exports.....	\$251,957,146	\$228,288,675
Add excess of exports, silver.....		13,182,051
Add excess of exports, gold.....		8,570,861
Total export balance.....		\$250,041,587

The gold and silver movement in detail will be found in the table at the head of this column.

### Copper, Tin, Lead and Zinc

#### NEW YORK

September	Copper		Tin	Lead		Zinc	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
19	17 3/4	17.45	50	5.10	4.95	7.50	7.35
	@17 3/4	17.50			@5.00	@7.55	@7.40
20	17 3/4	17.45	50	5.10	4.95	7.50	7.35
	@17 3/4	17.50			@5.00	@7.55	@7.40
21	17 3/4	17.45	50	5.10	4.95	7.50	7.35
	@17 3/4	17.50			@5.00	@7.55	@7.40
22	17 3/4	17.45	50 1/4	5.10	4.95	7.50	7.35
	@17 3/4	17.50			@5.00	@7.55	@7.40
23	17 3/4	17.45	49 3/4	5.10	4.95	7.50	7.35
	@17 3/4	17.50			@5.00	@7.55	@7.40
24	17 3/4	17.50	50 1/4	5.10	4.95	7.50	7.35
	@17 3/4	17.55			@5.00	@7.55	@7.40

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. and that for casting copper usually about 0.125 to 0.2c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market for good ordinary brands, both desilverized and non-desilverized; specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium.

#### LONDON

Sept.	Copper			Tin		Lead, Spanish	Zinc, Ordinaries
	Spot	3 Mos	Best Sel'd	Spot	3 Mos		
19	78 1/4	79 1/4	83 3/4	227	223 1/4	22 1/2	27 1/4
20	78 1/4	79 1/4	83 3/4	227 1/4	225	22 1/2	27 3/4
21	.....	.....	.....	.....	.....	.....	.....
23	79	80	84	228 1/4	226	22 1/2	27 1/4
24	78 3/4	79 3/4	84	227 1/4	225 3/4	22 1/4	27 1/4
25	79	80	84	228 3/4	226 3/4	22 1/4	27 1/4

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17 1/2 c.; £15 = 3.26 c.; £25 = 5.44 c.; £70 = 15.22 c. Variations, £1 = ± 21 3/4 c.

**Copper**—The market was, if anything, rather quieter up to Sept. 21. Sales for domestic consumption have been rather moderate. The leading agencies are holding for their price of 17 3/4 c., usual terms, and are generally getting their price. Sales have been made abroad on terms which mean a shade over 17 1/2 c., New York. Consumption continues very large both here and on the other side, and there are no present signs of a slackening in the demand. With the opening of this week a very heavy demand developed in Europe, which resulted in a very large volume of business for export. European

manufacturers, hoping against hope for lower prices, had allowed their stocks to run down, but when they heard of the strikes at the mines of the Utah Copper Co., they decided not to delay buying any longer, and this in a measure explains the sudden appearance of foreign orders. The strike, however, had little effect on the market here. At the close, the market is firm, with Lake copper quoted at 17½@17¾c., and electrolytic copper in cakes, wirebars and ingots at 17.50@17.55c. Casting copper is quoted nominally at 17.35@17.40c. as an average for the week.

The London market showed a steady tendency toward higher prices, closing firm at £79 for spot, and £80 for three months.

Copper sheets are 23@24c. per lb., base for large lots. Full extras are charged and higher prices for small advanced. Cookson's is quoted at 9¾c. base, carload lots at mill.

Copper exports from New York for the week were 5579 long tons. Our special correspondent gives the exports from Baltimore at 2068 tons for the week.

A sale of copper from Katanga is reported at Antwerp, Sept. 6, when 130,805 kg. blister copper brought 184 fr. per 100 kg.—equal to 16.1c. per pound.

**Tin**—The advance in the London market has been resumed and quotations have been carried to a level higher than previously attained. The intrinsic strength of the market and the confidence of the bulls is demonstrated by the large transactions in future tin, which is now selling at about £2 below spot, while all along the backwardation has amounted to £3 and more.

So far as this market is concerned, consumers have become very cautious, and their buying seems to be restricted to their absolute needs, especially as at this time they cannot contract for future material at much concession from the price of metal, which they can get for near-by delivery.

The market closes in London at £228 15s. for spot, and £226 15s. for three months, and in New York at about 50¼c. for September delivery.

**Lead**—The market is unchanged at 5.10c., New York, and 4.95@5c., St. Louis.

The scarcity of near-by lead is still the feature of the foreign market, which remains firm at £22 5s. for Spanish lead, and 2s. 6d. higher for English.

**Spelter**—The market has been quieter, although near-by spelter is still in good demand. Prices for early deliveries have been a shade lower and the difference noted last week between the New York and the St. Louis parity has disappeared for the present. There is a good deal of inquiry for future deliveries, but smelters are not inclined to commit themselves too far ahead, principally on account of

the uncertainty about the supply of gas in the Kansas district. The prices of ore and the supply of ore are also considerations in respect to future deliveries. Upon the whole the market is strong at the recent slight concession, and closes steady at 7.35 to 7.40, St. Louis, and 7.50 to 7.55, New York.

The foreign market continues very firm, and is again higher at £27 5s. for good ordinaries, and £27 10s. for specials.

Base price of zinc sheets is \$8.90 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8% discount.

Zinc dust is quoted 7½@7¾c. per lb., New York.

The Granby Mining & Smelting Co. expects to have its new zinc works at East St. Louis, Ill., in operation by the end of next year.

Imports and exports of zinc and zinc products in Germany seven months ended July 31, metric tons:

	Imports		Exports	
	1911	1912	1911	1912
Spelter.....	28,134	29,469	43,529	51,648
Scrap zinc.....	1,268	1,208	2,440	2,573
Zinc sheets.....	278	462	24,600	14,988
Zinc dust.....	512	357	1,830	2,434
Zinc pigments.....	4,469	5,283	19,963	21,414

Imports of zinc ore were 148,500 tons in 1911, and 161,368 in 1912; exports were 30,809 tons in 1911, and 23,333 tons this year.

Other Metals

**Aluminum**—The market is firm and sales have been good. Prices are firmer and we quote 25¼@25½c. per lb. for No. 1 ingots, New York.

**Antimony**—The market is strong and sales have been heavy. Prices have again advanced. Cookson's is quoted at 9¾c. per lb.; Hallett's at 8¾@8¾c.; Hungarian, Chinese and other outside brands, 8½@8¾c. Higher prices are expected.

**Quicksilver**—The market is steady, and prices here are unchanged. New York quotations are \$42 per flask of 75 lb., with 60c. per lb. for retail lots. San Francisco, \$41.50 for domestic orders and \$39 for export. The London price is £8 per flask, with £7 17s. 6d. quoted from second hands.

**Bismuth**—The syndicate which controls the European production quotes 7s. 6d.—equal to \$1.80—per lb. in London. In New York a quotation of \$1.72 per lb. is made for metal produced from American ores.

**Cadmium**—The quotation continues at 700 marks per 100 kg., f.o.b. works in Silesia, Germany. This is equal to 75.6c. per lb., at works.

**Magnesium**—The price of pure metal is \$1.50 per lb. for 100-lb. lots f.o.b. New York.

**Nickel**—Shot, blocks, plaquettes bring 40@45c. per lb., according to quality. Electrolytic nickel is 3c. per lb. higher.

British Metal Imports and Exports

Imports and exports of metals in Great Britain, seven months ended July 31, figures in long tons, except quicksilver, which is in pounds:

Metals	Imports	Exports	Excess
Copper, long tons	73,486	31,961	Imp. 41,525
Copper, 1911.....	87,408	45,632	Imp. 41,776
Tin, long tons....	24,380	27,073	Exp. 2,693
Tin, 1911.....	25,868	26,733	Exp. 865
Lead, long tons..	122,001	30,091	Imp. 91,910
Lead, 1911.....	129,476	39,768	Imp. 89,708
Spelter, 1'g tons..	86,815	5,162	Imp. 81,653
Spelter, 1911....	76,822	5,965	Imp. 70,857
Quicksilver, lb..	3,237,088	1,147,113	Imp. 2,089,975
Quicksilver, '11	3,098,840	1,716,214	Imp. 1,382,626
Minor met's, tons	4,382	15,546	Exp. 11,164
Minor, 1911.....	3,264	12,612	Exp. 9,348
<b>Ores</b>			
Tin ore and con.	17,024	.....	Imp. 17,024
Tin ore, 1911....	17,683	.....	Imp. 17,683
Pyrites.....	528,034	.....	Imp. 528,034
Pyrites, 1911..	553,619	.....	Imp. 553,619

Copper totals include metallic contents of ore and matte. Exports include re-exports of foreign material. Minor metals include nickel, aluminum and the minor metals and alloys.

Zinc and Lead Ore Markets

**Joplin, Mo., Sept. 21**—Zinc advanced to \$67, on a base per ton of 60% zinc ranging from \$59 to \$64.50. Zinc silicate sold on a base of \$31@33 per ton of 40% zinc. The average price, all grades of zinc, is \$56.62 per ton. With an increased tonnage of unsold ore on hand at the week-end prices declined slightly on

SHIPMENTS, WEEK ENDED SEPT. 21

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	5,071,260	.....	789,000	\$176,990
Joplin.....	2,607,350	.....	300,040	80,278
Galena.....	1,771,250	.....	88,450	57,698
Duenweg.....	823,870	.....	89,790	27,544
Alba-Neck.....	656,320	.....	18,840	20,929
Granby.....	57,180	977,160	12,150	17,120
Miami.....	348,170	.....	149,740	14,814
Carl Junction	314,670	.....	7,200	10,717
Oronogo.....	369,450	.....	.....	9,893
Carthage.....	284,460	.....	.....	7,964
Jackson.....	235,410	.....	.....	7,067
Spurgeon.....	73,670	256,790	.....	6,760
Sarcoite.....	45,000	.....	.....	1,305
<b>Totals.....</b>	<b>12,658,060</b>	<b>1,233,950</b>	<b>1,455,210</b>	<b>\$439,079</b>

38 weeks...400,805,000 24,936,060 68,058,300 \$12,841,207  
Blende val, the week, \$373,211; 38 weeks, \$10,551,396  
Calamine, the week, 20,095; 38 weeks, 383,611  
Lead value, the week, 45,773; 38 weeks, 1,906,200

MONTHLY AVERAGE PRICES

Month	ZINC ORE				LEAD ORE	
	Base Price		All Ores		All Ores	
	1911	1912	1911	1912	1911	1912
January.....	\$41.85	\$44.90	\$40.55	\$43.54	\$55.68	\$58.92
February....	40.21	45.75	39.16	43.31	54.46	52.39
March.....	39.85	51.56	38.45	49.25	54.57	54.64
April.....	38.88	52.00	37.47	50.36	56.37	54.18
May.....	38.25	55.30	36.79	53.27	55.21	52.45
June.....	40.50	55.88	38.18	54.38	56.49	55.01
July.....	40.75	58.85	38.36	56.59	58.81	58.83
August.....	42.50	55.13	41.28	53.27	60.74	57.04
September..	42.63	.....	41.29	.....	59.33	.....
October.....	42.38	.....	40.89	.....	54.72	.....
November..	45.40	.....	43.25	.....	57.19	.....
December... 44.13	.....	40.76	.....	62.03	.....	
<b>Year.....</b>	<b>\$41.45</b>	<b>.....</b>	<b>\$39.90</b>	<b>.....</b>	<b>\$56.76</b>	<b>.....</b>

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.



under-grade ores, the \$59 base price being paid Saturday. Lead sold on a base price of \$65 per ton, the high price reaching \$67 and the average price, all grades being \$62.92 per ton.

The production of zinc ore was never higher for a term of successive weeks than it has been throughout August and September, ranging from 6500 to over 7000 tons per week. There is more unsold ore now than for several months, yet the bin stock tonight will but slightly exceed 3000 tons, with less than 1000 tons unsold.

**Platteville, Wis., Sept. 21**—The base price paid this week for 60% zinc ore was \$60@62 per ton, the highest ever paid here. The base price paid for 80% lead ore was \$63 per ton.

SHIPMENTS, WEEK ENDED SEPT. 21

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point.....	665,000	.....	.....
Highland.....	531,000	.....	.....
Benton.....	438,800	.....	367,150
Galena.....	415,800	.....	.....
Platteville.....	304,000	.....	198,000
Cuba City.....	297,520	.....	124,660
Hazel Green.....	260,000	.....	.....
Harker.....	223,580	.....	76,700
Shullsburg.....	148,000	.....	.....
Rewey.....	65,000	.....	.....
Linden.....	.....	85,400	54,970
Total.....	3,348,700	85,400	821,480
Year to date.....	148,269,570	6,077,260	25,711,210

Shipped during week to separating plants, 2,291,410 lb. zinc.

Chemicals

**New York, Sept. 25**—The general market continues steady and fairly active.

**Arsenic**—The position continues strong, but speculative dealings are less in evidence. Prices are \$4.75@5 per 100 lb. and are strong.

**Copper Sulphate**—Business is active and sales are increasing. Prices are unchanged at \$5.50 per 100 lb. for carload lots, and \$5.75 per 100 lb. for smaller parcels.

**Nitrate of Soda**—The market is firm. Spot nitrate is a shade higher, at 2.55c. per lb., while 2.57½c. per lb. is named for October-January deliveries. High ocean freights are a factor in futures.

Petroleum

Berlin dispatches report that the active competition for the oil business has been marked by a sharp reduction in prices of illuminating oils by the Standard Oil Co. representatives, which was promptly met by its German rival. Further price cutting is expected.

The budget law of Mexico for 1912-13 establishes a special internal tax on crude petroleum produced in the country, at the rate of 20 centavos (about 10c.) per ton.

Imports of petroleum and its products into Germany for the six months ended June 30, were 641,850 metric tons in 1911, and 847,789 in 1912; increase, 206,939 tons. Of the imports this year, 499,555 tons were from the United States,

128,841 from Austria, 87,831 from Rumania and 78,300 tons from Russia.

MINING STOCKS

**New York, Sept. 25**—On Sept. 19, prices on the Exchange were firmer, on light trading. Copper stocks on the Curb moved up by fractions. Other mining stocks were rather weak on small sales.

Sept. 20 the Exchange dealings were broader and more active. Mining stocks on the Curb moved narrowly.

Sept. 21 increased activity and an upward tendency was manifest on the Exchange. The Curb was comparatively quiet, but coppers were firmer and other mining stocks in fair demand.

Sept. 23 the Exchange continued firm, but on a moderate amount of business. The mining stocks on the Curb were more active, with small fluctuations. The copper stocks were generally firm.

Sept. 24 and 25 the Exchange continued fairly active and strong. Sales of mining stocks on the Curb were good, at firm prices, especially for the coppers, though other stocks were also in some demand.

At auction, in New York, Sept. 19, a lot of \$10,000 Waldorf Mining & Milling Co. first-mortgage 8% bonds, due Apr. 1, 1908, sold at \$1000 for the lot.

**Boston, Sept. 24**—But one incident has happened locally to create any undue influence against a strengthening of copper-share prices. This was the failure of the Stock Exchange firm of S. R. Dow & Co. today, which precipitated a decline in the stocks which this house stood sponsor for. This failure will embarrass somewhat the cash position of the various companies under Mr. Dow's charge, he being president of them, although his resignation has been accepted and R. M. Edwards, who has been associated with Mr. Dow in the management of the properties, has assumed the position of acting president.

Franklin mining stock fell \$2.75 to \$7.75, and the management states that an early assessment must be called. There are \$223,000 in notes outstanding. The cash resources of the Algolah, Indiana and North Lake companies have been pretty well used up, although they each have a balance of quick assets over current liabilities. Algolah has fallen \$1.50 to \$3, Indiana 4.37½ to \$11, and North Lake \$1 to \$4.

The increasing of the Anaconda's dividend adds another to those which have already taken like action and has invited a spirit of optimism such as has not prevailed for a long time. The general market is active and strong. Calumet & Hecla is up \$22 for the week to \$580. East Butte has taken on quite a bit of activity.

Activity has also developed on the Curb and a general higher range of

COPPER SMELTERS' REPORTS

This table is compiled from reports received from the respective companies, except in the few cases noted (by asterisk) as estimated, together with the reports of the U. S. Dept. of Commerce as to imported material, and in the main represents the crude copper content of blister copper, in pounds. In those cases where the copper contents of ore and matte are reported, the copper yield thereof is reckoned at 95%. In computing the total American supply duplications are excluded.

Company	June	July	August
Alaska shipments.....	4,134,569	2,224,441	1,242,836
Anaconda.....	22,750,000	23,000,000	25,250,000
Arizona, Ltd.....	3,300,000	3,200,000	3,260,000
Copper Queen.....	7,622,730	7,708,147	8,040,424
Calumet & Ariz.....	4,160,000	4,748,000	4,514,000
Chino.....	1,474,979	2,945,000	3,437,309
Detroit.....	1,959,634	2,194,090	1,882,289
East Butte.....	1,267,343	1,261,304	1,410,500
Mammoth.....	1,849,953	1,818,738	1,802,590
Mason Valley.....	1,438,580	1,500,000	.....
Nevada Con.....	5,913,832	6,084,274	.....
Ohio.....	665,900	617,500	.....
Old Dominion.....	2,130,000	2,543,763	2,620,000
Ray.....	3,004,195	2,985,965	2,868,095
Shannon.....	1,270,000	1,446,000	1,460,000
South Utah.....	162,335	142,555	224,855
United Verde*.....	2,500,000	2,500,000	2,500,000
Utah Copper Co.....	8,772,742	10,602,000	11,248,992
Lake Superior*.....	15,600,000	19,500,000	21,000,000
Non-rep. mines*.....	8,300,000	8,970,000	8,770,000
Total production.....	98,275,392	105,991,687	.....
Imports, bars, etc.....	24,262,292	.....	.....
Total blister.....	122,538,184	.....	.....
Imp. in ore & matte.....	8,404,936	.....	.....
Total American.....	130,943,120	.....	.....
Miamit.....	2,683,310	3,027,710	3,048,750
Brit. Col. Cos.:	.....	.....	.....
British Col. Copper	996,000	1,026,000	.....
Granby.....	1,888,400	1,802,753	.....
Mexican Cos.:	.....	.....	.....
Boleof.....	1,851,920	2,386,480	.....
Cananea.....	4,310,000	4,000,000	4,044,000
Moctezuma.....	3,176,819	3,094,016	3,229,839
Other Foreign:	.....	.....	.....
Cape Cop., S. Africa	.....	1,325,000	.....
Kyshtim, Russia.....	757,120	795,200	.....
Spassky, Argon.....	.....	.....	.....
Famatina, Argon.....	.....	.....	.....
Tilt Cove, Newf'd.....	.....	.....	.....
Exports from:	.....	.....	.....
Chile.....	9,856,000	8,960,000	8,512,000
Australia.....	8,176,000	8,288,000	8,064,000
Arrivals in Europe†	12,667,200	14,114,240	20,200,320

†Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister.

‡Does not include the arrivals from the United States, Australia or Chile.

STATISTICS OF COPPER.

Month	U.S. Refin'g Product'n	Deliveries, Domestic	Deliveries for Export
VIII, 1911.....	125,493,667	59,935,364	69,855,660
IX.....	115,588,950	57,311,584	50,824,011
X.....	118,255,442	64,068,307	60,084,349
XI.....	111,876,601	68,039,776	67,049,279
XII.....	122,896,697	65,988,474	79,238,716
Year.....	1,431,938,338	709,611,605	754,902,233
I, 1912.....	119,337,753	62,343,901	80,167,904
II.....	116,035,809	56,228,368	63,148,096
III.....	125,694,601	67,487,466	58,779,566
IV.....	125,464,644	69,513,846	53,252,326
V.....	126,737,836	72,702,277	69,485,945
VI.....	122,315,240	66,146,229	61,449,650
VII.....	137,161,129	71,094,383	60,121,331
VIII.....	145,628,521	78,722,418	70,485,150

VISIBLE STOCKS

	United States	Europe	Total
IX, 1911.....	133,441,501	191,228,800	324,670,301
X.....	140,894,856	191,945,600	332,840,456
XI.....	134,397,642	176,825,600	311,825,242
XII.....	117,785,188	164,281,600	276,066,788
I, 1912.....	89,454,695	158,323,200	247,777,895
II.....	66,280,643	154,851,200	221,131,843
III.....	62,939,988	141,142,400	204,082,387
IV.....	62,367,557	136,819,200	199,186,757
V.....	65,066,029	134,176,000	199,242,029
VI.....	49,615,643	117,801,600	167,417,243
VII.....	44,335,004	106,186,000	152,521,004
VIII.....	50,280,421	113,299,200	163,579,621
IX.....	46,701,374	113,568,000	160,269,374

prices is at hand. Old Dominion trust receipts have advanced \$1.50 to \$8.50 on knowledge that good progress is being made on the securities controlled by this trust. Alaska Gold is firm around \$9. Corbin Copper, a Dow property, has fallen from 60 to 21c. during the week.

Assessments

Table with columns: Company, Delinq, Sale, Amt. Lists various mining companies and their assessment details.

Monthly Average Prices of Metals SILVER

Table with columns: Month, New York (1910, 1911, 1912), London (1910, 1911, 1912). Shows monthly price averages for silver.

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Table with columns: NEW YORK (Electrolytic, Lake), London, Standard. Shows monthly price data for copper.

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Table with columns: Month, 1911, 1912. Shows monthly price data for tin.

Prices are in cents per pound.

LEAD

Table with columns: Month, New York, St. Louis, London (1911, 1912). Shows monthly price data for lead.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Table with columns: Month, New York, St. Louis, London (1911, 1912). Shows monthly price data for spelter.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

Table with columns: Bessemer, Basic, No. 2 Foundry (1911, 1912). Shows monthly price data for pig iron.

STOCK QUOTATIONS

Table with columns: Name of Comp., Bid. Lists various stock prices under categories like COLO. SPRINGS, SALT LAKE, and TORONTO.

Table with columns: Name of Comp., Bid. Lists various stock prices under the TORONTO category.

SAN FRANCISCO Sept. 24

Table with columns: Name of Comp., Clg., Bid. Lists various stock prices under the SAN FRANCISCO category.

N. Y. EXCH. Sept. 24

Table with columns: Name of Comp., Clg., Bid. Lists various stock prices under the N. Y. EXCH. category.

N. Y. CURB Sept. 24

Table with columns: Name of Comp., Clg., Bid. Lists various stock prices under the N. Y. CURB category.

BOSTON CURB Sept. 24

Table with columns: Name of Comp., Last. Lists various stock prices under the BOSTON CURB category.

LONDON Sept. 25

Table with columns: Name of Com, Clg., Bid. Lists various stock prices under the LONDON category.

†Last quotation.