

Issued Weekly by the
Hill Publishing Company

JOHN A. HILL, Pres. and Treas. ROBT McKEAN, Sec'y.

505 Pearl St., New York.
6 Bouverie St., London, E. C.
Unter den Linden 71, Berlin.

Subscriptions payable in advance, \$5.00 a year for 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii, or the Philippines, \$6.50 in Canada.

To foreign countries, including postage, \$8.00 or its equivalent, 33 shillings: 33 marks; or 40 francs.

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

Advertising copy should reach New York Office by Thursday of week before date of issue.

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

Cable Address, Engminjour, N. Y.

CIRCULATION STATEMENT

Of this issue 9300 copies are printed.

None sent free regularly, no returns from news companies, no back numbers. Figures are live, net circulation.

Contents

	PAGE:
Editorials:	
Government Experiment Stations ..	295
Pig Iron Production in 1911.....	296
Stratton's Independence Mill.....	296
The Cut in Lead.....	296
Metallics—By the Way.....	297
Correspondence and Discussion:	
The Basis of Calculating Tonnage Costs...Coöperation in Research Work...Gold Mining near Washington, D. C.....	298
American Institute of Mining Engineers	299
What's in a Name... R. W. Raymond	299
President Urges Leasing System.....	300
Federal Control of Coal Prices.....	300
Details of Practical Mining:	
*A Six-Ton Skip Loading Device	
*Rotary Rig for Deep Drilling	
*Combination Post and Set	
*Structural and Corrugated Steel Stack	
*Separating Rock from Clay	
*A Car Dumping Device	301
A New Gold Dredge at Oroville.	
Lewis H. Eddy	306
Utah Copper Co.....	306
Pig Iron Production in 1911.....	307
The Sitka District, Alaska.....	308
Portland Cement in 1911.....	308
Aluminum Dust Explosions.....	308
*Link-Belt Elevators	
Benedict Shubart	308
Giroux Consolidated.....	309
The Flameless Combustion of Gas	309
Mining Explosives Used in Great Britain	310
The Experiment Station Bill.....	310
Diamonds in the Belgian Congo.....	310
Mining in Great Britain in 1911.....	310
*Stratton's Independence Mill.	
T. C. Linderfelt and J. K. Stewart	311
Zinc Smelting at Trollhattan.....	314
Rules for Coal Storage.....	315
*Righting Overturned Gold Dredges.	
Lewis H. Eddy	316
Goldfield Consolidated Report.....	317
Depreciation of Gas and Oil Fields...	319
*The Buffalo Spiro Turbine.....	319
Roller Bearings on Mine Cars.....	320
Prevention of Blue Powder Formation	320
*First Aid to Mining Machinery—VII.	
Henry M. Lane	321
Magnesite in 1911.....	324
The Payne Electrostatic Separator ..	324
New Electric Hoist at West Rand Consolidated Mines.....	324
Cripple Creek Drainage... W. Weston	325
Duty on Zinc from Imported Ores...	325
Cooling Pyrite Burner Gases.....	326
New Kink in Iodide Copper Assay ..	326
Hudson River Tunnel Holed Through	326
Personal Obituary and Societies.....	327
Editorial Correspondence.....	328
Mining News	330
Markets	336
*Illustrated.	

The Engineering and Mining Journal

Vol. 93.

FEBRUARY 10, 1912.

No. 6.

Government Experimental Metallurgical Stations

The Committee on Mines and Mining of the House of Representatives recently conducted hearings on H. R. bill 11,414 to establish a mining experiment station in Colorado. The following are some of the gems of thought expressed by advocates of this measure, the interpolated comments being our own.

There has not been, so far as I know, one dollar expended by the Federal government in this state in the way of erecting experimental plants, so that our mine owners and mining men may have some knowledge of what kind of reduction plants are most suitable and adapted to the treatment of the different characters of ore that are mined in certain mining districts in this state.

Colorado includes within its limits a large number of experienced and competent mining and metallurgical engineers who are able to supply the knowledge needed by mine owners and mining men. Places in which experiments may be suitably conducted exist within the state.

Today we have nothing but monuments, one after another, of mills strung from one end of the different gulches to the other end, which are absolutely worthless, all on account of the owners not knowing just what kind of a plant to erect that would save values.

The first part of the foregoing statement is undeniable, but the second part is too sweeping. Almost all mining districts are "over-milled." The reason is rather mistaken estimates of the resources of the mines than ignorance of the proper kind of plant to provide, although the latter is sometimes a reason. In either case many of the "monuments" would have been avoided if proper engineering advice had been taken.

If the Government could evolve processes of handling low-grade ores—that is, ores running below \$10 per ton—thousands of mines would be opened, and the wealth of the world would be added to by many hundreds of millions of dollars. We have lost many thousands of miners from the State of Colorado in the last 10 or 15 years be-

cause the Smelting Trust and the railroads have very largely consumed the values in our low-grade ores and we have been unable to treat them in a way that would be profitable; and there are a larger number of valuable substances we know that cannot under present processes be handled at all, and the problem of the continued prosperity and rejuvenation, we might say, of the mining industry depends upon the establishment of metallurgical experimental stations, or at least a great deal of scientific work being done along that line.

The "smelting trust" has about 1,500,000 tons of annual capacity in its Colorado plants which are able to secure only about 700,000 tons of ore per annum. We surmise that it would take ore at but little over the cost of smelting if it could get it in order to employ its idle capacity; and that the railways would be equally generous. For the same reason we have no doubt that the smelters are not disregarding any "valuable substances" that may be treated or are refraining from doing scientific work for the development of improved processes:

We want experts to go into those camps themselves and examine the ores and examine the manner in which they are found in the ground and the topography of the country and ascertain on the ground the best manner of treating the ores found there.

Is not this what experienced engineers have been doing during the whole history of the mining industry? And when any more than nowadays?

Colorado has appropriated \$125,000 for the purpose of erecting and equipping a metallurgical testing plant at the school of mines at Golden, and they have erected a building and have some equipment and hope to secure further appropriations from the state and finish the equipment and get the plant in operation.

This seems to take the wind out of the demand upon the Federal government.

The following is a supreme expression of nonsense.

There is some difference in the ores, of course, in all of the states. I doubt

very much whether you will be able to have one station do all the work. If you do confine yourself to one station, we will have to ship ore from all over the West to that one station, or else we will have to have experts do it in traveling experimental cars or investigation trips to examine on the ground the different kinds of ore that may be found in the several localities.

This whole ridiculous movement simmers down as a raid to get something for nothing; to get the Federal government to organize a corps of engineers to do gratuitously that for which a large body of experienced engineers exists and does all the time as a matter of professional practice. It will be absurd and scandalous if Congress allows itself to be imposed upon by such nonsense as that which we have quoted.

Pig Iron Production in 1911

We have now the complete figures for the make of pig iron in the two larger producing nations of the world, the United States and Germany. For Great Britain, the third producer, the statistics are not available; but its output falls considerably below that of Germany, having averaged not far from 9,000,000 tons for several years past. The accompanying table gives the production of the United States and Germany, classified according to the uses for which the iron was intended; our figures being reduced to metric tons, for purposes of comparison.

PIG IRON IN THE UNITED STATES AND GERMANY

	Germany		United States	
	Tons	PerCt.	Tons	PerCt.
Foundry & forge.	3,575,375	23.0	5,340,924	22.3
Bessemer.....	374,455	2.4	9,559,653	39.8
Basic	9,851,113	63.4	8,656,349	36.1
Charcoal .....	.....	.....	283,135	1.1
Spiegel, ferro, etc.	1,733,280	11.2	187,672	0.7
Total.....	15,534,223	100.0	24,027,733	100.0
Total, 1910.....	14,793,325	.....	27,740,424	.....

Germany reports no charcoal iron. The proportion of foundry and forge iron in the two countries is nearly the same. The German classification of steel pig is much wider than our own, which is limited to spiegeleisen and ferromanganese; but the figures serve to show to what an extent the various ferro-alloys are made in Germany, which exports them largely to other countries. The strongest contrast is in the proportions of bessemer and basic pig. In this country bessemer iron still leads, while in Germany it is almost a negligible quantity. The German production of basic iron is much nearer to that

of basic steel than our own, owing to the extensive use of the basic converter. Our basic steel is made entirely in the openhearth furnaces and with the use of a larger proportion of scrap than is usual in Germany. Germany had a rather prosperous year, while reverse conditions prevailed here. It is, moreover, always the case that the fluctuations in the foreign markets—the differences between a good and a bad year—are proportionally much smaller than in America.

Stratton's Independence Mill

Recent innovations in the metallurgy of the low-grade ores of the Cripple Creek district make it worth while to review the scheme used in one of the large mills of the district. At Stratton's Independence mill, which is described in this issue of the JOURNAL, dump-ore and some low-grade mine ore are successfully treated by means of concentration and cyanidation.

The natural acidity of the ore is neutralized by lime automatically added dry to the ore just before it is elevated to the rolls. The aim, of course, is to obtain a uniform mixture of ore and lime before cyanide solution is added. Besides neutralization, lime has the further function of aiding in the settlement of the slime. The quantity of lime to be added daily varies, because of changes in the character of the ore to be treated, and is largely controlled from the laboratory, the circulating mill solution being tested each morning for alkalinity. When a streak of oxidized ore is struck in the dump, the settlement of slime becomes a problem and the addition of lime requires careful adjustment for a large excess of lime defeats its object.

Crushing in solution, before the removal of some of the cyanicides, must cause some loss, but it is probably more than compensated by the fact that a fair percentage of the precious metals goes into solution early in the process, permitting later chemical treatment to be concentrated on the refractory residue.

The reconcentration of the second-grade concentrate seems to offer a nice means of control for the production of an especially clean first-grade concentrate and a low-grade tailing. The favorable rates available make it advantageous to ship this high-grade concentrate to smelters rather than to treat it locally.

While the extraction is not as high as desired, it has exceeded the expectations of many who formerly looked with skepticism on the proposal to treat "waste" rock at a profit. That this venture has been profitable is now beyond question, and for that reason is noteworthy.

The Cut in Lead

The reduction by the American Smelting & Refining Co. of 0.45c. per lb. in its price for lead within less than a fortnight has excited more than the usual gossip. One hypothesis is that it is a warning to Congress to refrain from reducing the tariff on lead and lead ore. If the price for lead be low the producers of lead ore receive less, howl and write to their representatives in Congress, who may thereby be influenced. The recent drastic reduction is to be an object lesson, Q. E. D. However, this is something like cutting off the nose to spite the face. A more rational hypothesis is that the smelting company wanted to sell lead and having found the demand sluggish at the previous price made a series of cuts in order to stimulate consumption and make its supplies move.

We continue to hear about a prospective copper famine, producers sold out cleanly, shipping metal hot from the cathode furnaces, etc., although these conditions do not deter some of the larger agencies from causing pain in many quarters by their efforts to sell their copper, even if they have to make concessions to do so. The simple fact is that there is no such dearth of copper yet as some would fain have it believed. We have previously estimated that Europe and America ought to have a stock of about 100,000,000 lb. to insure the ordinary smooth movement of trade. At the beginning of 1912 the actual visible supply was about 248,000,000 lb. The division between Europe and America does not matter, because if surplus be merely transferred from America to Europe the situation is not helped at all until consumption has finally absorbed it.

The index to Vol. XCII of the ENGINEERING AND MINING JOURNAL is mailed with this issue. Any subscriber not receiving same should notify the subscription department at once.

Metallics

Concrete is about three times as heavy as timber, but the allowable working stress is only half as great.

While it is essential for good precipitation that the gold-bearing solutions be distinctly alkaline, an excess of alkali may result in the formation of white foam, caused by the too rapid evolution of hydrogen.

The *Echo des Mines* is authority for the statement that palladium and rhodium now cost 10 guineas per troy ounce. The increased demand from America has raised the value of iridium to about £13 per oz., a higher price than has ever been attained.

The freight and treatment charges on siliceous ore from the Parral, Chihuahua, Mexico, camp sent to the smelters amounts to about 17.50 pesos. The taxes are about 4% of the gross value on the precious-metal content. The smelters pay for 95% of the silver and \$19 an ounce for the gold.

At the Alaska-Treadwell cyanide mill the concentrates are ground to pass 200 mesh, given a preliminary agitation with 2-lb. lime solution, thickened by decantation, and cyanided. The treated pulp is filtered in Kelly presses, from which the solution passes to Merrill precipitation presses. The precipitate is acid treated, melted in a specially constructed oil-burning furnace, and refined in Faber du Faur tilting furnaces.

An ingot of cast manganese steel is as brittle as glass, but when reheated to a temperature of 1000° C. or more and suddenly chilled by plunging in water, it becomes as ductile as soft carbon steel or wrought iron, and has three times their tensile strength. Manganese steel cannot be forged except with great difficulty and as no method is known for softening it, cannot, to all practical purposes, be machined. Objects of manganese steel are, therefore, cast, reheated and chilled.

Limes containing less than 10% MgO are classified as high-calcium limes; those containing more than 10% MgO, as magnesian limes. There is a great difference of opinion among users as to which class is better. Magnesian limes slake slowly with little evolution of steam, so that there is danger of the mixer not thoroughly slaking the lime before use. They swell but little upon slaking, hence are less bulky. Some contractors believe the high-calcium limes cheaper for this reason. A given weight of magnesian limestone, can, however, be mixed with a greater weight of sand than the same quantity of high-calcium limes. Magnesian-lime mortar sets more slowly than high-calcium-lime mortar, but is much stronger.

By the Way

The U. S. Steel Corporation does not seem to have stifled competition wholly. The Inland Steel Co., a relatively new concern, which owns ore lands on the Mesabi range and a steel plant near Chicago, in 1911 declared an extra dividend of 3% in addition to the regular 7% and then gave the stockholders the right to subscribe to \$900,000 new stock at a price far below the market. This year the performance is repeated, an extra dividend of 3% being declared and a new stock issue to the amount of 10% of that outstanding being authorized. This certainly does not look as if the Steel Corporation had "unreasonably restrained" trade from flowing into the mills of its smaller competitor.

The "bull crowd" in copper, both the shares and the metal, is understood, says the *Evening Post*, to have taken it ill that the Guggenheims recently went so far as to sell some metal abroad "at the market." Selling a thing that way means to sell it on the bid price, rather than on the asking price, and recently the copper boom has been resting rather heavily upon the asking price. The metal forced to a sale went for less than 14c., whereas the asking price on this side of the ocean had not been below 14½c. But a bull crowd must always expect something like that to happen.

A photographic campaign against coal-mine accidents, projected some time ago, has taken shape in an illustrated textbook just issued by the coal-mining department of the Delaware, Lackawanna & Western R.R., for the benefit of foreign mine workers who cannot speak English. It shows both the mistakes that cause accidents and the way to avoid these mistakes. Two hundred photographs are included in the volume, depicting on opposite pages the right and the wrong method of procedure in mining. In explanation of the pictures, text matter is given under them in the plainest of English; the "don'ts" on the accident side of the page being emphasized strongly by the use of red ink.

J. Parke Channing, at the recent annual dinner of the Mining and Metallurgical Society, related in Cornish dialect, of which he is a past master, one of his early experiences in the Lake Superior country. He had been assisting Messrs. Van Hise and Irving in the study of the ore occurrence on the Gogebic range. Mr. Channing said: "I was full of youthful enthusiasm on the subject and one day was going through the Colby mine with a party of visitors, which was being led by a Cornish mining captain. I have no doubt that my description of the formation was rather too much for him and he felt that he was being relegated to the background. Dur-

ing a rest in the trip he said to me: 'Mister Shannon, wheer did you learn all that to?' I said, 'Captain, some of it is the result of my own observation, and some of it is information that has been published in a monograph of the United States Geological Survey.' 'Monograph, what do'ee call a monograph?' 'A monograph,' said I, 'is a book.' 'A book,' said he; 'how big is that book?' I replied that it was about twelve inches high, eight inches wide, and about an inch thick. 'Huh,' said he, 'I've got a book at 'ome and its three feet 'igh, two feet wide and six inches thick, and damme it ain't in theer.'"

The answer of the United States Steel Corporation to the complaint in the government suit has been filed. It is a comparatively brief denial of the charges made, and sets forth that full publicity has always been given to the company's affairs; that it has made no attempts whatever to monopolize trade; that it has not attempted to control or to interfere with its independent rivals, large or small. It is especially emphatic in denying all intention or attempt to monopolize supplies of iron ore. On the whole the answer is just what was expected, and contains nothing new and no special pleading beyond the general statement of the case.

The "Blue Sky" law of Kansas, under which stock venders must secure a license from the state bank commissioner, is coming in for a good deal of attention recently. Even the popular magazines have taken it up, and we presume no one will be swindled in Kansas any longer. The law was no doubt intended to protect the people of Kansas, and we hope it will do so. We shall be interested, however, in learning just what protection the people are securing from the sellers of wildcat mining shares. The bank commissioner naturally does not recommend the securities of companies, but only licenses a company or its agents to sell shares to Kansans, and it is difficult to see just what sort of examination or judgment his department will make that will be of value to Kansas. We have before us the advertisement of a Kansas gold-mining company, which starts off: "Fourteen per cent. on the original investments—Stop!—Investors—Think! . . . We are offering our 7 per cent. preferred stock at 50c., par value \$1, full paid and nonassessable. This means 14 per cent. or better on your investment. We offer a limited amount only in lots of \$100. Books now open for a subscription. This will not last long. *This has been investigated and approved by the state bank commissioner.* Address — — — Milling Co." This has an almost familiar ring. The limits of "high finance," as actually established by the "Blue Sky" law, seem to be reflected in the sobriquet.

Correspondence and Discussion

Views, Suggestions and Experiences of Readers

The Basis of Calculating Tonnage Costs

The article by William Hague under the above caption in the *JOURNAL* of Feb. 3, 1912, and the editorial comment published in the same issue, afford an opportunity to discuss a subject on which opinions and ideas are at great variance among mining engineers. He who would attempt to standardize the practice of cost keeping at mines has an unhappy task before him, and little hope of success.

The so called systems of cost keeping at mines are really more or less arbitrarily chosen systems of distributing the expense of production over a number of operations, so that a comparison of costs can be made between one day's or one month's work and another's. Whether the unit is the ton mined, raised or milled is really of little consequence to the manager, to whom the cost sheet is the pulse of the mine, provided the same standard is always used.

The tonnage milled is perhaps the most generally used basis, because, under normal conditions, there will be less variation from month to month in that figure than in the tonnage raised or mined. Moreover, it is generally the case that the weighing and sampling of the ore can be most conveniently done as it comes to the mill bin. Of course, at many mines the ore is not actually weighed. A tally of the cars is made and the tonnage estimated. Furthermore, it is a growing practice to abandon sampling of the mill feed, the tailings being sampled and the assay of the heads being calculated. The practice is, and rightly, varied to meet the needs of each individual case, just as Mr. Hague states that the manager of the North Star mine found that the basis of tonnage raised better suited his purpose than the tonnage-milled basis.

As for basing costs on the tonnage of ground broken, and regarding all elimination of waste as a step in concentration, there are many more objections than to a tonnage-milled basis. The variation in tonnage broken is usually greater from month to month than the tonnage milled, and at most mines it is customary to break ground in excess of the mill capacity; it is also more difficult to estimate such tonnage and satisfactorily sample the ore. If the tonnage-milled basis represents or is to be regarded as a partially concentrated ore, the question might be raised: Why not base the costs on the

unit of salable product, just as is done in most manufacturing industries? This is often done, and affords a means of drawing interesting and valuable conclusions from the cost sheets, but it is also desirable to keep costs figured on some tonnage basis besides that of salable product. Insofar as it affects the operations at any particular mine, I fail to see how it matters what unit is used.

When it comes to comparing the costs of operations at different mines, the matter takes an entirely different aspect. Then, in my opinion, the costs should be based on the unit actually involved. Comparisons should be made as to the costs per foot of hole drilled, or per ton of ground broken, or material raised. The statement that at a certain mine drilling costs 10c. per ton of ore milled means nothing unless it is also stated how many feet of hole is required to break a ton of ground and how many tons of ground must be broken to yield a ton of milling ore. Unless figured on such a basis, I fail to see how any comparison of costs between one mine and another can possibly be made, except when they are, as rarely is the case, being operated under identical conditions.

Such a system of cost keeping could easily be standardized, but the increased expense of clerical and surveying work, would, in most cases, be attended by too few advantages to be generally adopted. On the other hand, as costs based on tonnage milled or raised depend upon so many varying factors, governed by the occurrence of the deposit, as well as the local conditions and methods of mining, no very illuminating comparisons can be drawn between different mines, and the manager should be, as he is now, free to select the basis that best suits his needs.

CLARENCE C. SEMPLE.

New York, Feb. 5, 1912.

Co-operation in Research Work

I have read R. C. Benner's reply in the *JOURNAL* of Dec. 16, to B. F.'s letter of May 15, 1911, and am of the opinion that while B. F. was shown to be somewhat ill-advised in some of his statements, Mr. Benner's letter does everything but convince. Mr. Benner says, "In all cases the relations of research men with practical engineers are meant to be coöperative, a friendly aid in the bringing about of economical solutions of the worrisome problems of the industrialist."

How will he do it? Are we research chemists to write him stating our problems and receive an answer by return mail, giving us a free solution of our troubles? Or will he charge us or our employers for his service? If the latter, will not employers eliminate us entirely, and deal direct with him? And in case we are doing general consulting work, cannot he cut into our prices, because he is sure of a steady college salary even when work is slack? And he pays no office rent for his laboratories, or taxes on office equipment. So that apparently all that will be left us is to crawl under the protecting *aegis* of some technical school, and conduct a campaign against the works' chemists, who would hold out longer, owing to being on a salary basis, and see whether, supported by taxpayers' money, we cannot do their work at less than cost.

Mr. Benner's letter states, "the system of industrial fellowships takes care of the fellows as well, if not better, than some industrial engineers take care of themselves." How? By making two industrial problems grow where one did before, or underbidding the industrial chemist?

The parting of the ways of research seems clear. Either the college laboratory becomes a subsidized research bureau, doing work at less than cost, or its investigations are carried on in the realms of pure science, with an occasional purely practical byproduct, such as Rowland or Pupin or Nernst produced. In pure science I would certainly include certain practical problems of wide interest, such as the smoke nuisance, the influence of the barometer on liability to coal-mine explosions, and others of like generality of interest, but for the solution of which the consulting chemist can get no reward except the consciousness of benefiting the race.

CONSULTING CHEMIST.

Newark, N. J., Feb. 1, 1912.

Gold Mining near Washington, D. C.

I have been informed that gold mining is being carried on actively near the Falls of the Potomac, near Washington, D. C. Can any reader of the *JOURNAL* tell me whether this is the case, and give me a reference to something showing the financial returns of the mine in question?

SOUTHERN GOLD INVESTOR.

New York, Feb. 2, 1912.

American Institute of Mining Engineers

The proposed amendments to the constitution of the A. I. M. E., including change of name, increase in dues and classification of its membership, is exciting opposition. We have received the following letter with the request that we publish it:

Washington, Jan. 30, 1912,

EDITOR ENGINEERING AND MINING JOURNAL,

Sir—On Jan. 27 a meeting was held in Washington of the members of the American Institute of Mining Engineers who are also members of the U. S. Geological Survey to consider the proposed amendments to the constitution of the Institute. At this meeting were present G. A. Ashley, State Geologist of Tennessee; G. F. Becker; A. H. Brooks; E. F. Burchard; R. H. Chapman; Frank L. Hess; W. Lindgren; H. D. McCaskey; E. W. Parker; F. L. Ransome; C. E. Sieben-thal; George Otis Smith; A. C. Spencer; D. B. Sterrett. Arnold Hague was prevented from attending, but he, as well as George P. Merrill, of the National Museum and J. A. Holmes, of the Bureau of Mines, desires to express his concurrence in the action taken.

The following resolutions were passed after full discussion and without a single dissentient vote:

"The members of the American Institute of Mining Engineers present do not approve of the proposed change of name of the Institute to 'American Institute of Mining and Metallurgy.'

"The members of the American Institute of Mining Engineers present are not in favor of the change in classification of members on the basis proposed in the circular, which is not a re-classification based upon professional standing.

"In the absence of a financial statement showing that an increased income is necessary, the members present are opposed to the proposed increase in dues."

A committee was also appointed to communicate the resolutions to the mining press in the hope of eliciting expressions of opinion from other members of the Institute. This committee consisted of the undersigned.

Waldemar Lindgren,
George F. Becker,
A. H. Brooks.

A similar movement has been going on contemporaneously in New York and the following circular letter has been sent to all members of the Institute in the United States, Canada and Mexico.

New York, Feb. 3, 1912,

To the Members and Associates of the American Institute of Mining Engineers.

Dear Sirs—At the annual meeting of the A. I. M. E. in New York, on Feb. 20, some radical changes in its constitution are to be considered. Among these is a

proposal to increase the dues of all corporate members.

We, the undersigned, intend to vote against an increase of dues, and we ask the coöperation of members unable to attend the forthcoming meeting, who are of the same mind in this matter as we are.

The reasons for an increase of dues offered officially by the Secretary of the Institute are, in our opinion, vague and unsatisfactory. Without denying that an increase may be advisable, we propose to contest such a measure until full information respecting the situation has been communicated to all members of the Institute; and until after it has been determined by a careful investigation of the Institute's affairs that the same purpose cannot be accomplished by economies in administration.

We intend to vote against the proposed increase in dues, and to offer a resolution to appoint an independent committee to study the affairs of the Institute before any further action be taken. If you desire us to vote for you upon these principles, please execute the proxy that we inclose herewith.

If you have already given your proxy to someone else you have the right to cancel it. If you now give us your proxy you will thereby cancel all those previously given.

Yours truly,

George C. Stone,	J. R. Finlay,
C. R. Corning,	J. Parke Channing
W. R. Ingalls,	F. F. Sharpless,
J. Langeloth,	W. H. Nichols, Jr.,
Otto Sussman,	J. A. Van Mater,
Allen H. Rogers,	Arthur Thacher,
Lewis G. Rowand,	Robert Peele,
H. M. Chance,	W. C. Ralston,
F. L. Garrison,	Richard H. Vail,
John H. Allen,	E. B. Kirby.

The proxy accompanying this circular is made out in the names of George C. Stone, 55 Wall St., New York, and J. R. Finlay.

The meeting of the Institute at which the proposed changes in the constitution will come up for action will be held in New York, Feb. 20 at 10 a.m.

Elsewhere in this issue Doctor Raymond discusses the proposed change in the name of the society.

What's in a Name?

By R. W. RAYMOND*

When the Institute was organized, the rules of the North of England Institute of Mining Engineers were adopted for temporary use, and its name was copied without debate. The rules were soon after rewritten to suit the conditions of our society; but the name remained unchanged. The North of England Institute was, in fact as in title, made up of mining engineers—mostly colliery managers—whereas the American Institute included from the beginning the representa-

*Secretary Emeritus of the American Institute of Mining Engineers, New York.

tives of metallurgy, chemistry, mechanical engineering, geology—in fact, all the arts and sciences auxiliary to mining.

That no change of name was made in the early years was due, I think, largely to the feeling that it was better to let the term mining engineers cover the whole field than to create a long and cumbersome title by attempting to state in it all the branches represented in our membership and proceedings. It was deemed unnecessary to make a complete table of contents out of a title page.

After a few years, there was another reason for conservatism in this respect, namely: the members of the institute became fond of its name, and listened with impatience to any proposal of amendment. It was, at the worst, they said, a lucky misnomer, under which the Institute had prospered, and the wide range of activities covered by it was well understood throughout the world. Moreover, although an institute, strictly speaking, was not a body of men, yet this institute "of mining engineers" was just that; and the fellowship of its human members was as important and as dear as the information contained in its volumes. Finally, a good many of us remembered from our school days the old maxim that when a debating society of boys began to tinker its constitution and change its name, it was pretty sure to be moribund; and we had seen the same phenomenon in struggling periodicals, and even in the history of nations.

Having been asked from many quarters to express my opinion concerning the present proposal to change the name of the Institute, I must say frankly that I have no strong opinion one way or the other, apart from the consideration of sentiment and habit which would have weight only with the old members who, like myself, are soon to pass from activity. When the Institute was organized, I do not think I would have objected to any respectable designation; but having loved it long under the name by which it happened to be baptized, I might naturally find difficulty in transferring my affections to another. And I confess that the substitution of impersonal abstractions, like "Mining and Metallurgy," for a term of personality, like "Mining Engineers," seems to me somewhat chilly, and to put us somewhat out of touch with our sister national societies of civil, mechanical and electrical engineers.

Yet the proposed title is perhaps better English than the old one; and if it will give deeper satisfaction, arouse more enthusiasm, command wider support and lead to better work, by all means let the new label be pasted over the one which has been with us round the world. It is really a small matter, unless it be made a large one by over-estimating its importance. And my advice to everybody is, vote with the majority! Only, do not stop satisfied with a mere pedantic improve-

ment, but go ahead with all your might to make the married as glorious as the maiden name!

The disinterested character of my advice may be inferred from the circumstance that my election as honorary member of the institute deprives me of the right to vote, and therefore I must preserve the dignified attitude of a veteran observer only.

President Urges Leasing System

President Taft, in a message to Congress, read in the House on Feb. 1, again recommends the adoption of the leasing system for public lands valuable for minerals. He says in part:

The chief change, however, which ought to be made . . . is that by which Government lands containing coal, phosphat and other nonmetalliferous minerals shall be leased by the Government, with restrictions as to size and time, resembling those which now obtain throughout the country between the owners in fee and the lessees who work the mines, and in leases like those which have been most successful in Australia, New Zealand and Nova Scotia. The showing made by investigations into the successful working of the leasing system leaves no doubt as to its wisdom and practical utility. Requirements as to the working of the mine during the term may be so framed as to prevent any holding of large mining properties merely for speculation, while the royalties may be made sufficiently low, not unduly to increase the cost of the coal mined, and at the same time sufficient to furnish a reasonable income for the use of the public in the community where the mining goes on. In Alaska there is no reason why a substantial income should not thus be raised for such public works as may be deemed necessary or useful.

There is no difference between the reasons which call for the application of the leasing system to the coal lands still retained by the Government in the United States proper and those which exist in Alaska.

Federal Control of Coal Prices

WASHINGTON CORRESPONDENCE

Representatives of the American Mining Congress including Secretary James F. Callbreath, Jr., appeared before the Senate Committee on Interstate Commerce on Feb. 2, for the purpose of urging the amendment of the Sherman act in such a way as to permit coal operators to unite in the establishment of trade agreements that would allow the fixing of rates and the regulation of output subject to such kinds of control as the Government sees fit.

It was stated that at present the bituminous industry is in an exceedingly depressed condition. Men are idle about one-third of the year and as about 500,000 men are engaged in the industry, the loss is said to be great. It was urged that at present railroads are getting a large share of the price of coal to the con-

sumer and a concession is seriously needed permitting operators to unite in agreements for the establishment of satisfactory living conditions in the business. By so doing, it was alleged, there would be a saving of money to the public at large, as unnecessary production would be stopped and the coal supply would thus be economized, thereby rendering prices more stable over long periods.

Tables were submitted to show the actual condition of the industry, the witnesses depending largely upon the figures submitted by the Pittsburg Coal Operators Association in cases which are now pending before the Interstate Commerce Commission designed to test the equitableness of the rates between Pittsburg operating points and lake ports. The demands made by the representatives of the mining congress are similar to those made by coal operators in the past. Should a mining commission be created it would be desired to subject to it other mining operations besides coal mining.

Chronology of Mining for January, 1912

Jan. 2—High Ore mine of Anaconda company resumed operations. Picher Lead Co. secured control of the lead smelteries at Webb City, Mo., and Galena, Kansas.

Jan. 6—Mason Valley smeltery at Thompson, Nev., was blown in.—Final announcement made of organization of Inspiration Consolidated Mining Company.

Jan. 9—Six men were reported killed and two injured by an explosion of dynamite in the Parrish mine, near Plymouth, Penn.—Dynamite explosion destroyed powder house and damaged other buildings at the Hollinger mine at Porcupine.

Jan. 11—Lehigh Valley R.R. announced plan to separate the railroad from its coal properties.—An anti-Japanese riot occurred at Hayden, Arizona.

Jan. 15—Converters at Braden mines in Chile, were started, marking final commission of entire smeltery.—Utah Copper Co. placed the seventh section of the Arthur mill in commission.

Jan. 16—Fire at property of Canadian Copper Co., in the Sudbury district, Ontario, destroyed the hospital.—Two men were killed by a falling timber in Kingdon shaft of Old Dominion company.

Jan. 17—Four men were killed in a mine of the Central City Coal & Iron Co. at Central City, Kentucky.

Jan. 18—Vote of British miners was announced as 445,801 for a strike on Mar. 1, and 115,921 against.

Jan. 20—Fire at loading station of the Daly West and Ontario mines in Utah, caused loss of about \$20,000 and neces-

sitated temporary shutdown of former mine.

Jan. 21—Five men were reported killed or injured in a dust explosion at No. 4 mine of Kemmerer Coal Co., at Kemmerer, Wyoming.

Jan. 22—Oro Vista No. 1 dredge in Oroville district, California, was placed in commission.

Jan. 31—Fire destroyed surface works at the W. Y. O. D. mine, near Grass Valley, Calif., entailing \$30,000 loss.

January Dividends

The accompanying table shows the amount per share and total amount of the dividends paid during January, 1912, by a number of mining and industrial companies in the United States, Canada and Mexico.

UNITED STATES MINING COMPANIES	Situation	Per Share	Total
Ahmeek, c.	Mich.	\$3.00	\$150,000
Amer. Zinc, Id. & Sm.	U. S.	0.50	40,060
Anaconda, c.	Mont.	0.50	2,166,250
Bunker Hill Con., g.	Cal.	0.07½	15,000
Bunker Hill & Sull., l.s.	Ida.	0.20	65,400
Copper Range Con., c.	Mich.	0.50	192,093
Champion, c.	Mich.	1.00	100,000
Daly West, s.l.	Utah	0.45	81,000
Homestake, g.	S. Dak.	0.50	109,200
Iron Blossom, s.l.g.	Utah	0.07	70,000
Hecla, l.s.	Ida.	0.02	20,000
Goldfield Con., g.	Nev.	0.50	1,779,574
New Idria, q.	Cal.	0.60	60,000
North Butte, c.	Mont.	0.30	123,000
Portland, g.	Colo.	0.02	60,000
Ophir, s.g.	Nev.	0.10	20,160
Old Dominion, c.	Ariz.	1.00	162,000
Osceola, c.	Mich.	3.50	336,525
Pittsburg-Idaho, l.	Ida.	0.04	32,120
Tonopah-Belmont, g.s.	Nev.	0.25	375,000
Tonopah Mining, g.s.	Nev.	0.40	400,000

CANADIAN, MEXICAN AND CENTRAL AMERICAN COMPANIES	Situation	Per Share	Total
Crown Reserve, s.	Ont.	\$0.05	\$88,441
La Rose, t.	Ont.	0.10	149,840
McKin-Dar.-Sav., s.	Ont.	0.10	224,769
Mines Co. of America.	Mex.	0.15	135,000
Nipissing, s.	Ont.	0.07½	450,000
Nova Scotia Stl. & Coal, com.	N. S.	1.50	90,000
Nova Scotia Stl. & Coal, pfd.	N. S.	2.00	20,000
Temiskaming & Hudson Bay, s.	Ont.	3.00	23,283

COAL, IRON, INDUSTRIAL AND HOLDING COMPANIES	Situation	Per Share	Total
Am. Ag. Chem., com.	U. S.	\$1.00	\$171,141
Am. Ag. Chem., pfd.	U. S.	1.50	275,730
Am. Sm. & Ref. Co., com.	Mex.	1.00	500,000
Am. Sm. & Ref. Co., pfd.	U. S.	1.75	875,000
Am. Coal Products, pfd.	U. S.	1.62½	169,299
Gen. Coal & Coke, com.	U. S.	1.50	76,875
Gen. Coal & Coke, pfd.	U. S.	1.25	23,437
Consolidated Coal.	Md.	1.50	258,389
General Chem., com.	U. S.	5.00	407,565
General Chem., pfd.	U. S.	1.50	150,000
Guggenheim-Expl.	U. S.	2.50	519,832
Harbison-Walker Refractories.	U. S.	1.50	144,000
Nat'l Carbon, com.	U. S.	1.50	82,500
Monon. R. Coal, pfd.	Pen.	1.00	100,000
Old Dominion of Me.	Ariz.	1.00	293,244
Pittsburg Coal.	Penn.	2.25	371,262
Republic I. & S.	U. S.	1.75	357,296
Sloss-Sheffield, pfd.	Ala.	1.75	117,250
U. S. Sm., R. & M., pfd.	U. S.	0.87½	425,425
U. S. Sm., R. & M., com.	U. S.	0.50	175,525
Vir. Car. Chem. Co., pfd.	U. S.	1.75	360,000
Vulcan Detinning.	N. J.-Ill.	1.75	26,250

The dividends shown in the table amount to \$13,418,735, which compares unfavorably with \$14,478,609 in January, 1911.

Details of Practical Mining

Accounts of Useful Ways of Doing Many Things in the Day's Work

This department is designed to treat in a brief way of details of everyday practice. Many readers are doing interesting things in mining and milling that other readers like to know about. The thought that there is nothing new in them should not be a deterrent to telling about them. Something that is an old story in one district may be quite unknown in another. Our draftsmen can develop any kind of pencil sketch that is intelligible. A blueprint answers all the purposes of the engraver. Contributions are solicited.

A Six-Ton Skip Loading Device

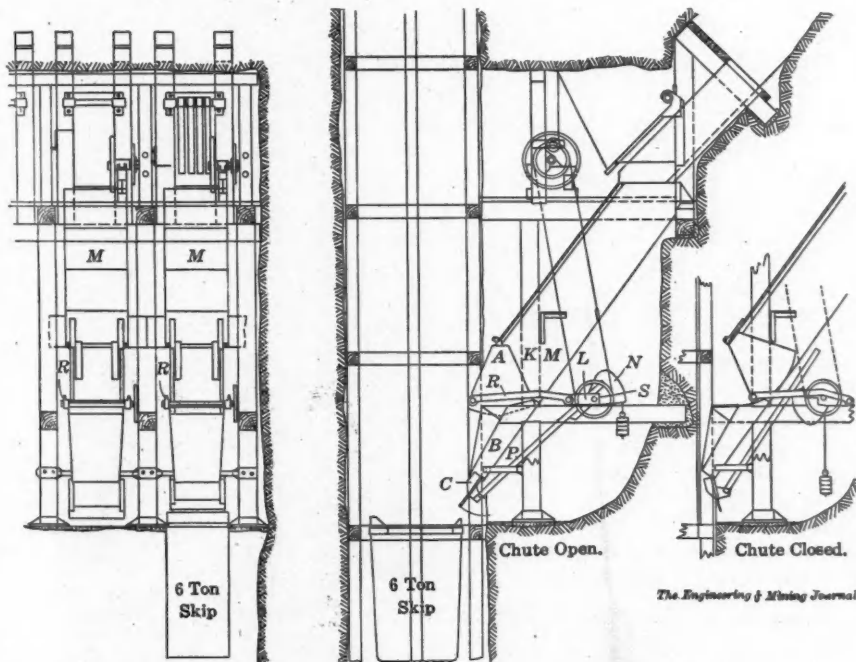
The following particulars and the accompanying drawings of the six-ton skip-loading device used at the Rand Col-

Below the door is a fixed apron plate *B* with wing plates extending inside the line of the shaft timbers. At the end a short lip plate *C* with wing plate is hinged to the fixed plate. The inside of the magazine swing door, apron plate and lip are provided with renewable liner plates. The liner plate of the lip *C* is in two parts, the lower, $9\frac{1}{2}$ in. wide, being secured by two bolts to the upper portion of *C*. When the chute is open this portion projects into the shaft over the edge of the skip and catches most of the spill. The device is so arranged that the swing door and lip when full open are clear of the skip. The liner plate, in the event of untimely starting of the skip, would be torn off and only the two bolts would be fractured without further damage being done.

shaft *S* and the shaft being rotatable outward, the center lever *N* releases the links *P* which fall and elevate the lip *C*, which is then locked in place by the toggle action of the links *P*. On the back of lever *N* is built a chain wheel with balance weight to reduce the turning movement to a minimum.

To make it impossible to give any starting signals unless the chute is closed and the lip swung back, one of the levers is connected with a switch on the bell signal which is cut off when the lip is lowered.

The driving shaft *S* is made of square iron turned at the journals with levers shrunk on and it carries a sprocket chain wheel which is connected by a chain gear to the control wheel on the platform above, where the finger doors of the chute are operated.



A 6-TON LOADING CHUTE IN THE RAND COLLIERIES GOLD MINES

lieries gold mines are given by Roger Price in a paper read before the South African Institute of Engineers. This device is of the type known as the Kimberley magazine loader. The magazine *M* in the accompanying illustration is a steel box of the same capacity as the skip, 123 cu.ft., which is closed at the bottom by a swing door *A* with wing plates. It is filled from the shaft ore bin of 1000 tons capacity by a chute with a finger door operated by hand.

The swing door is operated by two side rods *R* connected at one end to a cross bar on the door and at the other to two levers *L* shrunk on the square drive shaft *S*. The toggle action of the crank keeps the door closed while ore is being loaded into the magazine. The hinged lip *C* is controlled by a third lever *N* in the center of the driving shaft *S*. This engages a crosshead between the links *P* controlling the swinging lip. These links hang loose on a turned portion of the

Rotary Rig for Deep Drilling

BY L. H. EDDY

The capability of the rotary rig for deep drilling in California oil fields has been so successfully demonstrated that by many it is now believed the depth of 6000 ft. may be reached with this type of rig, should it be necessary. A depth of 4900 ft., drilled by a rotary, was reported in December to have been reached in Lakeview No. 4 well. At Lakeview Annex well, drilled with a rotary, 6-in. casing was put in at 4500 ft. Lakeview No. 1 suspended at 3950 ft. and Lakeview No. 3 at 3945 ft., both having been drilled with a rotary rig. The 4900-ft. well represents an advancement in rotary drilling, of 1600 ft. in depth in about one year; considering the fact that the rotary has been in successful operation for only about three years in California, the achievement of 3300 ft. in the Coalinga field in October, 1910, and 4900 ft. in the Maricopa field, in December, 1911, is evidence of rapid progress in drilling methods.

While true that there are formations which cannot be successfully and economically explored with a rotary, it is likewise true that some other formations can be more economically drilled by this method than with the standard rig. The introduction of the standard rig in California fields dates back to 1884. Prior to that year the springpole was the only means for drilling employed. The rotary was introduced in California several years

prior to its successful employment, but was not considered economically available until it had been so demonstrated in the Louisiana and Texas oil fields; in the first two years of its successful operation in California the maximum depth for which it was deemed available was about 2000 ft., until the 3300-ft. well was drilled in the Coalinga field. In Maricopa flat it is said the formation is such that it would have been extremely difficult to reach with the standard rig the depth that has been drilled with the rotary; that the running sand encountered could not have been drilled economically with standard tools, while the rotary was driven through without difficulty. The usefulness of wells 5000 or 6000 ft. deep, should that depth be necessary and attainable, is problematical, and is dependent upon the gas pressure and the capacity of pumping machinery.

Combination Post and Set Timbering in Shafts

BY CLAUDE T. RICE

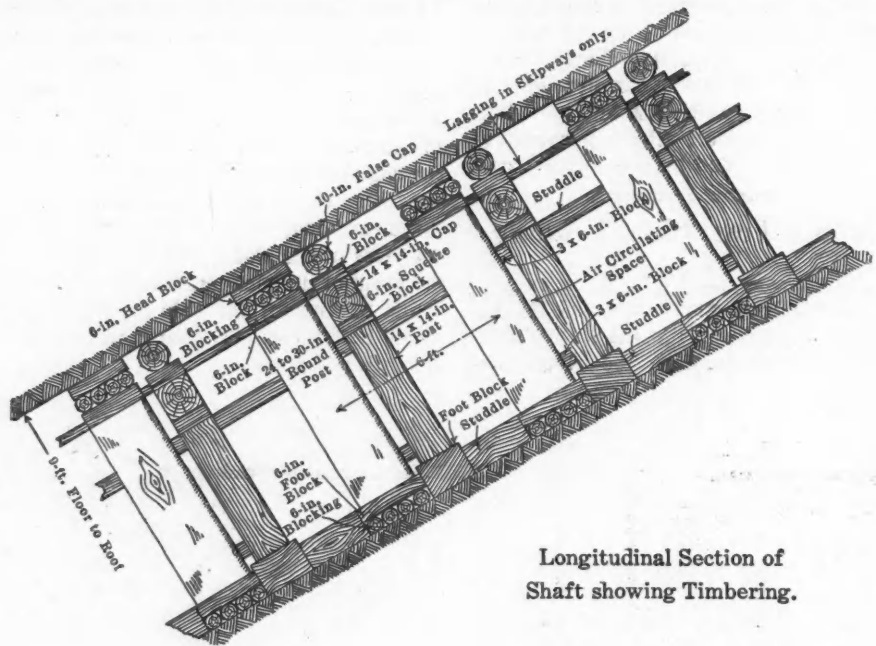
The ground in the inclined shafts that follow the Calumet & Hecla conglomerate is heavy, so that a crew of seven men is kept at work easing the timbers. The manner of supporting the roof when it gets heavy is novel, in that the main part of the top weight is carried on posts while the scalings from the roof are supported by lagging carried on regular shaft sets. When the shaft is first sunk, only the posts, or the "end timbers," as they are called locally, are put in, and the shaft is made 22x9 ft., but after a time the weight begins to come on the roof and the shaft pillars begin to flake away under the pressure, increasing the width to about 25 ft. by the time that the shaft sets are put in.

The posts are put in with foot and head blocks, built up of 6-in. pieces criss-crossed to make a head block 18 to 24 in. thick, and a foot block about 12 in. thick. Then when the weight comes on the posts the crushing of these thick head blocks gives the ground a chance to adjust itself to the new conditions before the posts are injured. Indeed, these built-up head blocks serve quite well to take up what is called the initial creep in ground—the settling of the ground until it has adjusted itself so that it takes most of the weight itself by forming an arch as it were—possibly better than a solid block would. The posts when first put in are about 6½ ft. long, from 2½ to 3 ft. in diameter, and the best of them are Georgia pine, a resinous variety which resists attack by fungus spores quite well. Posts of Georgia pine last about two years before they need to be reheaded and will stand three reheadings, each of which lengthens the post's life two years, so that the Georgia-pine posts have a life of seven or eight years

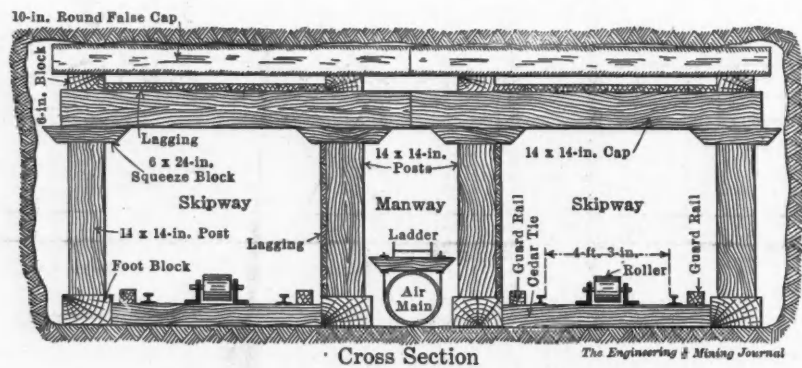
in these shafts. Some hemlock posts are used, which last about two years before they have to be replaced. No reheading of the hemlock posts is possible, as they rot too fast for it to pay. A few hardwood posts have been tried, but last scarcely a year, rotting into a mush-like pulp, in an amazing manner. Indeed so short is their life that it hardly pays to use them.

The post is reheaded as soon as the head block has been compressed to the limit and before compression of the post itself has begun. Owing to the pieces in the head block being laid so that they

of head blocks has been compressed to the limit, the post is again reheaded, but before the post has had to be reheaded, the roof has begun to scale off partly under the weight and partly because of swelling, caused by oxidation of lime minerals in the hanging wall. Lagging has, therefore, to be put in over the skip compartments, and this lagging is carried on regular sets such as are commonly used in inclined shafts. Owing to the swelling of the foot wall, which gives especial trouble through raising and warping the tracks so that the skips will not stay on them, no sill is used under the



Longitudinal Section of Shaft showing Timbering.



POSTS AND SQUARE TIMBERS IN AN INCLINED SHAFT

take the weight across their fibers instead of along them, the compression is confined entirely to the block until the last, when the wood fiber has become so compacted that it is as firm as the fiber of the posts. This reheading consists of sawing and chiseling out a cut across the top of the post so as to allow the post to be knocked out. About 6 in. is lost in this way at each reheading. Then a new set of foot and head blocks is put in, and the post is good for another two years, being practically as strong as when first put in. When the second set

posts of the shaft set; instead foot blocks of liberal proportions are put in.

The lagging rests on 14x14-in. caps of pine. In a shaft having two hoisting compartments, the cap is in two pieces that butt against one another over the manway, which is placed in the center, as shown in the accompanying drawing. Above the cap proper is carried a false cap of round timber whenever there is room enough. This rests on blocks placed on the cap pieces directly over the posts. Under the cap and between the posts and the cap are squeezing pieces of 6x

14-in. timber, about 24 in. long, with their ends beveled so that they will bend and have less tendency to cut into the caps. The squeezing pieces take most of the crushing in these sets, as by them the pressure is distributed over a larger area on the cap than on the post. In other words, there is a concentrated pressure on the underside of the squeezing pieces, and a distributed pressure on the top side. Consequently, the post cuts up into the underside of the squeezing piece, but the squeezing piece does not in turn cut into the cap. As the weight comes end-on on the fibers of the post, it sustains little injury when it cuts into the squeezing piece.

Studdles are put in to brace the timbers, always at the bottom and generally also at the top of the posts. In order to provide room for the circulation of air between the stull, or end-timber posts and the square-timber posts, as the shaft sets are called, a 3-in. block is put in between. This prevents decay starting on the posts where the two would otherwise be in contact, as it is where there is dead air that the fungus spores which cause the decay first find lodgment and get a foothold.

In easing the timbers, the men work on top of the lagging that is carried on the square timbers, and throw the rock that comes from the easing of the roof off principally at the far sides of the shaft, as it can be scraped down to the level and loaded on the sides more easily than if it were allowed to fall in the manway. Some of it cannot be prevented from falling into the manway and is worked down to the level that way. By this arrangement the timbermen are able to work over the skipways without interfering with the hoisting in the least; indeed it is in order to permit that, as much as for any other reason, that the square timbers are put in.

The combination of posts to take the bulk of the top weight with sets to carry the lagging is a most admirable scheme for timbering inclines in heavy ground, for it throws the most of the wear and tear on the round posts, which are the cheapest elements in the combination to replace. Moreover, by using the squeezing pieces, owing to their acting much as head boards between the caps and the posts, the caps are saved from injury and the life of the square-timber sets is increased.

The manway is put in the center of the shaft, so that the men who replace the rope idlers can inspect the track between idlers without entering the skip compartments. The ladder is carried on pieces of timber clamped to the air main, the ladder being bolted to the crosspieces by staples. There is some objection to this arrangement, as if any repairs have to be made on the airmain, the ladder has to be taken off. Still this is a small drawback, and there is the advantage that the lad-

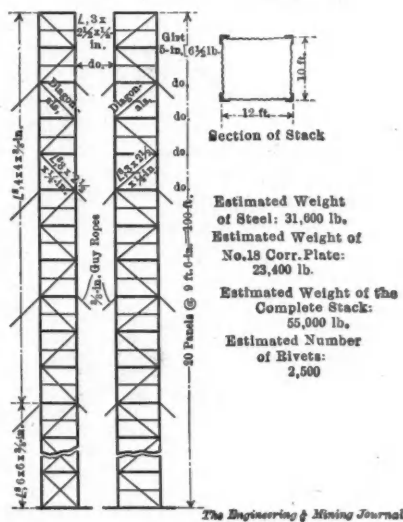
der is kept clear of the ground, so that rocks cannot accumulate under it to make the securing of a good hold on the ladder rungs difficult. Accumulation of loose rock under the ladder is one of the things that has to be guarded against in an inclined shaft. The rungs of the ladders are 12 in. apart, just as in a ladder for a vertical shaft.

Structural and Corrugated Steel Stack*

By PERCY E. BARBOUR†

The temporary stack shown in the accompanying illustration is an interesting example of unusual practice. I have never heard of any other stack of this size built of corrugated plates and structural steel.

At the Garfield smeltery, Garfield,



STEEL STACK FOR SMELTERY

Utah, an additional stack was required in short order, and one was constructed of wooden posts and braces with a lining of corrugated iron. It served the purpose fairly well, but frequently caught fire and always required watching. The blowing in of another basic converter required an immediate increase in stack capacity, which, it was required, should be cheap and temporary, as an elaborate and expensive flue and stack system for all the converter gases was being designed.

This stack, designed and built by me, was 10x12 ft. inside, 190 ft. high, and rested on the steel work of the old structure, which was 20 ft. 6 in. high, thus making the top of the stack 210 ft. 6 in. from the ground. The corner members of the structure were of 6x6x3/8-in. angles for the lower nine panels and of 4x4x3/8-in. angles for the remaining

upper eleven panels. Each panel was 9 ft. 6 in. high. The girts were of 5-in. 6 1/2-lb. channels, and the diagonal ties were 3x2 1/2x1/4-in. angles with the long leg outstanding. The panels were made 9 ft. 6 in. in order to take a 10-ft. sheet of corrugated metal, and, because this was too long an unsupported span, a 3x2 1/2x1/4-in. angle girt was put in the middle of each panel. At the base of the structure a 6x6x3/8-in. angle was used on all four sides to connect the stack to the old steel work. At all panel points 3/8-in. gusset plates were used.

The corrugated plates were bolted on with 3/8-in. bolts through the channel girts and held on the inside by means of straps of 1/4x1 1/4-in. iron, and were fastened to the angle iron girts by means of 9-in. clinch nails.

The steel erection gang consisted of five men, including the boss who operated

COST OF A TEMPORARY STEEL STACK

		Cents per lb.
Labor:		
Erection contract*	\$650.00	
Erection gang, extra labor	106.90	
Total erection	\$756.90	1.376
Machine and boiler shops	\$659.30	
Carpenter shop	69.45	
Mason	1.45	
Common labor	40.00	
Hauling	6.35	
Total fabrication and outside	776.55	1.412
Materials:		
Structural steel	\$804.44	
Corrugated iron	768.00	
Round iron and steel plate	487.22	
Rivets, bolts and clinch nails	175.86	
Total structural	2235.52	4.064
Cast iron	\$6.94	
Guy wire	265.29	
Paint	105.14	
Cement	15.00	
Lumber	7.63	
Tools and sundries	8.92	
Total sundries	408.92	0.744
Supervision, city office	709.73	1.290
Total cost of stack completed	\$4887.62	8.886

*The actual cost to the contractor for erection was \$708.23, but the extra work due to a multiplicity of shop errors in fabrication more than offset the contractor's loss, which is therefore not taken account of in the per pound cost.

the air hoists with which the hoisting was done. Three of the men were topmen. The riveting gang consisted of four men and a gang of four men was put on the corrugated plates.

After the skeleton was erected and riveted, it was painted, two men doing this in 1 1/2 shifts of eight hours, with two men below to lower staging which was inside the skeleton and slung from a single block at the top. The corrugated plates were painted on the ground before they were put in place.

The total estimated weight of stack was 55,000 lb. The total cost of the stack completed was \$4,887.62. This cost is given in detail in the accompanying table.

*An article in the Journal of the Worcester Polytechnic Institute for November, 1911.

†Superintendent, Uwarra Mining Co., Candor, N. C.

Of course this is a high cost per pound, but the structure is a skeleton, the shop was unused to fabricating work of this kind, and the erection was done under great difficulty, as the sulphur smoke was at times heavy enough to drive the men to the ground. My original estimate of the cost was 10c. per pound.

Separating Rock from Clay*

By F. A. KILLIK

For the purpose of separating a large proportion of stiff wet clay from the ore delivered to the mill of the Totok gold mine, Celebes, Dutch East Indies, the following method was employed:—The clay occurs with the quartz, and formerly gave great trouble in the bins, breakers and automatic feeders. The ordinary puddler did not prove a suitable machine for effecting the necessary separation, on account of its high cost of installation, heavy running charges and other drawbacks, and therefore it became necessary to find a better method. Owing to the fact that water under pressure was available at the mine, the present plant was devised, and has proved eminently satisfactory in the reduction of labor and other costs, besides being beneficial in other ways. I am not aware that any description of a similar method has been published.

In Fig. 1 is shown a strongly constructed V-shaped hopper *A* made with water-tight joints and set at an angle of 25° to the horizontal; the front or mouth of this hopper is four feet wide, and is closed to within two feet of the level of the washing plate *B*. Six inches in front of this is an adjustable board *C*, 10 in. wide, so set as to form a space between it and the plate *B*, which is four feet wide, four feet long, and has a fall of three inches. It is boarded in at the sides from a height of from three to four feet; fitted under the forward end is a grizzly *D*, four feet in width, set at an angle of 45°, the bars of which are 10 ft. long and spaced ¼ in. apart.

The ore bin *E* is placed 18 in. below the grizzly at an angle of about 38° from the horizontal, the boarding around the bin being extended up both sides of the grizzly. The bin front is of the usual construction, fitted with an adjustable door and butterfly in the chute.

The timbers carrying the washing-plate are extended some 15 ft. and supported by the front posts of the bin. Upon this extension is the operating platform *F* about 18 in. above the level of the washing-plate. A pipe line is provided, terminating in a nozzle *G* controlled by a valve. The nozzle *G* of the washing-pipe is afforded change of direc-

tion by means of a ball-and-socket joint of simple construction, the details being shown in the sectional drawing. It will be noticed that the ball-and-socket joint is kept tight, when the high-pressure water is shut off, by means of a spiral spring that keeps the two parts in bearing. A lever is clamped loosely to the nozzle for the purpose of directing it where required; this is attached in position by a bolt on a bridge support in the same manner as is practiced with hy-

draulic monitors. The bottom being kept well inclined to one side, where it is narrowed down and connected with a launder leading to settling tanks *L*. The hopper *A*, and also the sides of the grizzly compartment and bin, are lined with ½-in. flat steel sheets; for the bottom and sides of the washing-plate *B*, old side-plates from mortar-boxes are used. The settling tanks *L* are of the usual construction, with filter bottoms and bottom-discharge doors, and of a size and

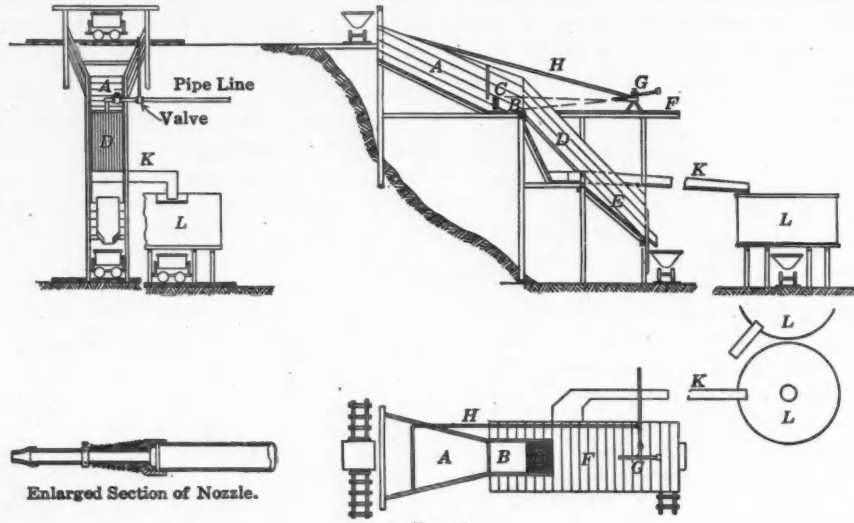


FIG. 1

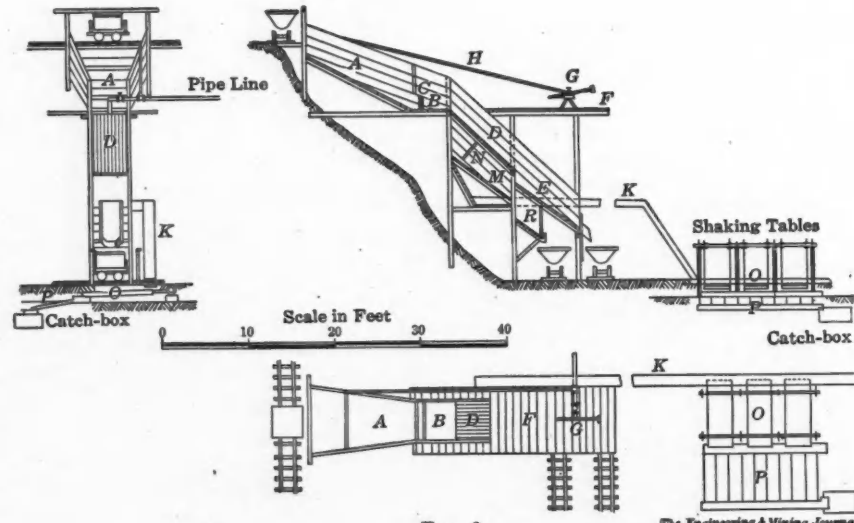


FIG. 2

PLANTS FOR SEPARATING STIFF CLAY FROM ORE

draulic monitors. A ¾-in. pipe *H*, with a controlling valve, is taken off the pipe line at a convenient point before it reaches the nozzle, and this pipe is carried up above the hopper, over which it is extended by a right-angle bend provided with perforations, for the purpose of spraying the material as it is dumped into the hopper from the trucks above.

A waste-rock "sollar" is built below in a convenient position for sorters. Immediately below the grizzly is a wide launder *K* closed in to prevent loss from

number suitable to the capacity of the plant.

The total height, as shown in Fig. 1, is 28 ft., but to meet the circumstances of the installation, the measurements may be reduced in the following respect; the hopper may be shortened, the grizzly cut down to six feet, or somewhat less, and the ore bin below the grizzly set at an angle of 35° and shortened.

The foregoing description is of the No. 1 plant. The No. 2 plant varies from that already described in having a fine

*Excerpt from an article entitled "Notes on a Simple Method of Separating Rock from Stiff Clays." Bull. 87, I. M. M.

removable screen *M*, Fig. 2 under the grizzly, and the baffle-board *N* set at right angles to the latter to throw sand on the screen; a second small bin *R* to take the product remaining on the screen, together with shaking tables *O* and blanket tables *P*, all of which are shown in the accompanying illustration.

If a large quantity of ore has to be handled it must be ascertained if the fines (say the material passing an 8- or 10-mesh screen, after contact with mercury on the shaking tables) are worth collecting and milling. If so, the plant would be constructed according to the arrangement shown in Fig. 1, using the grizzly only, with settling tanks. If, on the other hand, the fines be poor enough to discard after mercury contact, an 8- or 10-mesh screen must be placed immediately below the grizzly, as shown in Fig. 2. The fines passing the screen are led to shaking tables, the first two compartments of which contain mercury, and they are run at a speed to give some 200 shakes per min. After this treatment the sands are run over a wet blanket table and thence into the catch box.

Should the material to be treated contain but a small percentage of rock, and this not of sufficient size to act as a disintegrator on the plate, rock must be added at this point, and the opening exposed to the water jet diminished to prevent too rapid feeding. The larger pieces of rock on the plate may be retained there by a few bars through which the fines and water pass.

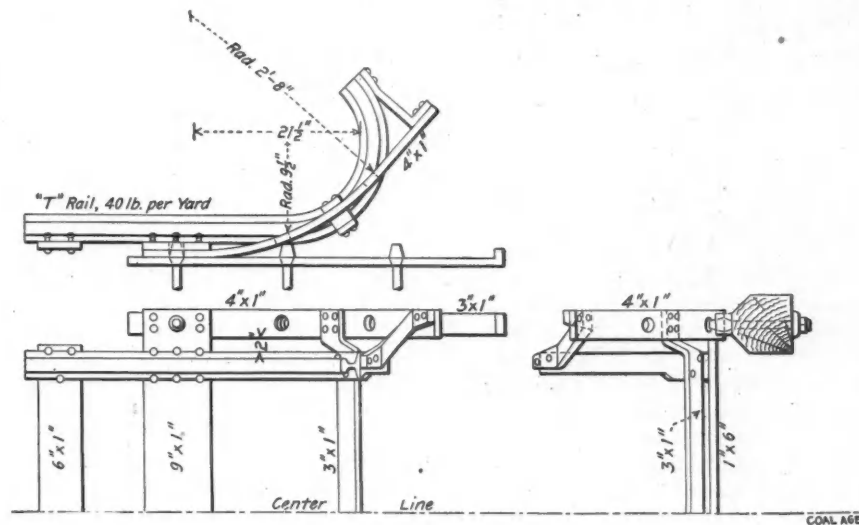
The material dumped into the hopper is subjected to a constant spray of water by means of the sprinkling pipe *H*, which thoroughly moistens the clay and aids the subsequent disintegration of the charge when it is attacked by the water jet.

When the hopper is well filled, water from the nozzle is caused to play upon the opening; the rock washed out lies on the washing plate and sets up a grinding action upon the material. As the washing process continues the rock accumulates on the plate and is gradually worked forward until it drops into the bin below, the fines and water passing through the grizzly, whence they are conveyed by launder to the settling tanks. The hopper should be well supplied during the time of filling the settlers, and the flow of water maintained in order to prevent settlement of slimes in the tanks which would hinder their subsequent draining.

The material actually being treated at the mine with one washer is about 200 tons per 24 hours, and consists of:—Rock retained upon $\frac{3}{4}$ -in. grizzly, 30%, assaying 10 grams of gold per ton; fines passing grizzly, collected in settling tanks, 23%, assaying 16 grams; waste rock sorted out, 7% and slimes discarded, 40%, assaying one gram.

The pressure of water at the nozzle is about 125 lb. per sq.in., but if necessary a lower pressure could be used efficiently. A $\frac{7}{8}$ -in. nozzle is fitted, but the valve is never opened full, from 15 to 20 cu.ft. of water per min. being used.

The cost of treatment per ton, based on 200 tons per day actually treated, was: Labor (8 hours per day), hydraulicking, 3 natives, at 24c. per day 72c.; sorting and trimming, 12 natives, at 20c. per day, \$2.40; discharging tanks, 4 natives, at 20c. per day 80c.;—total, \$3.92. The cost on total amount treated was 1.96c. per ton; on total amount recovered, 3.6c. per ton. The cost of treatment by the older method, with puddlers and shaking tables (on contract), upon the basis of 400 tons daily of material, containing 21% rock, 6.5% sands, 10% waste sorted out, and 62.5% passed away over shaking tables, was, on total amount treated 6c.



A QUICK-ACTING MINE-CAR DUMP

per ton; and on total amount recovered, 22c. per ton.

Upon this material the costs under the new method would be:—On total amount treated, 1.8c.; and on total amount recovered, 6.4c. per ton. These figures do not include the power for driving the puddlers, etc., required by the older method, which would amount to 1.2c. per ton of material treated.

The disadvantages of the older system, compared with the new, were: higher first cost, power required to drive puddlers; great wear and tear of plant; increased labor; lack of continuity; increased time required for clean up and excess of water required.

The advantages of the new method are: a continuous plant working almost automatically; no gold settling anywhere except in the tanks, or upon the shaking tables; uniform flow of water, facilitating good running of the tables; minimum wear and tear and constant feed of rock into bin, assisting sorting.

A Car Dumping Device*

By R. O. BURTT†

The dumping device shown in the illustration consists of a movable platform which stops and supports the car as it tips over for dumping. There are two stationary guide plates on either side, outside the rails. These plates are of 1x3-in. iron, mounted on longitudinal timbers. Two lengths of 40-lb. T-rail are bent to form horns for engaging the car wheels on each side and just outside the rails, 1x4-in. roller bars are carried by the same plates, which act as spreaders for the rails.

In operation the carriage is held to its proper position by tapered studs which project from the guide plates and engage corresponding holes in the rollers. The force and the angle of the tip is so great that the car is pitched forward until the

hind wheels leave the track, the car balancing on its front wheels.

The dumps are set close up to the switch of the track for empty cars, so that the car on being dumped immediately switches out of the way of the approaching loaded car. The distance of the heel of the rocker from the point of switch is 2 ft. 2 in. and the lead of the switch is 9 ft. 4 in. As much as 6061 tons have been dumped in 10 hours over a device of this sort, and the dump has a capacity of at least 6700 tons when the loaded cars are kept ready on the side track all day long. The approaching grade is 3 per cent.

The mine cars carry a net load of 4704 to 5152 lb. Running to the dump at a good speed, they would jerk the structure considerably were it high or long, so the dumping device should be used only where the structure is low and short.

*Abstract from an article in "Coal Age," Jan. 6, 1912.

†Chicago, Ill.

A New Gold Dredge at Oroville

By LEWIS H. EDDY

Oro Vista No. 1 dredge, installed at Oroville, Calif., by Lawrence Gardella and put into active commission on Jan. 22, is the first new gold dredge in the California fields in 1912. This is the fourth boat built by the Risdon and the Union Iron Works for Mr. Gardella. It was the last dredge designed by the Risdon prior to the taking over of the plant by the Union Iron Works in July, 1911, and was the only uncompleted one on the Risdon books at that time. It is probable that this installation will be the last new boat in the Oroville field of the Feather River district, as the field is now covered with a full complement of dredges necessary to the area remaining to be worked.

SEVERE DIGGING REQUIREMENTS

This is a 5-cu.ft. bucket-elevator Risdon-type dredge designed to dig 35 ft. below the water line in average operation, but equal to a depth of 42 ft. below the water line under extreme conditions and to handle a bank 12 ft. above, making a total depth of 54 ft. The ground which is situated between two sections of the town of Oroville is hard-digging material, necessitating especial strength in design and construction to withstand the severe strains to be encountered. The dredge is equipped with revolving screen, belt conveyor and standard-type gold-saving tables. It is electrically driven, the total power being 200 hp. The yardage capacity is 80,000 cu.yd. per month.

The hull is 108 ft. long, 42 ft. wide, 8 ft. deep; the frames are cut of 8x10-in. timbers extra well braced. All planking is of 4x12-in. lumber; the gantries and housings are made especially strong; all lumber is of the best quality, selected to withstand hard service.

The base and hood of the buckets are cast in one piece of manganese steel; the lip is of manganese steel riveted to the bucket; no other rivets are used in the construction of the bucket. There is no extra thick metal used, although great strength is assured in the design, which is different from any other bucket made. The bucket pins are of high-carbon steel, each pin being subjected to shearing in four places, making them smaller in diameter than for the usual bucket of this size; they are held from turning by a large cross cotter which eliminates expensive forge work and machining. The pins are reversible so that the bucket line does not get badly out of pitch before the pins are worn down; and they are longer than the usual pin for a 5-cu.ft. bucket in order to give the necessary wearing surface.

The digging ladder is of solid-girder type, 78 ft. long, fitted with sluiceway; also equipped with an indicator and automatic device to register the depth below the water line at which the dredge is digging, which is deemed necessary in this ground as it is rich at bedrock. The lower tumbler is six-sided, lined with manganese-steel wearing plates on treads and side flanges; the bearings are watertight, lubricated by compression grease cylinders fitted on the ladder above the water line, thus providing for lubricating without going off the ladder. The upper tumbler is five-sided. It is carried on a steel frame which extends down and forms the dump box or hopper. The hopper is supported by four vertical posts, passing through the steel work, and resting on top of the posts. Two fore-and-aft stringers 12x20 in. extend from the bow to the stern gantry, thoroughly braced in all directions.

The upper-tumbler shaft is 14½ in. diameter in the center; the tumbler center is lined with manganese tread plates. The single driving gear, 12 ft. in diameter, is cast steel; the teeth are double shrouded. The pinion driving the gear is situated forward and below the tumbler shaft; thus the strains of the bucket line and the strains exerted by the pinion in driving the gear counter-balance one another to a great extent. The intermediate gear and pinion are of cast steel and have cut teeth; the usual friction mechanism is attached to the pinion, and is also of cast steel, and has cast-steel shoes lined with friction fiber. All this arrangement is simple as compared with former construction of this character. The main-drive motor is 100 hp., driving with a 16-in. belt, a solid wooden pulley being used on the first countershaft.

RIFFLED COLLECTING BOX BENEATH REVOLVING SCREEN

The revolving screen is 32 ft. long, 6 ft. diameter, fitted with screen plates having ⅜-in. perforations. The screen is driven by friction gearing at the lower end. The gold-saving device is fitted with a steel collecting box or pan set beneath the revolving screen and lined with riffles; 90% of the gold being saved in these riffles. The material then passes to the lower end of the box and runs forward on an inclined sluice where it is divided and passes on to the side tables on both sides of the dredge; all the discharge is at the stern of the boat through the usual side sluice.

The conveyor is 103 ft. long, fitted with a 30-in. belt, and is carried on two 15-in. I-beams. The belt is driven at the upper end by a separate motor. The winches were taken from the L. & J. Gardella dredge; there is one main winch with six drums and one ladder hoist with

one drum; the winches are driven by separate motors situated on the forward port side.

The hopper is an interesting feature of this dredge. The design and construction are such that the hopper always contains sufficient material discharged from the buckets to prevent wearing of the hopper bottom, thus making it self-lining; also the angle of repose always is adjusted to the character of the material handled. Sticky material piles up in a much deeper angle than does clean gravel, the result being that the material slides into the revolving screen easily. In the use of the steel chute heretofore, the material passed into the revolving screen at a considerable velocity and might move half-way down the screen before coming to rest.

Utah Copper Company

The quarterly report of the Utah Copper Co., covering the last quarter of 1911, shows that there was produced a total of 26,818,247 lb. of copper. The production by months was as follows: October, 8,660,729 lb.; November, 9,117,961; December, 9,039,557 lb. The total of 26,818,247 lb. compares with the first three quarters of the year as follows: First quarter, 21,296,709 lb.; second quarter, 24,469,812 lb.; third quarter, 25,851,456 lb. The average monthly production for the last quarter was 8,939,416 lb., comparing with, first quarter, 7,098,903 lb.; second quarter, 8,156,604 lb.; third quarter, 8,617,152 lb. The total production for 1911 was 98,436,224 lb., as compared with 89,019,511 lb. for the preceding year; the average monthly production for 1911 was 8,203,019 lb., compared with 7,418,293 lb. for 1910.

The total quantity of ore treated at both plants for the last quarter was 1,365,910 tons, as compared with 1,273,373 tons for the previous quarter. Of this tonnage the Magna plant handled about 76%, and the Arthur plant about 24%. The average assay of the ore treated during the last quarter is stated as 1.418% copper, as compared with 1.483% for the previous quarter. It is further stated that the low grade of the ore treated during the fourth quarter is due to the fact that the shovels on some of the intermediate stripping levels encountered ores that were more or less mixed with capping, some of which was unavoidably included in the ore. This difficulty is expected to be experienced for some months to come, or until it is possible to remove all of the capping from a considerable portion of the orebody on some of these intermediate levels. About 73% of the total ore treated during the quarter was mined by steam shovels, and about 27% came from underground mining operations.

After making allowances for smeltery deductions, and without crediting miscellaneous income, the average cost per pound of net copper produced during the fourth quarter is stated as 7.85c., as compared with 7.56c. for the third quarter of 1911. It is stated that this increase in cost per pound is accounted for by the decrease in the average assay value of the ore, and the increased cost of operations during the winter months. The financial results of the last quarter's operations are given as follows: Net profits from milling operations, \$1,475,680; additional income from rent and miscellaneous sources in Utah, \$86,896; income from Nevada Consolidated Copper Co.'s dividends, \$375,187; income from Bingham & Garfield Ry. Co.'s dividends, \$220,000; total net profit for quarter, \$2,157,764; dividends paid, \$1,177,011; leaving \$980,752 as net surplus for the quarter. It is stated that these earnings are computed on the basis of 13.642c. per lb. for copper. At the end of the quarter no copper due for delivery from the refinery remained unsold. The \$220,000 income from the Bingham & Garfield Ry. Co.'s dividends does not represent the earnings of the railway company merely during the quarter, but includes trackage rentals for the year.

SEVENTH SECTION OF ARTHUR MILL STARTED

The entire Magna plant was operated throughout the quarter, but its capacity was reduced considerably below the normal of 12,000 tons per day during November and December, because of winter-weather conditions, which were especially severe. In the latter part of October, the sixth remodeled section of the Arthur plant was placed in commission, and since then the six sections have been in full operation. About the middle of January, the seventh section was completed and placed in operation. It is stated that the operations of the Arthur plant indicate that when all the 13 sections have been remodeled, the capacity of the plant will be at least 8000 tons per day. During the last quarter a total of 1,520,058 cu.yd. of capping was removed from both the Utah and Boston groups, as compared with 1,595,095 cu.yd. for the third quarter. This decrease was also due to winter-weather conditions.

The Bingham & Garfield Ry. is stated to have done a profitable business during the quarter and no difficulties were experienced in its operation. An average of 7275 tons of ore per day was hauled from the mines to the mills, and this was done with only two road engines and 120 cars in service. Additional equipment was purchased for the increase in business on this railway during 1912. Orders were placed for a third Mallet compound locomotive, two switching locomotives and 130 additional ore cars. When these have been received, there will be three Mallet

compound locomotives, four switching locomotives and 250 ore cars in the total equipment.

Pig Iron Production in 1911

The completed statement of the American Iron & Steel Association shows that the total production of pig iron in the United States in 1911 was 23,649,344 long tons; a decrease from 1910 of 3,654,223 tons, or 13.3 per cent. The production for the second half of the year was 11,982,348 tons, being 315,352 tons more than in the first half. In 1910 there were 14,978,738 tons made in the first half and 12,324,829 tons in the second half of the year.

CLASSIFICATION OF IRON

The classification according to uses for which the iron was intended is as follows:

	1910		1911	
	Tons	PerCt.	Tons	PerCt.
Foundry & forge	6,352,379	23.3	5,256,815	22.2
Bessemer pig	11,245,642	41.2	9,409,107	39.8
Basic pig	9,084,608	39.2	8,520,029	36.0
Charcoal	396,507	1.5	278,676	1.2
Spiegel and ferro	224,431	0.8	184,717	0.8
Total	27,303,567	100.0	23,649,344	100.0

Included in the bessemer pig in 1911 is 282,460 tons special low-phosphorus iron. This was 23,383 tons more than in 1910, and was the only increase in any class of iron, except ferromanganese. The make of ferromanganese in 1911 was 74,482 tons, or 3106 tons more than in 1910. Spiegeleisen decreased, however, the production in 1911 being 110,235 tons, or 42,820 tons less than in the previous year. Included in charcoal iron are small quantities of pig iron and of ferro-phosphorus, ferrotitanium, ferrovandium and other alloys made in the electric furnace.

The notable point in the classification is the decrease in the proportion of bessemer pig and the increase in basic iron. The production of bessemer pig showed a decrease of 16.3 per cent., as compared with 1910, but the loss in basic was only 6.2 per cent. The proportion of forge and foundry also decreased, the loss being chiefly in forge iron.

FUELS USED

The production according to fuels used was as follows:

	1910	1911	Changes
Coke	26,257,978	23,141,093	D. 3,116,885
Anthracite & coke	628,579	212,548	D. 416,031
Anthracite	20,503	17,027	D. 3,476
Charcoal	396,507	278,676	D. 117,831
Total	27,303,567	23,649,344	D. 3,654,223

Raw bituminous coal is used by only two or three small furnaces; they are included under coke. The very large decrease in anthracite iron is due to the fact that the furnaces using that fuel are chiefly merchant stacks in eastern Pennsylvania which can compete profitably with the Central West and the South only when prices are at a comparatively high

level; and they are, therefore, usually the first to quit in slack times.

NUMBER OF FURNACES

The whole number of furnaces in blast on Dec. 31, 1911, was 231, against 212 on June 30, 1911, and 206 on Dec. 31, 1910. The number of furnaces idle on Dec. 31, 1911, including furnaces being rebuilt, was 235, against 261 on June 30, 1911, and 268 on Dec. 31, 1910. During the last six months of 1911 the number of furnaces actually in blast during a part or the whole of the period was 275, against 297 in the first half of the year. In the last half of 1910 332 were active, against 374 in the first half.

PRODUCTION BY STATES

The production by states for two years has been, in long tons:

	1910	1911
Massachusetts and Connecticut	16,582	9,649
New York	1,938,407	1,562,756
New Jersey	264,781	40,663
Pennsylvania	11,272,323	9,806,834
Maryland	326,214	255,816
Virginia	444,976	293,642
Georgia and Texas	14,725	1,200
Alabama	1,939,147	1,712,443
West Virginia	174,661	291,472
Kentucky	100,509	95,202
Tennessee	397,569	324,648
Ohio	5,752,112	5,310,310
Illinois	2,675,646	2,108,002
Indiana and Michigan	1,250,103	1,163,932
Wisconsin and Minn.	307,200	276,807
West of the Mississippi	428,612	395,968
Total	27,303,567	23,649,344

The producing states west of the Mississippi are Missouri, Colorado, Washington and California. In 1911 Pennsylvania remained the leading state, making 41.5 per cent. of the total. It was followed in order by Ohio, Illinois, Alabama and New York.

PRODUCTION FOR TEN YEARS

The make of pig iron in the United States for 10 years has been, in long tons:

1902	17,821,307	1907	25,781,381
1903	18,009,259	1908	15,936,108
1904	16,497,003	1909	25,795,471
1905	22,992,380	1910	27,303,567
1906	25,307,191	1911	23,649,344

The production in 1911 was greater than that of any year prior to 1906; but it was exceeded in every year since that, except in the disastrous period of 1908. The consumption of pig iron in 1910 and 1911, however, did not differ widely. While exact figures on this point are not to be had, the closest possible estimate puts the stocks of unsold or unused pig iron in makers' hands at the close of 1910 at 2,100,000 tons, an increase of 1,700,000 tons during that year. In 1911 these stocks were decreased by something like 1,250,000 tons, standing at about 850,000 tons at the end of the year. From the decrease in production, therefore, the decrease in stocks must be subtracted to get at the real diminution in the quantity of iron used.

The Sitka District, Alaska

WASHINGTON CORRESPONDENCE

The U. S. Geological Survey prepared a study of the Sitka mining district, Alaska, by Adolph Knopf and transmitted it to the House of Representatives where it has been published (H. R. Doc. 183, 62d Congress, 2d session).

The main points with relation to the ore deposits are as follows:

The known mineral resources of the Sitka mining district are gold and gypsum. To these granite may, perhaps, be added as a possible undeveloped resource. The gold is found in quartz lodes, which commonly occupy shear zones in graywacke. Two properties, both situated at Klag Bay, on the coast of Chichagof Island, have so far been put on a productive basis and give strong promise of a prosperous career. The ores, which range in value from \$15 to \$90 per ton, are of considerably higher grade than the average ore of southeastern Alaska. A large number of orebodies of the same general character have long been known to occur near Sitka, but owing to the low-grade ores contained in them none have yet been brought to a producing stage.

The orebodies of the region show neither in their mode of occurrence or origin any obvious or immediate relation to contacts of dissimilar rocks, to dikes, or to other igneous rocks. The principal mineral belt appears to lie along the edge of the slate-graywacke formation bordering the band of metamorphic rocks that flank the diorite occurring in the central portion of the islands. The better known ore deposits are found in graywacke, but this is doubtless a fact of no essential significance and should not deter the prospector from searching in other kinds of rocks. . . . That a favorable set of conditions is most likely to be found in the zones that border the long belts of granitic rocks traversing the region is maintained in this report. The indications afforded by present developments point strongly to the conclusion that the entire strip of territory contiguous to the west coast of Chichagof Island offers a more encouraging inducement to the search for new orebodies than any other part of the region.

Portland Cement in 1911

A preliminary estimate of the district production of portland cement in 1911 has been issued by the U. S. Geological Survey. It divides the producers into groups, the basis of which is the trade territory covered by each group. To a certain degree this results in basing the grouping of plants on the raw material used. For instance, plants in northeastern Indiana using marl are grouped with the Michigan plants. The plants in southern Indiana and northern Kentucky using hard limestone are grouped together. All the plants near Chicago, whether in Illinois or Indiana, are put together because of their nearly equal freight rates. The southeastern States, in which the plants use mostly Appalachian limestone, are grouped together and Texas has been

transferred to the group of Great Plains states with which it logically belongs.

By territories the production is given as follows: Eastern Pennsylvania and New Jersey (Lehigh district), 25,924,516 barrels; New York, 3,314,217; Ohio and western Pennsylvania, 6,675,249; Michigan and northeastern Indiana, 4,570,033; Kentucky and southern Indiana, 2,818,820; Illinois and northwestern Indiana, 8,617,341; southeastern States, 4,500,001; Iowa and Missouri, 6,060,261; Great Plains states, 6,904,468; the Mountain states, 2,117,930; Pacific Coast, 6,860,400; a total of 77,877,236 bbl. This, as may be seen, is only a small increase over the 1910 figures, and indeed the Survey states that when the absolute returns are in for 1911 it may be that they will show a slight falling off from the 1910 figures.

Aluminum Dust Explosions

The question of explosions of aluminum dust has been investigated extensively. According to R. J. Zink (*Chem. Zeit.*, 1911, p. 1370; abstr. in *Journ. Soc. Chem. Ind.*, Jan. 15, 1912, p. 30), aluminum dust alone is not explosive, but becomes so in presence of a quantity of an inflammable gas, corresponding to about one-third of the lower limit of inflammability of the gas. In the case of explosions in aluminum-bronze factories, the presence of the inflammable gas was attributed to the decomposition of water by the aluminum powder or by electrical discharges produced in the machinery. The ignition of the mixture of dust and gas was attributed to electrical sparks produced in the machinery. The author states, however, that even if the aluminum powder be carefully dried, explosions cannot be entirely prevented, and he considers that a more probable source of inflammable gas is the presence of a small quantity of aluminum carbide in the aluminum powder; this might escape complete decomposition in the preliminary working up of the metal, owing to a protective film of alumina, but the latter would be gradually removed in the polishing mill. From 10 kg. of aluminum containing 0.1 per cent. of aluminum carbide and only about 0.15 per cent. of moisture, 4.8 liters of methane would be produced, or sufficient to form 160 liters of an inflammable mixture of dust and gas. Since, at present, it appears impossible to prevent electrical phenomena in the machinery, it is necessary to provide means to minimize the danger arising from the explosions, and the author suggests that in addition to the rules formulated by the *Suddensch. Edel- und Unedelmetall-Berufsgenossenschaft für die Herstellung von Aluminium in Pulver* the mill should be closed dust tight by a plate of a material (plaster, earthenware, etc.) permeable to gases, but not opposing any considerable re-

sistance to an explosion. By this means the explosion would be propagated, as in the firing of a cannon, mainly in one direction, i. e., into the open air, and risk of injury to workpeople and to other machinery considerably lessened.

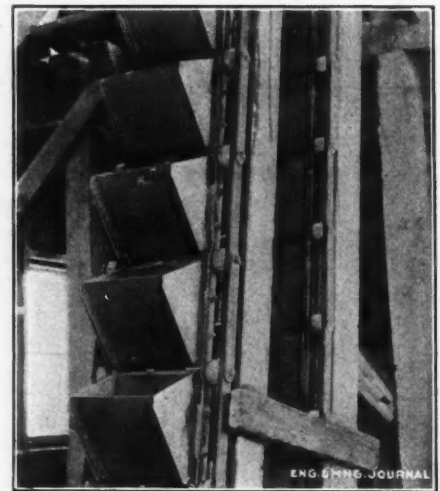
Link-Belt Elevators

BY BENEDICT SHUBART*

The subject of conveying and elevating machinery is of importance in milling operations but is not always given the consideration it deserves when a mill is being designed. Too often the time-honored rubber-belt elevator is installed without regard to conditions, in the mistaken belief that long usage has established this form as the best to be had.

After 15 years' experience in designing, constructing and handling elevators, I am convinced that in nine cases out of ten more economical operation and more satisfactory service can be obtained from other types of elevators.

In the selection of an elevator several



LINK-BELT ELEVATOR AT STRATTON'S INDEPENDENCE

points should be considered: the character of the ore to be handled, whether dry, wet, sticky or freely discharged; size of the product; capacity and length of service desired. Naturally no one type of elevator will serve all these different conditions. I shall confine this article to a description of an elevator for handling dry ore crushed to 5 in. or less.

After unsatisfactory experience with various types of elevators for handling abrasive material, the engineer who designed the United States Portland Cement Co.'s plant at Concrete, Colo., decided to take a radical step and in connection with the engineers of the Link-Belt Co., developed a continuous bucket elevator mounted on two strands of heavy bushed steel roller chain. These elevators were massive and slow moving, running only about 60 ft. per min., and

*Boston Building, Denver, Colo.

were set as near vertical as possible. In point of reliability and low maintenance costs, the results were so thoroughly good that when Phillip Argall designed the plant of Stratton's Independence, Ltd., he decided to install four Link-Belt Co. continuous-bucket, slow-moving elevators of the following specifications: 18x18x12-in. buckets mounted on two strands of $\frac{3}{8}$ x3x18-in. bushed steel chain with 5-in. inclosed oiling rollers at the articulation; speed, 60-ft. per min.; no boot used, the feed spouting directly into the buckets; head gearing of the Link-Belt equalizing gear type.

These elevators have been in use for four years and the supplies so far purchased consist of eight head sprockets, a pair for each of the four elevators, at a total cost of approximately \$150. So far as known, the elevators have never broken down and have been substantially free from any operating trouble. A similar elevator was subsequently installed at the Portland mill, replacing a different type of elevator.

inches below a point established by striking a 45 deg. line through the center of the headshaft.

The capacity of the above elevators at a speed of 100 ft. per min., is 150 tons of rock per hour. The power consumption based on 50-ft. centers is not in excess of 15 hp. In comparison with a properly designed belt elevator of the same capacity, the cost is but little more. A 50-ft. elevator complete with chain line, head and foot gearing, and steel guards, will cost approximately \$850 at the works. The design of this elevator and its appearance after four years' service are plainly shown in the accompanying cuts which were taken at Stratton's Independence.

Giroux Consolidated

At the Giroux shaft, water is being hoisted by bailers to the 1200-ft. station sump and thence to surface by the 1200-gal. pump. The submerged

are fully developed in the Bunker Hill mine. There is also said to be an estimated tonnage of 10,291,000 tons of 2% and 6,600,000 tons of 1.65% copper ore fully and partially developed. The Alpha shaft is said to have enough ore in sight to meet all cost of equipment and machinery for this shaft. It is stated that the company expects to produce copper for 9½c. per pound.

The Flameless Combustion of Gas

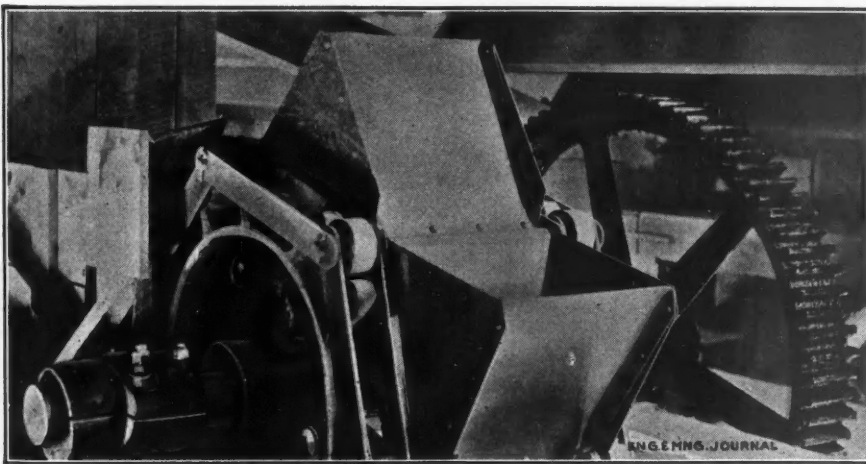
The article published under the above caption in the JOURNAL, Jan. 20, 1912, was taken, almost without excision, from Prof. Bone's lecture, delivered at the annual convention of the American Gas Institute at St. Louis, Mo. The introductory paragraphs, in which a brief review of the work of other investigators, as well as the theoretical aspects of "surface combustion" were stated, were omitted purposely to emphasize the fact that Prof. Bone had made his initial practical application of the results of his investigations.

In these introductory paragraphs, Prof. Bone says:

The influence of hot surfaces upon combustion at low temperatures seems to have occupied the attention of several chemists (Dulong and Thénard, and, independently, Döbereiner in France, Sir Humphrey Davy, William Henry, Thomas Graham, Faraday and de la Rive in England) during the first third of the last century, but no one of these distinguished men succeeded in evolving a satisfactory theory of the phenomenon, nor, with the exception of the famous "Döbereiner Lamp," was there any practical outcome of their efforts. In 1836, after a long and abortive controversy between Faraday and de la Rive, interest in the subject dropped and was not revived again until recent years.

Having said in a previous paragraph that Frederick Siemens believed that hot surfaces, by promoting dissociation, must necessarily hinder combustion, Prof. Bone goes on to say how he became interested in surface combustion and how he finally became convinced, through his own investigations, that Siemens was wrong and that hot surfaces really accelerated combustion to a marked degree. The rest of the paper elucidates this theory, then passes on to the experiments in applying practically the principles that had been worked out in the laboratory. He laid no claim to having made a new discovery, other than disproving Siemens' hypothesis.

An editorial comment of Bone's work in the *Journal of Industrial and Engineering Chemistry* for February, calls attention to experiments in burning explosive mixtures of gas, made by C. E. Lucke, at Columbia University, in 1900, the results of which were published in a paper entitled "The Heat-Engine Problem," presented to the American Society



DISCHARGE OF LINK-BELT ELEVATOR, STRATTON'S INDEPENDENCE MILL

In designing an elevator of this type, the first consideration is absolute rigidity between the buckets and the chain. The chains must be heavy enough and the buckets made of sufficiently heavy material so that there can be no weaving of the various parts constituting the bucket line. The elevator must move slowly, not over 100 ft. per min. The rollers at the articulations must be large and must be so designed that the oiling is certain. The sprockets at the head end should be of the flint-rim type and equalizing gears should be used to prevent the pulsation due to the operation of a long-pitch chain. The elevators should be set vertically or as near so as possible. There should be no boot but the feed should go directly into the buckets, feeding in at a height about two buckets above the center of the footshaft. The discharge spout should be at an angle of not less than 45 deg., should clear the buckets about one inch, and should be set at a point six

station pump at the 1400-ft. level was started with air but is working inefficiently. This is believed to be due to worn packing and to exhausting under a head of from 50 to 75 ft. of water in the shaft. On surface at the Morris shaft excavating is in progress for a railroad spur, which will run close to the shaft but at an elevation about 30 ft. lower. This difference in elevation will be utilized by constructing large orebins with the top at the elevation of the shaft collar. About 60 days will probably be required to finish the excavating.

Dispatches from Duluth state that the directors were re-elected at the annual meeting, Feb. 6. The annual report shows a balance of \$180,000 in cash and bonds. A 5-year contract has been made with the Steptoe smeltery, at McGill, Nev., effective May 1, which provides for minimum shipments of 900 and maximum of 1200 tons per day. It is stated that over 4,000,000 tons of 2.14% porphyry ore

of Mechanical Engineers, in December, 1901, and which formed part of his "Doctor's Dissertation." Two patents were taken out by Lucke, and in the illustrations apparatus practically identical with that designed by Bone is shown. The only notable difference is that Bone also used a diaphragm of porous material, as well as broken refractory substances.

Whether or not Lucke's work antedated Bone's, or whether Bone was cognizant of his contemporary's work, does not in the least detract from the credit due him. It may be only one of many instances where two investigators have quite independently arrived at the same results. In this day and generation, it is not sufficient to enunciate a scientific principle, no matter how widely it may be published. The investigator is expected to follow up the principle, and develop from it something that can be of use to the world. He should go still farther and make the world want and use it. Prof. Bone has already made the first practical application of the principle, and is now at work solving the many difficult problems that always arise when the results of scientific investigation are put into commercial form. For this he is justly entitled to all the rewards of his labors that he can get.

Mining Explosives Used in Great Britain

The accompanying tables¹ show the explosives used in Great Britain in the year 1910.

TABLE I. PERMITTED EXPLOSIVES

Name of Explosives	Quantity Used, Lb.	Name of Explosives	Quantity Used, Lb.
Bobbinite...	1,128,926	Swalite....	117,561
Samsonite..	1,071,143	Permonite..	116,277
Monobel powder...	706,295	Negro powder....	90,958
Arkite.....	687,393	St. Helens powder....	90,017
Ammonite..	621,801	Celtite.....	78,274
Rippite....	540,354	Stomonal....	63,277
Westfalite.	461,330	Oaklite.....	50,389
Bellite....	448,952	Fracturite....	48,624
Roburite..	446,120	Steelite....	44,032
Carbonite..	322,910	Amvis.....	29,616
Ammonal..	257,776	Dominite....	27,246
Stowite....	214,222	Tutol.....	25,142
Faversham powder...	177,949	Kolax.....	22,865
Excellite..	177,582	Minite.....	18,586
Rexite.....	173,095	Normanite..	10,576
Abbcite....	169,575	All others...	21,064
Cornish powder...	147,955	Total....	8,607,882

TABLE II. ALL EXPLCSIVES

Name of Explosive	Quantity Used, Lb.
Permitted explosives, as in Table I	8,607,882
Gunpowder.....	17,664,483
Gelignite.....	3,039,256
Gelignite dynamite.....	494,560
Blasting gelatin.....	257,756
Blastine.....	165,456
Cheddite.....	123,584
Saxonite.....	118,886
All others.....	66,258
Total.....	30,538,121

¹Mines and Quarries Report for 1910, Part II.

The Experiment Station Bill

The text of the bill introduced in Congress by Mr. Martin, of South Dakota, proposing the establishment of mining experiment stations, is published herewith substantially in full. It is diverting reading, and a glance through it will immediately call to mind a multiplicity of problems the government will have to face when it starts to deal with its citizens' individual commercial problems.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that there be . . . established in each of the states and territories which are known to contain natural deposits of the precious metals in commercial quantities, when in the judgment of the Secretary of the Interior it will subserve and promote the development of the mineral resources of the United States and will tend to carry out the purposes and objects of this act, a mining experiment station. The said mining experiment stations and the supervision, management, and control thereof shall be under the direction of the Secretary of the Interior.

Sec. 2. That the Secretary of the Interior be authorized . . . to appoint at each mining-experiment station . . . one expert geologist, at a salary of \$3000 per annum; also one competent and experienced chemist, at a salary of \$2000 per annum. And the Secretary of the Interior is hereby authorized to expend a sum not to exceed \$5000 in establishing, equipping and maintaining each of said experiment stations.

Sec. 3. That it shall be the duty of such geologist and chemist appointed under this act to receive for assay and analysis all rock, cement, clay, or other mineral-bearing substance that may be deposited with them by any citizen of the United States and make a proper classification or assay of each sample . . . for the purpose of ascertaining the exact amount of gold, cinnabar, silver, copper, wolfram, tin, or any other mineral known for its value in the arts and sciences or used in commercial transactions, and to furnish, at a nominal charge, to be regulated by the Secretary of the Interior, to each depositor of rock, cement, clay, or other mineral-bearing substance, a full assay or analysis, showing the quantity and quality of each and every mineral found in said rock, cement, clay, or other mineral-bearing substance so examined by them.

That the person depositing such sample shall at the time of making such deposit make oath before any person authorized by law to administer oaths, stating the place from which such sample was taken and by whom taken, and in addition said chemist and geologist shall be each of them authorized and empowered to administer such oath; and the making of any false oath as to the facts set forth in said affidavit shall constitute perjury. . . .

Sec. 4. That the said geologist and chemist at each station shall keep an accurate record of each and every mineral found in said rock, cement, clay, or other mineral-bearing substance, the name of the party depositing the same, with his postoffice address, and also the particular place where such rock, cement, clay, or other mineral-bearing substance was found; and they shall keep this information secret from all

persons except the depositor for a period of 15 days after the delivery to such depositor of the assay or analysis of rock, cement, clay, or other mineral-bearing substance so deposited by them. Each office shall have a public bulletin board therein, on which shall be posted, at the end of the 15 days hereinbefore mentioned, a full description of their assay or analysis of the rock, cement, clay, or other mineral-bearing substance hereinbefore mentioned, and the names of depositors of each lot of rock, cement, clay, or other mineral-bearing substance, and the location in which it was found.

Sec. 5. That at the end of each calendar month each geologist and chemist shall send a full report to the Department of the Interior, to be used for the benefit of the public.

Sec. 6. That the said geologist, when not necessarily engaged in his office duties as herein provided, shall personally explore and carefully examine the mineral regions within his jurisdiction, and especially at points of new and recent discovery, and make full and careful report of such explorations and examinations at such times and in such manner as may be required and directed by the Secretary of the Interior, and he shall be allowed his actual and necessary expenses while so engaged.

Diamonds in the Belgian Congo

In Sydney H. Ball's article, "Diamonds in the Belgian Congo," in the JOURNAL of Feb. 3, 1912, the subhead inserted to summarize the geologic formation in the Congo basin read: "Jura-triassic Sandstones Cut by Basic Pre-cambrian Intrusions." The word "Pre-cambrian" should have been omitted, the heading not having been submitted to Mr. Ball, and the obvious geologic anachronism having escaped editorial scrutiny. The facts are that the Jura-triassic sandstone was laid down on a basement of micaceous schists, quartzite, and granitic and basic igneous gneisses, intruded by granites, diabases and gabbros. This basement, presumably of Pre-cambrian age, had been planed down to an almost level surface, from which a few low ridges protruded, when the Jura-triassic sandstone was deposited. To quote Mr. Ball, the diamonds found along the Kasai River "may possibly have originated from one of the basic igneous rocks of the Pre-cambrian-like series, or they may have once formed pebbles in the flat-lying sandstones. It is believed more probable, however, that they will be found in basic intrusive masses which cut the Jura-triassic sandstone."

Mining in Great Britain in 1911

The copper-ore output of Great Britain in 1911 was about 4500 tons. Mr. Skewes writes that owing to a clerical error, the production was given as 46,500 tons in the article, "Mining in Great Britain in 1911," published in the JOURNAL of Jan. 13, 1912.

Stratton's Independence Mill

By T. C. Linderfelt
and James K. Stewart*

Concentration followed by cyanidation is employed in treating the low-grade dump material. The product of rolls and chilean mills is classified and treated as sand and slime.

*Mining engineers, Box 148, Victor, Colo.

The mill of Stratton's Independence Ltd. in the Cripple Creek district, was designed and constructed in 1907 by Philip Argall. The old ore-house dump was extensively sampled by a series of small shafts sunk through the dump to the surface of the ground. It was found to run from \$2.70 to \$3 in gold. The mill was then built to handle this dump and the ore from the mine, but after the construction of the mill, the ore reserves in the mine were found to be less extensive than at first supposed. The mill was at first equipped with an Edwards duplex roaster and five grinding and amalgamating pans, but these were discarded as unnecessary for the treatment of the low-grade dump material.

The crushers are in a separate building, which is situated to the west of the main building. The rest of the plant is in two working units, the concentration and the cyanidation departments. The cyanidation department for some reason is situated above the concentration department. This is probably due to the fact that experiments proving that concentration was more efficient than roasting, the roasting department was discarded and the concentration department erected.

The foundations and retaining walls are of reinforced concrete; the framework is of wood, 10x10-in. and 12x12-in. timbers being used; all splices are butt joints, secured by 2-in. planking and 1-in. bolts. The framework is housed with 1-in. sheeting, covered with rubberoid building paper.

TWO GATES CRUSHERS USED.

The dump ore is handled by a Thew electric shovel, with a capacity of 1 cu.ft. which loads the rock into two four-ton cars, drawn up an inclined double track by an electric hoist. The ore is delivered directly to a 7½ D Gates gyratory crusher, which cuts to a 4-in. product. From here it passes over grizzlies to a 24-in., 6-ply, belt conveyor, 20 ft. between centers, and is fed to a 5 K Gates gyratory crusher, which cuts to a 2½-in. product. The machinery in the crusher department is driven by a 100-hp. motor. The entire product from the second crusher and the grizzlies is carried by an 18-in. belt conveyor, 250 ft. between centers, driven by a 20-hp. motor, to a cone-bottomed, steel storage tank with a capacity of 150 tons.

The ore is fed by an automatic disk feed to an 18-in. all-steel, bucket elevator 30 ft. between centers, and is delivered to a set of 16x36-in. Allis-Chalmers rolls, which cuts to a 1-in. pro-

duct. It is then conveyed up an incline by a 16-in. belt conveyor, 25 ft. between centers, to a similar set of rolls, and is cut to a ¼-in. product. It is then dropped to a 16-in. belt conveyor, 60 ft. between centers. An all-steel bucket elevator, 60 ft. between centers, delivers it to a belt distributor, 35 ft. each way from the elevator, which feeds four 25-ton steel hoppers. This machinery is all driven by a 50-hp. motor.

A reciprocating feed delivers the ore to four Akron 6-ft. chilean mills, driven by two 100-hp. motors. These mills grind to about 12 mesh. The screen analysis of the chilean mill product is as follows: On 30 mesh, 5%; on 50, 14%; on 100, 19%; on 150, 4%; through 150, 58 per cent.

The product from the chilean mills goes to two triplex screw classifiers, 15-in.x15-ft., driven at the rate of 9 r.p.m. by the same power as the chilean mills. The screen analyses of the classifiers follow: Sand—on 30, 60%; on 50, 10%; on 100, 6%; on 150, 4%; through 150, 20%. Slime—on 30, 0%; on 50, 4%; on 100, 12%; in 150, 8%; through 150, 76 per cent.

CONCENTRATION DEPARTMENT

In the concentration department, there are 21 Card tables, 4 Frue vanners, 13 No. 3 Deister slime tables and 1 No. 2 Deister sand table. The sand from the classifiers below the chilean mills is fed to 20 Card tables. The tailing from these tables goes directly to a sump and is pumped through a 6-in. feed line to the cyanide department. The first-grade concentrate, assaying between 5 and 6 oz. in gold, is taken directly to the ore bin, from which it is loaded into railroad cars. The second-grade concentrate flows to a 2-in. centrifugal pump and is fed to Nos. 1, 2 and 14 Deister tables, No. 1 vanner and No. 10 Card table. The tailing from these five tables goes to a 2-in. centrifugal pump and is thrown to a duplex

screw classifier. This classifier receives its power from the chilean mill motor.

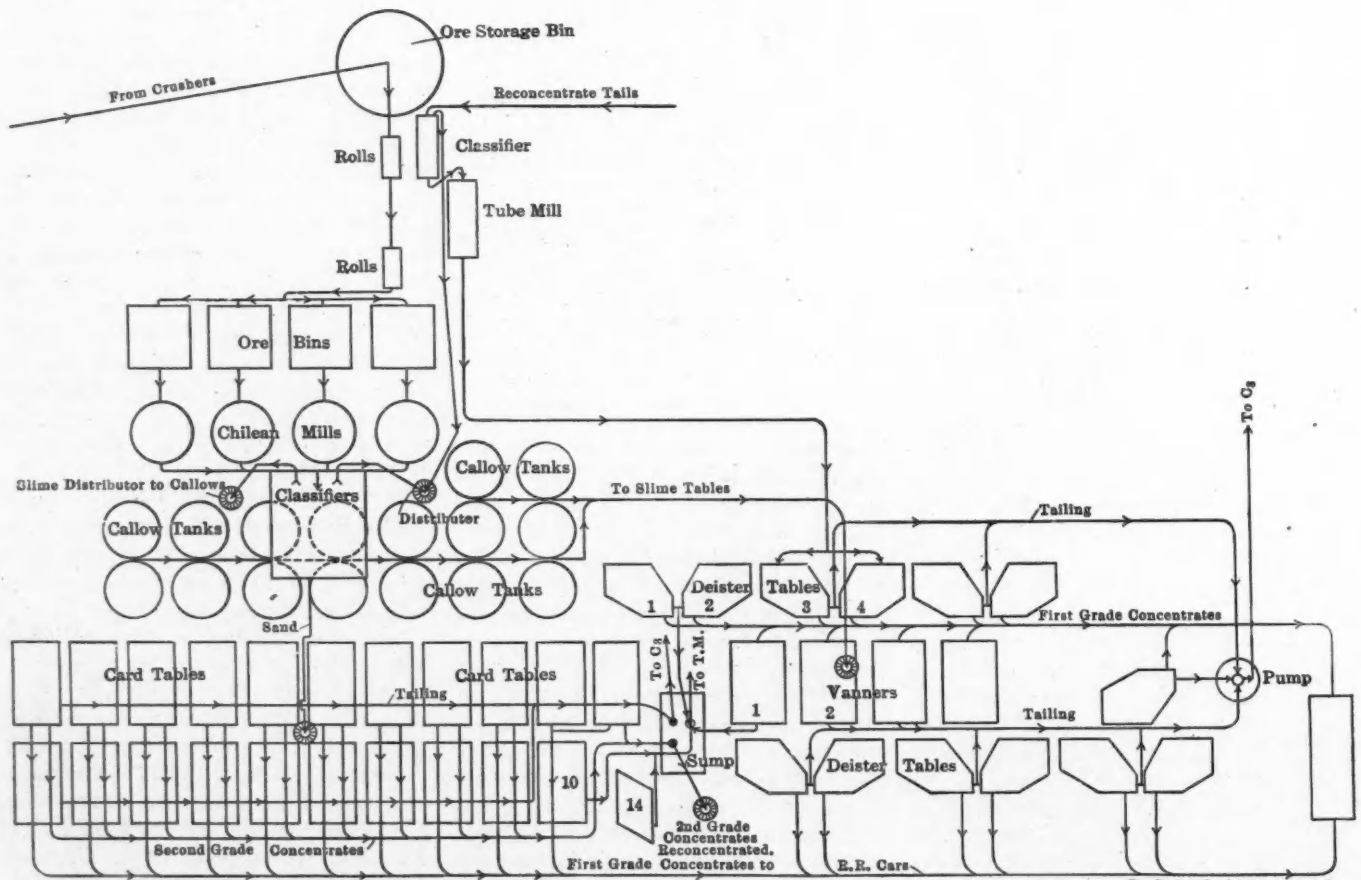
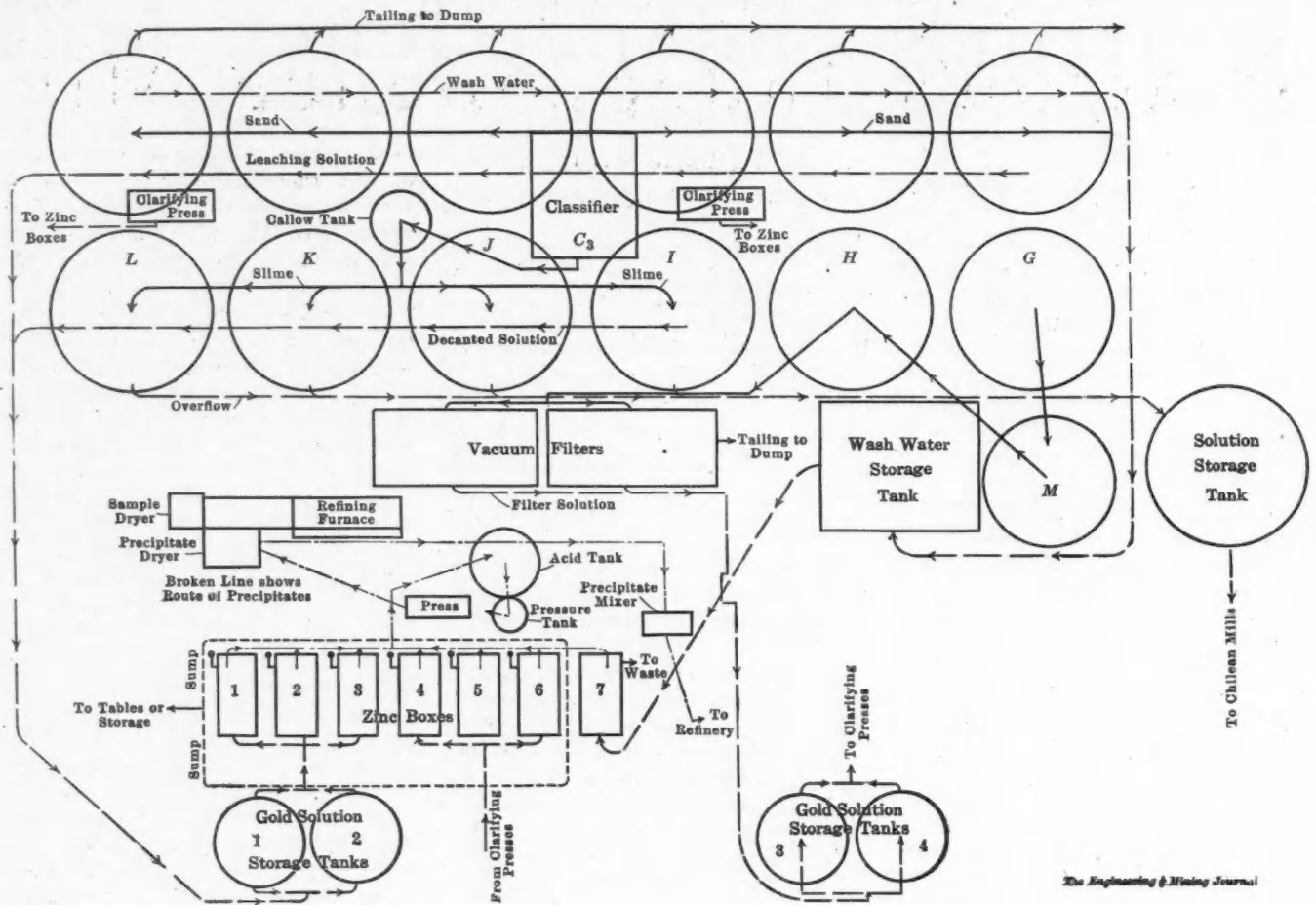
The screen analyses of the products of this classifier are: Sand,—on 30, 42%; on 50, 12%; on 100, 18%; on 150, 8%; through 150, 20%. Slime,—on 30, 0%; on 50, 4%; on 100, 6%; on 150, 14%; through 150, 76 %. Slime from this classifier goes to Callow tanks, while the sand feeds a 5x15-ft. spiral-feed tube mill, making 30 r.p.m. and driven by a 25-hp. motor. The screen analysis of the tube-mill feed is: on 30, 18%; on 50, 21%; on 100, 20%; on 150, 4%; through 150, 37%. The tube-mill discharge analysis: on 30, 0%; on 50, 0%; on 100, 8%; on 150, 4%; through 150, 88%. The feed has 60% of solids.

The discharge from the tube mill is fed to Nos. 3 and 4 Deister tables. The slime from the chilean-mill classifier is delivered to the 16 Callow tanks. The settlings go with the sand from the chilean mill classifier to 20 Card tables, while the decanted slime flows to a cylindrical distributor which feeds the vanners and Deisters. The tailing from the slime tables goes to a 4-in. centrifugal pump, driven by a 25-hp. motor and is elevated to the cyanide department. All the tables in this department are run by a 30-hp. motor on the chilean mill floor.

CYANIDE DEPARTMENT

In the cyanide department there are: 6 wooden leaching tanks, 6 cone-bottomed settling tanks, 1 Pachuca tank, 2 clarifying presses, a "dope" room, 2 vacuum filters of Butters type and 7 zinc boxes. The table tailings are delivered to two sets of Argall classifiers 15 in.x15 ft. The screen analyses of the products of these classifiers are: Sand,—on 30, 70%; on 50, 4%; on 100, 6%; on 150, 14%; through 150, 6%. Slime,—on 30, 0%; on 50, 4%; on 100, 4%; on 150, 12%; through 150, 80%. The sand from these classifiers is delivered directly to a 16-in reciprocating conveyor, 125 ft. long, driven by a 25-hp. motor. The sand is deposited into the six leaching tanks, equipped with four Argall discharge gates. These tanks have a capacity of 175 tons of water or 325 tons of sand each.

The leaching extends over a period of 120 hours. The tanks are filled with leaching solution intermittently every three hours. This solution is drained off at the end of this time and goes directly to zinc boxes Nos. 1, 2 and 3. The washing requires 24 hours, the tanks being filled intermittently every three hours; the wash water going to a discarded Argall filter used as a storage tank, which feeds No. 7 zinc box. The dis-



PLAN AND FLOW SHEET OF CONCENTRATING MILL AND CYANIDE PLANT, STRATTON'S INDEPENDENCE, LTD.

charge from this zinc box is allowed to go to waste.

SLIME TREATMENT

The slime is fed continually from the cyanide-department classifier to a Callow tank. The settlings from this Callow tank flow through a 2-in. line to the classifier which feeds the tube mill. The slime overflow goes to four cone-bottomed settling tanks, I, J, K, L, which have a capacity of 226 tons of solution each. The overflow from these tanks runs clear for about three hours after a charge has been pumped, the remainder of the charge time it runs about a 20 to 1 slime, to a storage tank of 300 tons capacity on the east side of the building. The thickened pulp from these cone tanks, which has a specific gravity of 1.275, is pumped by a 4-in. centrifugal pump, driven by a 20 hp. motor, into an agitating tank, G.

About 3 ft. of the slime from each of the cone settlers is pumped into this tank once every 12 hours. Seventy-five lb. of NaCN are added every 24 hours at this point and the tank is kept in agitation by means of air from the mill compressor. From this tank, the slime is pumped to a modified Pachuca tank, M, 15x40 ft. which has a capacity of 230 tons.

The slime is agitated for eight hours with air, the bromocyanide solution is added, and the pulp agitated for two hours by pumping in a closed circuit. The pump is then shut down and agitation is renewed with air for the remaining two hours of treatment. The charge is then pumped to a cone-bottomed tank, H, having a capacity of 226 tons, which feeds the filters. The time of charging and treatment is 12 hours.

The bromocyanide mixture, known as "dope," is prepared in a tank of about one-ton capacity, and is mechanically agitated by power received from the sand-conveyor motor. This tank is filled with 36 in. of water and 45 lb. of commercial H_2SO_4 , 25 lb. of NaCN and 45 lb. of "mining salts" ($2KBr + KBrO_3$). The reaction is: $4KBr + 2KBrO_3 + 6H_2SO_4 + 6NaCN = 6BrCN + 3K_2SO_4 + 3Na_2SO_4 + 6H_2O$. Four hours after this solution is added to the pulp all the bromocyanide is consumed. It is necessary to agitate with the pump for two hours and then with air for two hours, for if the air were used first, it would carry out all the bromine, break up the bromocyanide and cause a large loss of cyanogen. The use of bromine requires experience and skill, otherwise the loss of cyanogen is large and poor results follow. The reason for this is that the bromocyanide will oxidize into certain impure compounds and cyanogen is set free more rapidly than the gold will combine with it.

VACUUM FILTERS USED

The filters used are of the Butters type, having 56 leaves and a filtering surface of 678,088 sq.in. per filter. They are connected to a dry-vacuum system which has a U standpipe of 25 ft. A 12-ft. vacuum is furnished by a 16x12-in. Blake vacuum pump, making 100 r.p.m., driven by a 15-hp. motor. A cycle of four hours is required for each filter charge: 2 hrs. being required to form a 1-in. cake; 30 min. to pump back excess slime; 20 min. to fill with wash water; 30 min. to wash; 20 min. to discharge the filter cake, and 20 min. to refill. The filters are fed from the storage tank by gravity until the slime has reached the cone; after this the pump must be used. The pump is an 8-in. centrifugal, driven by a 30-hp. motor.

The vacuum pump delivers the filtered solution to a 3-in. Worthington centrifugal, direct connected to a 10-hp. motor, which is situated in an uncovered sump 8 ft. square and 6 ft. deep, directly under the filters. This pump throws the solution to two gold storage tanks, which have a capacity of 50 tons each. A Deming triplex pump with 5-in. plungers, forces the solution up to the tank floor through two Johnson filter presses, 4x4x12 ft. In the launders at the presses the solution is strengthened with 100 lb. of NaCN every 24 hours, and flows to zinc boxes Nos. 4, 5, and 6 by gravity.

ZINC SHAVINGS PRECIPITATION

There are six steel, 5-compartment zinc boxes and one wooden 5-compartment zinc box, 4x3x12 ft. The barren solution flows from the foot of the zinc boxes to two concrete sumps situated under the zinc boxes. The solutions from these sumps are pumped either to a storage tank of about 300 tons capacity, situated in the concentration building which furnishes solution for the Chilean mills and the concentrating tables, or to a storage tank of 300 tons capacity, situated on the west side of the building, near the discarded roaster stack. Three compartments in each zinc box are loaded with 300 lb. of zinc per compartment.

The precipitate is elevated by means of block, tackle and bucket to a lead-lined acid tank, which has a capacity of 15 tons, and acid treated. The precipitate is then dropped into a steel pressure tank, 3x5 ft. and is forced by compressed air into a filter press; 30x30 in. x 8 ft. The product is dried in a furnace used for that purpose alone. From the dryer the precipitate is delivered to a cylindrical revolving drum, driven by an 8-hp. motor and mixed for 12 hours. The precipitate is then removed from the drum, sampled, weighed and boxed for shipment to Omaha, where it is refined.

ELECTRIC POWER USED

The electric power is furnished by the Pueblo & Suburban Power & Traction Co. It is stepped down from 22,000 volts to 460 volts by three Western Electric Co., 400-kw. transformers. All motors and compensators were manufactured by the General Electric Co. There are no main-line switches in any of the departments, and when the power goes off, the operators are forced to shut off the individual compensators before the power returns.

Air is furnished by a 14x14x18 Blaisdell compressor, driven by a 30-hp. motor. The company cuts all its zinc in a lathe which receives its power from the same motor that drives the precipitate mixer. In addition, there are: an air hoist, used for elevating the chemicals to the "dope" room; a Deming triplex pump, and a Worthington 3-in. centrifugal pump, which are connected to a second 12-ft. dry-vacuum system, held in reserve. A Mine Supply Co. compressor is held in reserve in case of a breakdown of the other compressor. There are two dryers in the cyanide department, one for samples, and the other for the precipitate; and a 4-crucible refining furnace, which is not in use at present. The mill is heated by steam from a boiler in the east end of the concentrating department.

The losses in the tailings are large. A series of assays showed that the heads from the leaching tanks average \$0.60 per ton in gold, while the tails average \$0.20 per ton. The tailings from the filters show the largest loss, running from \$1.20 to \$1.60 per ton. An extensive series of experiments made by us showed that this loss is in the form of fine tellurides. In our tests, these were readily caught on canvas tables of the form commonly known as "rag plants." The extraction was from 90 to 95%. One thousand square feet of canvas table would be sufficient to handle the daily output of 150 tons of tailings from the filters. Other losses are: the consumption of power in pumping the table tailings from the concentrating department to the cyanide department; and the leakage of enriched solution from pumps the launders. The mill staff is composed of Philip Argall & Sons, consulting engineers and general managers; A. R. Minner, superintendent; Milo Hahnenkrat, master mechanic; Neil Twyman, chief electrician.

Alluvial gold deposits have been discovered in South Sumatra, close to the Palembang boundary. They are said to be so situated that they can be readily worked by dredging. The government of the Netherlands East Indies has granted to a company organized at Batavia, a license to prospect and work a large area.

Zinc Smelting at Trollhattan

During the last five or six years electric zinc smelting, inaugurated under the De Laval patents, has been conducted at Trollhattan, in Sweden, and at Sarpsborg, in Norway. It was attempted at first to smelt ore, but for a long time this was not commercially successful, the product being chiefly zinc powder, which had to be subjected to a resmelting, giving an impure spelter, which finally had to be refined. The works were continued in operation in a more or less irregular way, and spelter from them came on the market, but this was understood to be chiefly the product of smelting dross, scrap and other secondary products rather than ore. Some progress in ore smelting was, however, made, and during 1911 the works were studied by F. W. Harbord, in behalf of the Norse Power & Smelting Syndicate, organized to take them over and enlarge them. The following is a summary of Mr. Harbord's report, especially from the metallurgical standpoint.

The Trollhattan works has a furnace building about 300x52 ft., equipped with 11 smelting furnaces of the new resistance type, six on one side of the building and five on the other, two refining furnaces and several of the old type of arc furnaces, which at present are not working and are to be replaced by the new resistance type. The furnaces are arranged in two rows, one on each side of the building, the condenser sides of the furnaces facing each other.

THE FURNACES

The furnaces of the resistance type are of 350 hp. each, having one large vertical electrode passing through the roof, the other electrode being a carbon block bedded in the bottom of the furnace. The ore is charged through the roof. In the more recently erected furnaces the charge opening is on one side of the electrode only. A furnace is being erected with a continuous side-feed, which it is anticipated will give improved results. Two electrodes are fastened together to form the vertical electrode, which then measures 0.218 sq.m. in cross-section and 3 m. in length, its weight being 680 kg. The capacity of each furnace is approximately three metric tons, and the actual smelting is about 2.8 tons of ore per 24 hours.

Current is supplied to the works by a high-tension three-phase system at 9640 volts and is transformed by single-phase transformers to low-tension single-phase current, the nominal ratio of transformation being 10,000:110. The transformers are of the open type, air-cooled by forced draft from two fans, the average loss of energy across the trans-

An account of the smelting of 537 tons of ore in electric furnaces, with a statement of the results, including cost and extraction of metals, and reference to the condensation of zinc as powder as the weak point of the process.

formers being 2.5% of the energy at the furnace. The transformers are situated in a tunnel under the furnace room, each transformer being placed as near as possible and immediately below the furnace to which it is connected.

THE SMELTING PROCESS

The smelting process consists in charging the ore, with suitable additions of flux and reducing material (such as anthracite or coke) into the furnace, where most of the zinc and some of the lead are volatilized and condensed, partly as metal and partly as blue powder and oxide, containing about 54 per cent. of zinc and 20 per cent. of lead. This powder is then mixed with fresh ore and recharged, when a much larger percentage of the metal volatilized is recovered as metal. The first operation of smelting ore alone may be regarded mainly as a concentrating process for the production of a rich oxide, which is reduced to the metallic state by subsequent treatment.

The other portion of the lead, carrying a considerable proportion of the silver, is mainly reduced to metal in the smelting hearth and is tapped out with the slag. Some of the lead, zinc and silver passes into the matte and some into the slag.

In the test conducted by Mr. Harbord and assistants, the following were the charges first used, four furnaces working on ore-powder mixture and three furnaces on ore mixture: Ore-powder mixture; Broken Hill slime (roasted), 100 kg.; powder, 200 kg.; coke dust, 25 kg.; lime, 5 kg. Ore mixture: Broken Hill slime, 300 kg.; calamine, 10 kg.; coke, 75 kg. At the end of the second day the ore-furnaces were making sufficient powder to supply the powder furnaces (powder had previously been taken from the works stock in order to start the test) and from this time until the end of the run no further powder was taken from stock. The furnaces were tapped every four hours for crude zinc and powder, and the slag, matte and lead were tapped about every eight hours. During the run a good deal of trouble was experienced from break-outs of lead near the bottom of the furnace, due evidently to the furnace bottom becoming saturated with lead.

During the early part of the run the slags were far from clean, containing large quantities of zinc and lead, chiefly due to imperfect separation of the matte, which in turn was due to imperfect mixing of the charge and to the slags being too basic, owing to improper proportions of flux and reducing agent. Later on the slags improved considerably, although not infrequently two furnaces working side by side on the same mixture would give totally different slags, showing clearly that this was due to some outside cause, like irregular mixing.

Another serious trouble was the removal of electrodes, which caused very considerable delay, due to a great extent to the defective mechanical appliances for removing and replacing the parts. The average time for changing an electrode was 150 min., whereas it should easily be done in 30 min. with proper appliances. Although there were various minor troubles, there was no serious stoppage caused by failure of the furnaces.

INPUT AND OUTPUT

During 27.58 days of the experimental run, the furnaces smelted 518 metric tons of Broken Hill slime (roasted) 19 tons of calamine and 22.5 tons of blue powder (from stock); and produced 160.8 tons of crude zinc and 36 tons of powder. The powder produced by the different furnaces was recharged with fresh ore, a portion each time being reduced to metal, and the final result at the end of the run was 13.4 tons more powder on hand than at the beginning. The crude metal obtained from this smelting averaged about 79% zinc, 20% lead and 0.6% iron. This was afterward refined, with a production of 112.4 tons of spelter (assaying 99.9% zinc) and 24.7 tons of lead. The lead tapped with the slag was remelted, in order to remove the slag. This yielded 41 tons of marketable bullion, containing 141 oz. of silver per ton. In addition to this there was obtained 17 tons of leak-lead, assaying 27 oz. silver per ton. There were also nearly nine tons of skimmings containing zinc, lead and silver. The total input of metals was 204.04 tons of zinc, 128.35 tons of lead and 15,750 oz. of silver. The extraction in the form of metals was 130.46 tons of zinc, 94.94 tons of lead and 7230 oz. of silver, showing a yield of 64%, 73.99% and 45.9% respectively. If the metals in the powder be included, the percentage yields are 73.4 zinc, 79.3 lead and 49.5 silver. Mr. Harbord considered that the losses of lead and silver were unduly large because of the retention of some of those metals in the masonry of the furnaces.

POWDER CONDENSATION THE WEAK POINT

Mr. Harbord was of the opinion that the method of charging through the roof leaves much to be desired and anticipates much better results from side charging. Very considerable quantities of valuable fine dust were lost, owing to inadequate arrangements for its collection. A modern bag house, or its equivalent, would lead to an increased recovery of dust. He says furthermore: "The weak point of the process is the large amount of metallic powder produced in proportion to the metals. The recovery of a large percentage of metals as metals is admittedly a very difficult problem, but that the present practice can be very greatly improved upon, I have not the least doubt, leading to decreased consumption of energy and reduction of labor costs. * * * One detail, which is a great improvement on the early practice, is the better separation of the crude zinc from the powder by a mechanical stirrer, which was only tried just before we commenced our investigation."

ELECTROTHERMIC REFINING

At Trollhattan practically the whole of the crude zinc made during the experimental run was afterward refined. Out of 111,794 kg. of crude zinc there was obtained 78,136 kg. of fine zinc, 17,179 kg. of lead and 11,209 kg. of powder (corresponding to 10,088 kg. of metals). Consequently, there was a loss (unaccounted for) of 5.7%. This loss was distinctly higher than the average, as shown by the records of the works over a considerable period, and probably is explained by the new brick work continuing to absorb some of the metal. In the refining of commercial spelter at Sarpsborg the average practice has been as follows: Fine zinc, 83.9%; powder, 9.8% (corresponding to 8.8% metals); residues (lead, etc.), 2.20%; charge in furnaces, 1.1%; impregnation in brickwork of furnaces and condensers, 0.5%; unaccounted for, 3.5%; total, 100%.

SMELTING AT SARPSBORG

Mr. Harbord also conducted an experimental run at Sarpsborg. The works at that place have three smelting furnaces of the old arc type and four refiners. During 20 days he smelted 133 metric tons of Broken Hill roasted slimes and three tons of calamine. For the first day, to enable two out of the three furnaces to be put on powder mixture, about 3.5 tons of powder were borrowed from the works stock, but after the first 24 hours sufficient powder to supply two furnaces was made, the third being kept on ore charge alone until within about 36 hours of the finish of the run, when powder was charged with the ore to use up some of the excess stock made during the run. The furnaces worked very

well and gave no serious trouble, but the slags were far too basic and contained very large percentages of both zinc and lead, and at no time during the trial run was any matte obtained separate from the slag, the latter being really a mixture of slag and matte. During the run 43 tons of crude zinc and 12 tons of tap lead, containing 191 oz. silver per ton, were obtained. No leakage lead from the furnace bottoms was obtained. The crude spelter contained 74.74% zinc, 24.57% lead, and 0.7% iron.

ARC FURNACE VS. RESISTANCE FURNACE

The consumption of electric current in the experimental run at Trollhattan averaged 2078 kilowatt-hours per ton of ore smelted. The cost of power at Trollhattan is at present 30s. 3d. per horsepower-year, or 41s. 3d. per kilowatt-year.

The arc furnace, so far as the process of actual smelting is concerned, was found to give just as good results as the resistance furnace, but the consumption of energy was over 70% more. The method of hand feeding the electrode was slow and unreliable, especially as regards keeping the arc in the center of the furnaces. The consumption of electrodes also was materially higher than in the case of the resistance furnaces. At Trollhattan the average consumption of electrodes was 31.51 kg. per 1000 kg. of ore smelted; at Sarpsborg it was 40.57 kg. per ton of ore. If it be decided to continue smelting at Sarpsborg, the old type of arc furnace will have to be replaced by resistance furnaces.

Rules for Coal Storage

Messrs. Porter and Ovitz, of the Bureau of Mines, have been investigating the deterioration of stored coal and the liability of it to spontaneous combustion.¹ If coal be stored under water there is no deterioration, and no difference can be found in the preservative action of salt and fresh water. However, the advantages of storage under water are questionable, as the water absorbed and entrained by the coal must all be evaporated, with corresponding loss of heat units. It was found that after coal which had begun to heat was rehandled and turned over, that reheating rarely began.

The following suggestions were offered for dry storage, where their use does not involve unreasonable expense: Do not pile over 12 ft. deep nor so that any point in the interior will be over 10 ft. from an air-cooled surface. If possible, store only lump; keep dust out as much as possible; therefore reduce handling to a minimum. Pile so that lump and fine are distributed as evenly as possible; not as is often done, allowing lumps to roll down from a peak and form air passages at the bottom. Re-

¹"Power," Jan. 2, 1912.

handle and screen after two months. Keep away external sources of heat even though moderate in degree. Allow six weeks' seasoning after mining before storing. Avoid alternate wetting and drying. Avoid admission of air to interior of pile through interstices around foreign objects, such as timbers or irregular brickwork; also through porous bottoms, such as coarse cinders. Do not try to ventilate by pipes as more harm is often done than good.

Republic Iron and Steel Company

The semiannual report of the Republic Iron & Steel Co., is of special interest, since it was the action of this company which started the break in prices which ultimately brought about the increased buying of the closing months of the year. The statement covers the half-year ended Dec. 31:

	1910	1911	Changes
Gross profits.....	\$2,673,041	\$2,208,314	D. \$464,727
Main. and repairs \$	680,630	737,501	I. \$ 56,129
Other charges.....	424,393	491,346	I. 66,953
Depreciation.....	300,168	180,694	D. 119,474
Total	\$1,405,191	\$1,409,541	I. \$ 4,350
Net profit.....	\$1,267,850	\$ 798,773	D. \$469,077

Other charges in 1911 included \$369,338 interest and \$112,008 charge for exhaustion of minerals. The net earnings in 1911 were \$76,227 less than the half-year's dividends on preferred stock. The unfilled orders on the books for finished material and for pig iron were as follows at the dates given below:

	Finished	Pig Iron
Dec. 31, 1911.....	414,431	158,392
June 30, 1911.....	481,425	102,077
Dec. 31, 1910.....	293,734	76,378
June 30, 1910.....	341,887	82,906

The gross volume of business for the six months compares favorably with best previous periods when greater market activity ruled, but the average prices for shipments made are the lowest in the history of the company. The shrinkage in values is the natural result of the restricted demand, incident to disturbed conditions of general business. The increase in the gross volume of business obtained is due entirely to additions to capacity and to greater diversity of products manufactured.

Substantial reductions in costs were generally effected, but the net profits show reductions as compared with 1910, as a result of low prices naturally incident to conditions above stated. While full maintenance charges have been made, some reduction in depreciation charges was thought proper in view of previous liberal allowances on this account. All provisional funds, however, have been fully maintained. In December, the new 90-in. plate mill and the 14-16-in. continuous merchant mill were put in operation.

Righting Overturned Gold Dredges

BY LEWIS H. EDDY*

Two gold dredges were accidentally sunk in California in 1911, one on Nov. 27, the other on Dec. 22. Both accidents occurred in the Oroville field of the Feather River district. One dredge has been raised; the other is being raised. The dredge that has been raised is commonly known as a Perry dredge, or Pacific No. 1; the other is El Oro No. 1.

The raised dredge was initially installed by the Pacific Gold Dredging Co., in May, 1906, and is now one of the fleet under management of O. C. Perry. It is a 7½-cu.ft., close-connected, bucket-elevator type, equipped with Bucyrus machinery; the digging ladder and tailings conveyor are of lattice-girder construction; the screens are the flat end-shaking type, and are retained in the reinstallation, as the clayey character of the ground is said to be more economically handled by the flat than by the revolving screen. In the initial installation the dredge was equipped with modified Holmes gold-saving tables; these have been displaced by the cross-system type of tables, with distributing pans.

Another and important economical change made in the reinstallation of this dredge is in the electrical apparatus. After being floated the boat was rewired, and a change in voltage was made, 440-volt apparatus being substituted for the former 2000-volt machines. The motor equipment has a rated capacity of 300 hp., distributed as follows: One 50-hp. motor, connected to a 10-in. pump, and one 25-hp., connected to an 8-in. pump, to supply water to the screen and tables; one 15-hp. motor, connected to a 4-in. pump, to supply water to the spray hopper; one 20-hp. motor to drive the shaking screen; one 20-hp. for tailings conveyor; one 20-hp. winch motor; one 50-hp. sand-pump motor; one 100-hp. bucket-drive motor. Besides the repairs necessary to be made in the hull, the only other essential repair work was on the conveyor frame, which was damaged by being swung over as the boat sank, and was badly twisted; it was necessary to take out the frame and rebuild the lower end.

The hull of the dredge is 95 ft. long, 38 ft. 6 in. wide, 8 ft. 3 in. deep, and draws 5 ft. 9 in. It sank in 26 ft. of water, listed to the port side at an angle of 42 deg. from the water line. The sinking was caused by a leak aft of the well-hole through a hole 6 in. wide and 12 in. long; this hole was made by the spill from the buckets sliding down back of the well and under the protecting plate which, from a cause unknown, had bulged away from the well-hole planking. Divers were

*2218 Peralta St., Oakland, Calif.

sent under water and first nailed all the hatches down, and repaired the leak, thus making the hull water tight. An 8-in. electrically driven pump was installed on the port pontoon, which was the most submerged part of the boat, the divers cutting a hole in the deck and making a water-tight entrance. Also a 6-in. pump was installed in the center compartment to keep down the water in that part of the hull as an aid to the larger pump.

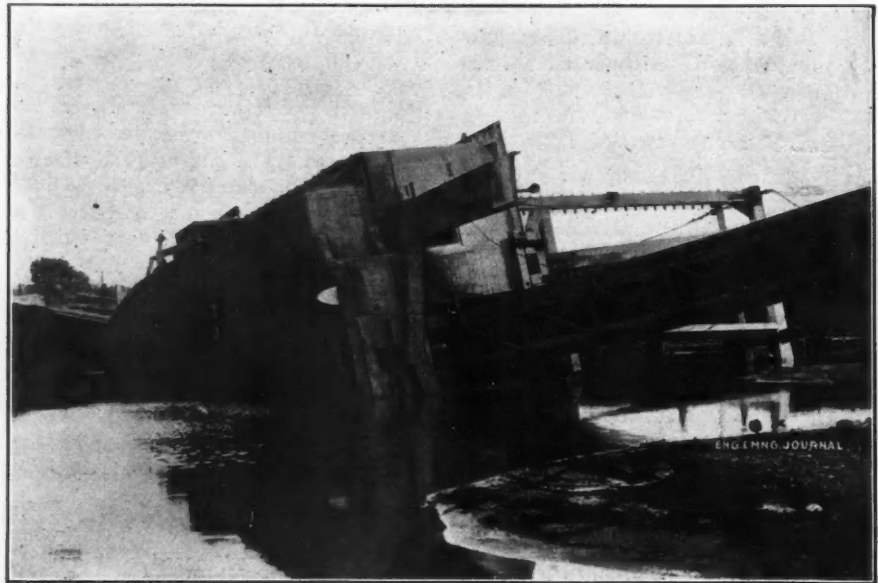
METHOD OF RIGHTING DREDGE

Double triple-blocks were rigged to the bow gantry, the upper-tumbler gantry and the stern gantry. A 1½-in. hawser was employed in making connection with the upper tumbler, which is in the center of the boat and the place where it was desired to make the strongest pull. Because of the sinking of the dredge on the port side, the auxiliary winch on the main

for the necessary hoisting pulls. There were many unforeseen difficulties encountered, peculiar to the conditions, as is the case in each individual job of this kind; so that after holding a *post mortem*, the operators were able to see how the work might have been done more expeditiously. The reinstallation of the dredge was delayed about 10 days by the changes made in the gold-saving tables and the electrical apparatus. Otherwise the boat would have been in commission within three weeks from the date of the sinking; the damage to the conveyor frame also caused delay. The actual work of raising the boat was done with moderate ease and expedition.

EL ORO DREDGE TOP HEAVY

El Oro No. 1 dredge was installed in December, 1903, by the El Oro Dredging Co., with head office in Mills Building,



EL ORO DREDGE NO. 1 OVERTURNED DEC. 22, 1911

deck was out of water, and was employed in pulling. Lines were attached to the top of the structure, so as to assist in righting the dredge. A heavy strain was taken on all the lines fastened to the gantries before starting the pumps, and then both pumps were put in action, and steady pulls were taken on all the lines fastened to the top structure, pulling them as evenly as possible. It was demonstrated that the lines were of sufficient strength and leverage to raise the dredge out of the pond, before the pumps were started, the operator recognizing that the tendency of the hull would be to settle further over as it was relieved of the weight of the water within. It required only an hour and a half to float the dredge after the pumps were started. The dredge was raised on Dec. 7, just 10½ days after it sank.

The progress of the work was necessarily slow, owing to much rigging of pumps, motors and transformers, and

San Francisco; J. Hellman is local manager. This is a 5-cu.ft., close-connected, bucket-elevator type, electrically driven, and equipped with plate-girder digging ladder, end-shaking flat screens, and Holmes gold-saving tables. The hull is 90 ft. long, 45 ft. wide, 7½ ft. deep, 6-ft. draft. The structure is top heavy, and will require correction of the flotation, as the sinking was due primarily to such irregularity of construction. This boat was not wholly submerged, but went down in 19 ft. of water with the bow entirely submerged, while the stern is above water, the boat standing at an angle of 7 deg. 30 min. from the horizontal of the water line. The submersion reaches to just below the upper tumbler. Practically the same methods are employed in raising this as in raising the Perry dredge. No costly damage was done to the boat or machinery, the resultant expense being covered by the cost of raising the dredge and correcting the flotation, and loss of time.

Goldfield Consolidated Report

The annual report of the Goldfield Consolidated Mines Co., for the year ending Oct. 31, 1911, states that the fiscal year closing on that date was the company's banner year, both with respect to tonnage handled, amount of earnings, and ease of operation, combined with freedom from adverse circumstances. During the year there were produced 330,549 tons of ore of an average value of \$32.55 per ton, a total of \$10,760,198. Metallurgical losses amounted to \$1.81 per ton, a total of \$597,071, leaving total amount realized from the year's production, \$10,163,127, an average of \$30.74 per ton.

EXPENSES AND PROFITS

Gross expenses, including mining, milling, transportation, general, all construction, local, state and Federal taxation, amounted to \$2,636,281, leaving a net operating realization of \$7,526,846, an increase of \$179,154 over the previous year, notwithstanding that the metallic contents realized were \$110,806 less than the previous year. At the end of the year the company had no debts; there was a cash balance of \$1,369,177 and \$451,306 outstanding in bullion and concentrate settlements. It is stated that additional milling facilities are being provided at an approximated estimated cost of \$70,000, whereby large economies are anticipated in the treatment of the concentrate residues over the past cost of shipment.

It is stated further that the results of this construction will narrow the company's output to bullion alone, all by-products being handled locally at maximum economy.

Depreciation of plant and equipment has been written off to the extent of \$147,194, and during the year a total of 46,739 ft. of development work was done on the properties.

President Wingfield states that the company purchased the Bulldog Fraction at a cost of \$13,000, the Jumbo Fraction for \$2500, and a one-half interest in the Vinegerone claim at a cost of \$195,000. He further states that the company's policy of distributing net realizations as they accrue, to stockholders, in dividends, and retaining a cash reserve of not less than \$1,000,000 will be maintained.

GENERAL SUPERINTENDENT'S REPORT

Supt. J. F. Thorn states that the stoping cost for the year was \$2.29 per ton of ore mined; development cost, \$1.06; total mining cost, \$3.35 per ton. Development work, amounting to 46,739 ft. was performed at a cost of \$7.51 per ft. The total cost of mining and milling, including concentrate treatment, was \$5.62 per ton, or 66c. per ton less than

During 1911, 330,549 tons of ore were produced, averaging \$32.55 per ton. Net realization was \$7,526,846 or \$22.77 per ton. Important additions have been made to the mill, resulting in increased capacity. Reserves are estimated at 600,000 tons, equal to a 2-years' supply for the mill.

the previous year. Other expenses, including marketing, income and bullion taxes, but not including construction, bring the cost to \$7.55 per ton. During the year the assay building, electrical

BALANCE SHEET, GOLDFIELD CONSOLIDATED, OCT. 31, 1911

ASSETS	
Mine properties.....	\$31,500,196
Amount computed as representing exhaustion of ore deposits to date	15,145,090
	<u>\$16,355,106</u>
Organization expenses.....	4,079,970
Mine buildings, machinery and equipment.....	122,941
Office building and furniture.....	18,475
Compressor plant.....	38,694
Power station and pole line.....	11,497
Miscellaneous real estate, buildings and equipment.....	54,450
Stocks owned.....	1,660,290
Unexpired insurance.....	696
Accounts receivable.....	105,208
Supplies on hand.....	63,404
Cash in bank and on hand.....	989,187
Distributed as dividends.....	18,144,430
	<u>\$41,644,354</u>
LIABILITIES	
Capital stock authorized.....	\$50,000,000
unissued.....	14,408,520
	<u>\$35,591,480</u>
Reserves:	
Bullion tax.....	\$34,388
Property tax.....	1,794
	<u>\$36,182</u>
Accounts payable.....	\$85,950
Net amount realized from operations.....	21,075,832
Amount computed as representing exhaustion of ore deposits to date	15,145,090
	<u>\$5,930,742</u>
Total.....	\$41,644,354

BALANCE SHEET, GOLDFIELD CONSOLIDATED MILLING & TRANSPORTATION CO., OCT. 31, 1911

ASSETS	
Stamp mill and addition.....	\$361,938
Railroad and equipment.....	25,126
Water plants, reservoirs and pipe lines.....	5,000
Absorption.....	227,800
Mill supplies on hand.....	120,960
Concentrate residues on hand.....	74,195
Bullion and concentrate settlements outstanding.....	451,306
Accounts receivable.....	615
Cash in bank.....	379,989
	<u>\$1,646,932</u>
LIABILITIES	
Capital stock.....	\$400,000
Accounts payable.....	50,823
Reserves:	
Income tax.....	\$21,812
Property tax.....	4,192
	<u>\$26,004</u>
Undivided profits.....	\$1,170,103
	<u>\$1,646,932</u>

building, storage-battery plant, and Laguna headframe were completed. Improvements at the mill were also undertaken.

COMBINATION MINE

In the Combination mine 6201 ft. of development work were done which, together with the sill floors, produced 2376 tons of ore worth \$17.78 per ton, a total of \$42,243. The principal new orebody in this mine is the 136 stope on the second level, which has produced 6877 tons, worth \$88.64 per ton, a total of \$609,601. The indications are stated to be that this section will be productive during the coming year. At the Mohawk mine 14,717 ft. of development work were done, and together with the sill floors, produced 13,203 tons of ore worth \$17.74 per ton, a total of \$234,193. Two important new orebodies were exposed during the year, as follows: The 260 stope on the 350 level, which produced 7836 tons of ore worth \$306,396; the 354 stope on the 450 level, which produced 24,566 tons worth \$707,152. The latter orebody has not been found on the 350-ft. level, but it has been found on the 600-ft. level of the Clermont, and in an intermediate drift between the 450- and 600-ft. levels, which is said to assure the downward continuation to a depth of 600 ft. The downward extension of the 403 orebody was found on the 450 level of the Mohawk. Several smaller productive orebodies were found in various places; also orebodies known to exist in some of the caved leased workings were uncovered and have added to the production of the mine. It is said that there still remains in the mine a large area partly developed, which will undoubtedly be productive.

CLERMONT MINE

The Clermont mine, in which 14,511 ft. of development work were done, produced 9366 tons of ore worth \$40.41 per ton, a total of \$378,489. Some good discoveries were made in this mine, the most important being the westerly extension of the 408 orebody, between the 600- and 750-ft. levels. A promising orebody is stated to have been uncovered recently, above the back of the famous 401 stope on the 750 level. Practically all developments were stopped below the 1000-ft. level, because of interference with the sinking of the Grizzly Bear shaft, which is being sunk to the 1400-ft. level. When this shaft reaches this level development work on the 1200-ft. level will be resumed. Only a small block of territory at this level has been prospected.

RED TOP, LAGUNA AND JUMBO MINES

In the Red Top mine, the downward extension of the Red Top vein is being worked from the lower levels of the Mohawk, the 600 level of the Clermont

and the 450 and 600 levels of the Laguna; no new ore has been credited to this mine below the 330-ft. level. The orebodies on the upper levels have been considerably extended and have added some to the reserves. This mine produced 6341 tons of ore worth \$15.05 per ton, a total of \$95,486, and 4339 ft. of development were done. The Laguna produced 3752 tons of ore worth \$10.06 per ton, a total of \$37,765 and a total of 6725 ft. of development was done. The downward extensions of some of the Red Top orebodies were found on the 450-ft. level of this mine, and a large tonnage is expected to be mined during 1912. The Hazel shaft was unwatered, and will be sunk to the 900-ft. level, from which point a crosscut will be run and a raise driven to connect with the bottom of the Laguna shaft. The old Jumbo mine, formerly worked by lessees, has been reopened, and found to contain a large tonnage of about \$15 ore. During the three months it was in operation, it produced 3377 tons of ore worth \$67,685. Owing to the fact that the mine was honeycombed by leases, it is stated to be almost impossible to estimate the tonnage, but that it is practically assured that the mine will produce a considerable tonnage during the coming year.

ORE RESERVES

Superintendent Thorn states that considering the past performances of the property, the present exposures and possible extensions of the orebodies now being worked justify an estimate of ore in reserve amounting to 600,000 tons, a sufficient tonnage to keep the present mill running at full capacity for practically two years. He states, however, that owing to the fact that some of the high-grade orebodies have been exhausted, the value of the ore will be somewhat lower. It is further stated that owing to the facts that the cost of production has been considerably reduced and a larger tonnage is being milled, it will be possible to maintain a high rate of production from the lower grade of ore.

The prospects for developing ore, in addition to reserves estimated, are stated to be promising. In the Jumbo, practically no ore has been mined, and only 500 ft. of the 4000 ft. of prospective ground along the strike of the vein have been explored below the 1000-ft. level; the chances of finding ore at greater depth, it is believed, have not been nearly exhausted. The possibilities of finding new orebodies above the 1000-ft. level are stated to be good. During 1911, the 354, one of the largest orebodies ever discovered in the property, was found on the 450-ft. level of the Mohawk. Other important discoveries were made on the 150- and 350-ft. levels, and an important discovery was also made on the 130-

ft. level of the Combination mine. It is stated that it is reasonable, therefore, to expect that the large, partially developed area above the 1000-ft. level will produce a large tonnage of new ore during the coming year.

MILL DEVELOPMENTS

J. W. Hutchinson, mill superintendent, states that the new refinery was completed and in operation on Jan. 1, 1911, and that it has fulfilled every expectation.

The cost of refining the bullion has been reduced to 7c. per ton, as compared with 19c. per ton the two previous years. The total saving to the company on this account is expected to be in excess of \$60,000 per year. During the year a new plate room was built in order

One 5x18-ft. tube mill, together with tanks, agitators, etc., will be housed in an extension to the present concentrate treatment plant, together with the necessary dust chambers, storage bins, etc. This plant will cost approximately \$73,000, and is expected to effect a saving to the company of practically \$80,000 per year. It is stated that during the year the mill ran 96.37% of the total time, and averaged 9.39 tons per stamp, actual running time.

DEPRECIATION

In one of the accompanying tables it will be noticed that a certain amount has been written off for depreciation, at the rate of \$16.36 per ton. The report of A. H. Howe, secretary and treasurer, contains some information bearing on this. In this connection Mr. Howe states:

Under the Act of Congress, approved Aug. 5, 1909, and popularly known as the Federal Corporation Income Tax Law, depreciations in the value of property are made available as a deduction against gross income; but the Internal Revenue Bureau of the Treasury Department, having in charge the administration of that law, requires all depreciations so claimed, to be shown on the books of account and balance sheets of the Corporations claiming the benefit thereof. The methods described for ascertaining such depreciation make necessary the adoption of an estimated unit of depreciation, ascertained by reference to the cost of the property, subject to the depreciations in question. A complete account of the computations made necessary in the case of the Goldfield Consolidated Mines Co., could only be accomplished by such extended explanation as would exhaust the reader's patience. Avoiding, therefore, unnecessary detail, it may be briefly stated that the unit employed by this company for that purpose, in obedience to the requirements of the Treasury Department, is \$16.36 per ton, being the estimated average cost per ton to the company of its whole estimated commercial tonnage.

The theory upon which these depreciations for exhaustions of ore are based is the well known economic principle, which has in numerous cases received judicial recognition and approval, and which should always be borne in mind by investors in mining property, namely, that unlike most other business projects, the earnings of a mine distributed in dividends are chiefly derived from exhaustions of the mine property in which the capital has been invested. Therefore, no matter how profitable the investment may prove to be, the dividends should not be regarded as profit in the ordinary acceptance of that term, until the net amount realized shall have equaled the capital investment in the mine property. Readers of the report will observe that by reason of the adoption of a depreciating unit, as required by the United States Treasury Department, it necessarily results that the net realizations in any year from the company's operations may be derived in part from the exhaustion of assets, and in part from apparent profits flowing from a net recovery per ton in excess of the estimated cost per ton.

PRODUCTION AND EXPENSES, GOLDFIELD CONSOLIDATED, YEAR ENDED OCT. 31, 1911

PRODUCTION			
	Tons	Total Value	Value, per Ton
Milled.....	330,062	\$10,586,936	\$32.08
Shipped.....	487	173,262	355.77
Total.....	330,549	\$10,760,198	\$32.55
Loss in tailings Realized.....		597,071	1.81
		\$10,163,127	\$30.74

EXPENSES		
	Total	Per Ton of Ore
Stopping.....	\$758,472	\$2.29
Development.....	350,985	1.06
Transportation.....	30,628	0.09
Milling.....	626,293	1.89
Concentrate treatment Marketing concentrate, residues and by- products.....	124,315	0.38
Marketing bullion.....	244,583	0.74
Marketing ore shipped	49,141	0.15
General expenses, in- cluding office, legal, corporation and administration.....	17,103	0.05
Bullion tax.....	181,334	0.55
Income tax.....	126,319	0.38
Total operating ex- penses.....	27,009	0.08
Miscellaneous earnings	2,536,180	7.66
Net operating expenses	37,730	0.11
Realization from oper- ations.....	2,498,450	7.55
Construction.....	7,664,677	23.19
Net realization from operations.....	137,831	0.42
Depreciation of plant and equipment and accounts charged off	7,526,846	22.77
Depreciation of mine property at \$16.36 per ton.....	147,194	.....
Net profits.....	5,407,781	.....
	\$1,971,869	.....

to localize the work of amalgamation. A small testing plant and laboratory were also added. Minor changes have been made, causing the plant to handle a larger tonnage than previously, and it is expected that the plant will average 950 tons per day during the coming year.

Work is now in progress on the construction of a plant to treat the residues of the present concentrate treatment process. Two Edwards duplex roasting furnaces, with 112x13-ft. available hearth area, and one Baker cooler, will be housed in a steel building erected for the purpose.

Depreciation of Gas and Oil Fields

WASHINGTON CORRESPONDENCE

The Commissioner of Internal Revenue has issued a circular relative to the deductions which may be made by natural-gas and oil companies from income for depletion of their property resources. Such deductions they are allowed to make in computing the amount liable to the corporation tax.

NATURAL-GAS COMPANIES

The following methods for estimating depreciation are recommended: "That the producing gas area of said company be laid off in squares not exceeding 1 square mile, and that three months prior to Sept. 30 of each year, one or more representative wells be shut in in each square or territory, and that as of Sept. 30 an accurate gage be taken of the rock pressure of said wells, and the decline in the average rock pressure from year to year shall be considered as the base of determining the exhaustion of deposit. For instance, a corporation may have 80 square miles of territory, and the average rock pressure Sept. 30, 1909, may have been 600 lb. per sq.in. On Sept. 30, 1910, the average rock pressure may have been 540 lb., or a decline of 10 per cent., and this percentage is to be applied as a basis of depreciation for the year 1910 on the cost of the field and main-line divisions, less depreciation charged off prior to that date, and any salvage value that may remain in the property.

"If, by reason of lack of area, or for any other good and sufficient reason, any corporation engaged in the production of gas shall prefer the volume basis as more accurately reflecting the rate of exhaustion of deposits, the amount of capital invested to be returned out of the income of any given year may be determined on that basis. In case the volume basis is adopted, the volume of each well must be taken with instruments generally recognized as reliable for determining the daily volume produced by each well at stated periods each year, and the percentage of loss in daily production shall determine the percentage of capital investment which shall be returnable out of gross income and the proper deduction to be made each year in the return of annual net income as return of capital invested.

"Any unreturned cash investment remaining when wells or territory have to be abandoned or lines taken up because of failure of the supply of gas, less salvage, may be deducted as part of the reasonable depreciation for the year in which such territory is abandoned unless such values shall have been returned in the reduction made because of loss of volume or decrease in rock pressure, which in

such case would be considered as having reached the vanishing point."

PETROLEUM COMPANIES

In all producing oil fields an average value per barrel of the settled daily production shall be adopted as the guide in determining the value of the property, and the following method in depreciating said values is recommended:

"Each corporation will fix this valuation per barrel as of Jan. 1, 1909, or upon the date of commencement of production, if after that date, for ascertaining the deductions for depreciation on the basis of depletion of deposits. This valuation per barrel should be based on the cost of the property to the corporation, plus the cost of the development thereof with a proper deduction from that valuation for the number of years the property has been in operation, and the resulting proportioned decrease in daily production of oil. With this basis per barrel fixed as of Jan. 1, 1909, or at the date of commencement of production, if after Jan. 1, 1909, the value of the property as a whole is to be de-

"The cost of drilling and equipping new producing wells shall be considered additions to capital investment account; the expense of drilling dry holes may be charged to profit and loss.

"The amount of petroleum produced and sold during the year, or the price received for the same will not, so far as the application of this regulation to determine depreciation is concerned, affect the value of the property at the end of the year, which value is based only on the comparative rate of decrease in production in accordance with the standard unit value ascertained, as stated above."

The Buffalo Spiro Turbine

A new form of steam-driven prime mover, to be known as the Spiro, is being put on the market by the Buffalo Forge Co. While the inventor, John H. Van Deventer, is insistent that it be called a turbine, it seems to fall more in the category of a pressure engine, as it works by expansion and not by reducing the velocity of moving steam.

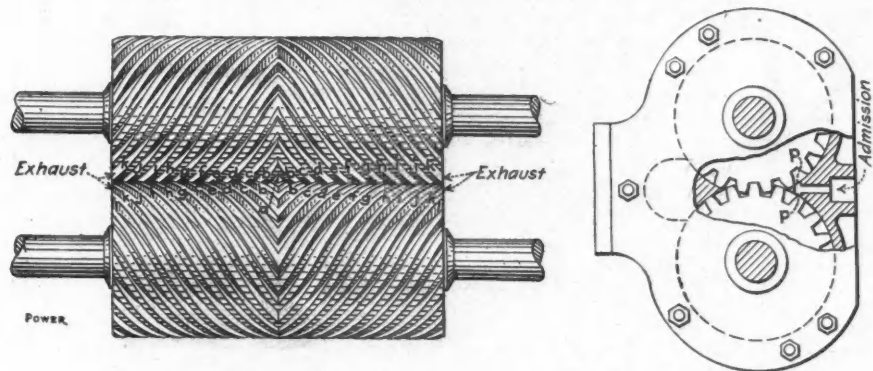


FIG. 2. SHOWING THE INCREASED VOLUME FOR EXPANDING STEAM

termined by applying this unit value per barrel to the daily average production for the month of December, or other representative month, in the year for which the return is made. The representative month chosen shall be the same in each year. This unit valuation per barrel is to be retained in arriving at all future depreciation deductions, except where an additional production is secured by drilling or an additional production is required by purchases, in which cases a new average rate per barrel, based upon the actual cash invested in such development, or in the new properties and their development, may be adopted.

The amount of income each year to be applied to the return of the cash investment shall be ascertained by multiplying the unit valuation ascertained as required above, by the difference between the daily average production in barrels during the representative month of each year. The product of such multiplication will be the amount deductible from gross income on account of cash investment based upon the rate of depletion of deposits.

If a pair of spiral or herringbone gears are held together, there will be found to be a lozenge-shaped pocket in the center, as at *a* in the accompanying illustration. If the gear is revolved, this space is extended, and as the teeth inclosing it advance to the respective positions, the volume will be increased to that shown at *b, c, d, e* and *f*.

A fluid under pressure admitted to the space *a*, and acting upon the receding surfaces, would drive the gears, the energy being equal to the product of the pressure and the volume generated. If the driving fluid were expansible and were cut off at any point, it would expand into the increasing volume, and the advantages and economies of expansion be realized just as in a cut-off engine working with a regular piston. When the ends of the grooves in which the action occurs pass the line of contact, so that they are no longer closed by the teeth of the opposite gear, the fluid would be exhausted, as indicated at the end of the gear in the illustration. It is upon this principle that

Note—Abstract of article in "Power," Feb. 6, 1912.

the Spiro acts. One of the great advantages of the Spiro is the small size of the units for the power developed. It can be shown mathematically that a pair of gear wheels 8 in. in diameter, by 24 in. long, with teeth 1 in. deep, and rotating at 2000 r.p.m., will develop the same power as a piston 13 $\frac{3}{4}$ in. in diameter running at 600 ft. per min., and using steam at the same pressure. Consequently great capacity can be obtained with small weight. For instance, a 40- to 60-hp. machine, steam at 100 lb. initial pressure, weighs 1600 pounds.

A test on two small units gave results as follows: No. 1, boiler pressure, gage, 120 lb.; initial pressure, 101.5 lb.; horsepower, 25.3; speed, 2450 r.p.m.; water per brake horsepower, 53.2 lb. No. 2,

Roller Bearings on Mine Cars

An interesting test was made by a large manufacturer of mine cars to ascertain the relative merits of two forms of roller bearings, the flexible steel spiral and the solid steel roller, with special reference to durability. A roller bearing of each of these two types was fitted in journal boxes on a 2 $\frac{1}{2}$ -in. lineshaft. Between these bearings was placed a babbitted journal 10 in. long and at the ends of the shaft just outside of each of the roller bearings was placed the same type of journal box making three babbitted journal boxes bearing the same load as the two roller bearings.

Across the top of the two roller-bearing boxes were placed heavy I-beam

late and roughen; 255 hours, the rollers were bent, the axle was cut and ringed by the ends of the rollers and reduced 1/32-in. in diameter and the linings of the box were granulated; 459 hours, apparently could last but a short time. On the other hand, the Hyatt bearing at the end of the run is said to have shown no ill effects.

As an additional test, the oil in the box was mixed with fine coal dust and a run of 8 $\frac{1}{2}$ hours made. The Hyatt bearings were again reported undamaged as the rollers ground the dust to powder, mixed it with the oil and took it up in the hollows of the rollers. The solid roller bearing ejected the coal dust from the box without further damage to the bearings; but the bearings ran much harder. The brass car bearings became hot, the oil in the brass journals reaching boiling point.

In a third test, the speed was increased to 380 r.p.m. and the weight reduced to 1200 lb.; at frequent intervals the bearings being sledged on top with 16-lb. sledges, and the load jostled up and down and sidewise to represent the conditions affecting the life of bearings on a mine car in actual operations. The following results are reported: At this speed and weight the brass car bearings could not be kept cool enough to run and the shaft was cut and practically ruined. It is claimed that none of these tests seemed to work any damage to the Hyatt bearings.

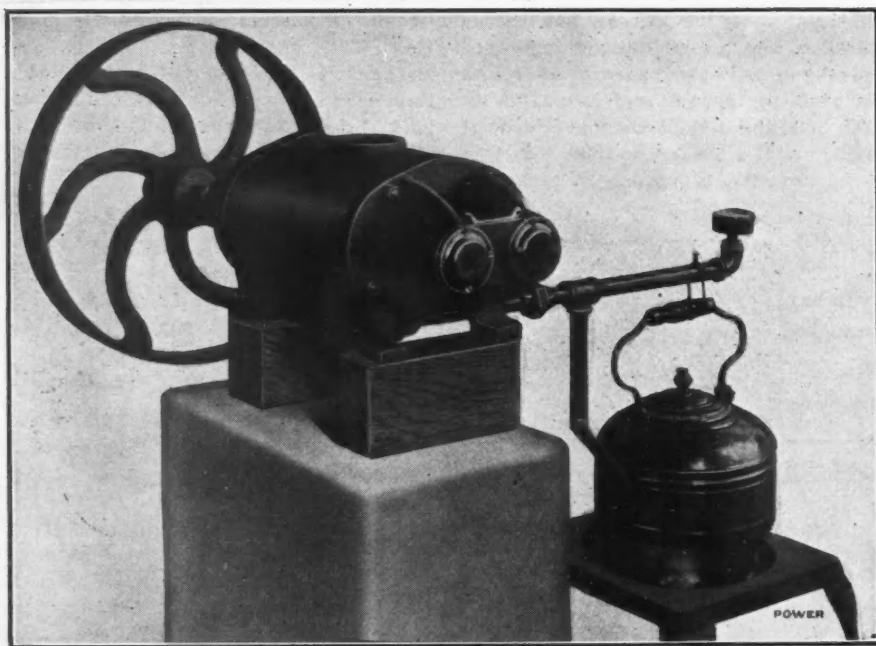


FIG. 3. A 5-HP. SPIRO RUN BY A TEA KETTLE

boiler pressure, gage, 130 lb.; initial pressure, 115 lb.; horsepower, 151; speed, r.p.m., 2710; water per brake horsepower, 31.8 lb. A small hand motor, the rotors of which lie in the palm of the hand, will run a $\frac{1}{4}$ -in. drill into hard cast iron at a rate of one inch per 12 sec., while an illustration shows a 5-hp. unit being operated by the $\frac{1}{4}$ -lb. pressure of a tea kettle, this pressure being sufficient to start the engine and keep it running. One of these engines has been in use by the Buffalo Forge Co. for about three years, with great satisfaction.

The Chatelet gold mines in France in the fiscal year 1910-11, mined and treated 29,454 metric tons of ore, which yielded 524 kg. fine gold, or \$11.82 per ton. The ore is chiefly an arsenical pyrite. The extraction was between 88 and 90 per cent. The profits for the year were \$63,815. At the close of the year there were 6968 tons of ore at the surface, and 33,500 tons blocked out underground.

levers, one end of each being attached to the floor and the other end supporting a 400-lb. cast-iron weight. The weight on each of the roller bearings was 2720 lb., which would make the weight sustained by each plain bearing about 1800 lb. The shaft was then rotated at a speed of 185 r.p.m., equal to 10 $\frac{1}{2}$ miles per hour with 18-in. car wheels.

At the end of a two-hour run or about 21 miles under this load and speed, it is reported that the 7-in. babbitted bearings melted out, although they were kept well oiled. These were then replaced by 2 $\frac{1}{2}$ x7-in. brass car journals. The condition of the solid roller bearings at various times during the test is reported as follows: At the end of 8 hours the spacing ring had cut ridges in the rollers; 46 hours, the rollers showed small pox marks on their surface, the metal in the rollers seeming to fall out in small granulations; 103 hours, the linings in the bearings likewise commenced to granu-

Prevention of Blue Powder Formation in Zinc Smelting

A recent invention for the prevention of the formation of blue powder in zinc distillation is the use of the vapor of an alkaline haloid (Fr. pat. No. 423,912). It has been proposed before to mix sodium chloride with the retort charge, but this is disadvantageous if the ore carries lead or silver, owing to the volatilization of these metals after chlorination. In the practice of this invention, for a charge of about 100 kg., 112 grams of salt are placed either in the front of the retort, separated by a bed of coke cinders from the charge, or in the back of the condenser, in a small pocket which the present invention proposes to place there. The sodium chloride, or other alkaline haloid, is volatilized, and mixes with the zinc vapors.

It is claimed that the yield of zinc is better, as the yield of blue powder is less and condensation quicker, the furnace man can more easily watch his retorts, and the lead carried over has a tendency to separate from the zinc and deposit separately. If the fumes from the condenser are burned the flame is a brilliant yellow and constitutes a useful source of light.

First Aid to Mining Machinery—VII

By Henry M. Lane*

Large or heavy castings, such as lead kettles, the making of which is described in this article, are cast in loam molds, the supporting structure being brickwork. Instead of the usual patterns, revolvable sweeps are used to shape the loam mold.

*Editor, Castings, Caxton Building, Cleveland, Ohio.

There are many heavy castings which can be made without the use of patterns or with the use of part patterns only by employing loam molding. This method also does away with the necessity of building large and heavy flasks.

The principles involved are well illustrated in the making of the lead kettle shown in Fig. 1. It will be noticed that this kettle is 5 ft. in diameter on the inside and 2 ft. 6 in. deep. If this kettle is molded in the position it will occupy when in use it will have the soundest and best metal at the bottom and any blow-holes or defects will be in the rim. This method will not make a good looking kettle, as any defects will appear in the rim, but will insure a longer life than if molded in an inverted position. The molding is simplified by turning the kettle wrong side up; but as this is accomplished only at a sacrifice in the quality, the molding in the position it will occupy while in use will be considered first. The reason this method of molding gives a better kettle is that the metal at the bottom will be under compression and hence more dense; then, too, as already stated, the dirt will rise to the rim.

MOLDING A LEAD KETTLE BY SWEEPS

The general method of procedure in the making of the lower or drag portion of the mold is shown in Fig. 2. Where a large drying oven is available, this portion of the mold is usually made on a large cast-iron plate known in the foundry as a loam plate, and after it is completed the mold is picked up, placed on the mold-oven truck and run into the mold oven for drying. It will be assumed, however, in this article that the foundry is not equipped with a mold oven sufficiently large to contain the entire mold, and hence it is necessary to dry it on the floor or at least to dry it sufficiently so that it can be cast.

The special rigging necessary to carry on this work consists of an arbor or spindle stool as shown at A, Fig. 2. This is a casting having a tapered hole in the center for supporting the lower end of the spindle that carries the sweeps. For making the first portion of the mold the arbor seat is placed in position, leveled and the spindle erected in it. In order to prevent any dirt from working into the bottom of the spindle hole it is common practice to crowd a little waste down through the hole in the seat and into a small pocket left in the sand under the seat. A piece of waste should also be placed around the spindle on top of the stool to keep dirt from working into the joint around the spindle. The top of the spindle B can be supported by extend-

ing timbers from the wall or suitable supports outside of the mold so that they will carry a top bearing for the spindle. This is not shown in the illustration.

A sweep, as shown at C, is provided to sweep out or shape the inside of the kettle. This is secured to the spindle by

venting, particularly as the mold is not to be dried in an oven. For this reason sifted coal ashes should be placed in the longitudinal cracks between the brick in every third or fourth course, forming horizontal vent passages between the inside and outside of the mold. These ashes are obtained by taking ordinary boiler-room ashes and sifting out the coarse cinders by passing the material through a 1/2-in. riddle or, if no riddle of this class is at hand, a No. 4 or 1/4-in. riddle may be used. If soft coal or any similar material forming a good ash is not used at the plant, that is, if the boilers are fired with oil or wood, it is necessary to use some other material for opening up the joints and furnishing vent, and this may be accomplished by placing sawdust in some of the vents. These vent passages formed by ashes or sawdust should occur in at least every second row of brick vertically, and should

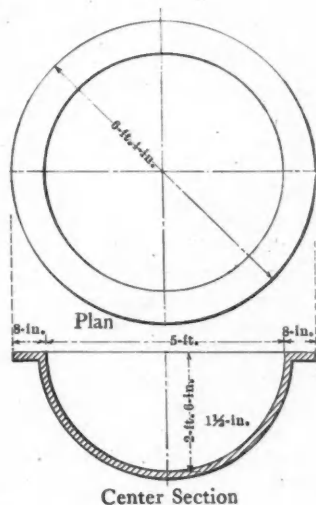


FIG. 1

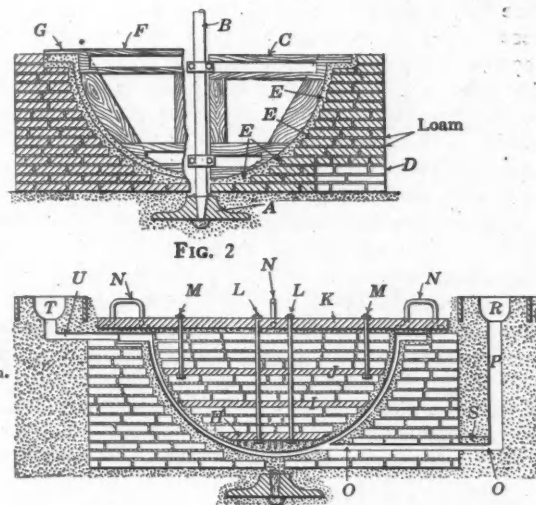


FIG. 2

FIG. 3 *The Engineering & Mining Journal*

LEAD KETTLE AND LOAM MOLD FOR CASTING IT

suitable clamp blocks as shown. In the case under consideration in which no loam plate is used as a foundation, a level bed of sand would be struck off around the spindle. This sand should be rammed hard so that it will not settle during subsequent operations. Upon this sand, brick are laid, the brick being joined by loam mortar. This material is soft mud made from loamy earth. It should be worked up to the consistency of ordinary plasterers' mortar.

More rapid work, however, can be accomplished in most cases by handling the mud with the hands instead of with the trowel. The brick are built up layer by layer as shown, leaving at least an inch between the brick and the edge of the sweep. In work of this kind it is necessary to make ample provision for

not be separated by a space of more than one foot horizontally.

PROVISIONS FOR DRYING THE MOLD

Where a large mass of brick like that shown is to be built up, some small pockets of such a length that they can be bridged by two brick placed end to end, each projecting half a length, should be formed around the outside at intervals. These pockets should be eight inches wide and they should be eight inches to a foot high. They can be made to extend into the brickwork as shown at D, Fig. 2. The object of these pockets is to afford an opportunity to build small fires in the brickwork to assist in drying the loam between the bricks. In order to indicate the opening D, the rest

of the brickwork has been lightly cross-sectioned. After the mold is dried out these pockets or openings are filled with sand which is tamped in lightly with a rammer. This sand should be moistened to about the consistency used for ordinary green-sand work, and should not be rammed in so hard that it will interfere seriously with the vent. Some foundrymen prefer to shovel ashes into an opening of this kind and ram them in lightly, which undoubtedly affords a freer vent.

Ordinarily a loam mold of this kind is made in a pit so that the entire mass of brickwork will be below the foundry floor. This makes it possible to back up the brickwork by ramming sand behind it so as to prevent run-outs or metal leaking through the mold. After the brickwork has been built up so as to clear the sweep, a coating of loam is swept on to the inside of the bricks as shown at *EE*, Fig. 2. This forms the face of the mold proper.

In order to make the cope portion of the mold it is necessary to sweep a thickness of loamy sand on top of the surface *EE*, to form a mass equal in thickness to the kettle, and this sand really becomes the pattern. To accomplish this the brickwork should first be partially dried. This is effected by taking out the spindle and sweep and hanging an iron basket or box made of sheet iron in the mold and maintaining a charcoal fire in it long enough to partially dry the loam facing. This surface is then covered with damp newspaper to form a parting, and a thickness of heavy loam sand is swept on to form the pattern. The sweep for accomplishing this is shown at *F*, Fig. 2. It differs from the sweep shown at *C*, in that the diameter of each portion of the edge is sufficiently less than that at *C* so that it will leave a body of sand $1\frac{1}{2}$ in. thick.

The point *G* of the sweep is also arranged so that it will sweep off the top of the flange of the kettle even with the parting of the mold. After the loam sand has been swept on the inside of the kettle by the sweep *F* the sweep and spindle are removed, waste is placed in the hole in the step or support *A*, and the hole through which the spindle fits is patched up with sand even with the inside of the bottom of the kettle.

FORMING THE COPE OF A KETTLE MOLD

The mold is now ready for the forming of the cope. In order to accomplish this, however, a number of pieces of rigging must be arranged. A general view of a section of a mold showing the completed cope in place is shown in Fig. 3. To make the cope it is necessary to make what is known as a pricker plate, as shown at *H*, two loam plates at *I* and *J* and a covered loam plate as shown at *K*. These four plates are made in open

sand and the operation of making them will be described before making the mold.

The pricker plate *H* is shown in detail in Fig. 4. This should be from $1\frac{1}{4}$ to 2 in. thick and is made by preparing a level bed of sand and then striking out a circle 2 ft. 2 in. diameter and beveled on the lower corner as shown at the edge of the plate. Several vent openings should be formed through the plate by means of cores, as indicated in the drawing. To make these a simple core box is made and a number of cores about 4 in. in length and 1 to $1\frac{1}{2}$ in. thick are made. These cores should be about $2\frac{1}{2}$ in. high, so that they will project above the top of the plate slightly when the mold is poured. After the impression for the plate has been struck out in the sand the cores are placed in position and fastened down with nails. It is also well to weight them by placing some iron bars across the top and then by piling iron on top of the bars. It is also necessary to make provision for the bolt holes which pass through the plate. These holes are $1\frac{1}{4}$ in. diameter and should be formed by $1\frac{1}{4}$ -in. round cores set on the sand bed and secured in position by weighting.

Sometimes these cores are set in tapered prints formed in the bed by pressing a tapered print-block into the bed, but in any case they should be weighted to keep them from floating when the metal is poured around them. In order to form the prickers which serve to keep the loam in position a stick, usually a dowel stick from $\frac{5}{8}$ to $\frac{3}{4}$ in. diameter, is sharpened at one end. This is then thrust into the sand to the desired depth to form the prickers. To limit the depth to which the stick is thrust into the sand a washer is sometimes fitted around it and as longer prickers are wanted the stick is whittled away and the washer forced farther up. Another way is to cut notches in the stick and thrust it in until it comes to the different notches.

MAKING OF THE LOAM PLATES

At the same time that the pricker plate shown in Fig. 4 is made the two loam plates *I* and *J* shown in Figs. 5 and 6 should be made. These should be about $1\frac{1}{2}$ in. thick and about the form shown in the illustration. They can be struck out of a level bed of sand prepared on the foundry floor. The venting slots and bolt holes are formed by cores weighted in place as already described. The cover plate *K*, Fig. 3, is made as shown in Fig. 7. In this illustration the cover plate as shown is provided with four 1-in. lifting irons. These are bent into a U-shape, and are fastened on the bed by means of nails thrust across the lower end of the U and are generally kept in an upright position by laying a bar or iron across the mold and tying the U-

shaped handles to it with wire. The slots for vents and the bolt holes are formed in the manner described in connection with the bolts *H*, *I* and *J*. The under surface of this upper plate is generally covered with prickers throughout its entire area, though it is only necessary to have the prickers around the upper portion of the area where the plate projects beyond the brick body of the core; in Fig. 3 this is shown.

After the plates shown in Fig. 4, 5, 6 and 7 have been made the mold is made as shown in Fig. 3. Dampened newspaper is spread over the inside of the sand which has been struck in to form the pattern. A quantity of loam is then put in the lower part of the mold and the plate *H* lowered upon it. The four bolts shown at *LL* are placed in position when the loam plate is lowered into the mold. Brickwork is then started on the plate *H* and carried up for several courses, the space between the ends of the brick and the paper covering the sand pattern being filled with loam. After several courses of brick have been placed in position the plate *I* is lowered over the bolts *LL* and several more courses of brick introduced. Next the plate *J* is lowered into position and with this are introduced the bolts *MM*, of which there should be at least six. In the plate *K*, shown in detail in Fig. 7, provision has been made for eight bolts in the ring indicated by *MM*. The brickwork with loam filling is continued up to the top of the mold.

VENTING A LOAM MOLD

As each of the plates is placed in position upon a bed of loam, all of the vent holes in the plate should be filled with ashes or a loam mixture rich in sawdust so as to facilitate the escape of gases from the interior of the mold. This large amount of venting in a loam mold is provided mainly to assist in drying the mold rapidly, for if it were not thoroughly vented it would take a long while to drive the water out of the interior of the mass.

After the brickwork has been built up to the top of the kettle a bed of loam is spread over the top of the mold and the plate *K* lowered into position. This plate is allowed to rest upon the mold until the loam beneath it has stiffened considerably by the absorption of moisture taken up by the brick. After this the nuts on the bolts *LL* and *MM* are run down to a bearing. After several hours the inner part of the mold is lifted by means of the lifting lugs *NN*. After the interior of the kettle which forms the cope has been lifted off, its under surface is gone over carefully with the trowel and any rough spots repaired. It is then set up on four or five supports surrounded with sheet iron and a charcoal or coke fire started under it to dry

it. The drying should not be forced rapidly but should proceed slowly and in a mold of this size it will probably take 16 to 20 hours to dry it out thoroughly. As drying progresses it may be necessary to tighten up the bolts a little, but if the loam was of the right consistency there should not be much shrinkage. If there is much shrinkage it will distort the kettle, making it too thick at the bottom, and this will show that the loam mixture was not right and that it was applied too wet.

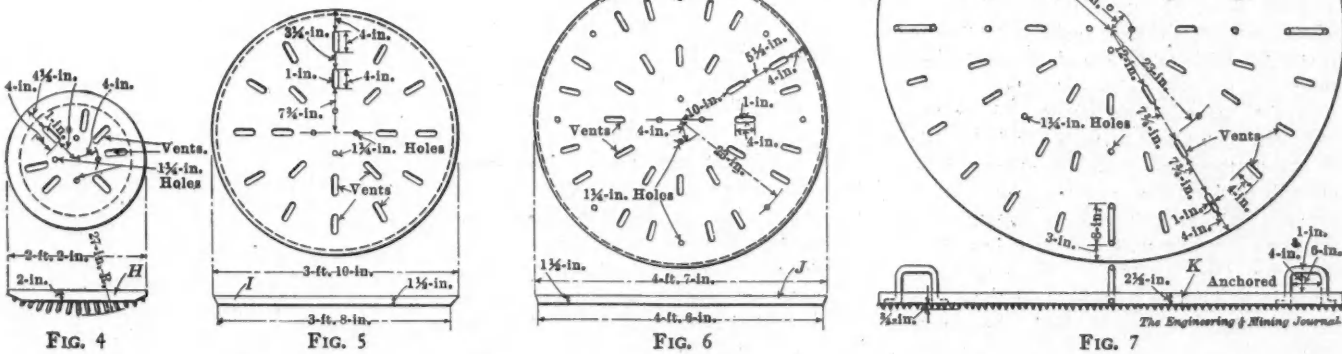
Ordinarily the bricks are dry enough to take up the excess moisture in the mixture and dry it down to approximately the volume it will occupy in its final form. Before the upper part of the mold has been lifted out, marks should be arranged on the lower or drag portion which will enable the foundryman to return the upper or cope portion into exactly the position it occupied during molding. After the cope part has been lifted off and set away to dry, the hole at the bottom of the mold should be cleaned out, the spindle returned and the sand which was struck on to form the pattern, swept out. Some foundrymen, however, do not return the spindle, but

For gating the loam mold, provision should be made during the building up of the wall for two sets of horizontal pouring gates. Fig. 3 shows the gating arrangement. The gate *O* leads to a point near the bottom of the kettle and this should be at least 1 1/4 x 3 in. The down gate *P* should be provided with a pouring basin *R*, the top of which should be built up several inches above the mold. To form the horizontal portion of the gate, a gate stick should be introduced into the mold during the building up of the brick and this should be drawn out after the sand pattern has been cleaned away from the interior of the mold. The gate stick must be covered with heavy oil to prevent the loam from sticking to it. The horizontal portion of the gate *O* which projects beyond the brickwork can be formed by means of a dry-sand cover core *S*, which is placed over the gate passage. The vertical portion of the gate *P* can be formed by a gate stick in green sand, or it can be made of pipe-shaped, dry-sand cores. In some foundries ordinary clay drain tile is used for this purpose.

The first iron introduced into the mold should be poured in through the pouring basin *R* and this should be allowed

be large so that the metal in the heads *T* will feed down into the rim to follow up the natural shrinkage as the metal sets. During the pouring the plate *K* should be weighted in place with a pile of pig iron or any other suitable heavy weights or it can be bolted down to iron plates placed beneath the brickwork in the drag portion of the mold.

In some shops where kettles are cast they make it a rule to lift out the cope portion of the mold as soon as the metal is set. The object of this is to cause the metal to cool rapidly from the inside, which tends to give a more dense casting. In most cases, however, the metal is left in the mold to cool for several days. In the case of complicated work cast in loam it should never be stripped too quickly unless there are parts which would be cracked by the contraction if not shaken out promptly. In the case of a kettle like that shown in these illustrations it will be necessary to ease off or partly raise the cope soon after casting in order to prevent the plates *I* and *J* from exerting undue pressure on the



PRICKER PLATES AND SUPPORTS FOR THE CORE OR COPE OF A LEAD-KETTLE MOLD

depend on the paper parting to enable them to remove the sand pattern completely. If the work was done carefully this will save one setting of the spindle.

DRYING THE MOLD

After the sand pattern has been removed, the surface of the mold should be blacked, and a charcoal-fire basket made of sheet iron introduced into the interior to dry the mold from the inside. At the same time several small wood fires should be started in the pockets left in the brickwork, and after these have burnt a short time charcoal should be added to them. The pit in which the mold stands can be covered with sheet-iron plates so that the pit becomes a mold-drying oven.

to flow in until the mold is filled to about one-third of its height. After this, metal should be introduced through the pouring basin *T* which connects with the flange by a number of gates *U*. The pouring basin *T* should be fairly long, extending for several feet along one side of the kettle and in many cases two such gates are used on opposite sides of the kettle, so that with the pouring basin *R* they divide the circumference of the kettle into about three equal parts. Pouring should continue through the gates *R* and *T* until the mold is full.

At least two risers should be put on the rim connected through gates similar to that shown at *U*, and when the metal in these rises to a point four or five inches above the flange the pouring should be stopped. The gates *U* should

inside of the casting. It is for this reason that these plates should be kept at least 1 1/2 to 2 in. clear of the face of the casting and generally this amount of loam will be sufficient to prevent injury to the work. It must be remembered that when the plates *I* and *J* are introduced into the mold they are cold. As the casting cools it imparts heat to these plates which tends to expand them. At the same time the casting is losing heat and shrinking, so that the two effects in opposite directions tend to aggravate the difficulty, due to shrinkage.

A loam mixture is essentially a sticky mud which will dry without shrinking. To have this property it must contain sufficient silica in the form of good sharp sand to act as the framework of the final mixture. It must contain consider-

able clay, and generally some other adhesive.

LOAM MIXTURES

In almost every region sand that will make good loam mixtures can be found. Usually a heavy molding sand high in clay is taken as the base of the mixture, and to it are added sharp sand, chopped straw, sawdust, or horse manure, and glutrin water or molasses water. Clay wash is also frequently used in wetting down a loam mixture.

The following may be given for the composition of loam mixtures in various regions: Where there is available a fairly heavy molding sand and a good sharp silica sand such as a clean lake or river sand, the following mixture could be used: Molding sand, 9 parts; sharp sand, 11 parts; finely sifted fire-clay, 1 part; chopped straw, 3 parts; seacoal, 1 part. The straw should be chopped fine and sifted through a $\frac{1}{4}$ -in. riddle. The fireclay should be sifted through a $\frac{1}{8}$ -in. riddle. If no regular seacoal is available, any good, high-grade bituminous coal may be ground to a fine powder and used.

Any loam mixture requires thorough mixing and hence it is best to mix it in a clay-pan which operates similarly to a Chilean mill. Where no machine of this kind is available a fair mixture can be made by treading it with the feet and shoveling it over and over, or by placing a large sheet of boiler iron on a bench about three feet high and shoveling a layer of stiff loam about three inches thick on top of this. Then take a $\frac{3}{8}$ - or $\frac{1}{2}$ -in. rod and beat the mixture, striking hard enough to drive the rod through to the plate every time and beating long enough to work the mixture over several times. Fair results can be obtained in an ordinary mortar-box with a hoe, if a man will stick to it, for the longer the loam is worked the better it will be. It is also good practice to soak loam over night.

Chopped straw or sifted horse manure has been used in loam from so far back in the history of foundry work that no one knows when the mixture was first introduced, but it is only within the last few years that we have learned to appreciate the significance of the horse manure or chopped straw. It seems that chopped straw or any similar vegetable compound contains a considerable amount of what the chemist calls colloidal matter, which has the property of deflocculating and increasing the plasticity of clay. After the loam is dry the fibrous material in it serves as a venting agent.

Other mixtures are as follows: Where loam work is being done regularly the old loam sand can be worked into the mixture in the following proportions: old loam sand, one part; sharp sand, two parts; molding sand, two parts. Wet

down with a strong clay wash made with glutrin or molasses water. Not over a half pint to a pint of glutrin should be used to a bucket of water and clay should be stirred in to the consistency of a thin cream.

Another good mix is composed of sharp sand, four parts; molding sand, one part; clay, one part; and pine sawdust, one part. This should be wet down with a thin clay wash. The addition of the clay in this case serves as a bond for the large amount of sharp sand. Slaked lime may be mixed with loam in the proportion of 2 or 3% of lime, but it is not often used as it hurts the men's hands. For the rough or backing coats coarse molding sand containing large pebbles may be used; for the finishing coats finer sand should be used.

BLACKING LOAM MOLDS

All loam molds require blacking, and the blacking is best applied when the surface of the mold is air-dried to some extent before it is put in the core oven. The blacking should be made by taking a good plumbago or coke blacking and first mixing it with sufficient water to make a paste. Then glutrin water or molasses water is added and the entire mass stirred thoroughly. It is best to mix blacking several hours before it is to be used and some foundrymen prefer to mix it the day before it is to be used. After the face of the mold has been gone over with the wet blacking it will dry rapidly and when it becomes sufficiently stiff, tools may be used for slicking.

Some foundrymen prefer to shake powdered plumbago or "silver lead," as they call it, from a bag over the damp surface of the mold after applying the blacking and then finish it with trowels or slicks. In some cases loam molds are blacked after they are dried and while they are still hot. In this case the blacking dries rapidly and will have to be strong to prevent its cracking or peeling off.

Magnesite in 1911

The American supply of magnesite continued to come almost entirely from Austria and Greece in 1911. A small shipment was received from the Island of Margarita belonging to Venezuela, and American interests took option on other deposits there during the year. A deposit in Quebec was under option to Americans during the summer, but no exploitation was undertaken. The California deposits are operated on a small scale to supply local demand, but toward the close of the year, plans for a larger utilization of California magnesite were made. The demand for calcined mag-

nesite in the eastern United States was good and at the close of 1911 this market showed a decided upward tendency.

The Payne Electrostatic Separator

In a recent patent issued to Clarence Q. Payne (U. S. pat. 994,870), the inventor calls the attention to the fact that mechanical interference does much to make the present styles of electromagnetic and electrostatic apparatus inefficient. That is, large pieces of electrified material may form "bridges" which will retain small fragments of unelectrified material, and *vice versa*. To prevent this he has previously (U. S. pat. 791,494) attempted to make the field a unipolar field, that is, the lines of force do not at any time return upon themselves. This was accomplished by having the separation take place in the air gap between two opposite poles.

In the present invention, cleaner separations are sought by close sizing of the material to be treated, followed by treatment in an electrostatic or electromagnetic machine, in which the one pole consists of a cylinder, made up of conducting disks of width varying directly as the size of the material to be treated, which are separated from each other by insulating disks similarly proportioned.

New Electric Hoist at West Rand Consolidated Mines

LONDON CORRESPONDENCE

The British Westinghouse Electric & Manufacturing Co. has supplied the West Rand Consolidated mines with an electric hoist for a seven-compartment shaft, 3000 ft. deep, dipping at an angle of 50°. The No. 1 hoist has a capacity of 12,000 lb. of ore. The skip weighs 7500 and the rope 8500 lb. The No. 2 hoist has a capacity of 6000 lb. of ore. The skip weighs 5500 and the rope 6000 lb. The hoists are intended to be operated at a speed of 2000 ft. per minute.

The Victoria Falls company will supply the power. Each motor-generator set comprises a 2000-volt, three-phase, 50-cycle, slip ring, induction motor directly coupled to a direct-current generator and an exciter. The two drums are 10 ft. in diameter and measure 3 ft. 9 in. across the face between flanges. They run loose on the drum shaft and are driven by multi-tooth clutches that slide on hexagonal sections of the shaft.

The Ward Leonard system of control is used. There is a device on each hoist to prevent overwinding, overloading, failure of power supply, air supply, exciting current, etc. The hoists are housed in a substantially built brick structure, a novelty on the Rand.

Cripple Creek Drainage

By W. WESTON*

At this time when the renewed activities in driving the deep-drainage tunnel in the Cripple Creek district, Colorado, are having such marked effect in the unwatering of the lowest workings of the large mines, a short review of the underground water system of the Cripple Creek volcanic area and its drainage, may be interesting, more especially as it is unique in the mining world today; though in former years much has been written on the subject by various engineers, there are many readers of the JOURNAL to whom these articles have not been available, or, if read, have perhaps passed out of mind, and at this time a short, up-to-date review may not be amiss.

WATER CONTAINED IN GRANITE-RIMMED BASIN

At the commencement of mining operations the underground water surface of the area stood at about 9500 ft., in what might be described as a basin about two miles in diameter and filled with volcanic tuffs, breccia and islands and broken masses of granite, caused by a violent eruption which threw up the rocks and then allowed them to settle back again into the basin or plug thus formed, and which had for its rim a country of hard impervious granite which prevents the escape of the contained water. This is illustrated in a simple manner by Waldemar Lindgren, of the U. S. Geological Survey, who describes it as "suggestive of a water-soaked sponge set in a glass cup." This water is stored water that came from the rain and snow that fell upon the surface, and not from underground sources.

In the cooling of the volcanic area, shrinkage cracks extending across it were formed, and later dikes of phonolite and of basalt broke through the basin, and still later, probably, steam, gases and thermal waters having gold, tellurium and other minerals in solution, ascended these shrinkage cracks and walls of the dikes and permeated and were precipitated in the inclosing rocks, making the ore, which, since 1901, has added about \$200,000,000 to the world's supply of gold. That the face of nature must have been terribly disfigured, is shown by the fact that in some of the veins the remains of trees were found, and in a mine drift near Anaconda, I saw a tree trunk, 6 in. in diameter, that laid across the tunnel and was simply charred, the grain and knots being clearly discernible. The tree was 268 ft. below the surface. In the million years, more or less, that have elapsed since

matters quieted down, rain, wind, frost, snow, ice and running water have cracked the surface and made loose rock on top; its disintegration and dust storms made soil, trees and grass grow again, and in 1891 it was a grazing ground for cattle.

CLUE GIVEN BY BLUE BELL TUNNEL

The clue to the possible drainage of the basin by tunnels crossing the main course of the vein fissures, was first given by the Blue Bell tunnel, owned by a company, of whose leases I was in charge. This tunnel was a 200-ft. cross-cut from the gulch in the town of Anaconda and was driven to intersect a vein 50 ft. below the surface and at 9335 ft. elevation. The fissure on one wall of the vein was open, and about 6 in. wide, its sides being lined with quartz crystals, and the flow of water encountered was 200 gal. per min. Its effect, though slight, was clearly demonstrated in adjacent mine shafts. Then came the Ophelia, or as it was first known, the "Moffat-Bush" tunnel into Gold Hill, at 9268 ft. elevation with a discharge in 1896 of 2000 gal. per min. Then came the Standard tunnel at 9027 ft. elevation, from Gold Run west of Beacon Hill, with a maximum flow in 1899, of from 12,000 to 18,000 gal. per min. with a total length of 2800 ft. In 1903 came the El Paso tunnel, at 8930 ft. elevation, with a maximum flow in May, 1904, of 6848 gal. per min., and this was connected with the El Paso shaft in September, 1903. This, for the time, established the water level of the district.

THE PRESENT TUNNEL STARTED SEVEN YEARS AGO

Recently came the tunnel of the Cripple Creek Drainage & Tunnel Co., composed of the chief mining companies of the district, which in the last seven years has been driven three miles and is now in the phonolite plug of Beacon Hill; it has drained the 700-, 800- and 1000-ft. levels of the El Paso mine in an ore horizon approximately 500 ft. lower than ore has been opened in any other part of the district, and is correspondingly benefiting the deep mines of nearly the entire Cripple Creek area. This point was the most available for an economical tunnel project, as Beacon Hill is farther down Cripple Creek than any other and is consequently at the lowest altitude. The El Paso mine, being in Beacon Hill, was the first to be benefited by it.

The flow from the portal of the tunnel at present is about 10,000 gal. per min., the breast being in hard granite and not encountering any water courses. The present flow, however, comes mainly from a crosscut to the C. K. & N. vein, and it has been clearly established by the result of this and the two previous tunnels, that though Beacon Hill is a

plug or island of phonolite, in the granite area, its vein fissures have some connection with the main water-soaked, volcanic or breccia basin from which the tunnel head is still about 2000 ft. distant, for the recession in the large mines, in the west side of the district, is now about 30 in. per week. When the tunnel emerges from the impervious granite walls into the basin itself, the flow of water will probably be much greater, the recession much more rapid, and the mineralized area more equally benefited. The main line of the tunnel is now headed for a point within about a hundred feet of the Elkton shaft; it is 1420 ft. below the surface, and the total length from portal to breast is 16,400 feet.

Duty on Zinc from Imported Ores

WASHINGTON CORRESPONDENCE

Secretary McVeagh has sent an important letter to the surveyor of customs at Kansas City as follows: "The Department is in receipt of your letter of Jan. 13, in which, referring to the transportation to Philadelphia of spelter produced in bonded smelters in your district, you express the opinion that as only 90 per cent. of the spelter as shown by assay is forwarded to Philadelphia, duty should be collected at your port on the remaining 10 per cent. for the reason that the spelter forwarded to Philadelphia is withdrawn for consumption at that port.

"In reply, I have to state that, while the regulations upon this particular phase of the question are not very explicit, you will observe by reference to article 551 of the 'Customs Regulations' of 1908, that credit for the full amount of the duties charged on the imported ores used in the production of the bullion withdrawn for shipment to another port, should be given on the warehouse bond. It has been the practice at the various ports for years to construe this article as providing that where the products of a smelting or refining establishment are withdrawn for transportation to another port, the withdrawal for transportation shall show the total weight of the metal that was in the ore when imported; that is, if 90,000 lb. of metal were forwarded to another port, this quantity should be shown on the withdrawal for transportation, but duty should be extended upon 100,000 lb. and the warehouse bond canceled upon notice from the collector at the port to which the merchandise is forwarded that it has been received. If upon its arrival it is desired to withdraw the metal for consumption, a re-warehouse and withdrawal for consumption should be made at the port of destination, say Philadelphia, and duty collected at the appropriate rate upon 100,000 lb. The practice as outlined above is ap-

*965 Gas & Electric Building, Denver, Colo.

¹Professional Paper No. 54.

proved by the Department, and, therefore, no duty should be collected by you upon spelter which is withdrawn from a bonded warehouse for transportation to another port, as duty is only collected upon merchandise withdrawn for consumption."

RECORD OF IMPORTED ORES USED

In another letter addressed to the collector of customs at New York City, Secretary McVeagh says:

"Drawback is hereby allowed under section 25 of the tariff act of Aug. 5, 1909, and the regulations promulgated thereunder (T. D. 31695 of June 16, 1911) on spelter manufactured by the New Jersey Zinc Co. from imported oxide zinc ores. A manufacturing record shall be kept showing the lots or runs; date of manufacture; quantity and value of the imported ore consumed; dutiable metallic content, lead and zinc, as determined by Government assay; the quantity of domestic ores consumed, where the spelter is not produced entirely from imported ore, giving the lead and zinc content; the total lead and zinc content stated separately of all the ores used; the brand of spelter produced; the quantity; the zinc and lead content stated separately; the quantity of by-products or valuable waste, the zinc and lead content of such waste and the value thereof, and the loss or worthless waste, both as to zinc and lead. A sworn abstract from this record shall be filed with each drawback entry.

"In liquidation, the quantity of imported ore which may be taken as the basis for the estimation of the drawback may equal the quantity used as shown in the sworn abstract from the manufacturing record, an allowance being made for wastage depending upon the value of such waste. Where domestic ores are used in combination with imported ores the loss, valuable waste, and the zinc and lead content of the spelter shall be apportioned to such imported and domestic ores in accordance with the respective quantities of the several ores used and the respective zinc and lead contents thereof."

Cooling Pyrites Burner Gases

A recent patent (Fr. pat. 431,067) provides for the cooling of pyrites-burner gases by a circular tower built in sections, surrounded by an annular space for cooling water which connects with hollow vertical partitions crossing each section, the whole being built of lead and supported over a circular trough in which it is sealed by sulphuric acid.¹ The gases from the burners enter from the top and leave at the bottom, while the cooling water passes in the opposite direction through the cylindrical jacket and the hollow partitions. The burner gases, it is

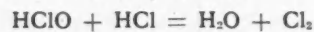
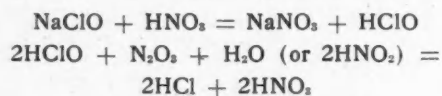
¹Journ. Soc. Chem. Ind., Dec. 15, 1911.

claimed, can be cooled from 500° C. to the ordinary temperature, and all the sulphuric-acid fog they contain separated as liquid. The lid of the apparatus is removable, and easy access is thus afforded for cleaning, which, however, is only necessary at long intervals.

New Kink in Iodide Copper Assays

The iodide method of copper determination has been considered by many chemists more accurate than the cyanide, but nevertheless rejected in favor of the latter, owing to its being somewhat shorter and requiring less manipulation. A modification is offered by E. C. Kendall¹ which he believes puts the two methods on a parity so far as ease is concerned.

The copper is supposed to have been brought into solution by means of nitric acid, and the innovation consists in the destruction of the residual nitrous acid by means of sodium hypochlorite, instead of by evaporation to dryness, or by bromine. The sodium hypochlorite reacts



with the free nitric acid in the solution to form sodium nitrate and hypochlorous acid. Hypochlorous acid and nitrous acid give nitric acid and hydrochloric acid. The hydrochloric acid formed reacts with the excess of hypochlorous acid to form water and free chlorine.

The free chlorine must also be removed, which is done with phenol. If the phenol be added drop by drop, colored oxidation compounds are formed which prevent a successful titration. The presence of a large amount of nitric acid also interferes, by formation of nitrophenol. Consequently the great excess of nitric acid should be neutralized first with caustic soda or potash, and then the phenol added quickly, preferably by forcing it with the breath through a pipette from which the tip has been removed. Under these conditions the chlorine forms an addition product. This is all preferably carried on in a flask, after which the gas above the solution is blown out, the flask washed down, and the solution immediately neutralized to prevent any possibility of nitrophenol formation.

STANDARD SOLUTIONS

The sodium hypochlorite solution is made by boiling 112 grams of calcium hypochlorite and 100 grams of anhydrous sodium carbonate in 1200 c.c. of water. Filter. The solution can then be made so that 1 c.c.=0.1 N sodium thiosulphate by adding 5 c.c. of the NaClO solution to

¹Journ. Am. Chem. Soc., Dec., 1911.

100 c.c. water, adding 5 c.c. KI solution, a few c.c. of dilute HCl, titrating with 0.1 N Na₂S₂O₃ and adjusting according to the results of this titration.

The other solutions are: 5% colorless solution of phenol; 20% caustic soda; 50% acetic acid; 30% potassium iodide; a 0.5% solution of Kahlbaum's soluble starch; and standard thiosulphate.

[The author recommends two Na₂S₂O₃ solutions, one in which 1 c.c. = 6 mg. Cu.; the other for finishing, in which 1 c.c. = 1 mg. Cu. The advisability of this for fast technical work is by no means clear.—EDITOR.]

The solution, before adding sodium hypochlorite should measure about 50 or 60 c.c.; the acidity be equal to 4 or 5 c.c. HNO₃ and the temperature about 75° F. Five c.c. of hypochlorite solution are added, and well mixed. The change of the color of the solution from clear blue to greenish, and the liberation of chlorine are indications that enough hypochlorite has been added. The reaction is somewhat slow and it is best to allow to stand two minutes before adding the phenol, which *must* be introduced as quickly as possible. Use 10 c.c. of the phenol solution. Blow out the flask, and wash down the sides, then add sodium hydrate until a white precipitate forms. Dissolve the precipitate with a few drops of acetic acid, add 10 c.c. of KI solution and titrate as usual.

Hudson River Tunnel Holed Through

The Hudson River tunnel at Storm King for the Catskill aqueduct, the deepest water-supply tunnel in the world, was "holed through," on Jan. 30, 1912. This tunnel forms a part of the long aqueduct from the Ashokan reservoir in the Catskill Mountains to the City of New York, and has been given much study on account of the great depth necessary in order to drive the tunnel in solid rock.

A contract for driving the tunnel between the shafts was let last spring to the T. A. Gillespie Co. On Jan. 30, a party of New York officials was lowered to the bottom of the east shaft, where Mayor Gaynor closed a switch, firing the final blast at the junction of the headings.

The tunnel, which is nearly 1200 ft. below the surface of the river, is remarkably free from water, and the rock through which it is driven is solid and free from seams. Less than a hundred feet of bench remains to be removed to complete the tunnel excavation, and the lining of the tunnel with concrete will then be started. The tunnel is of great importance to New York as it will bring water from the Catskills to replenish the Croton supply, now dangerously overtaxed.

PERSONAL

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

T. Lane Carter, of Chicago, is examining mines in Chihuahua, Mexico.

Frederick G. Clapp, of Pittsburg, is making examinations in the oil fields of Louisiana.

Pentecost Mitchell, vice-president of the Oliver Iron Mining Co., has been visiting the Mesabi Range.

Frank H. Probert has been in New York in consultation with the Ray Central and Proprietary Mines companies.

James Rutherford, of Victoria, B. C., sailed from New York, Feb. 1, for London, where he expects to stay about two months.

Henry D. Boddington, of El Paso, Tex., has gone to London on professional business, and will be there about three months.

F. M. Simonds, of Simonds & Burns, New York, is on his way to Colorado to visit the Rawley mine, at Bonanza, Saguache County.

W. L. Bowron has resigned as superintendent of the Gold Hill & Iowa Mines Co., at Quartzburg, Idaho, and has gone to California for a vacation.

A. L. Queneau, who has been in Europe on professional business for several months, expects to arrive home about the middle of February.

Charles J. Coll has resigned as general manager of the Acadia Coal Co., at Stelarton, N. S. He has been in charge of the mines for a number of years.

W. J. Loring, of Bewick, Moreing & Co., is expected to visit California in February or March when the Plymouth mine development in Amador County is under way.

W. T. Shepard, treasurer, and Hugh Kennedy, general manager, of the Rogers Brown Iron Co., are at Hibbing, Minn., to inspect the company's operations on the Mesabi Range.

W. J. Watson, of Ladysmith, Vancouver Island, has been appointed manager of the Tyee Copper Co., in British Columbia, in succession to W. H. Trewartha-James, who recently resigned.

E. V. Bray, of San Francisco, is in New York, on his way to the Dutch East Indies, where he will take charge of the installation and operation of an all-sliming mill for the Exploratie en Exploitatie Maatschappij Bolang Goudon.

Charles Whiting Baker, editor of *Engineering News*, last week completed 25 years of service on the staff of that journal. His friends and associates hope that the *News* may continue for many years to profit by Mr. Baker's energy, ability and capacity for work.

Norval J. Welsh, of San Antonio, Tex., has assumed the general management of the Mexican Mines Development Co., operating in the Santa Eulalia district, of Chihuahua, Mexico, and has established an office at 229 Avenida Independencia, in the city of Chihuahua.

M. C. Morris, general manager of the Horn Silver Mining Co., retired Feb. 1, on which date B. B. Lawrence, of New York, assumed charge as consulting engineer of all the company's property in Utah. Mr. Lawrence has appointed William H. Hendrickson under him as manager resident.

Dr. John C. Branner, vice-president of Leland Stanford, Jr., University, and head of the department of geology and mining, has been presented by the Philadelphia Academy of Natural Science with the Hayden Medal for the year 1912. This medal is conferred every three years on the man who, in the estimation of the academy, has done the most for the advancement of the geology and palæontology in that period. Dr. Branner is the fourth American to receive the medal, which was awarded first in 1888.

OBITUARY

John D. McKennan died at Pittsburg, Penn., Feb. 2, aged 58 years. He was born at Washington, Penn., and after graduating from college studied law and in 1877 opened an office in Pittsburg, where he became prominent as a corporation lawyer. He had been chief attorney for the Jones & Laughlin Steel Co. for almost 25 years, and prior to that time had represented the National Tube Co. He had also many years ago given legal advice to various coal and gas companies.

W. A. Stevens shot and killed himself at Oakland, Calif., Jan. 22. He was well known as a mining engineer in Idaho and Washington. He was a pioneer of the Cœur d'Alenes and later was general manager for Charles Sweeny in his extensive operations in the Buffalo Hump, Idaho, district. For a number of years he and his family resided at Spokane. From Buffalo Hump he went to Nevada and California, where he got control of valuable properties. About a year ago, in conjunction with Dan Greenwalt, he started a boom in the Steamboat Mountain camp in southern British Columbia.

Benjamin F. Pearson died at Halifax, N.S., Jan. 31, aged 57 years. He was born at Colchester, N. S., and was a leading promoter of industrial enterprises. In 1893, in conjunction with H. M. Whitney, of Boston and others, he organized the Dominion Coal Co. Six years later he took a prominent part in establishing the Dominion Iron & Steel Co. He promoted the Halifax Electric Tramway Co. and assisted in the organization of nu-

merous traction and power companies in Mexico, South America and the West Indies. Mr. Pearson entered political life in 1901 and was a member of the Nova Scotia government until a year ago. He was the proprietor of the *Halifax Chronicle*.

Charles Gilbert Wheeler died at Chicago, Jan. 30, aged 75 years. He was born at London, Ont., graduated from Harvard in 1858, a bachelor of science, and studied in German universities. He was assistant state geologist of Missouri from 1859 to 1861; was United States Consul at Nuremberg from 1862 to 1867; traveled in Europe and North Africa in 1867-8; and became professor of chemistry in the University of Chicago and the Chicago Medical College in 1868. Prof. Wheeler made frequent visits to Mexico and Central America, examining mines for American capitalists, between 1868 and 1900. He was a scientific expert for the Bell Telephone Co. and other companies in litigation. As he read 11 modern languages and spoke seven, he was state commissioner from Illinois to the Vienna Exposition in 1873. He was geologist and interpreter on the commission to examine the route for the Nicaragua canal in 1899.

Societies and Technical Schools

Canadian Mining Institute—The officers elected by the Cobalt branch of the institute for the coming year were: Norman Fisher, chairman; A. A. Cole, secretary; Messrs. Reinhardt, Neilly and McVichie, committee.

American Society of Mechanical Engineers—The monthly meeting will be held at the Engineering Building, New York, Feb. 13. A paper on the "California Gold Dredge" will be read by Robert E. Cranston. Several members of the Institute of Mining Engineers will join in discussing the paper.

Minnesota Alumni Association of the Michigan College of Mines—This association will hold its annual banquet on Feb. 22, at Hibbing, Minn. All graduates of the College of Mines will be welcome at the banquet, and should send notice that they intend to be present to A. L. Gerry, secretary, at Hibbing.

American Institute of Mining Engineers—The institute will hold its mid-winter meeting in the United Engineering Building, New York, on Feb. 19, 20 and 21. This meeting was formerly only a business meeting, but it is the intention this year to enlarge its scope by reading and discussion of papers, and also the promoting of social intercourse among the members. On the evening of Feb. 19 there will be a general reception in the institute rooms. On Feb. 20 and 21 there will be morning and afternoon sessions. On the evening of Feb. 20 there will be a dinner at the Plaza Hotel to members and their guests.

Editorial Correspondence

From our Representatives at Important Mining Centers

San Francisco

Feb. 1—The second severe storm of the winter, threatening the mining districts of California with a shortage of water for power purposes, occurred from Jan. 23 to 26. In the higher elevations the ditches had scarcely been cleared from the December snow and freeze when the second heavy snowfall came suddenly. But it was of short duration, and in a portion of the northern end of the state the precipitation was in the form of rain.

The report is current that the Hill railroad interests are looking for a rail outlet from Oregon into northern California, through Feather River Cañon. The line is said to have been surveyed from the mouth of Butte Creek into the Big Meadows and thence into Lassen County, and that construction will extend south from Alturas, Modoc County, into Lassen, and on further south. This would give a direct outlet for the cattle and mining sections of Modoc County, to San Francisco. The completion of the extension of the Nevada-California-Oregon R.R. through northeastern Modoc County to Lakeview, Ore., means the opening up of what is believed to be a high-grade prospective gold camp northwest of Fort Bidwell and extending to New Pine Creek on the southern edge of Oregon. In the last year there has been a large amount of prospecting and development in that section in what has long been known as the Hoag district. The immediate neighborhood has been the base of considerable energy by Colorado and Utah mining investors, though attracting little attention of California mining men except at Los Angeles. All reports from the new camp, which has been named High-grade, have it that there has been some good ore disclosed and that much of it is of high grade. Many of the reports have been apparently exaggerated; and there have been instances of effort on the part of speculators to induce investments on the bare chance of finding something of value. But this feature, of course, is common in the opening of new camps. The favorable indication in the present prospect of opening a valuable camp is in the fact that a good deal of development was done in the latter half of the year without causing any undue excitement. Just now there is enough snow in that region to discourage any rush; but the prospect of an early season is good, and the first two or three months of the

season will doubtless decide whether there is merit in the new camp.

Denver

Feb. 2—In the Camp Bird mine, at Ouray, some good ore has just been opened, and is being mined, in one of the old Gertrude shoots on the main vein. This shoot appears to carry its rich ore deeper than the other ones, which gave out at approximately the same depth, and this one also had begun to narrow in the same way, but unexpectedly opened out again. No new vein has been found, reports to the contrary notwithstanding. The workings in this great mine are approximately two miles in length. The Gertrude shoots are east of the original crosscut tunnel, and in that direction the limit of pay ground in the company's holdings is sharply defined by a vein called the Hancock & Tuscola, which crosses the company's ground in a northwest-southeast direction, and beyond which no pay ore has been found.

The largely increased tonnage of Cripple Creek gold ore handled at the various mills during January may, in all probability, be properly attributed to the unwatering of the deep levels of several of the largest mines by the drainage tunnel. The gross amount treated was 69,726 tons with a gross value of \$1,285,971. The whole camp is in excellent condition and unusually lively. The success of the drainage tunnel started everyone digging again, and new discoveries began to be made. On the Pride of Cripple Creek, on Iron Clad Hill, after nine years of work, and when about to pull out his machines, Fred Johnson, lessee, opened a flat vein, 6 ft. thick, of 5-oz. gold ore, and has a 6-months' supply of ore in sight already; on Tenderfoot Hill, Peter Timmons, lessee in the Emma Abbott, has opened 6 in. of ore that shows by assay \$500 per ton. The most sensational strike, however, is reported from the Mary McKinney mine, of 6 in. of sylvanite that runs from 5 to 20 oz. gold per ton. This was found on the 800 level.

The net profit of the Vindicator Gold Mining Co. for the last year, according to the annual report, was \$238,804, and a total of \$2,452,500 in dividends has been distributed among the stockholders. In the Cripple Creek district in January, a total of 30,233 tons was shipped, with a gross value of \$830,322.

The demands of the Colorado Mining and Metallurgical Association, of which State Treasurer Rody Kenehan is presi-

dent, for a government ore-testing plant, has resulted in a telegram from Congressman A. W. Rucker, calling for succinct data as to the grounds on which this association has petitioned the government to establish an experimental ore-testing station at Silverton, in the southwest corner of the state. According to the opinions of the most prominent and experienced mining engineers of the state, it will be exceedingly difficult to show the government valid reason for the demand.

An advance in the price of cement in Colorado is now expected, due to the formation of a \$25,000,000 merger of 15 of the principal companies doing business in Kansas. The price war in Kansas forced the Colorado concerns to meet the low prices made in the former state, and cement has been selling here for about \$1.25 per bbl. However, the main point is that when cement was up to \$2.60 per bbl. a few years ago, it did not check building, and a reasonable advance in price now will not have any effect on the active building movement going on in Denver.

Butte

Jan. 31—When the present lease on the Basin Reduction Works, held by the Butte & Superior company, expires June 1, it now seems assured that the new concentrator under construction at the Butte & Superior mine will be completed and ready for successful operation, for the work is going along rapidly. Construction of the ore-crushing house is well under way, and the crusher and motor to drive it are in place below the orebins at the shaft collar. The receiving tank is also finished; this tank is constructed of steel and holds 300 tons of ore; the latter will be conveyed from the crusher, at the shaft, by a belt conveyor. The main concentrator building will be completely inclosed within three weeks, and the three Chilean mills are being installed. These mills receive the ore after it has passed through the rolls, which are in turn supplied from the crushed-ore bins, having a holding capacity of 2000 tons. Three cars of machinery have arrived and this will be installed as fast as the portions of the concentrator containing them are completed. There are 300 men employed in the construction work. At present there are about 2,000,000 tons of ore blocked out in the mine, which carry an average of 23% zinc and some gold and silver, and with the saving in treatment charges

which is expected to be made through the new mill by reason of the doing away with transportation costs, and the use of the latest improved machinery and methods for handling zinc ore, it is figured that the company will earn the equivalent of its par value, \$10, on every share of stock. Capt. A. B. Wolvin, president of the company, is in Butte inspecting the property, and expects to be joined soon by several of the directors and by a member of the firm of Hayden, Stone & Co., of Boston.

Ground has been broken for the construction of the 200-ton concentrator at the Ophir mine of the Butte Central Copper Co., and it is expected that the first unit of the plant will be in commission by July 1. The cost of the mill will be about \$100,000, which has been advanced by the syndicate of Canadian bankers that advanced the company \$200,000, more than a year ago, on the strength of an examination by their engineers, and in consideration of obtaining a substantial stock interest; most of this money has been used since then in developing the property to its present state.

Salt Lake City

Feb. 1—Increased production was made by Utah during 1911 in all metals except zinc. The amount of zinc ores mined, however, was not greatly different from that of the year preceding. The Park City mines produced an increased tonnage of silver-lead ores from which zinc is obtained as a byproduct; the Scranton mine, in north Tintic, increased its output of zinc ores, while more ore containing zinc was mined in Bingham than during 1910. The apparent decrease in the production of this metal was not because there was appreciably less zinc ore mined, but because there was less of it marketed. There has been an accumulation of zinc ore and concentrates by some Park City properties, which did not reach the market, and consequently did not show in the output for the last year, as previously noted.

The case of the Conkling Mining Co., against the Silver King Coalition Mines Co., involving an accounting for ore taken from the Elephant stope in the Conkling claim, owned jointly, came up for trial in the Federal court before Judge Marshall, Jan. 29. The complaint filed some time ago charges the extraction of ore worth more than \$700,000 from the Conkling lode claim, in which the plaintiff company has a three-fourths interest. The Silver King Coalition Co., claims to have been entirely within its rights in entering the Conkling claim, the contention being based on two principal points at issue: First, that the Coalition has the apex of the fissure vein, which produced the ore in the Elephant stope; the second point at issue is the question as to the position of the west-

erly endline of the claim, which according to the defendant is situated 135 ft. east of where it is claimed to be by the plaintiff. Practically all of the ore in the Elephant stope occurs under the disputed portion of the claim. The defendant company is presenting its side of the case first.

At a meeting held by the mining committee of the Commercial Club, steps were taken to get in touch with the Utah delegation in Congress, on the matter of the tariff reduction on lead and zinc. Members of this committee, together with the Utah Development League and others, telegraphed to Senators Smoot and Sutherland and to Representative Howell, protesting against the reduction of the tariff on zinc and lead, and urging them to use their best efforts against the passage of the legislation now pending in this matter. The Underwood bill provides that zinc ores shall enter the United States free of duty, while the schedule on pig lead is to be reduced to 25 per cent., ad valorem. This bill has been approved by the House and will soon be sent to the Senate for consideration. During 1911, Utah lead mines produced approximately 117,593,855 lb. of lead valued at \$5,197,648, while the production of zinc was approximately 10,541,198 lb., valued at \$601,902. The reduction of the tariff on these metals would mean a reduction in the market price, and the necessity of competing with lead from Mexico.

Negaunee, Mich.

Feb. 2—The Breitung-Kaufman mining companies and the Cleveland-Cliffs Iron Co. have paid their taxes at Ishpeming and Negaunee under protest, but the Oliver Iron Mining Co. and the Jones & Laughlin companies have paid without protest. The tax of the Cleveland-Cliffs Iron Co., in Ishpeming and Negaunee, which does not include their mines in the Gwinn district, is over \$250,000. The protests deny the validity of the taxes and the method of assessment upon which they are based which was the result of the valuation of the mines by J. R. Finlay, under instruction from the Michigan Tax Commission. It is claimed that property in the district other than the mines is assessed at not exceeding one-third of its actual value. The officials of the companies charge that the Tax Commission over-assessed the mines with the full knowledge that such assessment was excessive.

Wallace, Ida.

Jan. 30—The Chicago & Northwestern Ry. has completed plans whereby it is to have a through line to the north Pacific coast. The road controls the Pittsburg & Gilmore R.R., which will take the C. & N. W. Ry. to Salmon City. From there the line will be built down the Salmon River to Lewiston and thence to Port-

land, Ore. This line will open the great lead deposits which are known to exist north of Salmon City. One property in that district has made a profit of \$50,000 in spite of the fact that the ore was hauled 85 miles by team. The property was a lead mine.

Another of the plans of the Northwestern is to go south along the middle fork of the Salmon River to its headwaters, thence through the Sawtooth Mountains to the Payette River. This line will terminate at Coos Bay. R. N. Bell, the Idaho state mine inspector, recently made a favorable report on this region.

Toronto

Feb. 3—It is understood that as a result of the strong pressure recently brought to bear on the Canadian Government by the iron and steel interests, the bounty on pig iron abolished by the late administration, will be renewed as a temporary measure of relief, pending investigation by the Tariff Commission, soon to be appointed, into the whole question of protection for the iron and steel industry. The bounty in operation in 1910 was 90c. per ton on pig iron manufactured from Canadian ore and 40c. per ton on the output from foreign ore. It is now proposed to increase this to \$1.50 on pig iron made from native and \$1 on that produced from foreign ore.

The establishment of a large steel plant at Port Arthur by Mackenzie & Mann, of the Canadian Northern Ry., in conjunction with other large Canadian and American interests, is under consideration and it is announced that the project depends upon the course of the government as regards the bounties.

Porcupine

Feb. 1—Interest in Porcupine during the week has centered around the report on the Hollinger by Manager Robbins. This report has been expected for some time, and is the first important statement of its kind from any of the larger properties. While the report may be a disappointment to the brokers and speculative element, it is a gratifying surprise to the majority of mining men. The grade of the ore is higher than was generally anticipated, averaging, as it does, \$22 per ton.

The proposed insurrection by the Temiskaming shareholders against the Cartwright control, appears unlikely to amount to anything. The dissatisfied shareholders in the United States sent delegates to examine and report on the Temiskaming property in Cobalt, and the North Dome in Porcupine, the purchase of which has caused all the trouble. The delegates made an examination of the properties, and expressed themselves as being entirely in accord with the actions of the Temiskaming management.

The Mining News

The Current History of Mining

Arizona GILA COUNTY

Miami—Churn drilling has just been started near No. 3 shaft about 1500 ft. northeast of the present orebody. This shaft is 460 ft. deep and is reported to be bottomed in chalcocite ore averaging about 2% copper.

Inspiration—No announcement has yet been made as to when the construction of the 7500-ton mill by the Inspiration Consolidated Copper Co. will begin. Work is progressing on the water-supply dam and J. M. Callow is still trying out the proposed flowsheet in the experimental mill. Underground development has not been started.

Live Oak—Development of the mine in a small way continues. A 15x20, double-drum hoist has been purchased from the Old Dominion company and will be erected at No. 2 shaft, which will be enlarged to three compartments. According to present intentions of the management, future increase of ore reserves will be accomplished by underground work rather than by churn drilling. Aggressive development appears to be waiting on the result of the recent examination by W. H. Aldridge and Dr. L. D. Ricketts.

Southwestern Miami—Churn-drill hole No. 2 is over 550 ft. deep.

Barney—Drilling continues steadily on this group, under option to the Lewisohns. A hole was recently started at the bottom of the 400-ft. shaft, about 3000 ft. west of the Live Oak west end-line. The hole is in schist.

New State—Six men are employed in the development of this group of 33 claims, on lower Pinto Creek, 15 miles west of Globe. On the Republic claim, a trench was started on the Duquesne vein and is reported to have disclosed, near the surface, from 1 to 3 ft. of shipping ore, carrying gold, silver and copper. The ore occurs in limestone. There are 20 tons of ore on the dump and preparations are being made to ship.

Duquesne—Smeltery returns on a car of ore recently shipped to the El Paso smeltery from this mine, 15 miles west of Globe, gave credit for 39 tons of ore assaying 0.76 oz. gold, 13.6% lead, 17.8% iron and 33% insoluble. The net returns above freight and smeltery charges amounted to about \$18 per ton. John Shaw is in charge of the property.

Copper & Silver Zone—A car of lead-silver ore has just been shipped to the El

Paso smeltery from this group of claims two miles east of Globe, which is owned by H. W. Clark and associates, and is being worked by several parties of lessees.

Superior & Boston—The crosscut north, from the McGaw shaft on the 12th level, has cut a vein reported to be 4 ft. wide and to carry copper ore of a good smelting grade. Specimens of the ore show the copper to occur as chalcopyrite, associated with pyrite and considerable hematite.

Five Points—Seven men are employed at the mine which is being developed by the Manitou Copper Co., under the management of A. T. Hammons, of Globe. The Cracker Jim shaft has been unwatered and a 25-hp. gasoline hoist has been erected. The shaft is 125 ft. deep and sinking will be resumed soon. It is proposed to crosscut to the Maverick vein at 200 ft. from which some high-grade copper ore has been extracted.

PINAL COUNTY

Ray Consolidated—There are rumors that this company is considering the purchase of the property of the Ray Central, which adjoins it.

California AMADOR COUNTY

Bunker Hill—In the six months ended Dec. 31, 1911, the 40-stamp mill crushed 35,526 tons of ore and operating expenses were \$108,000. The ore was average grade.

Keystone—Repairing the shaft is progressing with three full shifts. Difficulty of getting timbers has delayed the work, the timber supply having been exhausted when the mine was closed. C. R. Downs is superintendent.

Plymouth Consolidated—Installation of the electric pump will be completed and pumping will begin about Feb. 15. J. F. Parks, Plymouth, is superintendent.

South Jackson—A pipe-line is being laid for supplying water to the mine. The concrete foundation for the new hoist will be constructed soon.

Daphne—This gravel mine near Plymouth has been leased to R. C. Brown, of Jackson. It is said the royalty agreed on is 20% of the gross output.

Rose—Grading for the foundation for a new 20-stamp mill has been completed at this mine, sometimes called the Poundstone, near Sutter Creek. Thirty men are employed. Development underground

has shown good results. L. R. Poundstone is manager.

BUTTE COUNTY

Leggett Gold Mining Co.—A decree of foreclosure has been rendered in the Superior court, in favor of the Bank of Rideout, Smith & Co., on a mortgage of \$3000 on a dredge in operation.

Oro Electric Co.—The survey for a line of towers between Oroville and Marysville has been discontinued and the surveyors sent to Magalia to begin a new route across the valley to Willows in Glen County. H. H. Dewell has superseded S. M. Fisher as engineer in charge.

CALAVERAS COUNTY

Petticoat—The machinery of the Illinois mine is being removed to this mine at Railroad Flat, which will be reopened by a new company. Joseph King is superintendent.

Comet—A vein of good ore is being developed and milled at the mine at Railroad Flat. Mr. Harrington is superintendent.

Gwin—Negotiations are reported to be underway for building a spur from Valley Springs to this mine.

ELDORADO COUNTY

Stony Bar—Uncovering of rich gravel in this mine near Chili bar 21 miles from Placerville bridge has induced work preparatory to the installation of an hydraulic elevator. John and George Luse, and James and William Ober are working the mine.

INYO COUNTY

Santa Rosa—This mine is now a regular shipper of smelting ore. It is wagon-hauled to the railroad at Keeler. A new 3-ft. vein was disclosed in December. J. J. Gunn, of Independence, and other men of Tonopah, Nev., are owners.

Bullion—A good orebody has been opened at the 325-ft. level. The ore is being milled at the Southern Belle mill. Five new stamps are being installed, making a total of 10. The mine is being operated by L. W. Thompson, of Los Angeles.

Arondo—Sixteen miners and carmen are said to have been added recently to the force at the mine, and an increase in the mill and cyanide plant is contemplated.

Skidoo—During December 1654 tons of ore were crushed, producing total receipts of \$14,336. Development costs

were \$784; operation, \$7478; net profits, \$6073. On Dec. 1, the cyanide plant closed for the winter.

SHASTA COUNTY

Balaklava—Contrary to reports, it is officially stated that operations at the plants at Coram will not be resumed soon. An appeal to the courts is being considered, asking for the appointment of an arbitration committee to investigate alleged damages from the Selby smeltery fumes.

Bully Hill—It is believed locally that the property will operate again this spring, with the electric zinc recovery process, which is reported to have passed the experimental stage.

Yuba—This property, in December, is stated to have broken the record for low cost in placer mining. One of its 12 dredges cost \$327,000; in December it handled 320,000 cu.yd. of gravel at a reported cost of 1.85c. per yard.

YUBA COUNTY

Tarr Mining Co.—F. W. Tarr, vice-president and general manager, has announced his resignation. He has been managing director of the company for several years. The dry-land dredging plant and the 35-mile ditch from Grass Valley were constructed under his engineering supervision. The mine is an old hydraulic operation at Smartville. Pres. J. Thompson states that operations will begin soon. There have been various announcements of the installation and beginning of work at the new plant, which is an engineering experiment.

Colorado

CLEAR CREEK AND GILPIN COUNTIES

American Sisters—This old mine on Columbian Mountain is the scene of an important strike; in sinking the Headlight shaft 100 ft. from the 285-ft. level a vein of gray copper ore has been followed, and by the first test shipment shows 1000 oz. silver, 3.50 oz. gold and 28% lead per ton. Stopping has commenced and the shaft will be sunk another lift. As there are large bodies of mill ore in the upper levels, the 50-ton concentrator will be repaired and put in commission when water is available. Four months ago this property was leased for five years by the Mollie B. Mining Company.

Columbia—In the Central City district Steven Laner is operating a paying lease in this vein on the eastern slope of Quartz Hill. The ore is mined 200 ft. below the tunnel level. It is low-grade ore, but the crevice is a wide one and the ore is easily broken, which gives the lessees a fair margin of profit.

Baker—The crevice is about 3½ ft. wide and has been opened for nearly 1000 ft. on this property on Quartz Hill. It is being operated as a paying lease by Simmons & Roberts.

CRIPPLE CREEK DISTRICT

In the main heading of the drainage tunnel, water is shooting into the tunnel for several feet with a high pressure, and every round of shots brings more. It is difficult to make headway.

Isabella—A bitter fight for the control is being waged between James F. Burns, of the Portland, and A. C. Gardner, which will be decided at the general meeting at Cheyenne, Wyo., on Feb. 5. Circular letters are being sent out and charges and counter charges as to the efficiency of the management made by both sides. The royalties paid the company in January were \$3500; \$7000 being the total revenue.

Wild Horse—It is reported that this mill on Bull Hill is handling 1500 tons per month, with a 90% extraction by straight cyanidation, and also that the profits from the mill are paying the cost of developing the mine.

Gold Sovereign—About a car per day is being sent out by the Union Leasing Co. from the recent strike in this mine on Bull Hill; the ore runs from \$15 to \$50 per ton.

Trilby—This company will sink its shaft on Bull Hill, from 960 ft. to 1100 ft., and laterals will then be run to get into the oreshoots which have been producing in levels above this depth for two years.

Moose—Two cars of good ore have been shipped by Dwight Babcock from his lease on the fourth level of this mine on Raven Hill.

Stratton's Independence—During December, production totaled 2085 tons, averaging \$24.72 per ton. Low-grade mine and mill ore, amounting to 5200 tons, was treated. Net profit from mine and mill was \$16,150, and \$1400 were expended on special development. The mill was shut down for 10 days during the month.

LAKE COUNTY—LEADVILLE

Great Hope—The discovery, recently mentioned, of a new body of ore in this mine on the north side of Breece Hill, Big Evans Gulch, is reported now to have developed into a good body of ore running about 4 oz. gold per ton, average value. This ore, found by Thomas Gilroy, lessee, is about 150 ft. deeper than that mined in the upper plane, 17 years ago, and quite possibly is the same oreshoot.

Jolly—In addition to the lead ore found in the raise put up by the lessees at this mine at the head of East 5th Street, a fine body of iron ore carrying silver has been found.

OURAY COUNTY

Wanakah—Another important strike is chronicled in this company's property in the sandstone and quartzite cliffs below the town, and was made on

the Diamond claim. In this section the ore has been found in a succession of caves caused by the oxidation of the auriferous pyrite. The total thickness of the sedimentaries is about 1000 ft. here and they are intersected by a strong diorite dike which is supposed to be responsible for the gold in the horizontal deposits.

Barstow—This mine is in the Red Mountain district near Ironton and it is reported that the shaft recently sunk 160 ft. shows 5 ft. of ore for the entire distance; milling will resume when the present severe winter-weather conditions become more favorable.

Idaho

COEUR D'ALENE DISTRICT

Gold Hunter—A rich strike was made in this mine recently, in a crosscut from the 200-ft. level, below No. 6 tunnel. The length of the new orebody has not yet been determined. About 30% of the width of the vein is clean shipping ore and the samples taken show that the entire 12 ft. will run 45% lead and 67 oz. of silver. The mill is again running at full capacity. The continued cold caused a shortage of water but since the thaw the water supply has been normal. This property is situated east of Mullan and has been a steady producer for many years, but has always been worked on a small scale.

Beartop-Orofino—The ore now being taken from this mine in the north side section is sufficient to run the mill 24 hours per day. The concentrates are being shipped regularly. A new tunnel has been started to open up a new level. While the development is going on, the upper levels are being stoped. This new level will open up the Orofino orebody as well as that of the Beartop. The consolidation of these two properties insures each against the litigation, which would probably have arisen, had the properties remained under two separate managements. Both orebodies are unusually rich and if they do not diminish greatly with depth the mine should be a large producer.

Lucky Calumet—This company has installed its new compressor and will soon start work on the long tunnel. The property's end lines adjoin those of the Snowshoe, in which some excellent copper ore was found.

Kansas

Diplomat—This mine at Galena hoisted 1031 cans of dirt, 165 ft. in a 9-hr. shift. An electric hoist was used. This is 114% cans per hour.

S. H. & S.—The mill of this company, at Peacock, burned to the ground entailing a loss of \$20,000. The mill will be rebuilt. O. W. Sparks, of Galena, is manager.

Michigan
COPPER

Calumet & Hecla—The company is reported to have awarded a contract to the Allis-Chalmers Co. for a 10,000-kw. turbine engine, to cost about \$250,000, and for use at the mills at Lake Linden. It is said that this is the largest mixed-pressure turbine engine ever ordered in the United States. The engine will supply approximately 13,333 hp., 3000 of which will be used to operate the concentrating machinery in the new regrinding plant. It is stated that the new turbine will operate on exhaust steam from the stamps.

Hussey-Howe—This company has been organized under Michigan laws, with 100,000 shares, par \$25. Of these, 54,000 will be issued full-paid and nonassessable, 45,000 of which will go to the property owners. It is reported that the remaining 9000 issued shares will be sold publicly at \$10 per share. The property comprises 320 acres of land near the Indiana and Bohemia tracts. The directors are all Pittsburg men, except C. A. Senecal, who is a resident of Lake Linden. No work has been done on the property.

Ojibway—The test mill run, extending over several months, was completed Jan. 31, and it is reported that the rock stamped has averaged about 15.8 lb. copper per ton, exclusive of mass and barrel work. This is expected to bring the yield to 18 lb. per ton.

Franklin—The mine, after several years of underground development and surface additions, resumed shipping recently at the rate of about 1200 tons per day. Mining is being done on the Pewabic lode, and on the levels below the 20th and extending to the bottom or 33d level. Many improvements have been made to the rockhouse and mill, a new hoist installed, and costs are expected in the future to be more in keeping with the best Lake practice.

Mayflower—It is reported that a consolidation is being planned to include this and the Old Colony. The properties adjoin and could be advantageously worked as one mine. W. J. Uren, former general superintendent of the Bigelow Syndicate mines, has been mentioned as general manager of the proposed merger.

Winona—Working forces are being increased preparatory to doubling the output. The second stamphead is expected to start soon. The first unit of the mill is treating about 600 tons per day, from which an extraction of about 70% is said to be made. Tailing losses are still reported as high.

Isle Royale—It is reported that the directors have come to no final conclusion as regards plans for expansion. Enlargement of stamping facilities is believed to be under consideration.

IRON

The work of installing the electrical machinery at the new Carp River power plant, near Marquette, by the Allis-Chalmers Co., has been delayed by the burning out of the three transformers, which were being dried in preparation for starting the plant. The power house will furnish power to the mines of the Cleveland-Cliffs Iron Co. The concrete dam, four miles up the river, is practically completed and most of the men have been released.

Peninsula Power Co.—This company, which is completing a new power house and dam, at Twin Falls, near Iron Mountain, has begun work at Iron River on the site of the proposed substation, to be situated there for furnishing power to the mines. The property lies between the Sheridan mine siding and the main line of the Chicago & Northwestern Ry. tracks, and is part of the MacKinnon lands.

Norman—Two diamond drills are being operated at this property, seven miles northwest of Republic. The Cole & McDonald Exploration Co. is doing the work for the Jones & Laughlin company, which has an option from the Norman Iron Company.

American—This hard-ore mine of M. A. Hanna & Co., situated on the Marquette Range, is installing a system of efficiency engineering in its underground work, under the direction of W. C. Hart and Stanley Mahon.

Rogers—The Munro Iron Mining Co. has let a contract to Worden, Allen & Co., of Milwaukee, to erect extensive mine buildings and a shafthouse at this mine, near Iron River. The shafthouse, which will include a crusher house and orebin, will be of steel, and 140 ft. in height. The buildings will be of steel and brick, of the following dimensions: Boiler house, 48x66 ft.; engine house, 48x128 ft.; machine-blacksmith-wood shop, 48x160 ft.; warehouse, 40x96 ft.; dry, 40x96 ft. The work of erection will be started about Mar. 1, and will be completed about June 1.

Minnesota
MESABI RANGE

Wilrichfern—At this mine, at Buhl, operated by E. Richards, of Virginia, and J. Redfern, of Hibbing, Minn., work is being pushed rapidly. Drifting has been commenced in the ore, which is of good grade.

Lincoln—This mine, operated by the Jones & Laughlin Steel Co., is working about to capacity. Activity is commencing at other properties in the Virginia district, and forces are being increased.

Buffalo & Susquehanna—The Rogers Brown Ore Co. has started test-pitting at this property. The pits are being put down in 100-ft. squares, and are sampled every 5 ft. in depth.

Petit—This mine, at Gilbert, will be opened soon, and will be one of the large shippers this season.

Schley-Minethey—The mine, situated at Gilbert, is taking on more men and will have a crew of 430 men by Feb. 1. Both this and the Petit mine are operated by the Republic Iron & Steel Company.

Leetonia—The new vertical shaft is down to the orebody, and will be in operation early this season; it will increase this property's output considerably.

Missouri

Davy Crockett—This mine near Carthage is to be reopened under the management of John Durby.

Independence—The Panama mill, at Central City, is being moved to this mine in Gordon Hollow. G. M. Burke, of Joplin, is manager.

Hecma—This company, at Joplin, is sinking an air shaft.

Wilcox Mines Co.—This company, operating the John Jackson mine at Chitwood, has gone into bankruptcy.

Montana

BUTTE DISTRICT

Ophir—The south vein on the 500-ft. level was cut recently and drifted on for 30 ft., opening an average of 6 ft. of commercial ore, similar to that on the 300-ft. level. The 500-ft. level is the lowest being worked at present, and like the 200-, 300- and 400-ft. levels, contains principally silver and gold ore of a concentrating grade; however, at the 1050-ft. level, the bottom of the shaft, there is good silver ore, and the copper content increases at that depth, which leads the management to hope that eventually the lower levels will be found to contain commercial copper, for which metal mining was instigated there originally. Meanwhile production will come from the four upper levels in the immediate future, and will consist of silver and gold ore.

Davis-Daly—Since the cutting down of high-salaried officials and officers of the company and enlisting the efficient services of W. B. Fisher, the present manager, the company's affairs are beginning to look more prosperous than formerly, and it appears probable that the mine will soon be on a paying basis. During December about \$15,000 worth of ore was shipped to the smeltery and the amount for January will probably be as great or larger. Work is being carried on energetically and although no large veins have as yet been discovered, several small bodies of rich ore have been encountered.

Laurium-Montana—This company, owning nine claims about 3.5 miles south of Butte, is pushing development work on the property. Several veins, trace-

able through the property, have been prospected by opencuts and shallow shafts, and on the Montana claim a shaft has been sunk on the vein; this has shown up good gold ore, and the company is at present driving a crosscut tunnel to intersect this vein at depth. This tunnel has been driven nearly 200 ft. and is expected to strike the vein soon. The veins appear to be true fissure veins in a country rock of hard granite, similar or identical to that in the Butte district; also the strike of the veins is in a general east and west direction, with a south dip similar to the Butte vein system.

JEFFERSON COUNTY

Elkhorn & Duluth Development Co.—The first car of silicious silver ore from the C. & D. mine has been shipped to the smeltery. This marks an epoch in development in this camp as the ores from the old workings were an oxidized iron-gold-lead ore. Development on this silver lode promises well, the lode being a fissure standing almost vertical and cutting the dolomite and lime formations indifferently.

Union—A lease and bond has been given on this silver-lead property. It was worked a number of years ago, and produced a shipping ore of \$30 grade. Smelting rates now favor the operation of this class of ore by about \$3 per ton, while available electric power and advances in milling methods and facilities add materially to the net profit in operation.

Elkhorn Silver Mining Co.—This company continues the employment of about 150 men. The company is also developing the Sophia claim, sinking a new shaft below the old workings. The ore-body lies well in the foot wall.

Dolcoath—A lease and bond has been given by the owners on this claim near the town limits of Elkhorn and work will be started soon.

Nevada

COMSTOCK LODGE

Mexican—A cleanup was made recently on the run for January and the returns were substantial, although pay ore was not put through the batteries until the last two weeks of the month. The average capacity for the month was 50 tons per day, just half the designed amount, but a larger classifier is being installed, which will bring the plant up to 100 tons per day. It is estimated that about 10 days will be necessary to complete the addition of the larger equipment.

Ophir—The south drift of the 2100-ft. level that has been skirting the early-day stopes of the Hardy vein, has now reached virgin ground and is following a small streak of low-grade ore in place. The ground to the north of the old workings has produced over \$1,000,000 in

bullion, the last two years, and it is now proposed to open the ground to the south and explore it thoroughly.

United Comstock Pumping Association—At the Ward shaft a flow of water has been tapped on the 2450 level in the Combination shaft connecting drift, and the unexpected result has been to lower the water in the Gold Hill section. At the incline station of the Yellow Jacket the water has receded at the rate of 2 in. per day since it was tapped. Work continues clearing out the old workings on the 2000 level, where the Gold Hill drainage will be attempted through the old bulkhead. The motors for the new pumps at the C. & C. shaft have arrived in San Francisco and are now being fitted and adjusted to the pumps. The equipment will be shipped to Virginia City soon.

Crown Point—A large tonnage of low-grade ore was stoped from the 1400 level recently, the recovery being more than \$3000. The annual report for 1911 shows that 14,176 tons of ore were extracted, giving a bullion yield of \$67,777. The average battery assay of the ore was \$5.89 per ton, indicating that low-grade ore on the Comstock lode can be handled at a good profit.

CHURCHILL COUNTY

Nevada Wonder—The mill is partly closed down owing to lack of power. The company which supplies the power has been hampered by the freezing of part of its supply.

ELKO COUNTY

Esmeralda—A vein of rich ore was recently opened in this group of claims. The camp is known as Gold Circle and suffers principally from lack of power and transportation facilities.

ESMERALDA COUNTY

Goldfield-Belmont—President Heller has stated that the company will soon make another shipment of high-grade ore, which was taken out in developing.

Goldfield Consolidated—The estimated January production was 28,870 tons of a gross value of \$683,000. Operating expenses were \$220,000 and \$463,000 are estimated as the total net realization. During the quarter ended Dec. 31, 1911, 88,381 tons were treated, yielding \$2,243,596 gross and \$1,586,738 net.

HUMBOLDT COUNTY

A 15-ft. vein of \$12 ore was found recently on the north side of Winnemucca Mountain. The find has caused considerable interest locally and the surrounding country has been thoroughly staked.

LINCOLN COUNTY

Nevada-Utah—A meeting of creditors of the corporation was held on Feb. 2 at the office of Peter B. Olney, referee in bankruptcy, New York, to prove claims

and elect a trustee. Henry Melville, the receiver, was unanimously elected trustee. He said that he had not found any money yet to receive. Robert G. Mead, president of the company, was briefly examined concerning its affairs.

LYON COUNTY

Nevada-Douglas—Production continues at the rate of 300 to 350 tons per day. During December and January, the first two months of production, 7000 tons of 6% copper ore were shipped to the Mason Valley smeltery, at Wabuska. This ore came principally from the Ludwig mine, and 1800 tons came from the Douglas Hill mine. A 1700-ft. surface tram connects the latter mine with the Nevada Copper Belt R.R. Shipments from the Casting Copper mine will start in March. Ten 50-ton cars of gypsum per week are being shipped from the quarry and a crusher and chain bucket elevator are being installed there. The gypsum is in rock form, is snow white and analyzes 94 to 96% gypsum. It is used for plaster and is shipped to the Western Gypsum Co., at Reno.

NYE COUNTY

Tonopah ore shipments for the week ended Jan. 25 were: Tonopah Mining, 3100 tons; Tonopah-Belmont, 2350; Montana-Tonopah, 1053; Tonopah Extension, 914; West End, 800; Midway, 50; total, 8267 tons and \$206,675 estimated value.

Round Mountain—During the quarter ended Nov. 30, 1911, 15,936 tons of ore were mined and milled at a total cost of \$65,710, or \$4.12 per ton. The gross value was \$90,576, or \$5.68 per ton; recovery, \$80,558; miscellaneous earnings, \$476; total gross earnings, \$81,034; net operating profit, \$14,848 or 93c. per ton. The operating cost of \$4.12 includes a depreciation charge of 27c. per ton. Cash on hand, Nov. 30, totaled \$107,566. Since the previous report, a crusher, trommel and conveyor have been ordered and will be installed in the 451 crosscut. This machinery is now at the property. General conditions at the property are reported to be satisfactory. It is the intention to change the fiscal year to end Dec. 31.

WHITE PINE COUNTY

Boston Ely—The mine shut down recently but it is stated that development will continue with diamond drills.

New Mexico

New Mexico Oil & Refining Co.—The first merchantable strike of oil in the Seven Lakes district is said to have been made recently by this company, of Gallup, N. M., 200 yards from the original Talle well. The well is 400 ft. deep with

a 6-in. casing; there are 265 ft. of oil in the hole, and it will pump steadily from 30 to 35 bbl. per day. This is reported to be the most important development in this field since oil was first discovered there a few months ago. The directors of the company have decided to sell the oil to other companies operating in this field, for fuel. The strike has aroused considerable excitement and seems to point to the possibility of Seven Lakes developing into a larger producer.

Oklahoma

Chapman & Lennan—The two shafts of this company, at Miami, have reached a depth of 250 ft. and probably will soon cut into the ore.

Miami Concentrating Co.—This company has bought the Old Chief tailing mill and is moving it to the King Jack tailing pile.

South Dakota

Hidden Fortune—In the examination of this and the Columbus properties for Wood Brothers, of Montreal, 5-ft. samples are being taken in all workings, and these are being assayed in the office which was rented in Deadwood. The work will include a thorough sampling of present ore faces, and should it be necessary, drifting and crosscutting will be done. A diamond drill is being installed at each of the principal workings, viz., the Hidden Fortune and Columbus shafts, and considerable drilling will be done. The former shaft is 300 ft. deep, and the latter 500. At the Hidden Fortune pumps were used to take out the water, and at the Columbus skips are removing it at the rate of 400 gal. per min. The property includes about 1000 acres, adjoining the Homestake on the north and west.

Black Hills Grubstaking Concern—This company has been organized by local men, with the intention of raising a fund of at least \$20,000, which it is proposed to spend in grubstaking owners of patented ground, and encouraging development. Should any of the properties show favorably, work will be centered upon them. The promoters will attempt to raise the necessary money locally, but should it not be possible to place all of the stock in the Black Hills, outsiders will be asked to join. The promoters of the company have the cooperation of the Deadwood, Lead and Rapid City commercial clubs.

North Homestake—The work of sinking 400 ft. below the quartzite level, or to a depth of 220 ft., has been completed and a station is now being cut. Crosscuts both east and west from the station will be run to develop some known veins in the schists. A sump 15 ft. deep will be completed soon.

Utah

JUAB COUNTY

Tintic shipments for the week ended Jan. 26 amounted to 167 cars.

Beck Tunnel—Ore has been followed 400 ft. with a good showing in the face. A drift has been started from the 175-ft. level of the No. 2 shaft to reach the orebody 100 ft. below the present workings.

Yankee Consolidated—The annual report assured stockholders that the property is in the best condition for mining in its history, and that the prospects for encountering ore at depth are encouraging. The shipments of dump ore so far have met development expenses, and the year closed with about \$160 cash on hand.

Colorado—The ore recently developed on the 300-ft. level of the No. 2 shaft is being followed and will probably connect with one of the old stopes.

May Day—Regular shipments are being made from the new orebody on the 400-ft. level.

Iron Blossom—The ore opened three weeks ago on the 600-ft. level of the No. 3 shaft has been followed for 300 ft. A good tonnage of shipping ore is being mined from three large stopes. Shipments are normal again, following the recent cold weather and car shortage.

Centennial-Eureka—The large steam-electric plant at this property is still in operation, and will probably be kept running for the remainder of the winter. The mine has a contract with the Knight power company for electric power, but line troubles necessitated the starting of the steam plant at the mouth of the Holden tunnel.

SALT LAKE COUNTY

Utah Consolidated—Shipments of between 500 and 600 tons of copper ore and from 75 to 100 tons of lead ore per day are being made to the International Smelting & Refining Co. Some difficulty has been experienced in operating the aerial tramway in high wind, but as it has not been run up to capacity there has been no delay in transportation. Low-grade concentrating lead ore is being shipped to the Winnemucca mill over the old tramway, and this plant has been treating lead ores for about six weeks. The concentrates are sent to the International. It is reported that Utah Consolidated engineers have made a survey and examination of the Yampa property.

City Rocks—At a meeting, Jan. 26, stockholders ratified the recent action of the directors turning over the property to the Michigan-Utah company, on a basis of share for share in the stock of the new corporation.

Cardiff—Work is being done in the new 2400-ft. lower tunnel. About 125

tons of shipping ore per month are being mined from the upper workings.

SUMMIT COUNTY

Park City shipments for the week ended Jan. 27 amounted to 2,517,760 lb.

Daly West—The damage to the ore house at the mouth of the No. 2 tunnel, by fire recently, has been so far repaired as to allow the resumption of shipments.

Thompson-Quincy—Raising from the main level is being done at the rate of about 8 ft. per day. The raise is being driven for the ore-bearing contact between limestone and quartzite. The company's ground takes in about 2000 ft. on the strike of the contact.

TOOELE COUNTY

Norma Consolidated—This company has recently been organized to operate the old Helvetia property, at Mercur. The claims are in the West Dip portion of the camp. There is a 600-ft. shaft and low-grade gold ore is reported to have been opened.

Cliff—Ore has been encountered in the Middle tunnel, which is thought to be the same shoot opened in the upper workings. If this is so, there will be 400 ft. of stoping ground. The ore is about 3 ft. thick where cut.

Washington

International Lead & Iron Co.—It is reported that this company will erect two blast furnaces with a daily capacity of 500 tons for the manufacture of pig iron and cast-iron pipe. The plant will be erected within 10 miles of Spokane, and work on the furnaces will begin within three months. The company owns 800 acres of iron-bearing ground about 15 miles south of Salmon, B. C., north of the boundary, and nine miles from a railroad. The extension of the Idaho & Washington Northern R.R. Co.'s line, however, from Trail to the boundary line, will afford a through rail route to Spokane. The deposit is said to be a large body of hematite ore which will be mined with steam shovels.

McKinley—A 50-ton mill and amalgamating plant will be erected at this mine, Ferry County, in the spring. C. F. Wickstrom, Orient, is president.

Wisconsin

New Enterprise Mining Co.—The company has unwatered the Enterprise mine, the pioneer deep jack mine in the Platteville district, and will commence operations.

Wisconsin Zinc Co.—The Grant County property, recently acquired, is showing a good body of zinc ore; a tramway connection and an additional roasting kiln will be installed at the Empire mine to treat the concentrates. The company commenced sinking a new shaft on the old Wicklow lease, near Cuba City.

Canada

ONTARIO—COBALT

Cobalt shipments for the week ended Feb. 2 were: La Rose, 226,140 lb.; Coniagas, 204,040; McKinley-Darragh, 146,560; City of Cobalt, 132,680; Trethewey, 84,560; Cobalt Lake, 60,840; Buffalo, 56,240; Crown Reserve, 44,920; Colonial, 40,000; total, 995,980 pounds.

Buffalo—During December the mill treated 4088 tons of ore, the average assay before milling being 40.27 oz. of silver per ton. The amount of silver recovered was 144,440 oz. of silver, worth \$78,900, or 87.70% of the quantity shown by the assay.

La Rose—Recent developments on two of the subsidiary properties have been favorable. For 45 ft. of the winze put down from the 60-ft. level of No. 9 vein of the Lawson, the vein was found to average 7 in. wide, of 2000-oz. ore. At the Princess, the main stope is now 225 ft. long and full of ore from the second level to the surface. In a raise from the second level on No. 6 vein, 2 in. of 2000-oz. ore have been encountered, and in the winze below that level 1½ in. of high-grade ore are being developed.

Cobalt Lake—A leak which delayed the work at No. 4 shaft has been repaired by means of a cement bulkhead, and the shaft will be put down another 100 feet.

Nipissing—In drifting west toward the shaft at the 100-ft. level of No. 1 shaft, what appears to be a shoot of rich ore has been struck in a vein 3 to 6 in. wide.

Keeley—The liquidator of the defunct Farmers' Bank, of which this property, in South Lorrain, is an asset, has accepted an offer of the Wetlaufer Mining Co., to take the property over on option, the company agreeing to expend \$15,000 per month on development for one year.

ONTARIO—PORCUPINE

McIntyre—Rich ore has been encountered on the 100-ft. level of the No. 4 shaft. W. D. Cooper, manager, has announced that the first unit of the mill will be in operation about March 1.

Apex—Work on the property has been stopped until spring, when sufficient water supply will be available to run the plant. P. Kirkegaard is consulting engineer.

Plenaureum—Drifting on the vein has been started from both shafts, at the 200-ft. level. The new electrically driven compressor is in operation with 12 drills.

Rea—The main shaft is being continued to 400 ft. depth. Sinking is being done with small hammer drills, which are being found more economical than the reciprocating drills used at first. On the three levels established at 100, 200 and 300 ft., the main vein has been cut. While on the upper levels the vein ran from 3

to 5 ft. in width, it was about 30 ft. in width at 300-ft., but the gold content was not so large.

Porcupine Gold—It is expected that deliveries of mill machinery will commence about Feb. 15. The mill is being built by the Canada Foundry Co., with a guaranteed capacity of 100 tons per day.

Standard—In putting down a new shaft on this property, rich ore was recently encountered both in quartz and quartz-porphry. The shaft is being sunk to cut a vein discovered with the diamond drill.

Alexo—This nickel property, situated northeast of the Porcupine gold area, and near Kelso, has been opened and arrangements made for the shipment of ore for testing purposes. A shaft is down to the 30-ft. level. The International Nickel Co. formerly had an option on the property, which they abandoned after diamond drilling. The orebody on which the shaft is sunk is 17 ft. wide, and it is believed that there are other deposits.

ONTARIO—SUDBURY

Dominion Nickel Copper Co.—The company has carried on extensive development work at its Whistle mine, besides drilling many of its claims in the townships of Bowell, Wisner and Falconbridge. Recently the company has increased its drills and it is rumored that a reduction plant will be underway next spring. Improvements in the treatment of the ore will enable this company to handle at a profit the lower-grade ores of the north range.

Mexico

CHIHUAHUA

El Cristo—This property in the Santa Eulalia district recently resumed operations and is in charge of Norval J. Welsh.

Le Fe—Carlos Halter, G. C. Harding and Ross D. McCausland are reported to have taken a lease on this mine in San Sostenes, three kilometers from the San Sostenes station of the Kansas, Mexico & Orient Ry., and owned by Agustin Moye. The ore is low-grade, siliceous copper ore and shipments are expected to be made to the local smeltery at the rate of from 30 to 40 tons per day.

Aguilerena—Reports from the property are satisfactory. About 50 tons per week are being shipped to the smeltery regularly, and the run-of-mine ore is said to average from 1 to 1½ kilos of silver per metric ton.

Maria—High-grade ore has been encountered recently, and enough ore is in sight to last for some months.

Montezuma—It is reported that the company is considering resumption of milling operations at the Santa Barbara plant. The concentrator has been idle for some years, the ore going to the smeltery. J. H. Battle is in charge.

DURANGO

Inde Gold Mining Co.—While on a recent trip to the United States, R. C. McCart, Jr., manager, is said to have ordered a 230-hp. De la Vergne oil engine, which will be used to replace the present steam plant at the Terrible mill. The new unit is reported to have a guaranteed consumption of one-half pound of crude oil per brake-horsepower, under working conditions and installation is expected to lower the present power costs.

Guadalupe—An Oliver filter is reported to have been installed recently, and a second one will be added soon. The mill is being rearranged and additions made.

OAXACA

San Juan—This mine is reported to have been sold to an American lawyer in Mexico City.

Navaro—Frank Waterhouse has found some good ore in this group of properties and has been maintaining regular shipments. The Escuadra tunnel is being used at present but shaft sinking on the property is contemplated.

Los Ocotes—This mine is expected to be closed soon.

San Francisco—Work has been prosecuted continuously at this mine, but with a small force of men.

SONORA

Buena Vista—George M. Ryall, of the Pacific Smelting & Mining Co., and other New York men are interested in this mine at Realito. Ore running 114 oz. silver and \$4 gold per ton is reported to have been taken from the mine recently.

Empire—Officials are reported to have announced that a 3-unit Pittman mill will be installed at the company's Gold Cross property, about 24 miles southwest of Cananea.

Central America
COSTA RICA

Aguacate—During January the mill crushed 1300 tons of ore, averaging \$11.80 per ton. The steam plant was completed and placed in commission. Total bullion production exceeded that for December and yielded a profit over all expenses. The excavation for the sand-leaching plant was nearly completed and construction will be rushed.

Africa
RHODESIA

Gold production in December was 51,534 oz., or 703 oz. more than in November. For the full year the total was 609,956 oz. in 1910, and 628,519 oz.—or \$12,991,498—in 1911; an increase of 18,563 oz. for the year.

Asia
CHOSEN

Oriental—Cable advices state that the cleanup for January was \$127,500.

The Market Report

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

COAL TRADE REVIEW

New York, Feb. 7—The coal-trade situation has improved in some degree, but there is still much trouble arising from delays in transportation and scarcity of cars. The demand for coal is good, both in the East and the West, and there is apparent a growing disposition among large consumers to stock up ahead. This increases demand, and the mines are generally quite ready to respond, if they can only get the railroads to do their part.

The mining rate conference at Indianapolis has come to an end without results, neither operators nor miners being willing to compromise. Probably another meeting will be called later, but no action for such a meeting has yet been taken. It looks as if the bituminous people were inclined to wait and see what action is taken in the anthracite field.

Bituminous coal shipments to Lake ports for three years past, short tons:

District	1909	1910	1911
Pittsburg.....	8,687,905	11,911,900	10,611,941
Ohio.....	3,002,815	4,297,300	4,019,544
West Virginia.....	3,874,570	6,629,500	7,151,200
Total.....	15,564,690	22,838,700	21,782,685

In 1909, the proportions furnished by the respective districts were: Pittsburg, 55.8; Ohio, 19.3; West Virginia, 24.9 per cent. In 1910 the percentages were 52.2, 18.8 and 29; in 1911 they were 48.7, 18.5 and 32.8, respectively.

Exports of coal from the United States, with coal furnished to steamships in foreign trade, year ended Dec. 31, long tons:

	1910	1911	Changes
Anthracite.....	3,021,627	3,553,999	I. 532,372
Bituminous.....	10,784,239	13,878,754	I. 3,094,515
Total exports..	13,805,866	17,432,753	I. 3,626,887
Steamer coal....	6,445,593	6,658,648	I. 213,055
Total.....	20,251,459	24,091,401	I. 3,839,942
Coke.....	879,123	914,142	I. 35,019

In 1911 Canada took 14,108,567 tons of coal; Cuba, 1,053,703; West Indies, 577,159; Panama, 496,830; Mexico, 470,674 tons. The increase in exports was largely due to the long strike in Canada.

Imports of coal and coke into the United States, year ended Dec. 31, long tons:

	1910	1911	Changes
Anthracite.....	.....	2,159	I. 2,159
Bituminous.....	1,991,943	1,238,808	D. 753,135
Coke.....	156,417	69,515	D. 86,902
Total.....	2,148,360	1,310,482	D. 837,878

Canada furnished in 1911 a total of 980,174 tons of coal and nearly all the coke; Australia, 232,969 tons of coal. Imports were chiefly on the Pacific Coast

and in the northwestern border states. The decrease in 1911 was due chiefly to the long strike in Alberta and British Columbia.

Coal tonnage of the Norfolk & Western Ry. for the year 1911 was: Commercial coal, 17,051,221; company coal, 2,392,760; total, 19,443,981 short tons. This was an increase of 2,092,011 tons, or 12.1 per cent. over the previous year.

Shipments of coal from Nova Scotia collieries for the full year were 5,275,907 long tons in 1910, and 5,565,298 in 1911; increase, 289,391 tons, or 5.5 per cent.

IRON TRADE REVIEW

New York, Feb. 7—The iron and steel markets show little change for the week. Business is still below the December spurt, but is nevertheless on a large scale. Rail orders from the larger companies continue to come in but the total placed so far is hardly up to expectations.

Finished material is fairly active, though a little irregular. Structural steel orders placed for the week have been mainly in small lots. Bars have been rather quiet, but plates and sheets are active. The steel shapes for the New York Connecting R.R. contract, which was let to the McClintic-Marshall Construction Co., will be rolled by the Carnegie Steel Co.; the contract will take about 40,000 tons.

Pig iron has sold fairly well, orders for the week including some large ones from pipe foundries. Prices of pig iron, however, are not any stronger, though there seems to be less disposition to make concessions to secure business.

The railroads have reduced the freight rate on pig iron from Birmingham, Ala., to Pacific Coast points by \$2.40, to \$8.96 per ton. This is taken by some to indicate that other reductions asked by the Alabama people will be granted.

In Pittsburg, Feb. 6, a combination of nearly all the independent tinplate makers filed articles of incorporation under the name of the Association of Sheet and Tin Plate Manufacturers. The organization was formed, it is said, to combine the independent concerns for their own protection, but in a manner that would not conflict with the anti-trust law. No attempt will be made, it is stated, by the new association, to fix the prices of products. Its principal mission will be "the encouragement and protection of trade and commerce." Foreign consumption,

transportation, and markets, labor conditions throughout the world, safety devices for the protection of employees, and social intercourse of the members of the association are named in the application as the objects sought.

Export Trade—Articles of incorporation have been filed in Pittsburg for the Jones & Laughlin Steel Products Co. The incorporators are John L. Hames, Thomas Anderson and others, all connected with the Jones & Laughlin Steel Co. The object of the company is to handle and develop the export trade of that company. The formation of this company is taken as an indication that the proposed organization of a joint export company by several of the leading independent steel companies has been abandoned.

Baltimore

Feb. 5—Exports for the week included 5,038,950 lb. steel rails and 436,626 lb. track fastenings to Tampico, Mex.; 2,930,400 lb. steel rails and 59,355 lb. fishplates to Havana, Cuba; 222,500 lb. steel rails and 34,000 lb. fishplates to Liverpool; 3,361,280 lb. steel billets to Liverpool and Glasgow. Imports included 300 tons spiegeleisen, 500 tons ferromanganese and 513 tons manganese ore from Rotterdam; 10,900 tons iron ore from Cuba.

Birmingham

Feb. 5—Considerable pig iron has been sold again by Southern manufacturers for delivery during the first half of the present year, and there are still a number of inquiries in hand which promise to result in business. The quotations for the product are strong on a \$10.25 per ton basis, No. 2 foundry, with \$10.50 asked. Cast-iron pipe interests have been the best customers as to size of orders. The smaller consumers have been placing business right along, and while, in the main, this business is in small lots, the aggregate is considerable. The make in the Southern territory is not being increased; there will be no increased production in this section until the demand grows better and most of the accumulated iron has been removed from the yards. The inventory shows that there has been an appreciable reduction recently in stocks of iron. Some of the companies in this section have disposed of all their accumulated iron. There was a furnace blown in recently, but it only replaces one which went out through accident. The Woodward Iron Co. is getting ready to

blow out a furnace in order to rebuild it. The Tennessee Coal, Iron & Railroad Co. may be forced to start another furnace or two to meet demands. In addition to the export business now being delivered on, it is announced that an order for 5000 tons will be gotten out in March. There are several inquiries in hand from across the water.

The cast-iron pipe demand is strong. As soon as the United States Cast Iron Pipe & Foundry Co. gets its North Birmingham plant in operation, it is proposed to make extensions on the Bessemer works of the company. Southern pipe makers have supplied much pipe for work in the Panama Canal zone. A large quantity of pipe has been shipped from this section to California during the past few months.

The steel situation shows no change this week. There is a steady outward movement of steel rail from the Ensley plant, while fabricated steel is in good demand. Charcoal pig iron continues at \$22 per ton, with a little business coming in. The scrap-iron business is quiet.

Chicago

Feb. 6—The last week has seen activity in charcoal iron, some 10,000 tons having been sold in this market, at \$16@16.50. This is indicative of a wide use of charcoal iron and of a bunching of contracts for it at this time, but the sales have not affected the demand for coke iron, which remains light. Southern No. 2 brings \$10@10.50, Birmingham, or \$14.35@14.85, Chicago, despite efforts to raise the price to the higher figure as a minimum.

Northern No. 2 sells for \$14@14.50, as heretofore, with no strong inclination to buy it in preference to Southern manifested by melters. The average melter is apparently contented to let things drift along on the same policy that has been pursued for several months, that of frequent and small purchases. There probably is a slowly increasing aggregate of foundry tonnage, but a waiting disposition on the part of the buyers.

The market for iron and steel products has little change. Sales of railroad supplies in general are good; structural-material contracts have been made for a few new bridges and buildings, but in general are light, with beams and channels selling at 1.30@1.32c., Chicago delivery. The market for both iron and steel bars is light, soft-steel bars bringing 1.25@1.33c. and iron bars 1.15@1.20c. Plates are in very good demand at 1.30@1.38c., with the market firm. Sheets are quiet, but firm, as are also wire goods. General business conditions are fair to promising. The prospect of tariff changes no doubt is influencing the buying market as a general factor, but few specific indications are to be found. Coke is in fair demand at \$4.50@4.65, with a good supply.

Cleveland

Feb. 5—The sensation of the week has been the inquiry for a large tonnage of Lake ore from an Eastern company, which has heretofore used local and imported ores. The placing of the order, it is understood, depends entirely upon the prices which can be made. It seems quite probable at present that no general price on ores will be made this season, and there may be considerable irregularity.

Pig Iron—Sales have been chiefly in small lots, but quite a fair aggregate tonnage has been taken. Quotations, Cleveland delivery, are \$15.15 for bessemer; \$13@13.15 for basic; \$13.25 for No. 2 foundry; \$12.50 for forge.

Finished Material—Specifications are coming in fairly well, while new business is irregular. Bars are dull, but sheets are active and prices better maintained. One or two structural contracts have been let, and others are under negotiation.

Philadelphia

Feb. 7—Large sales of low-grade iron for pipe are being closed and additional inquiries just to hand show that consumers are providing for future requirements with unaccustomed promptitude. The most notable feature of the market today is the number of inquiries from large as well as from many smaller consumers for iron for the latter half of the year; also, increased interest in basic for immediate delivery. Southern makers have developed unexpected activity in soliciting business. There is much more talk of an early hardening of prices in consequence of the general improvement in pipe iron. The demand for other grades does not show marked improvement, but the tone of the market nevertheless is much stronger. An interesting feature of the market is that some large Eastern consumers who are provided with all the iron they need are figuring upon deliveries later in the year. Forge iron is more active as stocks are light. Foundries are better supplied but are willing to extend contracts if the December concessions are granted. Malleable is weak and very few sales noted. Basic is strong, with negotiations pending for two or three lots, but makers of basic for the open market see no encouragement beyond meeting the requirements now in sight. The undertone of the market is stronger than it has been for some time and rumors of shading are not heard. Average quotations for No. 2 X foundry, \$15.25; gray forge, \$14.25; basic, \$14.25 per ton.

Steel Billets—The market is quiet without sales of moment. Buyers are sufficiently supplied to run some weeks. Openhearth billets are quoted at \$23, tidewater.

Bars—There has been a gradual ac-

cumulation of business since the opening of the year in the bar mills of this territory but makers are still overanxious for business and are not attempting to push the quotation above 1.27½c., though small orders go in at stronger figures.

Sheets—Sheets are strong and have a good volume of business which steadies prices in negotiations now pending.

Pipes and Tubes—The week's business has been better than for some time. Two or three large concerns have renewed their understanding in regard to spring and early summer deliveries for tubes. Merchant pipe is also sharing in the activity. The cast-iron pipe foundries are independent and business is crowding in on them.

Plates—The steel-plate situation is better than it has been for a long time. It would be a matter of guess work to say just how much business is pending in the shape of inquiries and for work that the shipbuilders know will soon come along.

Structural Material—Very large requirements for shapes are now being figured upon for local and near-by requirements as well as for building work throughout most of the Eastern states. Inquiries have also been received for export material, some of it for Panama. On all small lots for delivery within 60 or 90 days, slight advances have been made and a further hardening of prices for spring delivery is looked for.

Scrap—Sales of scrap are limited to small lots for urgent needs. Quotations on large lots of railroad and yard scrap are beyond the present views of buyers. There are two or three inquiries for old iron rails and for old iron and steel axles. The stock of scrap is more than sufficient for current demand and purchases of large supplies have been made, delivery of which will probably be postponed until buyers' requirements render shipments necessary.

Pittsburg

Feb. 6—The iron and steel market has turned for the worse, chiefly, it appears, because of disappointment that there has not been a definite improvement. In November and December orders and specifications came in freely, being interrupted, and then not very seriously, by the holidays. During the first half of January not much was expected, on account of inventory taking, but when the second half of the month passed without any improvement both producers and consumers began to take serious notice.

The situation as to specifications for finished-steel products is decidedly different with different mills. In a few instances, the specifications received during January were close to capacity, and in the case of one important interest exceeded the actual production, this hav-

ing been relatively light with all the mills in the Central West, on account of the extremely bad weather. In the case of other steel interests, specifications were poor in the first half of January, but good in the second half, the month making a fair showing at the close, while in the case of still other interests specifications have uniformly been below actual output.

The mills still have enough business actually specified on books to carry them for several weeks, and there is no tendency to decrease production. There has been an increase, as compared with December, but chiefly on the part of the Steel Corporation, and due to the car orders placed so freely toward the close of the old year.

The Jones & Laughlin Steel Co. will start one of its Aliquippa furnaces about the middle of this month, and a second about the beginning of March. At the beginning of this year the steel department at Aliquippa was started for the first time. It was not certain at the time how long the tonnage would be required, and the start was therefore made with pig iron in stock, and iron purchased in the market to the extent of about 50,000 tons, the intention being to produce pig iron in case the steel tonnage would be required for a period of months. This seems to have been the conclusion now reached by the management.

The weakest item in the whole steel list is shafting, which has sold at 68 per cent. off list in exceptional cases. Late last year the market was advanced from 67 to 65 per cent. off list, but the advance did not hold when actual orders were to be competed for. On plates, shapes and bars the market continues quotable at 1.15c., but it is believed the figure could be shaded were attractive orders to be offered.

Pig Iron—It is reported that two merchant furnaces are to be blown in, but there is no evidence in the market that additional iron is required; it has been extremely quiet, with prices held merely because through the long decline they had reached a level below the cost of production as ordinarily figured. We continue to quote: Bessemer, \$14@14.25; basic, \$13.25@13.50; No. 2 foundry, \$13; gray forge, \$12.50; malleable, \$13, all f.o.b. Valley furnaces, 90c. higher delivered Pittsburg.

Ferromanganese—The market is extremely quiet, but the price seems to be well held. We quote prompt and forward at \$41, Baltimore.

Steel—There is little fresh tonnage being bought, but adjustments have been made for February deliveries on contracts, and these adjustments have involved concessions from the nominal prices, as recently advanced, though as a rule the mills will obtain a little more than they did for December and January

steel. We quote bessemer and open-hearth billets at \$19.50@20 and sheet bars at \$20.50@21, Pittsburg; bessemer billers at \$19 and bessemer sheet bars at \$20, Youngstown.

Sheets—The advanced market as established in November of 1.90c. for black and 2.90c. for galvanized is being freely shaded by several mills by at least \$1 a ton, and there are reports that \$2 a ton off has been given, making a basis of 1.80c., but if these reports are correct it is probable they refer to exceptional cases. Specifications are good for a number of the specialties, but for common grades it appears some of the mills must search continually for specifications in order to maintain operations. We quote black sheets, 28 gage, at 1.85@1.90c.; galvanized, 2.85@2.90c.; blue annealed, 1.40c. for 10 gage, and corrugated roofing at \$1.33@1.35 for painted and \$2.47 @2.50 for galvanized, 28 gage, per square.

St. Louis

Feb. 6—The pig-iron market is a little slow at present. In Southern foundry there has been practically no buying since the first of the year and stocks in foundry yards are rather large, which taken into consideration with the tonnage contracted for, will, no doubt, hold up any buying movement until the latter part of March. Even at that time, from present indications, no buying will be done except for third-quarter shipments. The average price is \$10@10.25 per ton, Birmingham.

United States Foreign Trade

Exports and imports of iron and steel and of machinery in the United States for the year ended Dec. 31, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1910	1911	Changes
Exports.....	\$201,271,903	\$249,656,411	I. \$48,384,508
Imports.....	38,907,119	28,995,600	D. 9,911,519

Excess, exp. \$162,364,784 \$220,660,811 I. \$58,296,02

Increase in exports, 24 per cent.; decrease in imports, 25.5 per cent. The leading articles of iron and steel were, in long tons:

	Exports		Imports	
	1910	1911	1910	1911
Pig iron.....	127,385	120,799	237,233	148,459
Scrap.....	25,825	77,918	72,764	17,272
Billets, blooms, etc.	58,230	234,767	46,578	29,207
Bars.....	125,606	141,033	38,231	26,730
Rails.....	353,180	420,874	.....	.....
Sheets and plates..	274,521	372,373	6,152	2,453
Structural steel....	146,721	223,493	.....	.....
Wire-rods.....	22,861	22,641	20,378	15,483
Wire.....	171,928	229,316	.....	.....
Nails and spikes..	61,201	77,833	.....	.....
Tinplates.....	12,445	61,466	66,640	14,099
Pipe and fittings..	155,778	197,507	.....	.....

Imports of rails and structural steel are not reported separately. Imports of wire are not reported in quantities; values were \$1,468,741 in 1910, and \$1,270,426 in 1911. Exports of mining machinery were valued at \$6,586,044 in 1910, and \$6,982,360 in 1911; an increase of \$396,316, or 6 per cent.

METAL MARKETS

New York, Feb. 7—The metal markets show little change from the conditions which prevailed a week ago. The copper market seems to be waiting for the publication of the January statement, which will be due in a couple of days.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold:			
Dec. 1911..	\$ 994,677	\$ 4,707,930	Exp. \$3,712,565
" 1910..	1,330,400	4,976,632	Imp. 3,646,232
Year 1911..	37,183,074	57,445,184	Imp. 20,262,110
" 1910..	58,774,822	59,222,518	Imp. 447,696
Silver:			
Dec. 1911..	5,997,360	3,306,727	Exp. 2,690,630
" 1910..	6,061,060	4,398,450	Exp. 1,662,610
Year 1911..	65,664,646	43,746,571	Exp. 21,918,075
" 1910..	57,960,973	45,878,168	Exp. 11,482,805

Exports from the port of New York, week ended Feb. 3: Gold, \$265,050, chiefly to South America; silver, \$1,034,302, principally to London and Paris. Imports: Gold, \$186,720; silver, \$569,660, from Central and South America.

Gold—The price of gold on the open market in London remained at 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. Aside from small amounts taken for India and Egypt, there was little foreign demand. In New York a total of \$5,000,000 gold has been taken for shipment to Paris.

Iridium—The price continues unchanged, at \$64 per oz. for pure metal.

Platinum—The market has been quiet and prices are unchanged. Dealers ask \$46 per oz. for refined platinum and \$48.50 per oz. for hard metal, up to 10 per cent. iridium.

Silver—The market continues firm with rising tendency, on Indian Bazaars' buying. The market closes steady at 27 1/4 d., in London.

SILVER AND STERLING EXCHANGE

Feb.	1	2	3	5	6	7
New York....	58 1/2	58 3/4	58 1/2	58 1/2	58 1/2	58 1/2
London.....	26 1/2	26 1/2	26 1/2	26 1/2	27	27 1/2
Sterling Ex..	4.8730	4.8750	4.8745	4.8735	4.8720	4.8710

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 Jan. 25, reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India.....	£ 589,500	£727,300	I. £137,800
China.....	116,000	110,000	D. 6,000
Total.....	£ 705,500	£837,300	D. £131,800

India Council bills in London averaged 16.15d. per rupee for the week.

Coined silver in the United States, Feb. 1, is estimated by the Treasury Department as follows: Dollars, \$565,222,367; subsidiary coins, \$164,667,449; total, \$729,889,816. Of the dollars \$484,594,000 are held against silver certificates outstanding.

Copper, Tin, Lead and Zinc

NEW YORK							
Feb.	Copper		Tin	Lead		Zinc	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.		New York, Cts. per lb.	St. Louis, Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
1	14 @14 1/2	13.80 @13.90	42 1/2	4.25 @4.15	4.12 1/2 @4.15	6.35 @6.45	6.20 @6.30
2	14 @14 1/2	13.80 @13.90	42 1/2	4.25 @4.15	4.12 1/2 @4.15	6.35 @6.45	6.20 @6.30
3	14 @14 1/2	13.80 @13.90	42 1/2	4.10 @4.00	3.97 1/2 @4.00	6.35 @6.45	6.20 @6.30
5	14 @14 1/2	13.75 @13.85	42 1/2	4.00 @3.90	3.85 @3.90	6.35 @6.45	6.20 @6.30
6	14 @14 1/2	13.75 @13.85	42 1/2	4.00 @3.90	3.85 @3.90	6.35 @6.45	6.20 @6.30
7	14 @14 1/2	13.75 @13.85	43 1/2	4.00 @3.90	3.85 @3.90	6.35 @6.45	6.20 @6.30

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 prices of casting copper and of electrolytic cathodes are usually 0.125c. 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

Feb.	Copper			Tin		Lead, Spanish	Zinc, Ordinaries
	Spot	3 Mos	Best Sel'd	Spot	3 Mos		
1	61 1/2	62 1/2	66	194	192	15 1/2	26 1/2
2	61 1/2	62 1/2	66	193 1/4	191 1/4	15 1/2	26
3	.....	.....	.....	.....	.....	.....	.....
5	61 1/2	62 1/2	66 1/2	194	191 1/2	15 1/2	26 1/4
6	61 1/2	62	66 1/4	194 1/4	191 1/2	15 1/2	26 1/2
7	61 1/2	62 1/2	66	195 1/2	192 1/2	15 1/2	27

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.; £12 = 2.61 c.; £23 = 5c.; £60 = 13.04c. ± £1 = ± 0.21 1/2 c.

Copper—Although a fair volume of business has been reported, the market upon the whole has been rather listless throughout the week. Consumers the world over are in general pursuing a waiting attitude and it has taken a good deal of pressure to promote business. At the same time, the ruling quotations are not uniformly met by the leading sellers, and thereby the varying opinions as regards the future of the market are reflected. The business that was done was both for European and for domestic account, American manufacturers having become interested by the reduced prices to the extent of taking some fair ton-nages of electrolytic copper. In the first half of the week domestic sales were

made at 14c., delivered, usual terms, and in the latter half at 13.95c., corresponding respectively to about 13.85c. and 13.80c. cash, New York. Sales to Europe were upon about the same basis. In these transactions several of the important agencies participated. Some copper was reported to have been sold by second hands at 13.75c. The business in Lake copper has been insignificant, although it has been freely offered at 14 1/2 c. At the close the market does not exhibit any positive trend and is quoted at 13.75@13.85c. for electrolytic copper in cakes, wirebars and ingots, and 14@14 1/2 c. for Lake copper. Casting copper is quoted nominally at 13 1/2 cents.

The standard market declined in sympathy with refined sorts until Feb. 6. On Feb. 7, a sharp rally took place, occasioned by the expectation of favorable statistics, and the close is firmer at £61 18s. 9d. for spot, and £62 13s. 9d. for three months.

Copper sheets are 19@20c. base, for large lots. Full extras are charged and higher prices for smaller quantities. Copper wire has been reduced to 15c. base, carload lots at mill.

Copper exports from New York for the week were 7573 long tons. Our special correspondent gives the exports from Baltimore at 1711 tons.

Visible stocks of copper in Europe on Feb. 1 are reported as follows: Great Britain, 40,190; France, 5940; Rotterdam, 4900; Hamburg, 8200; afloat from Chile, 2300; afloat from Australia, 7600; total, 69,130 long tons, an increase of 90 tons over the Jan. 15 report.

Tin—Since Feb. 1, the new contract is in force on the London Metal Exchange. Sellers are now enabled to deliver at certain rebates under such contract brands of tin which have hitherto been barred from the London Metal Exchange. Judging from the small transactions that took place, traders are seemingly not quite accustomed to the new order of things. The market was very steady to firm, and closes strong at £195 10s. for spot, and £192 10s. for three months.

Consumers are not buying very freely in this market. The spot situation has eased somewhat, due to large shipments from abroad, which are expected to arrive within the next few days. February tin is quoted at about 43 1/2 cents.

Visible stocks of tin on Feb. 1 are reported as follows: London, 11,303; Holland, 2595; United States, excluding Pacific ports, 2809; total, 16,707 long tons, an increase of 193 tons over Jan. 1, but a decrease of 1909 tons from Feb. 1 last year.

Lead—The leading sellers have again reduced the price, by lowering their schedule on Saturday, Feb. 3, to the basis of 4.10c., New York, which cut was followed by a further reduction to 4c., New York. Their reasons for these actions

have excited much gossip and surmise. At the lower level, the demand is increasing, and the close is active at 4c., New York, and 3.85@3.90c., St. Louis.

The London market is firmer, the close being cabled at £15 15s. for Spanish lead, and £15 17s. 6d. for English.

Spelter—There has been a very fair inquiry for March and April shipment and a considerable tonnage has been contracted for, the demand having been freely met by the smelters. The bulk of the business was booked at 6.20@6.25c., St. Louis, a little higher price being realized for February and a little lower for April. Belated customers still have to pay premiums for prompt delivery, but such are realized only upon occasional carloads. The close is steady at 6.35@6.40c., New York, and 6.20@6.30c., St. Louis.

The London market, after declining to £26, shows a better tendency toward the end of the week, owing to short covering of dealers, the close being cabled firm at £27 for good ordinaries, and £27 5s. for specials.

Zinc dust is quoted at 7 1/2 @ 7 1/2 c. per lb., New York.

Base price of zinc sheets is \$8 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Aluminum—Business continues quiet and quotations hold at 19@19 1/2 c. per lb. for No. 1 ingots, New York. The foreign market is reported firm at about 12c. for ingots.

Antimony—Business has been quiet during the week. The price of Cookson's is 7 1/4 c. per lb. Hallett's is unchanged at 7 3/8 @ 7 1/2 c., while 6 3/4 @ 7c. per lb. is still named for Chinese, Hungarian and other outside brands.

Quicksilver—The New York quotation is rather higher at \$44 per flask of 75 lb., with the usual advances for small quantities. San Francisco, \$43.50 for domestic orders and \$41 for export. London prices is £8 5s. per flask, with £8 2s. 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 latest quotation received is 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—Large lots, contract business, 40@45c. per lb. Retail spot from 50c. for 500-lb. lots up to 55c. for 200-lb. lots. The price of electrolytic is 5c. higher.

Imports and Exports of Metals

Exports and imports of metals in the United States, year ended Dec. 31, are reported as follows, in the measures usual in the trade:

Metals	Exports	Imports	Excess
Copper, long tons	369,677	149,378	Exp. 214,299
Copper, 1910....	321,590	153,766	Exp. 167,824
Tin, long tons....	1,010	47,740	Imp. 46,730
Tin, 1910.....	621	46,937	Imp. 46,316
Lead, short tons.	101,227	87,319	Exp. 13,908
Lead, 1910.....	69,786	105,117	Imp. 35,331
Zinc, short tons..	7,330	1,638	Exp. 5,692
Zinc, 1910.....	4,037	3,452	Exp. 585
Nickel, lb.....	25,099,586	29,545,967	Imp. 4,446,381
Nickel, 1910....	15,244,937	32,050,082	Imp. 16,805,095
Antimony, lb....	160,844	10,957,844	Imp. 10,797,000
Antimony, 1910.	339,685	9,899,514	Imp. 9,559,829
Platinum, oz....	181	122,390	Imp. 122,209
Platinum, 1910.	47	120,478	Imp. 120,431
Aluminum, value	\$1,158,608	.....	Exp. \$1,158,608
Aluminum, 1910	949,215	.....	Exp. 949,215
Ores, etc.			
Zinc in ore, lb....	21,636,946	38,148,847	Imp. 16,511,901
In ore, 1910....	9,420,984	53,529,140	Imp. 44,108,156
Zinc oxide, lb....	29,236,779	.....	Exp. 29,236,779
Zinc oxide, '10..	26,339,933	.....	Exp. 26,339,933
Zinc dross, lb....	5,492,252	.....	Exp. 5,492,252
Zinc dross, '10..	9,457,304	.....	Exp. 9,457,304
Chrome ore, l.t..	5	37,529	Imp. 37,524
Chrome ore, '10	30	38,579	Imp. 38,549

Copper, lead, nickel and antimony include the metal contents of ores, matte, bullion, etc. Quantity of antimony ore is not reported. Quantity of zinc ore imported in 1911 was 57,933 tons; exported, 16,322 tons. Imports of aluminum, July 1 to Dec. 31, 1911, were 4,120,992 lb.; not reported previous to July 1, 1911. The metal exports given above include re-exports of foreign material.

British Metal Imports and Exports

Imports and exports of metals in Great Britain, year ended Dec. 31, figures in long tons, except quicksilver, which is in pounds:

Metals	Imports	Exports	Excess
Copper, long tons	140,785	72,613	Imp. 68,172
Copper, 1910....	132,174	81,267	Imp. 50,907
Tin, long tons....	45,906	45,576	Exp. 330
Tin, 1910.....	46,285	43,916	Imp. 2,369
Lead, long tons.	213,704	44,026	Imp. 169,678
Lead, 1910.....	218,936	46,836	Imp. 172,100
Spelter, l'g tons..	144,338	9,582	Imp. 134,756
Spelter, 1910....	139,285	9,101	Imp. 130,184
Quicksilver, lb..	3,491,016	2,357,916	Imp. 1,133,100
Quicksilver, '10	3,344,699	1,856,169	Imp. 1,488,530
Minor met's, tons	6,195	22,913	Exp. 16,718
Minor, 1910....	5,494	22,212	Exp. 16,718
Ores			
Tin ore and con.	28,837	.....	Imp. 28,837
Tin ore, 1910....	26,072	.....	Imp. 26,072
Pyrites.....	849,041	.....	Imp. 849,041
Pyrites, 1910..	812,247	.....	Imp. 812,247

Copper totals include metallic contents of ore and matte. Exports include re-exports of foreign material. Miscellaneous metals include nickel, aluminum and the minor metals and alloys.

Zinc and Lead Ore Markets

Joplin, Mo., Feb. 3—The high price of zinc sulphide ore was \$49, the base offerings, per ton of 60 per cent. zinc, \$42@46. Zinc silicate sold on a base of \$23@25 per ton of 40 per cent. zinc. The average price, all grades of zinc, was \$42.92. The bulk of the lead reported this week was bought on prices of last week, \$58@59 per ton, while the high price this week was \$56 and the low \$52. The average price, all grades of lead, was \$57 per ton.

Despite the increased demand for zinc

ore prices were lowered. The shipment is equal to an average week's summer shipment, while every buyer has from three to 10 cars purchased but not loaded. With the western zinc-mine output considerably curtailed, producers are expecting a continued strong demand for the ores of this district.

Other Ore Markets

Manganese Ore—The price for domestic ores, as fixed by large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 49 per cent., or over in manganese, not over 0.20 phosphorus and 8 per cent. silica. Prices range down to 23c. per unit for 40 per cent. manganese; with deductions for excess phosphorus and silica.

These prices are put at a high level to encourage exploration for manganese deposits in the United States. Most of the manganese ore used here is imported—from India, Brazil and Russia—and is bought abroad on the open market, usually at prices below those quoted.

The latest quotations in Great Britain are: Indian or Brazilian ore, 50 per cent. manganese, 19@19½c. per unit; 45 per cent., 17½@18c. Caucasian, 50 per cent., 16@16½c.; 48 per cent., 15½@16c. per unit.

SHIPMENTS, WEEK ENDED FEB. 3

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville...	5,692,740	.....	1,234,200	\$115,184
Joplin.....	2,022,270	.....	216,270	51,555
Galena.....	775,340	.....	232,250	22,780
Alba-Neck....	919,850	.....	42,440	22,344
Duenweg.....	768,820	83,450	87,010	19,185
Oronogo.....	614,220	.....	67,600	14,278
Miami.....	272,730	.....	151,060	9,055
Jackson.....	318,240	.....	65,660	9,675
Carl Junction	316,250	.....	.....	7,590
Spurgeon....	131,880	130,000	66,800	6,285
Granby.....	108,710	198,370	15,320	5,630
Lawton.....	176,010	.....	.....	3,870
Aurora.....	68,360	145,710	.....	3,630
Springsfield.	88,410	.....	46,990	3,494
Stott City....	132,000	.....	.....	3,438
Quapaw.....	143,670	.....	2,020	2,802
Badger.....	75,960	.....	8,350	1,749
Wentworth...	64,460	.....	.....	1,353
Totals.....	10,679,920	557,530	2,195,970	\$302,797

5 weeks... 43,116,220 2,265,930 7,206,360 \$1,196,965
Blende val., the week, \$232,184; 5 weeks, \$955,669
Calamine, the week, 8,017; 5 weeks, 30,032
Lead value, the week, 62,596; 5 weeks, 211,264

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	\$40.85	\$43.54	\$55.68	\$58.92
February.....	40.21	.....	39.16	.....	54.46	.....
March.....	39.85	.....	38.45	.....	54.57	.....
April.....	38.88	.....	37.47	.....	56.37	.....
May.....	38.25	.....	36.79	.....	55.21	.....
June.....	40.50	.....	38.18	.....	56.49	.....
July.....	40.75	.....	38.36	.....	58.81	.....
August.....	42.50	.....	41.28	.....	60.74	.....
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	.....
Year.....	\$41.45	.....	\$39.90	.....	\$56.76	.....

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.

Platteville, Wis., Feb. 3—The base price paid this week for 60 per cent. zinc ore was \$46@46.50. The base price paid for 80 per cent. lead ore dropped to \$52 per ton.

SHIPMENTS, WEEK ENDED FEB. 3

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Shullsburg.....	1,167,140	86,700	.....
Mineral Point.	755,250	.....	.....
Harker.....	490,790	.....	.....
Galena.....	477,300	.....	.....
Benton.....	477,100	.....	294,300
Platteville....	350,100	66,000	.....
Hazel Green...	300,000	.....	.....
Cuba City.....	120,420	59,820	.....
Montfort.....	83,000	.....	.....
Linden.....	.....	.....	50,000
Total.....	4,221,100	212,520	344,300
Year to date.....	15,759,080	535,080	1,217,000

Shipped during week to separating plants, 2,479,560 lb. zinc ore. The year's totals for lead and sulphur ore correct errors in totals as reported for week of Jan. 27 in previous letter.

Chemicals

New York, Feb. 7—The firm of Mortimer & Wisner having been dissolved as of Feb. 1 by mutual consent, Wm. T. Wisner announces that he will continue the brokerage business in chemicals, fertilizers and dye stuffs as heretofore. Mr. Wisner has associated with him Paul H. Stetson, under the firm name of Wisner & Stetson, at 11-21 William street, New York.

Copper Sulphate—Business continues fair and prices are unchanged. Current quotations are \$4.90 per 100 lb. for carload lots, and \$5.15 per 100 lb. for smaller orders.

Nitrate of Soda—Business remains about the same and prices are rather firm at last figures. Spot nitrate is 2.20c. per lb.; while 2.20c. is asked also for futures up to July 1, and 2.17½c. for deliveries after that date.

Arsenic—Demand continues fair and prices are unchanged, \$2.50@2.75 per 100 lb. being asked for white arsenic.

Imports and Exports—Imports and exports of chemicals and raw material in the United States, year ended Dec. 31:

	Imports	Exports	Excess
Copper sulph. lb.	7,421,439	E. 7,421,439	.....
Copper sul., '10	.....	.....	.....
Bleach, lb.....	82,895,472	17,804	I. 82,877,668
Bleach, 1910....	101,029,345	496	I. 101,028,849
Potash salts, lb.	672,639,582	2,731,762	I. 669,907,820
Potash salts, '10	510,191,652	2,187,797	I. 608,003,855
Soda salts, lb....	22,202,469	611,922	I. 21,590,547
Soda salts, 1910	39,183,586	535,417	I. 38,650,169
Acetate lime, lb.	72,663,243	E. 72,663,243	.....
Acetate, 1910..	64,116,074	E. 64,116,074	.....
Nit. of soda, tons	544,878	6,787	I. 538,091
Nitrate, 1910....	529,172	5,784	I. 523,388
Phosphates, tons	1,246,577	E. 1,246,577	.....
Phosphates, '10	1,083,037	E. 1,083,037	.....
Sulphur, tons....	24,260	28,103	E. 3,843
Sulphur, 1910..	28,647	30,742	E. 2,095
Pyrites, tons....	1,001,453	.....	I. 1,001,453
Pyrites, 1910....	806,590	.....	I. 806,590
Magnesite, lb....	244,840,369	2,169,935	I. 242,670,434
Magnesite, 1910	286,904,705	3,496,662	I. 283,408,043
Sul. ammonia, lb.	189,265,797	.....	I. 189,265,797
Sul. am'n'ia, '10	184,686,534	1,206,998	I. 183,480,536
Arsenic, lb.....	5,404,263	3,684	I. 5,400,579
Arsenic, 1910....	8,267,474	6,098	I. 8,251,376

Exports include re-exports of foreign material. Estimating sulphur contents of pyrites the total quantity of sulphur imported this year was 424,831 tons. Exports of copper sulphate in 1910 were not reported.

Chemicals and Minerals

CURRENT WHOLESALE PRICES

Table listing current wholesale prices for various chemicals and minerals including Ammonium sulphate, Arsenic, Barytes, Calcium acetate, Magnesia, Paints, Phosphates, Potassium cyanide, Sulphur, and Zinc chloride.

Steel common was heavy. At the close, however, there was a general advance. The Curb was active in spots. Ray Central and Butte Coalition led among the coppers. Nipissing advanced, and there was a demand for Tonopah.

Feb. 2 trading on the Exchange was slow and there was little movement in prices. One sale of Homestake was recorded at \$90 per share. On the Curb business in Butte Coalition fell off, but there was a demand for Inspiration rights. Nipissing sold fairly and there was some dealing in Porcupine.

Feb. 3 there was little difference on the Exchange, and trading was light. The Curb was dull and uninteresting, with small sales, on narrow demand.

On Feb. 5 the Exchange was dull, with light trading and few changes in price. The Curb was more active. Cobalt and Porcupine shares found a fair market. Copper stocks were quiet except for Ray Central and Inspiration. The Standard Oil Co., of Indiana, issued a call for a special meeting to vote on increasing the capital stock from \$1,000,000 to \$30,000,000, and it is reported that part of the new stock will be issued as a stock dividend or bonus to present stockholders.

On Feb. 6 there was more activity and some sharp rises in quotations on the Exchange. The anthracite stocks were especially in demand. On the Curb dealing was not quite so active, but there was a fair demand for copper and Cobalt stocks, and prices were firm. On Feb. 7, conditions were about the same on both Curb and Exchange.

Boston, Feb. 6.—An irregular tone accompanies the local share market, while prices have been shaded from those of a week ago. This market has fallen into a rut which will require considerable effort to drag it out. Business has fallen off.

There is lessened interest in both Mayflower and Old Colony stocks and present prices are materially lower than the recent high records. An effort is afoot to consolidate these mines, but it meets with opposition from the managements. North Butte came in for considerable activity and a \$3.50 advance to \$26 on talk of a share for share exchange with Anaconda. Consolidation talk is heard in other directions, but nothing definite can be given at present.

An advance in Isle Royale stock is accompanied by reports that the company is planning for future extension and improved earning power. Superior & Boston received a little impetus upon the announcement that a sale of 20,000 shares of treasury stock had been effected to a local brokerage firm at \$5 per share less a commission that brings the net price to about the present market price of just above \$4 per share.

Curb trading has been chiefly in the penny stocks and prices are inclined to

COPPER PRODUCTION REPORTS. Copper contents of blister copper, in pounds.

Table showing copper production reports for various companies from November to January, including Alaska shipments, Anaconda, Arizona, Calumet & Ariz., etc.

Figures are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners. *Estimated. †Does not include the United States, Australia or Chile.

STATISTICS OF COPPER.

Table showing statistics of copper production and deliveries from 1911 to 1912, categorized by month and visible stocks.

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month. Stocks at Hamburg and Rotterdam are included in the visible stocks for Europe.

Petroleum

The monthly report of the Oil City Derrick for January gives the number of producing wells completed during the month in New York, Pennsylvania and West Virginia, 271; Lima-Indiana district, 23; Kentucky, 13; Illinois, 81; Kansas and Oklahoma, 207; Texas and Louisiana, 42; total, 637, with an aggregate daily production of 32,968 bbl.

MINING STOCKS

New York, Feb. 7.—On Feb. 1 the Exchange was rather weak at the opening.

sag. A small sale of Ahmeek occurred at \$245. Rhode Island Coal went off to 20c. per share upon the announcement that a friendly receiver had been appointed.

Table with columns: Company, Delinq, Sale, Amt. Lists various companies and their financial details.

Monthly Average Prices of Metals

SILVER

Table with columns: Month, New York, London. Shows monthly price trends 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, Lake, London, Standard. Shows monthly price trends 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 trends for tin.

Prices are in cents per pound.

LEAD

Table with columns: Month, New York, St. Louis, London. Shows monthly price trends 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. Shows monthly price trends 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. Shows monthly price trends for pig iron.

STOCK QUOTATIONS

Table with columns: Name of Comp., Bid. Lists various stock prices.

TORONTO Feb. 6

Table with columns: Name of Comp., Bid. Lists Toronto stock prices.

SAN FRANCISCO Feb. 6

Table with columns: Name of Comp., Clg., Bid. Lists San Francisco stock prices.

N. Y. EXCH. Feb. 6

Table with columns: Name of Comp., Clg., Bid. Lists New York exchange stock prices.

N. Y. CURB Feb. 6

Table with columns: Name of Comp., Clg., Bid. Lists New York curb stock prices.

BOSTON CURB Feb. 6

Table with columns: Name of Comp., Last. Lists Boston curb stock prices.

LONDON Feb. 7

Table with columns: Name of Comp., Clg., Bid. Lists London stock prices.

† Last quotation.