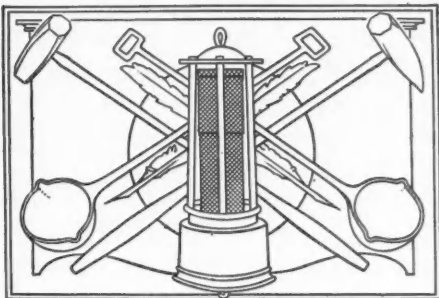


THE ENGINEERING AND MINING JOURNAL
PUBLISHED WEEKLY

By the Hill Publishing Company,
505 Pearl Street, New York :-:
John A. Hill, president; Robert Mc
Kean, secretary :-: Subscriptions
payable in advance, \$5.00 a year
for 52 numbers, including postage
in the United States, Mexico, Cuba,
Porto Rico, Hawaii, or the Philip-
pines, \$6.50 in Canada :-: To for-
eign countries, including postage,



\$8.00 or its equivalent, 33 shill-
ings: 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.

VOL. 89

APRIL 23, 1910.

NO. 17

CIRCULATION STATEMENT

During 1909 we printed and circulated
534,500 copies of THE ENGINEERING AND
MINING JOURNAL.

Our circulation for March, 1910, was
39,500 copies.

April 2.....	11,000
April 9.....	9,500
April 16.....	9,500
April 23.....	9,500

None sent free regularly, no back numbers.
Figures are live, net circulation.

Contents

Editorials:	
The Alaska Coal Cases.....	851
Consistency with Good Business Man- agement.....	851
The Porphyry Coppers.....	852
Average Daily Copper Production.....	852
Correspondence and Discussion:	
Flue Gas Losses..... W. C. Smith	853
Efficiency Index in Milling..... Mark R. Lamb	853
Wildcatting in California Oilfields..... L. E. Aubury	853
A Far Sighted Corporation.....	854
Daly-Judge Mining Company.....	854
Zinc Mining in Wisconsin..... J. E. Kennedy	854
New York Curb Requirements.....	855
Details of Practical Mining:	
*Table for Assay Balance..... Stuart H. Ingram	856
*A Method for Handling Sinking Buckets..... W. B. Baggalley	856
*Determining Dust Losses from Roast- ers..... C. C. Hoke	857
*A Dry Pulverizer and Separator.....	858
*A Gas Valve That Cannot Leak.....	858
*Skip for Hoisting Coal.....	858
*A Useful Bank of Lamps..... L. Earle Brown	859
*A Hydraulic Air Blast.....	859
The Alaska Coal Cases..... H. V. Winchell	860
Notes from the Lake Superior Iron Ranges..... Dwight E. Woodbridge	863
Coalinga Oil District, California.....	864
*New International Smeltery at Tooele, Utah..... John Tyssowski	865
Manganese Deposits of the Blue Ridge..... L. G. Lackey	867
*The North Pole Mine, Baker County, Oregon..... Emil Metzger	868
*Copper Deposits of Globe-Kelvin Dis- trict.—III..... Edwin Higgins	870
Preparation of Zinc Oxide for Reduction The Porcupine District.....	874
Special Correspondence	
*Ore Dressing in the Coeur d'Alene Dis- trict.—IX..... Edward S. Wiard	875
*Sinking by Means of Underhanging Tubbing.....	878
*The Advance and Retreat Room-and- Pillar System..... H. J. Nelms	879
The Cost of Electric Shot Firing.....	880
*Tunnel Survey in an Anthracite Col- liery..... D. P. Jones	881
Mexico's Coal Output.....	881
Underground Fires in Gaseous Mines.....	882
Special Correspondence	
Colliery Notes.....	882
Personal, Obituary and Societies.....	883
Editorial Correspondence.....	884
Mining News.....	887
Markets.....	892
*Illustrated.	

The Alaska Coal Cases

We have previously ridiculed an article that appeared in one of the popular magazines charging enormous frauds in connection with the location of coal lands in Alaska, and have also published sound evidence as to the actual value of those lands, showing that the muckrakers and tyros in mining were indulging in gross exaggeration. We were not sure that there had been no significant fraud in the location of the Alaska coal lands. Our laws for the location of coal lands are of such antiquated and incompetent character that they put a premium upon fraud. We have urged repeatedly that Congress amend the laws so as to make them conform to modern knowledge and conditions.

We have no desire to condone or ameliorate frauds that have been perpetrated upon the Government under the existing laws, no matter how absurd be those laws. There should be strict compliance with the letter of the law. Anyone who has evaded it by deceit or fraud should suffer the consequences.

In this issue we publish an article about the Alaska coal cases by H. V. Winchell, which comes with peculiar authority. Mr. Winchell stands among the front rank of our mining geologists and is a man whose personal integrity and professional standing are recognized as of the highest. He shows in his present contribution that there was no intentional fraud in the Cunningham cases that have been creating such a stir. We will confess frankly that previously we had not taken the trouble to inform ourselves as

to the identity of the Cunningham claimants. Now that Mr. Winchell has published the list, we recognize from our own knowledge many of them as men of standing, and have no reason to doubt that all of them are such as Mr. Winchell says.

The action of the Government appears to be another example of bureaucratic injustice to citizens of the United States, wherein the laws of the land are overridden. This case may be even more flagrant than some others. In the zinc-ore case the Treasury Department could at least stand upon a misinterpretation of the law. The maladministration of the Post Office Department probably has some basis in law. We imagine that the Department of Justice in putting the Anaconda Copper Mining Company to unnecessary expense over the pending smoke suit has also some color for action. These examples of bureaucratic assumption of power are all injustices to the citizens of the country. It appears, however, that in the Alaska coal cases the bureaus have acted in direct contravention of the law. How long are the people going to stand such assumption of authority by the bureaucracy?

Consistency with Good Business Management?

The secretary of the North Butte company is reported to have made the following statements:

1. "The abuse heaped upon the company and the management is entirely unwarranted, and the cry that has been going forth that the company would not

furnish information is untrue, for there has never been a time that any stockholder could not get information when applying for it."

2. "It is very true that we have not given out information regularly to the general public; for it stands to reason that such a policy would not be consistent with good business management."

3. "The lower levels of the mine have not shown up such large and consistent bodies of ore as appeared on some of the upper levels, yet we have opened up stopes of commercial ore."

Referring especially to the second statement, we beg to ask, Why not?

George W. Perkins, who ought to be recognized as an authority, said recently in a public address that "Corporations would not be a menace, but a great public benefit, if managed under laws that would compel proper publicity and punish officers for improper methods."

The North Butte company has just published its report for 1909, which contains estimates of ore reserves not only by its own manager, but also by an independent engineer. As to the fullness of detail with which the condition of the mine is now described, this report leaves nothing further to be asked. The manager and the engineer agree that the reserves of the mine amount to about 880,000 tons, which is about two years' supply at the rate of production in 1909. The petering out of the orebody below the 2000 level is frankly admitted. Upon that level the orebody appears to be of about the same size as on the 1800, but the grade of the ore is extremely irregular. High-grade ore shows for short distances and then drops to second class, the orebody at this level being mostly second class. On the 2200 level, "Most of the ore has been too low in grade to be considered a part of the ore reserves."

This experience confirms the opinion expressed by some good geologists in the early days of this mine, namely that the class of vein upon which the North Butte is opened, possesses rich lenses of ore that do not extend continuously to great depth (as depth in Butte is measured). North Butte may find another orebody below the 2200 level, or may not. A good deal of prospecting will probably be required to determine this, and in the meanwhile the life of the mine cannot be safely estimated beyond two or three years.

The Porphyry Coppers

The porphyry coppers are going to make good (of course we refer only to those that have been properly engineered). There is no question about this, Utah and Nevada having amply demonstrated their possibilities. Nevertheless, there are going to be disappointments among them, as we have previously indicated. This is going to result from overestimates of grade of ore, extraction of copper, and cost of mining.

One of the absurdities of porphyry promotions is the uniform assumption that their copper is going to cost 9c. per lb. Mr. Channing announced this estimate for Miami, in which case there appears to be an excellent probability of realization, and ever since the same has been adopted by nearly everyone else without consideration in all cases.

Now, it is manifestly unlikely that all of the Arizona porphyries are going to realize the same figure. For one thing this does not recognize the effect of difference in grade of ore. For example, take two mines of identical physical characteristics, permitting a mining and milling cost of \$2 per ton in each case, whereof one yields 30 lb. and the other 40 lb. of copper per ton. The cost per pound of copper up to this stage will be respectively 6 $\frac{2}{3}$ and 5c. per ton, which is a material difference. As between any two mines, this difference may, of course, be reduced by some condition favorable to mining and milling, but on the other hand, it may be increased. So we look for some of the new porphyry copper to cost 10, 11 and even 12c., instead of the 9c. that looks so well in promoters' prospectuses.

In the steam-shovel mining of these thick orebodies, covered usually by a thick overburden, many problems have had to be solved and conditions have developed that were not considered in the first estimates. Thus, what was simpler than to estimate that in the mining of an orebody 100 ft. thick covered by 100 ft. of overburden, one ton of the latter must be removed per ton of ore. How many paused to think that a pit could not be dug 200 ft. deep with vertical sides, and that, in fact, the ratio of overburden would be a good deal more than 1:1 when the necessary slope of the sides was provided?

The sloping of the slides, the extraction

of ore in the corners at the bottom, and the raising of the ore from deep pits are important considerations, and all tend to increase the cost of mining over what the promoter estimates in his office and over what may be realized in taking the first slice near the surface. Reflection upon these points, and several others also, will raise the doubt whether the cost-factor that is taked about for a mine possessing ore reserves for 20 years will apply over that whole period as well as to the initial operations.

The average daily rate of the production of refined copper, according to the statistics of the Copper Producers' Association, during the last 12 months is given in the following table.

3,785,809	3,890,233	3,800,924
3,814,714	3,934,104	3,759,589
3,885,583	4,021,216	4,025,446
3,815,406	4,053,612	3,873,144

It appears from the above figures that production increased progressively, with the exception of a single month, up to November, when the climax was reached. Since November there has been no marked tendency toward further increase.

The world's visible supply on Dec. 1, 1909, was 390,000,000 lb., as a round number. On April 1, 1910, it was 373,450,000 pounds.

Upon the face of the returns, therefore, deliveries in the last four months have exceeded production. The same is probably true, with respect to actual consumption.

The producers of copper, lead and zinc are inquiring why the prices for those metals do not inflate if it be true that the increasing production of gold is responsible for the general rise in the commodity indices?

The promoters of oil companies are coming to town. Already are their literary productions to be observed in the papers and their voices are heard on the curb. Now, indeed, does the sucker need to keep his hand on his pocketbook.

The Goldfield Consolidated is to be congratulated upon its energy in getting 70 of its 100 stamps into operation so soon after the fire, which it was reported at first would tie up the mill for several months. Without doubt the management of the company has exercised great ingenuity in overcoming difficulties to avoid the delay that was anticipated.

CORRESPONDENCE and DISCUSSION

Views, Suggestions
and Experiences of Readers

Flue Gas Losses

In a recent discussion regarding stack losses at smelteries and refineries the question arose, are the metals lost as dust (solid matter), or as vapor, or as both. I maintain that the losses are due to both dust and vapor.

Assume that we have a stack handling 30,000 cu.ft. gas per minute at 273 deg. C. How much silver will this gas carry as metallic vapor? Prof. J. W. Richards in his "Metallurgical Calculations," Vol. III, under the metallurgy of silver and gold, gives a method of calculating this, provided we determine some value for the vapor tension at moderate temperatures.

By interpolation of the table given in the above reference between 729 deg. C. and absolute zero —273 C. (at which point all molecular action ceases), about 0.0001 mm. of mercury is the vapor tension of silver at 273 deg. C. One cu.ft. of hydrogen weighs 0.00559 lb. at zero degrees C. and 760 mm.; therefore

One cubic foot of silver vapor weighs $0.00559 \text{ lb.} \times \frac{108}{2}$ or 0.30186 lb. at zero degrees and 760 mm.

One cubic foot of silver vapor weighs $0.30186 \text{ lb.} \times 14.583 = 4.402 \text{ oz. Troy}$ at zero degrees and 760 mm.

One cubic foot of silver vapor weighs $4.402 \text{ oz.} \times \frac{273}{546} = 2.201 \text{ oz. Troy}$ at 273 degrees C. and 760 mm.

If at 273 degrees C. the vapor tension of silver vapor is equivalent to 0.0001 mm. of mercury and the gas is saturated, the silver vapor supports $\frac{0.0001}{760} \times 100 = 0.0000131$ per cent. of the total pressure or is equivalent to 0.0000131 per cent. of the total volume. Therefore, one cubic foot of gas carries 0.000000131 cu.ft. of silver vapor at 273 deg. C. and 760 mm. and as one cubic foot of silver vapor at 273 deg. C. and 760 mm. weighs 2.201 oz., we have 2.201×0.000000288 oz. silver vapor per cu.ft. of gas.

Assuming this to be an approximately correct figure, we have for a daily total $30,000 \times 60 \times 24 = 43,200,000$ cu.ft. giving a silver loss of about 12 oz. per day due to metallic vapor.

Treating lead in a similar manner, assuming the vapor tension to be approximately 0.0001 mm. mercury at 273 deg., we obtain for our daily stack losses as lead vapor, about 1.6 lb. lead. We could consider gold, bismuth, copper, arsenic, antimony and oxides of these metals in

the same manner, and prove that there are certain amounts of metals lost as vapors at such a moderate temperature at 273 deg. Centigrade.

Applying this reasoning to a bag-house where the average temperature is, say, 80 deg. C., we would still have some vapors present in the gases. Less than at 273 deg. C., but still a relatively large amount. This vapor will, in all probability, go through the bags and be lost, the dust being trapped in the bags. Air can and does carry moisture or water vapor. If air carrying small amounts of water vapor is drawn or forced through bags, the amount of vapor extracted by the bags is practically nothing, therefore, why should bags remove metallic vapors or vapors of metallic oxides?

The above calculations are qualitative rather than quantitative.

W. C. SMITH.

Grasselli, Ind., April 11, 1910.

Efficiency Index in Milling

The contribution by H. A. Megraw in the JOURNAL of Feb. 5, entitled "All Slime Treatment of Ore in Cyanide Plants," is suggestive and offers numerous points of departure for interesting lines of speculation and experimentation.

His suggestion to treat sand and slime separately, though each is to be air agitated, gives rise to the question of relative required time of treatment for sand leaching and sand agitation. If six days are required to obtain a 90 per cent. extraction when leaching 100-mesh sand, what period of air agitation will attain the same result? If the sand is separated practically free from slime, the loss of time and dissolved metals and cyanide in washing will be much less than with slime, said washing being done by agitation and decantation or by arranging a filter on the cone bottom of the air-agitation tank.

His "efficiency index" AY , where A equals cost of treatment and Y equals the per cent. loss in tailings, is applicable in only a limited number of cases, and even then is not an index as it is not proportional.

In the comparative example given, the two processes cost \$4 and \$3 and give 85 and 70 per cent. extractions respectively. It is stated that the smaller the index the more efficient the process. Taking the above costs and extractions and applying to ores of different grades, it will be found that for ores over \$7 the statement "the smaller

the index, the more efficient the process" is true, but for ores containing less than \$7 the converse is true.

Again, taking for comparison costs of \$5 and \$4 on a \$7 ore for 80 and 75 per cent. extractions, the index in either case is 100 while the process costing \$4 and giving a 75 per cent. extraction results in twice the net profit secured by making an 80 per cent. extraction at a cost of \$5. This efficiency index needs more factors and I think it is up to Mr. Megraw to provide the missing ones, as such an index certainly will be interesting and useful if it can be simply presented.

MARK R. LAMB.

Milwaukee, Wis., April 17, 1910.

Wildcatting in California Oilfields

In the JOURNAL of March 26, under heading "Special Correspondence" from California, and discussing the oil situation, wildcatting, etc., a direct misrepresentation is made concerning the prosecution or exposure of "wildcat" oil operators in this State by "certain State officials." The shoe apparently fits me, so I shall wear it.

Statements were made by me to the press a short time ago that the California State Mining Bureau proposed to expose or prosecute the fake oil operators wherever sufficient evidence was secured to warrant the same. It was not assumed by me that a "wildcatter" was necessarily a faker or a swindler, and it was distinctly stated and published in the press that it was *not* the "wildcatter" who was spending money legitimately in an unproved field that we were after, but the "wildcatter" who incorporated a company on wind and transferred the money of the stockholders into his own pocket instead of spending it in a legitimate endeavor to find oil. California is again suffering from the presence of men of the latter class who have been drawn here by the great opportunities which the present oil excitement offers for swindling the unwary.

The East is being flooded with worthless stock in companies which purport to operate in California, and a full investigation of them is now being made by the Bureau with as much rapidity as our appropriation will allow. Evidence is being collected for the exposure or prosecution of the swindlers. In the meantime, Eastern and foreign investors will do well to scrutinize and investigate every oil proposition offered.

L. E. AUBURY, State Mineralogist.

San Francisco, Cal., April 1, 1910.

A Far Sighted Corporation

The United States Steel Corporation has not been deterred by the abuse showered upon it by Mr. Gompers and other union leaders from taking an advanced and admirable position in regard to Sunday labor, says the *Evening Post*. Of their own accord, the officers of the Corporation have curtailed the hours of weekly labor at all steel works, rolling mills, shops, quarries and docks controlled by them. As they have no less than 200,000 men on their pay-roll, the far reaching character of this change is obvious. Most of this Sunday labor has heretofore been defended as unavoidable, and it is not yet to be wholly done away with. But there is so much just criticism of corporations in their various capacities that it seems to us only proper to draw especial attention to an unselfish and enlightened act like this one of President Gary and his subordinates.

The Steel Corporation managers really seem to understand the truth that the more contented their labor is, the more efficient it is certain to be, and that contentedness depends upon proper hours of work and sound physical condition. A year ago its finance committee voted to recommend to all subsidiary corporations that Sunday labor be "reduced to the minimum." Now Mr. Gary has notified the heads of all companies that "all of us expect and insist that hereafter the spirit of the resolution will be observed and carried into effect." After this authoritative warning, it is accepted that, wherever possible, there shall be "no construction work or loading or unloading of materials" on Sunday, for Mr. Gary says: "I emphasize the fact that there should be at least 24 continuous hours' interval during each week in the production of ingots." This means an immense easing of life for thousands of men.

The Steel Corporation has taken another noteworthy step forward by instituting a voluntary "employers' liability relief system" for its workmen. The payments the Corporation plans to make will be quite irrespective of its legal liability. During temporary disablement single men will receive 35 per cent. of their wages and married men 50 per cent., with an additional 5 per cent. for each child under 16 and 2 per cent. for each year of service above five years. In case of death of the wage-earner the widow and children will receive one and one-half years' wages, with an additional 10 per cent. for each child under 16 and 3 per cent. for each year of service of the deceased above five years. The Corporation announces that for some years past it has been paying more than a million dollars a year to injured employees and to their families. Its new scheme will be tried for a year to see

how it works, and the Corporation announces that "it is intended by this plan to treat employees fairly and generously, even under the most enlightened view of the employer's responsibility." It also announces that it has under consideration the pensioning of disabled or superannuated employees. To all this must be added the fact that on April 13 the Corporation voluntarily increased the wages of its 200,000 employees by about nine million dollars per annum. The official announcement is as follows:

"The subsidiary companies of the United States Steel Corporation have decided to make substantial increases in wages. Notwithstanding that the subject matter has been under careful consideration for the last 60 days the exact amounts have not yet been fully determined, except as to the ore companies and the coal companies, which already have announced advances.

"As to the other companies, the figures will be definitely arrived at in time to become operative on May 1, except the Tennessee Coal, Iron and Railroad Company and the transportation companies, which may not be able to arrange the increases until a later date."

The Corporation is deserving of the widest praise for its admirable attitude toward its workmen. Such an example as it sets is bound to have a tremendous effect on other industrial corporations throughout the United States.

Daly-Judge Mining Company

The total receipts of the Daly-Judge Mining Company, Park City, Utah, in 1909, were \$437,631; total expenditures, \$347,590, leaving a cash balance of \$222,038 at the close of the year. The surplus was increased by \$90,041, while the construction account was unusually large,

	Tons.	Oz. Silver.	Oz. Gold.	Per Cent. Lead.	Per Cent. Copper.	Per Cent. Zinc.	Per Cent. Iron.	Sold for
Crude	3,437	31.10	0.034	23.00	1.39	13.90	9.03	\$23.81
Concentrates	9,243	16.30	0.059	32.60	0.28	9.40	18.90	24.23
Zinc middlings	17,652	4.80	0.02	4.00	0.00	29.00	14.70	5.88
Iron middlings	3,032	8.08	0.044	12.90	0.27	12.00	26.00	9.06

\$15,117, owing to new compressor installation. The receipts from the operation of the zinc plant were \$100,918, and this plant has been demonstrated a success.

The mine produced 51,309 tons of ore, of which 3437 tons of crude were sold. Two orebodies of shipping grade were opened during the year, and one of milling grade, and since Jan. 1 a new bed of milling ore has been opened on the Contact vein above the 1200 level, of over 30 ft. in width. The thickness has not yet been determined. Exclusive of prospecting in ore, 5165 ft. of dead work was done during the year.

The mill was in service 351 days of eight hours each, and treated 47,872 tons, from which 9243 tons of lead concentrates, 3032 tons of iron middlings and 5510 tons of zinc middlings were made. The accompanying table gives the tonnage and composition of the products sold during the year.

The accompanying data as to operating costs are available from the report.

COSTS AT DALY-JUDGE.

	Total.	Per Ton.
Mine Account (51,309 tons):		
Labor and salary	\$106,145	\$2.06
Repairs	803	0.01
Supplies	10,246	0.20
Explosives	5,021	0.12
Timber and lumber	21,927	0.43
Fuel	6,685	0.13
Rails and cars	1,568	0.03
Piping	757	0.01
Insurance	2,202	0.04
Sundries	295	0.00
Total	\$155,649	\$3.03
Mill Account (47,872 tons):		
Labor and salary	\$24,136	\$0.51
Repairs	4,954	0.10
Supplies	6,322	0.13
Assay office	1,619	0.03
Fuel	6,734	0.14
Insurance	1,112	0.03
Sundries	719	0.01
Total	\$45,596	\$0.95
Dead work (51,309 tons)	\$89,756	\$1.75
Marketing (33,364 tons)	25,496	0.76
General expense (51,309 tons) ..	12,635	0.25
Total operation (51,309 tons) ..	\$329,132	\$6.41

Zinc Mining in Wisconsin

By J. E. KENNEDY*

The shipment of zinc ore from the Wisconsin district during the first three months of 1910 aggregated 10,145 tons. These figures represent commercial "spelter" and "oxide" ores and are computed on a different basis than the figures showing a shipment of 11,889 tons for the corresponding period of last year. In the statistics of this year the tonnage of roasted or "spelter" ore sent from

the roasting plant of the Mineral Point Zinc Company, at Mineral Point, Wis., to its smeltery, at Depue, Ill., is substituted in place of the "separator" ore shipped from the mines to the Mineral Point roasting works. Computed upon the old basis the shipment so far this year would show a gain of 7000 tons over the shipment of the same period of last year. Due to the snow blockade in January and the subsequent decline in ore prices the stock of raw concentrates in bins has remained at about 7000 tons since the first of the year.

*Platteville, Wis.

OPERATIONS OF VARIOUS COMPANIES

Fifty-two mining companies, operating 60 concentrating plants, have contributed to this year's shipment. Fifteen other companies have begun or will shortly resume milling operations, eight of which have finished construction of new or second-hand mills since January. Highland, Platteville and Benton have evidenced greatest activity in prospecting and new development. At Highland a 100-ton mill is under construction by the Wallace Mining Company and a 25-ton plant by Frank Kroll. Imhoff & Williams have struck a rich deposit of lead and jack east of the No. 1 mill of the Highland Mining Company. The Kennedy west eighty and the old Clemenson farm, east of the village, are showing up good zinc ore. Nearly every mine and prospect in this camp is slated to operate steadily throughout the summer season and miners are in good demand.

At Platteville the Wisconsin Zinc Company has developed a big body of heavy sheet jack on the Longhenry land; this company is also developing the Grant county property under option contract. Milling plants are completed on the Kohinoor and Dickson-Oettiker properties. The Seitz land, east of the Klar-Piquette, has been proved by churn drill and will be opened up by shaft. The Klar-Piquette, Cruson, Homestead and Lyght are new properties which are making a good record in output; the St. Rose holds first place in ore grade, turning out a raw concentrate assaying 59 per cent. zinc.

DEVELOPMENT AT BENTON

The territory around Benton will be the scene of the greatest amount of development work during the coming summer. The Field and Lucky Twelve companies have opened up orebodies at New Diggings, thus extending the zinc-producing area to the southeast. The Winskill, under option to the Wisconsin Zinc Company, the Coon Branch, under option to the Vinegar Hill Zinc Company and the Sedgwick, owned and operated by the Frontier Mining Company, are showing up strong runs of zinc ore by churn drill and shafts and undoubtedly will be supplied with mills during the early summer. The Wisconsin Zinc Company is equipping the Drumm lease and developing the land of the LaFayette Land and Mining Company, comprising 1900 acres. The Miffin-Linden Mining Company, the mining branch of the Mineral Point Zinc Company, has reopened the Fox and will also start work at the Winnebago, both of which were recently acquired. The Vinegar Hill Zinc Company is completing a 100-ton mill at the Midway shaft, south of Hazel Green. The Cleveland Mining Company has contracted for heavy Smedley pumps and will resume shaft sinking on the Witherby land. The

Wilkinson has worked into rich jack ground below the lead run and will build a concentrator. The Little Bennie, newly equipped with mill, has resumed operations under sublease.

Ground has been broken at Cuba City by the Campbell Ore Separating Company, of Boston, for the erection of a roasting and magnetic separating plant. The Mineral Point Zinc Company is increasing the capacity of its oxide plant one-third. At Galena, Ill., the Interstate Light and Power Company, with a capital of \$750,000, has completed its central power station of 5000 kw. capacity and extended the main transmission line to Platteville. Approximately 26 miles of primary power lines and 16 miles of secondary lines will be built to furnish electric motive power to mines throughout the district.

Chinese Iron Ore for the United States

The Western Steel Corporation of Seattle, Wash., has published a statement with regard to its contract for iron ore and pig-iron imports from China, from which the following extracts are taken:

"The contract calls for a minimum of 36,000 tons each of ore and pig iron for the first two years, and after that for the full amount of 200,000 tons a year. We have the option of renewing our contract at the expiration of 15 years.

"The Chinese ore is a hematite, containing 66 per cent. of iron, with just a trace of sulphur and phosphorus. This ore, mixed with equal amounts of British Columbia and Washington iron ores, will give us a product equal to the best made by any steel plant in the world. The pig iron will be mixed with the pig iron made at Irondale, and used in making high-grade steel of all kinds.

"During the next two years, the Western Steel Corporation will build a new blast furnace at Irondale, with a capacity of 300 tons of pig iron a day, as well as new rolling mills, a tube plant and tinplate mills. This, together with the 300 tons of pig iron a day, received from China, and with the scrap steel used to mix with the pig, will give Irondale two years hence, a total daily output of 700 tons of steel.

"This will mean the erection of new plants at Irondale, with six times the capacity of the initial plant, which is about to begin operations . . .

"It should be clearly understood that this contract will not hamper in the slightest our development of our Washington and British Columbia ore deposits. Our present blast furnace will handle these American ores, and a new blast furnace will at once be built.

"The handling of the Chinese ores will simply mean that our rolling mills will

be kept equally busy, that our capacity will be at once vastly increased, and that a great steel plant will be built up at Irondale many years sooner than could be done had we been unable to get this contract.

"It will be our policy neither to advance nor cut the standard tariff of steel prices. Plants will be built in British Columbia to take care of the steel business originating there."

New York Curb Requirements

The New York Curb agent, E. S. Mendels, has posted the following new listing requirements:

"Statements of assets and liabilities, earnings and expenses, signed by an officer of the company, with seal attached, and sworn to before a proper court officer or notary public.

"Engineer's report, certified and sworn to.

"Certified copy of the charter.

"Maps of the property.

"All matter printed or otherwise relating thereto.

"A list of the officers and directors, with their addresses, and an individual reference for each.

"Transfer office and registrar must be in New York.

"Certified copy of the leases.

"Confirmation of the titles, etc., certified.

"A check to cover fee of agent for examining papers."

The Bureau of Mines Bill

SPECIAL CORRESPONDENCE

Senator Dick, chairman of the Senate committee on mines, has about concluded a canvass of the Senate undertaken for the purpose of ascertaining how the vote on the proposed Bureau of Mines bill will be likely to turn out. He reports that in his judgment the bill will have a safe majority if allowed to come up for debate and vote. This opinion is confirmed by other investigators not connected with the agitation for the bill.

Enforcing Dust Allaying Regulations in Australia

The various States in Australia have for some time had laws on their statute books requiring mine managers to provide water sprays where necessary to allay the dust from drills or other sources in order to prevent miner's phthisis. These regulations have not been strictly enforced of late, with the result that the spread of the disease has been alarming, and steps are now being taken to insure the proper observance of the law in all cases.

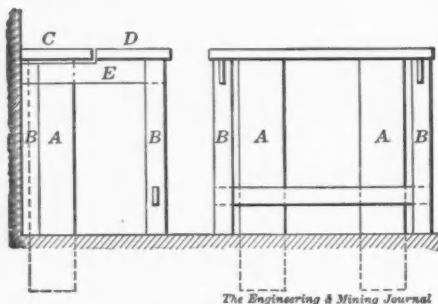
DETAILS of PRACTICAL MINING

Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

Table for Assay Balance

BY STUART H. INGRAM.*

The accompanying illustration shows a balance table that I use in my office. I have not seen it in use at any other place, except in the University of California. The advantage of this table is that it provides a firm base for the balance which is not affected by the assayer resting his arms upon the table, or otherwise jarring it. It is made in two separate and distinct parts. The first is composed of the top *C*, on which the balance rests, supported by the posts *A A*. These posts are 8x8 in. and are set in a concrete base. The second part is the top *D*, supported by the legs *B B*. The



ASSAY BALANCE TABLE

cross piece *E* is cut away under *C*, so that the second part does not touch the first anywhere.

Saving Power on Paddle Agitators

At the Florence-Goldfield mill, by the simple device of hanging a piece of track iron from one blade of the stirrer used in the pulp tank, the power consumption was found to be reduced one-third. The piece of iron is suspended from the paddle blade by two chain links so that as the paddle revolves, the iron drags over the surface of the settled slimes, leveling it off so the paddle blades do not scrape along. The play allowed by the links keeps the iron from having to dig deeply. It is merely the weight of the dragged iron that presses against the settled pulp. It has been found that by using this device no trouble is experienced from stirrer arms getting broken on account of the excessive strain from digging packed, settled slimes.

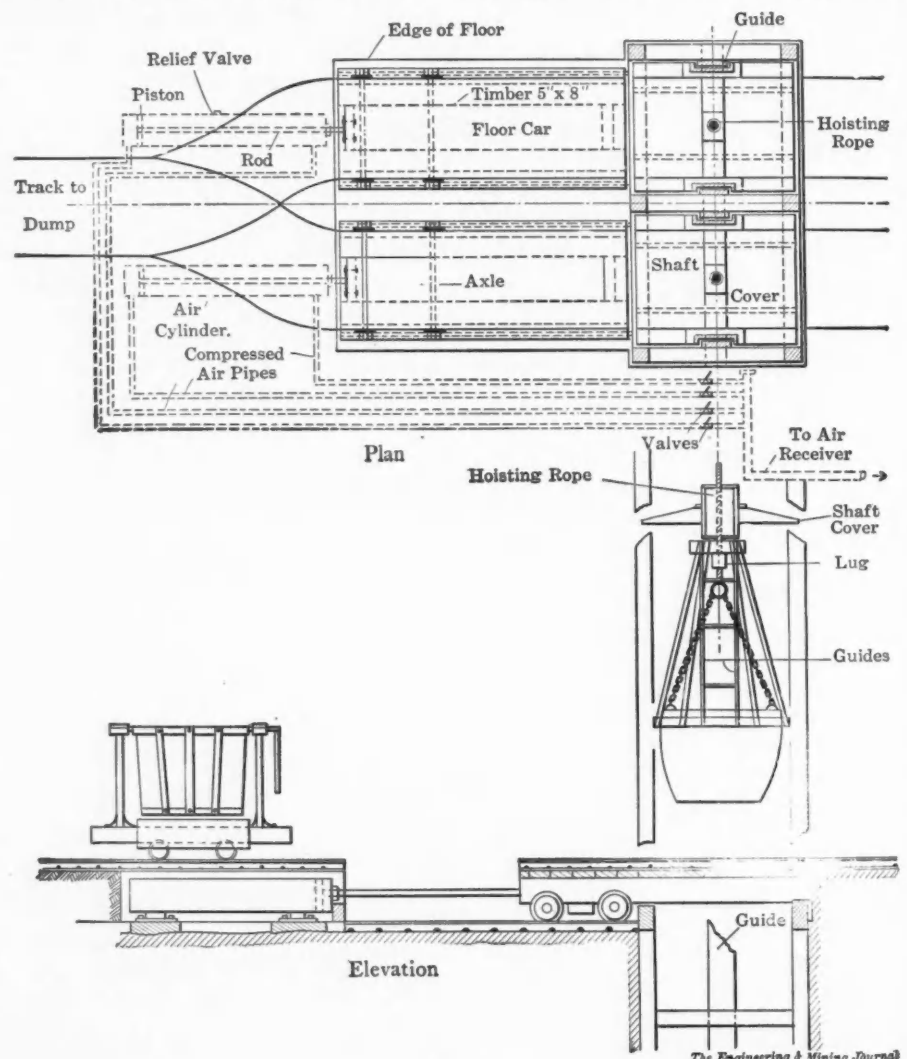
*Mining engineer, Guaymas, Mexico.

Method of Handling Sinking Buckets

BY W. B. BAGGALEY.*

The accompanying illustration shows the method of removing buckets from the cage at one of the newer Lake Super-

cover, and then proceeds to an elevation of 15 ft. above the floor of the shaft house. Chairs are used in the shaft to prevent the cage descending. The floor car, operated by the compressed-air cylinder shown, and having the bucket car upon it, is run over the shaft. The cage is not attached to the hoisting rope, but rests upon a lug, while the bucket hangs



SURFACE ARRANGEMENT FOR HANDLING SINKING BUCKETS BY COMPRESSED AIR

rior copper properties, which is still in the development stage. A vertical, five-compartment shaft is being sunk to an ultimate depth of 4000 ft. Two compartments are being used for hoisting rock and water and lowering timber, etc. A floor plan and elevation of part of the shaft house are shown in the illustration.

On nearing the surface the cage slows down sufficiently to pick up the shaft

*Houghton, Mich.

from chains which are permanently fastened to the end of the rope itself. Consequently, when the bucket is lowered the cage remains on the chairs. The full bucket is then lowered to the car below, which has a mounted and pivoted frame into which the bucket fits. The floor car is then pulled back to the normal position, and as it stops suddenly, sufficient impetus is given the car to materially assist the trammers, who push it to the dump. It will be noted that the

tram car is of such dimensions that it could not drop down the shaft if any accident should occur.

An empty bucket is now placed on the rope, and hoisted until the lug lifts the cage from the chairs. The latter are then drawn back, allowing the cage to be lowered slowly until the shaft cover comes to rest on the first set of stringers at the level of the floor. The shaft cover has a hole in the center through which the hoisting rope runs. The cage is necessary to act as a guide for the bucket, which contains about 2 tons of rock, and which is hoisted at the rate of 3000 ft. per minute.

This arrangement, which keeps the shaft covered at all times, not only prevents anyone falling in at the surface, but also safeguards the miners working below, from having anything dropped on them when the cage is being loaded with drill steel, etc. The loading of shaft

Determining Dust Losses from Roasters

BY C. C. HOKE*

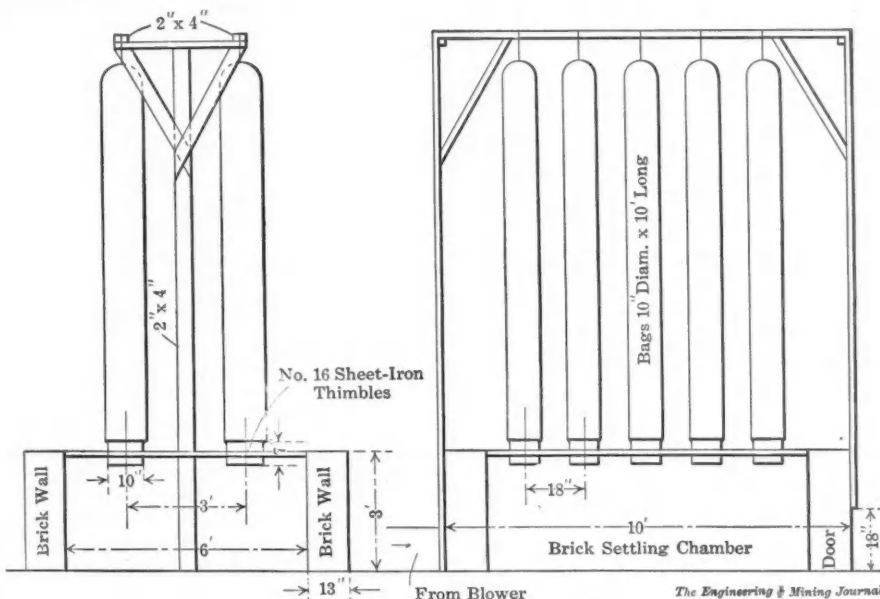
In order to determine the dust losses from roasters, lead and calcining furnaces, converters and the like, the Compañía Minera de Peñoles, at Mapimi, Durango, Mex., installed an experimental bag house consisting essentially of a gas-tight settling chamber opening into filtering bags suspended vertically from supports above. The gas to be filtered is drawn from its source by a fan blower and discharged into the settling chamber, whence it escapes through the bags. Upon cutting off the pressure from the bags and shaking them, the fume falls into the settling chamber and may be removed through a door provided for the purpose. The size of the bag house and number of bags

between shaking the bags obviously depends entirely on the fume density in the gases, and should be such that no great reduction in volume delivered by the fan will result. In treating 25 lb. of fume per hour, the interval between shaking the bags would probably be about 1½ hours.

CONSTRUCTION

This installation, which can be cheaply constructed and is simple in operation, has proved entirely satisfactory and is suggested in reply to the inquiry of M. W. von Bernwitz in the JOURNAL of Feb. 26, 1910. It should commend itself to anyone desiring to carry on investigations of like nature. The construction of the plant is as follows:

The settling chamber is 3 ft. high, 6 ft. wide and 10 ft. long; the walls are built of brick—two bricks thick—and the top or thimble floor is of matched flooring made air-tight by cementing over. The thimbles are 10 in. in diameter, made of sheet iron about 1/16 in. thick, with an expanded rim at the top to fasten the bags more securely, and are fitted tightly into holes cut through the thimble floor. They are further retained by lugs riveted on the sides. There are 10 bags of a fair quality of drilling, running about 50 strands to the inch, and measuring 10 in. in diameter by 10 ft. long. They are secured to the thimbles by tying tightly, and are suspended (not too tightly) from a wooden framework above the thimble floor. A fan blower, suitable for delivering about 1000 cu.ft. of gases per min. at a pressure of ½ in. of water is used, delivering to the fume chamber through a 9-in. pipe. A cleaning door, 18x24 in., is provided at one end of the chamber. This apparatus is capable of handling about 25 lb. of fume per hour, if the bags are shaken at frequent intervals.



EXPERIMENTAL DUST CATCHING PLANT

timbers which are swung under the cage, is greatly facilitated. Also the substitution of a bailer in place of the cage is made easier and safer.

The services of two men are saved underground, by having the cage rest upon the lug, as the latter comes to rest on chairs at the lowest level and the bucket continues to the bottom of the shaft. Ordinarily, an auxiliary hoist is installed at the lowest level, which, being operated by compressed air, is much less efficient.

Referring to the rivalry at Broken Hill between the respective advocates of tube mills and of grinding pans, Mr. Poole says that owing to being able to get rhodonite at a nominal cost instead of flints for the tube mills, grinding with tube mills is cheaper than with pans in a given case where the results of grinding are the same.

required will depend on general conditions, such as the fume density in the gases to be treated, volume of gas driven through the bags, etc.

In making a quantitative test it is necessary to provide an anemometer to measure velocities in the fan suction or discharge, and in the flue or source from which the sample is drawn. Care should be taken that the cross-section of the pipe in which the velocity is measured be such that the velocity will not exceed 1000 ft. per min., and a lower velocity (say 600 to 800 ft. per min.) will be desirable. The ratio of the fume recovered by the bags to the total will be as the volume of gas delivered to the bags to that passing through the source from which sample is taken, both volumes being reduced, of course, to an equivalent pressure and temperature. The interval

*Mapimi, Durango, Mexico.

Ore Extraction at Miami

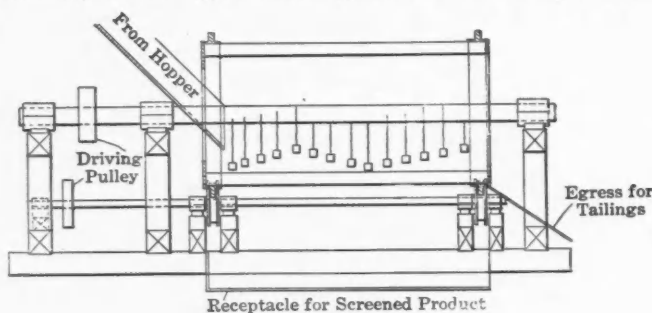
The Miami Copper Company intends to adopt the auxiliary-raise and sub level stoping method, and the mining officials of the company are confident that this will be a great success. As mining progresses the width of the rooms may be increased, or a great many of the pillars may be broken and drawn with the rooms, thus increasing the percentage of the ore mined by this method. At the same time the mine is being blocked out so that a change to the top-slicing or sublevel caving methods may be effected without great trouble, if such a change be at any time desired.

The management is of the opinion that the auxiliary-raise and sublevel stoping method affords the greatest safety to the men and will give a large tonnage per man, besides securing a high percentage of extraction and clean ore. At the same time there will be complete control

of the mining operations, and the danger of losing blocks of ore by caves or admixture of capping will be eliminated.

A Dry Pulverizer and Separator

The machine shown in the accompanying drawing was devised by M. Quinner and is successfully used in the Altar district placer region, near El Tiro, Mex. The construction is based on the trommel screen; being cylindrical in form and surfaced by steel bars $\frac{1}{8}$ in. apart. The cylinder is usually about 6 ft. long and 3 ft. in diameter, and revolves not faster than 25 r.p.m. on flanged wheels set under it. A shaft, operating on its own journals, runs through the center of the machine and to it are attached about three dozen chains set spirally and at uniform distances from each other. Iron slugs are welded to the ends of the chains. These are about 6 in. long, square-shaped, about $2\frac{1}{2}$ in. thick, and are placed so that the sharp edges strike the material fed through. The shaft turns in an opposite direction to that of the trommel, at an approximate speed of



QUINNER DRY PULVERIZER AND SEPARATOR

375 r.p.m. The spiral arrangement of the pendants carries the rocks and pebbles through rapidly; the pulverized cement, black sand and gold falling between the bars into a receptacle placed beneath. While the chains are forced to practically a rigid position when running, they rarely break when a substance too hard to shatter is encountered—an advantage over rigid rods.

One machine will handle 500 tons of suitable ore per day. The chief elements in favor of this apparatus are that it requires no water, except for steam operation, and discards the bulk of valueless pebbles and rocks without crushing them into the material that is later dry-washed for gold.

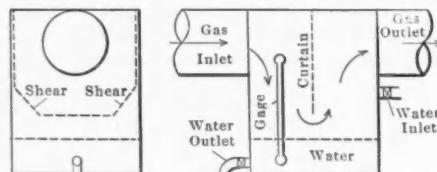
Foresight in Shaft Timbering

When sinking a shaft, if there is any possibility of another compartment being added at a future date, much labor and time will be saved by merely sawing off the outer end of the tongue at the end of each wall plate thus leaving the tongue one-half its original length. A block is lightly spiked in the opening thus left

and in case of adding another compartment to the shaft, this block can be knocked out, leaving a ready space in which to fit the wall plate of the new compartment.

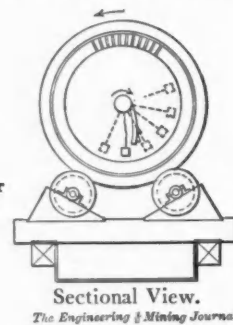
A Gas Valve That Cannot Leak

A simple application of the ordinary water seal as illustrated in the accompanying sketch makes an efficient and



WATER SEAL GAS VALVE

easily regulated gas valve. It consists of a cylinder of metal closed at both ends, the gas entering on one side near the upper end of the cylinder and leaving on the other. Inside the cylinder and at right angles to the entry and exit



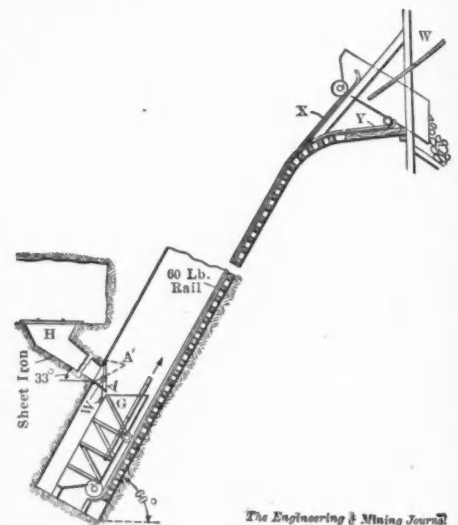
pipes is set a metal curtain connected gas tight to the upper end and to both sides of the cylinder. The curtain has a shear cut on each side to permit delicate adjustment. The area of the gasway below the curtain must be rather more than the area of the gas entry or exit and the top of the gasway must, of course, be lower than the lower side of the gas entry or exit pipes. By regulating the water level the gas can be wholly or partly cut off.

This water-valve arrangement has been found extremely useful in many cases where slide dampers were useless because never tight, and with noxious gases that destroy valves. In certain cases, on account of temperature, oil should be used as the regulating liquid instead of water.

South African mining companies have spent much time and money experimenting with air drills. Most of such drills are designed for 90-lb. pressure, while the pressure carried in the mines where the tests are being carried on falls as low as 40 lb., and averages 60 lb., never exceeding 80 lb. What is the answer?

Skip for Hoisting Coal

A skip, as illustrated by the accompanying sketch, is peculiarly adapted to hoisting coal on the heavy pitch of the slopes which prevail in the southern anthracite coalfield of Pennsylvania. An economical operation of this system requires, first of all, the concentration of the coal mined in the different levels at a main level where the coal is dumped into the hopper, as indicated by *H* on the sketch; then the coal slides down the chute which is lined with sheet iron and has a pitch of 33 deg. At the end of the chute is an apron *A*; a counterweight *W* is in the loading position, and when not in operation it takes the position *A'*. The skip *G* is shown in the loading position at the foot of the slope. The overall dimensions of the skip or "gunboat" are; length, 16 ft.; width, 6 ft.; height, 6



SKIP FOR HOISTING ANTHRACITE COAL IN PENNSYLVANIA

ft.; and its capacity is 7 tons of coal. The skip is hoisted in the usual manner, and when it reaches the head of breaker or its dumping place, the hind wheels take the track *X*, while the fore wheels take the track *Y*; thus the contents of the gunboat are automatically dumped. The tread of the fore wheels is 3 in., while that of the hind wheels is from 7 to 8 in. The skip is constructed of $\frac{1}{4}$ -in. to $\frac{5}{16}$ -in. iron plates riveted on the frame work; the plates are reinforced by the angle irons; 60-lb. rails are used on the slope. The pitch of the slope varies from 20 to 70 deg., but in all cases the foot of the slope is graded to about 60 deg. for 10 to 12 ft., which is considered as the proper loading angle. The economy effected by the self-dumping property of the gunboat is that of about 4 men as compared with the ordinary slope, hoisting the cars. Cars cannot be hoisted economically up a slope having a dip over 30 deg., hence the "gunboat" hoist.

A Useful Bank of Lamps

BY L. EARLE BROWN*

Nearly every electrician has the usual "five-lamp bank" and knows how much ordinary trouble can be located with it. In fact, he would be at a loss without it. There are circuits and testing conditions where the magneto cannot be used, as it gives a ring when in reality there may not be any metallic circuit at all. It is for just such purposes that the bank of lamps

A hardwood box 6 in. high, 6½ in. wide and 9 in. long, inside measurements, is sufficiently large when it is not desired to use 32 c.p. lamps. A bottom or top, as the case may be, can be left off. A hard rubber, fiber or vulcanite cylinder about 5¼ in. long and 2 in. in diameter should be used for a drum to carry the contacts, making connections with the fingers, as shown in the diagrams. A small nurlled hand wheel and ratchet is placed upon the drum shaft to set and lock the drum in position for the different voltage connections. A small pointer is

used on 220 volts, giving a multiple-series connection. It is evident that connections for lamps when used on 440 volts will be the same as for 500 volts, with the exception of the second or third contact on the drum from the left hand in Fig. 2, which must make contact with both fingers. It will be noted from the diagrams that the contacts on the end of drum are one continuous contact for the entire circumference.

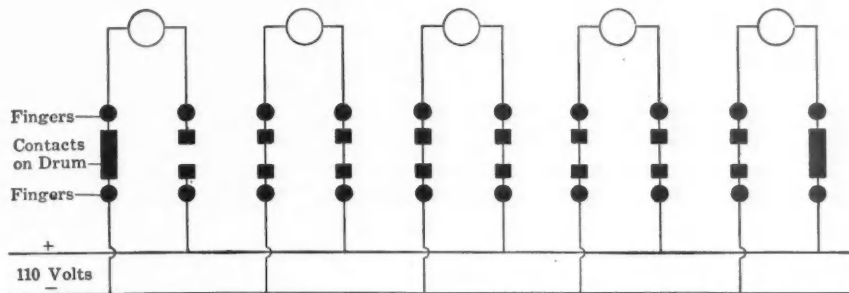


FIG. 1

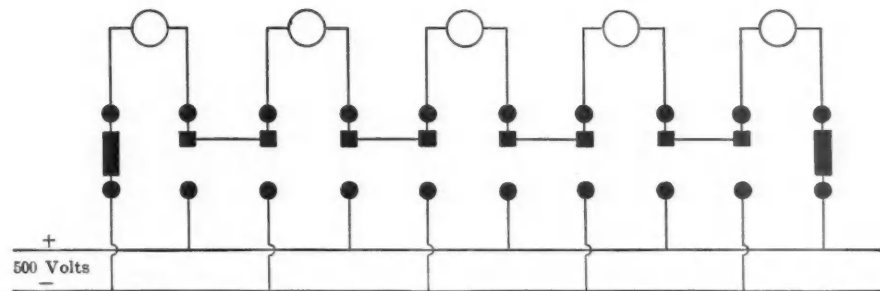


FIG. 2

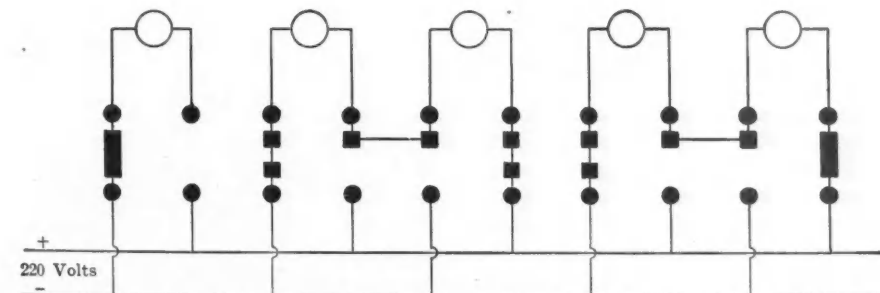


FIG. 3

ARRANGEMENT OF A BANK OF LAMPS FOR DIFFERENT VOLTAGES

is of the greatest value. With the ordinary "five-lamp bank" with the lamps in series on 500 volts, there is a great deal of annoyance in changing the connections for the various other voltages that it is desired to test. The threads of the screws become stripped, making trouble when one is in a hurry and needs the lamps most. To overcome these objections and to have an ever-ready bank of lamps, a simple apparatus can be constructed, and the resultant voltage connections obtained, as per Figs. 1, 2 and 3:

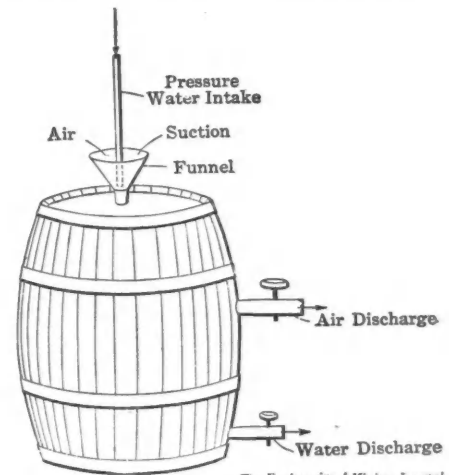
placed upon the top of drum to indicate at what voltage it is set.

Anyone can construct the entire apparatus for a few dollars and its value will be appreciated the more it is used. The drum and lamps should be placed upon the bottom of the box, so that in removing the top of box the lamps will be outside where the light can be of service.

Fig. 1 shows the connections for the lamps when used on 110 volts, giving all the lamps in parallel. Fig. 2 shows the connections for lamps when used on 500 volts, giving all the lamps in series. Fig. 3 shows the connections for lamps when

A Hydraulic Air Blast

A hydraulic air blast is easily rigged up where water under high head is available, and serves quite satisfactorily for affording ventilation, supplying the blacksmith shop, etc. Three holes are bored into a tight, strong barrel, one in the top and two on the sides, as indicated in the accompanying drawing. Into the one in the head of the barrel a funnel



The Engineering & Mining Journal

CONVENIENT AIR BLAST

is inserted and fitted tightly. Pipes are tapped into the other holes and preferably some sort of valve or spigot arrangement provided on each. A smaller pipe connected with the water supply opens into the funnel, the end of the pipe being set a couple of inches above the throat of the funnel.

On turning on the pressure water, air is entrapped and forced into the barrel. The lower pipe serves for an outlet for the water and the upper one as an air discharge. By regulating the valves on the discharge pipes so that the water is let out as rapidly as it enters, and setting the end of the pressure-water pipe at the proper height above the throat of the funnel, a strong air blast can be maintained. The amount and pressure of the water admitted regulate the amount of blast obtained. On the 800-ft. level in the Pittsburgh mine near Nevada City, Cal., such an arrangement is used with great success, water being taken from the pump column to operate the blast.

*Roundup, Montana.

The Alaska Coal Cases

BY H. V. WINCHELL *

PREFACE

For many years I have been personally acquainted with the Northwest, including British Columbia and Alaska, and have been impressed by the importance of the fuel question upon the Pacific coast. Without ample supplies of good fuel no great independent development can be attained. With it, and with an adequate supply of iron ore there is no reason why the West may not some day equal the marvelous East in manufacturing and industrial prosperity, and even in population.

Through my familiarity with the other natural resources and the demand for high-grade fuel throughout the entire Pacific region, I have since 1903 been led into a study of Alaskan coals. Becoming thoroughly convinced of the value and high grade of these coals, and the necessity for their exploitation for use up and down the coast from Alaska to California as well as for naval supplies on the Pacific, I have conceived it no unworthy task to aid in that development.

To this end, after careful investigation and competent legal advice I became financially interested in some of the properties embraced within what are called the "Cunningham claims." Under all the hue and cry of misinformed public clamor I have remained silent as long as my sense of outraged decency will permit; and I now make an appeal for fair play through an organ of my profession where those who know me will have an opportunity on the one hand to judge best to what extent my views are tinged by self-interest and on the other hand to decide how far they portray a tendency upon the part of certain bureaus of the Government to assume authority and exercise discretionary control with which they were not intended to be endowed by the founders.

A DEMAND FOR FAIR PLAY

In the name of fair play and common decency is it not about time to utter a protest against all of this snap judgment in the Alaska coal matter? In the name of respectable journalism is it not time for someone to investigate the facts before charging reputable citizens with frauds against the Government? Is it only a pleasing American fiction that every man is presumably innocent until he is proved guilty? If not, what justification is there for the attitude of many magazines and newspapers toward what is known as the "Cunningham coal

*Mining geologist, Minneapolis, Minn.

cases." In view of the fact that this matter is now being investigated by a special commission of the Department of the Interior and by at least one Congressional committee, and since the only verdicts thus far rendered have discredited only the authors of the charges instead of sustaining the charges themselves is it not rather undignified and suggestive of sensationalism to prejudge the matter as has been done? Granted that the subject is a large and interesting one, and that it permits of the use of dazzling figures; is there any justification for misrepresentation or hasty conclusion? And if it ultimately develops that many honorable men have been maligned, in what way shall they receive compensation for their damaged reputations and outraged feelings? And how much confidence will the public then place in the lurid proclamations of those writers who have uttered such unfounded calumnies? Let us consider the facts as they have been presented in undisputed sworn testimony and documents on file in the case; let us leave entirely out of consideration the Balingier-Pinchot controversy and take up the facts as to the coal entries themselves. The truth will perhaps prove as interesting as many of the newspaper "stories" with which the public is familiar, and may be even more surprising.

Let us concede at the outset that the Government in the past may have been too liberal with its lands and mines, let us admit that it may be desirable to amend the laws, so as to provide for different disposition of our natural resources, so far as they still remain in the possession of the Government. Let us pronounce with utmost emphasis in favor of the *sound* principles of conservation. And having done this let us state as our first proposition the admitted principle that those properties which the Government has sold by due process of law, those lands which have been disposed of at the price and under the terms fixed by the Congress, are no longer the property of the Government nor under its control.

Let us remark in the second place that Congress has no right or disposition to enact retroactive legislation of such nature as to impair or arbitrarily modify the terms of contracts already entered into in good faith between the Government and individuals, nor to take away a man's property without due process of law. This is claimed to be the fact regarding the Cunningham claims. The Government has parted with its equitable title under the law of 1904, and this title

can only be revoked or cancelled by clear proof of fraud on the part of the entrymen.

THE LAW OF 1904

The law referred to reads as follows: [Act of April 28, 1904, (33 Stat. 525).]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person or association of persons qualified to make entry under the coal-land laws of the United States, who shall have opened or improved a coal mine or coal mines on any of the unsurveyed public lands of the United States in the district of Alaska, may locate the lands upon which such mine or mines are situated, in rectangular tracts containing 40, 80 or 160 acres, with north and south boundary lines run according to the true meridian by marking the four corners thereof with permanent monuments, so that the boundaries thereof may be readily and easily traced. All such locators shall, within one year from the passage of this act, or within one year from making such location, file for record in the recording district, and with the register and receiver of the land district in which the lands are located or situated, a notice containing the name or names of the locator or locators, the date of the location, the description of the lands located and a reference to natural objects or permanent monuments as will readily identify the same.

Sec. 2. That such locator or locators, or their assign, who are citizens of the United States, shall receive a patent to the lands located by presenting, at any time within three years from the date of such notice, to the register and receiver of the land district in which the lands so located are situated, an application therefor, accompanied by a certified copy of a plat of survey and field notes thereof, made by a U. S. deputy surveyor or a U. S. mineral surveyor, duly approved by the surveyor-general for the district of Alaska, and a payment of the sum of \$10 per acre for the lands applied for; but no such application shall be allowed until after the applicant has caused a notice of the presentation thereof, embracing a description of the lands, to have been published in a newspaper in the district of Alaska published nearest the location of the premises for a period of 60 days, and shall have caused copies of such notice, together with a certified copy of the official plat of survey, to have been kept posted in a conspicuous place upon the land applied for and in the land office for the district in which the lands are located for a like period, and until after he shall have furnished proof of such publication and posting, and such other proof as is required by the coal-land laws; *Provided,* That nothing herein contained shall be so construed as to authorize entries to be made or title to be acquired to the shore of any navigable waters within said district.

Sec. 3. That during such period of posting and publication, or within six months thereafter, any person or association of persons having or asserting any adverse interest or claim to the tract of land, or any part thereof, sought to be purchased, shall file in the land office where such application is pending, under oath, an adverse claim, setting forth the nature and extent thereof, and such adverse claimant shall, within 60 days after the filing of such adverse claim, begin an action to quiet title in a court of competent jurisdiction within the district of Alaska, and thereafter no patent shall issue for such claim until the final adjudication of the rights of the parties, and such patent shall then be issued in conformity with the final decree of such court therein.

Sec. 4. That all the provisions of the coal-land laws of the United States not in conflict with the provisions of this act shall continue and be in full force in the district of Alaska.

HOW THE FIRST LOCATIONS WERE MADE

This law is practically an invitation to citizens of the United States to make locations of coal lands in Alaska. It has never been repealed; it stands upon our statute books today and under it

during the last six years, hundreds of perfectly honest men have undergone peril and hardship searching for and attempting to acquire coal claims in Alaska, and yet there is no single one of them who has yet received the patent solemnly promised by this great government.

Nay, more, those who have attempted in all good faith to benefit by it now find themselves branded as thieves and land grabbers and tools of soulless corporations. First in order of application, first to locate properly, first to make the payments required by the law, first to receive final certificates of purchase, and therefore first to be considered by the executive officers of the Government, were these Cunningham claimants. The history of their operations is briefly as follows:

In the '90s, thousands of prospectors were attracted to Alaska by the gold discoveries of the Klondike, Cape Nome, and other districts. Title was by location and possession; and local rules and regulations prevailed. In 1900, Congress passed an act extending the mining laws of the United States to Alaska. In 1903 Clarence Cunningham, while prospecting for oil, first visited the Controller Bay coalfield. Returning to Washington and Idaho he told several friends of his discovery and asked them to "grub-stake" him in the usual manner so that he might return to the north and locate a claim for himself and one for each of his friends.

These locations were to be made in the customary and entirely proper manner, by power of attorney from each individual to Cunningham. In accordance with his agreement with these individuals Cunningham returned to Alaska, bought out the rights of certain squatters already on these coal lands and staked out claims. When he attempted to file on these claims, the officials of the land office refused to accept the filings because there were at that time no base lines or meridians established and the law was not considered sufficient to authorize coal locations.

By the act of April 28, 1904, Congress passed a new law providing especially for the location of coal claims as quoted above. This new law said nothing as to the number of coal claims that might be located by one man. They were to be in tracts of 40, 80 or 160 acres each; and for the sole use and benefit of the locator.

By its terms and the interpretation placed upon it by the Land Office, there could be no joint ownership of a group of claims nor prior to perfecting of entry any agreement to sell or consolidate after title was acquired, nor could the lands be located by any corporation. But there is no contention that after acquiring title the locator was restricted in any way as to the disposition of his claim.

THE CUNNINGHAM CLAIMANTS

Cunningham and his friends proceeded to make locations of claims under this new law, each man giving to Cunningham a new power of attorney and agreeing to pay the necessary expenses including a salary to Cunningham for his services. In this way were located 33 claims of 160 acres each, in the names of the following individuals:

Andrew L. Scofield, Los Angeles, Cal., retired capitalist; Francis Jenkins, Moscow, Idaho, registrar State University; Charles J. Smith, Seattle, Wash., banker; Horace C. Henry, Seattle, Wash., banker and railroad contractor; Ignatius Mullen, Port Townsend, Wash., merchant; Henry White, Wallace, Idaho, banker and merchant; Henry W. Collins, Rockford, Wash., banker; Fred C. Davidson, Oakesdale, Wash., merchant and lumberman; Michael Doneoh, Rosslund, B. C., miner and land owner; Frank F. Johnson, Wallace, Idaho, banker; John G. Cunningham, Spokane, Wash., physician and surveyor; Clarence Cunningham, Seattle, Wash., prospector; A. B. Campbell, Spokane, Wash., capitalist; Henry Wick, Youngstown, O., iron and steel manufacturer; Hugh B. Wick, Elyria, son of the foregoing; Fred H. Mason, Spokane, Wash., hardware merchant; Wm. E. Miller, Elyria, capitalist; Chas. Sweeney, Wallace and New York, mining man; Byron C. Riblet, St. Louis, Mo., Riblet Tramway Company; Fred Cushing Moore, Wallace, Idaho, mining engineer; Alfred Page, Wardner, Idaho, mine owner, State Senator; W. W. Baker, Walla Walla, Wash., banker; Frederick Burbridge, Wallace, Idaho, mine manager, Federal Mining and Smelting Company; Reginald K. Neill, Spokane, Wash., mine manager; Jos. H. Neill, Spokane, Wash., mine manager; Miles C. Moore, Walla Walla, Wash., banker and ex-governor; John A. Finch, Spokane, Wash., mine owner and business man; Walter B. Moore, Walla Walla, Wash., banker; Arthur D. Jones, Spokane, Wash., real estate and loans; Orville D. Jones, Wallace, Idaho, business man; W. H. Warner, Cleveland, O., Warner Coal and Coke Company; Frank A. Moore, Walla Walla, Wash., banker; Nelson B. Nelson, Seattle, Wash., merchant.

THE APPLICATIONS FOR PATENTS

These are the men called "dummies" by Glavis and the yellow press, which makes the assertion in all seriousness that the Cunningham locators are stevedores off the docks at Seattle and tramp miners from Butte and the Cœur d'Alene. The names of these men are not only enough to refute such outrageous falsehoods, but are in themselves a proof of the sincerity and character of Clarence Cunningham, who was implicitly trusted by each one as a friend and agent, and in whose hands they placed whatever funds he told them were needed for development of their claims as required by law.

Having proceeded to explore and survey their claims, they desired to know something more about them than could be learned by mere outcrops and surface openings. It was apparent that this information would be useful and valuable to every one of the locators, no matter where or on whose claim the work of exploration was prosecuted. In fact, such information would be needed before the value of any of the claims could be demonstrated.

Desiring then, to run a tunnel which would crosscut the coal measures and disclose the character of the various coal seams at depth, a letter was addressed to the Commissioner of the General Land Office at Washington, inquiring whether

there was anything in the Alaskan coal land prohibiting the doing of such work at the joint expense of all the locators in the Cunningham group. To this letter an answer was received stating that there appeared to be no objection to such an arrangement.

Much is made of the common development fund by Glavis, et al., as an indication of an agreement on the part of Cunningham and his friends to consolidate after patent. But the critics never call attention to this correspondence as evidence of good faith and a desire to comply strictly with the law.

Having done all that the law required Cunningham and his associates in due course made application for patent. The matter was investigated in the usual manner, and a final certificate of purchase was issued to each entryman who thus became the equitable owner of a coal claim under the laws of the United States and entitled to patent unless charged with and convicted of fraud. The amount paid for the 33 claims aggregated about \$52,000, which money has been in the treasury of Uncle Sam for the last two or three years, but no patents have been issued yet nor has any other coal claim in Alaska received as a final receipt.

We now come to the reason why.

CONSERVATION OF RESOURCES

When in the course of the last preceding administration the infant Conservation was born it leaped full-panoplied to its feet and declared that many former practices although sanctioned by law and custom were wrong and must be discontinued. This sturdy and strenuous youth was introduced to the people so suddenly and with such eclat that the people, always ready to follow and crowd around a new prodigy, forgot that "Conservation" was only a son of Mr. Roosevelt and hailed him as the son of the sovereign people. They even approved Mr. Roosevelt's arbitrary setting aside of the law of the land, and considered his "principles" as more forceful than the unrepealed statutes.

To be more specific it may be stated that the President withdrew "temporarily" from entry all coal lands in Alaska, and they have not been again opened to entry although the law of April, 1904, is unrepealed and still in force. Then, long after the entry of the Cunningham claims a forest reserve was created which threw its sheltering arms around half of them; and finally the Secretary of the Interior, Mr. Garfield, declared that it was not the intention of the administration to issue any patents to coal claims in Alaska until the law was modified. Admitting that there was nothing whatever against some of these claims and only vague suspicions as to others, yet he decided to place his own interpretation upon the law which states that "locators shall re-

ceive patent" and introduces the ultra conservative word "not."

THE LAW OF 1908

In May, 1908, Congress enacted a law which reads as follows:

Be it enacted, etc., That all persons, their heirs or assigns, who have in good faith personally, or by an attorney in fact, made locations of coal land in the territory of Alaska in their own interest, prior to Nov. 12, 1906, or in accordance with circular of instructions issued by the Secretary of the Interior, May 16, 1907, may consolidate their claims or locations by including in a single claim, location or purchase not to exceed 2560 acres of contiguous lands, not exceeding in length twice the width of the tract thus consolidated, and for this purpose such persons, their heirs, or assigns, may form associations or corporations who may perfect entry of and acquire title to such lands in accordance with the other provisions of law under which said locations were originally made; *Provided,* That no corporation shall be permitted to consolidate its claims under this act unless 75 per cent. of its stock shall be held by persons qualified to enter coal lands in Alaska.

Sec. 2. That the United States shall, at all times, have the preference right to purchase so much of the product of any mine or mines opened upon the lands sold under the provisions of this act as may be necessary for the use of the Army and Navy, and at such reasonable and remunerative price as may be fixed by the President; but the producers of any coal so purchased who may be dissatisfied with the price thus fixed shall have the right to prosecute suits against the United States in the Court of Claims for the recovery of any additional sum or sums they may claim as justly due upon such purchase.

Sec. 3. That, if any of the lands or deposits purchased under the provisions of this act shall be owned, leased, trusted, possessed or controlled by any device, permanently, temporarily, directly, indirectly, tacitly, or in any manner whatsoever so that they form part of or in any effect any combination, or are in anywise controlled by any combination in the form of an unlawful trust, or form the substance of any contract or conspiracy in restraint of trade in the mining or selling of coal, or of any holding of such lands by any individual, partnership, association, corporation, mortgage, stock ownership or control, in excess of 2560 acres in the district of Alaska, the title thereto shall be forfeited to the United States by proceedings instituted by the Attorney-General of the United States in the courts for that purpose.

Sec. 4. That every patent issued under this act shall expressly recite the terms and conditions prescribed in sections two and three hereof.

Approved, May 28, 1908.

THE BUREAUCRACY OVERRIDES THE CONGRESS

After the passage of this law Secretary Garfield offered patents under it to the Cunningham entrymen. To this offer they made the very natural and proper reply that they were not concerned with a law passed after their entries were perfected under an earlier law and that they would stand upon their rights already acquired. The answer was: "This law or no patents," and a dead-lock ensued. No Alaska coal claims have gone to patent under the law of 1908.

From time to time frequent inquiries were made by these entrymen as to the date when they might expect their patents. A new special agent appeared who told them that while there were indications of much irregularity in the matter of coal land applications in Alaska, yet there was no apparent reason why they should not have their patents and he was willing to assist them in securing final papers of title. This agent, whose name was L. R. Glavis, drew up various affidavits skillfully designed to convey an impression of fraud when interpreted in connection with

his own ideas; but sufficiently accurate to warrant the signatures of some of the entrymen. These affidavits are almost the only evidence *against* these claims, and they were made for the purpose of procuring patent.

Not receiving their patents, and not knowing of the arbitrary stand taken by Secretary Garfield in the matter, various entrymen called at Washington to find out the reason for delay. In no case could they gain any satisfactory information. The matter was always "under investigation." After a year or two it was learned that certain charges had been filed by special agents; but as to the nature of these charges, they were kept in absolute ignorance and given no opportunity to meet them. The former Commissioner of the General Land Office, Mr. Ballinger, a personal friend and acquaintance of several of the entrymen, was asked to see what he could learn as to the real reason why patents were withheld, and to urge upon Secretary Garfield the injustice of such delay. He could learn very little.

BALLINGER, GLAVIS AND PINCHOT

When the present administration was seated, one of Mr. Ballinger's first acts as Secretary of the Interior, was to decline to act upon the matter of the Cunningham claimants for whom he had acted as an attorney, and to turn the whole matter over to Assistant Secretary Pierce. Mr. Pierce, upon being appealed to, said he could see no reason for further delay, and ordered an investigation before a special commissioner appointed to hear all charges against the claims. Mr. Glavis was also ordered to file his charges. To this he demurred, saying more time was needed in which to obtain evidence. This seemed hardly necessary, since he had already been investigating for nearly two years and the only "evidence" he had found was furnished freely by the claimants themselves. Upon being urged to prepare his charges, Glavis then went to Forester Pinchot and reminded him that part of these claims are within a belated forest reserve. Pinchot then, in his zeal for the interests of the poor prospector, asked the Land Office to delay the hearing all summer so he might send forest rangers to look over these coal claims and see how many trees are on them. Of course, there is no reservation by the Government of trees on coal claims, nor any reason in law why coal or mining claims may not be located within a forest reserve. But if anybody wants to know what trouble can be caused by Government employees in their efforts to defeat the operation of the laws, just let him try to make such a location. He will see a few side lights on conservation.

The hearing before Commissioner McGee was finally begun in Seattle on Nov. 18, 1909, and was completed in Salt Lake about the first of April, 1910.

Testimony was taken in Seattle, Spokane, Cleveland, Salt Lake, Washington, Paris and Rome, and the coal claimants have been put to the expense of employing attorneys and stenographers, paying traveling and other expenses half around the world in meeting charges and refuting the insinuations of Glavis and the sensational press. The testimony has been published, and 31 of the entrymen have appeared and under oath cleared themselves of the charges of fraud. The other two are dead, but their record is clear without any such testimony.

THE GUGGENHEIMS

The only thing remaining to be discussed is the connection of the Guggenheims with these claims. It is almost unbelievable that the public have been brought by misrepresentation and positive falsehood to the conviction that there is in some mysterious way an improper and illegal connection between the Guggenheims and the Cunningham claims.

It will hardly be denied that a man has a right to sell or otherwise dispose of his own property. The right of the Guggenheims or anyone else to buy property will likewise be conceded.

Now it appears from the evidence *that after the issuance of the final receipts* the entrymen began to wonder what they were going to do with their coal claims in Alaska. Some 18 of them held a meeting in Spokane and after consulting an able attorney as to the entire legality of their action, appointed a committee of three to devise some plan for consolidation or development of the coal claims. This committee went to Salt Lake and there entered into a tentative contract with representatives of the Guggenheims looking to the foundation of a corporation to take over the claims. By the terms of the contract, the Guggenheims were to build a railroad to the coal and to advance \$250,000 for development and were to have one-half the stock of the corporation, and a contract for the coal at a certain figure. This contract was subject to ratification by Daniel Guggenheim and by a majority of the individual entrymen. It was not so ratified; not a cent was ever advanced for development, and the contract was never consummated in any way. From that time to the present, the Guggenheims have had no connection with or interest in these claims, and this tentative arrangement which fell through was the only connection they ever did have, and in it there is nothing in any way improper, illegal or contrary to public policy.

SUMMARY OF THE FACTS

The facts here stated may all be found in the volumes of published testimony. From them we may single out a few as follows:

1. Although there has been for six years a law specifically providing for the location and sale of coal lands in

Alaska at \$10 per acre, there has not as yet been one acre patented.

2. Instead of controlling all the coal lands in Alaska, the Cunningham claims comprise only 5200 acres. (U. S. Geological Survey estimates about 40,000 acres in this particular field, and many times as much in other Alaskan fields).

3. The Guggenheims have no interest in the Cunningham claims, and negotia-

tions looking to that end fell through almost immediately.

4. The Cunningham claims were not located by "dummies," but by respectable citizens under the law.

5. If justice is rendered they will probably be the first Alaskan coal lands patented and developed.

6. The interests of Alaska, of the Pacific coast and of the general Government

require the opening of coal mines in Alaska. The policy of obstruction and delay has already resulted in dwindling of population and the stagnation of enterprise and all kinds of development.

7. "Conservation" does not mean obstruction and positive violation of the laws in force. Insofar as it does it is not sound nor to be commended and practised.

Notes from the Lake Superior Iron Ranges

BY DWIGHT E. WOODBRIDGE *

While no definite schedules have been received by the various Lake Superior iron-ore railways, the probabilities of the season are about as follows in shipments: Duluth, Missabe & Northern, 16,000,000 gross tons; Duluth & Iron Range, 10,500,000; Great Northern, 10,000,000; Minneapolis, Sault Ste. Marie & Atlantic, 150,000 tons. This makes, say, 36,000,000 tons from Minnesota, of which all but 2,000,000 tons will be from the Mesabi range. The probabilities for the Michigan ranges are for the shipment of about 14,000,000 tons, of which the chief shipper will be the Menominee, with something more than 5,000,000 tons; the Marquette will have nearly as much; indeed it is not impossible that the Marquette may lead. The proportionate shipments of these three Michigan districts will vary a little from last year, to the advantage of the Marquette range. Last year these ranges shipped as follows: Menominee, 4,875,385; Marquette, 4,256,172; Gogebic, 4,088,457 tons.

THE CUYUNA RANGE

For the first time the Soo line figures as a shipper from Minnesota, this being ore expected to be forwarded from the Kennedy mine of the Rogers-Brown Ore Company on the new Cuyuna range. This ore will, during 1910, be sent from the mine by rail to Ashland, and there transferred to ship. So far the Soo has made no move toward the construction of ore shipping piers, other than to secure room for them on the harbor of Duluth. Such piers will doubtless be erected during the winter of 1910-11. This shipment from the Cuyuna is a notable occurrence, marking the advent of a new district, the possibilities of which are great.

NEW WORK ON THE VERMILLION

Another eventful occurrence of the year will be the beginning of shipments from a new mine on the Vermillion, the first of its kind opened since 1888. Many millions have been expended in fruitless

*Mining engineer, Providence building, Duluth, Minn.

exploration there, and the section 30 property is the only one that, to date, is a mine. About 50,000 tons of exceedingly high-grade bessemer hematite will be sent forward. It is understood that part of this ore has been sold, Lake Erie ports, at better than \$7 per ton, or \$2 above the average price for bessemer ores.

The year is witnessing remarkable exploratory activity on this range, and tremendous developmental activity on two more. The success of one exploration on the Vermillion has stimulated many speculative companies on that range, and a large amount of deep drilling is in progress, two old shafts are being pumped out and one or two working shafts are being sunk. So far as I know no workable iron orebodies have yet been discovered, but I do not pretend to definite information as to all the explorations. The installation of a machinery plant suitable for handling 1000 tons a day and the sinking of a concrete shaft should mean that ore has been found in quantity. G. A. St. Clair, who made a mine of section 30, is pumping out the old 120-ft. shaft of the NicComber prospect, on Armstrong lake preparatory to examination and further sinking, and I am doing the same at the 100 ft. shaft on the old Anderson property near Ely. These are two old workings that really showed ore under preceding explorations. Drilling and testpitting are in progress at various places; on Pine island in Vermillion lake, at Mud lake, which is at the northeast corner of the Vermillion, at various places around Robinson lake, at the McCue property in town 62-14 where old-shaft workings brought out ore and on sections 30 and 19, 62-11. With the advance of knowledge as to the Vermillion it is reasonable to expect favorable results from some of this work.

EXPLORATIONS ON THE CUYUNA

The second district of remarkable exploration activity is on the new Cuyuna, where probably 50 drills are at work and where some excellent ore is known to be found. Those of us who were skeptical

of this district have been proved in the wrong. It is an iron district and is showing a few holes of as high-grade ore as one could ask for. It will be a valuable addition to the available iron-ore tonnage of Minnesota and may be a very large addition.

NEW WORK ON THE OLD RANGES

For two or three years, and until now, exploration on the Menominee has been fruitful in results. Old mines are being enlarged, new ones are being found, and the end is not yet. The same is true of the Marquette; a shipper since 1855, it is today a greater district than ever before, and its future looks most promising. In the Negaunee and Princeton sections the recent finds have been really magnificent.

DEVELOPMENTS ON THE MESABI

To be sure, so far as the development of new mines is concerned, the Mesabi range leads. It must, in order to maintain a production equivalent to 68 per cent. of the Lake region, as it is scheduled for this year. The Hill Ore Lands, so called, will come in for a production this year and efforts will be made to reach as near the agreed minimum for 1910 as possible. It is probably no secret that these lands have proved somewhat disappointing to the Steel Corporation, both as to tonnage and grade developed. Still, they contain much ore. This year will see the beginning of concentration of sandy ores of the Trout-lake section, by the Oliver company, as the first sections of its 10,000-ton concentrating works are nearly ready.

As of late, the drift toward steeper shoveling ore continues. It was accentuated the other day by the beginning of work on a mass of overburden at Hibbing, that lies 120 ft. thick. I have no doubt the time will soon come when mine managers will no longer attempt to build long and costly approaches to their deeper shovel pits on grades economical for locomotives, but will adopt stationary hoisting plants of capacity to pull loaded

50-ton standard-gage cars out of their mines. The economy of this innovation ought to be apparent today.

LAKE RATES ON ORE

Vessel rates are better by 10c. a ton to the ship than in 1909; that is, there is a 5c. advance in freight, and a 5c. drop in unloading charge, which charge the vessel pays. The gross rate is still 5c. under the 1907 rate of 75c. from the head of Lake Superior, while the net rate is the same—60c. I recollect that not very many years ago, James J. Hill, speaking of rail and water competition, stated that the time was not far distant when the railroads could so reduce their rates that they would drive waterborne commerce from the Great Lakes. Today, a 2240-lb. ton of iron ore is carried down the lakes, an average distance of 880 miles, at a freight that nets the carrier but 0.062c. per net-ton-mile; and the ship pays dividends on that rate. A railroad that averages a cost ten times as high, is to be congratulated for economy.

ORE SHIPMENTS

Simultaneously with the beginning of underwriting on April 15, the procession of ore-laden ships began to move. By May 15 it will be in full swing, and this is nearly a month earlier than usual. Ore pockets were full, mines were ready, railways were waiting. All are prepared to reach the totals indicated at the beginning of this article. They will be reduced only by severe labor troubles or an unexpected slackening in the demand for iron and steel.

Lucky Tiger-Combination

The report of the Lucky Tiger-Combination Gold Mining Company for the year ended Dec. 31, 1909, states that during the year 47,130 tons of ore were mined, of which 1911 tons were shipped to smelteries at Douglas, Ariz., and El Paso, Texas; 37,721 tons were milled, averaging \$24.65 per ton; dividends paid, \$409,500; development work, 8161 ft.; total development work now amounts to 34,759 ft.; ore reserves increased 79,445 tons, making a total of 259,861 tons; in addition to this there are 150,000 tons of probable ore; also 48,000 tons of tailings containing \$9.96 per ton.

Plans are being made for enlarging the mill from 100 tons to 250 tons capacity, and also for the construction of a 250-ton cyanide plant. Work has begun on a 1000-h.p. steam power plant and electric transmission line 31 miles long from Yzabel on the Nacozari railroad to the mine. The mine is 55 miles southeast of Douglas, Arizona. James W. Malcolmson is consulting engineer.

The Coalinga Oil District, California

A report¹ on the geology and oil resources of the Coalinga oil district, in the western part of Fresno and Kings counties, California, covers a district which is about 15 miles wide and 50 miles long, stretching along the northeast base of the Diablo range. It includes a band of productive oil land 3 miles wide and 13 miles long at its north end and a narrow strip of oil land along its southwestern boundary.

The region includes about 550 producing wells, which range in depth from 600 to 4000 ft. and penetrate from 20 to 200 ft. of oil sand. The product ranges from a black oil of 15 deg. B. to a green oil of 35 deg. B. The yield of single wells differs greatly, ranging from 3 to 3000 bbl. per day.

PRODUCTION AND RESOURCES

The district is the leading producer in California and one of the most productive in the world. Its production in 1907 was 8,871,723 bbl., in 1908 it was 10,386,168 bbl., and in 1909 it was probably 15,200,000 bbl. or more.

The total quantity of oil thus far taken from the ground in the district to the end of 1909 was about 63,000,000 bbl. of 42 gal. each, leaving available a vast store of oil which has been roughly estimated as 2,737,000,000 bbl. Even if this great quantity of oil is in the ground it is not possible to state whether all of it can ever be obtained.

Pipe lines connect the district with the seaboard at Monterey, 110 miles away, with San Francisco bay, 200 miles away, and with other points.

BROAD QUESTIONS DISCUSSED

The discussions of the oil zones, of the factors affecting the accumulation and the gravity of the oil, of the relations of oil and water, and of the origin of the oil are of broad general interest. The maps and diagrams and the detailed accounts of the geology of the wells and the character of their various products are of decidedly practical, immediate value.

Nabesna-White River Copper District, Alaska

The Copper River basin and the adjacent parts of the Yukon basin contain two known mineral-bearing zones, lying respectively on or adjacent to the southern and the northern slope of the Wrangell mountains. The southern belt has been called the Kotsina-Chitina region and contains chiefly copper-bearing lodes with some gold placers, and is about 100

¹Bull. 398, U. S. Geol. Surv., by Ralph Arnold and Robert Anderson.

miles from the coast. The northern belt, termed the Nabesna-White' region, contains both auriferous and copper-bearing lodes, and is 70 to 100 miles farther inland. A railway up Copper river, now under construction, has greatly stimulated mining activities in both fields but will provide transportation only for the southern district.

OCCURRENCE OF THE COPPER

The important economic conclusion is that the copper deposits are associated with amygdaloidal basalts of Carboniferous age—an association like that in the Chitina region. The presence of some primary native copper in the amygdaloids is significant, for in the Chitina region only secondary deposits of native copper have been found. Copper sulphide deposits and auriferous quartz veins were also found in such relations as to indicate that the orebodies in this field originated in the same way as those in southeastern Alaska.

Exports of Crude Oil from California during 1909

The following statistics of exports of crude oil from the San Francisco customs district during 1909 are interesting as

Destination.	Barrels of 42 Gallons.	Value.
Canada	15,476	\$16,500
Guatemala	25,000	15,500
Salvador	40	50
Panama	532,619	339,750
Chili	422,119	268,535
Peru	35,960	30,690
French Oceanica	72	180
German Oceanica	79	99
Total exports	1,031,365	\$671,304
Total production	58,250,300	

showing that nearly all the California crude oil is consumed in the United States, either as fuel or in the manufacture of refined products.

Pipe Line from Southern California Oilfields

The 8-in. pipe-line system of the Producers' Transportation Company from the Coalinga, Kern river, McKittrick, Sunset and Midway oilfields to Avila, Cal., the port of San Luis Obispo county, has been completed, and has a length of a little over 200 miles, in addition to the gathering systems in the district referred to. The lines from Sunset, Midway and Kern river fields merge at McKittrick, and a single line runs to Junction, where the Coalinga line joins it. The line is expected to handle about 26,000 bbl. daily. At Avila are wharfage facilities to load the oil into tank steamers. The problem of storage at the coast line is a serious one now under consideration.

¹Bull. 417, U. S. Geol. Surv., by F. H. Moffit and Adolph Knopf.

The New International Smeltery at Tooele, Utah

Plant Designed by Anaconda Engineers to Smelt the Utah Consolidated and Custom Ores; Will Blow in during the Coming Summer

BY JOHN TYSSOWSKI

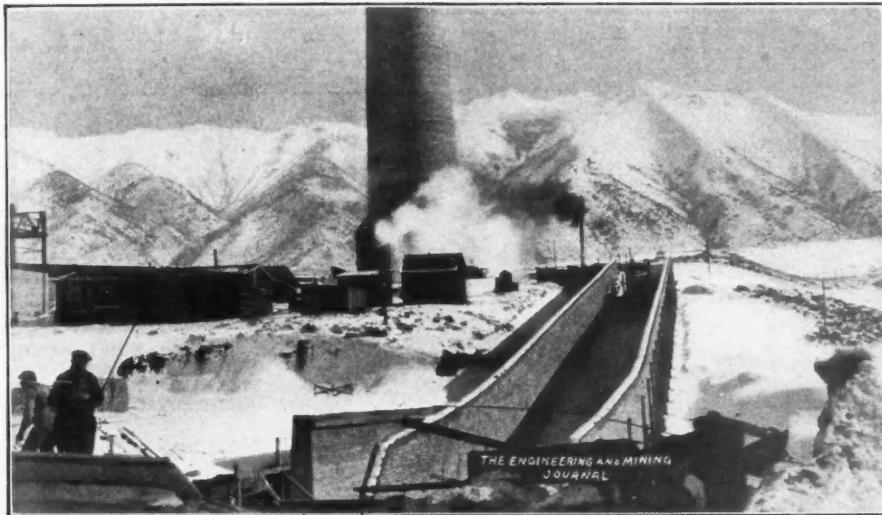
The Tooele smeltery of the International Smelting and Refining Company, now under construction, is eight miles from Tooele Junction on the San Pedro, Los Angeles & Salt Lake Railway and 34½ miles southwest of Salt Lake City, Utah. The maximum grade on the line from the junction to the smeltery is 2.4 per cent., and it is the ultimate intention of the company to electrify this as well as the transportation system about the plant. In this particular the equipment will differ from that of the Anaconda smeltery, after the pattern of which it is designed. The Western Pacific Railway line also passes within a few miles of the

into the gradual incline of the Salt Lake basin. The smeltery faces to the west and on both the north and south are cañons that will give ample space for slag and waste dumps. There is also plenty of room on each side of the plant to allow for the addition of extra units. Great elasticity is a feature of the general design of the plant. By taking advantage of the nature of the site the necessary amount of excavation was reduced to a minimum and amounted to only 200,000 cu.yd. When complete it is estimated that 30,000 cu.yd. of concrete and about 6,000,000 common bricks will have been placed.

supplies will be brought to the store house and shops.

ORE BINS

At the terminal of the aerial tramway from the Highland Boy mine all ore will be weighed by the smelting company. A check among all departments will be a feature of the operations. It is interesting to note that it is estimated that 100 h. p. will be developed in braking the last section of the Bleichert tram. The receiving bins have a capacity of 3000 to 4000 tons and are to be constructed of steel with a base 30 x 300 ft. and 32 ft. high. The ore will be conveyed from the receiving bins by means of belt conveyers to the sampling mill and crushing plant, where it will be crushed and screened to size, either for the roaster ore bins or blast-furnace ore bins. After screening and sizing it is conveyed to these bins by means of belt conveyers. The receiving bins are made with double compartments, so that material can be delivered into the bins and from thence directly to the tramming system and conveyed to either blast furnaces or reverberatories. There is also in connection with these receiving bins a silica grinding and crushing plant, where material will be prepared for converter lining. The roaster ore bins have a base 27x180 ft., and the blast-furnace bins have a base 27x100 ft. The fine ores from the roaster bins will be delivered to the roaster furnaces by means of conveyers. In all, there are about 24 conveyer belts used for the transportation of ore.



MAIN FLUE AND STACK, TOOELE SMELTERY

smeltery, so that excellent railroad transportation facilities are assured.

SITUATION OF SMELTERY

As the Tooele smeltery is being built by the Cole-Ryan interests, primarily to treat the ores from the Utah Consolidated's Highland Boy mine, the situation with respect to the delivery of this ore is of the greatest importance. The Highland Boy mine is only about four miles across the Oquirrh range from the smeltery. Ore will be transported by a Bleichert aerial tramway having a carrying capacity of 100 tons per hour. Owing to the character of the Highland Boy ore, the excess of iron it carries, and the advantageous situation of the smeltery, it will be in position to handle a large amount of custom work, and the layout of the plant shows that this is in the mind of the designers.

The new smeltery is on the slope of the Oquirrh range just below where it breaks

The main-line railroad branches into three tracks at the plant, these branches corresponding to the three main divisions of the industrial transportation system and the horizons of the smeltery, viz.: the high, power house, and low lines. There are seven miles of standard-gage track in the industrial system, and although the curves are too sharp to allow the use of a heavy engine about the plant, a standard box car can be run over all the tracks. This system will be operated with electricity.

The high line will distribute the ore from the receiving bin of the aerial tramway, and also deliver custom ores to the main orebins. The power-house division will handle material from the McDougal roasters to the reverberatories; it will also transport dust from the chambers to the reverberatories. The blister copper product from the casting house will be transported by the low line, over which

SAMPLE MILL AND CRUSHING PLANT

The sample mill is of the Brunton type, arranged in two parallel units. From the receiving bin at the mill, ore will be conveyed on 30-in. belts to two shaking grizzlies, feeding two 12x24-in. Blake crushers, making a 2-in. product. Two 20-in. belts capable of transporting 100 tons per hour will each deliver the ore to the No. 1 elevator with 10x20-in. buckets, traveling 350 ft. per min. From the elevator ore will pass to the No. 0A sampler, making a 20 per cent. cut (20 tons per hour). The sample portion of this ore in each unit of the mill will pass to a No. 1 shaking feeder and then to the 10x20-in. crusher, making a 1-in. product. This will go to a No. 1A sampler, again taking a 20 per cent. cut (4 tons per hour). The reduced sample will pass to a No. 2 shaking feeder, then to a 12 x 48-in. roll, crushing to ¼ in., and thence

to a No. 2A sampler, reducing the amount of the sample to 1600 lb. per hour. The sample will then pass to a No. 3 shaking feeder and then to a 15x26-in. roll, grinding to 1/16-in. size and the final sample of 320 lb. per hour taken by a No. 4A sampler, cutting, as in all cases, 1/5 of the stream.

The reject from the No. 0A sampler in each unit will go to 4x14-ft. revolving screens with 3/8-in. and 1-in. perforations; the oversize to two 15x9-in. crushers, thence to another 4x14-ft. screen with 3/8-in. perforations, the oversize passing to two 12x48-in. rolls; a 20-in. belt conveyer will deliver the material to No. 2 elevator discharging on 20-in. belt delivering to bins. The coarse material from the second screens will be re-elevated in No. 3 elevator, with 8x16-in. buckets delivering the material to a 16-in. belt conveyer, which carries it to the blast-furnace storage bin.

Power to operate the mill is supplied from two Westinghouse 175-h. p., 2000-volt, 60-cycle, three-phase induction motors. The lift outside the mill is run by a General Electric 35-h. p., 60-ampere, 500-volt, 975-r.p.m. motor.

ROASTERS AND DUST CHAMBERS

The roaster building comprises two units each of 16 McDougal roasters set in rows of eight. The roasters are 16 ft. diameter and of 45-ton capacity. The dust chamber connected with the McDougals is 120x140 ft. long and 45 ft. high. The flat-arched brick roof of this chamber is carried on I-beams spaced 5 ft. apart, trussed and supported on steel columns. An important feature in this construction is the inclosing of the steel columns in brick, an air space being left to protect the steel work. Dust is to be delivered from three lines of hoppers to cars which will convey it to the reverberatories. The calcines from the McDougals will be taken in cars and charged hot to the reverberatories. The dust chamber is connected by a short flue to the main stack.

STACK AND FLUE

The stack is 350 ft. high, having an inside diameter of 25 ft., tapering from 4 ft. 6 in. thick at the base to 13 in. with a 2-ft. flare at the top. The pressure at the base of the complete stack is figured as five tons per sq. ft.; two million bricks were used in the construction of the stack.

The main flue will be 1300 ft. long, 20 ft. wide and 18 ft. high. The accompanying photographs show the construction of this flue. The concrete walls taper from a thickness of 4 ft. at the base to 2 ft. at the top. They are reinforced by fifteen 7/8-in. steel rods placed horizontally and 1 1/8-in. vertical rods spaced at 3 ft. centers. The walls are supported on a footing of concrete 9 ft. wide and 2 1/2 ft. thick. The inside brick

walls are 16 in. thick. A 4-in. air space is left between the brick and concrete walls. I-beams placed at 5 ft. centers will carry the flat-arched brick roof of the flue. Brick walls will support the I-beams. Side pressure will be taken up by pilasters spaced 10 ft. apart.

REVERBERATORIES

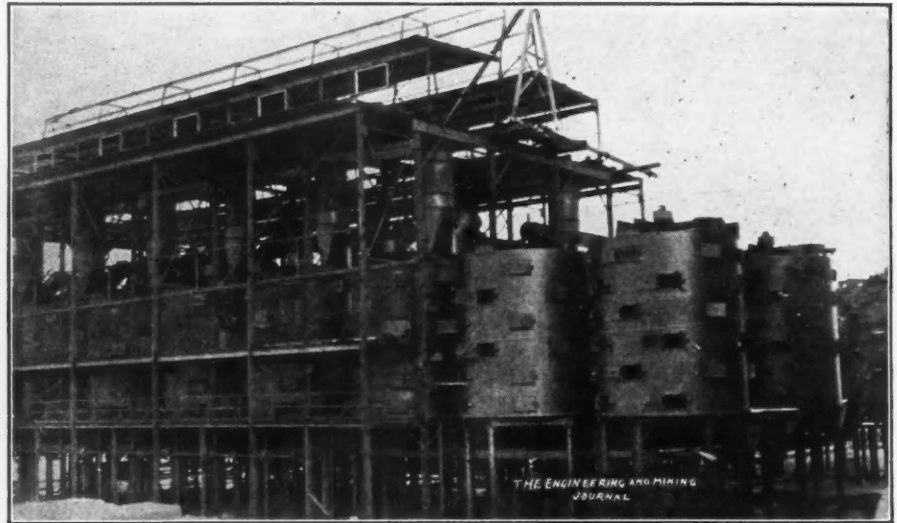
Five reverberatory furnaces are now being constructed and room is provided for two more. These are to be of the Anaconda type, 19 ft. wide and 102 ft. long, inside hearth measurement. Slag will be drawn from the reverberatories into cast-iron launders delivering directly to slag-pot cars running in a tunnel beside the main flue. Boilers to utilize the waste heat will be set over this tunnel. There are to be four 750-h.p. Stirling boilers utilizing waste heat, and three 350-h.p. hand-fired boilers, developing in all about 4050 h.p. with steam at 180 lb. pressure. This will furnish steam for generating all the

WAREHOUSE AND MACHINE SHOP

Below the casting shed are the warehouse and machine shops. They were constructed from material brought from the old Highland Boy smeltery at Murray. Other material from that plant, McDougal furnaces, etc., is being used in the construction of the new plant.

POWER PLANT CONSTRUCTION

The steam for the plant will be generated in the boilers mentioned, mostly by waste heat from the reverberatories. The other power-plant equipment comprises two direct-current generators (E 1 and E 2) for supplying current for the transportation system, cranes, etc.; two alternating current generators (E 3 and E 4) for running motors.; two blowing engines (C 1 and C 2) to furnish converter air, and two pair compressors (A 1 and A 2) to supply air for miscellaneous purposes. Space is provided for the installation of rotary blowers for providing blast-furnace air.



MCDUGAL ROASTERS, TOOEE SMELTERY

electricity needed for the plant, and also run blowing engines.

Matte from the reverberatories will flow 60 ft. in launders directly to the converter building. The converter house and casting shed are to be under one roof, and directly below the reverberatory building; five converter stalls will be built and accommodation provided for a sixth. The converters will be 96x150 in. and electrically operated.

Converter slag will be skimmed in pots and will be picked up by a 25-ton crane and dumped hot into the reverberatories. In the converter building there will also be a 60-ton crane, and a 40-ton crane in the casting shed; also a 30-ton wrecking crane above all others in the converter building.

The blast furnace to smelt the first-class ore will be 56 in. x 51 ft. Two 16-ft. settlers are provided for the furnace. The foundations are completed.

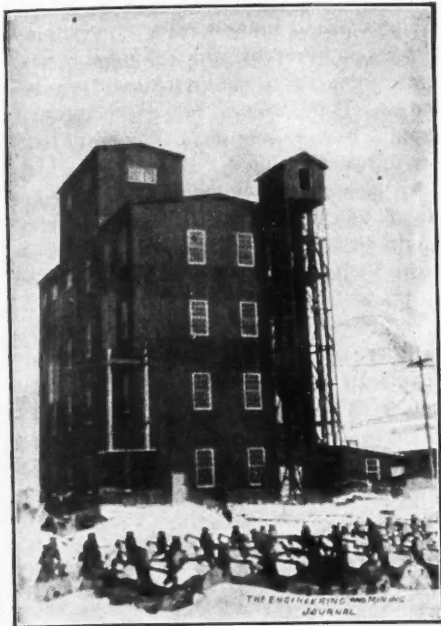
The details of the various engines and machines which they operate are as follows: (E 1) steam cylinders, 16x32x36 in., 100 r.p.m., Nordberg; generator 250 k.w. 550 volts, d.c., Westinghouse; (E 2) steam cylinders 15x30x36 in., 120 r.p.m.: generator as above; (E 3 and E 4) 18x26x40x24 in., 180 r.p.m. Union Iron Works; generator 750 k.v.a., 2200-volt 3-phase, 60-cycle Westinghouse; (C 1) steam cylinders 15x30x42 in., air cylinders 36x36x42 in., Nordberg; (C 2) steam cylinders 26x52x48 in., air cylinders 52x52x48, Rarig Engineering Company; (A 1) Laidlaw-Dunn-Gordon cross compound engine 15x26x36 in., tandem connected with a two-stage compressor, 13 1/2 x 26 x 36 in.; capacity 3500 cu. ft. free air per min.; (A 2) 26 1/4 x 15 1/4 x 18-in. Ingersoll Rand compressor operated by 176-h.p. Westinghouse motor. There is also a 290-h.p., 2200-volt, three-phase, 60-cycle,

synchronous motor, and a 200-kw., 550-volt, direct current, 1200-r.p.m. Westinghouse generator. The exciters for E 3 and E 4 are: (Ex. 1) Steam cylinder 10x12, 300 r.p.m., Skinner Engineering Company; Westinghouse direct connected generator 50 kw., 125 volts; (Ex. 2) motor 74½ h.p. 2200 volts, three-phase, and

May, 1910. C. H. Repath, formerly mechanical superintendent at Anaconda, is chief engineer. At Tooele, J. B. McIntosh, formerly with F. J. Bride as assistant engineer at Anaconda, is in charge of construction. E. E. Thum is engineer on the works. E. P. Mathewson is general manager.

cial output will be shipped to the steel mills in Pennsylvania, but some of the ore produced will be suitable for the manufacture of chemicals, brick, paint, etc.

In many of the iron mines of the Blue Ridge there are pockets of manganese ores interbedded with the iron ores, which can be recovered as a by-product if proper provision is made for the recovery when constructing iron-ore concentrating plants. With the increased demand for manganese ores, there will be an advance in prices and a ready market for the output. This will lead to the working of many abandoned, small deposits, especially those found with the iron-ore deposits.



SAMPLING AND CRUSHING MILL, TOOEELE SMELTERY

generator as above. There are also in the equipment: two pumps (feed pump No. 1), an 8-in., 12x7x10, 332 gal. per min., Knowles; (feed pump No. 2), a 346-gal. Worthington of the same dimensions; a fire pump 16x9x12 in., 750-gal., Worthington; a centrifugal pump for E 1 and E 2, with 8x8-in. steam cylinder and 1600-gal. pump capacity running at 300 r.p.m.; a condenser for E 1 and E 2, 16x24x24 in., built by the Deane Steam Pump Company.

PROGRESS OF CONSTRUCTION

There is no doubt but that the Tooele smeltery will be a great asset of the Cole-Ryan forces. The situation is ideal and, with the experience of the Anaconda plant to draw upon, successful operation should be obtained almost at the outset. The engineering department began work Dec. 10, 1908, and the Tooele Valley Railroad, connecting with the San Pedro line at Tooele Junction put cars upon the smelting site June 15, 1909. The machine shop and store house are complete, as is the sample mill and power plant. The McDougals are placed, stack completed, dust chamber and flue nearly finished. The concrete foundations for the reverberatories are in and the steel work is all erected for the converter and casting building and is now being erected for the reverberatory building.

The tramway is expected to be complete by the time the smeltery is ready for operation, which will be about

Manganese Deposits of the Blue Ridge

By L. G. LACKEY*

It is generally known that the most important manganese deposits of the United States occur in the Blue Ridge district of Virginia, this region having produced the principal tonnage mined in this country for many years, and the entire output of this class of ore for 1908 and 1909. It does not seem to be generally known, however, that only a few of the deposits found in Virginia have ever been thoroughly prospected or developed. In most cases this has been due to the fact that sufficient capital has not been available.

MANY SMALL POCKETS

In many cases small pockets near the surface have been worked out and operations discontinued without further exploration. In the Blue Ridge, manganese occurs in small, scattered pockets near the quartzite or country rock, where it is usually found intimately associated with the iron ore; but, on the same slope of the Blue Ridge along the foot hills and near the valley limestone, it is found in clay beds and is a persistent deposit following the strike of the country rock northeast to southwest.

This fact is demonstrated by the old workings at the Crimora mine in Augusta county and is confirmed by recent development work at Happy Creek, Warren county, Va., where a deposit of considerable magnitude has recently been exposed. This deposit occurs near the contact of the Cambrian quartzite and Shenandoah limestone, on the west slope of the Blue Ridge, in a clay bed one-half mile in length and with an average width of 200 ft. Throughout this bed are found kidneys of black psilomelane and nests of crystalline pyrolusite imbedded in the variegated clays, and these nests or pockets are connected by seams of stringers of granular pyrolusite and wad. Overlying this deposit is a blanket formation of iron ore, 2 to 4 ft. thick, a wash from the heavy iron-ore deposits above.

THE SEIBEL CONCENTRATOR

A concentrating mill has been constructed at the Seibel mines, Happy Creek, Va., and is now turning out high-grade manganese ore. The capacity of the mill is 50 tons per day, and the prin-

*Manager, Seibel Mines, Happy Creek, Va.

The Santa Gertrudis Negotiation

The actual stock and money transaction involved in the recent notable sale of the Santa Gertrudis mine, Pachuca, Mexico, to the British company, is given in a recent company circular as follows:

The report and accounts show that the total number of shares allotted is 1,196,000, of which 993,131 shares were allotted for payment in cash, 202,869 shares were allotted as consideration for the purchase by the company from Camp Bird, Ltd., of an option granted to Camp Bird, Ltd., by the Cia. Minera de Santa Gertrudis y Guadalupe to acquire a controlling interest in the Santa Gertrudis mining properties.

The total amount of cash received by the company from the shares allotted for payment in cash is £993,131, and application money, 2s. per share on 79,000 shares not yet allotted, £7900; and the following payments have been made to Camp Bird, Ltd., in accordance with clause 2 of agreement with that company dated Jan. 1, 1910, being on account of \$200,000 deposit paid to Santa Gertrudis y Guadalupe, £20,000; remittances to the company's agent in Mexico, £956,000 (9,270,303 pesos); for balance of purchase price paid to Santa Gertrudis y Guadalupe as per agreement, 8,800,000 pesos; purchase of Girault mill, 344,825 pesos; 10 per cent of 25,000 pesos of subscription stock in Cia. Santa Gertrudis S. A., 2500 pesos; duty and charges *re* transfer of property 31,007 pesos; total, 9,178,332 pesos; London office expenses and cables £138 18s.

The preliminary expenses of the company payable by Camp Bird, Ltd., to be refunded to that company as per agreement, out of the first profits earned by this company, are: Registration fee, £3240; stamp duty on agreement, £1114; law charges, £367; cables and petty expenses, £112; sundry payments relating to the examination of the mines, etc., £16,027; total, £20,862.

This is clearly the most important mining deal in recent years in the Mexican field.

The North Pole Mine, Baker County, Oregon

Mine Worked by Tunnels; Has Produced One-eighth of Oregon's Gold for 12 Years; Average Value of Ore Mined, \$15.63 per Ton

B Y E M I L M E L Z E R *

The most important gold-mining section of the State of Oregon is its north-eastern part in the Blue mountains, using the name in its wider sense, with Baker City as the main distributing center. The mines which in the last decade have regularly contributed to the gold production of the State are not far from Sumpter, in the Cracker Creek district, and include the Columbia, the Eureka & Excelsior and the North Pole mines.

The North Pole mine is reached by means of the narrow-gage line of the Sumpter Valley railway, 31 miles, from Baker City to Sumpter, and thence by a good wagon road along Cracker creek to the village of Bourne. It is situated on the mountain slope northeast of Cracker creek.

About one mile north of Bourne a strong quartz vein traverses the country, and the principal mines of the district are on this vein. All of them have carried on extensive operations during the last 12 years and have produced a large amount of gold.

At the present time the Columbia is the only mine in active operation on the so-called Cracker Creek "mother lode," the Eureka & Excelsior having stopped operations in the early part of 1907 and the North Pole in August, 1908, after a continuous and successful run since July, 1896.

The North Pole mine embraces a total length of 5679 ft. on the main ledge of the district and some detached claims on parallel ledges. The Bourne Gold Mining Company owns the Eureka & Excelsior mine, covering 3000 ft. on the ledge south of the North Pole property. The Columbia company owns 3000 ft. on the ledge south of the Eureka & Excelsior. The vein has a strike of about north 34 degrees east and dips about 70 degrees southeast.

OCCURRENCE OF ORE

The vein filling is quartz. The walls are as a rule well defined, with gouge seams of varying width. The country rock is a silicious slate described as an argillite by Waldemar Lindgren. The vein itself is quite prominent and persistent, and is traced through the various properties mentioned above. The width varies from a few feet to more than 100 ft. in the widest place.

The ore is generally confined to one wall or the other, but sometimes it cuts across obliquely. Its occurrence might

be called a series of lenses which frequently overlap each other, forming an orebody of great continuity. The width of the ore varies from a mere seam to as much as 25 ft.; the average width of all the ore stoped may be given as a little more than 3½ ft.

The gold occurs chiefly in a fine arsenopyrite which often forms concentric layers in coarsely crystalline quartz. The average value per ton of all the ore mined from 1896 to 1908 was \$15.63 in gold. This average, however, includes a large amount of high-grade ore which was found on the border line between oxide and sulphide ore. It was found in tunnel No. 3, and was evidently due to secondary enrichment.

Besides the fine arsenopyrite there occurs a little iron pyrite, mostly low in gold. Isolated bunches of telluride minerals have been found, also native quicksilver and cinnabar, tetrahedrite, stibnite and other minerals of less commercial importance.

MINE WORKINGS AND EQUIPMENT

As the mine is situated on a hill with a slope of about 20 deg. or more, it is opened by a series of tunnels. The lowest or No. 1 tunnel is 210 ft. above the level of Cracker creek where the creek crosses the vein near the Eureka & Excelsior shaft house. It is a crosscut tunnel, 1000 ft. to the vein, and then following the vein for a distance of about 2150 ft. Two raises connect it with tunnel No. 2, 424 ft. above. Several smaller manways and some levels were opened between tunnels Nos. 1 and 2 and considerable stoping done from them.

Tunnel No. 2 is about 2450 ft., and No. 3 about 2300 ft. long. Tunnel No. 3 is 270 ft. above No. 2, with a blind intermediate level between. Tunnel No. 3 has been the main working tunnel of the mine for several years. It was remarkable for a continuous payshoot, 1600 ft. long. Tunnel No. 4 is 211 ft. above No. 3. The latest working tunnel, No. 5, starts as a crosscut tunnel from the west side. It is 327 ft. above No. 4. The five tunnels cover a vertical distance of 1227 ft.

The ground to the north of No. 5 is practically unexplored. Surface indications make it probable that further ore may be developed here when the company gets ready to resume operations. The greatest depth obtainable above the level of No. 1 tunnel will be about 2200 ft. at the north end of the claims.

The various tunnels have connections with each other by one or more raises, established for communication, ventilation and exploration. The raise between tunnels Nos. 4 and 5 is, however, only two-thirds completed.

An idea of the extent of the workings can be gained from the accompanying longitudinal section, showing both the North Pole and the Eureka & Excelsior workings.

The North Pole is equipped with blacksmith shops, air compressor fitted for steam and water power, and with electric motors to supply power during the low-water season in the cold winter months. A sawmill with a capacity of 10,000 ft. per day was partly used for sawing lagging and cribbing.

MILL AND TRAMWAYS

The mill is 1½ miles below the mine in the cañon of Cracker creek where there are several water powers available. It is connected with the mine by an aerial wire-rope tramway, single-rope type, with a capacity of 100 tons per 10 hours.

The 30-stamp mill has a 300-ton ore-storage bin, and is built in three 10-stamp units, supplied by the Allis-Chalmers Company. The ore passes over amalgamating plates and is then treated on Wilfley tables for the removal of a first concentrate. It is then retreated on Frue vanners—three for each Wilfley—and a second concentrate is removed. The tailings are then separated into sands and slimes preparatory to cyanide treatment.

The sands plant consists of nine percolating tanks of 100 tons capacity, arranged in two rows with two revolving distributors fastened to overhead carriages—one for each row—to be moved from tank to tank as the operation of charging requires.

The slimes are treated by the agitation and decantation method. There are six 5x18-ft. agitating tanks fitted with mechanical stirring apparatus. The slimes amount to 30 per cent. of the total pulp. The gold solution is precipitated on zinc shavings.

The ore presents peculiar difficulties in the mill. Rather fine crushing is necessary to liberate the finely divided sulphides, causing, in turn the sliming of valuable material which has to be recovered by concentration methods. Many experiments aiming to treat this material by cyanidation from an all-slimes tailing have proved unsuccessful. The problem of increasing the saving was

*Mining engineer, Baker City, Ore.

therefore one of improving the method of concentration and was to some extent solved by feeding the concentrating machines with screen-sized pulp.

The compressor is operated by a 3-ft. DeRemer water wheel, driven from an 8-in. pipe line with a 325-ft. head. A flume one mile long brings the waters of Cracker creek to this pipe line. There are two water powers available to furnish power for the mill. The more important one, from Cracker creek, drives a 4-ft. DeRemer water wheel and develops enough power for 20 stamps even during the low-water season. The other pipe line is fed by the waters of Fruit creek and furnishes power for dynamos and solution pumps. An auxiliary steam plant with two boilers and a Corliss engine provides power for emergencies and steam heat to the mill.

As the mill is about two miles below the mine by wagon road, the ore is car-

able to handle the ore between tunnels by the tramways instead of passing it down underground.

SUMMARY OF OPERATIONS

Within the 12 years, 1896 to 1908, there were mined at the North Pole mine 158,917 dry tons of ore containing \$2,485,006 in gold, an average of \$15.63 per ton. The total gold recovered amounted to 100,045 oz., a recovery of 80.55 per cent. The total tonnage of ore mined includes 1115 tons of high-grade ore shipped direct to the smeltery and averaging \$500 per ton.

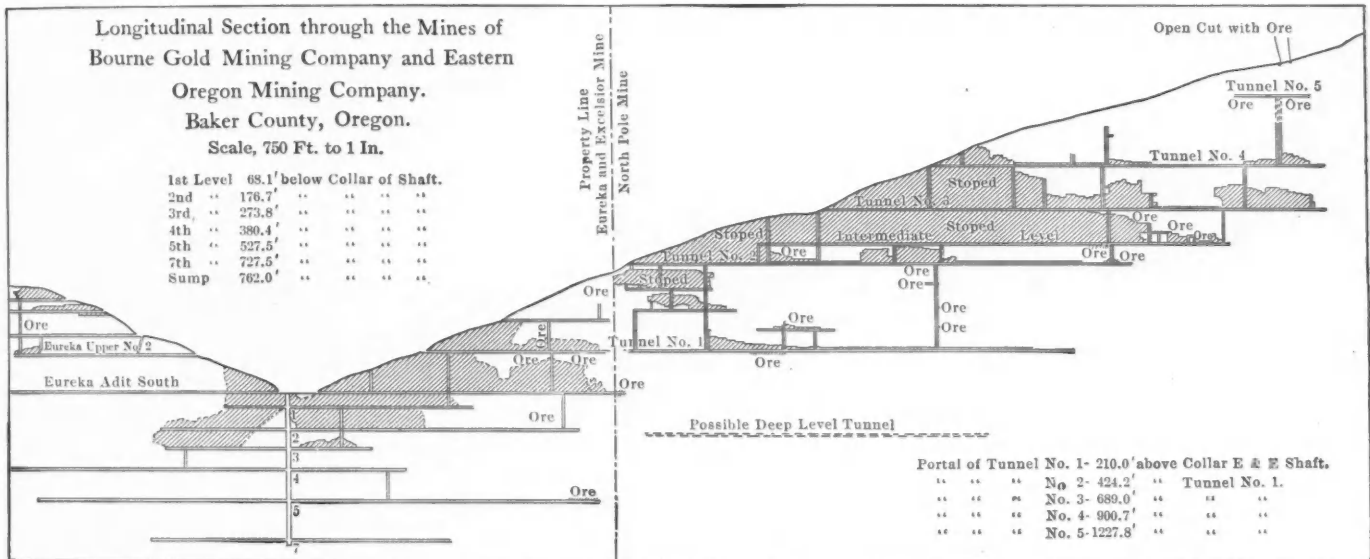
The balance of 157,801 tons of ore of an average value of \$12.21 per ton was treated in the company's mill, yielding \$1,443,729 in amalgam, concentrates and cyanide bullion.

The gold production of Oregon during the period from 1896 to 1908 amounted to about \$17,000,000, one-eighth of which

Vanadium

Deposits of ores of vanadium, one of the rare metals, occur at several places in the western part of the United States, according to a report issued by the Geological Survey. The most important use of vanadium so far discovered is as an alloy of steel, to which it adds remarkable toughness. Its effect in steel is said to be due to its removal of oxygen and nitrogen, to its union in a solid solution with the iron, and to its formation of carbides that increase the strength of the steel.

It is said that steel treated with vanadium has great resistance to shock and to fatigue caused by constant bending, that it makes much better saws and springs, and that high-carbon vanadium steels also make much better tools, such as cutters and riveting dies. About 0.1



SECTION THROUGH NORTH POLE AND EUREKA & EASTERN MINES

ried from mine to mill by means of an aerial wire-rope tramway, a distance of 7800 ft. in a straight line. The tramway is of the single-rope type and has 200 side-dump buckets of 235 lb. carrying capacity. The loading station for this tramway is in front of the ore bin at the mouth of No. 1 tunnel. Another single-rope tramway, of a length of 2400 ft., connects the ore-storage bins at tunnels Nos. 4, 3 and 2 with the ore bin at the mouth of No. 1 tunnel.

Owing to the great height of the raises between tunnel levels and the consequent great wear on chute linings in dumping ore, and the large amount of water to be contended with at certain seasons, with a large loss of fines, it was found prefer-

able to handle the ore between tunnels by the tramways instead of passing it down underground. must be credited to this mine. As it may be assumed that the neighboring Columbia mine has had a similar output, it may be said that the mines of the Cracker Creek district furnished more than one-quarter of the gold output of the State during the last 12 years. The U. S. Geological Survey has issued two publications dealing with the Cracker Creek district.

Gems in South Australia

The presence of various small gem stones in wash gravel and sand of Tertiary age has been detected in South Australia. The report of the Secretary for Mines of South Australia covering the half year ended June 30, 1909, gives the details of tests which proved the presence of rubies, topaz, sapphire, chrysoberyl, rutile and corundum besides coarse and fine alluvial gold.

per cent. of vanadium is used for deoxidizing and denitrogenizing steel, and about 0.25 per cent. of vanadium is left in the steel itself. It is ordinarily used with chromium or manganese, or both, to which nickel may also be added.

Vanadium has also been used in cast iron with good effect, and experiments with brass and bronze show that it may be used with advantage in these alloys.

Vanadium salts are said to be favorable to the growth of plants; vanadyl phosphate acts physiologically like potassium permanganate; from vanadates and tannic acid a waterproof black ink is made; vanadium salts are used in coloring glass; metavanadic acid has been used as a substitute for gold bronze in paint; vanadium chloride is used as a mordant in printing fabrics, and the trioxide as a mordant in dyeing. Vanadium compounds are used for several purposes in chemistry.

¹Twenty-second Annual Report, 1902, Part 2, pp. 551-776. "The Gold Belt of the Blue Mountain of Oregon," by Waldemar Lindgren: Bull. 380. Contributions to Economic Geology, 1908, Part 1, "Faulting and Vein Structure in the Cracker Creek Gold District, Baker County, Oregon," by J. T. Pardee.

Copper Deposits of Globe-Kelvin District—III

Operations in the Kelvin Section; Ray Consolidated Reports Nearly 42,000,000 Tons of 2.25 Per Cent. Ore Developed by Churn Drills

BY EDWIN HIGGINS*

Among the several companies that will before many months begin to contribute their quota to the already enormous copper production of southern Arizona, the Ray Consolidated Copper Company promises to take first rank in point of magnitude of operations and output. At the present time¹ there has been developed in the property of this company, by underground workings and churn-drill holes, 41,500,000 tons of ore that will average 2.25 per cent. copper; the last link of the standard-gage railroad from the mine to the concentrator and smeltery site, a distance of 21 miles, has been completed; the grading for a 5000-ton concentrator has been done and the foundations partly laid; and work will soon be started on a 7000-k.w. power plant to operate the mine and mill.

The Ray Consolidated Copper Company owns about 1000 acres of lode mining claims at the old camp of Ray, in the Mineral Creek mining district, Pinal county, Arizona. Ray is situated about six miles north of Kelvin, a small town on the north bank of the Gila river; Kelvin is 81 miles east of Phoenix, on the Phoenix & Eastern Railroad, a branch of the Southern Pacific system. Ray is also connected with Kelvin by a narrow-gage railroad but this will soon be abandoned in favor of the standard-gage road.

In addition to 200 acres of mill sites in the town of Kelvin the company owns about 4000 acres of mill- and smelter-site lands 12 miles up the river and southeast of Kelvin. The site selected lies principally on the north bank of the Gila river, directly opposite the point where the San Pedro river empties into it. About 2000 acres of the land purchased is approximately level and comprises practically all the land that is, or might become, valuable for agricultural purposes on both sides of the Gila river for a distance of over three miles.

The company's spur from the Phoenix & Eastern starts at Hayden Junction, about three miles west of the station of Winkleman. The point where the mill and smeltery are to be constructed has been named Hayden.

GEOLOGY

The mineralized belt in which the property of the Ray Consolidated Copper Company is situated consists of an area of highly altered and silicified schists.

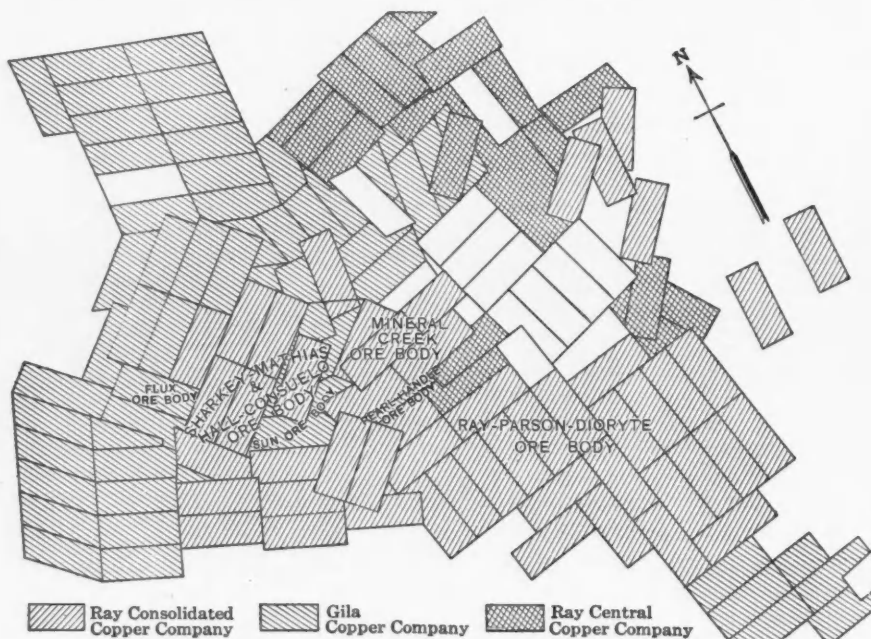
*Consulting mining engineer, Columbia Trust building, Los Angeles, Cal.

¹January, 1910.

These schists, including different metamorphic rocks, are the oldest rocks of the district. The oldest member of this schist group was a thick series of sediments which was later intruded by granite and granite porphyry, and metamorphosed into schist. Following this period of metamorphism was an intrusion of diorite.

Later, during which period the district was beneath the sea, Cambrian quartzites and Devonian and Carboniferous limestones were laid down. The

bearing sulphides were deposited in the fissures formed. The earliest was the great Ray fault, following the general course of Mineral creek, along which, subsequent to the primary mineralization, movement took place, the block on the west side being relatively uplifted. This upthrown block was then attacked by erosion and brought down to the level of the east block; the overlying strata were removed and the Pre-Cambrian schists laid bare. Further erosion of these schists was followed by desert-wash deposits in



The Engineering & Mining Journal

MAP SHOWING PROPERTY AND OREBODIES OF RAY CONSOLIDATED, GILA AND RAY CENTRAL

Ray property lies on the border of a mass or batholith of diabase that came up through the schist, probably toward the close of the Cretaceous, forming sheets at the base of the quartzites and dikes in the overlying strata.

Following the granite porphyry there were intrusions of small dikes representing complementary differentiation products of the granitic magma, including monzonite porphyry, diorite porphyry and a still more basic type; also more silicious dikes, including aplite, pegmatite and pegmatite-quartz veins. Metallic sulphides, chiefly cupriferous pyrites with some molybdenite and galena, partly accompanied, but mainly followed, these quartz veins.

Faulting had begun at the time of the granite-porphyry intrusion, and copper-

the valley that had been formed. This was followed by a lava flow, more desert wash and then volcanic ash. These rocks are probably of late Tertiary age.

At about the end of the Tertiary the block to the west of the Ray fault was again uplifted. Erosion then attacked this block and stripped off the Tertiary rocks, again laying bare the schists. The detritus accumulated in the valley as another desert-wash deposit called the Gila conglomerate. This probably occurred in the Pleistocene period. Later the general uplift brought about a period of cañon cutting by streams; at the same time there was a slight reverse movement along the Ray fault, involving the Gila conglomerate, and the west block suffered a downthrow. This brings us not far from the present time.

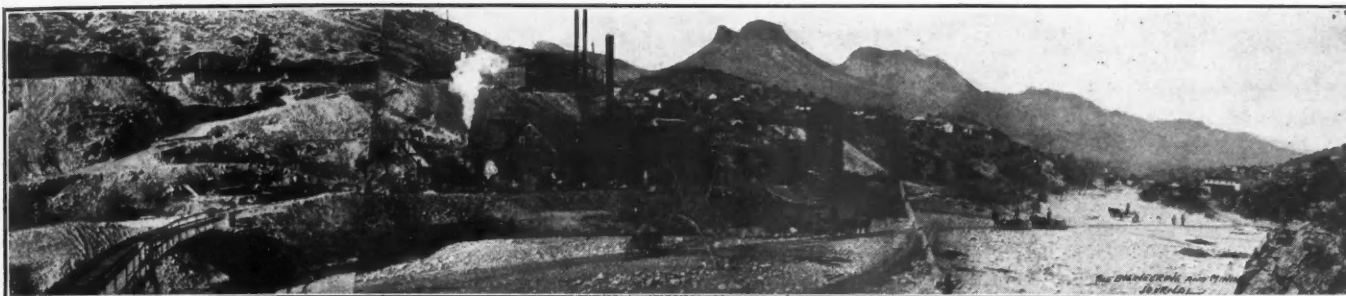
MINERALIZATION

The original or primary ore deposition followed the granite-porphry intrusion and the beginning of the faulting. The strata then overlying the schists appear to have exercised a blanketing effect on the solutions, which spread out beneath them, permeating them and the porphyry beneath and forming the basis of the disseminated deposits. A smaller part of the

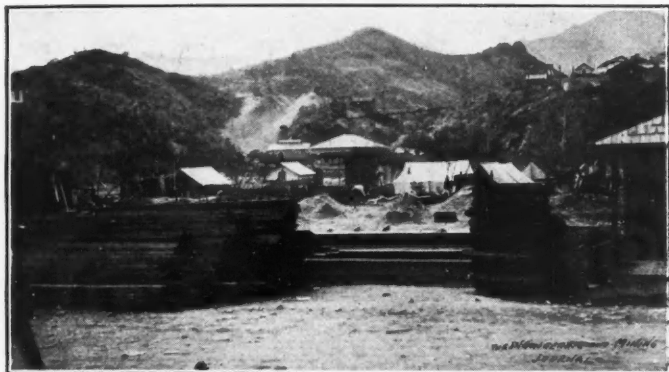
ft. on the south side and about 9000 ft. on the north. An accompanying sketch shows in section the thickness and horizon of the ore through the greatest length of the deposit owned by the Ray company. The width of the zone transversely to this section varies from about 3000 ft. toward the southeast to about 2000 ft. on the northwest.

The Ray ore zone was silicified during

the original ore deposition thoroughly shattered the main Ray belt of primary mineralization. The primary orebody was not commercially valuable, containing only a fraction of 1 per cent. of copper. The present orebody, carrying an average of 2.25 per cent. copper, has been concentrated by downward percolating surface waters which permeated the shattered rocks, oxidized the superficial por-



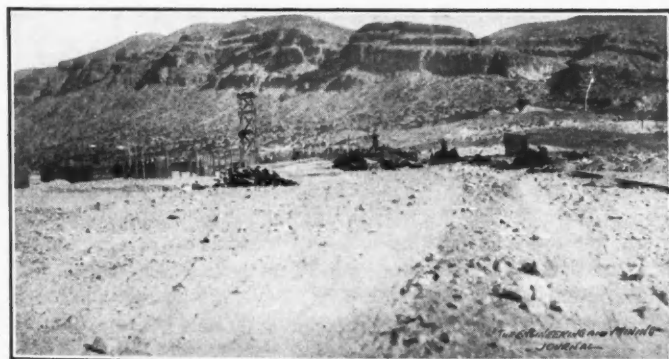
PANORAMIC VIEW OF RAY CONSOLIDATED COPPER COMPANY'S PROPERTY, KELVIN DISTRICT, ARIZONA



LOOKING WEST FROM MAIN STREET OF RAY. SHAFT AND DUMP OF RAY CENTRAL IN CENTER



WEATHERED SCHIST SURROUNDING SHARKEY SHAFT OF RAY CONSOLIDATED; ORE FOUND HERE 18 FEET FROM SURFACE



TWO VIEWS OF THE RAY CONSOLIDATED CONCENTRATOR SITE AT HAYDEN, ARIZ.

solutions escaped through fissures, usually along faults, into the overlying strata and thus formed lode deposits, sometimes with impregnation of the wall rocks.

The main Ray orebody belongs to the class of disseminated deposits in the schist and porphyry. The mineralized area has been shown to be about 3000 ft. wide near its east end, decreasing steadily and becoming less than 1000 ft. wide on the west. The extreme length of the orebody, through the properties of the Ray and Gila companies, is about 12,000

the original or primary mineralization; hence the exposed portion west of the Ray fault, being relatively resistant, stands out as a ledge of hills. It is iron-stained from alteration of the original pyrite. Bordering the belt of maximum mineralization there is another area showing a less amount of mineralization—a transition between the more altered rock and that which is practically unaltered. The boundary between the two is not distinct.

The fault movements which followed

tion, dissolved out the copper and carried it down to the ground-water level, where it was precipitated as the rich copper sulphide, chalcocite.

The present sulphide orebody contains, besides that dissolved from the leached ground, a great quantity of copper that must have been derived from rock leached and afterward removed by erosion. It is estimated that the thickness of the eroded rock was about 500 ft. This amount, added to the present surface, would raise it to the level of the bottom

of the Tertiary wash deposits where these overlie the mineral-bearing rocks on the edge of the district, not yet having been removed by erosion. It is, therefore, probable that the secondary concentration began with the removal of the Tertiary cover, and that probably the entire amount of copper contained in the rocks removed by erosion is contained in the present chalcocite zone. Locally the orebodies have been slightly displaced by recent faults.

CHURN DRILL DEVELOPMENT

Although there are over 20,000 ft. of shafts, drifts, raises and tunnels on the Ray property, most of the ore has been developed by means of the churn drill. On June 1, 1908, a report was made by S. W. Mudd indicating the existence at that time of about 3,000,000 tons of reasonably assured ore. Up to that time a comparatively small amount of drilling had been done, and the work was continued on a small scale until November

this basis, out of the 230 holes mentioned above, 163 have been used in arriving at the ore developed. These 163 holes average 432 ft. in depth, or a total slightly in excess of 70,000 ft. The average thickness of capping was shown to be 242 ft.; the average thickness of ore 113½ feet.

The ore developed early in January, 1910, by drill holes and underground workings in three groups, was as follows: Immediately contiguous to the main shaft, 54 acres containing 17,000,000 tons of ore, average 2.35 per cent. copper; about 700 ft. north of this orebody, 15 acres containing 3,500,000 tons of ore, average 2.25 per cent. copper; in the Sharkey-Mathias and Hall orebodies to the northwest, 36 acres containing 21,000,000 tons, average 2.18 per cent. copper; total, 105 acres containing 41,500,000 tons of ore, average 2.25 per cent. copper.

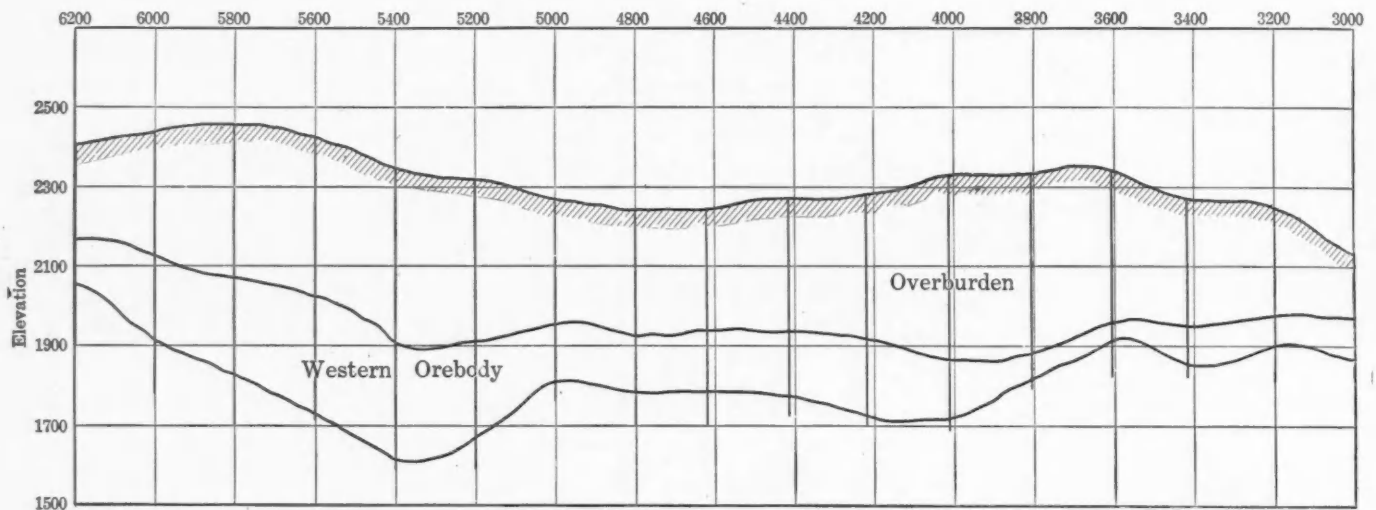
DRILLING OPERATIONS

There are at present nine Star and four

through. The final record of the drill hole shows the depth of hole, the copper content of every 5-ft. section, the depth of capping, thickness of orebody, grade of ore passed through, and remarks regarding special features of the hole.

At the start the tools used in the hole consist of: (1) drilling bit, 175 lb.; (2) stem, 900 lb.; (3) jars, 300 lb. (put on at a depth of about 200 ft.); (4) rope socket, 75 lb.; total 1450 lb. These tools are for the largest-size holes; for smaller holes the weight decreases. Special hard-laid 2-in. rope cable is used. There are three sizes of ordinary oil-well casing provided, 8¼, 6¼ and 4¼ in., but there are used only when the hole is caving or shelly.

In an accompanying illustration a Star drill, standing beside the headframe of an old shaft, is shown at work. The bailer has just emerged from the hole and is delivering its charge of sludge to the sampling device. The nature of the country over which the drill has



RAY CONSOLIDATED COPPER COMPANY—PROJECTIONS OF EAST AND WEST SECTIONS OF OREBODY, 600-FOOT WIDE

of that year, when the number of drills in operation was greatly increased.

A more vigorous campaign of development, which has continued to the present time, was then instituted by the management.

The whole property has been divided by coördinates into blocks 200 ft. square. At each corner of the developed squares, churn-drill holes have been sunk through the capping and enriched zone to the formation below.

Up to May 15, 1909, there had been completed 151 holes of an average depth of 377 ft., or a total of 57,000 ft. At the time of my visit, early in January, 1910, there had been completed 230 holes totaling approximately 90,000 ft. These holes vary from 200 to 970 ft. in depth.

ORE RESERVES

In calculating the ore developed by drilling, no ore has been figured beyond straight lines connecting holes in ore. On

Keystone drills at work on the Ray property. These machines are of the traction type and have a capacity of from 1000 to 1200 ft. of depth. Considering the rough character of the country, these machines have little trouble in moving from point to point; it is only necessary to grade a road, after which the machines negotiate steep grades with comparative ease.

In general, the practice in drilling the holes is as follows: The machine is set up over the coördinate point selected and drilling begun. The drill furnishes a sludge sample; this sludge is delivered to a specially designed sampling device which cuts out any desired proportion. The sample is collected in tubs. When mineralized ground is encountered samples are taken every 5 ft. and a careful record kept of the ground passed through. Work is continued in 5-ft. sections, alternately drilling and sampling until the mineralized zone is passed

to travel is shown also in the illustration.

These churn drills work two 12-hour shifts per day and are manned by one driller at \$6 per day, one driller's helper at 40c. per hour, and one sampler at 50c. per hour. Often it is possible for one sampler to take care of two drills. The drills consume about 1½ tons of coal and 1500 gal. water per day. The depth made per day is variable; as high as 50 ft. has been made under favorable conditions at the start. The average is about 30 ft. per day.

The cost of churn drilling at the Ray property varies with the character of the ground and the depth of hole drilled. The average cost of drilling per day is \$60, or \$1800 per month. The monthly average drilling cost ranges from \$2 to \$3.50 per foot. The average cost of 89,000 ft., including expenses, amortization of drills and general charges, was \$2.90 per foot. At times the entire operations consisted of drilling and general charges

were all against this operation. The distribution of charges in the 89,000 ft. mentioned above is as follows: general expense, \$0.52; labor and supplies, \$1.55; sampling holes and collecting technical data, \$0.57; grading roads, moving and setting up drills, \$0.27; total, \$2.90 per foot.

This type of drill is well adapted to sampling the character of orebody found at Ray has been proved by the results of samples taken from underground workings in the mine. Approximately 700 ft. of raises in ore have been put up alongside drill holes, and the results obtained from hand samples taken every 5 ft. check up closely in nearly every case. Also many drill holes have been checked in part where they pass through drifts on the underground levels.

MINE DEVELOPMENT

The mine is being opened up on three levels, the 50, 160 and 270 ft. Eventually there will be a fourth level to catch

ore. It is situated on the edge of the Ray-Parsons orebody and is at present a few feet deeper than the 270 level. This shaft is designed to accommodate two skips, each 5x5x10 ft. deep (12½ tons) running in balance, which will provide for a hoisting capacity of 5000 tons in not to exceed 16 hours.

A 30-deg. incline shaft, entering the ground at the extreme left of the panoramic view, will hoist and lower all men, tools, supplies, timber, etc. This shaft has three compartments, each 5x7 ft. inside timbers.

MINING AND HANDLING ORE

The methods of mining will be modifications of the caving system as practised by the Utah Copper Company. Details of the method cannot now be given, for local considerations will doubtless dictate a system peculiar to the orebody as found at Ray.

Sublevels will be driven at intervals, probably every 25 ft., between the main

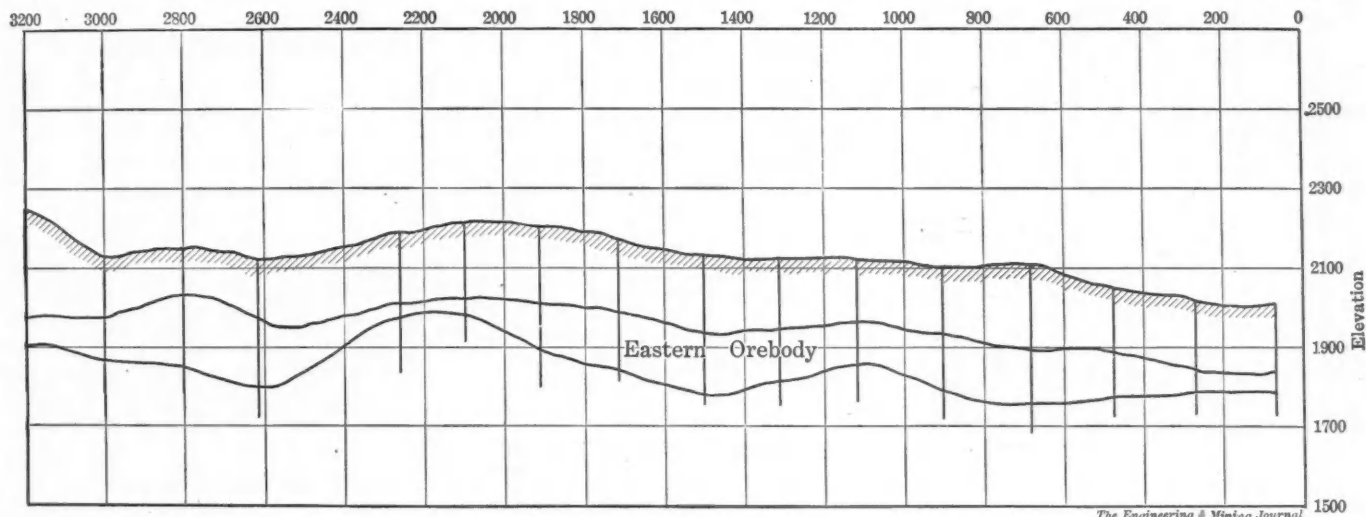
hoisting speed of 300 ft. per min. It will be equipped with a 300-h.p. motor, and will operate two 12½-ton skips in balance. This hoist is so designed that it may be changed easily to hoist from any one of the three levels. The incline hoist will have a speed of 600 ft. per min. and will be equipped with a 200-h.p. motor.

At the present depth of mining, water gives practically no trouble. A pump operated by air and having a capacity of 50 gal. per min., now handles the flow by working about three hours per day.

There will be installed two 500-h.p. electrically driven air compressors of a total capacity of 6000 cu.ft. of air per min. Large shops are being erected to take care of all machinery at the mine, locomotives, and for general repair work.

LABOR

At the time of my visit there were about 350 men employed in and about



THESE TWO SECTIONS REPRESENT 53.5 PER CENT OF THE DEVELOPED AREA. DRILL HOLES INDICATED BY HEAVY VERTICAL LINES

the ore east of Mineral creek to the limit of the property. Each of these will constitute a main haulage level. The inclination of the orebody is such, following as it does the general topography of the country, that the three levels, driven in different directions, will each be under the orebody it is intended to serve. The first level goes under the hill and reaches the ore developed partly by the old company. The second level goes under a draw and extends into virgin ground. A continuation of either the second or third levels will open up most of the ore in the northwestern part of the property where the capping and ore are both thicker.

The ore-hoisting shaft, the temporary headframe of which may be seen to the left in the panoramic view, has two compartments, each 6 ft. 10 in. by 6 ft. inside timbers. This shaft will be equipped with a 100-ft. steel headframe and will be used exclusively for hoisting

haulage levels. On the main haulage levels the ore will be gathered in ore trains and hauled by electric motor to 300-ton pockets at the shaft.

There will be three pockets, one for each main haulage level. These pockets will discharge automatically into skips, which will dump into a bin at the surface. This bin will feed to two gyratory crushers which will reduce the ore to 4-in. size; thence it will pass to two 6-ft. (20-in. face) rolls, which will crush to 1-in. size. The crushed ore will then be conveyed about 100 ft. by belt conveyor to railroad bins of 20,000 tons capacity, ready for transportation to the mill.

EQUIPMENT

All of the machinery at the mine will be operated by alternating current, to be supplied from the power plant at Hayden. The main ore hoist will have the largest load capacity known and will have a

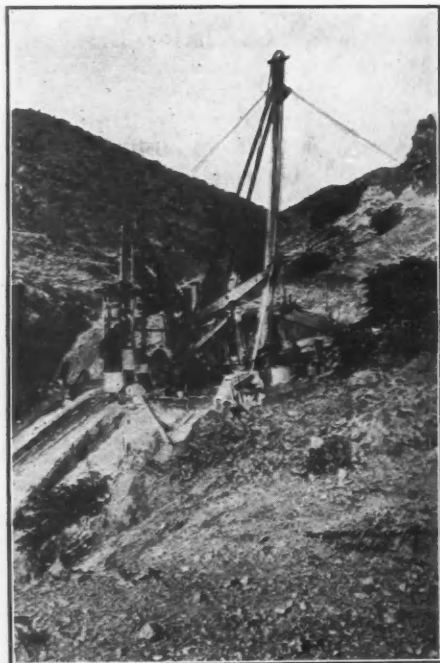
the mine. Of these, 120 were working on churn drills, about 150 underground and the remainder on general surface work. The work in the mine is being directed toward prospecting and blocking out ore, so that when the mill is ready to start the mine will be in readiness to supply the required tonnage. Machinemen and hand miners receive \$3.50; helpers, \$3; muckers and trammers, \$2.25 per day of eight hours; top labor, \$2 per day of 10 hours. The miners employed are chiefly Americans, Austrians, Italians and a few Swedes. Muckers and trammers are mostly Mexicans, as are also top laborers. Apache Indians make good laborers on railroad work, but for some reason cannot be induced to go underground.

The standard-gage railroad from Ray to Kelvin, a distance of six miles, has been completed. The last work to be done was the building of a small bridge just below the mine. The Ray company will

use its own locomotives only as far as Kelvin, whence cars will be run on the tracks of the Phoenix & Eastern and hauled the remainder of the way to the concentrator by locomotives of the railroad company. The haul will be six miles to Kelvin, 12 miles to Hayden Junction, and three miles on the company's spur to Hayden, total 21 miles.

MILLING

For about 10 months previous to August, 1909, the Ray company operated an experimental mill at Kelvin. This mill had been constructed by previous owners of the Ray property and was of almost obsolete design and equipment, but with



CHURN DRILL OPERATING NEAR OLD SHAFT

some additions it served well as an experimental plant. The tonnage put through this mill varied from 100 to 150 tons per day, and the results obtained have been valuable in determining the best design and arrangement of apparatus for the new plant. During the last period of its operation, the mill ran on ore of the normal grade shown by all the mine developments and showed a saving of about 70 per cent., accompanied by the production of a 27 per cent. concentrate. From the fact that this mill was poorly designed the management expects to do better when the new plant is running.

The site for the new mill near Winkleman is shown in an accompanying illustration. The work of grading is about completed and the forms for the concrete foundations are fast being put in. The mill will have a capacity of 5000 tons per day, divided into eight sections of 625 tons each. In general terms, the milling practice of the Utah Copper Com-

pany will be followed, with the exception that the ore will be crushed to 1-in. size before leaving the mine. Ore from 50-ton steel railroad cars will be dumped into bins at the mill. Each section of the mill will consist of two 42-in. rolls, three 6-ft. Chilean mills, and reciprocating roughing tables. After the material is finished to $\frac{1}{8}$ in. it will pass over the roughing machines, the coarse being returned to the Chilean mills for regrinding. Fine concentration will be done on smooth- and corrugated-belt vanners. The concentrating ratio will be about 17 into 1. A smeltery is planned for taking care of the mill product, and possibly custom ore. This will be near the concentrator, where there is an excellent site.

POWER PLANT NEAR HAYDEN WILL SUPPLY MINE AND MILL

A 7000-kw. power plant will be built near the mill on the Phoenix & Eastern railroad, from which power will be supplied to the mine and mill. This plant will consist of 6600-volt alternators, direct connected with 1750-kw. triple-expansion engines. At normal capacity it will require three of these engines to run the mine and mill; one engine is being installed as a reserve.

In closing I wish to express my thanks to D. C. Jackling, vice-president and general manager of the Ray Consolidated Copper Company, for much of the information contained in this article.

Preparation of Zinc Oxide for Reduction

A process for preparing zinc oxide for reduction, preventing loss due to its small density and during transportation, has been patented by Herman Pape, of Hamburg, Germany (U. S. Pat. 947,399, Jan. 25, 1910).

The zinc oxide, in the loose condition as it leaves the dust chambers, is fed into a muffle or reverberatory furnace, where it is exposed for two or three hours to a temperature of about 1000 deg. C. The oxide is condensed or solidified so that it coagulates into solid lumps and pieces, and when this is accomplished it is withdrawn from the furnace and allowed to cool. It can then be transported in a similar way to roasted blende, and after the larger lumps have been broken up, it can be used in the same manner as blende for reduction to zinc. The looseness of zinc oxide which is prejudicial in the reduction process, is thus entirely obviated.

The Great Salt lake in Utah has been rising at the rate of approximately 7 in. per month, as shown by records kept by the U. S. Weather Bureau. On March 15, the water was 6.5 ft. above the zero mark on the recording scale as compared to 4.4 ft. a year ago at this time.

The Porcupine District

SPECIAL CORRESPONDENCE

As a general thing, the country in the Porcupine district, Ontario, is flat and swampy, with occasional outcrops of rock in the form of hummocks. The country rock is schist, and the gold occurs in quartz dikes varying in width from a few inches up to 60 ft. Some of these dikes have been traced for over 800 ft. In several cases the gold showings are spectacular, the gold occurring in the form of small leaves and nuggets in the quartz.

The district was discovered several years ago, when prospectors passing through staked a few claims and did a little work without, however, finding any free gold. The claims were subsequently abandoned and nothing more was heard of that part until Wilson made his discovery last autumn. Several other discoveries of free gold followed this, and then ensued one of the quietest and quietest rushes ever seen in northern Ontario. In a couple of weeks the townships of Whitney and Tisdale were staked and prospectors were working in Mountjoy, Godfrey, Shaw and Carmen townships and down into the Temagami forest reserve.

Options were taken by prominent people on several of the best properties, chief among them being the O'Brien, Timmins and McArthur. Subsequently the Wilson claims were purchased for Eastern capitalists. Since that time several shafts have been sunk. A number of plants are on the ground and three of the companies have installed compressors. The deepest shaft is down about 60 ft. on the Timmins property, and free gold shows in the bottom of it. During the coming summer, when these plants are working, operations will be pushed much more rapidly and the work done during that time will to a large extent determine the future possibilities of the camp.

The first road into the district was cut by the Timmins interests to enable them to take in their supplies, and it is this road that has been used all winter. It is now, however, practically impassable for teams, and people coming out or going in have to do so on foot. The country will be practically isolated until the ice leaves the lakes and rivers and the navigation company starts its boats.

One of the greatest needs of the new camp is a summer road, and although several have been projected, nothing much has been done as yet. The Government has been asked to assist in this undertaking, but so far has done nothing. Surveys have been run for a branch line from the Temiskaming & Northern Ontario railroad, should the possibilities of the district warrant its construction.

Ore Dressing in the Coeur d'Alene District—IX

Crude Sampling Methods Usually Employed; Haultain Sampler Used for Wet Sands. Assaying Methods; All Ore Sold on Fire Assay

BY EDWARD S. WIARD*

The most pleasant way of treating the question of sampling and assaying the ore entering the Coeur d'Alene mills would be to avoid it entirely. The crude ore sampling is entirely insufficient and inadequate. The same evil exists in many mills in other districts. It is due largely to poor sampling that small advances are made in the art of ore dressing as compared with other lines of engineering. I have heard arguments that small mills could not afford to install proper sampling devices. It is not clear to me why the ton cost of equipping and operating well designed sampling plants in small mills should necessarily be any greater than large ones. The argument of cost has no weight in the rich and successful mines of the district, and I know of no mill where proper devices could not be installed without interfering with the regular mill operations and at comparatively small cost.

The only analogy by which I can compare crude ore-sampling conditions is to suppose a manufacturing concern to spend thousands of dollars on book-keeping to determine how much and for what prices it markets its finished material, but keeping no records of raw material purchased. I am not sure that the samples taken in the mills and at the mines even allow of a shrewd guess being made as to the metallic contents of the ores passing through the mills.

THE VEZIN SAMPLER

The ore is usually sampled after leaving the crusher and when it has been reduced to 1½-in. size. Hand sampling once an hour with an elevator bucket mounted on a rod is the practice at a few of the mills. In others mechanical samplers are used. These often show considerable ingenuity but are faulty in principle. The amount of ore taken at the first cut by these machines is entirely too small. The Bunker Hill rock house contains the most complete set of sampling devices of any mill in the district. By referring to the flow sheet in Section II in the JOURNAL of Dec. 4, 1909, it will be seen that the ore crushed to 1¼ in. is cut by a Vezin sampler at the head of the inclined conveyer belts. The 15:1 cuts indicated on the flow sheet are the ratios the plant was designed for, but actually so large a portion is not obtained. The second cut makes a 500-lb. sample in 24 hours from 1000 tons of ore. There is no

mixing or staying device below the set of sample rolls shown between the two Vezins; the time periods when the second Vezin catches the douse from the first which has been passed through the rolls must be variable. This plant is the nearest approach to real sampling of any in the district and it needs but little work to make it accurate, provided the Vezins are run more slowly. It is probable that when the Bunker Hill company's new mill is in operation these faults will be corrected.

HAULTAIN SAMPLER FOR WET SAND

Minor sampling devices about the mills do not need any attention with the exception of the riffle device of H. E. T. Haultain for reducing wet sand and slime samples. By its use the amount of time and trouble in handling of the sample of sand and slime at the end of a shift is reduced to a minimum. I believe it is more accurate than the complete drying of a sample collected in a large settling tank or in a canvas conical filter bag. If desired, the sample can be run through the device from a small settling tank. This is the mode in which it is employed at the Detroit Copper company's mill at Morenci, Arizona.

The complete installation of teeter box sampler tanks and reducing device as installed by Haultain at the Last Chance mill at the end of the sand and slime tailings launder merits description.

Water for operating the teeter box was first introduced into a little V-tank with a plug at the bottom for removing sand and one near the top for furnishing the actuating water under a constant head. At one end of the teeter box was secured an arm hinged so as to hang vertically. At the lower end of the arm was mounted a plunger consisting of a circular piece of pine which fitted loosely in a prismatic box kept full of water. The function of this device was to prevent the tipping apparatus from accelerating its to and fro movements. The teeter box actuated a carriage sliding on two horizontal rails placed about 18 in. apart. Little wheels were tried on these rails but gave trouble. On this account the carriage was provided with shoes which slid on the rails, these being kept well lubricated. Suspended from the carriage was the cutter which passed through the stream of tailings and took the sample. Attached to the teeter box was a Veeder cyclometer which counted the throws of the sampler, and by calculation it could be seen whether

the sampler had worked smoothly or intermittently during a shift.

From the cutter the sample flowed into a series of five 5-gal. kerosene cans, arranged as are the zinc-precipitating tanks in cyanide works, one below the other. Each can was provided with a baffle of iron plate suspended in the middle. The overflow of each can into the one below it was through two small angular spouts soldered in V-shaped grooves cut from the front of the can at the top. The interval between cuts in this sampler was between three and four minutes. During this time the slime back of the baffle in the first can would settle fairly well but much better on the front or discharging side of the baffle. The same thing, but marked by progressively better settling, could be observed in the other cans. The last can discharged absolutely clean water. When the douse from the sampler came slightly turbid, water would be lifted from the first can into the second, less turbid water from the second to the third and so on with diminishing turbidity until the final overflow would be perfectly clean.

This system was thus a highly efficient intermittent settling device. The kerosene cans did not last long, although the water was only slightly acid. It was necessary to have a small army of boys gathering in cans and bringing them to the mill. It would have been far better if the series of small tanks had been made of substantial copper sheeting.

At the end of a shift the sampler was hung up, the time being noted. The first can, which usually was about two-thirds full of sand and slime, was lifted up and the surplus water poured through the reducing device shown. The sand was loosened by pouring in water from a lower can of the series and the mixture poured through the reducer. The first can was finally washed perfectly clean with a jet of water pointed up into it from a hose mounted alongside the reducer and put back in place. The remaining cans in order were treated in a similar way with a view of using as little fresh water as possible. The four other cans usually had only an accumulation of sediment in them an inch or less deep. During these operations a can to receive the cutting rested under the lowermost set of riffles at A. The reducing device used in this sampler contained two sets of riffles and reduced the sample to a quarter; a third set of riffles would reduce a sample to an eighth. The riffles

*Mining engineer, Boston building, Denver, Colo.

are inclosed and supported by two heavy sheets of copper, shown by the heavy lines in the drawing. If the contents of the cans at the end of a shift with the added clean water for washing them out amounted to 28 gal., then the sample at the first reduction would amount to 3.6 gallons. On passing this through the reducer a second time the sample would amount to about 0.7 gallon. The second cut was placed in a copper tray and a little hydrochloric acid added. In a few hours it was perfectly possible to siphon off the bulk of the water and the rest could be quickly removed by heating on a sand bath.

COMMINATION OF SAMPLES

In the comminution of a large number of mine and mill samples a crushing plant consisting of a 4 x 6-in. Blake crusher, a Gates gyratory sample grinder and two or three bucking boards will be found satisfactory. With a crusher of this size the assayer's helper can dump a sample containing 10 to 15 lb. of ore into the jaws and it will be broken to half-inch size without any further attention on his part. The broken ore from the crusher can then be thrown in mass into the bell of the gyratory machine, which will reduce it to sand without attention. For reducing a large number of finely ground samples the riffle cabinet described in the JOURNAL, Feb. 2, 1907, will be found rapid and accurate.

METHODS OF ASSAYING

All ores shipped from the district are sold on the fire assay. Silver is determined by scorification assay. At the Bunker Hill mill the mill operations are checked by the wet assay for lead, Guess' electrolytic assay being employed successfully. At the other properties in the district some wet assaying is done but the efficiency of mill operations is based on the fire assay. The fusion period for a fire assay varies from 40 to 60 min., the idea being to raise the temperature of the furnace gradually so as to get a gentle fusion. After the fluxes are thoroughly decomposed and the contents of the crucibles quiet the temperature of the furnace is raised for 15 to 20 min. to make the slag extra liquid and allow suspended shots of lead to settle. I believe this practice better than that of Colorado where a fusion is made in 30 to 40 min. By crushing, weighing and assaying the crucible and slag from certain samples I have found that the loss of lead in the case of the longer melt could be accounted for almost entirely by the slag, whereas with the same ore and a shorter fusion period the smaller amount of lead recovered could only be attributed to sublimation and slagging losses.

Some account of my personal experience in assaying Cœur d'Alene ores may

be of interest. I used two flux compositions consisting of sodium bi-carbonate, potassium bicarbonate, borax glass and argols. I preferred argols to flour as the latter burned with a long yellow flame which prevented estimating the temperature of the muffle. For careful work I fired the furnace briskly for two or three hours with bituminous coal. At the end of that period the muffle, being new and free from cracks, would have a clear light orange color. There would also at the end of this period be a bed of bright coals on the grate bars, free from clinker and long flame. The slot in the muffle was luted to prevent any draft through it.

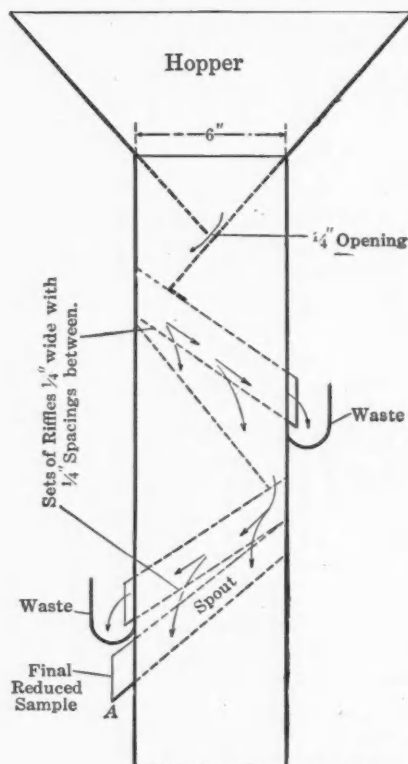
After the crucibles were placed in the muffle a couple of bars of coke were

cautiously, the gases would burst into flame. At 30 min. or thereabouts, the damper would be opened slightly and an hour after the crucibles had been introduced the fusions would be perfectly quiet. At this time I would open the muffle and drop the proper number of nails in each crucible. By doing so at this time I found that the nails performed their function as well as though inserted at the beginning and they were not so heavily attacked by the slag. Moreover, the fluxes had a tendency when melted to rise on the nails by capillary attraction, and when they fell they would leave entangled shots of lead. Ores containing barite attack the nails heavily, but if the nails be introduced after the fusion is quiet it will be found that the soda will have thoroughly decomposed the barite, and the nails can be withdrawn in good condition when ready to pour.

After the fusion was quiet the dampers were thrown wide open and the furnace brought up to a white heat for 15 or 20 min.; the crucibles were then poured. The indications of a good assay were quietness in melting, the hissing sound being heard only by putting the ear near the muffle cover. The charge should not have risen above the line of the dry fluxes in the crucible. Lastly, a thin watery pour which when cold was black and glassy. A certain amount of water of crystallization in the fluxes is essential for a quiet melt. It is a well known fact that salts have their fusion point lowered by combined water. In northern camps it will be found if borax glass be used that the other fluxes and particularly the potash will absorb enough moisture from the air, in all but the driest months of summer, to obtain the quiet melting conditions. In the dry months of August and September in the Cœur d'Alene I used to keep my potash in a closed canister and sprinkle it from time to time.

ASSAY OF LOW-GRADE ORE

For the lower grades of ore I have found the fire assay very erratic, it being impossible to plot a curve showing the difference between the wet and the fire assay for lead. At about 0.7 per cent. lead and lower the fire assay fails completely, no lead being recovered or only traces. Between 0.7 and 30 per cent. two samples showing the same per cent. lead by wet methods will often give widely different results by the fire assay. I am at a loss to understand these idiosyncrasies. It cannot be attributed entirely to improper fluxes or improper firing of the furnace as Table 1 will show. In assaying these samples, the fluxes were widely varied from day to day. On some days the muffle was badly cracked, on others it was in good condition; and of course the raising of the temperature varied for the different melts.



DEVICE FOR REDUCING SAND-SLIME SAMPLES

placed in front of them. The front of the muffle was then closed with a cover consisting of alternate sheets of asbestos board and steel riveted together so as to give a thickness to the cover of about $\frac{3}{4}$ in. The object of luting the muffle and placing the coke at the front was to give a reducing atmosphere in the muffle so that if any metallic lead came to the surface of the melt it would not be oxidized and cupelled. The furnace was then filled with fresh coal to a depth of about 12 in. and the damper closed. I preferred a damper of the pudding-furnace type.

The charge would slowly absorb heat from the highly heated walls of the muffle and the furnace. In about 20 or 25 min. a gentle hissing could be heard in the muffle, and if reducing conditions were right, on opening the muffle

Above 30 per cent. lead the differences between the fire assay and the wet method are more regular. In the neighborhood of 80 per cent. there is little difference between the fire and the wet assay. The uncertainties in the fire assay are bound to make serious and variable errors in the reports of mill saving. In Table 2, assays of mill feeds by wet and fire assay are shown for a Coeur d'Alene mill for a period of four months. It was the custom at this plant to make up composite samples of the mill-feed samples semi-monthly, about 3 grams be-

differences between the wet assays of material yielding about the same per cent. lead by fire assay should be noted. In the two assays of July 1 to 15 the fire assay is nearly 20 per cent. lower than the wet figure. With inaccuracies in sampling and a fire return such as this the reported saving might run over 100 per cent. Such a grotesque result has happened to my knowledge.

It may be asked what average figure would represent the saving in the Coeur d'Alene mills. I might guess, but I do not know. If there are any reliable

figures from any of the properties I am not cognizant of them.

figures from any of the properties I am not cognizant of them. (To be Concluded)

plotting this seam and the erection of coke ovens. The corporation then acquired the properties owned by the New South Wales Shale and Oil Company which was then the only competitor in Australia.

The advantage of acquiring this property was that the corporation came into possession of works which enabled it to gain experience in the treatment of the oil shale. But the purchase swallowed up a lot of the capital intended for quite another purpose. Further unanticipated expenditure was required for building a railway to the Wolgan valley, where the retorts and refinery are being erected, over a distance of 32 miles of mountainous country. Besides financial troubles the corporation has had unfortunate labor experiences. For seven months last year there was a strike of miners in the Wolgan valley. In consequence of these difficulties, a good deal of time has been lost.

The outlook today according to the directors' report which has just been issued, is promising and it is hoped that production on a large scale will soon be an accomplished fact. The first bench of retorts will be completed soon and it is expected that before the end of the year the Wolgan refineries will be running for the manufacture of kerosene and motor spirit, and a few months later for the production of paraffin wax, lubricating oil and other products. During the fifteen months ended September 30, 1909, 20,000 tons of export shale have been sold.

The corporation hopes to do a large business in Australia which has a population of 4,000,000. At present, although Australia is a protected country, no duties are placed on such products as kerosene or motor spirit because there is no home product to protect. Whether Parliament will assist this new industry remains to be seen but it is clear that the corporation is looking for protection. As regards the raw material, the oil shale, it is claimed that there is an abundant supply. The longest tunnel in the Capertee valley has opened the shale bed for over 4000 ft. and at the working face the seam is 42½ in. thick in the thinnest part and in the widest 54 in. In the Wolgan valley shale is now being produced at the rate of 800 tons per week from a 2-ft. seam. From what has been said it appears that the corporation has got over the worst of its troubles and is now well on the road toward the establishment of a successful industry.

The South African government is making the recruiting of native laborers a national business. While South African statesmen are quoted to the effect that the labor problem is thus practically solved, the *Mining Journal* truly says that this problem can never be solved in South Africa any more than in England, America or Australia.

TABLE 1. VARIATION IN FIRE ASSAYS

Samples.	Aug. 24, Pb, Per Cent.	Aug. 29, Pb, Per Cent.	Sept. 3, Pb, Per Cent.	Sept. 8, Pb, Per Cent.	Sept. 12, Pb, Per Cent.	Sept. 15, Pb, Per Cent.
No. 1.....	5.2	4.9	6.0	5.9	5.8	5.9
No. 2.....	6.0	5.0	3.8	3.5	3.9	3.7
No. 3.....	4.1	4.2	15.3	15.4	15.3	
No. 4.....	15.1	15.8	9.2	8.8	8.8	
No. 5.....	8.6	9.3	0.8	1.0	0.9	0.8
No. 6.....	1.0	1.0				

ing taken from each daily mill sample, and submit this combination to fire and wet assay.

COMPARISON OF WET AND FIRE ASSAY

Let us see what effect this would have on reported savings. Suppose the actual saving is 70 per cent. of the lead received by the mill during the above period and that the wet assay shown is the correct average assay for the same time. Then in 100 lb. of lead ore there will be 10.1 lb. of metallic lead. If the concentrate contains 56.5 per cent. lead, then with the

TABLE 2. FIRE ASSAY AND WET ASSAY COMPARED.

Date.	Fire Assay, Lead, Per Cent.	Wet Assay, Lead, Per Cent.
May 1 to 15.....	7.0	8.46
May 15 to 31.....	9.0	10.48
June 1 to 15.....	8.3	9.84
June 15 to 30.....	9.4	11.15
July 1 to 15.....	8.8	10.80
July 15 to 31.....	9.1	9.42
Aug. 1 to 15.....	9.3	9.67
Aug. 15 to 31.....	9.9	10.92
Average.....	8.9	10.10

assumed saving there will be 12.6 lb. of concentrate. Now the assay of the concentrate as reported by fire will be about 1.5 per cent. lower than by wet methods. The concentrate will then be reported as containing 55 per cent. lead. From 12.6 lb. of concentrate there will be reported 6.9 lb. of metallic lead. In the 100 lb. of feed as reported by fire assay there will be 8.9 lb. of lead and the saving under fire assays will be about 78 per cent.

The salient point is that while with concentrates of the grades made in the district, the difference between the fire and wet assays is about 3 per cent. of the latter, the difference between the two kinds of assay on the feed may be over 10 per cent. The great

Oil Shale Development in Australia

Subscriptions are being invited for the Australian Oil Company, Ltd. The properties to be acquired are at Murrurundi and Capertee, in New South Wales, and have been reported on by Ronald Johnstone, Jr., of Glasgow. The oil is in shale similar to the Scotch shale and the samples give a favorable yield both in crude oil and sulphate of ammonia, the second-class shale giving a higher yield than the Scotch shales, while the first-class shale is much richer. The reporting engineer estimates that shale can be delivered to the retorts at 8s. per ton, in which figure are included all mining charges, or cost above and below ground, management royalty and transport of three miles to the retorts. Particulars are given in the prospectus of the various products that will be obtainable from the distillation of the crude oil. A bulk test of the shale was made at one of the oil works in Scotland, 85 tons of shale having been shipped for that purpose. This company will compete with the Commonwealth Oil Corporation which has been in existence several years but which has not yet reached the producing stage, on a large scale. The main properties of this corporation lie in the Wolgan and Capertee valleys, in the Blue mountains of New South Wales, about 120 miles from Sydney. The original capital provided for this undertaking proved inadequate and further funds had to be raised. The company, formed originally to work the oil shale, discovered soon after its formation a coking coal seam and a slice of the original capital was devoted to ex-

Sinking by Means of Underhanging Tubbing

Description of Plant and Method Used at Hamsterley Colliery. A Shaft 55 ft. Deep Was Sunk and 56 Tons of Tubbing Completed in 28 Days

SPECIAL CORRESPONDENCE

The Hamsterley colliery is situated in England about 10 miles southwest of Newcastle-on Tyne, and in his introductory statements, Mr. Cummings gave a section of the strata sunk through, as follows:

SECTION OF STRATA.		
	Ft.	In.
Soil	1	0
Sand, dry.....	2	9
Sand, with water.....	9	6
Sand, with gravel, heavily watered	12	6
		25 9
Blue clay with boulders....	6	9
Large boulders.....	2	0
Dark blue to black shale, very soft.....	11	8
Seggar clay.....	3	0
White post, very soft.....	5	6
		28 11
Stronger and darker post...	30	0
		30 0
Total	84	8

Following a description of the sinking plant, the author explained the process of sinking, and with acknowledgments we make the appended extracts:

THE SINKING

A commencement was made by excavating an annular trench in the sand to a depth of 4 ft., with an outside diameter of 19 ft. An annular concrete foundation-ring, having an internal diameter of 10 ft. 10 in. and an outside diameter of 19 ft., and 3 ft. deep, was then laid, the top of the concrete being 1 ft. below ground level. The concrete block was strengthened by scrap-iron bars and rails laced across each other. The concrete was composed of equal parts of cement, sand, and broken bricks. Great care was taken to level the top of the concrete block, as this formed the bed for the cast-iron hanging ring, from which the whole of the tubbing was suspended, and upon this the vertical condition of the shaft depended.

The hanging ring or curb (Figs. 2 and 3) was of cast iron, 11 in. deep and 19¾ in. wide in the bed. It was in six segments, bolted together to form a circle 10 ft. in diameter inside the flanges. Three out of these six segments had holes sloping downward (Figs. 2 and 3) through which liquid cement was poured for grouting the course of tubbing below. All the joints were machined, and lead sheeting ⅛ in. thick was placed between them to form a watertight joint.

NOTE—A paper by John Cummings, entitled, "Sinking the John Shaft at Hamsterley Colliery, Through Sand and Gravel by Means of Underhanging Tubbing," presented to the North of England Institute of Mining and Mechanical Engineers, at Newcastle-on-Tyne, Dec. 11, 1909.

The hanging ring was laid on the foundation with the inner flanges projecting over the edge of the concrete, the top of the ring being flush with the surface of the ground. As a further precaution against slipping, and in order further to spread the weight, two baulks of timber, 20 ft. long and 12 in. square, were laid across, one at each side of the pit, and bolted to the hanging ring.

The sand was then taken out of the center of the pit for a depth of 5 ft. This was done without difficulty, as there was a concrete lining for a depth of 3 ft. A course of tubbing was then put in and

to preserve the holes for grouting the next course below.

DESCRIPTION OF TUBBING

The tubbing (Figs. 2 and 3) is of cast iron, 1 in. thick, with six segments to the circle. It is in two sizes, namely, eight courses of segments, C 2 ft. 5½ in. deep., for going through the sand and worst ground, and eight courses of segments, B 4 ft. 11 in. deep (Fig. 3). The object of the deeper rings was to save joints, as these, being machined, are costly. Every alternate segment in the circle is provided with a grouting hole A just above

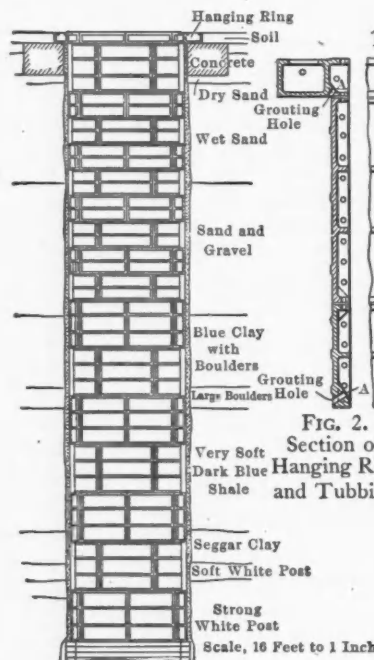


FIG. 1. Section of Shaft.

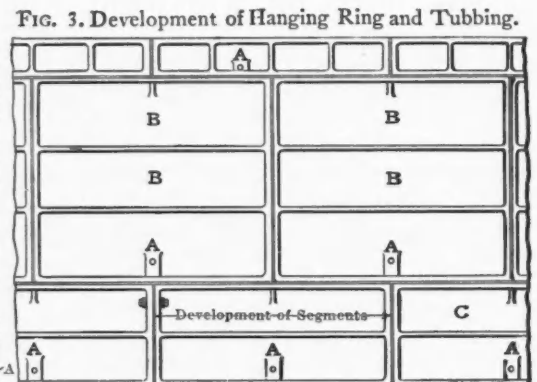


FIG. 3. Development of Hanging Ring and Tubbing.

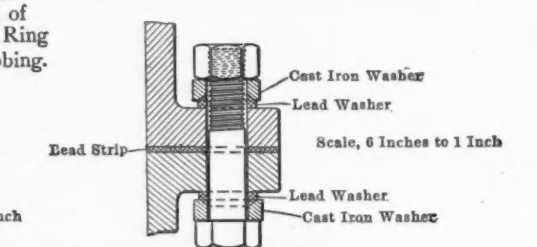


FIG. 4. Section of Joint.

SHOWING METHOD OF SINKING THROUGH SAND AND GRAVEL BY MEANS OF UNDERHANGING TUBBING

bolted to the bottom flange of the hanging ring, strips of lead sheeting being inserted between all joints, both vertical and horizontal, before the bolts were put in.

The bolts being thoroughly tightened up, the space at the bottom of the tubbing all round the shaft bottom was rammed tight with well puddled clay, and liquid cement was poured into the grouting holes of the hanging ring above so as to fill up the space behind the tubbing. Long tapered plugs were driven into the bottom grouting holes, these having a twofold purpose, first, to prevent the liquid from being wasted, and second,

the bottom flange (Fig. 2), which slopes downward as in the hanging ring. All the joints are made with strips of sheet lead ⅛ in. thick, accurately cut to pattern (Fig. 4), each strip projecting ⅓ in. beyond the face of the joint to allow for caulking, which was done after the tubbing was completed. The bolts were all turned 1 5/16 in. in diameter, and to prevent the threads from being damaged, ⅓ in. of it was turned off at the end of each bolt. In order to make the bolt holes as well as the joints watertight, a conical lead washer (Fig. 4) was put on next the flange at each end of the bolt, and a metal washer (Fig. 4)

having an inverted cone to fit over the lead one, was put on next to it. When the nuts were tightened up, the soft-lead washer was squeezed between the cast iron of the flange, and the conical space in the metal washer and formed a perfectly watertight joint.

It will be seen from Fig. 2 that small projecting horizontal ribs were cast on the outside of the tubing. These formed supports for the tubing in the cement grouting.

Fig. 1 gives a section of the shaft as tubbed. It will be seen that at the surface a course of deep segments was put in, as the ground was fairly easy, and it was deemed advisable to keep shallow segments for the worst ground. The 8 shallow courses were next inserted, the remainder of the deep segments being put in last. Before the sixteenth course was put in, the sinking had reached a good firm stone; this last course was, therefore, not quite so necessary and was not inserted until later. The sinking

was carried down for over 30 ft. into the post stone, when a walling bed was formed and the shaft was lined with walling lumps 9 in. thick. This walling was carried up to within about 6 ft. of the bottom of the tubing, and a wooden crib of elm was made to suit and laid on the top of it, being wedged firmly from behind. The last course of tubing before mentioned, was then put in, and the joint between it and the crib wedged and made tight.

THE TOTAL WEIGHT OF TUBBING WAS 56 TONS

While the sinking and walling was being carried below it, the whole length of tubing remained suspended from the hanging ring at the surface, entirely without support at the bottom (except so far as it was self-clinging in the grouting) until the walling was joined up below it. The total weight of tubing with bolts, etc., in the shaft was over 56 tons.

The time occupied in sinking the shaft, putting the grouting, and completing the tubing to a depth of 55 ft. from the surface, was 28 working days, including the time occupied in laying the hanging ring, but not including a stoppage of 6 days after the tenth course was finished in the boulder clay, due to a consignment of bolts being delayed in transit.

In concluding, Mr. Cummings said that the only objections to this method of tubing, so far as he can see, are: (1) The absence of a good foundation from which to suspend the tubing; (2) the difficulty of getting in the grouting against high pressures; and (3) the difficulty of securing a tight joint at the bottom of the tubing courses to hold the grouting when the pressure is greater than usual.

We are indebted to the North of England Institute for copy of engraving enabling us to illustrate Mr. Cumming's description of the sinking of the John shaft.

Advance and Retreat Room-and-Pillar System

BY H. J. NELMS *

The advance and retreating system of operating a coal mine where the room-and pillar system of mining is used, is the most consistent to employ.

Three face entries, on 50-ft. centers, are driven parallel to the main entries

the middle entry can be used for a haulage road, and should be confined to itself and not enter into the ventilation at all.

No. 1 room on the butt entry can be driven 16 ft. wide and used as a return

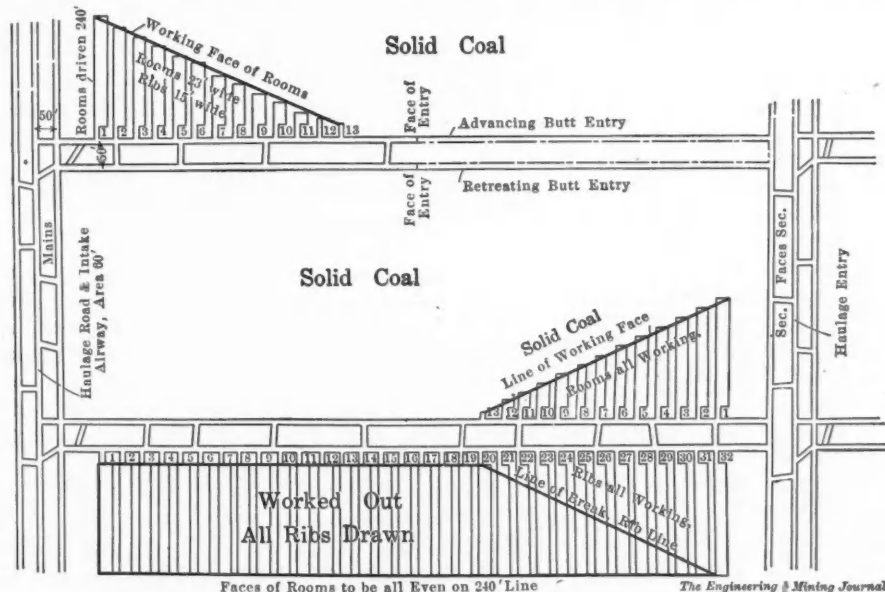
when robbing is commenced on this butt entry.

The gob in No. 1 room should be kept as low as possible and if slate is dumped outside and easily handled, then all the slate from the No. 1 room should be loaded and dumped outside; the superintendent then has a return airway, 16 x 6 ft. = 96 sq.ft., which is large enough under most any circumstances.

Butt entries should be turned every 450 ft. A chute is driven on a 60-deg. angle, from the middle main entry to the outside main for haulage. The butts are turned on a 90-deg. angle, and are driven on 50-ft. centers for a distance of 1400 ft. A 60-deg. chute should connect the butt entries 25 ft. from the center of the outside main for haulage from the butt entry. It is bad practice cutting corners off break-throughs.

Each butt entry should maintain a sectional area of about 50 sq.ft. and be driven perfectly straight. It seems impossible to convince mine foremen that straight entries overcome the troubles of track laying, cars jumping track, etc., and that it is as easy to drive them straight as crooked.

The best engineering practice today advocates having entry sights so that they are never more than 180 ft. apart; this gives a mine foreman a good chance to keep his sights well up. In providing ventilation, I believe that two pairs of butts on one split make a good method. The rooms should be turned 90 deg. off butts and driven as shown in plan.



PLAN FOR DEVELOPING A COAL MINE ON THE ADVANCING-AND-RETREATING SYSTEM

at 1400-ft. intervals. The sectional area of the face entries is kept as nearly as possible to a 60-ft. standard in a 5-ft. seam.

It is advisable where possible to use all three face entries for intake airways;

airway. When the No. 1 room is maintained for an airway, it should be widened toward the face or main entry and be driven on 70-ft. centers with the face entry. A 30-ft. pillar of solid coal should be left between No. 1 and No. 2 rooms; No. 1 rib can then be easily extracted

*Engineer, Castle Shannon, Penn.

GENERAL SYSTEM OF DEVELOPMENT

No. 1 room should be started as soon as possible, then No. 2 and so on from the advancing butt entry. When No. 2 room is finished working on the face, No. 14 should be just started; when No. 2 rib is out No. 14 room should be just finished and No. 27 room just starting. The ribs must be extracted as soon as each room is finished, no matter whether the next room on the advance side is finished or not; the rib is started while the next room is still 30 ft. from being finished. When No. 32 room is finished working on the face, No. 19 rib is just finished, also No. 1 room on the retreating butt is about finished and No. 13 room just started. As soon as No. 2 rib on the retreating entry is finished, it is advisable to start extracting immediately the butt-entry stumps and chain pillar, bringing everything along with the retreating butt and closing entry in tight, knocking out the brattice in each succeeding break-through for ventilation.

This method of operating is the most consistent method to use where the room-and-pillar style of mining is used. The rib men and the machine loaders are always separate, you confine your workings to the smallest space possible for a large tonnage and you can easily ventilate it. You will not have your mine dotted with old abandoned workings if this method is consistently used and maintained. Any system that keeps the area of old workings down to a minimum is surely the scheme to adopt.

When a set of butts are worked by this method, they are off the operators' hand when once finished. There is never any danger of a squeeze as every movement of the rock runs up against solid coal, and for this reason it is impossible to have a squeeze swing across a set of butts to another set as it generally does where both entries are worked advancing. The accompanying drawing shows how this system is worked, and five pairs of butts developed on this plan are capable of producing from 1000 to 1500 cars of coal a day.

Small mule "partings" should be at the bottom of each pair of butt entries and the distance for mule haulage will then be as short as possible.

The coal from these partings can be gathered by a 6- or 8-ton locomotive, and delivered to a larger parting where a "dilly," or large locomotive can take it outside.

The directors of the Great Northern railway have filed with the Montana Secretary of State a copy of their resolution authorizing the construction of a branch line from the town of Vaughn in Cascade county along the Sun river west into Lewis & Clark county, a distance of 58 miles. It is thought that the line may eventually be extended over the divide.

The Cost of Electric Shot Firing

SPECIAL CORRESPONDENCE

James Douglas, in a paper before the North of England Institute of Mining and Mechanical Engineers on Dec. 11, 1909, says that simultaneous electric firing from a switchboard outside the mine is an absolute safeguard, not against explosions of coal dust through misfires, or against fire, but against loss of life. He describes the application of the system at Dawson, N. M., devised by David Crow, general superintendent of the Stag Cañon Fuel Company. It consists in firing simultaneously all the shots when all the workmen are outside the mine, by closing for a second a switch in a cabin on the side of the hill away from the pit mouth. The system has been installed for somewhat over a year, and has given entire satisfaction.

RULES GOVERNING FIRING

The following are the rules governing the firing:

- (1) The mining or cutting must in all

missing, Mr. Douglas says the shot firer must find him. In connection with the firing system, one wireman, or shot firer, and two fire bosses are employed. Before the wireman enters to connect up the firing circuits he must see that all the employees are out of the mine and that the power is cut off, and after shots have been fired ascertain that all firing circuits are disconnected from power lines. He is also required to see that the firing lines are kept up in good shape, and furnish the miners with wire for repairing lines. After reporting that the switches are all connected, he remains for at least an hour after the shots are fired, and then reenters and disconnects the switches, looking in the return from each split to see whether there are any indications of fires in the mine.

The duty of the fire bosses in connection with the firing system is to distribute electric caps. They examine all shot holes in their districts before they are charged, to see that they comply with the rules governing the same; then they issue the number of caps necessary to fire properly the shots prepared by the miners.

COST OF SHOT FIRING BY ELECTRICITY.

	Mines			Total.
	Nos. 1 and 2.	Mine No. 4.	Mine No. 5.	
Tonnage (short tons)	50,929.15	19,571.80	23,259.35	93,760.30
Drilling, firing and loading	\$30.02	.....	.....	\$30.02
Checkman	132.90	.....	\$67.26	200.16
Wiremen	118.20	\$81.00	78.00	277.20
Shot inspector	241.16	100.75	102.39	444.30
Repairing shot-firing wires	54.09	67.21	20.34	141.64
Tapping material .....	.....	.....	2.45	2.45
Tamping and powder boxes	3.00	.....	.....	3.00
Incidentals	0.62	.....	.....	0.62
Total	\$579.99	\$248.96	\$270.44	\$1,099.37
Cost per ton (cents)	1.14	1.28	1.16	1.17

cases extend at least 6 in. beyond the back of the holes.

- (2) All holes must be at least 30 in. in length; no shorter holes will be fired.

- (3) All coal dust must be extracted from the holes before they are charged.

- (4) No holes must be charged with more than five sticks of powder.

- (5) Standing holes or parts of standing holes must not be recharged.

- (6) The holes in a tight corner must be at least 12 in. from the rib at the back end of the holes.

- (7) In solid faces, holes must not be more than 6 ft. apart horizontally, and not less than two such holes shall be fired.

- (8) The object of these rules is to prevent and remove the danger from blown-out or windy shots; and it shall be the duty of shot inspectors, in addition to the above rules, to refuse to shoot any holes which in their judgment may be dangerous whether the circumstances are fully covered by the rules or not.

EVERY MAN MUST BE ACCOUNTED FOR

Every man must be accounted for before the firing is done, and if a man is

Mr. Douglas submits the accompanying table showing costs of shot firing by electricity at Dawson mines.

Production of Ammonia and Ammonium Sulphate

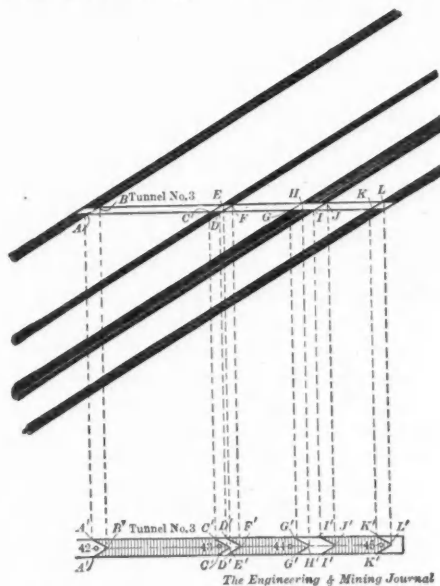
According to statistics collected for THE MINERAL INDUSTRY, the production of ammonia and ammonium sulphate in the United States in 1909 amounted to 106,500 tons (all forms expressed in terms of the sulphate equivalent), of which 75,000 tons came from by-product coke-oven plants, and the remainder was recovered in the manufacture of coal gas, bone black, etc. The production was 23,400 tons in excess of the 1908 output, and 7200 tons more than the recovery in 1907, the best previous year. Imports into this country for the fiscal year ended June 30, 1909, amounted to 40,192 tons, as compared with 34,274 tons in 1908, and 32,669 tons in 1907. The average quotation for domestic ammonium sulphate for the first six months of 1909 was \$2.90 per 100 lb., and for the last six months a shade under \$2.70, making an average price of \$2.80 for the year.

Tunnel Survey in an Anthracite Colliery

BY D. P. JONES

The accompanying field notes illustrate the general method employed in taking side-notes of a tunnel survey in the coal-fields of Pennsylvania. Young engineers are often confused when recording, in the small space of a field note-book, the data obtained in locating the various seams that have been cut by a tunnel. In the lower left-hand corner, I have recorded the kind of survey to be made, under that, is the name of mine and the date of the survey, and lastly, the names of the party taking the notes.

The survey party consist of two men (only those who take the side-notes are considered here), first and second assist-



SHOWING SECTION OF TUNNEL AS RELATED TO THE DIFFERENT COAL SEAMS

ant transitmen. The first assistant transitman holds the reel end of a steel tape at station 43 while the other man takes the end of the tape at station 42. After a gentle pull to straighten the tape, it is laid on the floor on the line of the two stations, 42 and 43. When the distance between the two stations becomes greater than approximately 150 ft., the first assistant transitman comes back half way between the two stations and records the data obtained by the other man at various places, measured at right angles to the line of the tape. The notes show that station 42 is located in the center of the tunnel No. 3. The station in the notes is indicated by a circle with a dot inside.

One line below station 42, is minus 10 (-10) at which point the bottom of the seam and the bottom of the tunnel intersect. It is indicated in the notes as C.E.B. or "coal ends at bottom." At plus 18, you will note C.E.T., or "coal ends at the top," or the intersection of

the floor of the seam with the roof of the tunnel. On the right side of the notes at station 42, the pitch of the seam is indicated by an arrow, with the number of degrees on one side of it. The accompanying section of the tunnel shows clearly where these points are.

Points A and B are station 42, -10 and +18 respectively; point C is station 42 + 231, and so on. All these points in the tunnel No. 3 are located and recorded

Side Notes of a Tunnel Survey.			
	40	8	8
	22 C.B.T.	7	8 C.B.T.
St. 45	170.20	7	9 ↓ 31°
	162 C.B.B.	8	8 C.B.B.
	140	7	9
	120	8	8
	100	8	8
	82 C.E.T.	8	8 ↓ 32° C.E.T.
	55 C.E.B.	7	9 C.E.B.
	33 C.B.T.	8	8 C.B.T.
	8 C.B.B.	8	8 C.B.B.
St. 44	135.00	8	8
	120	8	8
	100	9	7
	80	8	8
	60	8	8
	37 C.E.T.	9	7 C.E.T.
	16 C.B.T.	9	7 C.B.T.
	11 C.E.B.	8	8 C.E.B.
St. 43	239.51	8	8 ↓ 31°
	231 C.B.B.	7	9 C.B.B.
	220	7	9
	200	7	9
	180	7	9
	160	8	8
	140	7	9
	120	7	9
	100	8	8
	80	8	8
	60	7	9
	40	7	9
	18 C.E.T.	8	8 C.E.T.
St. 42		8	8 ↓ 32°
	10 C.E.B.	8	8 C.E.B.
Survey of Tunnel No. 3			
Potts Mines, Feb. 23, 1910.			
D.D. Owens and John Williams.			

SHOWING METHOD OF RECORDING FIELD NOTES

in the field note-book. To show these points correctly on the plan of the tunnel is another puzzle to some engineers. The plan of tunnel No. 3 is projected below the section and the points A B C, etc., are also projected on this plan as indicated by the dotted lines. When the bottom of the tunnel intersects the seams, as at A C D G, etc., as shown in the section, these points on the plan of the tunnel as shown by the projection of the section, correspond to A' C' D' G', etc., or along both sides of the tunnel, while the points, B' E' F', etc., on the section correspond to B' E' F', etc.

In other words, the intersections at the bottom of the tunnel correspond to the sides on the plan, and the intersections at the roof correspond to the points at center of the tunnel. These points on the plan map are connected at A' B', C' E', etc. Thus forming V's, and the area between the V's and A' C' D' G', etc., are cross hatched to represent the rock work, while that of the unshaded portions represents the intersections of the seams with the tunnel. It will also be observed that the vertex of the V's shows the direction in which the seam dips. The side notes above illustrated can be platted on a plan map without the aid of a section.

Mexico's Coal Output

The reports of the mining companies in Mexico show that a total of 919,338 metric tons of coal was produced in 1909. It is estimated that this production will be largely increased in 1910. Practically all of the mines are situated in the state of Coahuila, although there are said to be extensive undeveloped coal-fields in other parts of the republic. The coal produced in the Coahuila field is of the coking grade, and during 1909 a total of 150,000 tons of coke was made. Three companies are now building the new type of retort oven, which will make coke in 48 hours, against 72 hours required by the older process. It is announced that the Mexican Coal and Coke Company, an American concern, will soon have 50 of these ovens in operation. The Lampacitos Coal Company is erecting 30 of the ovens, and the Rosita Coal Company will soon have 60 of them. In the Cleote district a battery of 60 beehive ovens was finished in October, and a secondary plant of 60 more ovens is now being installed. It is claimed that at the present rate of development of the coal industry in Mexico, it will be only a few more years when it will be unnecessary to import coal from the United States.

The Oliver Iron Mining Company, a subsidiary of the United States Steel Corporation, operates more than 150 steam shovels in its Lake Superior iron-mining operations.

Underground Fires in Gassy Mines

SPECIAL CORRESPONDENCE

In the course of a paper on "A Natal Colliery Explosion and Underground Fires in Fiery Mines," presented at the meeting on Dec. 11, 1909, of the North of England Institute of Mining and Mechanical Engineers, William Taylor Heslop indicates the precautions that should be taken in dealing with a fire where fire-damp is issuing from the coal. He says the conditions must be so controlled that there is a minimum danger of accumulation of firedamp in explosive proportions at a point not in contact with the fire, but which, as the accumulation increases, may possibly be brought into contact with the still active fire. It is therefore necessary that the area dammed off should be confined within the smallest possible limits. If it should happen that it became necessary to dam off both of a pair of main headings, of which only one was on fire, then, provided that there was no accumulation of firedamp, it would, so soon as preparations for building the dams were completed, be advisable to ignite the gas blowers in the second heading, before commencing the actual work of building the dams.

AIR SHOULD NOT BE DECREASED

Until the building of the dams has actually been commenced, Mr. Heslop says it is preferable that the fire should burn fiercely, so that combustion may be rapid and the air inside the dams be quickly consumed. It is, therefore, not advisable to decrease the amount of air passing over the fire until the preparations to shut it off completely are concluded. This would be accelerating the exhaustion of the oxygen within the dams, reduce the likelihood of any unignited blower of gas accumulating in such quantity as to cause an explosion before the active combustion, or flame of the fire had ceased.

Where the blower of firedamp is insignificant, and the resultant fire very small, a chemical fire extinguisher depending on the generation of carbon dioxide might be tried, but in case of a large fire, the fire itself would furnish the carbonic acid gas in sufficient quantity more readily.

In the view of the author, it is of vital importance that after the air supply has once been shut off from the fire, the greatest precautions should be taken to prevent any possible readmission of air. As soon as the activity of the fire has ceased and the gases begin to cool, then in a rising or level place the carbon dioxide would find its way along the floor away from the region of the fire, and if it were possible, fresh air would rush in to take its place.

In a dip place the risk of rekindling

the fire would not be so great, but the risks of accumulation of an explosive mixture at a point not in initial contact with the fire might be greater, unless specially provided for by the arrangements made.

Mr. Heslop recalls that the point has sometimes been raised whether the intake or return road should be first shut off. In practice, he says, it will generally be found difficult indeed to deal with the return airway first, on account of the state of its atmosphere, as far as breathing and working are concerned. Apart from that, the selection should depend on that which would be less likely to cause an accumulation of firedamp away from initial contact with the fire.

It must always be remembered that the cutting off of either airway will stop the supply of air to the fire, except so far as connection currents and diffusion are concerned. If one dam is at a lower elevation than the other it would be preferable to shut it off first, with a view to giving any firedamp a better opportunity of escaping by the higher airway.

In a reference to the conditions obtaining at Glencoe and North Cambrian collieries in Natal, Mr. Heslop says that ultimately the zone of foul gases formed the only barrier, preventing the ingress of fresh oxygen to the fire. That zone was of such an extent that neither diffusion nor convection currents were able to break through it after the final explosion until the embers of the fire were effectually extinguished, but in each case convection currents were able to break through the zone of oxygen depleted gases left by the earlier and smaller explosions.

Explosives Forbidden in Coal Mines of Austria-Hungary

SPECIAL CORRESPONDENCE

The government of Austria-Hungary has decided to stop the use of explosives, "safety" or otherwise, in all coal mines of the danger class. The law just issued recognizes three classes of mines: (1) Gaseous or fiery mines. (2) Medium-gaseous mines. (3) Nongaseous mines. Powder is abolished absolutely from all mines in the first class. To all proprietors of mines in the second class, it is recommended that mechanical means for bringing down the coal be used. As a consequence of this recent legislation, the hydraulic mining cartridge is being largely employed for breaking down hard coal.

To timber all the coal mines in North America controlled by the United States shareholders requires yearly a forest area of 1458 square miles.

COLLIERY NOTES

Conductors for shot-firing circuits are composed of single wires, or of a number of wires twisted together to form a small cable; the latter type have the advantage of greater flexibility and consequently less liability to rupture in the frequent coiling and uncoiling of the firing line. It is also true that a stranded cable will withstand blows from pieces of coal or rock and other rough treatment much better than a solid wire.

Watering, when properly carried out, constitutes an effective method of preventing coal-dust explosions. However, a universal rule as to complete watering is impracticable. In some mines the watering of the floor is possible, and other mines admit of water being judiciously applied to the roof and sides; however, the latter class of mines are exceptional. The "man and hose" system of watering is best, as it enables the water to be applied judiciously.

In Great Britain alone, 106 mine explosions have been caused by shot-firing during the past 10 years. In the same period more than 3000 persons have been injured and over 500 killed by accidents arising out of the use of explosives. Statistics show that in England, on the average, one person is injured every day and one dies as the result of his injuries each week throughout the year. Practically all of these casualties are the result of inexperience or thoughtlessness and form a powerful argument in favor of the employment of men who are known to possess sufficient knowledge of the duties upon which they are engaged.

There is much talk at present concerning the high cost of living and the necessity of advancing wages to meet this added expense. According to "Bradstreet's," the cost of living in the United States has increased 61 per cent. in 1896 to 1910. If the coal miners secure a 5-cent advance in present wages, the increase in their wages since 1897 will have amounted to about 70 per cent. This is a matter of record and refutes the general idea that wages of coal miners have been advanced but 20 per cent. in the past decade. Moreover, the miners have obtained various other concessions by way of shorter hours and better mining conditions, which give them additional advantages. It is not generally realized how dependent the coal operator is upon the wage scale; while the average manufacturer has both labor and material as distinct elements in his cost sheet, the coal operator has but little charge to make for the cost of material, because his expense is composed chiefly of labor. An advance in the wages of coal miners, therefore, cannot be overcome by buying materials at the same, or a lower price.

PERSONAL

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

Robert T. Hill has returned from London.

C. W. Purington is paying a visit to this country.

J. P. Hutchins is in St. Petersburg, on his way to Siberia.

J. Morgan Clements, of New York, has been in Butte, Montana.

J. Parke Channing is expected to arrive in New York next week.

Pope Yeatman leaves New York for Nevada at the end of this week.

Dwight E. Woodbridge has left Duluth for a month's absence in Sonora, Mexico.

R. V. Norris has returned from Mexico, where he has been doing some personal work.

H. R. Stobie has been appointed assistant metallurgist at the Rio Tinto mines.

A. McLean, of Montreal, has been chosen a director of the Vulture Mines Company, of Arizona.

T. Lane Carter addressed the students of the University of Tennessee at Knoxville recently, on mining in South Africa.

Frederick J. Mayer, of Baltimore, is engineer in charge of construction of the new by-product coke plant of the Bethlehem Steel Company.

Gustav Berentsen, of Pittsburg, has taken charge of some gold mines owned by Louis Dunker & Co., near Salisbury, North Carolina.

L. S. Ropes and R. McIntire have formed the firm of Ropes & McIntire, and have opened offices in the Power block, Helena, Mont., as consulting and mining engineers.

Capt. L. B. Anderson, one of the largest operators in the Fairbanks district, will spend the coming season investigating the quartz possibilities of the Kenai peninsula, Alaska.

W. D. Thornton, president of the Greene Cananea; Arthur C. Carson, general manager of the Red Metal Mining Company; and P. L. Foster, of El Oro, were recently guests of Dr. L. D. Ricketts, at Cananea, Mexico.

Ezra Allendorf, of New York, vice-president and general manager of the Excelsior Zinc and Lead Company, has taken active charge of the company's mines at Joplin, Mo. C. V. Sholl, formerly local manager, has resigned.

W. G. Sharp, president of the United States Smelting, Refining and Mining Company; with Frederick Lyon, vice-president, Stephen L. Bartlett and S. Preston Clarke, directors, are inspecting

the Real del Monte mines at Pachuca, Mexico.

H. B. Barling, formerly with the Compania Metalurgica y Refinadores del Pacifico, has been appointed assistant superintendent and chief engineer of the San Antonio Copper Company, one of the Cole-Ryan organizations operating at San Antonio de la Huerta, Sonora, Mexico.

Charles H. Shamel, author of "Mining, Mineral and Geological Law," who is engaged in the practice of law at Seattle, Wash., is delivering the annual course of lectures on mining law to the senior law class and the mining students of the University of Washington at Seattle.

A private geological survey of Tonopah has been undertaken by the principal producing mines of that camp, who have invited J. E. Spurr, of Spurr & Cox (Inc.), to make detailed geological surveys of the development work done since his original examination of that district.

Brooks Fleming, Jr., has been appointed superintendent of the Robinson Run mine of the Consolidated Coal Company in the Fairmont district in West Virginia. John Riggins has been made superintendent of the Pinnickinick, and D. A. Reed of the Ocean mine, in the same district.

+ OBITUARY +

Henry S. Brooks, who died April 13 at Dobbs Ferry, N. Y., had been known of recent years chiefly as an editor and writer. From 1860 to 1895, however, he was a resident of California and a prolific writer on mining topics.

Sir Robert Giffen died in London, April 12, aged 73 years. He was born in Scotland, and was employed in Glasgow for several years, going to London in 1862. For a time he assisted Mr. Morley in the *Fortnightly Review*; from 1868 to 1876 he was assistant editor and principal contributor to the *Economist*, under Mr. Bagehot, being also, from 1873 to 1876, writer of the trade and finance article in the *Daily News*. In 1876 he was appointed chief of the statistical department of the Board of Trade. This office was merged in 1882 in that of assistant secretary, commercial department, and in 1892 the branch was again enlarged, and Sir R. Giffen was appointed controller general of the commercial, labor, and statistical departments. In his connection with the press he was a contributor to the *Fortnightly Review*, *Saturday Review*, *Spectator* and other journals, and in his official capacity had written numerous reports on commercial matters, besides giving evidence on similar subjects before numerous committees of the House of Commons and royal commissions. In 1892 he was elected a fellow of the Royal Society; in 1881 Mr. Giffen resigned his post at the Board of

Trade, and was understood to have been for some time on the staff of the *Times*. He retired finally in 1897. He was the author of "Stock Exchange Securities: An Essay on the General Causes of Fluctuation in Their Price," published in 1878; "Essays in Finance," and of many shorter papers and articles on statistical and economic subjects.

SOCIETIES and TECHNICAL SCHOOLS

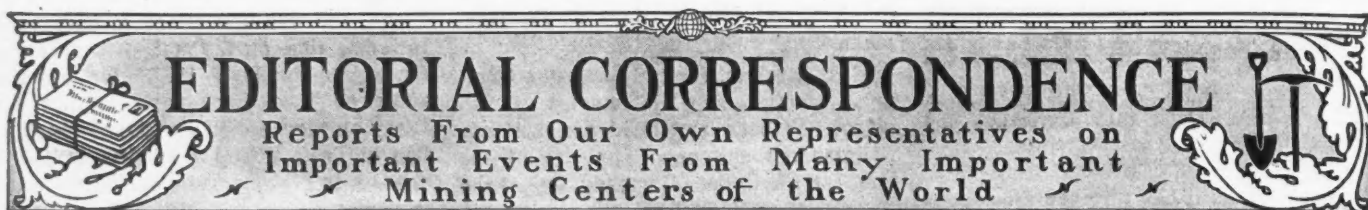
Engineers' Society of Western Pennsylvania—This society has moved its quarters to the 25th floor of the Oliver building, Sixth avenue and Smithfield street, Pittsburg.

Engineering Association of the South—The Birmingham Section on April 7 visited the University of Alabama and inspected the new buildings of the technical department and mining school of the University.

Wisconsin State Mining Trade School—During the week beginning April 4 Director H. C. George took the seniors of this school at Platteville on a geological and mining inspection trip in the Wisconsin lead and zinc district. The St. Rose, Klar-Piquette, Cruson, Light and Homestead mines near Platteville were visited. The mines of the Highland, and the Franklin Mining companies at Highland were also visited, as well as the zinc oxide works and the sulphuric-acid works at Mineral Point.

Lafayette College—A small concentrating mill has recently been erected in the laboratory of this institution at Easton, Penn. It is designed to give practical results in handling small quantities of ore. The equipment includes a Blake crusher, three sets of Cornish belt-driven rolls, an ore feeder, two elevators, trommels, three five-compartment New Century differential-motion jigs, concentrating table, round buddle, hydraulic classifier, spitzkasten and a 1½-in. centrifugal pump, together with ore bins, shafting, pulleys, etc. All of the machines are of laboratory size. The mill will be driven by a 10-h.p. A.C. motor.

American Chemical Society—The summer meeting will be held in San Francisco, July 12-15. For the accommodation of eastern members, a special train will start from Chicago July 4 making stops at Colorado Springs; Adamana where the petrified forests can be seen; the Grand Cañon of the Colorado; Riverside and Los Angeles, Cal.; Lang, where the borax mines can be visited; and Santa Barbara. In connection with the meeting the local committee in San Francisco has arranged for a number of excursions to points of interest. Members desiring to use the special train should address Charles L. Parson, New Hampshire College, Durham, N. H., the secretary who has general charge of the arrangements.



EDITORIAL CORRESPONDENCE

Reports From Our Own Representatives on
Important Events From Many Important
Mining Centers of the World

San Francisco

April 16—Much activity in mining is being shown in Siskiyou county. Gold dredges are at work during a part or all of the year at the head of Scott river near Callahan and at Hamburg bar on the Klamath river. A small dredge has just been completed on McAdams creek near Fort Jones, built by the Yuba Construction Company. It is equipped with buckets of 5 cu.ft. and is capable of digging to 60 ft. The power is supplied by the Siskiyou company. Formerly a dredge was operated on Yreka creek at Hawkinsville, north of Yreka.

Hydraulic mining still affords the main part of the gold product of Siskiyou county. Local buyers state that more placer gold is brought in than for several years.

Quartz mining is likewise progressing but much of the gold comes from comparatively small properties and from "pocket" mines. The mill of the Zarina mine in the Taylor Lake basin is in full operation as also that of the Lappin mine. The new mill of the Oom Paul mine is ready to operate. It is equipped with electric power. Work has been resumed on the Highland mine, famous for its specimen ore, and on the Big Cliff. The Central mine, adjoining the Hazel, 18 miles northeast of Hornbrook, has been bonded for \$50,000 to New York parties. H. O. Cummins, the engineer who promoted the deal, will be retained as manager.

The Cassidy Consolidated Gold Mining Company has been incorporated to take over the Cassidy group of quartz claims between the Empire and Pennsylvania mines at Grass Valley. The early operations on these claims did not extend below the 200 level on account of a heavy flow of water. It is the intention of the new owners to sink to 1000 ft. The adjoining Empire shaft is down 3650 feet.

The formations of the mountainous sections of Tehama and Trinity counties are composed of rocks of the auriferous slate series and the accompanying igneous rocks. In these mountains are many metalliferous deposits, which have only been worked intermittently on account of high costs due to remoteness from the railway. The manager of the Tomhead copper mines, 40 miles west of Red Bluff, announces that Chicago capital has been interested to build a broad-gage railway from Red Bluff via the Tomhead mines, westward to Eureka

on the coast. Eureka is the most important port on the north California coast and has a good harbor. It will soon be connected with San Francisco by the extension of the Northwestern Pacific Railway and if the projected line from Red Bluff is also built, it is likely that mining will be much facilitated not only in Trinity and Tehama counties but also in Mendocino and Humboldt. The new line will perhaps supplant the projected line from Redding to Eureka, by way of the Trinity river basin.

H. H. Yard located and held by assessment work for some years between 600 and 700 placer-mining claims along the north fork of Feather river in Butte and Plumas counties. The Government finally investigated the manner of location of these claims and a number of them were officially declared not to be mines because there had been no discovery of mineral. All the fuss about them amounted to little because nobody else wanted the claims as separately they were of little value and had been lying idle for many years open to location. Yard claimed that he intended to work them as a whole group when the Western Pacific laid its rails through the cañon of the North Fork, taking up the gravel by steam shovel, loading it on cars and taking it down to a point where it could be washed. It cost Yard and associates some \$60,000 or \$70,000 per annum for annual assessment work. About the last of his large holdings, including 121 placer claims, have now been conveyed to the Northern California Mining Company, of which he was formerly president. Whether or not the company will ever work them on the plan originally proposed remains to be seen. The claims recently deeded are situated near Big Bend in Butte county.

Negotiations are nearly completed by which a British syndicate will acquire the properties of the Pinal Oil Company in the Santa Maria field. This company has paid to date dividends to the amount of \$872,109.

Denver

April 18—A new pump with a capacity of 1000 gal. per min. is to be installed in the Wolfstone shaft, Leadville, at the 1000-ft. level. It is the only pumping plant in operation on Carbonate hill, and also drains a large proportion of Fryer hill, and it is stated that with the addition of this new pumping plant, a large proportion of the district east of the city

will be drained. For this and other reasons, more than ordinary activity among the old mines of this hill is expected during the present year. The Matchless, for which H. A. W. Tabor paid \$117,000 in 1879, and the Robert E. Lee, which was bought from the original owners for about \$7000 in 1879, and in October of that year produced \$125,000 in 10 days, and in January, 1880, \$301,500, are both being worked under lease, with excellent results. The Matchless is under lease to T. M. Raney, of Leadville, and the Robert E. Lee, to William Jones. Good ore is being produced from both mines, and great things are expected.

The smeltery of the North American Smelter and Mines Company, at Golden, will be blown in shortly. The manager, George Vivian, has a supply of lime and coke in the bins, and a good supply of ore from Clear Creek and Gilpin counties is being received.

The Künzel smeltery, at Buena Vista, is reported to be running steadily, and a \$5 freight rate has been made from Ouray to Buena Vista on all ore not exceeding \$25 per ton valuation.

When Winfield Scott Stratton, the discoverer of Stratton's Independence mine, died in 1902, he left the bulk of the great fortune he took out of that mine for the endowment of the Myron Stratton Home for the Aged. The present value of the estate is about \$8,500,000. This has been now practically wound up, and the three administrators have been allowed \$207,684 as fees. By the sale of the above mine, and what he extracted from it, Stratton must have realized fully \$12,000,000 in money, and his large holdings in the Cripple Creek apart from that mine are now known as the Stratton Estate, and are being worked under lease. The Independence mine, since its sale to the English company, must have to date produced ore to the value of upward of \$11,000,000 gross. It is now under the sole management of Philip Argall.

The Vindicator Consolidated has been distinguishing itself more than ever by making in March its biggest output for years, and what is of equal importance, by developing two of its richest ore shoots on the 1400-ft. level. These it is said have an aggregate length of 635 ft., and an average width of 6 ft. The output for last month was 128 cars of ore, or about 4000 tons, yielding from 1 to 2 oz. gold per ton. A quarterly dividend has been declared payable April 25, which will make a total paid the stockholders of \$2,137,500.

Butte

April 18—President B. B. Thayer, of the Anaconda Copper company, has stated that the Amalgamated mines were in excellent condition, in fact, better than at any time within the last five years. He is also authority for the statement that the orebodies on the 2300-ft. level of the Gagnon mine are the best he has ever seen in a Butte mine. He further states that in the High Ore and Diamond mines, from the 1800-ft. levels up, new bodies of high-grade ore have been found.

The report of the Government assay office at Helena for March shows that a total of \$136,854 in precious metals was received. Fergus county, with \$52,808, led in the production.

At the hearing of the order to show cause why an injunction should not be issued against the Davis-Daly Copper Company to prevent it from building a tramway from its Colorado mine shaft to the Great Northern Railway tracks through the city of Butte, the local district court granted the abutting property owners an injunction and further work on the tramway has been stopped.

The Parrot Silver and Copper Company has called a special meeting of stockholders to be held in Butte, April 30. The meeting is called for the purpose of considering the proposition of selling to the Anaconda Copper Mining Company, in accordance with the offer. A statement has been issued showing the transactions of the company from May 1, 1899, to Dec. 31, 1909. A loss of \$2,101,269 for operations during the six months ended June 30, 1909, is shown. The cost of mining has risen from 8.94c. in 1903 to 17 cents in 1909. Ever since June 30, 1908, operations have been carried on at a loss. Of the properties owned, the Parrot and Little Mina mines were operated actively while the Oro Butte, Champion and Copper Reef in the Last Hope group, have not been operated for several years.

The Anaconda company is outlining an aggressive policy of developments and improvements, with a view of increased efficiency and production and reduced costs. At the Washoe and Great Falls smelteries, important improvements are being made, and at Great Falls, investigations are being made preliminary to an enlargement.

Salt Lake City

April 17—The aerial tram between the Utah Consolidated mine and the International Smeltery at Tooele is practically completed. A cleanup of flue dust, calcines and matte is now in progress on the site of the old Highland Boy smeltery at Murray, which will take the most of the summer. The material will be shipped to the International smeltery. Ore shipments from the mine will be started soon.

The Centennial-Eureka company suspended ore mining, April 9, to permit a chamber and sump being cut for the new electric pumping plant which is being installed on the 2250 level. It will be necessary to bail out the water in the shaft from the 2100 level down to the 2250. This will be done with bailers, and as it is impossible to handle the water and waste from the pump chamber and run the mine at the same time the working force will be put on development while the installation is in progress. Two sets of pumps made by Sulzer Bros., Winterthur, Switzerland, and having a capacity of 500 gal. each, will be used. Each set has a five-stage and an eight-stage centrifugal pump coupled in series, and will be driven by a General Electric 400-h.p. motor. It is figured that not over 125 gal. per min. will be pumped now, so that one pump will be held in reserve. A power house is being built at the mine. Arrangements have also been made with the Knight companies to furnish power.

Scranton, Penn.

April 19—A coroner's jury which has been investigating the death of the seven men in an explosion at the South Wilkes-Barre colliery of the Lehigh & Wilkes-Barre company, March 12, returned a verdict in which they find that the explosion resulted from an accumulation of gas due to faulty ventilation, this condition being brought about by some person unknown passing through a door on the intake and leaving it open. It is understood that the door was left open by one of the seven men who lost their lives. The verdict practically exonerates the owners and managers of the mine from contributory negligence.

Many anthracite-coal operators are again becoming anxious about the water supplies at the mines. While there is a sufficiency at present there is no guarantee for the future, for there is no reserve at any of the mines and a prolonged spell of dry weather entails shutting down a number of collieries, or hauling water from a distance. In former years there was no question about the supply in the anthracite region, for the streams were abundant. But these have been choke up with culm to a great extent in the neighborhood of the mines, while the denudation of the forests for mine props has had the effect of drying up the watersheds.

The new mine-examining boards seem to be giving as little satisfaction as the old and miners are complaining. These boards should be swept out of existence altogether and a number of practical mining engineers appointed, who reside in the several districts, who are acquainted with local conditions and who would have no other interest than to satisfy the requirements of the law and to insure the preservation of life.

Cobalt

April 19—The reported new discovery of gold 12 miles west of Burke's Siding has turned out to be a fake, and orders are out for the arrest of those who started the rush. Information of the new fields was brought by two prospectors who showed samples of telluride ores that gave high assays. It is understood that they collected a considerable sum of money on their affidavit that the samples brought in by them were taken from claims they had staked, and on their offer to lead the people into the district. The news traveled quickly. The country, mostly muskeg, was practically impassable, and one party spent three days in getting 12 miles. When the engineers arrived at the reported discovery, they found a large vein that was being worked by an old resident. The dump showed ore that ran in some cases \$10 per ton in gold. There was no other outcrop of rock in the district. The original prospectors are supposed to have brought the samples of telluride ores from the West.

The change in the mining laws of Quebec has resulted in an increased activity in that part of the Province, near the Cobalt and South Lorraine camps, and many prospectors are going in from Ontario. Geologically, the country is like South Lorraine, with diabase and Keewatin formations predominating. The contacts between these two formations are numerous, and many discoveries of calcite and smaltite veins have been made. Several prospects in the township of Fabre are being worked, and although no silver in paying quantities has as yet been discovered, the prospects for finding it are considered good.

Judgment has been handed down by the Court of Appeals in the case between the Coniagas mine and the town of Cobalt. The Coniagas claimed the right to carry on any mining operations on all lots in that part of the town under which they had the mineral rights. The trouble arose when some of the officers of the mine were arrested for ordering a trench dug on one of the principal streets. The contention of the mining company has been upheld as far as the lots are concerned.

In the case between the Nova Scotia and Peterson Lake companies, to prevent the former company from mining their Peterson Lake lease, the judge was unable to find any evidence of fraud to warrant the forfeiture of the lease.

The question of the royalty reduction between the Chambers-Ferland mine and the Ontario government has finally been settled. The mine will now pay 25 per cent. of the profits instead of 25 per cent. of the gross proceeds as formerly. This is the only mine that obtained a royalty reduction direct from the government. There is believed to be a large

amount of ore on hand, including one or two cars of high-grade, and regular shipments will now be resumed.

Toronto

April 18—The Temiskaming & Northern Ontario Railway Commission is impressed with the importance of the recent lignite discoveries west of Cochrane in northern Ontario, thinking it possible that the lignite at depth may give place to bituminous coal. J. L. Englehart, chairman, has returned from Cochrane. He says that the lignite containing from 40 to 50 heat units, as compared with 80 to 90 in coal, will only prove of value in a limited area, perhaps within a radius of 100 miles. The commission is sending a party to explore and a diamond drill may be sent to determine whether bituminous coal occurs beneath the lignite.

Hon. Charles Devlin, minister of mines for Quebec, has announced that the provincial government intends to impose a royalty on asbestos mined in that province. The government already possessed the power to do this without the need of further legislation.

The Wilson properties in the Porcupine gold area, comprising eleven claims, have been sold by a syndicate represented by George Burns for \$1,700,000 a deposit of \$35,000 having been made to bind the deal. It is understood that six of the claims were secured by the Dome Mines Company, of New York and Copper Cliff, for \$1,500,000, the remaining five being taken by McCormick Brothers, of New York, at \$200,000.

Thomas W. Gibson, deputy minister of mines for Ontario, gave evidence before the Mines Committee of the Canadian House of Commons at Ottawa on April 6. In reference to the feasibility of a uniform mining law for Canada, he thought there would be considerable difficulty in getting mining men generally to agree, but if the Federal department could devise a model law it might be adopted by the provinces. As to the question as between granting absolute titles to mining land and the leasehold system, he was disposed to favor the latter, but mining men as a rule preferred an unlimited tenure to lands once obtained. Dealing with the matter of refining nickel in Ontario, he said it was simply an economic question. There was nothing to hinder its being done as the processes were not now patented, but there was an American duty of 6 per cent. against the product and the comparative cheapness of the coal, coke and chemicals required in the United States was an important consideration. The principal market for refined nickel was in the United States. If an electric process of refining could be made commercially successful it would have considerable effect in stimulating refining in Ontario.

The Canadian Department of Mines will establish at Ottawa an experimental

ore-concentrating plant to demonstrate the best methods of treating ores of all kinds. It will be operated in connection with the new government peat plant.

Mexico

April 16—Much interest is felt in Mexico in the announcement that as a result of a visit to the west coast of Mexico of President Lovett, of the Harriman Lines, that orders have been issued to carry on, as expeditiously as possible, the completion of all the Southern Pacific work in Mexico now underway. This applies to the completion of the important trunk line extending from Guaymas to Guadalajara, now about two-thirds completed with a missing link in the southern part across a mountainous country, and also to the several small extensions and connecting lines in Sonora which are of themselves important in relation to the development of the mining districts of that State. It is also announced that the Southern Pacific company will build a branch line from Douglas, Ariz., to the El Tigre mining district, a distance of about 125 miles and that the company may assist in the construction of a line from Tonichi to the mines of the Cieneguita company. These Southern Pacific lines in Sonora and the line from Silver Bell in Arizona to the Gulf of California, being projected by the Development Company of America, will give a great impetus to mining in Sonora, Sinaloa and Tepic.

The financial statements for 1909 of the leading companies of the El Oro district is as follows: Production—Las Dos Estrellas, 8,395,359 pesos; Mina El Oro, 5,032,400; La Esperanza, 4,188,892; Mina Mexico, 2,625,700; total, 20,242,351 pesos. Expenses—Las Dos Estrellas, 4,168,123 pesos; Mina El Oro, 3,203,640; La Esperanza, 2,673,064; Mina Mexico, 1,134,940; total, 11,179,767 pesos. Profits—Las Dos Estrellas, 4,227,235 pesos; Mina El Oro, 1,828,760; La Esperanza, 1,515,828; Mina Mexico, 1,490,760; total, 9,062,583 pesos. During the year the four companies milled 922,766 tons of ore; 2114 tons of concentrates, and rich ores were shipped and 749,934 pesos was spent in permanent improvements.

London

April 16—A company, Newfoundland Oilfields, is being formed with a capital of £200,000, half of which is set apart for working capital, to acquire oil-bearing properties at or around Parson's pond on the northwest coast of Newfoundland. The directorate includes a former governor and a former premier of the Colony. The new enterprise is receiving support from the government, which, in order to foster the business, has consented to protect the local industry by the imposition of import duties on oil coming from

abroad and to remit or exempt from duty machinery and plant required for the industry. Reports on the properties have been obtained from Sir Boverton Redwood, J. D. Henry, and Prof. James P. Howley, government geologist for Newfoundland. Oil was originally discovered at Parson's pond many years ago, and since then operations have been carried on by individuals and local syndicates. Ten wells have been sunk which have yielded oil, and the experts believe that a payable oilfield exists over a considerable area. According to Mr. Henry £40,000 would be sufficient to put in producing order at least six of the present wells and to drill six new wells, besides erecting and equipping a power house, laying a 4-in. pipe to Cowhead, building tanks for storage, etc. The purchase price is £95,200, the greater portion of which is payable in fully paid shares. As regards the geology of the area to be acquired, the rocks consist of Lower Silurian age, somewhat older than those of any known oilfield, but as little altered and as capable of producing and storing oil as many Tertiary beds in the European and Asiatic oilfields.

The favorable developments at some of the Rhodesian mines, notably the Globe and Phoenix, the Surprise and the Eldorado, have attracted speculators once more to take an interest in the mining ventures of that country. Naturally the company promoter has not been slow to take advantage of the public demand for shares. There is one form of enterprise, which the public should be on their guard against, and that is the company that does not issue a prospectus accompanied by the reports of respectable engineers and the offer of shares for subscriptions. A favorite way now of producing scrip for the consumption of the public is to form a company with a capital of £200,000 or £300,000 in £1 shares, of which probably a small proportion is represented by cash. The promoters of this enterprise then bring the concern to the notice of the public by advertising in the press some general particulars, accompanied by an attractive map or plan, all of which, it is stated, are "for public information only." No shares are offered for subscription and thus no future shareholder presumably can demand his money back for misrepresentation. But while the capital is not offered for subscription in the usual way, it is clearly meant for public consumption, as, shortly after the appearance of the advertisement, it is customary to read in the financial papers that such and such a share was "introduced" on the Stock Exchange, usually at a substantial premium. The system, of course, lends itself to wholesale robbery. It is possible that a company formed on this method may be genuine but the chances are against it. Anyhow companies floated in this way must be treated with suspicion.



THE MINING NEWS

Reports of New Enterprises, New Machinery,
Installations, Development Work and Property
Transfers The Current History of Mining

Alaska

The local representative of the Alaska Northern railway has received instructions to get trains ready for operation May 1.

John T. Milliken, of the Golden Cycle mine, Cripple Creek, says he will install a large mill on an extension of the Treadwell lode.

Alaska-Mexican—The March crushing was 12,397 tons, and total yield \$42,199, with operating expenses \$26,481, leaving net \$14,127.

Alaska-Treadwell—The concentrate cyaniding plant will be in operation in July. It is proposed to cyanide all concentrates, about 100 tons daily.

Alabama

Cullman Coal and Coke Company—This company has nearly completed the railroad which it has been building from the Louisville & Nashville road to its new mines in Cullman county. The company some time ago bought 16,000 acres on which there was one mine, the Parker. It has since opened three new slopes and is preparing to mine 4000 tons daily as soon as the railroad is completed. A new town, called Bremen, has been built. The stockholders are nearly all residents of Holland. G. H. Ten Brock, of St. Louis, is president; George H. Parker, Cullman, Ala., treasurer.

Arizona

Denn-Arizona—The drift on the 1000 level at the Denn has encountered ore. On the 1350 level drift No. 13 has cut 9 ft. of sulphide ore. On this level a raise is being driven to the 1250 level for ventilation.

Bisbee Extension—So much water has been encountered in the shaft at 800 ft., that the boilers were unable to handle it. Further sinking has been discontinued and a station has been cut on the 700 level to drift point.

Princeton—One of the richest strikes in the Huachuca mountains has been reported at this mine.

Calumet & Arizona—An examination of the 1909 statement shows net earnings on the Bisbee properties of a little over \$1,200,000, or \$6 per share. As compared with 1908 the surplus shows a depreciation of about \$270,000, but \$375,000 was spent on explorations on properties under option and \$139,600 paid in completing payments for properties held under option and which will be reimbursed as the Courtland properties are

now producing 100 tons of 5 per cent. ore per day.

GILA COUNTY

Superior & Boston—This mine has been shipping, approximately 100 tons of ore per day, principally from the McGaw shaft, and producing, roughly, 500,000 lb. of copper per month. It is now understood that shipments will be begun soon from the Gardner shaft.

Inspiration—The underground work at the Joe Bush and Scorpion shafts and the churn drilling done so far indicate that the Inspiration orebody is 3000 ft. long and has a varying width, the maximum thus far proved being 800 ft. Churn-drill prospecting is continuing, however, and may eventually prove the extension of the ore into the western part of the property. The drills at present are working on the summit or highest part of the company's mineral land. The old mill will be dismantled and much of the material used in erecting a small test plant near the Joe Bush shaft.

Arizona Commercial—An issue of \$1,000,000, 6 per cent. bonds has been underwritten in Boston to provide funds for operation and development.

GRAHAM COUNTY

New England & Clifton—This Boston company is offering bonds to be used in developing the property at Clifton. J. Parke Channing and Julius A. Lewisohn will have control of the operations and are on the board.

MOHAVE COUNTY

Recent shipments from the Goldroad and Tom Reed mines at Kingman establish new records for these properties. The Goldroad output, consisting of nearly 600 lb. of precipitates, is valued at approximately \$25,000 and represents an 11-days run of the 200-ton mill. The Tom Reed sent in 159 lb. of bullion, worth about \$37,000, and is the result of a 12-days run in a 10-stamp mill. In both mines, the average of the ore now being stoped is better than ever, and the new orebodies being developed are showing up larger and richer.

YAVAPAI COUNTY

Consolidated Arizona—On April 16 the 450-ton furnace was blown in after more than two years' idleness. The tonnage now being treated is made up of about half custom ore, which includes ore from the Goldfield Consolidated and United Verde mines, and about half Consolidated Arizona ore. At the mine, the sixth level has been reached.

California

AMADOR COUNTY

Argonaut—In this mine, near Jackson, the main vein has been encountered on the 3100 level, and is said to show 16 ft. of good milling rock. A station has been cut on the 3300 level.

Plymouth and Empire—These mines have lately been inspected with a view to further operations. The Plymouth shaft is 1800 ft. and the yield of the mine is said to have been \$7,000,000.

South Eureka—The additional 20 stamps are now crushing. This mine is using 60 stamps, of which 20 are in the Central Eureka mill.

Marsino—This placer claim, near Volcano, is reported sold for \$12,000.

Fremont-Gover—A rich strike in this mine near Drytown was made recently.

MODOC COUNTY

Hess—Rich ore is being milled from this mine in the western part of the county, not far from the Hayden Hill district. Considerable interest is shown in the strike and six adjoining claims have been bonded for \$90,000.

NEVADA COUNTY

Fairview—On this mine, Washington district, tunnel development is going ahead and plans for a mill have been made. C. M. Wilson, Nevada City, is the manager.

Grover-Murphy—On this mine, the northern extension of the Mountaineer, the shaft is down 300 ft. and will be sunk deeper. Harry Gray, Nevada City, is the manager.

Banner Ridge—President C. A. Bailey has interested Honolulu people in his drift gravel mine and has resumed work. The shaft is 120 feet.

SIKIKYOU COUNTY

The new dredge in charge of F. H. Boles, on McAdams creek, near Fort Scott is operating. A dredge operating on Hamburg bar, is reported to have found rich gravel last fall, but operations were closed down on account of high water. Drift mining is in progress at the old Leavenworth mine, under the management of F. H. Tibbets. The Scott Bar company, at Scott bar, has started piling. Martin Schuler is the superintendent. Nesbitt & Crawford have a crew of men in their shaft, and Captain Noonan is operating two giants, George Milne is also piling. Scott river is now running thick with mud from the big hy-

draulic plants being operated near Callahan.

Bennett & Co. are operating giants with good results on both the Bloomer and Crapo claims on the Forks of the Salmon. At the Bonally hydraulic mine three giants with 5- and 6-in. nozzles are at work on a bank of gravel said to be a part of the old Shumway claims. The Red Hill company, operating near the mouth of Knownothing creek, has just finished installing a large elevator. Two giants are in use also. L. E. Taggart is the superintendent. Superintendent Sappe, of the French company that purchased the Bob Younger hydraulic mine at the little North Fork of the Salmon, has ditches and flumes in shape for piping the Yellow Jacket point.

Biglow Brothers are piping a good bank of ground, and Wilke & Co. are operating the Hickey claim on Sawyer bar.

The Gardner & Weed hydraulic mine, Quartz valley, is in operation day and night. This property has produced much gold, and the prospects for a long run this season are good.

Callahan—The dredger is working steadily and handling a large tonnage daily, while the hydraulic mines on Grouse creek are running full force.

Highland—The owners of this mine, of Yreka, have established a custom mill with a crusher, an amalgamator, a Pindar concentrator, cyanide tanks, etc., and an assay office in charge of C. L. Proebstel.

Colorado

BOULDER COUNTY

Shipments for the year of tungsten have been about 100 tons per month of concentrates and high-grade ore. The present price of \$7.50 per unit for 60 per cent. concentrates has probably reached the limit, beyond which the foreign product will enter the market.

CUSTER COUNTY

The concentrator tailings dump of the Bassick mine at Silver Cliff, which is credited with a production of \$12,000,000, is to be cyanided by a Colorado Springs company.

LAKE COUNTY—LEADVILLE

Last month's production from the Dinero tunnel is given at 350 tons of ore of the usual grade of about 30 oz. silver and about $\frac{1}{2}$ oz. gold per ton. It is expected that a spur from the main line of the Colorado Midland to the tunnel will be completed this summer.

New Monarch—The output from the Cleveland and Vinnie shafts is about 75 tons per diem.

Diamond—The old Diamond shaft has been reached with drill holes from the Yak tunnel breast, and is being drained thereby. The Yak company is said to

have obtained the control of, and will work this property from its tunnel.

TELLER COUNTY—CRIPPLE CREEK

United Gold Mines—The W. P. H., owned by this company, under lease to Oscar Fogleman, last week sent out two carloads of ore, of which 30 tons of screenings yielded \$96 per ton, and 28 tons of coarse rock, \$25 per ton. This was mined from a stope above the 400-ft. level of the W. P. H. mine.

El Paso-Gold King—A strike of rich ore is reported, as made by May & Macdonald, sub-lessees, between the 400 and 500 level. The rock will ship at \$30 per ton, and the screenings will be much richer.

SAN JUAN DISTRICT

The discovery of a vein carrying free gold is reported from Hazelton mountain at Silverton. It is described as honey-combed quartz, carrying wire and nugget gold, 40 lb. of which rock netted \$1920, or \$48 per lb. This, of course, is in a small streak, but outside of this there is said to be 5 ft. of ore averaging about \$15 gold per ton. The discoverer and owner is Andrew Falk.

Tomboy—The March returns show; crushed 10,500 tons, yielding bullion, \$42,000; concentrates shipped, \$32,500; total, \$74,500; expenses, \$47,500; profit, \$27,000.

Bullion King—Bankruptcy proceedings have been begun in Chicago against this Silverton Company.

Silver Ledge—This mine, Mineral Creek, is now turning out concentrates and opening silver-lead-zinc orebodies.

Idaho

BOISE COUNTY

Gold Hill—The shaft is being sunk from the 400 to 500 ft. and the new 100-ton mill will go into operation in April. E. E. Carter is manager and W. L. Bowron is superintendent.

Nabob—This company at Wardner, expects to install a compressor and other machinery, and to erect a concentrator.

Monarch—The mill at Murray will be increased to 250 tons capacity.

Western Development Company—This company organized by mining men of the Cœur d'Alene district, will have the control and management of the Idaho Giant Mining Company and the Boulder Creek Mining Company and the Bitter Root Mining Company. It is announced that the company will expend more than \$800,000 in development.

Success—This company, which controls the only zinc producer in the district, has apparently doubled the value of its holdings by encountering the north oreshoot on the old Granite claim. This shoot was lost for a long time, owing to a fault. The mine has been producing for a num-

ber of years. About 1200 tons of ore are shipped a month. H. F. Samuels has been reelected president and manager.

Kansas

Eureka—This mill has started operation on the Ihleng-Ping lease north of Galena. This has been awaited with great expectations as it will be the first producer in the deep-ore beds except the Herald mine.

Kentucky

A company has been organized at Birmingham, Ala., to operate fluorspar mines near Marion, Ky. The company is named the Birmingham Fluorspar and Lead Company. T. H. Benners is president.

Michigan

Adventure—This company's vertical shaft is 550 ft. on its way down to cut the first of three copper-bearing lodes revealed in drill work. This shaft has been sinking 70 ft. per month, and will be down to the lode this fall. No. 2 lode lies at an approximate depth of 2200 ft. and No. 3, 2600 feet.

Cherokee—This recently organized company has secured two drilling outfits and will start exploratory work at once under the supervision of Herman Fesing.

Mohawk—This mine has cut the Kearsarge lode with the second crosscut from its new No. 6 shaft, and at that point the foundation is 15 ft. wide and well charged with copper throughout. Drifts from the fourth level of this shaft have been extended over 100 ft. in each direction, showing a good grade of stamp-rock. Drifts south from No. 5 shaft to points tributary to this shaft are showing the best grade of rock at the property.

Osceola Consolidated—This company has put into commission two electrically operated pumps at the 600-ft. level of No. 3 shaft.

La Salle—This mine is shipping 700 tons daily, almost entirely from the stock pile.

Minnesota

Reliable advices from Minnesota indicate that the Cuyuna range is coming to the front, and that good ore is being developed.

Missouri

Uncle Joe—The company has started its mill in the Webb City-Carterville district.

West 20—This company is building a 200-ton mill on its lease near the Coahuila mine, Porto Rico.

Muskingum—This company has bought the 300-ton Arena mill and will move it from Peacock, Kan., to its 52-acre lease

in the West Joplin sheet-ground district. C. W. Squires is manager.

W. J. Bryan—This mine and 40-acre lease adjoining the Quick Seven mine at Neck City has been sold to Chapman & Lennan, of Webb City.

Bird Dog—The No. 2 mill has been moved from near the Goode mine, Webb City, and is being erected for the Bird Dog No. 1 lease in the vicinity of the Kansas City-Bradford mine.

Whillock-Rhea—This company is erecting a 250-ton mill on its lease north of Webb City.

Montana

BUTTE DISTRICT

North Butte—The report is that the diamond drill from the 2800-ft. level of the Diamond mine penetrated the Edith May vein, but it is impossible to obtain any information as to the result.

Amalgamated—The new vertical shaft at the Gagnon is now down 600 ft., and sinking will be continued to 2300 ft. The Belmont shaft is 1450 ft. and will be continued to 2400 ft. When completed, the shaft will be used to hoist ore from the Anaconda mine. The large hoist of the marine type at the Neversweat mine escaped from the control of the engineer recently, and one cage went to the sump. The rapidity of revolution of the reels after the engine ran away caused the reels to burst, demolishing the engine room and killing the engineer. The engine is a total wreck and it will take several months to repair. Operations at the mine will be continued through the adjoining St. Lawrence shaft.

JEFFERSON COUNTY

Ballard—Patrick Dowling has purchased the property from the Ballard Brothers for \$150,000.

LEWIS & CLARKE COUNTY

Bald Mountain—About 100 men are employed, and ten stamps are in use at the mill.

MADISON COUNTY

Realty—A complete equipment is being installed. Operations will be begun May 1.

Lennstrend—The property, in the Mineral Hill district, has been bonded to Passmore & Co., of Butte, for \$25,000.

MISSOULA COUNTY

Gold Chrome—A 200-ton mill has been ordered to supersede the 10-stamp mill.

New Mexico

GRANT COUNTY

Chino—Water supply developments have been favorable and early work on the projected mill will be begun soon. It is reported that a 3000-ton mill will be erected instead of 2500-ton as announced. Tests on the ore have demonstrated that

the metallic feature is to be an important one and that a rich concentrate of native copper will be obtained from the jigs, which will be melted into bullion at the mine, by which method it is expected that $\frac{1}{2}$ c. per pound will be saved in the treatment over shipping. A recovery of 35 lb. of copper per ton is now looked for on ore of average grade of 2.61 per cent. copper, which exceeds the original estimates of 32 lb. on a 2.46 per cent. ore. Work on a central shaft for operating will soon be started.

SIERRA COUNTY

Black Range—This mine at Fairview will install an aerial tram and a 100-ton mill and cyanidation plant.

Nevada

ESMERALDA COUNTY

Goldfield Consolidated—A telegram from Secretary A. H. Howe, April 16, says: "Seventy stamps dropping today. Normal monthly production will be made."

Booth—The Lind lease has cut a 4-ft. vein of milling ore, but has passed it in the search for the main Red Top vein, which is expected at any time.

Combination Fraction—A crosscut has been driven into Mohawk ground and a connection made at the 450-ft. intermediate level for ventilation.

Pioneer Leasing Company—The 5 per cent. dividend authorized last summer, which has been held up pending litigation, will probably soon be released and the company will be in shape to continue its weekly shipments.

EUREKA COUNTY

For several weeks back, traffic over the Eureka & Palisade railway has been cut off by washouts on the line, and operations by the Richmond-Eureka and other enterprises in the district have consequently been suspended. Now, it is reported that the railway will not be rebuilt. This will keep work in the Eureka district at a standstill until other transportation facilities are provided. If the Ely & Goldfield railway be constructed, as appears probable, a branch to Eureka will likely be built from Hamilton, or that vicinity. The present trouble in Eureka is enhanced by the recent failure of the county bank, in which the savings of the people of the district were largely deposited.

HUMBOLDT COUNTY

In the Red Butte district, many claims have been located, but little work has been done.

The lawsuits of the National Mining Company vs. the Stall Brothers, operating the lease on the National Mining Company ground, has been settled by compromise.

Auto—This group at National has been

sold to W. L. O'Connel, of Seattle by J. L. Workman, of Winnemucca.

Taft—This copper group at Mina is under option to Walter O'Neil, of New York.

NYE COUNTY

Tonopah shipments during the week ended April 9, were as follows: Tonopah, 3050 tons; Belmont, 800; Montana-Tonopah, 975; McNamara, 250; West End, 130; Tonopah Extension, 750; total, 5945 tons.

Tonopah Extension—A second tube mill is to be installed to permit the use of battery screens of lower mesh. The change will increase the capacity between 15 and 20 per cent.

WHITE PINE COUNTY

Giroux—The new shaft is now permanently timbered to the 1000-ft. level. The new hoisting equipment now under erection is the heaviest in the district and will be capable of raising from 2000 feet.

Oklahoma

Miami-Yankee—This mill at Miami has started up after a long period during which time the shaft has been sunk to a deeper run of ore and also new upper runs developed.

Oregon

CURRY COUNTY

Red River—Development is planned and machinery will be installed. J. R. Brown, Marial, has charge.

JACKSON COUNTY

Cheney—This property is in control of L. Barber and W. R. Oxley, of Gold Hill, and it is proposed to erect a 40-ton stamp mill.

LANE COUNTY

Oregon Mines Corporation—This company has been organized at Eugene to operate in the Bohemia district. Herbert Leigh is engineer and L. S. Wilson, of Chicago, president.

Pennsylvania

Philadelphia & Reading Coal and Iron Company—This company's statement for the eight months of its fiscal year, from July 1 to Feb. 28, shows gross receipts of \$22,296,206; expenses, \$21,358,776; net earnings, \$937,430. As compared with 1908-9, there were decreases of \$507,219 in gross receipts, and of \$223,840 in net earnings.

Utah

BEAVER COUNTY

Beaver Carbonate—This company, developing a prospect near Frisco, has about 12 men at work.

JUAB COUNTY

Tintic shipments for the week ended April 8 show an increase. They are in car lots: Sioux Consolidated, 31; Colorado, 15; Iron Blossom, 27; Carisa, 1;

Beck Tunnel, 3; Dragon Iron, 25; Lower Mammoth, 2; Mammoth, 4; Opohongo, 2; Grand Central, 8; Yankee, 2; Centennial-Eureka, 35; Eureka Hill, 2; Eagle & Blue Bell, 4; Uncle Sam, 2; Gemini, 4; Chief Consolidated, 2; Scranton, 4; East Tintic development, 1; Ridge & Valley, 3; May Day (concentrates), 1; total, 168 cars.

May Day—At the annual meeting, April 4, the old board of directors was re-elected. The report for the year ended March 31 gives the total receipts as \$75,638, less overdraft of \$10,000. The disbursements were equal to the income. During the year, 2607 tons of crude ore and 841 tons of concentrates were marketed and sold for \$59,371. Superintendent Griggs stated that unless work on the 1100 was productive of results, he would recommend sinking to at least the 2000-ft. level, in view of ore found at depth in neighboring properties.

Tintic Central—The shaft has penetrated porphyry at 635 ft. and is now in a fissured zone which affords a natural drainage.

East Tintic Development—It is reported that new ore has been found on the 430-ft. level, richer in lead and silver than the usual run. Regular weekly shipments are being made.

Utah Mine—This property at Fish Springs marketed 27 tons of ore, April 12, which is said to have brought \$2635 net. The ore carried around 138 oz. silver and 60.5 per cent. lead.

SALT LAKE COUNTY

Columbus Consolidated—The mill is being operated one shift on ore from development, and is paying expenses. Work is now being done on the tunnel level and on the 400 east of the shaft. Shipments of crude ore and concentrates will be resumed soon.

Bingham Butte—Ore showing native copper is reported to have been cut in the Eddy tunnel.

SUMMIT COUNTY

Park City ore shipments for the week ended April 8 were: Silver King Coalition, 1,282,160 lb.; Daly-Judge, 905,000; Daly-Judge (zinc), 107,340; total, 2,294,500 pounds. There was no shipment from the Little Bell and Daly West, owing to bad roads and the shutdown of the Daly-West mill.

Daly-Judge—During March, the company shipped 858 tons of crude ore, 770 tons of concentrates and 885 tons of zinc middlings.

Scott Hill—The tunnel is in 200 ft. and is following a mineralized fissure.

Virginia

Notice is given by J. P. Jones, receiver of the Manganese, Iron and Coal Company, that he will sell at public auction at New Castle, April 30, the company's property, consisting of 19,646

acres of mineral and timber lands on Craig and Nutter mountains in Craig county.

Clinchfield Coal Corporation—This company, owning mines in southwest Virginia, has made arrangements to turn over its coal to the Clinchfield Coal Company, of Spartanburg, S. C. The intention is to market the coal in the cities along the South Atlantic coast, with which rail connections are made over the Carolina, Clinchfield & Ohio road.

Washington

FERRY COUNTY

Iron Chief—On this group of seven claims a large body of ore was recently opened, containing 70 per cent. iron and small amounts of gold and silver.

Ben Hur—Operations are being carried on successfully by the leasing company. Four stopes have been opened, from which 4000 tons of ore have been shipped. New machinery will be installed.

Summit—Development work will be continued on the Summit group, and operations will shortly be resumed at the railroad group. S. Tanner, Orient, is secretary.

OKANOGAN COUNTY

Golden Chariot—Capital has been secured and the shaft will be sunk 200 ft. deeper.

Prize—Arrangements are being made to examine this mine. A. J. Reed has charge.

Lucky Knock—This company is mining antimony ore at Loomis. W. A. Ingram is manager.

PIERCE COUNTY

Swastika—This company will erect a 40-stamp mill and build five miles of railway into Lakeview.

SNOHOMISH COUNTY

In the case of the National Mining and Milling Company vs. James Peccolo, et al., the State Supreme Court has decided in favor of the Peccolo people. This involves the title to some rich mining claims in the Silver Creek district.

The Monte Cristo district mines will reopen soon and ship to the Everett smeltery, which is preparing to resume.

West Virginia

MARION COUNTY

Four States Coal and Coke Company—A shaft has been started at Worthington, which is to be the initial point of the development of the large tract of land recently bought.

Keystone Coal and Coke Company—This company has bought 3000 acres from the New England Gas Company, near Fairmont. Arrangements have been made to open two mines.

MINGO COUNTY

S. W. Patterson and associates have organized the Sycamore Coal Company, with main offices at Vivian. This company has purchased and leased some 4000 acres on Sycamore and Lick creeks. It is now running a branch line up Sycamore creek from the main line of the Norfolk & Western. It will commence development, opening first with the Winifrede seam.

Thacker Coal and Coke Company—This company is opening four new mines on Grapevine creek, and will develop the Thacker seam of coal, which is said to be 5 ft. thick at that point. The coal will be handled by retarder conveyers and brought to one tippie, at which five loading tracks for the different grades will be constructed, including a box-car loading track.

RANDOLPH COUNTY

Near Elkins a 6000-acre coal tract will soon be opened by the Four States Company, which also operates in Kentucky, Ohio and Pennsylvania.

WEBSTER COUNTY

A 1000-ton mine will be developed on its 700-acre tract by the Crystal Block Coal Company, which has its headquarters at Gary.

Canada

BRITISH COLUMBIA

Stewart—A native silver strike of importance is reported to have been made. The ore is said to rival that of Cobalt in richness.

Tyee—Returns for March: One furnace was in blast 18½ days, and smelted 4750 tons, producing 270 tons of matte valued at \$37,000.

ONTARIO

The shipments from Cobalt for the week ended April 8 were: Nipissing, 253,817 lb.; Kerr Lake, 240,190; La Rose, 146,400; Crown Reserve, 63,500; O'Brien, 61,700; Buffalo, 52,900; Trethewey, 61,673; Right-of-Way, 61,178; Colonial, 43,600; total, 984,958 pounds.

Wyandoh—A vein about ½ in. wide but very rich has been found on the surface. This is the second high-grade vein found in the Gillies Limit.

Black Consolidated—Native silver has been found in the main vein at the 200-ft. level. This is the first native silver found on this property.

Maidens—Good ore has been found in the No. 2 vein, South Lorrain, at 62 ft. A small plant will be installed.

Crown Reserve—Operations for the first quarter of 1910 were as follows: During the period there were shipped 800,000 oz. of silver having a gross value of \$410,000. Smeltery charges amounted to \$30,000, expenses were roughly, \$65,000, and royalties, \$30,000, leaving \$285,000 net profits. A regular quarterly divi-

dend of 6 per cent. and bonus of 9 per cent. has just been paid, equivalent to \$265,000. One of the most significant features is that the whole output for the quarter has been taken from the Kee-watin formation at the 200-ft. level.

NOVA SCOTIA

Dominion Coal Company—At the annual meeting in Montreal, April 12, President J. H. Plummer discussed the position of the company and its relations with the Dominion Iron and Steel Company and announced that to meet the strike losses it had been decided to sell \$825,000 in bonds. Arrangements are being made to increase the annual output to 4,000,000 tons. The price agreed on for coal by the new arrangement with the Steel company was \$1.55 per ton, an increase of 27c. on the former rate. This rate would hold for five years. He pointed out that there would be great difficulties in the way of completing the merger, owing to the disturbed earning power of the Coal company on account of the strike and the changing status of the Steel company by reason of the abolition of bounties and the enlargement of its plant. It might, therefore, be some time before the merger could be accomplished.

YUKON TERRITORY

Atlas—This company recently organized in Spokane with a capital of \$600,000, has bought the Yukon-Pueblo property at White Horse, Yukon territory, for \$500,000, from Byron N. White, of Spokane. President R. K. Neill announces that Wilbur D. Greenough and John Mocine, of the Snowstorm mine, in the Cœur d'Alene, will leave for White Horse in May to install a 10-drill compressor and erect buildings.

Mexico

CHIHUAHUA

Dr. H. S. Durand, of Rochester, N. Y., is developing a property in the Urique district, and proposes to erect a smelting plant. The Rosario, the principal mine in the district, has not been worked for 25 years. The ore in the district is base sulphide carrying gold.

Los Letreros—This property, better known as the Boggs, is sending out occasional carlots of high-grade ore. It is in the Sierras west of Ocampo in charge of W. Q. Bryan.

Santa Eulalia Exploration Company—Experts in the employ of the Exploration Company of London have completed an examination of this property and reports are that the purchase option may be exercised. The sale price is, \$1,250,000. It is one of the largest producing properties in the camp.

Jibosa—J. L. Johnson and associates are operating this copper mine 15 miles south of Jiminez. Shipments are being made.

Nonoava—Increased activities are reported from this long neglected district about 100 miles southeast of Cusiuhirichic. The ores are mainly copper carrying gold and silver.

Hidalgo—Litigation involving ownership to properties in the vicinity of Cienegas de Olivas has been settled in favor of the Hidalgo company, which will resume operations.

MEXICO

Mexico Mines—March returns are: crushed 11,336 tons; yielding bullion, \$124,490; working expenses, \$44,210; expenditure on developments, \$11,600; profit, \$68,680.

El Oro—The March returns are: crushed 27,527 tons; yielding bullion, \$215,260; working expenses, \$97,680; expenditure on developments, \$21,260; profit, \$96,320; profit on railway, \$7000; total profit, \$103,320.

Esperanza—The reports for March are: Mill ran 25 days and crushed 13,730 dry tons; tailings treated, 2404 tons; concentrates shipped, 26 dry tons. Estimated realizable value of bullion and concentrates, \$174,034; less working expenses, \$98,998; estimated profit, £13,803.

SONORA

Greene-Cananea—Expenditures equaling the outlay for betterments during 1909 have been partially outlined by this company. These include the new reverberatory which is in process of construction now; 4 more units to the McDougal roasters, making eight in all; two turbine generators, probably larger in capacity than the one installed last fall; a trolley line for commercial purposes and supplies. Another 6000-cu.ft. compressor may be placed in the main power plant unless it is decided to place smaller sized ones in the mines and operate them by electricity. The expenditures will reach nearly \$400,000, but the reduction in operating cost will return the greater part of this amount within a year.

Picacho—Recent work, under the direction of W. C. Leaming, has uncovered some gold and silver ore in this mine.

Cinco de Mayo—A. J. King has arranged to lease this property, and will work it extensively.

Sonora Copper Company—Wells are being bored at Noria to supply water for the 100-ton smeltery, upon which construction work will shortly begin.

Sierra Gordo—A compressor has been set up at the entrance to the 1200-ft. tunnel just finished near Cumpas. The property is in charge of O. L. Neer.

Altar Gold Placer Company—This corporation has been organized to operate on a portion of the Aguilar lease, Altar district. W. H. Worthington is president.

Roy—This mine, Moctezuma district, has 50 men employed. A cyanide plant

has just been finished and the 30-ton stamp mill is undergoing repairs.

Washington Mining Company—This company has been organized by Dr. L. D. Ricketts and James S. Douglas to buy the Washington mine, in the Arizpe district. About 3000 ft. of underground work has been accomplished. Approximately 350,000 tons of 4 per cent. copper is in sight, the low-grade making the construction of a concentrator necessary.

American Ore Milling Company—In the Altar district 1475 pertenencias of placer ground has been secured by this company to be worked by the Quinner machines.

San Ygnacio—A small concentrator has been erected at this mine.

Ryall Concessions—The rights to exclusive mining privileges in the entire region lying between the Yaqui and Tecoripa rivers, from their confluence up each river to Tecoripa and San Antonio de la Huerta, which the concessions gave, will expire April 24. Several promising mines are within this area, among them the Realito, La Barranca, San Javier, Las Bronces, Toledo and Libertad.

Arnold—After a year's idleness, development work has been resumed on this company's holdings, west of Cananea.

Calumet & Sonora—This company, operating a lead and zinc mine at Cananea, has experienced a change in affairs, new interests having been engaged in the company. A. L. Warner has been placed on the directory, and the conduct of the affairs of the company has been put in the hands of an executive committee, of which Mr. Warner is chairman. The company is now shipping about 700 tons monthly of zinc and lead concentrates to the United States. This is the mine that produces the remarkable blende referred to in a recent issue of the JOURNAL.

Pacific Smelting—This company has given an option to the General Development Company, of New York, on the control in its extensive properties in Sonora and an examination is now being made.

Australia

WESTERN AUSTRALIA

The gold production in March is reported by the Chamber of Mines of Western Australia as follows: Exports, 16,694 oz.; mint deliveries, 100,831; total, 117,525 oz. fine, or 6510 more than in February. For the three months ended March 31, the total was 382,377 oz. in 1909, and 355,861 oz., or \$7,355,647, in 1910—a decrease of 26,516 oz. for 1909.

Europe

RUSSIA

The production of the Kyshtim copper mines, in which some Americans are interested, for five months ended Feb. 28 is reported at 1,633,960 lb. blister copper.

THE MARKETS

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

Coal Trade Review

New York, April 20—The Seaboard bituminous trade is comparatively quiet, although the strike conditions in the West are causing some anxiety, and the suspension in Central Pennsylvania is coming rather near home. However, the trade is fairly active and prices are firmer. The anthracite trade is steady and uneventful.

In the West little progress has been made toward a settlement of the wage scales. The agreements made in Ohio and in the block-coal district of Indiana were noted last week. To these may be added a settlement in the unionized Kanawha district of West Virginia. The Indiana bituminous field is still out; though the operators have conceded terms, the miners decline to work pending the settlement of some minor details. The Pittsburg district seems far from an agreement, the explosive question being the main point of difference.

In Illinois operators and miners have been in session in Chicago, but up to date absolutely nothing has been done in even the most preliminary steps toward an agreement and it is the opinion that the meeting will be adjourned without anything being accomplished. The labor situation seems more complicated than ever and many believe that there is no chance of work being resumed before June, with a possibility that it will not be resumed until July.

Further West, Iowa is approaching peace, but nothing is doing in the Southwest.

Meantime it is developing that stocks are not so large as was generally supposed, and if mining is not resumed early in May a shortage of coal will begin to be felt at many points.

COAL TRAFFIC NOTES

Coal and coke shipments Chesapeake & Ohio railway, eight months of fiscal year July 1—Feb. 28, short tons:

	Coal	Coke	Total
New River	5,227,465	240,828	5,468,293
Kanawha	4,207,760	37,909	4,245,669
Kentucky	344,144	228	344,372
Connecting lines.....	66,086	33,562	99,648
Total.....	9,845,455	312,527	10,157,982
Total, 1908-9.....	8,119,946	234,396	8,354,342

Total increase this year 1,803,640 tons, or 21.6 per cent. Deliveries to points west of mines, 5,172,385 tons coal and 150,056 coke; points east, 1,318,908 tons coal and 162,471 coke; tidewater, 3,349,016 tons coal; anthracite to line points, 5146 tons.

Coal passing Davis Island dam on the Ohio, two months ended Feb. 28, was 978,840 short tons in 1909, and 590,630 in 1910; decrease, 388,210 tons.

Coal passing the locks on the Monongahela above Pittsburg, two months ended Feb. 28, was 1,490,280 short tons in 1909, and 1,644,800 in 1910; increase, 154,520 tons.

Coal receipts at St. Louis, two months ended Feb. 28, were 1,203,135 short tons in 1909, and 1,810,580 in 1910; increase, 607,445 tons.

Coastwise shipments of coal from chief Atlantic ports, two months ended Feb. 28, long tons:

	Anthracite.	Bitum.	Total.	PerCt.
New York....	2,693,731	1,814,269	4,508,000	64.3
Philadelphia	313,001	724,268	1,037,269	14.8
Baltimore....	36,874	545,420	582,294	8.3
Newp't News .....	.....	465,034	465,034	6.6
Norfolk.....	.....	421,851	421,851	6.0
Total.....	3,043,606	3,970,842	7,014,448	100.0
Total, 1909.	2,635,576	3,428,329	6,063,905	.....

The total increase this year was 950,543 tons, or 15.7 per cent. New York includes all the harbor shipping points.

New York

ANTHRACITE

April 20—The anthracite market is quiet and steady. A good business is being done with dealers on the April discounts, but there has been no unusual rush.

Schedule prices for domestic sizes are \$4.25 per ton for lump and \$4.50 for egg, stove and chestnut, f.o.b. New York harbor. For steam sizes current prices are \$3@3.25 for pea; \$2.15@2.50 for buckwheat; \$1.70@2 for No. 2 buckwheat or rice; \$1.25@1.50 for barley. These prices are f.o.b. New York harbor, according to quality, the lower prices being for washery coals.

BITUMINOUS

Strike talk is occupying much of the time of the market. The Central districts in Pennsylvania are pretty well tied up and are not shipping to any extent. The small part of West Virginia which is unionized has reached a settlement, and no immediate scarcity of coal is probable. A continued suspension in the West, however, may have an effect on this market. Meantime there is an inquiry for coal which indicates either a better demand, or some anxiety about supplies.

Prices hold about the same as last week and are firmer than for some time. Car supply is fair and transportation is good.

The Coastwise vessel market is steady, with a good supply of boats. Going rates from Philadelphia are 85c. to Boston, Salem and Portland; 90c. to Portsmouth; 95c. to Lynn; \$1 to Newburyport; 95c. to Providence and the Sound. From New York boats can be had at 60@65c. to Boston, Salem and Portland; 75c. to Bangor.

Birmingham

April 18—The coal output in Alabama is heavy and the prospects are bright for some time to come, practically through the year. There is full operation at practically all the mines in the State. The local consumption is heavy. The coke operations show no abatement. As long as the pig-iron production keeps up there will hardly be disturbance in the coke make. There is some demand in the open market for coke also. Good prices obtain for coke, but coal prices are not satisfactory. An increase in wages is promised the miners in Alabama shortly, which will mean more labor.

Chicago

April 18—The coal market hardly exists. Consumers manifest no anxiety over the lack of supplies and most of them—the large ones anyway—have supplies that will last until May 1 at least. Hardly any coal is coming in from Illinois and Indiana mines. Many users of steam coal not provided with storage piles have turned to smokeless with the result that even that coal, so long over-abundant, is not now troubled about surplus on track and sells close to circular quotations. The cool weather of the last three days has caused a new interest in anthracite, which otherwise has had a record of light sales.

Quotations on Illinois and Indiana coals are nominal. The little business being done is at \$2.25@2.65 for lump, \$2.10@2.50 for run-of-mine and \$2.15@2.40 for screenings. Hocking holds to \$3.15. Smokeless is selling for \$3.55 lump and \$3.15 run-of-mine, list prices.

Illinois screenings show a probability of being the first coal actively sought under a continuance of present conditions; such screenings as are now obtainable bringing the high price of \$2.40 in car lots.

Cleveland

April 18—Coal rates by Lake from the Lake Erie ports for the season have been fixed at 30c. to Lake Superior; 35c. to the

quick unloading docks at Lake Michigan ports; 40c. to the slow docks at Milwaukee. Navigation opened April 15, and a number of coal carriers have started already. The water stages are unusually low, and only 17 ft. 6 in. draft is reported possible to Lake Superior.

Local business is dull. The Ohio mines have resumed work, but many large consumers have stocks which they will use up before buying more. Prices are unsettled, with some prospects of an early decline.

Indianapolis

April 18—It has been discovered that there is not as much coal in storage as anticipated on April 1. Instead of a 90-days' supply there was only a 30-days' supply and one-half of that is exhausted. The miners do not object to the suspension. They have been working hard for several months, the mines having been operated full time. The convention at Cincinnati last month decided on the terms under which the miners would agree to work during the coming two years. The first condition demanded an increase of 5c. a ton in the rate for mining coal and proportionate increases for dead work, outside work and day labor, and set out the day-wage scale in full. The second condition provided that where a State, district or subdistrict agreed to pay the advance the mines might continue in operation pending final settlement of details. The Indiana operators adopted a resolution agreeing to the advance and asked State President Vanhorn to order the miners to return to work but he has refused to do so until all the details of the contract have been agreed to. The operators charge this to be a direct violation of the conditions agreed to at Cincinnati. A meeting has been called for this week by both the miners and the operators and President Lewis is expected to attend each. Lewis has advised by letter that the miners return to work and it is believed there will be a general resumption of mining in Indiana before the close of the week.

Pittsburg

April 19—A decidedly chaotic condition is developing in the local coal situation, for in the conferences between miners and operators the two sides are as far apart as ever, while several mines, it is understood, have signed the scale, expecting the men to go back to work. On the other hand, conditions are taking on more of a strike appearance, as the men are getting into crowds, hiring brass bands, and marching on nonunion mines for the purpose of closing them, in which work they have scored several successes. While the operators have been particularly careful to make no public declaration of policy, it is evidently their plan to let matters take their

course, feeling that whatever develops must prove to their advantage. Coal is growing scarcer and if many nonunion mines are closed conditions may become such as to justify making some concessions. Relations between National President Lewis and District President Feehan have become still more strained, Feehan maintaining the propriety of his accepting scale signatures from individual operators—which would narrow the powder question down to gaseous mines—while Lewis insists that the National convention allowed nothing but district signatures.

While coal is becoming scarcer there are moderate supplies offered, which are more available to some consumers than others, on account of differences in freights. Roughly, mine-run can be quoted at \$1.20@1.30 and slack at \$1.10@1.30 per ton.

Connellsville Coke—A Chicago steel and blast-furnace interest has bought coke for the 12 months beginning July 1, but absolute information is not obtainable as to details. Reports have it that standard Connellsville coke was sold at \$1.85, but in some quarters it is asserted a higher price was secured, and it is also reported that some West Virginia coke was bought. There has been a slightly better demand for prompt furnace coke, on account of some production being lost in union districts, and prices are firmer, at \$1.80@1.90. Furnace coke on contract for second half is generally quoted at \$2.25, but the figure could probably be shaded.

The H. C. Frick Coke Company, the coke subsidiary of the United States Steel Corporation, has given orders for the blowing out of a total of 3500 ovens and about half the number seems to have been taken out to date. The Corporation was accumulating coke for a while and the curtailment in production will eliminate this and also cover the blowing out of a few blast furnaces, which seems to be in contemplation.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ended April 9, at 447,508 tons, a decrease of 8000 tons and shipments at 4542 cars to Pittsburg, 7275 cars to points west of Pittsburg and 702 cars to points east of Connellsville, a total of 12,519 cars.

St. Louis

April 18—There has been very little doing in the coal market for the past week. Illinois coal is practically cleaned up and prices are not high enough yet to place outside coal in this market advantageously. There is very little coal on the market for jobbers to speculate in. A few operators are loading up screenings which they were unable to give away last summer, and consequently were dumped on the ground. Operators who

did this were fortunate, as screenings are now bringing \$1.50 per ton at the mines, which is the highest price they have brought in recent years.

Consumers are beginning to eat into their storage supplies and it will only be a very short while before a number of them will be forced to buy coal heavily. Present conditions point to a long suspension of mining.

Several bunches of Kentucky coal have been in East St. Louis up to demurrage. In another two weeks Kentucky coal will undoubtedly be a factor in this market.

Anthracite business opened up very slowly, and while orders are coming in a little better as the month gets older, yet the April business is far from par. It was generally thought that after the price war last year the dealers would be glad to have conditions restored to normal again as they had been during the past two months. However, last week one of the largest companies cut the price 50c. per ton, making the retail price \$7.50, delivered, on chestnut, stove or egg, and \$7.25 per ton delivered on the grate size. This is a cut of \$1 from the winter price. Nearly everyone interested in the coal business had hoped that another price war would be averted, but it looks very much as if such was not going to be the case. At these prices there is no money in selling hard coal, and dealers will be forced to handle same at practically cost in order to hold their trade.

Prices in the St. Louis market are as follows:

Standard:	F.o.b. Mine.	St. Louis.
2-in. lump.....	2.00	2.52
Mine-run.....	1.60	2.12
Screenings.....	1.40	1.92
Carterville:		
6-in. lump or egg.....	2.00	2.67
Mine-run.....	1.50	2.17
Screenings.....	1.50	2.17
Pocahontas and New River:		
Lump or egg.....	1.50	4.00
Mine-run.....	1.10	3.65
Pennsylvania Anthracite:		
Nut, stove and egg.....		6.45
Grate.....		6.20
Arkansas Anthracite:		
Egg or grate.....	3.35	5.35
Coke:		
Connellsville foundry.....		5.40
Gas house.....		4.50
Smithing coal.....		4.15

Kentucky coal sold, f.o.b. Louisville & Nashville tracks, East St. Louis, at \$2.50 for 3-in. lump, \$2.25 for 1-in. nut, \$2 for mine-run and \$1.75 for screenings.

FOREIGN COAL TRADE

Transvaal Coal—Coal shipped from Transvaal collieries in January was 311,796 tons. The total mined was 498,000 tons, 37.5 per cent. being sorted or screened out as waste.

Spanish Fuel Imports—Imports of coal into Spain in January, 158,336 metric tons, a decrease of 14,530 tons from last

year; imports of coke, 15,407 tons, a decrease of 10,350 tons.

Mexican Coal—A preliminary report gives the total shipments of coal from mines in Mexico in 1909 at 919,338 metric tons. Of this total 538,067 tons were sold to railroads and 381,261 tons for commercial and domestic purposes.

British Coal Trade—Exports of fuel from Great Britain, with coal supplied to steamships in foreign trade, three months ended March 31, long tons:

	1909.	1910.	Changes.
Coal	13,914,097	13,357,353	D. 556,744
Coke	270,145	235,379	D. 34,766
Briquets	338,915	343,968	I. 5,053
Total exports	14,523,157	13,936,700	D. 586,457
Steamer coal	4,520,902	4,405,962	D. 114,940
Total	19,044,059	18,342,662	D. 701,397

Imports of coal were 462 tons in 1909 and 3378 in 1910, both negligible quantities.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, Wales, report prices as follows on April 9: Best Welsh steam, \$4.08; seconds, \$3.96; thirds, \$3.84; dry coals, \$3.90; best Monmouthshire, \$3.60; seconds, \$3.48; best steam smalls, \$2.40; seconds, \$2.16. All prices are per long ton f.o.b. shipping port, less 2½ per cent. discount.

IRON TRADE REVIEW

New York, April 20—The iron and steel markets continue in a rather sluggish condition so far as new business is concerned, although the finished steel mills are fairly busy on contracts, except in a few lines.

The pig-iron market is especially dull. There is very little buying of either bessemer or basic pig, and foundry iron is going only in small lots for immediate consumption. Large buyers are still holding back and seem to be confident that when they are obliged to come in the market they will find matters in a position to suit them. Meanwhile prices are gradually weakening. Concessions are denied, of course, but there is no disputing the fact that prices which were considered concessions a short time ago are now generally accepted. Foundry iron especially is demoralized by offers of cheap Southern iron, \$12 Birmingham, being generally accepted, while a recent large order was reported placed for less. There is much talk about curtailing production and several furnaces have already blown out. There is no question that the production of raw iron has run ahead of finished material with resulting weakness in prices. It must be remembered that blast furnace capacity has been largely increased. We are able now to produce 36,000,000 tons of iron in a year, and for a few months the output was at the rate of 32,000,000 tons, or 25 per cent. above the production of

even the boom year 1907. It has not been possible to use this up, and the result has been an apparent weakness even on a very large actual consumption.

Finished material is rather quiet in most lines. There have been no important changes in price, but it is generally known that the large fabricating companies in eastern cities are taking contracts at prices which involve low rates for the material.

Lake navigation opened April 15, and everything is in train for a large early movement of iron ore.

The Steel Corporation has announced a general advance in wages and also a prospective plan for labor insurance and retiring pensions. This is a shrewd move; it is evidently meant to offset the corporation's fight against the Amalgamated Association last year, and to prevent any movement to unionize its working force.

United States Steel Corporation—At the annual meeting in Hoboken, N. J., April 18 the following directors, whose terms had expired, were reelected for three years: Alfred Clifford, Edmund C. Converse, Elbert H. Gary, J. Pierpont Morgan, J. Pierpont Morgan, Jr., Thomas Morrison, George W. Perkins, Henry Phipps.

Baltimore

April 18—Exports for the week included 3317 tons rails to Freemantle, Western Australia; 1736 tons rails and 116 tons rail joints to Bombay, India; 115,812 lb wire and 109,994 lb. corrugated sheets to Great Britain. Imports included 2950 tons spiegeleisen and 250 tons ferromanganese from Rotterdam; 412 tons manganese ores, 1639 tons ferromanganese and 176 casks silicospiegel from Liverpool; 9800 tons manganese ore from India; 27,400 tons iron ore from Cuba.

Birmingham

April 18—While the pig-iron market in the southern territory has been rather quiet, there are indications of an early awakening. Prices have been low, but some improvement is to be noticed, the minimum being \$12@12.50 per ton, No. 2 foundry, with the maximum, \$13, deliveries extended through the balance of the year at the last named price. A report that 200,000 tons of iron had been accumulated on furnace yards in Alabama is denied from an authoritative source here; the warrant and furnace company iron stacked up being considerable under the figures given. There is not enough iron on the yards to have any effect on the market. Only the smaller companies have seen fit to make concessions on pig iron, save in a few instances where a round lot or two, immediate delivery, was sold by a larger concern. There has been but little, if any curtailment in the production in this section. The suggestion, however, has been

under consideration recently, but no action has been taken. Basic and charcoal irons are still in fairly good demand. The home consumption continues brisk, the foundries and machine shops reporting a little more activity than has been.

Chicago

April 18—Sales of pig iron continue to be unsatisfactory to selling interests and both Southern and Northern iron show decided weakness. Southern at \$12 @ 12.50 Birmingham (\$16.35@16.85 Chicago) and Northern at \$17@17.50 for No. 2 foundry are not actively sought by melters. It seems to be the firm conviction of the melting interests that there is overproduction, and so their purchases remain light in tonnage and for a short time ahead. Nothing like general buying for last-half requirements exists. There are some large inquiries but only rarely does an order for more than 1000 tons materialize. Meanwhile the condition of the foundry business, on which this market relies chiefly, is good and shows every prospect of continuing good. Needs therefore are large, as regards pig iron.

The general conditions of the market for iron and steel products are rather quiet, but firm. Railroad supplies and structural material show no important new contracts; minor products have a fair sale. Coke is very dull at \$5.25 for Conellsville as a result of large shipments and no increase in the demand.

Cleveland

April 18—No sales of iron ore are reported, but the movement from the docks to furnaces is active. The Canadian canal at the Sault opened April 11, and the American canal April 15. The first cargo of iron ore started April 11, from Ashland.

Pig Iron—The market is slow and weak. The Cleveland Furnace Company has blown out one of its stacks. Quotations, Cleveland delivery, are \$18.40 for bessemer; \$16.75@17 for No. 2 foundry; \$16.35@16.85 for No. 2 Southern; \$16.25 @ 16.50 for forge.

Finished Material—New orders are rather disappointing, but most mills are doing well on contract specifications.

Philadelphia

April 22—The week's business in pig iron has fallen below the average. Large consumers are watching developments at Southern furnace centers and whatever they may do will be determined by what they think of the Southern situation. A few sales of basic have been made and no more are imminent. Consumers are holding off as it were, thinking that the drift of things is in their favor. Large sales of iron for casting purposes are hanging fire and sellers are unable to guess what prospective

buyers will do. Forge iron continues strong at \$16.50, with basic at \$17.50 and No. 2 X foundry selling in a small way at \$18. There is less confidence expressed among makers for continued strong prices.

Steel Billets—Steel billets are dull, sales are limited though full prices are asked and paid.

Bars—Bar iron is active in small lots from stores, but mills report no large orders for a week. Deliveries are being hastened on old orders. There appears to be a slowing down of demand at the mills, explained by the fact that many of the large consumers ordered heavily during March.

Scrap—Very little scrap has sold for a week as holders are refusing the prices that are offered for No. 1 yard and heavy melting-steel scrap.

Pittsburg

April 19—No improvement has taken place in the general iron and steel market, which shows a condition of moderate activity, but not enough to raise the least question of productive capacity being able to take care of consumption, so that the market lacks snap and prices show no tendency to harden. Apparently there will be a gradual curtailment in total production, although some finished steel lines appear able to take care of themselves. Tinplate promises full activity through the third quarter, as mills are completely sold up into the fourth quarter, and steel bars come next, mills being able to see full operation into mid-summer. Plates and shapes, particularly the latter, are not so well sold up and some mills cannot look ahead much more than a month. Shading in sheets has slightly increased, particularly in the West, and sometimes amounts to \$2 a ton.

Pig Iron—The tendency to curtail production continues. Clinton, the only merchant furnace in the county, has gone out of blast and several merchant furnaces in the Valleys are to follow. Prices are no stronger and indeed the market is so quiet that it becomes a question what a block of iron would really bring. While prices are down close to cost, based upon purchased ore and coke, it does not follow that this will control, for there are many furnaces owned by ore interests, and, of course, these furnaces could sell even at a loss, in order to make an outlet for the ore. It is of great significance that at this moment no less than eight merchant furnaces are being built by Lake Superior ore interests, these being two Iroquois at Chicago, one Zug Island at Detroit, two Rogers-Brown at Buffalo and two Cleveland and one Josephine by Corrigan, McKinney & Co., the latter announcement having been made within the past week. Merchant furnaces which have to buy ore

can, of course, only obtain the overflow pig-iron business and in present stagnant conditions it is not certain there will be any. There is no harm in noting, however, that somewhat similar obituaries were written for the merchant furnaces in the Valleys in 1897 and 1898. Nominal prices may be quoted as follows: Bessemer, \$17.50; basic, \$16; malleable, \$16; No. 2 foundry, \$15.75; gray forge, \$15.25; all at Valley furnaces.

Steel—The scarcity of open-hearth steel continues, but there is probably less demand. Prices remain quotable at \$27 @ 27.50 for bessemer billets, \$27.50 @ 28 for bessemer sheet bars, \$28.50 @ 29 for open-hearth billets and \$29 @ 29.50 for open-hearth sheet bars, with rods nominally at \$33, all at mill, Pittsburg or Youngstown.

Ferromanganese—The market has continued quiet, prices being nominally quotable at \$41, Baltimore, for prompt and \$41.50 for second quarter, freight to Pittsburg being \$1.95 per ton.

Sheets—Business in sheets is somewhat lighter, and the shading has increased, sometimes reaching \$2 a ton. Regular prices are 2.40c. for black and 3.50c. for galvanized sheets, \$1.70 for painted corrugated and \$3 for galvanized corrugated roofing, with blue annealed sheets at 1.90c. for early delivery.

FOREIGN IRON TRADE

German Iron Trade—Exports and imports of iron and steel, and of machinery in the German Empire, two months ended Feb. 28, metric tons:

	Exports.	Imports.	Excess.
Iron and steel..	688,514	71,207	Exp. 617,307
Machinery.....	49,402	7,862	Exp. 41,540
Total.....	737,916	79,069	Exp. 658,847
Total, 1909.....	602,990	66,220	Exp. 536,770

Imports of iron ore in 1910 were 812,868 tons; exports, 483,628 tons.

METAL MARKETS

New York, April 20—The metal markets this week have been more interesting, and some activity seems to be developing on certain lines.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Mar. 1910..	\$ 1,815,329	\$ 4,492,229	Imp. \$ 2,676,900
" 1909..	21,252,462	5,161,648	Exp. 16,090,814
Year 1910..	10,915,595	9,686,702	" 1,228,893
" 1909..	37,978,632	12,158,275	" 25,820,357
Silver:			
Mar. 1910..	4,553,110	3,872,912	Exp. 680,198
" 1909..	5,079,287	3,279,531	" 1,799,756
Year 1910..	13,640,033	11,276,595	" 2,363,438
" 1909..	14,473,930	10,453,218	" 4,020,712

Exports from the port of New York, week ended April 16: Gold, \$4,016,640, chiefly to London; silver, \$855,759, also chiefly to London. Imports: Gold, \$100,402; silver, \$71,526, from Mexico and South America.

Gold—The price of gold on the open market in London has been 77s. 9d. per oz. for bars, and 76s. 5d. per oz. for American coin, the premium on the latter having been dropped. In New York an additional \$4,500,000 was taken for London, and \$1,350,000 for shipment to Argentina on London account.

Platinum—Business is steady and prices are unchanged, dealers asking \$29 @ 29.50 per oz. for refined platinum and \$34.50 per oz. for hard metal.

Silver—The market has remained steady the past week with small fluctuations in price. The China banks have been inclined to sell on any advance. The market closes quiet at 24½d. in London.

SILVER AND STERLING EXCHANGE

Apr.	14	15	16	18	19	20
New York....	53¼	53½	53½	53½	53½	53¼
London . . .	24½	24½	24½	24½	24½	24½
Sterling Ex.	4.8765	4.8765	4.8785	4.8780	4.8775	4.8785

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 from Jan 1 to April 7, reported by Messrs. Pixley & Abell:

	1909.	1910.	Changes.
India.....	£1,150,600	£1,550,300	I. £ 408,700
China.....	925,600	1,088,500	I. 162,900
Straits.....	82,800	.....	D. 82,800
Total.....	£2,159,000	£2,647,800	I. £ 488,800

India Council bills in London brought an average of 16.09d. per rupee.

Copper, Tin, Lead and Zinc

Apr.	Copper.		Tin.	Lead.		Zinc.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.		New York, Cts. per lb.	St. Louis, Cts. per lb.		
14	12½ @ 13	12½ @ 12½	57½	33	4.35 @ 4.40	4.20 @ 4.25	5.32½ @ 5.37½
15	13½ @ 13½	12½ @ 12½	57½	33½	4.35 @ 4.40	4.20 @ 4.25	5.32½ @ 5.37½
16	13½ @ 13½	12½ @ 12½	.....	33½	4.35 @ 4.40	4.20 @ 4.25	5.32½ @ 5.35
18	13½ @ 13½	12½ @ 12½	57½	33	4.35 @ 4.40	4.20 @ 4.25	5.32½ @ 5.35
19	13½ @ 13½	12½ @ 12½	57½	33	4.35 @ 4.40	4.20 @ 4.25	5.32½ @ 5.35
20	13½ @ 13½	12½ @ 12½	56½	33	4.35 @ 4.40	4.20 @ 4.25	5.32½ @ 5.35

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. 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. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The large business that we reported last week continued up to April 16 and led to some stiffening of prices, but since April 18 the market has been weakish again, demand having dwindled, owing apparently to the weakness in.

the London market. A fairly large business has been done, total sales having been probably in excess of 30,000,000 lb., effected chiefly during the first half of the week, and several of the more important producers are now well sold for the near future. These sales were both for domestic and foreign delivery, more or less equally divided, and were chiefly in electrolytic copper. European consumers who had allowed their stocks to run down came into the market, and American consumers followed. Calumet & Hecla having sold freely of Lake at 13c. previous to April 14, then raised its asking price to 13¼c. Other Lake producers have made some scattering sales at that price, but these have been for carloads only and broadly speaking, the business in Lake during the last week has been insignificant and the quotations are essentially nominal. On the other hand, the producers of electrolytic have been free sellers, with nearly all of them offering unreservedly at 13c., delivered, 30 days, for domestic account and at 13c. c.i.f. for shipment abroad, these terms corresponding to about 12.85 to 12.80 net, cash, New York, while toward the close some were offering at a concession of 10 to 15 points. The consumption of copper is very large, and it is noteworthy that enterprises requiring large amounts of copper are still being held in abeyance, owing to the difficulty in financing them, and that the present consumption is evidently caused by an increase in the general needs of the country, due to its growth. However, several of the more important producers are now well sold for the near future. At the close electrolytic copper is quoted at 12⅝@12¾c. in cakes, ingots and wirebars, while Lake is nominally at 13⅝@13¾c. The average for casting copper for the week has been nominally 12½@12⅝ cents.

Copper sheets are 19@20c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14¼c. base, carload lots at mill.

The London standard market on Thursday opened at £57 2s. 6d. On Friday and Monday it was strong, and there was a large turn-over at about £57 15s. @ £57 17s. 6d., but on Tuesday and Wednesday, under realization of speculative holdings and the influence of weaker stock markets, prices declined, the market closing at £56 12s. 6d. for spot and £57 12s. 6d. for 3 months.

Refined and manufactured sorts are quoted: English tough, £60; best selected, £60 10s. @ £61; strong sheets, £69 @ 70 per ton.

Statistics for the first half of April show a decrease in the visible supplies of 1200 tons.

The report of probable cessation of publication of statistics by the Copper

Producers' Association, circulated widely during the last week, was apparently manufactured out of whole cloth. The matter has not been discussed at all by the association, and all of the members of the latter are as much at a loss to account for this report as is anyone else. Inferentially, the report was circulated for purposes of speculators for the decline in the London market, telegrams by interests not directly connected with the sale of refined copper having been sent from this side. On Apr. 20, sales of standard copper in London amounted to about 4000 tons at a decline. It is quite true that the statistics of the Copper Producers' Association have been the subject of amateurish deduction, but among the producers it is generally recognized that the statistics themselves have been for the benefit of the industry and as stated above no motion for their discontinuance has been made.

The contract of the United States Selling Company for disposal of the product of the Boston Consolidated expires in May. After that date this copper will be sold by the Guggenheims.

Copper exports from New York and Philadelphia for the week were 3170 long tons. Our special correspondent gives the exports from Baltimore at 506 tons copper.

Brass Prices—The Ansonia Brass and Copper Company, on April 14, reduced prices of brass ½c. per lb. The new base price for high-brass sheets, high-brass wire and high-brass rods is 14¾c. per lb. net; brazed-brass tubing, 19⅞c. per lb. net. Other conditions as before.

Tin—Toward the middle of last week, the London market was helped considerably by large buying from this side. The lower prices ruling, induced both dealers and consumers in this country to buy more heavily than they had done for some time past. The consequence was an advance of £2, which was almost entirely maintained, and the close is cabled strong at £149 17s. 6d. for spot and £151 5s. for three months.

After the buying movement of last week, things in this market have quieted down considerably, and little interest is shown at the higher quotations. At the close, tin can be bought at 33 cents.

Lead—The market is quiet and unchanged at 4.35@4.40 New York and 4.30@4.35 St. Louis.

The London market also is dull and unchanged, the closing quotations being £12 12s. 6d. for Spanish lead and £12 15s. for English.

In St. Louis, April 12, Henry Greve was elected president of the John Wahl Commission Company, in place of the late John Wahl; J. B. Wahl, treasurer, and Edward Wahl, secretary. The occasion was the fiftieth anniversary of the firm, which for years has been one of the lead-

ing dealers in lead and spelter in the West.

Spelter—During the last week the business in spelter has been comparatively small, there having been a marked absence of buying demand, although reports from manufacturers indicate that consumption is going on at a large rate. However, continued large production has made smelters somewhat nervous over the absence of orders and they have been willing to make some concession. Toward the close of the week quotations at 5.35c. St. Louis, were underbid. Consumption of spelter by brass manufacturers appears to continue large and for brass specials a substantial premium over ordinary brands, rising as high as ⅓c. per lb., is paid. At the close ordinary brands are quoted at 5.32½@5.35, St. Louis, and 5.47½@5.50, New York.

New York quotations for spelter, April 14 and 15, were 5.47½@5.52½c.; April 16-20, inclusive, 5.47½@5.50 cents.

The London market is also lower, being quoted £22 7s. 6d. for good ordinaries and £22 12s. 6d. for specials.

Beer, Sondheimer & Co. have taken a lease of the Altoona plant of the Cockerell Zinc Company and intend to operate it at full capacity.

Other Metals

Aluminum—Business continues active and sales are good. The market is strong at 23¼@23¾c. per lb. for No. 1 ingots in large lots, New York delivery. The foreign producers continue optimistic in their views, and anticipate an increase in quotations in view of the steady demand.

Antimony—The market is dull, and prices are unchanged. Quotations are 8⅝@8⅞c. for Cookson's; 7⅞@8c. for U. S.; 7⅝@7⅞c. for outside brands.

Quicksilver—The market is steady, but not active. New York quotations continue \$48 per flask of 75 lb.; jobbers ask 67@69c. per lb. for retail lots. San Francisco, \$47@48 for domestic sales; \$2 less for export. London prices, £9 5s., but jobbers have sold down to £9 per flask.

Zinc and Lead Ore Markets

Joplin, Mo., April 16—The highest price paid for zinc-sulphide ore was \$46.50, the base being \$40@44 per ton of 60 per cent. zinc metal. Zinc silicate sold at \$21@36 per ton of 40 per cent. zinc, with the high price at \$30. The average price, all grades of zinc ore, was \$40. Lead ore continues unchanged at \$50 per ton for grades of 80 per cent. or above with deductions of \$1 per ton for each 1 per cent. under this grade. The average price, all grades of lead ore, was \$49.86 per ton.

The zinc-ore market jumped to a \$44

base bid at the close of last week, for ore delivered this week, was maintained on this base throughout the week, with no evident weakening at the close. The reserve stock was lowered over 1500 tons, and a large portion of the tonnage in the bins is sold for early delivery next week. Outputting conditions have not been so good, owing to spring rains and a growing shortage of mine help, occasioned by several hundred miners going West.

SHIPMENTS, WEEK ENDED APRIL 16.

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	5,519,670	658,230	\$129,583
Joplin	2,346,180	227,130	56,064
Oronogo	973,500	41,590	21,461
Galena	698,850	69,450	16,062
Alba-Neck	617,990	9,250	14,435
Duenweg	496,230	127,210	12,769
Jackson	595,020		12,197
Miami	374,370	255,320	10,501
Spurgeon	392,290	91,050	8,816
Aurora	498,290		7,710
Quapaw	362,700		7,254
Granby	431,720	2,200	6,310
Carthage	239,090		5,259
Sarcoile	303,680		4,769
Badger	220,160		4,733
Stott City	124,700		2,680
Carl Junction	115,340		2,537
Cave Springs	63,460		1,300
Totals	14,373,240	1,481,430	\$324,440

16 weeks.....177,094,810 26,190,750 \$4,348,841
 Zinc value, the week, \$287,497; 16 weeks, \$3,643,285
 Lead value, the week, 36,943; 16 weeks, 705,556

MONTHLY AVERAGE PRICES.

Month.	ZINC ORE.				LEAD ORE.	
	Base Price.		All Ores.		All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	\$41.25	\$47.31	\$38.46	\$45.16	\$52.17	\$56.99
February	36.94	40.69	34.37	39.47	50.50	53.64
March	37.40	43.60	34.71	39.71	50.82	51.26
April	38.63		37.01		55.63	
May	40.06		37.42		56.59	
June	44.15		40.35		57.52	
July	43.06		41.11		53.74	
August	48.25		44.54		57.60	
September	47.70		44.87		56.11	
October	49.50		45.75		55.02	
November	51.31		48.29		53.94	
December	49.45		47.57		55.26	
Year	\$43.98		\$41.20		\$54.60	

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., April 16—The highest price paid this week for zinc ore was \$43.50 per ton. The base price of 60 per cent. zinc ore was \$41@42. The base price of 80 per cent. lead ore was \$50 per ton.

SHIPMENTS, WEEK ENDED APRIL 16.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	452,190		
Highland	448,000		
Mineral Point	432,800		
Cuba City	254,580	87,840	
Galena	236,600		
Harker	196,330		
Benton	86,800		
Montfort	70,000	60,000	
Linden	60,990		
Rewey		58,900	
Total	2,238,290	206,740	
Year to date	24,009,900	1,747,939	4,506,390

In addition to the above there was shipped during the week to the separat-

ing plants, 2,370,920 lb. zinc concentrates.

CHEMICALS

New York, April 20—The general market remains quiet. Contract deliveries are good, but new business is only moderate.

Copper Sulphate—Business is steady and the market shows no change. Prices continue \$4.10 per 100 lb. for carload lots and \$4.35 for smaller orders.

Arsenic—The market is slow, and prices have weakened a little, \$2.37½@2.50 per 100 lb. being quoted for white arsenic. Sales of several 25-ton lots are reported at the lower figure.

Nitrate of Soda—Futures are a little softer and quotations are 2.05@2.07½c. per lb. Spot nitrate holds at 2.15c. per lb., with good sales.

Sulphur—Best unmixed seconds are quoted at \$22@22.50 per ton, New York delivery.

Petroleum

Exports of mineral oils from the United States for the three months ended March 31 were, in gallons:

	1909.	1910.
Crude petroleum	34,739,991	33,058,260
Naphthas	13,598,247	18,873,141
Illuminating oil	250,815,260	219,731,498
Lubricating and paraffin	35,434,307	37,053,851
Residuum	17,577,905	22,352,344
Total	352,165,710	331,069,094

The total decrease this year was 21,096,616 gal., or 6 per cent.

MINING STOCKS

New York, April 20—Some signs of recovery early in the week in the general stock market were hailed by brokers and speculators as the beginning of the bull movement; but this failed to materialize and a reaction followed. The market has been uncertain and inclined to dullness. It has been mainly professional also, and the public does not seem to be deeply interested. It closes rather irregular and without much promise of immediate improvement.

The Curb market also has been rather uncertain, with small fluctuations and little inclination to strength. The copper shares have not been strongly in evidence, although they were the most active of the mining stocks. Cobalt shares were dull and weak and nobody seems to be worrying over the Nevada gold shares.

The New York Stock Exchange has adopted a new rule, under which the commission on mining shares is \$6.25 per 100 shares for stocks selling below \$10 per share, instead of \$12.50 as formerly.

Sales at public auction in New York, April 14, included 200 shares Morning

Star Consolidated Mining at \$105 for the lot; 13 shares Pahasa Mining, preferred, \$1 for the lot; 5½ shares same company, common, \$1 for the lot; 2 shares Cannelton Coal Company, \$2.50 per share.

Boston, April 19—Copper shares have shown a much improved tone and outside of a \$6 drop in the price of North Butte upon the appearance of the annual report which carried the price down from \$41, a fair amount of optimism prevails. Today being Patriot's Day, there was no local market.

Arizona Commercial has steadied now

COPPER PRODUCTION REPORTS.

Copper contents of blister copper, in pounds.

Company.	January.	February.	March.
Arizona, Ltd.	2,646,000	2,658,000	2,886,000
Boleo (Mexico)	2,644,800	2,331,832	2,148,383
Copper Queen	10,001,000	8,927,203	10,809,488
Calumet & Ariz.	2,331,000	2,024,000	
Cananea (Mexico)	3,500,000	3,586,000	3,700,000
Detroit	2,165,156	1,486,400	1,638,975
Imperial	850,000	750,000	
Nevada Con. (Est.)	3,800,000	5,000,000	5,600,000
Old Dominion	2,130,000	2,035,000	2,674,000
Shannon	1,510,696	1,526,000	1,468,000
Superior & Pitts.	2,166,000	1,864,000	
Utah Copper Co.	4,745,066	5,798,819	8,190,000
Butte District	19,250,000	19,758,620	24,000,000
Lake Superior	19,260,127	18,250,000	19,250,000
Total production	77,000,845	69,995,874	
Imports, bars, etc.	24,305,526	14,093,381	
Imp. in ore & matte	7,053,522	6,063,764	
Total	108,359,893	90,153,019	

Butte district and Lake Superior figures are estimated; others are reports received from companies. Imports duplicate production of Cananea, and that part of Copper Queen production which comes from Nacozari. Boleo copper does not come to American refiners. Utah Copper report for March includes for the first time the output of the Boston mill.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
IV, 1909	118,674,292	47,546,010	65,110,111
V	118,356,146	61,163,325	70,542,753
VI	116,567,498	60,591,116	70,966,467
VII	118,277,608	75,520,083	75,018,974
VIII	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124,657,709	66,359,617	56,261,238
XI	121,618,369	66,857,873	55,266,595
XII	117,828,655	69,519,501	59,546,570
Year	1,405,403,056	705,051,591	680,942,620
I, 1910	116,547,287	78,158,387	81,691,672
II	112,712,493	66,618,322	37,369,518
III	120,067,467	62,844,818	40,585,767

VISIBLE STOCKS.

	United States.	Europe.	Total.
IV, 1909	182,279,902	115,024,000	297,303,902
V	183,198,073	114,060,320	297,248,393
VI	169,848,141	127,352,960	297,201,101
VII	154,858,061	150,928,960	305,787,021
VIII	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII	153,003,527	236,857,600	389,861,127
I, 1910	141,766,111	244,204,800	386,970,911
II	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392
IV	123,824,874	249,625,600	373,450,474

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.

that it is known that the \$1,000,000 convertible bond issue is to be a success. The high price of the week was not retained, however, when it was announced that the smeltery would be closed down to allow of an accumulation of reserves. The other Amster stocks are also steadier. The new Lake issues have been fairly steady, although the sharp decline in North Butte caused a similar drop in the price of Lake Copper shares.

The North Butte report for 1909 was a deplorable exhibit and following despatches telling of rich drill strikes, was particularly distressing. The Cole-Ryan issues certainly have done copper shares a tremendous amount of harm. Utah Consolidated has been in better demand and seems to have recovered from the free offering of stock.

Curb stocks have followed closely the trend of prices in the big market.

Assessments

Table with columns: Company, Delinq., Sale, Amt. Lists assessments for various companies like Brownstone, Central Eureka, etc.

Monthly Average Prices of Metals SILVER

Table with columns: Month, New York, London. Lists monthly average prices for silver.

New York, cents per fine ounce; London, pence per standard ounce.

COPPER.

Table with columns: NEW YORK, Lake, London. Lists monthly average prices for copper.

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Table with columns: Month, 1909, 1910. Lists monthly prices for tin at New York.

Prices are in cents per pound.

LEAD

Table with columns: Month, New York, St. Louis, London. Lists monthly prices 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. Lists monthly prices for spelter.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

Table with columns: Bessemer, Basic, No. 2 Foundry. Lists prices for pig iron.

STOCK QUOTATIONS

Table with columns: Name of Comp., Bid., Cig. Lists stock quotations for Colorado Springs and Salt Lake.

SAN FRANCISCO. April 19.

Table with columns: Name of Comp., Cig., Name of Comp., Cig. Lists stock quotations for San Francisco.

N. Y. EXCH. Apr. 19 BOSTON EXCH. Apr. 18

Table with columns: Name of Comp., Cig., Name of Comp., Cig. Lists stock quotations for New York and Boston exchanges.

N. Y. CURB Apr. 19

Table with columns: Name of Comp., Cig., Name of Comp., Cig. Lists stock quotations for New York curb market.

BOSTON CURB Apr. 18

Table with columns: Name of Comp., Cig., Name of Comp., Cig. Lists stock quotations for Boston curb market.

†Last quotation.