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EDITORIAL.

THE ACTION taken by the Secretary of the Interior, in compelling the Governor of Alaska to resign from the directorate of a mining company, calls for commendation. Governor Brady is an honorable man and there is no reason to suppose that he would confuse the double duties of his two appointments. But it is high time that government officials, of every kind, should cease the use of official prestige to bolster up financial enterprises concerning which they know very little. A director is a trustee who assumes distinct responsibility and specific duties; the free grant of a man's reputation to commercial undertakings, which he cannot supervise or safeguard, is a piece of deception, because the use of his name is valuable only as being likely to lead the public to believe that he is using his abilities in the furtherance of interests in which the public has a stake.

THE WEST AUSTRALIAN Government has appointed a commission to inquire into the operation of the contract system in the gold mines of that State. It appears that this time-honored method has proved successful in lessening costs and in yielding fair wages; but the mine-workers claim that favoritism is exhibited in the granting of contracts, so that special parties get the plums. The Government has a contract of its own, if it expects to stamp out this bad practice. Such wrong-doing brings its own punishment and is redressed by agencies more powerful than legislation. The contract system always breaks down when unfairly administered; it is based on a logical method of payment, and appeals to individual enterprise. The mines of Western Australia have been besmirched with scandals enough; we hope that petty corruption, such as that suggested, is not another blot waiting to be made visible.

THE PRESIDENTIAL ADDRESS of Mr. R. A. Hadfield was in keeping with the high standing of the Iron and Steel Institute and his own reputation as a scientific man of affairs. He said many informing things and much that was stimulating. One point, apparently of minor importance, but really fundamental to the usefulness of technical societies, is his insistence that members should read the advance copies of papers before the meeting at which they are to be presented, so that there may be proper

preparation for intelligent discussion. This suggestion ought to be noted by members of all technical societies, the meetings of which are often rendered abortive by the lack of the preparedness advocated by the new president of the Iron and Steel Institute.

IN ANOTHER column there is a brief review of bulletin No. 259, of the United States Geological Survey, on the petroleum and coal fields of Alaska. While the work is only preliminary, yet it is apparent that the outlook is distinctly favorable. The production is fully as high as any field enjoying so little exploitation could hope to show. It takes time, money and patience to make an oilfield. The coal is a high-grade bituminous, some of it a 'semi-anthracite'; as the veins are many and generous in dimension, this may be considered as commercially available. Those who are in any way interested in the metallurgical and commercial development of Alaska, will do well to study this bulletin on the fuel near Cape Suckling, and that also back of Kodiak Island.

THE TRACTION engine has been used for freighting across the hard and level tracts in the Southwest, more particularly in the borax trade. More recently, the automobile has been brought into service in Nevada, and we learn from one of our professional friends that the journey of 100 miles from Tonopah to Bullfrog is made by him in seven hours. This reminds us of the journeys of inspection, covering several hundred miles, which Messrs. H. C. Hoover and J. H. Curle made last year, in a Panhard motor car, over the hard surface of the West Australian desert-plateau. The very idea of such comfortable locomotion will soften the unhappy memories of those who have had to ride the rocking camel or the refractory mule over the sand and spinifex of Western Australia, or the alkali and sagebrush of the Great Basin.

THE PAPER by Dr. O. Boudouard, of the College of France, on the fusibility of slags, abstracted in another column, is one of the most noteworthy contributions to the literature of the subject that has appeared in English since the classical paper by Professor H. O. Hofman, which was published in 1900. It will be recalled that Hofman's paper dealt with the temperature of formation of certain ferrous and calcic silicates, and the influence thereon of the oxides of magnesium, bari-

um, aluminum, etc. Both papers are marked by the greatest care in establishing the conditions of experiment and in the registration of results. It is interesting to note how each of these monographs makes its distinct additions to our knowledge of the composition and formation of the refuse of smelting. But each of these additions also constitutes a new question-mark from which radiates new investigation. The separation of the value in metal or matte is inseparably bound up with the fluidity and cleanness of the waste; and it is only in recent times that the real complexity and vastness of our ignorance regarding slags has come home to us. Most smelter-men read with some interest these casual bulletins of progress and then turn back to the bosh, satisfied if so be that the charge comes through without freezing and with a minimum of fuel. But the end is not yet. Every paper, as that of Boudouard, contributes each its part to the growing accumulation of knowledge. The result will be tested, as in the case of the triangular co-ordinates in this paper. Cross-examination, suggestion and rebuttal, in turn, will follow mutually, till economic smelting will pursue a line which, if not the ideal, will at least be a close asymptote of the highest efficiency.

THE ANNUAL DINNER of the Institution of Mining and Metallurgy, on May 10, appears to have been a grand function; the speakers were distinguished men and they spoke to a distinguished gathering. The future of the Royal School of Mines was the most important subject brought forward, and it was treated with more serious consideration than in times past; from an English point of view, it is something to have the chiefs of government departments talking about it respectfully and with a little more appreciation of the industrial importance of the mining industry. But beyond all this, the old students of the Royal School of Mines will find little to encourage them in the vague assurances which we have read in the account of the dinner, as published by our esteemed contemporary, *The Mining Journal*. It still looks as if the historic School of Murchison, Ramsay, Percy, Smythe and Huxley is to be smothered, amalgamated, consolidated or annexed—call it what you will; we mean that nothing said at the dinner removes the fear expressed in these columns nearly a year ago, that the identity of the Royal School of

Mines is to be lost, and that the British Empire will have no central technical college worthy of its manifold mining activity.

What Constitutes Eminence?

Our contemporary, *The New York Herald*, recently contained an advertisement of the American Nickel Company, advocating the purchase of its shares. This did not interest us; but when we read that the mines owned by the nickel company had been examined by "the greatest mining engineers and experts in the world, including" Brown, Smith and Robinson, our curiosity was awakened. No; not as to the mines, but as to what constitutes greatness in a professional man. We read often of this man as 'eminent' and that engineer as 'celebrated,' and we see such comprehensive adjectives applied to individuals of whom we never heard, or, if we have, it has been in connection with a notoriety of the least desirable kind. Come, let us reason together. Who is an eminent or distinguished mining engineer? Let not the reader anticipate that we are going to start off with a list of names calculated to provoke envy or invite criticism. Not at all; who has made us a judge over our brothers? We shall discuss this interesting matter in an impersonal way. To be 'eminent' is to be on an eminence, to be high in reputation, to be credited with unusual character or ability. To be 'distinguished' is to be different from the crowd, to be set apart for honor and esteem. In both cases some consensus of opinion is assumed. Jones is not rendered eminent because Brown tells Mrs. Brown that his friend is such and so; Smith cannot be styled as distinguished because Robinson labels him thus, preparatory to borrowing from him. To say that an engineer is eminent or distinguished, means that he is widely acknowledged to have proved, by achievement, the possession of unusual qualities. Good qualities are assumed; if the bad are to be indicated, then 'notorious' is the adjective we employ. Moreover, such judgment, to be acceptable, must come from his peers; it is the profession and not the press that determines the status of the engineer.

In the case above cited, four or five names were given. When we asked the Secretary of the American Institute of Mining Engineers; when we put the question to four representative consulting engineers resident in New York; when we

pressed the button of our own memory of a wide acquaintance, we found that only one of the gentlemen named was known at all, and even he could only be labeled as a respectable mediocrity. An engineer may be capable—he may be the most capable in the profession; he may be clever and experienced beyond his fellows; he may be honorable and deserving of distinction, but, unless he is *recognized* as such, he is not 'eminent' nor is he 'distinguished.' We will go further, and risk the jeers of the pseudo-eminents by saying that if an engineer is unknown to any three of such men of wide acquaintance as the Secretary of the American Institute of Mining Engineers, to him of the Institution in London, to the editors of such professional papers as the *Mining Journal* of London the *Mining & Scientific Press* of San Francisco and ourselves, he is not eminent; but he may be something a hundred times better—a gentleman and an engineer. All of which is meant chiefly for the benefit of those that write the flamboyant prospectus and delight in a multitude of words.

Shot-firers in Illinois.

The legislature of Illinois has passed the law making compulsory the employment of shot-firers in coal mines. The law was strongly urged by the miners' organizations. It contains some features not acceptable to the operators generally, but they do not seem to have taken much pains to oppose its passage. At any rate, their opposition was not sufficient to prevent the enactment of the law, which now only waits the signature of the governor to become effective. That it will receive that signature seems to be accepted as certain.

The main objection raised to the provisions of the law is the additional cost imposed on the operators by the shot-firers' wages. This, the Operators' Association claims, will compel them to pay for work properly included in that which the miners agreed to do, when the present wage schedule was adopted. In fairness, they say, the miners ought to reimburse the operators for this extra cost. In the present condition of the trade, with the sharp competition of coal from other States, the smallest addition to cost is important, and may turn the slight profit now realized into a loss.

It is further claimed that a direct effect of the law will be to favor carelessness on the part of the miners. This is already

enough in evidence, and any increase will be disastrous. The miner places and makes ready the shots, but the danger resulting from bad placing, improper drilling, or careless tamping will be incurred by the shot-firers alone. Theoretically, this should make no difference; practically, as human nature is constituted, the miner is very apt to be less careful, when any danger arising from his neglect will not affect him personally.

These claims of the operators seem to be well founded. It is doubtful, however, whether they will receive consideration from the other side. It is possible that some arrangement may be reached with the miners' unions as to the additional cost; but the inclination is not, apparently, toward such a concession. The other points must work themselves out. Whether the employment of specially skilled men as shot-firers will countervail the miners' carelessness is very doubtful, since it is impossible for any inspection to determine whether all shots are in proper condition. In any case the law adds a new cause for disagreement to the existing ones, which are already numerous enough to make trouble in the future.

Terreohmetry.

There are people who seem to think that the making of long names makes life easier to bear, and the worst victims of this illusion are the poor enthusiasts who never emerge from the mental fog of their own making. On the other hand, a really good thing may frequently be hidden behind a foolish affectation. The new candidate for lexicographical honors, which appears at the head of this paragraph, is a make-up of the common words which mean earth, resistance-unit and measurement. The purpose which underlies this stilted name is the old attempt to discover mineral by electro-magnetic or similar apparatus. Ore discovery is perhaps not yet a science, but it certainly is an art. It has cut loose from the mystery of the divining-rod, and it depends on common sense; but it is not averse to any real invention. Meanwhile a good use of the strike and dip, with a shrewd application of the simpler laws of fault, makes the basis. This is largely supplemented by the diamond drill. The future may bring us the electro-induction indicator; meanwhile mining engineering will continue to do business at the old stand of "knowing the ground."

The Nevada Goldfields.

The whirligig of Time plays strange tricks; some of them are unexpectedly agreeable. To a miner none is more striking than the chain of mineral discoveries which first linked Nevada to the glories of the Comstock and now gives it the fame of a new gold-mining region of first importance. The romance of Tonopah's discovery and the commercial value of the development resulting therefrom had hardly become an old story when, a few miles southward, another rich district was opened up in the locality now called Goldfield. These two mining centers added notably to Nevada's standing as a gold region in the statistical records of 1904. The ore is of exceptionally high grade; at one mine 14 miners are responsible for an output yielding dividends of from \$15,000 to \$30,000 per month. The Combination and the Florence have reached a maximum depth of 350 feet; a neighboring mine, the Jumbo, is 250 feet deep. These figures indicate the line of groundwater. Just above that horizon the ore has become base by admixture with tetrahedrite (gray copper), and it is expected that there will be a diminution in richness, the phenomenal value of the ore from groundwater to the surface being due to secondary deposition. However, the mineralization is less diffuse as the sulphide zone is penetrated, so that the cost of exploitation is likely to be less, warranting the expectation of successful mining to a depth greater than that as yet attained.

The discoveries at Goldfield have attracted prospectors, who, finding the ground occupied by those earlier to arrive, have scattered over the surrounding region and examined it with an energy that has resulted in further finds. About 80 miles south of Goldfield, another district is growing into prominence. This is Bullfrog. There are about 7,000 men at Goldfield and 3,000 at Bullfrog, but there is also a large floating population engaged in prospecting the desert region as far south—100 to 150 miles—as the Colorado river. All this country is now full of activity, and there is probability of further discoveries being announced during the season now in full swing. The occurrences of ore are widespread. It would appear that the region has been the scene of intense and widespread solfataric activity, resulting in a sporadic impregnation of the andesite and the removal of the basic ingredients of that rock, followed by a

later enrichment of the silicious framework by gold-bearing quartz. The high grade of the ore sent out from Tonopah, Goldfield and Bullfrog is in part indicative of the richness of the deposits, but it is also due to the lack of transport facilities. The published annual report of the Combination Mines Company shows that the entire output of 1,265 tons of shipping ore averaged \$450 per ton, while at the same time there was produced 4,400 tons of millstuff averaging \$50 per ton. This proportion is typical; the average output of the district is quoted at \$200 to \$250. Freight and smelter charges on the first-class ore—which goes to Salt Lake and the Selby smelter—are about \$37 per ton; it is obvious, therefore, that poorer stuff could be handled at a profit, but the fact is that the congestion of traffic on the little narrow-gauge railroads has caused a restriction of output and has compelled the selection of ore yielding the handsomest returns. Such being the case, it is obvious that as soon as the factor of transport is improved, there will be a notable increase of production and a rapid fall in the average tenor of that output, coincident with an expansion in mining operations throughout the region.

Market Conditions.

May 24.

The metal markets continue generally quiet, the prevailing feeling being apparently one of suspense as to the future—no apprehension, but a slight uncertainty.

Copper has been uninteresting, in spite of the undoubted large consumption, and the fact that buyers must come into the market for supplies before long. Trade abroad is also quiet. Tin has had moderate fluctuations only. Lead shows the usual consumptive demand, with no material changes, either in sales or prices. Spelter is quiet and again rather weak.

Silver has shown little change, and there seems to be no improvement in the demand from the East, which is just about sufficient to keep the market steady.

In iron and steel, we find a waiting market again. Consumers have generally contracted for supplies up to the end of the first half of the year—in many cases over the third quarter—and are unwilling to make any further commitments until the future is more clearly fixed. The main new business just now is in small orders for early delivery. Furnaces and mills are busy, and production continues at a high rate. The waiting attitude assumed by

buyers is, without doubt, partly caused by a hope of securing concessions in prices when new contracts come up.

The coal markets in the West are still suffering from over-supplies at most large consuming points. The Lake trade has been rather disappointing so far, which does not help matters. In the East, both anthracite and bituminous markets are in good condition, and there is no change from last week.

Metallics.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The oscillograph is an apparatus for recording the delineation of the forms and potential of the current waves.

Adulterating radium salts with witherite is a novel practice to maintain the luminosity and lower the price of this chemical.

The first production of tin from South Carolina was during 1903, from the Ross mine. A shipment of 19¼ tons of concentrate was made to England.

A telephone line fitted with the Pupin coils has been installed in Austria. Coils of 2.50 resistance, and a self-induction of 0.2 henry, were placed 1,250 meters apart.

An effective igniter for thermitite is said to be made by a simple but intimate mixture of powdered aluminum and barium peroxide. It can be lighted either with a common fuse or an ordinary match.

If 80,000 cubic feet of water per second are taken from Niagara river at the Lake Erie exit, the American Falls will cease to exist. This is the estimate of the New York State geologist.

Three Tesla patents expired during the first week in May, but it is still uncertain whether the use of the poly-phase principle, as used by the aforesaid patents, is, or is not, covered by numerous other patents which are still effective.

A new ship-propeller, patented by R. S. Crawford, carries an ingenious setting of the blades on the screw, which is claimed to give a better grip on the water, with less slip and less broken water. The blades are not arranged perpendicularly to the shaft axis, but are "inclined aft from root to tip," being curved circumferentially. The tip of one blade overlaps the base of the next. The result seems to be that the equivalent of one old blade is made up by a set of the new ones, perhaps catching more water, and releasing it with less back-suction.

Effect of Liquid Air Temperatures on Iron.

A note from R. A. Hadfield, at the recent meeting of the Iron and Steel Institute, at Sheffield, England, says: "As many iron alloys have shown anomalous results in their physical behavior at ordinary temperatures, it became advisable to ascertain the exact effect of very low temperatures upon such bodies, and accordingly a series of tests were carried out on standard iron and steel alloyed with other elements, the specimens being selected from a large collection made by the author at the Hecla Works, Sheffield. In the course of the inquiry, some 500 specimens have been examined. The bars experimented upon were finished a length of 2 in. and a diameter of 0.180 in. between punch marks, with an extra 0.60 in. at each end. The bars were then tested while immersed in liquid air, at minus 182° C.

"The results show that with the exception of the nickel-manganese-iron alloys, the effect of liquid-air temperature is to increase in a remarkable degree the maximum tenacity of iron alloys, while in most cases their ductility disappears. These changes take place in the softest wrought iron as well as in the various carbon and other steels. In the case of the nickel-manganese-iron alloys, not only, however, is the ductility increased, but the tenacity reaches the high figure of 85 tons, with an elongation of no less than 67½%. Further, there is no doubt that the useful toughening effect of nickel upon iron is shown by this research, as even though ordinary nickel steel becomes brittle, it does so to a much less extent than carbon steel. It would appear, therefore, that iron, a cheap and convenient metal itself, must be permeated or alloyed in the mass with some alloy to modify its properties."

Spanish Mineral Trade.

Imports of fuel into Spain for the three months ending March 31 included 521,049 metric tons of coal and 36,789 tons of coke; showing decreases of 55,156 tons of coal and 9,098 tons of coke, as compared with last year. The exports of minerals for the three months are reported by the *Revista Minera* as follows, in metric tons:

	1904.	1905.	Changes.
Iron ore.....	1,682,064	1,659,050	D. 23,014
Copper ore....	247,102	235,411	D. 11,691
Zinc ore.....	23,806	25,052	I. 1,246
Lead ore.....	7,228	10,377	I. 3,171
Pyrites.....	99,906	151,075	I. 51,169
Salt.....	81,025	86,172	I. 5,147

Exports of metals included 20,800 tons of pig iron, an increase of 11,358 tons; 5,985 tons of copper, an increase of 267 tons; 335 tons of zinc, an increase of 21 tons; 35,570 tons of lead, a decrease of 8,602 tons, as compared with the first quarter of 1904. The most notable point is the decrease of 19.5% in lead exports.

Approximately 43 per cent of all the tin produced in the world is consumed in the United States.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

THE COST OF MINING.

The Editor:

Sir—I am a reader of your valuable JOURNAL, and derive pleasure and profit thereby. Among the many things of interest it contains, to me there are none more so than the reports of the cost of mining; but in those reports we are never told what the cost is of those articles that make up the per ton cost; hence, as comparative figures, they are not very reliable. There is a great difference in the price of mining supplies if bought in large or small quantities. So also do the hours and wages

nature of a memorandum for the young mine-superintendent who may not have had the experience in shaft-sinking.

Our supplies were shipped from Butte, 30 miles by rail, thence eight miles by wagon over a rough mountain road, grade 200 ft. to the mile. When we started work on the shaft, it was already down 650 ft. The work involved in getting ready to sink, such as placing the station pump in a proper place, putting in a bulk-head, and cleaning out the mud—8 ft. of it—from the bottom of the shaft, cost over \$200, which was charged up to the cost per foot of sinking. The size of the shaft where we started is 9 ft. by 4 ft. 6 in., the new work is 9 ft. by 4 ft. 10 in., all timber 10 by 10 in. fir. For hoisting the rock we used a bucket with the bail pivoted below the center, and for lack

shaft being well in the foot-wall the granite was very hard for 160 ft.; the remainder, while it was good stiff ground, broke well. The contract price was \$16 per foot, the company furnishing all material; there were four contractors, who employed eight others, thus making four men per shift. We used two D-32 Ingersoll-Sergeant rock-drills. When sending up rock, one of the shaft men acted as top carman, for which I allowed the contractors \$3.50 per shift; this man also handled the rock from the drift, so that when there was no rock coming out of the shaft, we had no top man to pay. We found this plan advantageous both to the company and contractors, for the man that worked on top got \$4, the same as the men on the bottom, hence he got a 'move on him.' The distance sunk—214 ft. @ \$16—cost \$3,424; to which add \$357 for top carman; dividing by 864, the number of shifts, gives \$4.37 per shift per man. The top work was charged to pumping and hoisting account.

JAMES HUMES.

Basin, Mont., May 15, 1905.

THE HARVARD-'TECH' ALLIANCE.

The Editor:

Sir—I notice that, though you have room in your editorial columns to comment on the political danger that threatens small technical schools in the West, yet you have not devoted much space to the serious proposal for the amalgamation of the technical schools on the Charles. I pen this note in the hope that it may elicit further discussion which may throw light on the situation; for, evidently, as far as the published records speak, there is altogether too much hesitation and uncertainty on the part of those who should be intelligent leaders. I am sending you, under separate cover, a marked copy of the special April extra of *The Technology Review*, which is devoted to the discussion of this proposed alliance. You will note that the four affirmative arguments (page 10) are: (1) The financial; (2) economy in avoiding duplication of work and equipment; (3) concentration and elimination of competition; (4) the liberalizing influence of Harvard.

Now all this is well, but there are one or two points that are clear. The 'Tech' has 1,500 students. Harvard has in her 'technical' departments many hundred less, and the technical element is, has been, and always will be, overshadowed by the larger, more general, and more vague culture-idea. In New York city, Columbia grew up as an association of successful technical schools. President Butler is trying hard to annex a 'university' and a 'college' to these technical schools. I am not assailing the college culture idea, but business is business even in education, and the establishment and development of such a high-grade technical school as that under discussion, is no accident. In my humble judgment there are two main points to

Supplies for Sinking Shaft 214 Feet.

4 kegs 40d nails.....@	\$3 63½	\$14 52	
21 round-point shovels.....	0 84	17 64	
236 ½ by 8 in. lag screws.....	5 50	12 98	
20 lb. ½-in. cut washers.....		1 50	
4 plumb bobs.....		2 00	
200 feet plumb line.....		0 25	
6 mine torches.....	0 75	4 50	
Wicking for torches.....		0 15	
300 lb. 1-in. round soft steel for hanging bolts.....	3 40	10 20	
48 1-in. square nuts, 44 lb.....	0 07½	3 30	
48 1-in. cast washers, 32 lb.....	0 05	1 60	
9 axe handles.....	0 35	3 15	
2 axes.....	0 85	1 70	
2 doz. pick handles.....	0 27	6 48	
1 doz. 36-in. sledge handles.....	0 21	1 52	
100 lb. axle grease—for cartridges.....	0 06	6 00	
415 lb. of 2-lb. T rails—for surface track.....	2 75	11 42	
50 lb. track spikes.....	0 04	2 00	
2,345 lb. blacksmith's coal.....	16 50	19 38	\$120 29
18½ boxes candles—2040 Snowflake.....	3 00	\$55 50	\$55 50
2,600 lb. powder—Repauno gelatine.....	14 25	370 50	
10,700 ft. triple tape fuse.....	0 46	49 42	
2,400 caps—Lion brand.....	0 75	18 00	437 92
50,000 ft. timber and plank.....	17 50		\$875 00

The ratio of plank and square timber used was, square timber 55.36%; 2-in. plank 44.64%.

Labor.

Blacksmith, 57 days.....@	\$4 00	\$228 00	
Blacksmith helper, 24½ days.....	3 00	72 75	300 75
Carpenter, 77 days.....	4 50		\$346 50
Superintendent.....			556 92
Contractors.....			3,424 00
Pumping and hoisting account.....			1,916 05
Plant maintenance and additions account.....			534 79
			\$8,567 72
Hardware supplies.....	\$0 561916	per foot	
Candles.....	0 259345	" "	
Ammunition.....	2 046355	" "	
Timber—except guides.....	4 0887	" "	
Pumping and hoisting account.....	8 9535	" "	
Plant maintenance and additional account.....	2 4986	" "	
Blacksmith work.....	1 405374	" "	
Carpenter work.....	1 61916	" "	
Superintendent.....	2 60	" "	
Contract price.....	16 00	" "	
	\$40 03	" "	

paid differ in different localities, as do all other conditions affecting the character of operations. In giving those reports to the public, the character and hardness of the rock should be given, as well as cost of material; in fact, all things that add to the final expenditure. The mine owner reads the report perhaps as keenly as does the mine superintendent, and if it happens that he has had similar work done on his property at a greater cost, he will wonder why his man could not do it as cheaply as the other fellow, and thus many a good man may get 'knocked.'

This report is not intended as an example of how cheap this kind of work can be done (it cost \$13.50 less per foot than the previous 200 ft.), but is more in the

of height under the sheave it was hung just two feet under the cage; to dump it we hinged a door on the opposite side of the shaft from that on which we caged the cars; on this door we placed the car and dumped the rock into it from the bucket. We used the cage to lower and hoist men, also to hoist rock from the 400-ft. level, where we had two shifts, of two men each, running a drift. While the mine made considerable water, the shaft was quite free from it; what there was came from near the surface and amounted to 50 gal. per hour, which we hoisted to the 600-ft. station and dumped it into a launder, which carried it to the mine sump. We started to sink November 29, and finished February 19. The

which attention should be drawn: (1) The financial; (2) the matter of independent maintenance of high standard. To be frank, it is no whispered secret that Harvard is a place where the average man, of fair ability and some money, may have a 'picnic' after he gets in. This does not apply to all men nor to all courses, but the fact and its open confession are patent (as shown by reference to Part I, p. 72, and Part III, p. 37). The tentative relation may be safely and certainly carried out, provided that the 'Tech' contracts for generous financial support, and a free hand in maintaining that rigorous standard which has made her men known favorably wherever they have gone. There is a difference between the work of a lecture course, and that of one involving laboratory training. There is a difference between a study of romantic poetry and the rigor which involves the application of mathematical physics and mechanics. This difference obtains at Harvard at present, and the man who throws mud carelessly at that venerable and scholarly academe is a careless ignoramus. Nevertheless, the reputation of the 'Tech,' as a whole, for hard work, is better than that of Harvard as a whole.

This is, then, the gist of the whole matter (barring all the legal adjustments that must be made); let the plan be pushed boldly, openly, fearlessly. Both the Lawrence and the 'Tech' must grow; they can affiliate and be mutually and unitedly helpful; but it will take money and standards in scholarship, to say nothing of the wise management and adjustment required. That will come. It is easy to follow a policy that is wise and good, and that is clearly outlined. And the wise policy, however definite, always provides a large 'factor of adjustment' to forestall all incidental outworking of incidental detail.

I hope that this matter may receive prompt and free discussion in this JOURNAL, and by those fitted from experience to advise. Not only are the interests of two great schools concerned, but, much more, there is at stake the welfare of the public at large.

Boston, May 18, 1905.

ENGINEER.

The Editor:

Sir—There is such widespread misunderstanding of the attitude of the faculty and former students of the Massachusetts Institute of Technology toward the proposed alliance with Harvard, that the public should be definitely informed, in as few words as possible, of the real grounds of the opposition of at least 90 per cent of the men of these two bodies. College loyalty and sentiment, very properly, play a part in determining their attitude toward the suggested partnership; but it is a very minor one. The chief grounds of opposition are to be found in that common-sense, clear thinking and business caution which the institute training does

so much to foster. The theoretical advantages of such an alliance are indeed attractive, but when reduced to the practical details of a definite plan, based upon the actual conditions to be met, the objects desired can be but partially realized, if at all, and serious complications arise which would make the experiment dangerous and unwarranted.

Four main arguments are used in urging institute men to ratify this proposed alliance: (1) That it will bring in money; (2) that it will save money; (3) that it will broaden the institute education; and (4) that it will promote the cause of 'higher education. Even were all these advantages to be secured, theoretically, through an alliance with Harvard, the faculty and former students of the institute object, by an overwhelming majority, to the practical means proposed. By this 'Proposed Agreement' Technology is called upon to sign a contract, vague and unbusinesslike in form, revocable at the will of either party, wholly contingent upon legal interpretations and decisions, pregnant with misunderstandings, and requiring the institute to assume most of the present burdens and, in case of rupture, all future losses. The plea that this is a 'gentlemen's agreement' does not reassure men accustomed, as are those of the institute, to reading contracts and weighing their probable results. Long experience has taught them that such documents must sooner or later face the courts, and that the law reads them as they are written, not as 'gentlemen' may be willing to interpret them.

This 'agreement,' moreover, requires the institute to bring all her present resources in real estate near enough to Cambridge to share the disadvantages of that locality, but not near enough to partake of the real advantages of the collegiate environment; forces her to agree to reimburse the university in the event of annulment of the contract; and compels her to reorganize her government, to limit her choice of an executive board, and radically to change a policy which has given her the prestige she now holds—a prestige which has been attained, however, only because of her unique position as an independent institution.

Setting aside the question of the moral right of the university, even though she may secure legal permission, to divert bequests from their intended purposes, and assuming that the supreme court decides that a part of the McKay money may legally be spent at the institute, even then this highly objectionable 'agreement' does not achieve what it is supposed to accomplish. Were it to be ratified, the institute, for a generation to come, would secure from Harvard only money enough to pay the cost of teaching the Lawrence Scientific School students, and would be compelled to bear the whole burden of providing for the natural expansion of the combined institution. The McKay

endowment, under this plan of alliance, would yield to the institute only three-fifths of the *income of the net income* of the estate for about fifty years, and the sum then available would be only three-fourths of the income of the accumulation of about \$5,000,000. To offset this, however, the institute would lose at least \$2,000,000 in bequests contingent upon her independence, would undoubtedly forfeit State support, and, most serious of all, would almost wholly cut off the present and future financial support (direct and indirect) of the more than six thousand former students who are now enthusiastically ready to assist her.

The plan of alliance will not save money for the institute, because it does not and—except by giving a cheaper and less thorough education—cannot avoid duplication in either instruction or equipment. To save money in administration (following the example of business "mergers") is possible, but only on condition of making the institute an integral part of Harvard University.

The plan will not really broaden the educational life of the institute; it will merely substitute for the well-recognized and thoroughly tested spirit of Technology the different spirit of the university. The students of the institute, already pressed with the necessary work of their own courses, would find no time for intercourse with those of Harvard, even were they to be admitted (as Dr. Pritchett says they are not) to the undergraduate classes of the university. The association of Harvard and institute professors upon one faculty is likely to lead to friction rather than to educational development, since the Harvard members to be injected are mainly heads of established courses. As to the broadening which is supposed to come from paying larger salaries to teachers, that cannot take place for at least fifty years, since neither the 'Proposed Agreement' nor the McKay endowment (until the death of the last annuitant) can provide higher salaries.

The projected alliance, finally, will injure, not help, the cause of higher education: (1) Because it does away with competition, that leading stimulus to educational development; (2) because it creates a school too large for the only right kind of higher education—that which places every student under the immediate supervision of one or more members of the faculty; (3) because it restricts the choice of youth seeking a higher technological education to one kind of institution in this educational center; and (4) because it brings to an end the great endeavor of Rogers, Runkle, Walker and their associates to build up, on a basis of science, modern languages, history and economics, a true university which shall meet modern conditions and needs more fully than can any of the older colleges.

M. I. T. ALUMNUS.

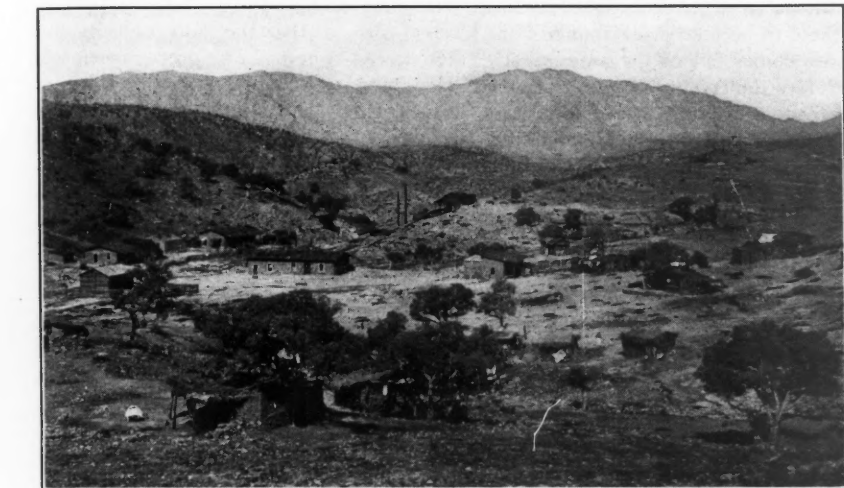
Boston, May 15, 1905.

The Moctezuma District, Mexico.

BY M. CLERE.

Contributions on Sonora and its mining possibilities have often appeared in this JOURNAL, and it is my intention at this writing to give only a brief account of the mining conditions in the northern part of the Moctezuma district. This region is well known by reason of the great copper belt worked by the Moctezuma Cop-

per Company, with its mines at Pilares and its smelter at Nacozari, and more recently by the Transvaal Copper Company, at la Verde, and some other concerns. During recent years, a number of silver-gold ledges have been developed around Nacozari and Cumpas. I happen to be more particularly acquainted with the group of ledges lying northeast of, and close to, Nacozari. They form an extensive system of almost parallel fractures, with certain defined characteristics. The country is ancient andesite porphyry, covered in places by an overflow of volcanic breccia and more recent granitic porphyry. The veins are in the older formation. The capping of breccia is sometimes cut by stringers, occasionally rich in gold, but as yet of no commercial importance. The mean average strike of the system is north 65° west. The parallel veins run at intervals, 600 to 3,000 ft. apart. There are four principal and a number of small secondary ones. They all dip south. At surface they are nearly vertical down to a depth of about 100 ft., then they flatten gradually and reach an average dip of 80°. The vein matter in many cases is a magma of decomposed porphyry and quartz impregnated with iron oxide, silver ores and gold. Occasionally the ore is almost pure quartz, of the amethyst variety; in other places it is absolutely decomposed and then takes the form of a plastic clay.



SAN JOSE CAMP AND MILL.

The distribution of the rich ore is very irregular. As a rule it occurs in shoots, but between these shoots there are zones of medium-grade ore with occasional bunches of high-grade. The shoots seem

to be limited in extent along the strike, but they are not far apart one from another. The length is between 50 and 200 ft.; the width is between 3 and 15 ft. It seems that they have a general tendency to pitch to the southeast and affect the form of a lens, some of them being almost perfectly lenticular. The silver ore is mostly the chloride, called here *plata verde*, and also, but less frequently,



MOUNTAINS, FROM EL GLOBO TUNNEL ENTRANCE.

argentite, and occasionally pyrargyrite and ruby silver. The gold is chiefly associated with the hematite, and is often coarse. Although there is no definite proof of it, it seems that deposition took place in two stages: First, the silver ore carrying a small percentage of gold; and second, ferruginous solutions depositing crystals of hematite with particles of free

gold. The best ore is not always found between the two parallel walls, but sometimes in a sort of pocket hanging along one of the walls. It is advisable to cross-cut from time to time in order to ascertain that the true wall has been penetrated.

on that subject have so far been gathered. The orebodies begin near the surface where they outcrop only as narrow streaks of rich ore, and sometimes even this indication fails entirely. The shoots widen from the surface down, and from my experience it seems that they attain their full width between 100 ft. and 200 ft. below surface. Only three mines in the silver belt are deeper than 300 ft.; these are the Churinibabi, the San Jose and El Globo. The first is 550 ft. deep; the orebody that has been worked in the upper levels has been encountered in the lower, with the same character and the same average value. In the San Jose mine, the bottom of the shaft, 365 ft. deep, is in low-grade ore. All the levels above have traversed a big ore-shoot, and it will be shortly ascertained, by drifting from the bottom of the shaft, whether it goes further down. In El Globo, the 300-ft. level is in rich ore. I do not know if there is any level below that. In short, the persistence in depth is not yet well ascertained, but in all probability the ore will go down at least to 500 or 600 feet.

As for persistence in depth, it may be said that the district being comparatively new and little developed, few general facts

mill, but in the meanwhile has been shipping sorted ore to El Paso and other smelters. Average values of \$140 per ton, for lots of five to ten tons, have been attained. El Globo is especially well situated for water and fuel. The Huacal and El Globo mountains are heavily timbered, and a perennial stream can be pumped easily to the millsite.

The Churinibabi mine is situated near

Nacozari and along the railroad from Douglas (Arizona) to that place. It belongs to the Moctezuma Copper Company, and its ore is used as a constituent for the re-lining of the converters. This is the only mine in the region that is worked below the water-level. It is now 550 ft. deep, and has cut a strong flow of water that recently overpowered the pumps. The mine is now being unwatered. The ore is silicious and averages \$15 in gold per ton. The output, before the mine was flooded, was about 15 tons per day. The mine is worked through an incline.

The San José mine, 4 miles northeast of Nacozari, belongs to the Sonora Mining Company, of Paris, France. The San Jose ledge, a well defined and strong vein, is traced 4 miles. The foot-wall is generally more apparent than the hanging, and is often covered with a seam of clay. Sometimes there is no definite hanging wall, the ore impregnating the porphyry and fading away. The average width of the vein, between the ore-shoots, is about 2 ft., the ore-bodies themselves being 3 to 10 ft. wide. The development work consists of 2,700 ft. of drifting and 1,200 ft. of shafts and winzes. Five levels have been started at rather irregular intervals; they are connected by an incline. The tendency of the present management is to do away with the standard distance of 100 ft. between two consecutive levels and to start drifts 200 ft. apart. This distance is quite safe, at least above the water-level; old stopes 200 ft. high stand almost without timbering. The assay-plan of the workings shows an average value of \$10 per ton in gold and silver; this average does not include certain ore-shoots now being opened up. It may be said that, generally speaking, half of the value is in gold and half in silver, though sometimes the output is purely a silver ore, and sometimes all the value is in gold. Sampling must be done at close intervals, and I would advise intervals of not more than 5 feet.

The San Jose company owns a 10-stamp wet-crushing silver mill, using the Boss system of pan amalgamation, with subsequent concentration on Frue vanners. The crushing capacity is between 19 and 24 tons per day through a 40-mesh screen. The stamps, when new, weigh 950 lb., and drop seven inches and 95 times per min. Wet and clayish ore causes frequent trouble.

The Sonora Development Company is a Kansas City concern, owning a number of prospects; among these, the Pittsburg mine is the most developed. It is situated on a vein parallel to the San José. It is now below the 200-ft. level and has about 1,500 ft. of development. The ore is silicious, but stained with hematite. Two ore-shoots have been encountered so far, one being of good size. The average value of a lot of 30 tons has been \$13 per ton.

Most of the prospects and the properties mentioned belong to small parties without the necessary means to open them, turn

them into mines, and treat the ore to the best advantage. It has been, therefore, the aim of the mine-owners to find a rich ore-shoot, work it down to 100 ft., sort the ore, and ship it. This method has never met here with a steady success. The reasons are many: First, the bulk of the ore is low-grade, that is, from \$7 to \$15 per ton. There are shoots of \$20 and \$30 ore, but not in large quantity. Second, sorting is generally difficult, especially in the porphyritic parts of the veins, where seams and pockets of wet clay are found. The broken ore comes out of the mine muddy and therefore difficult to sort. Third, the returns from the smelters are low; this is due, in part, to the heavy freight rates on all railroads in the southwest of the United States, the lack of competition and the Mexican export duties. There are four buyers of ore: The Nacozari smelter, the Copper Queen smelter at Douglas, El Paso smelting works, and, recently, the National Metal Company, of New



SAN JOSE MILL.

York and Mexico, with its sampling works at Yzabal, on the line of the Nacozari railroad. Under existing conditions, it is not profitable to ship ore carrying less than \$50 to \$55 per ton.

Here is the settlement of the National Metal Company on ore having an assay value of \$50 per ton: Payments: 85% of the silver value, 90% of the gold—valued only at \$18 an ounce. Reductions: Freight and treatment, \$16 per ton; silica, 10c. per unit. The ore in question contained 70% silica.

As a matter of fact, many trial shipments have been made, but the best result obtained has barely paid expenses. It is my opinion that a good custom mill, erected in the center of the district, would be kept busy and enable most of the mine-owners to work their properties to a fair profit. Let us see what has been done here in the way of mills. The first stamp-mill brought into the district was erected some eight or ten years ago in San Mig-

uelito, on the banks of the only available stream. It was intended to treat the ore of the San Jose mine and the Churini-babi, before they were sold to the existing companies. It did also a certain amount of custom work on rich ore from neighboring prospects. The ore was crushed dry, roasted in a revolving cylinder of the White type, amalgamated in pans by the ordinary process, settled, and cyanided. The plant was small and clumsy. There were nine stamps, in two batteries of different size, so that the daily capacity did not exceed 10 tons. The process seems to have been well adapted to the class of rock treated. Roasting was not always resorted to, but was necessary when bunches of sulphides were encountered. No ore under \$25 per ton was treated in that mill. The aim was to transport only the best ore possible, and hence a big force of men was kept busy at the mines in sorting ore, thus reducing the profits severely. The San Miguelito mill went out of commission three years ago, and then the San Jose mill was built. The ore is stamped wet through 40-mesh screens, then re-ground in two grinding pans, amalgamated by the Boss continuous process of pan amalgamation, and finally concentrated on Frue vanners. The process did not give full satisfaction, but I think that this was due rather to some deficiencies of the plant than to the process itself. There are only five amalgamating pans, and six or even seven would seem to be required; also, there are three vanners working, and on account of the light concentrate formed, four vanners would not be too much, and possibly five would do better work. The average recovery is 70%, and the maximum recovery has been 84%. It is possible that, in certain parts of the mine, some of the silver occurs as sulphide, and this is not all decomposed by the action of the salt and copper sulphate in the first pan.

The itemized cost of treatment per ton, for a crushing capacity of 20 tons per day, is as follows:

Labor.....	\$1.46
Chemicals.....	0.35
Loss of quicksilver.....	0.25
Power.....	1.35
Wear and tear.....	0.25
Oils and greases.....	0.17
Water supply.....	0.75
Total.....	\$4.58

The San Jose company is about to increase the capacity of the mill by adding 20 stamps and additional pans and vanners, so as to reduce the milling cost per ton. It is expected, then, to make a net profit on all ore having an assay value of at least \$8 per ton. The same process of treatment, namely, pan amalgamation and concentration, has been adopted by the Sonora Development Company. They have a 10-stamp mill on the ground, but the stamps are lighter than those of the San Jose and the whole plant is smaller. El Globo Company also is planning to erect a 10-stamp wet-crushing Boss pan-amalgamating mill, with subsequent cyanida-

tion of the tailing. Judging from the experience gained in the San Jose mill, I would say that a 10-stamp mill seems too small a unit in this particular district, where most of the ore running \$8 to \$12 per ton would have to be left in the mines, as it will not pay under the circumstances to treat it in such a small quantity as 20 tons per day.

As for the process adopted, wet-crushing continuous pan-amalgamation has answered fairly well; not that a better recovery could not be obtained by dry crushing and roasting, but it would be out of question for such low-grade ore, the additional recovery being much more than offset by the additional cost of treatment. As a matter of fact, most of the ore treated had always proved to be of a free character, until, a few months ago, the San José company, near the surface, ran across sulphide ore free from base metals, but where the silver was in the form of argentite, finely disseminated through the mass. The ore averaged \$17.50 per ton. Of course the recovery was low, and experiments were started to ascertain the best process to use in case this sulphide ore should be found in any quantity. Roasting and amalgamation might be resorted to, but, owing to the high cost of fuel and salt, can only be used for ore above the average. Cyanidation did not give any good results, except with previous roasting. With raw ore the best extraction, after a four days' treatment and with a solution strength of 0.3%, was only 46%. This could be foreseen, as it is known that sulphide of silver is not amenable to cyanidation. Further experiments are based now on an increased time of treatment in the pans, combined with a more thorough grinding of the pulp and a much more liberal use of chemicals. Good results have been obtained so far, and should it prove a commercial success, I shall be glad to transmit additional information on the subject.

SOUESITE.—This is the name of a new iron-nickel alloy occurring as a mineral in the auriferous gravels of the Fraser river at Lillooet, B. C., Canada. The mineral is associated with native platinum, iridosmine and gold, with magnetite, ilmenite, quartz and garnet. Souesite occurs as rounded grains of "a faint yellowish steel-gray color, and a submetallic luster; is strongly magnetic and malleable. Its specific gravity at 155° C. is 8.125." It is attacked by nitric acid in the cold, and by hydrochloric on heating. Its composition is Ni 76.48, Fe 22.30, Cu 1.22. The find is named by G. C. Hoffman, of the Canada Geological Survey, after Mr. F. Soues, the finder; and is described in the April issue of *The American Journal of Science*. Other minerals similar to souesite are awaruite, josephinite, and an Italian alloy found in the Elvo river, near Biella, Piedmont, Italy.

The Fusibility of Slags.*

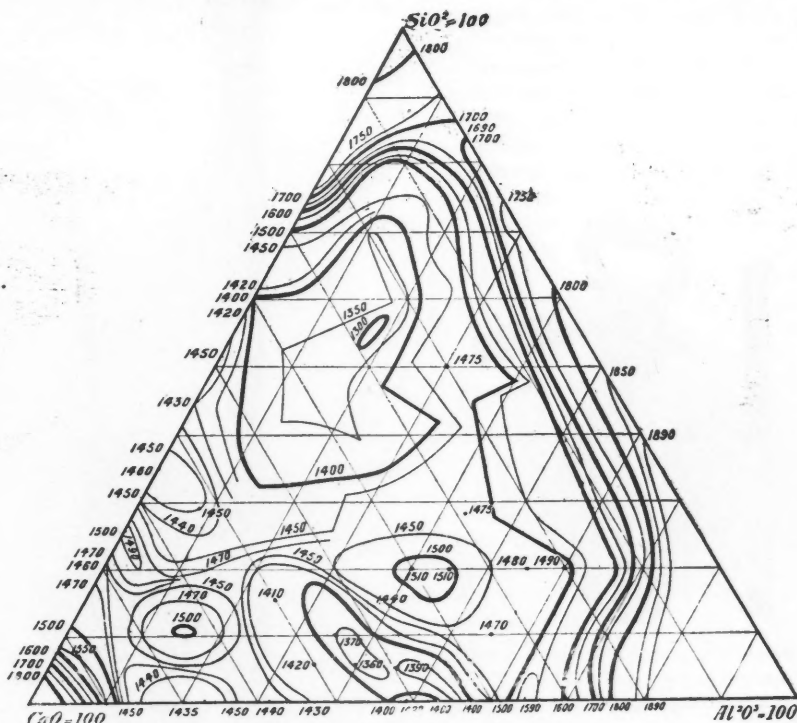
BY O. BOUDOUARD.

This investigation covers "the fusibility of silicates of lime and of alumina, of aluminates of lime and of aluminocalcic silicates."

After a brief historical review of the work and literature in slag fusion, the writer proceeds to a detailed description of the make-up of the experimental equipment of furnace, cones, etc., and their manipulation. Proceeding next to the experimental results, he gives a separate table of analytical figures, and a plotted curve, for each of the following groups in order: (1) Silicates of alumina; the most fusible mixture was that corresponding to $(SiO_2)_{10}(Al_2O_3)_1$ at 1,690° C. These figures are entirely different (higher temperatures and more silicious) from those of Jüptner. (2) Silicate of lime; the low-

on a triangular diagram (of Horne, Roozboom and others). In this way he obtains a set of *loci*, which are open or closed curves, each representing the fusibility of the respective mixture. Now by an ingenious system of combining these plane *loci*, with a new-dimensional co-ordinate, namely the fusibility figure, he transforms the whole into an undulatory 'surface of fusibility' in which the *loci*, originally plane, becomes a sort of contour lines in the new curved surface of fusibility. A photographic half-tone of their surface is given in the original paper.

In conclusion the writer states that no greater difference exists between the temperatures of softening and of fusion than between any temperatures of observation referred to actual temperatures below 1,500° C. The fusion point of silica is 1,830° C. The addition of a small quantity



CURVES SHOWING FUSIBILITY OF SLAGS.

est mixture corresponded to $(SiO_2)_{10}(CaO)_1$ at 1,400° C. The figures are practically in accord with those of Jüptner.

(3) Aluminates of lime; the minimum was at $(Al_2O_3)_2(CaO)_3$, and 1,395° C. (4) The aluminocalcic silicates; these were studied in several groups, of which one gave a minimum of $(SiO_2)_8(Al_2O_3)(CaO)_3$ at 1,300° C.; another, $(SiO_2)_4(Al_2O_3)(CaO)_5$, gave 1,370; another gave $(SiO_2)_2(Al_2O_3)(CaO)_3$, at 1,390. In all these the 'temperature of softening' was the one noted.

From this point the writer proceeds to plot curves which are designed to analyze the results with a view to showing definite compounds (a) with silica and lime; (b) with alumina and lime, and (c) with all three. He next proceeds to plot the results

(10%) of silica or alumina to silicates and aluminates lowers the fusion point.

The following definite compounds were established: $(SiO_2)(CaO)$; $(SiO_2)(CaO)_2$; $(SiO_2)(CaO)_3$; $(Al_2O_3)(CaO)$; $(Al_2O_3)(CaO)_2$; $(Al_2O_3)(CaO)_3$.

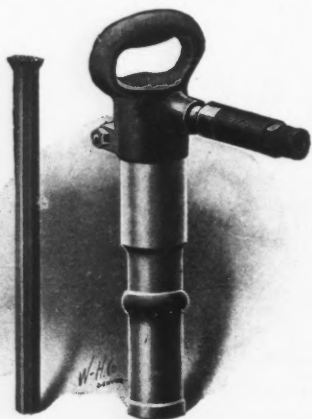
The triangular diagram focuses and extends the conclusion of Akerman and Gredt. In a general way, the addition of alumina to a calcium silicate first raises, but ultimately lowers, the fusibility; the more basic the silicate, the more alumina required to occasion fusibility. In addition to other details, "the triangular diagram constitutes a perfect chart, enabling metallurgists to determine without difficulty the fusion temperature of a given aluminocalcic silicate" (see illustration herewith). The paper concludes with a brief description of certain prominent industrial slags.

*Abstracted from the *Proceedings* of the Iron and Steel Institute.

The Leyner Rock Terrier Drill.

The Geo. J. Leyner Engineering Works Company, of Denver, Col., has, within the last few months, brought out a light-weight drill which is proving to be a help to miners in all kinds of work, with the exception of heavy tunneling, sinking, etc.; for stoping and upraising it is especially suitable. It is called the "Leyner Rock Terrier Drill," and is made in two patterns, called respectively the 'dry' pattern and the 'water' pattern. The dry pattern is recommended only for holes above the horizontal, whereas the water pattern can be used for holes of all kinds, as hollow steel is used, through which air and water in combination are forced for the purpose of cleaning the holes of the rock cuttings. Either drill can be changed to the other in a few minutes by the change of a few parts and the exchange of steel. The dry pattern has a total of only 19 parts, with one moving part, and weighs but 54 lb.; the water pattern has a total of 27 parts, with one moving part, and weighs 56 lb. Both drills have cylinder diameters of 1½ in., and consume about 25 cu. ft. of free air per minute.

The mounting used is a column or bar



of 2 in. inside diameter, which would make the complete equipment, including the drill, mounting and steel, so light that one man could easily carry it into the most difficult and narrow places. The steel is perfectly plain, which is possible on account of the striking-pin, which lies between the steel and the hammer—a feature not possessed by any other drill than these and the Leyner compressed-air hand drill.

One valuable feature of these machines is that the steel is rotated as the feed-screw is turned, this being accomplished by means of a positive gear connection between the chuck and a sleeve covering the feed-screw. This feature makes it almost impossible to 'rifle' and 'fitcher' a hole in the seamiest kind of ground.

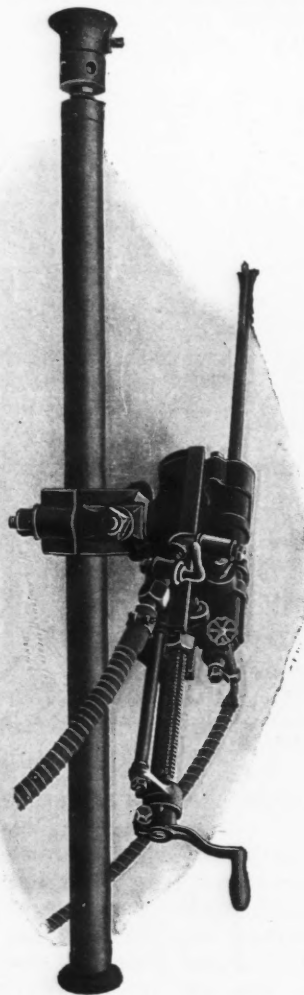
Before these drills were put upon the market, they were placed in several mines in Colorado for some months, and accurate records of the work done each day were kept. It was found that they will drill 30 to 45 lineal feet of holes in five hours, including setting up, changing and taking down, depending upon the nature

of the rock. The holes drilled were from 1½ in. down to 1 in. in diameter and up to 5 ft. in depth. These machines operate on the hammer principle, as do all of the drills manufactured by the Leyner company.

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Seepage.—Given a quantity of quick-silver in a reservoir of cement, would



LEYNER ROCK TERRIER DRILL.

the mercury work through in a short time and destroy the dam?—B. A. M.

Answer.—The question is stated in such general terms that it may respond to any kind of an answer. But, judging from the excessive permeability of furnace bottoms to molten lead (and lead has a sp. g. of 11.4, while mercury has a sp. g. of 13.6), it would appear that it is only a question of enough mercury to ruin any dam. A small quantity would probably be harm-

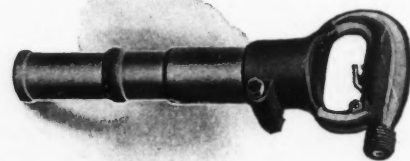
less, as is shown by its native occurrence in the pot-holes of certain river beds in connection with placer gold, and its occurrence in small globules in certain clays and schists.

Pyrite Grinding.—Are you acquainted with manufacturers of machinery suitable for grinding pyrite? We understand that economic work can be done with cast-iron balls.—X. U. B.

Answer.—Your question recalls the experiments of a prominent Southern pyrite mining company. For five years this company has used half-inch cast-iron balls on steel screen-plates as a jig-bed in Hartz jigs. These cast-iron balls made a free and lively bed, much better than anything else that has been tried. Such balls are made in several sizes by the Canton Malleable Iron Company, of Canton, Ohio. Small balls are better than large ones, considering the work done. It is also noteworthy that No. 10 steel punched with quarter-inch holes is used, and lasts ten times as long as woven brass wire, the presence of acid water notwithstanding.

Talc.—I have a very extensive deposit of talc and soapstone, and desire to learn of a market.—J. E. M.

Answer.—Appreciable quantities of both minerals are consumed in this country; the



talc, largely in the manufacture of paper, pigments and minor industries, and soapstone in the building of wash-tubs, chemical vats, etc. The value varies as widely as does the quality, and while talc may be marketed in the East at as high as \$30 per ton (the quotation on best Italian), soapstone articles are worth considerably more. Crude soapstone is seldom sold in the open market, as manufacturers are accustomed to sign contracts with producers for their season's supply. We would advise you to correspond with Hammill & Gillespie, 240 Front street, New York.

Recent Legal Decisions.

SPECIALLY REPORTED.

FORFEITURE OF INSTALMENT ON BOND.—The district court at Oroville, Cal., has decided that first payment on mining land bonded is forfeited if the balance due is not paid. Two years ago S. C. Peasley bonded some of his land to E. W. Fogg and Henry Jacobs for \$25,000, and these men then turned their contract over to Louis Glass and Homer King, the plaintiffs in the suit just decided. It was pro-

vided that the money should be paid in four equal instalments of \$6,400 each. King and Glass made the first payment, but none after that. When the limit set for the conclusion of the option had expired, Peasley sold the land in question to the Central Dredging Company, and thereupon Glass and King demanded the return of the \$6,400 they had paid to him. This he refused to do, and the suit at law followed. The court decided against the plaintiffs.

ASSESSMENT WORK VALID IF DONE IN GOOD FAITH.—A decision of the Secretary of the Interior in the mining claim contest of Vance vs. the Dennis Brothers, of Jenny Lind, Calaveras county, California, is of interest to all mining men, the point made being that if the mining claimant does his assessment work in good faith, regardless whether the work actually done is on the claim or not, he holds the title to the mine. In this case the Dennis Brothers had done much of the work on their claim. They had built a reservoir some two miles from their claim, and had dug a ditch to bring the water to the claim, in addition to having sunk several prospect holes on it. The Secretary of the Interior held that they did the work in good faith and are entitled to hold their claim. The matter has been in litigation for about four years, and during that time has been heard twice by the local Land-office officials, twice by the United States Land Commissioner, and once by the Secretary of the Interior. This last decision is final. The land in question is now being dredged by the Calaveras Gold Dredging Company.

Abstracts of Official Reports.

Great Boulder Perseverance Gold Mining Company, Ltd.

The report of this Western Australian company covers the year 1904. The event of greatest interest was the change in the company's professional management. The agreement with Bewick, Moreing & Company has been terminated, and Edward Hooper has been appointed consulting engineer to the board of directors. The management at the mine, too, has been transferred from Ralph Nichols, who was obliged by a law-suit to remain for some time in England, to G. C. Klug, a well-known Australian engineer. Mr. Hooper has also been appointed to a membership in the board of directors, and this, it is hoped, will be of advantage to the stockholders.

Development during the year amounted to 8,232 ft., of which the principal items were: Shaft-sinking, 508 ft.; drifting and crosscutting, 4,696 ft.; winzes and raises, 1,665 ft. Diamond drill holes in addition measured 1,585 ft. The latest estimate of ore reserves shows 127,299 tons, of an average value of 0.71 oz., and 174,453 tons, of which the value is not known.

This estimate includes nothing below the 700-ft. level, although recent reports state that 500 tons of ore, averaging over 2 oz. per ton, have been extracted from the 1,100-ft. level. The Perseverance lode, at this depth, has a width of 17 ft. and a value of 0.75 oz. over its full width. Two new lodes have been opened up since the last annual report was issued. One of these, 'El Oro,' lies between the two principal lodes, and the other, 'Ophir,' is a branch of the Perseverance. Work upon the 'Tetley' lode has failed to disclose any quantity of payable ore, although development of this vein has not been abandoned. The main shaft has now reached a depth of over 1,300 feet.

Ore broken and treated during the year amounted to 135,638 long tons, which yielded 135,559 oz. gold and 18,794 oz. silver; tailing to the amount of 2,069 tons was purchased and yielded 1,338 oz. gold. The mining and milling costs per long ton of ore may be itemized thus:

Mining.....	\$2.77
Sulphide treatment.....	4.12
Distribution of tailing.....	0.11
General expenses.....	0.46
Total.....	\$7.46

In addition, 146,191 tons of tailing was re-treated, at an expense of \$2.29 per ton. In the sulphide treatment the filter-press plays an important part, and for the last few months the extraction has been so nearly perfect as to produce tailing which will not pay for treatment by the filter-press process. The treatment as now installed consists of the following steps: The ore, after being screened and crushed, is ground in Griffin mills and is then elevated to the tops of Holthoff-Wethey furnaces. The roasted ore is then thoroughly mixed with water, and is passed through classifiers which separate the sand from the slime. The sand is then ground in amalgamating pans, the overflow joining the slime from the classifiers, and both together going to spitzkasten. The pulp is then agitated with cyanide solution and passed through filtering presses. The press-cakes are discarded, while the solution passes through zinc boxes from which gold is extracted in the usual way.

The report states the operating expenses in great detail, but we can condense the profit and loss account as follows:

Sale of bullion.....	£584,656
Miscellaneous.....	3,660
Total receipts.....	£588,316
Mining.....	£78,245
Development.....	43,051
Treatment of ore, tailing and bullion.....	201,084
Depreciation.....	207
Office and Insurance.....	23,017
West Australian duties.....	7,875
Total expenses.....	£353,479
Profit for the year.....	£234,837
Balance brought forward.....	114,870
Balance for dividends.....	£349,707

From this balance, dividends amounting to £250,876 were paid during 1904. The company is capitalized at £1,500,000, of which £1,400,007 has been issued.

The Waihi Gold Mining Company, Ltd.

The report of this New Zealand company covers the year 1904. In general, while the value of the ore mined during the year diminished somewhat from its average value during the previous year, yet the tonnage was considerably increased, and dividends amounting to £247,953 were paid during the year, with a credit balance of £65,892 remaining.

Development has been actively pushed during the year and comprises, in all directions, an advance of 20,511 ft., the principal item of which consists of winzes sunk from the lowermost level; by these a satisfactory extension in depth has been ascertained and ore reserves have been materially increased. These were estimated, at the close of the year, at 712,794 short tons. Pumping from No. 5 shaft, the deepest one of the six, by a lowering of the ground-water level, has permitted the sinking of shafts No. 1, 4 and 6, which, at the close of the year, had reached depths of 654, 632 and 554 ft. respectively.

The contract system of mining now prevails in the mine, and the entire output of the year was obtained on this basis. It amounted to 259,978 long tons, having an average assay value of 0.65 oz. gold and 4.70 oz. silver per ton, showing a slight decrease in the gold content but a larger increase in the silver content, the whole difference amounting to a decrease in value of \$0.36 per ton, as compared with the average value during 1903. The output, however, showed an increase of 28,655 tons over the amount raised in the previous year. Nearly half of the output of ore was derived from the Martha reef, the Empire and the Welcome being the next heaviest producers. Most of the twelve other reefs afforded an increased tonnage.

The entire output was wet-crushed at the company's three mills, having a combined force of 330 stamps, of which 320, as an average number, were in operation throughout the year, exclusive of Sundays and the Christmas holidays, showing an average duty per stamp per day of 2.66 tons. The total recovery, including the bullion extracted from concentrate by leaching process, was 928,050 oz., of an average value of \$3.38 per ounce. In addition to the bullion, slag-tailing and concentrate with a combined value of \$94,133 were shipped for treatment. The shipping of concentrate was discontinued early in the year, an addition having been made to the Victoria mill for the purpose of treating it; since that time all the concentrate made at the three mills has been treated in this plant, amounting to 1,992 tons, of an approximate value of \$202 per ton, to the end of the year. The concentrate, as received, carries 7.65 oz. gold and 98.25 oz. silver. The tailing from the plant carries 0.38 oz. gold and 7.94 oz. silver. This tailing is being impounded. The process consists in grinding the concentrate in a tube-mill, agitating it with cyanide solu-

tion by means of compressed air, and precipitating the value with zinc fume. In the Waihi plant, tube-mills are being installed to treat the product from the 90 stamps, and this process will probably be extended to the other mills in order to increase their output and to allow finer grinding.

The system of water supply has been improved through eliminating long stretches of flume and pipe line by means of driving tunnels. The railway between Waihi and the Victoria mill has been improved by the replacement of its old iron rails with new steel, while the supply of rolling stock has been augmented. The old timber railway has been taken up, as its territory had been exhausted, but a new timber area has been acquired and a new road 3.5 miles long is now under way.

The revenue account may be condensed as follows:

By sale of bullion.....	£683,882
Interest and fees.....	4,484
Total receipts.....	£688,366
Mining.....	£112,223
Development.....	18,828
Transportation, crushing and stamping.....	56,483
Recovery of bullion.....	70,164
Repairs, etc.....	6,056
Management.....	7,389
Government rent and duty.....	16,788
Freight and insurance on bullion...	13,604
Office and miscellaneous.....	16,677
Total expenses.....	£318,212
Profit for the year.....	£370,154
Balance brought forward.....	91,241
Balance available for dividends.....	£461,395

From this balance, dividends, including income tax, to the amount of £267,423 and a bonus of £49,591 were paid during 1904; the reserve account was increased by £20,000, extraordinary construction expenses to the amount of £30,983 were written off, and a sum of £27,506 was allowed for depreciation of plant, leaving a surplus of £65,892 to be carried forward.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ending May 2, 1905.

- 788,506. APPARATUS FOR AGITATING THE CONTENTS OF ELECTROLYTIC CELLS.—Edgar A. Ashcroft, Weston, via Runcorn, England.
- 788,512. SULPHUR-BURNER.—Henry Blumenberg, Jr., Daggett, Cal.
- 788,546. COMBINED SMELTING AND REFINING FURNACE.—Chauncey C. Medbery, New York, N. Y.
- 788,558. PROCESS OF PRODUCING COMPRESSED COKE.—Albert D. Shrewsbury, Washington, D. C., assignor to the Gas & Fuel Manufacturing Company of America, Washington, D. C.
- 788,584. PROCESS OF REDUCING METALS FROM THEIR SOLUTIONS.—Charles B. Jacobs, East Orange, N. J., assignor to the Ampere Electro-Chemical Company, Port Chester, N. Y.

- 788,589. COPPER SMELTING AND SEPARATING.—George Mitchell, Los Angeles, Cal.
- 788,593. MINING-DRILL.—Frederic W. Olcott, U. S. Navy, assignor to H. Frederica Olcott, Kingston, N. Y.
- 788,631. MANUFACTURE OF CHLORATES AND PERCHLORATES.—Marcel Couleru, Geneva, Switzerland.
- 788,650. CONTINUOUS PROCESS OF MANUFACTURING STEEL.—Henry Knoth, Birmingham, Ala.
- 788,664. PROCESS OF AND PRODUCT IN MONOLITH.—Harman Merkel, Milwaukee, Wis.
- 788,675. APPARATUS FOR DRYING, GRINDING, AND SCREENING.—Ludwig Blissmuller, New York, N. Y.
- 788,688. MACHINE FOR CLASSIFYING AND SIZING ORES.—William E. Wild, Denver, Colo.
- 788,701. OIL-WELL APPARATUS.—Waldo T. Bradstreet, Montpelier, Ind.
- 788,719. MINER'S PICK.—William W. Hoover, Penfield, Pa.
- 788,729. STAMP-MILL.—George C. Richards, Oakland, Cal.
- 788,737. PLACER-MACHINE.—Henry J. Swarts, Denver, Colo., assignor to the Swarts Manufacturing & Mining Company, Denver, Colo.
- 788,738. OIL-WELL TUBE-CLAMP.—Warren M. Thomas, North English, Iowa.
- 788,778. PROCESS OF CASE-HARDENING.—Carlo Lamargese, Rome, Italy.
- 788,799. ORE-SEPARATOR.—Charles W. Strong, Ward, Colo.
- 788,813. PROCESS OF TREATING FINE ORES.—David Baker and William W. Hearne, Wayne, Pa.
- 788,845. CONVEYER.—Frank M. Peters and Henry H. Hungerford, Chicago, Ill.; said Hungerford assignor to said Peters.
- 788,846. CHUTE.—Henry H. Porter, Jr., Chicago, Ill.
- 788,861. CABLE-HAUL.—John L. Wagner, Fairmount, W. Va.
- 788,862. PROCESS OF MAKING COPPER SULPHATE.—Arthur L. Walker, New York, N. Y.

- 788,888. APPARATUS FOR USE IN UNITING IRON AND STEEL PLATES.—William Cross, Winnipeg, Canada.
- 788,898. OPERATING MECHANISM FOR MINE-DOORS.—Robert J. Good and George E. Hall, Canton, Ohio.
- 788,912. PROCESS OF EXTRACTING METALS.—John A. Just, Pulaski, N. Y., assignor to Just Mining & Extracting Company, Rochester, N. Y.
- 788,919. MECHANISM FOR SHARPENING ROCK-DRILLS.—William P. Lightbody, Johannesburg, Transvaal.
- 788,934. MANUFACTURE OF EXPANDED METAL.—George G. McKay, Youngstown, Ohio, assignor to Youngstown Iron & Steel Roofing Company, Youngstown, Ohio.
- 788,940. METHOD OF MANUFACTURING THIN BRONZE OR OTHER METAL PLATES.—Ernst Oeser, Schoneberg, near Berlin, Germany, assignor to Genthner Cartonpapier-Fabrik G. M. B. H., Berlin, Germany.
- 788,964. CASTING APPARATUS.—Edward A. Uehling, Passaic, N. J.
- 788,970. APPARATUS FOR FORMING FLEXIBLE METAL TUBES.—Marcus M. Waterman, Troy, and Dellford H. Holloway, Waterford, N. Y., assignors, by mesne assignments, to Sterling Electric Company, Troy, N. Y.
- 789,074. PROCESS OF MAKING POTASSIUM SALTS.—Aurelius J. Swayze, Danville, N. J.
- 789,129. BRICK-MACHINE.—Ebenezer W. Rider, Detroit, Mich.

Week ending May 16, 1905.

- 789,703. ATTACHMENT FOR DRILLS.—Thomas E. Adams, Cleveland, Ohio, assignor to the Adams Drill Company, Cleveland, Ohio.
- 789,704. ATTACHMENT FOR ROCK-DRILLS.—Thomas E. Adams, Cleveland, Ohio.
- 789,712. CLAM-SHELL BUCKET.—Bluford W. Brockett, Cleveland, Ohio, assignor to John McMyler, Cleveland, Ohio.
- 789,721. ELECTROLYTIC APPARATUS.—Frank A. Decker, Philadelphia, Pa., assignor to Decker Manufacturing Company, Wilmington, Del.
- 789,740. ELECTROLYTIC APPARATUS.—Woolsey M. Johnson, Iola, Kan.

- 789,758. MACHINE FOR PRESSING WET PEAT.—Patrick Reynolds, Farnham, and Joseph A. R. Bedard, Quebec, Canada; said Bedard assignor of his right to Joseph William Harris, Montreal, Canada.

- 789,759. BRIQUETTE-PRESS.—Patrick Reynolds, Farnham, and Joseph A. R. Bedard, Quebec, Canada; said Bedard assignor of his right to Joseph William Harris, Montreal, Canada.
- 789,767. APPARATUS FOR CHARGING PLATES INTO FURNACES.—George T. Snyder, McKeesport, Pa., assignor to National Tube Company, Pittsburg, Pa.

- 789,773. BLUE-PRINTING APPARATUS.—James H. Wagenhorst, Mansfield, Ohio.
- 789,811. LUMINOUS COMPOSITION.—George F. Kunz, New York, N. Y.
- 789,812. LUMINOUS COMPOSITION.—George F. Kunz, New York, N. Y.

- 789,828. INGOT-MOLD.—Thomas D. West, Sharpsville, and George H. Boyd, Sharon, Pa.
- 789,844. ART OF CONTROLLING FURNACE-GASES.—John W. Dougherty, Steelton, Pa.

- 789,857. DIRECT-ACTING STEAM-PUMP.—Gustav Honegger, Berlin, Germany.

- 789,943. EXPLOSIVE COMPOUND.—Alfred E. Stanley, Ellinwood, Kan., assignor of one-half to Clarence E. Atkinson, Ellinwood, Kan.

- 789,951. ROCK-DRILL.—Thomas E. Adams, Cleveland, Ohio, assignor to the Adams Drill Company, Cleveland, Ohio.

- 789,952. PROCESS OF ROASTING ORES.—Joseph A. Anker, James H. Watson, and Pierce Evans, Los Angeles, Cal.; said Anker and Evans assignors to said Watson.

- 789,981. APPARATUS FOR BREAKING ROCKS UNDER WATER.—Fred Lobnitz, Renfrew, Scotland.

- 790,000. AMALGAMATOR.—Joseph J. Peacock, Chicago, Ill.

- 790,004. MINE TRAP-DOOR.—Albertus O. Slentz, Canton, Ohio, assignor of one-half to Edward A. Langenbach, Canton, Ohio.

- 790,030. AUTOMATIC DUMPING AND CLOSING BUCKET FOR AERIAL TRAMWAYS.—Enon F. Crawford, Nelson, Canada.

- 790,044. BRICK-MACHINE.—Hunton B. Fisher, New Orleans, La., assignor of 35% to Frederick W. Sweet, New Orleans, La.

- 790,055. CENTRIFUGAL APPARATUS FOR ELECTROLYTIC PURPOSES.—Ralph V. Heuser, Erie, Pa.

- 790,089. EXPLOSIVE COMPOSITION.—Leon Thomas, Paris, France.

- 790,097. RETORT FOR WOOD DISTILLATION.—Albert J. Adams, Cleveland, Ohio, assignor to the International Wood Distilling Company, Cleveland, Ohio.

- 790,109. FUEL-BRIQUETTE AND METHOD OF MAKING SAME.—Valentin Conti and Armand Levy, Paris, France.

- 790,113. PROCESS OF OBTAINING PRODUCER-GAS.—Adolphe Desgraz, Hanover, Germany.

- 790,122. TENSION DEVICE FOR OIL-WELL PUMPS.—Hugh J. Gorman, Smithfield, W. Va.

- 790,130. DREDGER OR LIKE HOPPER.—Thomas W. Hogg, Paisley, Scotland.

- 790,156. ORE-CONCENTRATOR.—William M. Reely, Missoula, Mont.

- 790,162. APPARATUS FOR DRYING MOIST MATERIAL.—Edward N. Trump, Syracuse, N. Y.

- 790,170. BRICK, BLOCK, OR TILE CUTTER.—Byron E. Bechtel, Waterloo, Canada.

- 790,202. METHOD OF MANUFACTURING CASTINGS.—Jacob K. Griffith, Latrobe, Pa.

- 790,208. PACKING FOR OIL-WELLS.—Alrwine J. Hubbard, Warren, Pa.

- 790,210. ROLLER FOR DREDGE-LADDERS.—Samuel L. G. Knox, Milwaukee, Wis., assignor to the Bucyrus Company, South Milwaukee, Wis.

- 790,211. DREDGE BUCKET.—Samuel L. G. Knox, Milwaukee, Wis., assignor to the Bucyrus Company, South Milwaukee, Wis.

- 790,226. ELECTRICAL FURNACE.—Isidore S. Prenner, Scranton, Pa., assignor of one-half to Gus N. Brown, Scranton, Pa.

- 790,238. METHOD OF RECOVERING COPPER FROM ITS ORES.—Henry M. Wilcox, Chicago, Ill., assignor to Esmeralda Copper Precipitating Company, Chicago, Ill.

- 790,253. GAS PRODUCING AND CONSUMING APPARATUS.—Carleton Ellis, New York, N. Y., assignor to Eldred Process Company, New York, N. Y.

Special Correspondence.

San Francisco. May 17.

The mountain newspapers and miners are now up in arms against the Caminetti law, which restricts hydraulic mining in the drainage basin of the Sacramento and San Joaquin rivers and puts such mining under control and surveillance of a Federal commission. The miners themselves were instrumental in securing the passage of this special law some 10 or 12 years ago, because for many years before that the hydraulic mines were closed by injunction. By this new law, when miners complied with the regulations of the Federal commission created by it, they supposed they could go ahead and hydraulic without fear of injunction from local courts. This was the case for some years, but of late the Anti-Débris Association has succeeded in closing down many hydraulic properties by injunction, and even some which had obtained a Federal license from the commission.

The result was entirely unexpected, as the miners supposed the Federal license would protect them. Now another unexpected feature is experienced. Some eight miners in Nevada county, who were most of them ground sluicing, have been arrested on complaint of the California Débris Commission itself and charged with violation of the Caminetti act. This commission has the right to grant licenses to mine by hydraulic process and to withdraw licenses granted where there has been a violation of the law. But it was not supposed they could arrest miners doing another class of mining than hydraulic, and who had never applied for any license. At any rate, they have made the arrests.

The miners are beginning to think the whole Caminetti act unconstitutional, on the ground that Congress has no power to legislate at all concerning the private property rights of citizens of this State or to determine through its special commission or otherwise what will or not constitute a nuisance. In every other mining State in the Union, where there are hydraulic mines, the miners are under no such disability as they are in California, where the Caminetti law is made to apply. In other States the miner conducts his business under the same rules as other industries, viz.: if he does no material injury he cannot be restrained. The miners here never claimed the right to destroy the property of others except after paying damages.

For these reasons the hydraulic and gravel miners of California are very apt to ask for a repeal of this act as being detrimental to the mining interests. Should it be repealed, then of course the California Débris Commission would be abolished, as it was created by, and its powers are derived from, the Caminetti law.

Siskiyou, one of the most extensive gravel mining counties of the State, is going into dredge mining. The area of aur-

iferous gravel occurrence is very large, but most of the work has been confined to hydraulic, river bed, ground sluice and sluice mining until lately. Now a new dredge is being built on Yreka creek, near Yreka, where 20 to 25 ft. of auriferous gravel is to be dredged. Another dredge will operate at Hawkinsville, near by. A dredge on the south fork of Scott river is being operated successfully with electric power, and another will soon be built at McAdams creek, where there are good deposits of gravel, but where there is considerable water to contend with in the old form of gravel mining.

The Standard and Associated Oil companies on the one hand, and the Union Oil Co. on the other, are contending for control of the local oil situation in the Los Angeles field, but this is not much to the satisfaction of the independent well owners. Those who are familiar with the situation assert that the Standard has practically formed a compact to squeeze out the smaller dealers, and in support of this it is said they have been exchanging oil in both Los Angeles and San Francisco. According to the story, the Standard loaded a large quantity of Associated oil and shipped it from the local field some time ago, while the same trick is just reversed in the north—the Associated loading from Standard tanks. The price of oil has been "beared" so low that it is almost impossible for independents in the Los Angeles field to compete with the larger corporations. The big concerns are selling the commodity as cheap, if not cheaper, than the actual cost of production. It is expected that open warfare may be declared between the Standard and Associated and the Union within a short time, unless some unforeseen agreement is reached.

The trial of the suit of W. A. Nevills and John P. Jones against William Flemming and others was commenced this week. Nevills and Jones sold half the stock of the Amador Tunnel Mill & Mining Co. to the Flemming brothers and D. C. Nichols for \$250,000, of which \$100,000 was paid down. The suit is for the remainder of the amount. The defendants accuse Nevills of fraud, and judgment for all the money expended by them is asked in a cross-complaint. All of the parties are well known. The defense is to bring witnesses from distant places.

Numbers of locations of tungsten ore are being made at Randsburg, Kern county, and many new discoveries are reported. Quite a number of men from Los Angeles and Bakersfield have come to the camp since these discoveries. It is now thought that the field in which the tungsten ore is found will prove much more extensive than at first supposed. Considerable quantities of the ore have been found on the dumps of old mines, where it has been thrown away by gold miners who did not know its value.

Denver. May 19.

In the State supreme court, the case of B. H. Dupraw against the Treasury Tunnel, Mining & Reduction Co., which involves the right to tunnel through another's property to construct an outlet for ore, is on trial. In the district court of Ouray county the complainant lost the case.

In accordance with an order from the district court of El Paso county, Leslie W. Popejoy has filed a bill of particulars in his suit against the executors of the Stratton estate for \$8,000,000. He claims to have grubstaked the late Mr. Stratton, and gained thereby a large interest in his mining property.

Robert Romaine, the convict in the Kansas State penitentiary, who last summer, just after the Independence explosion, made a startling confession which implicated the Western Federation of Miners, has made another confession, in which he declares that he lied at that time for a small money consideration. At the time no faith was placed in his statements on the part of the authorities, and no effort was made by them to extradite him.

It is stated on good authority that a reorganization of the Transcontinental Mining Co., operating in the Argentine district, has been effected. A large tunnel is being driven about 8 miles from Georgetown, this to be enlarged for the purpose of railroad transportation, and continued for about 1½ miles. The managements of the Colorado & Southern and Rock Island systems are said to be backing the project, the former's terminus being only about 3 miles from the mouth of the tunnel at present.

Attorneys of the Southern Pacific and the Arizona & Colorado railroads have secured an injunction against the Denver & Rio Grande railroad, at Santa Fe, New Mexico, enjoining the latter road, which is building a line from Durango to Farmington, from using and crossing the right-of-way of the Arizona & Colorado railroad. The writ is returnable on June 2.

From present appearances, a St. Louis syndicate, headed by John T. Milliken, one of the most prominent operators of the Cripple Creek district, will buy and consolidate the Golden Cycle and Theresa properties. The price mentioned is about \$2,000,000.

Stratton's Independence, Ltd., will pay a dividend of \$125,000 on May 22. This property is now being operated entirely by lessees, and the result certainly shows the advantage, at least in this case, of the leasing system. A few days ago, at a depth of 700 ft., a fine ore-shoot was found on the Abe Lincoln property, the ore running about \$100 to the ton.

Articles of incorporation of the new Republican Mountain & Gray's Peak Railway Co. were filed here this week, and the construction of this road, which will be similar to the cog-wheel road to the

summit of Pike's Peak, will commence at once.

On May 26 the closing exercises of the Colorado School of Mines, at Golden, will take place. The graduating class is at present on its trip through the State for practical instruction, previous to the final examinations. The past year has been one of the most successful, if not the most successful, since the school's existence, and 48 students will graduate.

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Scranton. May 22.

Now that the examination of the mine cages by the inspectors of the Bureau of Miners in the various collieries of the anthracite region is practically over, it is gratifying to have to report that in every case in which the test was made, except in two, the dogs worked efficiently, and that, even if the rope broke, the machinery for preventing the cage being dashed to pieces at the bottom was found to be adequate. There is one danger that came out at the inquest on the men killed in the Conyngham shaft at Wilkes-Barre. It is said that the weight and impetus of the rope from the spot at which it broke, say at least three or four hundred feet, added to the weight of the men in the cage, might be so overwhelming and sudden that it would tear away the dogs from the hold they obtain in the usual way. The experts that gave evidence were positive that the rope was jerked, and that this was the cause of the disaster; that it was impossible for the strain to break it. The engineer was equally positive that there was no jerk; and of course the matter had to be left at that. The operators have, it is understood, at most collieries given strict instruction that the cables, drums, and all other machinery connected with the lowering and hoisting of men into the mines are to be strictly and, as far as possible, scientifically examined periodically.

Work was resumed on Monday morning at the Mountain and No. 1 collieries of the Erie company in Dunmore. The strike instituted last week was settled at a meeting of the men employed at these collieries and W. W. Inglis, superintendent of the company.

One of the buildings of the Oliver Powder Co., which manufactures explosives for mining purposes at Laurel Run, Wilkes-Barre, blew up on May 18. The explosion occurred in the mixer and set fire to the powder press in an adjoining building, which was also consumed.

C. S. Mellen, president of the New York, New Haven & Hartford Railroad Co., and a number of directors and officials of that corporation, accompanied by T. P. Fowler, president of the Ontario & Western Railroad Co., and a number of the officials of that corporation, were in Scranton on May 17, having arrived on a tour of inspection of the Ontario & Western road and its large mining interests. The

New York, New Haven & Hartford Co. recently acquired a controlling interest in the Ontario & Western road and its coal properties, and this is the first time that either President Mellen or any of the directors have ever been over the entire system.

The Pennsylvania supreme court has upheld the injunction granted by the Northumberland county courts restraining the Pennsylvania Anthracite Coal Co., of Pittsburg, from polluting a stream of that county. The supreme court in affirming the county court in cases said: "This case is to restrain the defendant from pumping impure water, which had accumulated in a coal mine, into a stream where it polluted the supply of drinking water for more than 30,000 persons, when by the construction of a flume the mine water could be diverted into another course where it could injure no one. The case is clearly one for the granting of a preliminary injunction." This case is a very important one, as there are a number of coal mines to which this rule might apply. All the creeks and rivulets in a mining country are affected more or less by the water pumped from the mines.

Extensive alterations are being made by the Delaware & Hudson Co., in and around Carbondale, to facilitate the storage and hauling of coal. A third track will be laid between Jermyn and a point below the Lookout signal station at Carbondale for the accommodation chiefly of coal trains. The plans which the company decided upon some time ago for additional yard room are being worked out with energy and dispatch. It is proposed to move the coal and billing offices to a point considerably to the north of where they now stand. The coal pockets are also to be moved, and will be placed nearer the roundhouse. Several smaller buildings are to be torn down to make more room for these extensive alterations.

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Duluth. May 20.

Some of the Italian immigrants who are arriving at New York nowadays are coming this way, and the iron-ore regions are receiving their share. Several carloads of these men have arrived at Hibbing and other towns on the Mesabi, and some are going to other ranges. More of them will locate on the Mesabi than elsewhere, as the opportunities for unskilled men are better than anywhere else in the lake region. About 100 men arrived at Hibbing one day last week. This will assist in solving the problem of labor for the year. It was a serious matter, not so much at present, but in the future, for the summer work is just beginning and there will be employment for many more men in the lake region another month than are now busy here. The mines may take no more, some stripping contracts are yet to be let, and other jobs are yet to be started by mining companies direct; but the chief

absorption of labor is coming from railway extension along the western Mesabi and other parts of the district. There have been none too many men for the work being done, and with an additional call for large numbers they would have been a trifle too scarce for comfort. Unskilled men can be utilized both in railway work and in surface and open pit-mines.

J. C. Sullivan, president of the Western Federation of Miners, from Colorado, has taken the place here of an organizer named Keniston, and is attempting to organize the miners along the Mesabi. He has located several lodges, but the men are fighting rather shy of the Federation proposition, as it seems to them largely a matter of paying out dues to the organization, and they find very little direct benefit for themselves. There is no sign of trouble over wages or other labor matters at any point on the various ranges, and the mining men can only hope there will be none. Organizers for the Federation are at work at Iron Mountain, Menominee range, but are not successful so far.

Contrary to despatches from Cleveland, the flooding of open-pit mines a week ago had little or no effect on shipments, and they have been maintained at a remarkably high rate since the season fairly opened. It is one of the astonishing things connected with the trade this spring, the rapidity of acceleration, the quickness with which the whole chain of operations from mine to ship and receiving docks, sprung into full tide. It seemed to be immediate. The roads are now working up to their maximum rate of a year or two ago, though less than they will be able to do when they get the large orders of new equipment that are on the way. These orders include 20 large freight locomotives for the Duluth, Missabe & Northern and the Duluth Iron Range, and some 2,000 50-ton cars for the same roads. Some of both cars and engines have been delivered, and most of the orders are on the way from shops where built. The Duluth, Missabe & Northern road a day or two ago delivered at docks in Duluth 1,399 loaded cars in one 24-hour period, an amount equaling about 49,000 gross tons. This is the record for that road, but will doubtless be passed by any one of the three Mesabi range lines later in the year.

The Oliver Iron Mining Co. has ordered a new pumping plant for the Champion mine, near Marquette, and will resume there as soon as possible. The mine has been idle since its purchase with the Union Steel Co. There are some 200,000 tons of ore in stock at the Champion, and much, if not all, of this is to be forwarded this year. The Milwaukee road has a contract to take 50,000 tons to Escanaba at once. Champion is the deepest iron mine in the Lake region, nearly 2,000 ft., and contains a large tonnage of excellent ore. It is a far larger and better mine than a few years ago, thanks to the per-

sistence of exploration and the good management of Walter Fitch, now the United States Mining Company.

Spokane. May 16.

Kennedy J. Hanley has again won his Skookum case in the Supreme Court of the United States. The court has dismissed the motion for a rehearing, made by the Empire State-Idaho Co., the defendant. Coupled with its application was a request for certiorari. This is the third time that the Supreme Court has declined to intervene with the Skookum case, and Mr. Hanley has won five successive victories in the United States Court of Appeals at San Francisco. The case, which is one of the most celebrated in mining litigation, has been in the courts for six years, and it has been contested with every dilatory action that could be devised. Apparently, however, the end is in sight, and Mr. Hanley confidently expects to secure a settlement from the Empire State-Idaho Co., on his judgment for \$420,000, within a few weeks. The case grows over title to the Skookum mine at Wardner, Idaho, which has been mined by the Empire State-Idaho Co., now a subsidiary concern of the Federal Mining & Smelting Company.

The Hercules Mining Co., of Wallace, Idaho, which is conceded to own one of the greatest silver-lead mines in the world, has sold its stock in the Selby smelting company, operating near San Francisco, to the interests which are forming a combine of Pacific coast smelters. The Hercules had about a 10th interest in Selby, which it bought two years ago. The sale was for nearly \$500,000, and represented more than twice the original investment. Harry L. Day, manager of the Hercules, who is in Spokane, says that the new 250-ton mill at the mine near Burke, Idaho, will be running in 90 days. On the dump there are hundreds of thousands of tons of ore running from \$10 to \$15 a ton, which have been taken out in development. It will concentrate five to one. In the past all the fabulous profits of the mine have been made on clean shipping ore. The net profits for last year were \$430,000, after paying for development and much new machinery and equipment. Mr. Day thinks that the profits from the lower-grade milling ore will equal the future returns from the clean shipping rock. The mine has been opened on four levels, and a fifth tunnel is started, to be run for a mile. In most of the Cœur d'Alene mines the galena and the carbonate shoots are quite distinct. In the Hercules, however, galena and carbonate are found in the same deposits. That makes the process of concentration rather difficult. Numerous offers have been made for the purchase of the mine, but the Hercules people have refused to set a price upon it. Mr. Day said here that he personally thought the Hercules is worth \$10,000,000. Four

years ago the property was a mere prospect. It was developed to its phenomenal standard by the owners who still retain control.

The opening of the Similkameen country, with its rich mineral resources, seems in sight. The Great Northern road has let a contract for the building of its Similkameen extension between Oroville, Wash., and the international boundary line, on the Similkameen river. The work is only 22 miles long, but it will take 1,000 men a year. While the definite route of the railway has not been fixed, the Oroville section will be needed in any event, and work on it is being pushed. The Great Northern now reaches Curlew, Wash., and Republic, Wash. One project is to build on to Oroville from Curlew past Midway, mostly in Canadian soil, and the other is to build from Republic to Oroville. The latter route is longer but gives much easier grades, and is desired by the Great Northern. However, there is an agitation to compel it to build as much as possible in Canada. The railway in turn is making an effort in Ottawa to secure a modification of its charter so as to permit of the building around through American soil. If the road is built past Midway, which is already on the Canadian Pacific, there is good chance that the British Columbia Copper Co. will build its big new smelter at Midway.

Butte. May 20.

All mines of the Amalgamated are now in operation, the Parrot, which was closed down by order of Judge Hunt of the Federal court on April 12, at the instigation of the Nipper company, an asset of United Copper, having been started up. The order enjoining the company from working the mine was dissolved on May 15, with the exception of the part that covered the 'blue' vein, a stringer ranging in width from a few inches to a few feet, which the Parrot has never claimed absolutely. No particular increase in the output of the United Copper mines has been apparent during the last week. About 8 tons of low-grade copper ore were extracted from the Belmont last Saturday. It was dry. This is the first ore this mine has yielded since early in March. The Rarus, Cora and Minnie Healey are yielding ore of fair quality, and the company is buying some rock from lessees. The new hoisting engine at the Cora is almost ready for work. The air compressor at the Rarus exploded last week, causing a suspension of operations until a new one, kept in stock, could be substituted.

The Raven company is driving a cross-cut from the 800 station of the Buffalo to tap the vein of its own property, and will commence another at the 1,200 the latter part of this week. It has overhauled the large engine on the Buffalo and repaired the shaft between the 800 and 1,200. Both openings are expected to cut the main vein 400 ft. from the shaft. This

will give the Raven a depth of something like 1,400 ft. Ore is being extracted from the 600 and 700 of its own workings, some of it being copper-silver and some silver-gold.

The North Butte Copper Co., which bought the Speculator, is negotiating for the purchase of other claims in the vicinity of the Speculator group.

The Cable Lease Co., of which F. W. Bacorn, a Butte attorney, is president, has arranged with Pittsburg men to supply funds with which to open up the property. It is now unwatering the lower levels preparatory to sinking the shaft. The Cable mine, one of the group, has yielded nuggets of gold weighing from an ounce to a pound. They were near the surface.

Stockholders in the new Silversmith company held a meeting here yesterday and discussed offers made by capitalists for a lease on the property. The board of directors has them under consideration. The property was formally turned over to the new company; it being previously known as the Amy & Silversmith. The charter for the latter expired three years ago. One share of stock for each ten of the old will be issued by the new company.

The mill of the Montana Zinc Co. is now running smoothly on ore from the Alice mine and is doing good work. The Alice finished the delivery of 500 tons of ore on May 16; commenced on another on May 17. C. B. Wisner, president of the company, is now in the East negotiating for machinery for the Emma mine, bought recently by the Butte Copper & Zinc, with which he is also connected. A site for the proposed concentrator has not been selected, but the company has two in view.

The smelter of the Butte & Boston is entirely out of business. This leaves only two plants of this class in operation in Butte, the United Copper and the Clark works. Improvements are being made at the latter, the present daily capacity of which is 900 tons of ore.

Bisbee. May 18.

The Nordberg Manufacturing Co., of Milwaukee, has just taken orders for machinery for the Calumet & Arizona group, that indicate the amount of heavy work that group is about to do. The company is to build three great quadruple hoists for these mines, one for the Cole shaft, Lake Superior mine, one for the Oliver shaft, Calumet mine, and one for Junction mine. These hoists will be equipped with reels and flat cables, as is the case at most far Western mines. No drums will be used. Each of these engines is designed to hoist a load of 24,000 lb. from a depth of 2,500 ft. They will hoist skips carrying three tons of ore and will hoist in balance or singly as may be desired.

Six large blowing- and blower-engines have just been ordered from the Nordberg company by the Copper Queen Consolidated Mining Co. for extension to the

company's smelter. Nine of these engines are already in use there. The Calumet has also ordered two or three new blowing-engines from the same company.

Twelve carloads of machinery and steel supplies have arrived here for the Black Mountain Mining Co., which is developing a gold property near Magdalena. It is to be shipped there at once. The mine is 30 miles from the nearest railway point and everything must be hauled overland. About 250 men are working at the mine, which is in charge of N. C. Banks, an engineer from Pittsburg. A large electrical power station will be erected at Magdalena and all power for the mine, mill and other plants will be generated there, by coal received by rail, and carried over the mountains to the mine on wire. Lines of 6-in. steel mains will be laid for the water supply, and it is hoped to have the first 120-stamp mill running before next January. Ultimately the mine will be equipped with 400 to 500 stamps. It is a very large medium-grade property, with much ore shown up that will run to \$25 a ton.

Cadena del Cobre, which is developing into a very important copper property, and which is now being examined by mining engineers with a view to making recommendations for extensive betterments, is cutting solid carbonate in two tunnels. and the Bisbee tunnel is now in more than 100 ft. of this ore. Cadena tunnel is also in solid carbonate and a new one has been started which is expected to cut the same ore at a short depth.

Leadville. May 20.

With the breaking up of winter considerable new work is mapped out for the summer in several of the districts in the camp; the most important being the McKenzie placer, lying south of the Reindeer, Rock hill. This tract embraces over 100 acres and one shaft will be put down, work starting by the beginning of June. At the Arizona placer, head of Empire gulch containing 160 acres, a shaft will be put down to the lower contact to open the ore-shoots that trend in that direction from Rock hill. Work will start June 1. In the Mosquito range and Sugar Loaf districts more work will be done this season than in any preceding year, and at the Bug Golf property, French gulch, a mill will be erected to treat the large body of low-grade gold ore in the property.

The strike made in the Favorite shaft, on Little Ellen hill, last week, holds out as the shaft goes down. Ten feet of good lead carbonate ore has been opened and sinking continues. The ore is all over the bottom of the shaft and runs \$25 per ton. The shaft will be sunk until the bottom of the ore is reached, when drifting in both directions will start. At the Nil Desperandum, on Rock hill, the new machinery is being installed and this will see the last 15 ft. of the shaft sunk. In the

bottom of the shaft the matter is heavily mineralized and when the 750 ft. mark is reached drifting to the south will be started to catch the ore channel in that direction. With the favorable showing in the shaft it is expected that the ore-shoot in the drift will be caught in a short distance.

Walter Crippen has a lease on the Gunnison, on Sugar Loaf, and has been at work all winter driving on a fair streak of lead ore; recently this changed into talc and Crippen was doubtful as to its value. He had the stuff assayed and it gave returns of 6,000 oz. silver and 6 oz. gold per ton. The talc is now being sacked and the drift driven ahead. The size of the vein is 18 in. The Moyer, on Iron hill, continues to send to the smelter its daily quota of ore, and the immensity of the ore-shoots can be realized from the following: In one part of the mine a raise was made in one shoot 10 ft. and this was prospected for 400 ft. in length; then a winze was sunk 35 ft. to the lime and it was all ore, a lead-zinc sulphide; this also extended the full 400 ft.; the width of the shoot is in the neighborhood of 30 ft. That is only one of the numerous ore-shoots in the property.

Dawson. May 6.

According to press despatches from Ottawa, Sir Wilfred Laurier, premier of Canada, has announced the intention to divide all northern territory of the Dominion among the provinces, the Yukon to be included in British Columbia.

Navigation between Whitehorse and Dawson is opening earlier than usual. There are already many open places between Lake Laberge and Dawson, and an early break-up of the ice on the lake is looked for. At Puget Sound ports and at Vancouver and Victoria, through bills of lading for freight consigned to Yukon and Tanana points are being issued, consignments being accepted with the understanding that storage charges will not be made should the freight be held at Whitehorse until the Yukon river shall be open.

The first gold of the season is being received at Dawson, where it is accumulating preparatory to being shipped out early in June. The weather is still too cold for sluicing to be general, but it is expected that a favorable change in this connection will soon take place. Already the beneficial results of the gold coming in are evident, the miners paying their debts and more men finding employment.

On several of the creeks in the Klondike proper, within 50 miles of Dawson, there are big dumps of dirt ready to be sluiced—on Eldorado, Bonanza, Dominion, Sulphur and Hunker creeks. Quartz creek, which has been extensively worked during the winter, will probably be in the lead this season, promising a comparatively big yield. It is estimated that the total recovery of gold from the part of the Yukon territory included within the limits above

mentioned will be about \$8,000,000, while other calculations, anticipating an increase from the large hydraulic plants that have been put in, indicate a probable larger yield than that of last season.

A rich strike of gold is reported from Hight creek, a tributary of the Mayo river, distant about 250 miles from Dawson. On No. 84 below Discovery, Hector Morris is stated to have struck 6 ft. of pay dirt that will average five cents to the pan, or more than \$6 to the cubic yard. Neighboring claims have been selling at prices ranging up to \$50,000.

Reports from Tanana state that the Tanana river cut a new channel 8 miles above Chena, thus cutting off both Chena and Fairbanks from river communication and leaving some of the river steamers at Chena high and dry. Later news is that the ice that piled up in the old channel and caused the temporary diversion of the stream has given way below the water, which has resumed its old course.

Toronto. May 18.

Information has been received at the provincial bureau of mines of two new discoveries in the silver-cobalt region. One is in the township of Coleman, east of La Rose mine and another is on La Rose location, where a new vein of native silver has been struck, from which a large quantity of free silver has been taken.

In the Ontario legislature, on May 16, J. J. Foy, commissioner of crown lands, introduced a bill to amend the mines act by providing that persons having mining claims in the forest reserves shall only be given leases, renewable from time to time and not allowed to become owners.

The position of Minister of Lands and Mines (that title being substituted for the present designation of 'Commissioner of Crown Lands') will in all probability be filled by Frank Cochrane when the cabinet is reconstructed. Mr. Cochrane is a hardware merchant of Sudbury, and largely interested in mines and timber lands. Mining men are strongly in favor of his appointment as being a practical man, with some knowledge of the requirements of the industry—which has been conspicuously lacking in previous occupants of the post. A seat in the legislature will be found for him in East Nipissing.

At a largely attended meeting of prospectors, mining men and others interested at Haileybury, Timiskaming district, on May 6, resolutions were adopted approving the action of the provincial government in establishing the Timiskaming mining division and of the arrangement whereby all applications for claims must be made through the office at Haileybury; suggesting that claims staked should be inspected before being awarded, and provisions made to prevent the blanketing of claims which were often applied for before the discovery of any valuable mineral had

been made; protesting against the manner in which veteran claims, carrying all the minerals and timber on each grant of 160 acres, had been assigned, resulting in the tying up of large areas of mineral land and preventing its development; and declaring that the forest reserve and timber lands should not be cut off from the mining division, restricting the area open to prospectors.

R. W. Brock, of Queens University, Kingston, and the Dominion Geological Survey, has been commissioned to make a detailed examination of the Rossland, B. C., mining area. The investigation will be very thorough, the party employed in the work including a petrographer and a topographer—the rock sections being made on the field. Mr. Brock previously made an examination of the War Eagle, Centre Star and Le Roi mining properties in connection with their consolidation of interests, but the present undertaking will be much more detailed.

Victoria, B. C. May 16.

Cariboo.—Further tests of gravel taken from the deep drifts of the Slough Creek Gravel Gold, Ltd.'s ground on Slough creek, have resulted in a yield of 15 dwt. of gold from 10½ cu. ft. of gravel, or at the rate of nearly two oz. to the cu. yd.—Another dividend has been paid by Veith & Borland's Onward claim, on Keithley creek, in Quesnel mining division. This is also a drifting property; it employs on an average 15 men and pays its owners fair profits. The Ward mine, Harper's camp, commenced piping on May 5, after having repaired flumes and pipe lines and moved its gravel elevators. The winter and spring have been extremely dry, consequently water is very short throughout the district. A steady rain fell a few days ago, but exceptionally heavy rains are required to enable some of the mines to be worked. The Ward Co. has enough water for about 60 days' run.

Slocan.—On May 3 was completed the first contract for driving the crosscut tunnel the Rambler-Cariboo Mines, Ltd., is putting in with the object of cutting its ore vein at a depth of about 1,400 ft., or 600 ft. below the bottom of its main shaft, now 800 ft. in depth. The distance reached on above-mentioned date was 2,125 ft. from portal. Another contract has been let, under which it is intended the tunnel shall be completed, the estimated additional distance to be driven being about 2,300 ft. The tunnel is 7 ft. by 7 ft. 6 in. in the clear, with water box 1 by 2 ft. under car track.

Rossland.—Geo. S. Waterlow, though still weak after his recent severe illness, has been making progress with his amalgamation scheme at Rossland. After about a week in that camp, discussing matters with others materially interested, he left for Winnipeg on May 11, accompanied by A. J. McMillan, general man-

ager of Le Roi Mining Co., and J. W. Astley, general superintendent. W. H. Aldridge, general manager of the Canadian Smelting Works, Trail, and chief of the Canadian Pacific Railway Co.'s mining and metallurgical departments, and Jas. Cronin, general manager of the Centre Star and War Eagle mining companies, joined the party *en route*. At Winnipeg R. W. Brock, who examined the several mines proposed to be included in the amalgamation, was to be met. Meanwhile, on the journey to Winnipeg, the details of the proportion of valuations of the several properties were to be fully discussed. After the matter has been thoroughly gone into with Mr. Brock, Messrs. McMillan and Astley will return to Rossland, and the other members of the party will proceed to Toronto and Montreal, to there meet T. G. Blackstock and the president of the Canadian Pacific Railway Co., for the purpose of coming to an agreement concerning the details of the projected consolidation before submitting the scheme to the stockholders of the respective mining companies concerned, for approval and ratification. The chief promoters of this amalgamation scheme are understood to be sanguine that they will shortly achieve their object in this connection.

Coast.—The tunnel the Vancouver Power Co. has for two years been engaged in driving to connect Coquitlan and Trout lakes, in connection with its hydro-electric power generating enterprise, to supply power to the cities of Vancouver and New Westminster and surrounding district, for electric railways, manufacturing and lighting purposes, has been completed at a cost of about \$320,000. Its total length is 12,775 ft.; size, 9 by 9 ft., with 'rounded corners'; area of normal cross section, 73 sq. ft.; number of men employed, 100 to 175; time taken in drilling, two years, two months and three weeks; average rate of progress per day, 15 to 16 ft.; explosives required, more than 200 tons of dynamite, gelignite and blasting gelatine; fust used in blasting, about 500,000, or about 95 miles; candles used in lighting, nearly 175,000. The initial installation of machinery is equal to the generation of 9,000 h.p., but as the works have been designed with the intention of an eventual increase to 30,000 h.p. the hydraulic part of the undertaking has been developed accordingly. Coquitlan lake has an area of about 2,300 acres, and its elevation is 32 ft. above that of Trout or Beautiful lake, which has an area of approximately 460 acres. Both lakes are surrounded to their outlets by rugged mountains, rising abruptly from the shore lines, and between the two is a granite mountain range, the altitude of which is nearly 4,000 ft. above water level. Through this range the tunnel has been driven. The stored waters of Coquitlan are the main supply and Trout lake is a balancing reservoir.

Mexico. May 18.

It is reported from Chihuahua that H. R. Simpson, assistant general manager of the southern department of the American Smelting & Refining Co., has signed a contract with Gov. Enrique C. Creel, for the State of Chihuahua, to build a \$1,000,000 smelting plant in the city of Chihuahua. It is believed that the smelter will be at the intersection of the Mexican Central railroad with the Kansas City, Mexico & Orient railroad, which was surveyed some months ago by J. M. Knight, and on which it is understood a more detailed survey is now being made by Charles Hadskog. Just what the conditions of the contract are or when construction work will be started is not yet known, but it is probable that there will be no unreasonable delays. It is further stated that Paul Ginther, manager of the Encinillas Mines, Ltd., has been so successful in obtaining ores for the running of his 300-ton plant at Santa Rosalia, just south of Chihuahua, that he is having plans and estimates drawn for an 800-ton smelting plant to be erected in Torreon. At Saltillo ground is being broken for the erection of a large smelting plant for the Mazapil Copper Co., under the direction of W. J. Browning, the general manager of the company. The mines are at Concepcion del Oro, Zacatecas, where the company already has a small smelter in operation. At Matehuala, State of San Luis Potosi, the new plant of the National Metallurgical Co. is fast gathering shape. The formation of this company, which will have a 300-ton matting plant, has been in the hands of James A. Kilton for about three years, and when he obtained the necessary concessions, the needed water rights and the requisite mines, he organized his company under the laws of Colorado, with \$1,000,000 gold capital. C. S. Thomas, of Denver, is president and H. N. Nichols, also of Denver, vice-president. Four months' active building operations were started under the superintendence of A. L. Waters. Beside the smelter it is intended to furnish electric light and power to the town of Matehuala, and to put in a tram line from the smelter to the mines.

At Ebano, in San Luis Potosi, the Mexican Petroleum Co. has considerably curtailed operations, for the demand, even at \$1.50 Mexican per barrel for crude oil, is not sufficient to keep them pumping, so with the storage tanks of 450,000 bbl. capacity there is a four months' supply. In the meantime the Mexican Central, International and Mexican railroads continue their experiments with oil burners in their engines.

In the San Pedro district, near the city of San Luis Potosi, the Mexican Metallurgical Co., of which R. S. Towne, of New York, is president, is opening up some splendid orebodies in the lower levels of the Begonia and Victoria prop-

erties, which, on these lower levels, are held under lease by Mr. Towne's company.

At Santa Barbara, in Chihuahua, Mr. Towne has been obliged to close down the mines and mill of the Montezuma Lead Co. (a subsidiary to the Mexican Metallurgical) due to the zincy character of the ores. The orebodies are too large to abandon, and it is believed that the shut-down is only until some more exhaustive tests can be made on the ores and the necessary alterations made in the mill. Especially may this be looked upon as the outcome in view of the successful results in the Tecolotes 500-ton mill, across the gulch, from the Montezuma, which had also been closed down some eight months ago for similar reasons. After some alterations, one unit of 100 tons was started up about four months ago, and the work has been so satisfactory that the other units will be changed and started up as soon as possible.

London. May 13.

Particulars of the deal between the Camp Bird, of Ouray, Colo., and the Imogene Basin Gold Mines Co. are now available. The latter company owns a number of claims interlaced with those of the Camp Bird, and on the same mineral belt as the Tomboy, Revenue, Yankee Girl and Guston; but as yet, little development work has been done, and in fact no orebodies of importance have been found. As much of the ground can be effectively explored from the various levels, Mr. Hammond recommends the deal, and properly says that it is a pure speculation. The terms of the deal are that a committee of three, consisting of Mr. Hammond and Mr. Cox, together with a nominee of the Imogene Co. shall conduct exploring work for 18 months, and spend \$139,500 in so doing, in consideration of which sum the Camp Bird shall receive 558,000 shares (\$1 par value) in the Imogene Co. The nominal capital of the Imogene is \$3,000,000, of which \$2,442,000 shares have previously been issued, the present issue to the Camp Bird being the balance of the authorized capital. If further development is required, the Camp Bird is to subscribe \$51,000 and the Imogene \$49,000. Also, the Camp Bird has the option to purchase sufficient shares to acquire the control of the Imogene at a price of 50c. per share. The directors and shareholders in this country consider the proposal a very fair speculation, and have adopted Mr. Hammond's recommendations.

The recent amalgamation of the Mount Lyell with the North Mount Lyell is making for economy. The average costs during the six months ended March 31 of mining, smelting and converting have been reduced by 1s. 7d. per ton, as compared with the previous six months, and now stand at just over 13s. per ton.

These economies are specially important in this case, as the grade of the ore continues to decrease. The amount of ore treated during the six months in question was 150,251 tons from Mount Lyell, and 52,104 tons from North Mount Lyell. The average contents were 2.17% of copper, 1.84 oz. silver, and 1.1 dwt. gold per ton. After allowing £13,000 for mining exploration, and £8,764 for depreciation of plant, a net profit was made of £145,000. Out of this, £75,000 has been distributed as dividend, £25,000 placed to reserve fund, and the remainder carried forward.

The last of the big West Australian mines to issue its report for 1904 is the Sons of Gwalia. During the year the ore milled amounted to 108,000 tons, and the total yield of gold from the mills and by cyaniding was 62,626 oz. fine gold, realizing £266,613. The total expenses were £120,362, and the sum of £22,268 has been written off for depreciation. The dividends paid amount to £121,875. As will be seen from the figures of production, the average content is not particularly high, and the tendency of the ore is to become of still lower grade. The costs are so carefully watched that \$6 ore can be worked at a profit, certainly a result to be proud of in treating West Australian ores. The ore reserves on December 31 were estimated at 362,000 tons, an increase during the year of 40,000 tons, and the average content is estimated at 47s. 4d. per ton.

Johannesburg. April 25.

Monte Carlo has been moved to Johannesburg. The gambling spirit of the place broke all bounds, and there has been one of the biggest runs on a stock commonly called 'Sallip' (South Africa Lands) ever known in South Africa. Such violent fluctuations in prices, such an enormous business, such excitement, is extraordinary even for Johannesburg. The £1 shares were rushed up to £8 and over, a good deal of business being done at this high figure. Then they fell to £4, and almost every day have fluctuated from £4 10s. to £3 10s. These tin shares have been, and still are, the main topic of conversation. Even the Russian-Japanese war has fallen into comparative insignificance. The question that every man asks his neighbor is, "Have you any Sallip?" An affirmative answer receives the reply, "Lucky dog!" Why people bought these shares at £8, I do not know. Probably because someone whispered that they would undoubtedly see £10. A few might have been influenced by the report made by an enthusiastic 'tin expert,' who warned the company that they must be very careful in the future not to 'rush' the mine, as their output of tin would be so great that the market price of the world would be seriously affected. What a lovely bait!

Last week the mining industry passed through one of the government holidays, namely, Good Friday. The mining law

places this day, together with Christmas day and Sundays, under its protection and forbids the mines to work on these occasions under a maximum penalty of £75. Some of the mines were able to collect sufficient ore in the bins to run through. Others were in a less fortunate state, and to hang up on Good Friday meant a big loss, directly in gold, and indirectly in the disorganization among the intemperate whites, many of whom celebrate a holiday by getting drunk. Some mines, therefore, took the chances, considering it cheaper to pay the fine demanded by the government rather than 'hang up.' The reading of the law is unfortunate for the mine owners. It prohibits work on these legal holidays from midnight of the night before until midnight on the night of the holiday. Instead of breaking up two shifts, this regulation ruins three. Of course there has been considerable 'kicking' against the law, the suggestion having been made that in order to make use of Saturday night-shifts, for instance, Sundays should legally start at 5 A. M. Sunday morning, to 5 A. M. Monday morning. But so far the government remains inexorable. This holiday law bears harder on mines where it is a struggle to make two ends meet and keep the stamps running, than on mines which are in a flourishing condition and have a big supply of ore broken underground. Some mines are able to shut down at 1 o'clock Saturday and run through until Monday morning. Others work the same on Saturday as other days, being forced, however, to pay the workmen a shift and a half for Saturday, as the artisan in this country claims Saturday afternoon as a holiday. At some mines it is necessary to send a shift down on Saturday nights, working till midnight, the men receiving full pay for this half shift.

Quite a flutter was caused in the dovecot last week by a letter sent to London by Mr. Cresswell, the celebrated anti-Chinese advocate. The correspondent for the London paper could not possibly state that the Chinese were a failure. His line of argument was, therefore, that Chinese labor was ousting skilled white labor on the Rand, the proportion being at present one white workman to every thirty Chinese. Mr. Cresswell must have had a bad dream, and dreamed these figures. From all sides figures have poured in to show that the ratio is about 1 white to 8.02 Chinese or Kaffirs. The assertion that Chinese will replace skilled white labor is absolutely groundless. The skilled whites are well able to take care of themselves, and they will see that no skilled artisan, black or yellow, enters the ranks. As a matter of fact, it is likely that more whites will be employed in running the same number of Chinese than with Kaffirs. The Celestial is far and away more wily and cute than the Kaffir, and requires more watching than his black brother.

Personal.

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

Mr. E. G. Spilsbury has returned from Cuba.

Mr. H. Kilburn Scott has returned to Brazil.

Mr. R. M. Raymond sailed on the *Baltic*, May 24.

Mr. Claude V. Haines is at Wei-Hai-Wei, China.

Mr. J. W. Malcolmson was recently at Durango, Mexico.

Mr. Joseph H. Harper, of Butte, is at Tonopah, Nevada.

Mr. C. M. Fueller, of Denver, is at Birmingham, Alabama.

Mr. F. Cogill sailed from London for West Africa on May 13.

Mr. B. Magnus, of the Buffalo Smelting Co., is visiting New York.

Mr. H. I. Hood is examining coal fields in Routt county, Colorado.

Mr. S. F. Emmons leaves for Europe on *La Savoie*, sailing June 15.

Mr. P. G. Lidner, on his return from Nevada, has gone to Cartagena, in Colombia.

Mr. C. B. Dunster has recently returned to Marquette, having spent the winter in Mexico.

Mr. J. H. Watson, of Colorado Springs, is examining mines in the State of Guerrero, Mexico.

Mr. John Seward has returned to New York, after six months' absence in Mexico and California.

Mr. N. L. Birkett, manager of the Broomassie Mines, Ltd., West Africa, is in England on leave.

Mr. A. T. Sitwell arrived on the *Cedric* and is now with the Tennessee Copper Co., at Copperhill.

Mr. Leonard D. Sivyver, of Los Angeles, has returned after an absence of six months in Arizona.

Mr. Fred. G. Farish has returned from Sinaloa, and is now at the Creston-Colorada, in Sonora, Mexico.

Dr. Edward D. Peters sails for Europe on June 3. He will be absent from Boston until the end of September.

Mr. Arthur L. Walker, manager of the Perth Amboy smelter, has gone to Tacoma, on a visit of inspection.

Mr. T. B. Greenfield has been appointed chemist and assayer to the Sotiel Coronada mines at Huelva, Spain.

Dr. R. W. Raymond has been elected an honorary member of the Institution of Mining and Metallurgy, London.

Mr. T. J. Ryder has been appointed general manager of the oil fields department of S. Pearson & Son, in Mexico.

Mr. A. C. Massey has resigned as superintendent for the Model Gold Mining Co., of Arizona, and will go to Richinbar, Arizona.

Mr. F. Longmaid has been appointed manager of the Vacas-San Marcos Mining & Milling Co. at Vacas, State of Durango, Mexico.

Mr. S. E. Bretherton expects to visit Denver, about June 5, in order to look after his private interests in several mining and land companies.

Mr. R. W. Brock, of the Dominion geological survey, has been commissioned to make a detailed examination of the Rossland, B. C., mining area.

Mr. George E. Tilly has left London to take the management of mines owned by the Colombian Mines Corporation, Ltd., in the republic of Colombia.

Mr. E. Renshaw Bush, lately associate mining engineer with Ricketts & Banks, has opened an office as consulting mining engineer at 69 Wall street, New York.

Mr. E. W. Widdowson, provincial assayer and chemist, of Nelson, B. C., was married on May 9 to Ruth, the only daughter of Mr. R. Tipping, of Stockport, England.

Dr. Schuyler Skaats Wheeler has been elected president of the American Institute of Electrical Engineers. Dr. Wheeler is president of the Crocker-Wheeler Co., of Ampere, N. J.

Mr. Charles C. Schnatterbeck, for eight years on the editorial staff of THE ENGINEERING AND MINING JOURNAL, has accepted a position on the United States Geological Survey.

Mr. Julian Kennedy, of Pittsburg, has been appointed consulting engineer for the new bessemer steel plant to be built by the Youngstown Sheet & Tube Co., at Youngstown, Ohio.

Mr. Henry Cook Boynton, instructor in metallurgy and metallography at Harvard University, has been awarded a Carnegie Research Scholarship of \$350 by the Iron and Steel Institute.

Mr. Harry Mitchell, of the Mitchell Mining Co., is at the mines of the company in the State of Guerrero, Mexico, where he will superintend the blowing-in of the 200-ton smelter now approaching completion.

Mr. Francis A. Thomson, having completed his work as construction engineer for the New Western Reduction Co., will remain as permanent superintendent of that company's sampler and custom mill at Goldfield, Nevada.

Mr. Godfrey D. Doveton, of the firm of Doveton & Purington, is engaged in metallurgically examining the low-grades ores of Cripple Creek, with a view to determining if they can be profitably treated. He is also preparing designs for a large plant at Tonopah, Nevada.

Note.

We desire to obtain copies of No. 1 and 2, Vol. 74, July, 1902, of THE ENGINEERING AND MINING JOURNAL. Persons who have these numbers, and are willing to dispose of them, will confer a favor by communicating with us at once.

Obituary.

Sidney Pinchin, manager of the Combine mine, near Rat Portage, Canada, was drowned while traveling in a canoe from the Combine to the Regina mine.

Henry Merz, of the Heller & Merz Co., of New York, died on May 13, aged 70 years. Mr. Merz was the first manufacturer of ultramarine in this country, and was widely known as a maker of chemicals.

Edwin McCalla Davis died on May 17 after an illness of 18 months from nervous prostration. He was born in Philadelphia on November 21, 1861, and after a course in a Philadelphia technical institute became a mechanical engineer. Soon after he went into the employ of the Niles-Bement-Pond Machine Tool Co., of New York, of which he ultimately became secretary.

John Wesley Anderson, vice-president and general manager of the Carbon Steel Co., died on May 19 at Harrisburg, Pa., from injuries received in the recent train wreck at Harrisburg. His is the fourth death in the party of five which included Mr. Anderson; his son, Frank W. Anderson; Victor L. Crabbe, purchasing agent of the Carbon Steel Co.; Paul Bright, an engineer for the company, and George Loeffler, the chemist. Frank W. Anderson died from his injuries, as did Crabbe, who was a nephew of Robert Pitcairn, as is Bright, and now, by the death of the senior Anderson, the Carbon Steel Co. loses its principal officials. Mr. Anderson was also vice-president of the Union Steel Casting Co., and the patentee of a number of valuable steelmaking processes. He was a member of the American Institute of Mining Engineers, of the International Society of Testing Materials, and of the Engineers' Society of Western Pennsylvania.

Societies and Technical Schools.

American Society of Refrigerating Engineers.—The first year book of this society has just been issued, and copies may be had by addressing the secretary, suite 806, 258 Broadway, New York.

Trade Catalogues.

Portable electrical drills and electrical grinders are described in a circular issued by the Cincinnati Electrical Tool Co., of Cincinnati, Ohio.

The Big Wonder and hammer rock-drills are illustrated and described in bul-

letin A, issued by the Hardsocg Wonder Drill Co., of Ottumwa, Iowa.

Bulletin No. 56, issued by the Electrical Machinery Co., of Minneapolis, Minn., describes that company's revolving field generators and rotary converters.

'Ideal Power' for May, issued by the Chicago Pneumatic Tool Co., of Chicago, Ill., is an exceptionally interesting number of this readable little publication.

The Blake-Morsche electrical ore separator is described in a booklet, issued by the owners of the American patents and rights—the Blake Mining & Milling Co., of Denver, Colorado.

Circulars E and P, of the St. Louis Well Machine & Tool Co., of St. Louis, Mo., describe respectively the St. Louis center-beam driller, and the pipe and casing supplies made by that company.

Bulletin No. 6, issued by the Geo. G. Blackwell, Sons & Co., of Liverpool, England, contains an essay on the 'Supply of Iron and Steel Alloys.' It contains many interesting reproductions of the plant of the company.

'Let's Think About Pumps' is the title of a little book, tastefully prepared by the Gould Manufacturing Company, of Seneca Falls, N. Y. It describes and illustrates many of the well-known pumps made by this company.

An attractive booklet, descriptive of the Monarch engine-stop and speed-limit system, has been prepared by the Consolidated Engine-Stop Co., New York. It contains a list of installations of this system in the United States.

Industrial.

J. M. Callow reports that the Basin company and the Boston & Montana Consolidated Copper & Silver Mining Co. have ordered 20 and 30, respectively, of his settlers.

The S. H. Supply Co., of Denver, Colo., is furnishing the necessary machinery and equipment for a complete smelting plant to the Ohio-Mexican Mining Co. in Mexico. This shipment will include a 48-inch round water-jacketed copper matting furnace, No. 4 positive-pressure blower, forehearth, slag pots, matte pots, 80-h.p. boiler, 60-h.p. engine and complete electric outfit for lighting the entire plant.

The Newcastle Portland Cement Co. of Newcastle, Pa., has placed an order with the Westinghouse Electric & Manufacturing Co. for two 75 kw., three-phase, alternating-current generators, two 42-kw. exciters, and the necessary switchboard for the control of this apparatus. These machines will supply current for operating a number of type C induction motors, ranging from 10 to 100 h.p. each, which were also included in the contract.

The National Electric Co., of Milwaukee, has re-organized by the election of J. I. Beggs as president; J. H. Van

Dyke, vice-president; and the following directors: Charles F. Pfister, Frederick Vogel, Jr., John I. Beggs, and J. H. Van Dyke, Jr. S. W. Watkins has resigned as president and director F. G. Bigelow, as director, F. C. Randall, as director, vice-president and general manager, and Gordon Bigelow as director. The business of the company will be actively continued.

Kohler Bros., of Chicago, through their Pacific coast branch, the Abner Doble Co., of San Francisco, have recently installed their system on a new press of the Portland *Oregonian*, Portland, Oregon, and have closed contracts with the *Times-Mirror* Co., Los Angeles, Cal., and the *Spokesman-Review*, of Spokane, Wash. The Kohler system consists of a multiple push-button control for the electrical operation for printing presses and other machinery. The *Oregonian* has a 50-h.p. equipment and the proprietors are exceedingly well satisfied with the good results attained.

In consequence of the increase of its business, the H. W. Johns-Manville Co. has found it imperative to establish more branches in order to facilitate the handling of its business, and as a convenience to its customers. The new branches are in the far West—San Francisco, Seattle, Kansas City, Los Angeles, Little Rock and Minneapolis. With these, in addition to the old branches, New York, Milwaukee, Chicago, St. Louis, Boston, Philadelphia, Pittsburg, Cleveland, New Orleans, London, Paris and Brussels, the company now has 18 branches covering the entire United States and Europe.

The Shenango Furnace Co., of Pittsburg, has recently made an increase in its blowing capacity at the Sharpville, Pa., works, by the installation of another Standard type vertical Reynolds-Corliss engine, with steam and air cylinders of 44 and 84 in. diam., respectively, and a 60-in. stroke. This is one of the ordinary long crosshead blowing engines which Allis-Chalmers Co. has been furnishing for some time past from its Scranton works. It will operate with safety against an air pressure of 25 lb. and a steam pressure of 150 lb. to the square inch. The order was a duplicate of one placed shortly before by same company.

The No. 1 mine of the Donk Bros. Coal & Coke Co., of Donkville, Ill., recently broke all previous records in the tonnage of coal hoisted in the State, and it is believed established a record which has been exceeded by only one or two bituminous mines in the entire country. In an eight-hour day 3,013 tons of coal were hoisted, or at the rate of 377 tons an hour, or 6 tons every minute of the working day. The coal was produced in the mine, was assembled at the bottom of the shaft and raised to the surface. The power for hoisting the coal was furnished by a pair of Litchfield 20 by 36 engines, made by the Litchfield Foundry & Machine Co., Litchfield, Illinois.

General Mining News.

ALABAMA.

JEFFERSON COUNTY.

Tennessee Coal, Iron & Railroad Co.—At the annual meeting of this company, Don H. Bacon was re-elected president and chairman of the board; Frank S. Witherbee was elected first vice-president, and L. T. Beecher, formerly secretary and treasurer, was elected a director and second vice-president. The annual report shows gross earnings of \$9,535,404, as against \$13,468,535 in 1904; total profits of \$1,562,797, as against \$2,904,977, and net profits of \$801,264, as against \$2,165,448. After payment of dividends and sinking fund charges there remained a surplus of \$388,177, a decrease of nearly \$1,400,000. The report says, however, that this year promises to be of extraordinary activity in the iron and steel trade and that with good prices, full recovery from the effects of the coal strike, and increased production because of extensive improvements, the prospect is very encouraging.

ARIZONA.

YAVAPAI COUNTY.

United Verde Copper Co.—This company's mine at Jerome suffered from a cave-in on May 23. One stope was affected to the 700-ft. level, and two small stopes to a lesser degree. There were extensive surface damages, but mining has been resumed.

CALIFORNIA.

ELDORADO COUNTY.

California & Ohio Gold Mining & Reduction Co.—W. E. Garner, manager of this company, has started work on a new mine on J. D. Arnett's ranch, near Shingle. If results of prospecting are satisfactory extensive developments will be undertaken.

INYO COUNTY.

Southern Belle Mining Co.—In this group at Laws, A. E. Vandercook, manager, the New York shaft will be sunk 200 ft. below the present workings. Either 5 or 10 stamps will be added to the mill.

MARIPOSA COUNTY.

Tennessee & California Gold Mining Co.—The manager of this company, S. L. Brown, has set a force of men at work on the Mallet mine, Bear creek, and the old shaft is being unwatered preparatory to work on a large scale. Machinery is being hauled to the mine.

Our Cove.—This mine on Bear creek has been sold by D. E. Bertken and Mrs. M. Gordon to Mrs. Evaline Bell of San Francisco, who will at once develop it.

Sweetwater.—At this mine, L. E. Hanchett, principal owner, the new machinery is in place and the air drills have been started. The mill will shortly begin crushing.

MONO COUNTY.

Crystal Lake Mining Co.—The directors of this company, Lundy, have decided to continue the lower tunnel 400 ft. further north and then make an upraise. It was also decided to add 10 stamps to the mill.

NEVADA COUNTY.

Wm. H. Dye, of Salt Lake, has bought the Round Mountain Champion and Extension No. 1 claims on Rock creek, 4 miles north of Nevada City, and new machinery will be put in to develop the properties.

Canada Hill.—Littlefield & Co. having a bond on this mine near Nevada City, are re-opening the drain tunnel and will soon unwater the old workings.

Ethel.—This mine near Washington, owned by A. Maltman, of Nevada City, E. C. Crissell, of Washington, and B. Goodwin, of San Francisco, is to have a new 5-stamp mill. A 900-ft. tunnel is nearly completed.

Murchie.—The mortars have been put in place for the new 10-stamp mill of this mine at Grass Valley.

St. Gothard Mining Co.—H. Eddie, superintendent, and H. Kirchman, president of this company, are making plans for conducting operations on a more extensive scale at this mine, near Columbia hill.

Champion Mining Co.—The 1,000-ft. north drift of this company at Nevada City, has been advanced 2,300 ft. and it is expected to strike the old Nevada City shoot within two months. The latter claim was bought by the Champion company some years ago. The drift from the tunnel will open the pay streak at great depth.

New York-Grass Valley Mining Co.—At this property, Grass Valley, Geo. W. Root, the superintendent, expects to have the new 20-stamp mill in operation within about six weeks.

Austin & Wedge.—N. P. Brown has secured an option on these claims in Willow valley and also on the three adjoining Isolta claims. These claims are to be consolidated and a company will be organized in San Francisco to work them.

PLACER COUNTY.

Last Chance.—Two new companies have commenced operations at this place. One is the Blue Eyes, and the other is working the ground formerly known as the Glenn Consolidated.

Evening Star.—This mine is being unwatered preparatory to an examination by Tonopah men.

SAN DIEGO COUNTY.

Stonewall.—At this mine, owned by the Cuyamaca Co., ore is being taken from the 300-ft. level, and the mill will soon be started. The mine has been unwatered down to the 400-ft. level.

SHASTA COUNTY.

Black Jack.—The new 4-stamp mill on

this mine at Centerville, has been nearly completed. Geo. Jensen is the owner of the mine.

SISKIYOU COUNTY.

Dredge.—The Boston company owning the dredging ground on Yreka Flats will shortly have machinery for a new dredge, the old one not having proved successful.

Golden Eagle.—At this mine on Indian creek, A. C. Brokaw, superintendent, a power-house is being erected on which electrical machinery will be installed.

Medina Mining Co.—At this property, Oro Fino, a building is being put up to instal the concentrators.

Eaton.—This mine on the Tiger fork of Sugar creek has been bonded and will soon be developed quite extensively.

Gardner & Eastlick.—At this mine the hydraulic elevator has been put in place on bedrock, and will elevate the gravel 60 feet.

Baker.—Cole & Arnold are building a new stamp mill on this mine on Indian creek.

Dan Malloy.—On this claim near Sawyer's Bar, a contract has been let to run a tunnel and top the vein at a much lower depth than at present worked.

Advance.—A 3-ft. vein of good ore has been found on this mine on China Gulch, and it is expected that a mill will shortly be erected.

COLORADO.

BOULDER COUNTY.

Blue Bird.—W. E. McCoy and associates have acquired possession of this property, about two miles northwest of Nederland, and they are taking out some very good grade silver ores, a recent shipment bringing values of \$259 per ton, chiefly in silver, with lead and gold values.

GILPIN COUNTY.

Alice E. Mining & Milling Co.—This company has purchased the Jo. He tunnel group in the Phoenix district, and is preparing to instal an air-compressor plant and carry on heavy developments. D. D. Johnson, Tolland, Colo., is manager.

Yankee Consolidated Mining, Milling & Tunnel Co.—A Sullivan air-compressor, 100 h.p. boiler and other machinery has been received for this property at Lombard, in the Yankee district. It will be hauled out as soon as the roads are in shape for heavy hauling. The mill is to be started up, and the company plans to build an aerial tramway from mines to mill. H. I. Seemann is manager.

New York Mill.—The Pewabic Consolidated Mine Co., operating in the Russell district, has taken a lease and option on this mill near Black Hawk, with its equipment of 50 slow and 20 rapid drop stamps, and will ship over lines of Gilpin Tramway Co. its entire product of low-grade ores. J. C. Fleschutz, Central City, Colo., is manager.

Mabel.—Chicago parties have leased and bonded this property in Russell district, group consisting of six claims, credited with a past production of \$50,000. A 15-h.p. Witte gasoline hoist is being installed for sinking the shaft below tunnel level, and leasers will work the ground above tunnel. Tom Cudahy, Central City, is in charge.

Actna-Kent.—Local parties have taken a lease on this property on Quartz hill, and they will instal a plant of machinery, carrying out developments in the 300- and 500-ft. levels. J. T. Semmens, Bald Mountain, is in charge.

JEFFERSON COUNTY.

Independent Smelting & Refining Co.—This company has blown out its furnaces at its smelter in Golden, and everything is quiet at present; but it is reported that a meeting of the stockholders is to be held this week, at which time arrangements will be made to resume with increased capital and under a more businesslike method than heretofore. On account of the heavy storms in the mountains, the roads have prohibited hauling of ores from some localities, and this has been a handicap for the success of the smelter. The shut-down affects the sampling works at Black Hawk, Idaho Springs and Boulder.

LAKE COUNTY—LEADVILLE.

Tuscon.—Extension of the Moyer, belonging to the Iron Silver Mining Co., is still engaged in widening and retimbering the shaft; this work will take until the middle of June, when the shaft will be sunk to the mineral 350 ft., and the Moyer ore-shoot opened to the east.

Ballard Consolidated.—This company has secured a lease and bond on sixteen claims in Thompson gulch, between Iowa and Empire gulches, and will in the near future sink two shafts to the lower contact. In addition to this, both the Ballard and President, Breece hill, will be worked extensively this summer. The Ballard is now shipping in the neighborhood of 50 tons daily.

Ruby.—The earliest moment the roads will permit of it, the ore broken in the mine during the winter will be shipped. Alongside of the shipping-ore in the mine is a large body of low-grade ore, and it is the intention of the company this summer to erect a mill to treat it. Work on the mill will start as soon as the material can be hauled to the property.

Twin Lakes.—N. A. Loggin, the manager, has returned from England and resumed work on this placer. Cleaning out and repairing flumes is the work at present being done, and when this is completed washing will commence. A large tract of new ground will be worked this summer.

Brattleboro.—A new drift is now being driven northeast from the 290-ft. mark in the shaft to open the main ore-shoot that was found higher up. From

the old workings about 25 tons daily are being shipped.

TELLER COUNTY—CRIPPLE CREEK.

W. P. H.—The Harrison & Seaver lease has expired and the company is now preparing to work it. There is undoubtedly considerable ore left in the property, as the contract was only for the depth of 300 ft. A new hoist is being put in and work will be pushed. The lease has produced a large amount of ore.

Ethel Louise Gold Mining Co.—An important consolidation of mining properties on Gold hill has occurred. The Conundrum claim of the Anchoria-Leland Co., the Mary Ann claim of the Duchess Gold Mining Co. and the Ethel Louise No. 1 & 2, have become the property of the Ethel Louise Gold Mining Co. The officers of the new company are the following: Irving Howbert, president; J. A. Hayes, vice-president; F. H. Gay, secretary; A. H. Hunt, treasurer; and C. W. Howbert, general manager. The property is to be worked through the Conundrum shaft which is practically 800 ft. deep. A large amount of ore has been extracted from the Conundrum property and there is also a large amount of undeveloped ground.

El Paso Consolidated Gold Mining Co.—This company this week declared a dividend of three cents per share, making \$73,500 to be distributed among the stockholders. When this is paid it will make \$775,750, that have been distributed among the stockholders. The condition of the mine is splendid and it is understood that it is such as to insure these dividends for some time.

INDIANA.

The Deering Coal Co. has complied with the foreign corporation law, and filed a copy of its articles of incorporation with the secretary of State. The company is incorporated in Delaware and the capital stock is \$5,000,000. The amount of capital invested in Indiana is \$1,200,000, and the corporation fee was \$1,200. The company's home office will be in Terre Haute, in charge of Hugh Shirkle. The latest purchase the company made was on May 9, when it took over the Oak Hill mine at Clinton for a quoted consideration of \$100,000.

It is reported that the Freeman-Diekasen mines, near Linton in Greene county, will be sold this week to one of the big coal syndicates. The Freeman-Diekasen interests is not a merger but a combination of coal interests along the Southern Indiana railroad. This combination owns and controls five mines, four of which are valued at \$250,000 each, and one at \$350,000. Agents of the capitalistic merging companies have looked the property over carefully and there is little doubt of the plan to purchase. Two questions are being asked. One is, what effect will this merging business have upon small operators?

and the other is, how will it affect organized labor?

NEVADA.

HUMBOLDT COUNTY.

Bonanza King.—This is a gold and silver mine, 26 miles northeast of Lovelock. It belongs to a Michigan company, and is managed by J. P. Fitting, of Lovelock. A mill, equipped with Huntingtons and plates, has been operating for some time. Mr. Fitting will now instal 15 stamps, concentrating tables and cyaniding vats. He has been recovering \$20 per ton of ore from the plates. In the same locality are the placer properties of the Federal Mines Co., of Chicago, whose grounds are claimed to be very rich, the gravel being from 10 to 50 ft. to a false bedrock of cement. A gold dredge will be built for this work.

WASHOE COUNTY.

Olinghouse District.—This district is 9 miles northwesterly from Wadsworth. It comprises a mineralized area, estimated to be 2½ by 6 miles in extent. The country is andesitic and porphyritic. The district proper is cut by phonolite, andesite and basalt dikes, which strike northeast-southwest. The veins, which appear to be fissures, cut these dikes diagonally and range in width from 4 to 30 ft. Development shows there are numerous parallel veins of this character. The gangue is an altered material, being described as a phonolitic breccia, carrying free gold and gold-bearing sulphide, accompanied by some silver. The mineralized zone has been opened and developed to some extent within an area of 1½x3½ miles. According to some of the mill runs, the ore has much of it yielded \$26 per ton by amalgamation, and the tailing from plates has yielded \$40 per ton by concentration.

OREGON.

BAKER COUNTY.

Platts.—A strike of rich ore has just been made in this group, Rock Creek camp on the Jim Blaine claim. This property is under the management of the Geiser-Hendryx Co., and the ore is very rich shipping ore, which is now being sacked and sent to the smelters. Manager Hendryx states that the company will push development work on this property during the season as fast as men and money can accomplish it.

Red Boy.—John Thomsen, manager of this mine, which is undergoing re-organization, has just returned from the East and it is understood that work on the triple compartment shaft will be resumed in a few days, and the mine developed on the lower workings.

Virginia.—The manager of the Virginia property, which is controlled by an English company, expects to start operations again about the first of June, and will sink to another level before starting up the mill.

Foreign Mining News.

AFRICA.

GERMAN EAST AFRICA.

Two companies have just been organized in Berlin to operate for gold in German East Africa. The Central-Afrikanische Bergwerksgesellschaft, with a capital stock of \$150,000, has a concession covering 33,500 acres on the shore of Lake Victoria Nyassa, on which gold is said to have been found. The Victoria-Nyassa Bergwerksgesellschaft, with \$125,000 capital stock, has been granted the right to prospect over a district south of the great lake, covering about 14,000 square miles, with the right to locate and work any gold deposits which may be discovered. The small capital indicates that only prospecting operations will be undertaken at present.

TRANSVAAL.

The gold output in April was 399,166 oz. fine, being 657 oz. less than in March. For the four months ending April 30, the total was 1,532,058 oz. fine. This shows an increase of 339,544 oz., or 28.5%, as compared with the corresponding period last year.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending May 13 were as follows, in tons: Granby, 13,230; Mother Lode, 2,944; Brooklyn, 1,901; Rawhide, 628; Mountain Rose, 132; Dominion Copper Co. dump, 200; Oro Denoro, 132; Last Chance, 31; total for the week, 19,198 tons; total for year, 344,283 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending May 13 were as follows, in tons: Le Roi, 2,050; Centre Star, 1,500; War Eagle, 1,500; Le Roi, No. 2, 90; Le Roi No. 2 (milled), 600; White Bear (milled), 300; Jumbo, 200; Spitzee, 60; total for the week, 6,300; for the year, 128,114 tons.

VANCOUVER ISLAND.

Tyee Copper Co. Ltd.—This company's smelter ran 16 days in April, smelting 3,324 tons of Tyee ore, which gave a return, after deducting freight and smelter charges, of \$47,106.

NEW ZEALAND.

Exports of gold from the Colony for February and the two months ending February 28 are reported by the Mines Department as follows, in ounces of bullion:

	1904.	1905.	Changes.
February	52,318	31,816	D. 20,502
Two months.....	81,535	89,948	I. 8,413

The bullion reported for the two months this year was equal to 85,486 oz. fine gold, or \$1,766,990. Silver exports were as follows, in ounces:

	1904.	1905.	Changes.
February	66,442	79,964	I. 13,522
Two months.....	177,939	123,827	I. 5,888

Nearly all the silver comes from the Hauraki mining district.

Mining Stocks.

(See quotations on page 1031.)

New York. May 24.

In mining shares speculation has been quickened by the weakness in prices. The coppers attracted some attention by their fall in quotations, Amalgamated reporting on one day sales of 133,920 shares at \$79.25@75, while Anaconda fell to \$25.125. Tennessee made a few sales at \$24.125@24, Greene Consolidated copper at \$25.75 @ \$24.875, and British Columbia at \$6.125 @ \$6. United Copper did business in its preferred stock at \$73.75@72.25, and in the common at \$25.125@23.25.

Gold and silver shares were uninteresting. Portland, of Cripple Creek, took a turn at \$2.20, and Consolidated California & Virginia, on the Comstock, moved at \$1.70.

In the industrial section, American Smelting & Refining common stock was exchanged at \$111.375@106.25, and the preferred at \$119.125@116.75. Federal Mining & Smelting common reappeared at \$100, and the preferred at \$93.50@90. United States Reduction & Refining common stock was dealt in at \$27@26.50, and the preferred at \$59. United States Steel was not active, although the common shares weakened from \$26.75@24.875, and the preferred from \$93.75@90.75.

Boston. May 23.

The same causes that brought about the slump in New York stocks the last week are responsible for a lower range throughout the mining shares on this market. Led by the onslaught in Amalgamated, genuine liquidation ensued in some cases and some half a dozen stocks or so have sold at their lowest prices this year. This is true of Allouez, which fell off \$3.25 for the week to \$19.25; Bingham, \$3.50 to \$28; Isle Royale, \$5 to \$17.50; Old Dominion, \$1.25 to \$23.50; Parrot, \$2 to \$23; and Atlantic, 75c. to \$12.50. There have been faint rumors in the case of Atlantic of something favorable to happen. The Utah peg is still in evidence, although the quotation is down to the peg price of \$42.50. A selling order of several hundred shares in Victoria caused a slump of \$1.50 to \$2, but the price easily recovered to \$3. The mining end is declared to be all right.

Boston Consolidated has held strong at from \$8.25 to \$8.50. Announcement is made that a meeting is called for June 16 in London, to take action on an issue of £250,000 in 6% ten-year debenture bonds, and 125,000 shares of stock, making the latter 625,000 shares, to cover the bond conversion. The proceeds are to be used for the construction of a 2,500-ton concentrating mill. The bond issue is underwritten, one-half in this country. Stockholders will get the bonds at par. United States weakened with the rest of the list, falling \$1.75 to \$29. Underground developments at the company's

Mammoth property in California are reported very encouraging. The smelter there will not go into commission until the Fall. Copper Range fell \$4.75 to \$67.50 with the balance of the list. The next dividend will be declared in June and will undoubtedly be \$1 per share. Sales of North Butte have been made at from \$27.25 to \$26.50 per share.

In the general break Centennial tumbled \$3.25 to \$17.50; Greene, \$1.37½ to \$24.75; Michigan, \$1.25 to \$10.75; Mass, \$1 to \$7.50; Mohawk, \$2 to \$48; Osceola, \$4.50 to \$88; Tamarack, \$18 to \$101; and Wolverine, \$2 to \$107.50. Amalgamated touched \$75.37½, closing \$7.62½ lower than a week ago at \$76.25. It may be true, as has been reported, that there is a powerful bear party in this stock here, but if such is the case it is not shown in the local market and must be done in New York. Notwithstanding the great shaking up the local market has had, there are a great many people who believe that copper shares will sell at materially higher prices before the summer is over.

Colorado Springs. May 19.

There has not been much activity on the local mining market during the past week, and the prices of Cripple Creek stocks have remained quite stationary, but with a tendency to slightly lower prices. The most important news of the week is the report that the mines of the district are planning to drive a new drainage tunnel on a much larger scale than the last one, which proved so very effective. If the present plans are carried out, it will require five years to build, will be five miles long and be deep enough to drain the entire district for years to come. The estimated cost is close to \$1,000,000.

Cripple Creek Consolidated is quoted at 8½@9c. Acacia is selling for 9½c.; Anaconda at 13½c. Elkton has shaded off a fraction and is selling for 51c. El Paso is selling around \$2.09; Findley at 77c.; United Gold Mines at 20c.; Portland at \$2.10@2.25; Vindicator 85@90c.; Work 10½@11c. per share.

San Francisco. May 24.

The Comstocks weakened under some rather heavy liquidation, but recovered later, and were quite strong at the close. Ophir brought \$7.25@7.50; Hale & Norcross, \$1.90; Consolidated California & Virginia, \$1.85@1.90; Mexican, \$1.65 @ \$1.70; Best & Belcher, \$1.25; Savage, 60c. per share.

The Tonopah stocks were active and prices kept up well, with good buying. Montana Tonopah was quoted at \$3@3.10; Tonopah Midway, \$1.55; Jim Butler, \$1; Bullfrog, \$1; Jumbo, 75c.; Goldfield, 60c. per share.

On the California Exchange, trading in oil stocks was quiet, with light sales. Kern River brought \$10.50; Four Oil, 51c.; Home, 45c.; Wabash 35c. per share.

Coal Trade Review.

NEW YORK, May 24.

ANTHRACITE.

The hard coal trade continues its activity under the influence of discount prices. The large operators have good orders now on their books, sufficient to carry business at the present rate of delivery well through June. They do not anticipate cancellations of duplicate orders until July, and some companies report that they never suffer from them.

Egg and stove sizes are universally scarce, but the contrary is true of the steam-size, trade in which is slow.

May quotations remain at the same level, f. o. b. New York harbor shipping points: Domestic sizes, \$4.35 for broken and \$4.60 for egg, stove and chestnut. Steam sizes: \$3 for pea; \$2.25@2.50 for buckwheat; \$1.45@1.50 for rice and \$1.30 @ \$1.35 for barley.

BITUMINOUS.

The Atlantic Seaboard soft-coal trade shows a slight dullness, which seems to be a premature manifestation of the customary midsummer stagnation in the trade. It has been helped, probably, by the continuance of the discount season on anthracite. The last week has seen some heavy contracts placed and this cleans up a large portion of this business for the season, although a few scattering contracts will probably drag through another month. The market seems to be weak and low prices prevail to a small extent. Fair grades of steam coal are selling for \$2.30 @ \$2.35, f. o. b. New York harbor shipping points. The better grades command a price 15 or 20c. higher, while the specialties receive a very much higher price. The weakness of the market may be traced to the conditions of transportation that prevailed during the last week. During this time it was very much slower than it had been during the week previous, which was a record-breaker; to counteract this delay, operators increased their shipments from the mines, so that, with a quick improvement of transportation, they came upon the market in a flood greater than had been expected or could be handled. One tidewater shipping port is reported to have received over 4,000 cars in one day, which, if true, is excessive.

Trade in the far East is quiet, consumers seeming to be drawing on their stocks in hand, so that orders from this territory are scarce. Trade along the Sound is extremely quiet, nobody apparently wanting to take on any coal. New York harbor shows a fair demand, but the heavy arrivals at the shipping ports have almost swamped the trade. All-rail business is fairly good and steady shipments are being made. Transportation from mines to tide is quick and car supply is up to demands where individuals do not long keep their coal standing. When they do so to any extent, embargoes are the rule.

Vessels in the coastwise market are in better supply, although but little change is noted in rates, a slight weakness, if anything, being shown. Philadelphia quotes on large vessels as follows: To Boston, Salem and Portland, 70@75c.; to Lynn, 85@90c.; to the Sound, 65c.; to Newburyport and Gardner, 90c.; to Portsmouth and Bath, 80c.; to Saco, \$1 and towages; to Bangor, 90@95 cents.

Birmingham. May 22.

There has been no change in the coal production in Alabama in the past week, with the exception of a local strike at the Piper mines, in Bibb county, where 300 men have quit work. The output at this place is upward of 90 tons a day. The grievance of the men is purely a local one, and the State executive board of the United Mine Workers of America is now making an effort to solve the troubles. The strike has been on almost a week. The production at all other places is steadily increasing. At mines where non-union men and convicts are employed, there is a good output right along. The demand for coal is still quite brisk.

Preparations are being made by the United Mine Workers for their annual convention, to be held in Birmingham on June 12. It is expected that the convention is going to last at least two weeks. Delegates are now being selected by the local organizations, but if instructions are being given relative to the strike at the mines of the furnace companies, or as to the new wage contract at the commercial coal companies' mines, no statement can be secured. The leaders announce that they see no reasons for giving in, and the furnace company officials say that they do not care to recognize the union. In another month, now, the strike will have been on for a whole year.

The coke situation is but little improved over what it has been for the past four weeks, though efforts are still being made to increase the production. There is a strong demand for coke.

Chicago. May 22.

In general, the coal market is very little different from last week's market. If there is a change, it is in the way of increased dullness, for both bituminous and anthracite are moving very slowly. Decreased shipments are helping the demurrage question—always very important when demand falls off—but almost every day a consignment is caught by the time limit and sold at a sacrifice. In the city sales of both steam and domestic coals have fallen off materially because of the teamsters' strike, though conditions are becoming better daily as regards deliveries.

Fine coals, however, continue in comparatively large demand, and there is a slight increase on some grades of run-of-mine. This is, of course, important to dealers in Illinois and Indiana products. The significant fact, however, is that the

amount of coal coming into market continues to be considered too large, despite curtailments of shipments from the mines, that in some cases amount to 50%.

The new law requiring shot-firers to be hired and paid by mine operators will, it is asserted by producers of Illinois coal, operate injuriously against this coal in competition with coal from outside the State. Since the signing of the bill, somewhat higher prices have been asked and obtained on contract business for Illinois coal; but this is perhaps only a feature in a general recovery of the contract business from the pit of extreme depression in which it has been for two or three months. That contract business is better is generally admitted.

Eastern coals are in light demand, Hocking being the steadiest, as usual, with the price about \$2.85. Smokeless is not in heavy demand, but is fairly firm at about \$3—some sales being made at 10@15c. more. Youghiogheny finds a few purchasers at \$2.90@3. All Eastern coals are well restricted as to shipments. Illinois and Indiana run-of-mine are quoted at \$1.50@1.70, screenings at \$1.20@1.50, and lump—for which there is very little demand—at \$1.70@2 per ton.

Cleveland. May 23.

The coal market in Cleveland and this territory has hardly changed. Interest continues to be centered in the situation in the Lake trade, which has not yet struck its midsummer gait. The movement is very light, largely because the buyers in the upper lake regions have not yet arranged for their supply for this year. Many boats have agreed to engage exclusively in the ore trade for this season, and unless the shipments of coal begin at a sharp pace soon there is likely to be a serious shortage of tonnage in the fall. The prices for lake coal are still \$1.90 f. o. b. Lake Erie ports for ¾-in. steam. Rates have not changed from 35c. to the head of the lakes and 45c. to Milwaukee.

Run-of-mine steam coal is dragging on the bottom. There is not much better demand, with a constant danger of an over-production. The mine operators are holding for 95c. at the mines, for Ohio and Pennsylvania coal, but that price can be beaten. There is hardly any change in that respect. Slack holds firm with a fair lake demand. The price holds at 60c. for Pennsylvania and 70@75c. for Ohio slack at the mines. The coke market is about as it has been. There is a fair demand, but the prices have not changed either way. The best grades of 72-hour foundry coke are selling at \$2.75@3, with some selling as low as \$2.60. Furnace coke is bringing \$2@2.25 at the oven.

Pittsburg. May 23.

Coal.—The Pittsburg Coal Co. has nearly all of its mines in operation this week and is getting all the railroad cars necessary to rush shipments to the lake ports

for the Northwestern trade. Every indication points to a prosperous season, and the production in the Pittsburg district is expected to be the greatest on record. If the movement of representatives of the Pennsylvania Railroad Co. is successful, the operators in the Pittsburg district will be greatly benefited. According to reports, an effort is being made to obtain control of all the mines in the northern bituminous fields, which will result in the combination of about 65 independent interests. If the plans are carried out, the product will be shipped principally to the Buffalo and Canadian markets and remove some competition of Pittsburg operators. Prices are still quoted on a basis of \$1@ \$1.10 for run-of-mine at the mine.

Connellsville Coke.—Prices remain unchanged, strictly Connellsville coke being quoted at \$1.90@2 for furnace and \$2.65 @ \$2.80 for foundry. Both production and shipments were a trifle larger last week than the previous week. The production was 258,960 tons and the shipments aggregated 12,128 cars distributed as follows: To Pittsburg and river points, 4,639 cars; to points west of Pittsburg, 6,273 cars; to points east of Everson, 1,216 cars.

San Francisco. May 18.

J. W. Harrison's circular, of this date, says: "Since our last there has been only one cargo from Newcastle, N. S. W., 2,240 tons. There are two cargoes now fully due which should certainly arrive within the next few days; there are on the chartered list for coal from Newcastle 26 in all, with a carrying capacity of about 75,000 tons. Eight of these vessels are already *en route*, but some of them will not arrive until the latter part of the year. The quantity of Colonial coal here in yard is very light, as we have had but one cargo delivered in 60 days. Notwithstanding the small quantity in jobbers' hands, there has been no change in market prices. The sales of fuel for household purposes are being materially reduced, as warm weather has made its appearance, and for steam purposes fuel oil is consumed by the larger portion of steam producers. Shipments from British Columbia are of sufficient volume to make good the deficit created by the small arrivals from Australia. There is a growing disposition to charter grain carriers at improved prices for future arrivals; this should lead to a reduction on coal rates from Newcastle, as there is nothing but coal to ship from Australia, and the rates that grain shippers will have to pay, may enable shipowners to do business at a profit. Fuel oil is being freely offered in quantities to suit at low figures."

For Coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, \$8; Roslyn, \$7; Seattle and Bryant, \$6.50; Beaver Hill and Coos Bay, \$5.50; White Ash, \$5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, \$14; Castle Gate, Clear Creek, Rock Springs and

Sunny Side, \$8.50. Eastern coals are nominal at \$14 for Pennsylvania anthracite, and \$13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, \$13; cannel, \$8.50; Wallsend and Brymbo, \$7.50 per ton.

Foreign Coal Trade. May 24.

Exports of fuel from Great Britain for the four months ending April 30 were as follows, in long tons:

	1904.	1905.	Changes.
Coal... ..	14,303,227	14,731,791	I. 428,564
Coke	217,251	201,387	D. 15,864
Briquettes . .	419,024	344,264	D. 74,760

Total .. 14,939,502 15,277,442 I. 337,940

The quantity of these exports sent to the United States was as follows:

	1904.	1905.	Changes.
Atlantic ports....	19,456	14,891	D. 4,565
Pacific ports.....	34,660	21,183	D. 13,477

Total.. 54,116 36,074 D. 18,042

In addition to the exports given above, there was sent abroad for the use of steamships engaged in foreign trade, 5,283,697 tons in 1904, and 5,396,169 tons in 1905; an increase of 112,472 tons. This makes the total quantity of fuel sent outside of the United Kingdom in the four months, 20,223,199 tons in 1904, and 20,673,611 tons in 1905; an increase of 450,412 tons this year.

Iron Trade Review.

NEW YORK, May 24.

Conditions in the iron trade are somewhat conflicting. New orders continue scarce, and there is very little business coming in for the second half of the year. At the same time, all mills and furnaces continue extremely busy, and existing contracts are sufficient to keep them so for some time to come. The production of pig iron continues at a very high rate. It is possible that there may be some change in this, however, as some furnaces which have had a long campaign, will undoubtedly have to close for repairs very soon. The United States Steel Corporation has made no purchases of outside iron, but it is believed that it will have to do so early in June, especially as some of its large furnaces will very probably need repairs before long. Should the Corporation come into the market, the price of pig iron, which has shown some tendency to weakness, will probably be supported at about the present level.

In finished material, conditions are the same as in pig iron. New orders of any size are scarce. At the same time, there is considerable business doing in a small way in the local markets, and there is no cessation in the activity of mills and furnaces. Specifications on long contracts continue to come in well, and deliveries are called for at a rate which does not give manufacturers any leisure. Structural material is perhaps doing best. While rail orders are not pressing, the car and locomotive builders are all busy, and are using a great deal of material.

Upon the whole, it may be said that the trade is passing through a waiting period. There is no particular apprehension as to the future, but people are simply waiting to see what comes. The somewhat depressing condition of the speculative markets has had very little effect on actual trade and the consumption of material. It is quite probable that the present temporary cessation, so far as new business is concerned, will soon pass over.

Iron Trade of Great Britain.—Exports of iron and steel, and manufactures thereof, from Great Britain for the four months ending April 30 are valued by the Board of Trade returns as follows:

	1904.	1905.	Changes.
Iron and Steel..	£9,046,169	£9,580,055	I. £533,886
Machinery.....	6,519,872	6,942,108	I. 422,236
New Ships.....	1,077,283	1,182,871	I. 105,588

Total.....£16,643,324 £17,705,034 I. £1,061,710

Exports of mining machinery, included above, were £285,447 in 1904, and £281,469 in 1905; a decrease of £3,978. Of the exports this year, £82,853 in value were to South Africa.

The leading items of the iron and steel exports were, in long tons:

	1904.	1905.	Changes.
Pig iron... ..	273,549	266,645	D. 6,904
Wrought iron... .	57,663	54,663	D. 3,000
Sheets... ..	129,268	132,617	I. 3,349
Plates... ..	45,247	50,538	I. 5,291
Rails... ..	141,324	170,776	I. 29,452
Steel ingots, etc.	37,527	40,006	I. 2,479
Tin-plates... ..	109,584	124,734	I. 15,150
All other kinds..	235,916	250,954	I. 15,038

The total increase in quantities was 60,855 tons, or 3%, as compared with last year.

Imports of iron and steel into Great Britain for the four months ending April 30 were valued at £2,653,273 in 1904, and £2,656,313 in 1905; an increase of £3,040. Imports of machinery were valued at £1,475,164 in 1904, and £1,621,454 in 1905; an increase of £146,290. The chief items of imports were, in long tons:

	1904.	1905.	Changes.
Pig iron.....	43,574	38,782	D. 4,792
Wrought iron... .	38,248	25,135	D. 13,113
Steel ingots, etc.	176,275	203,572	I. 27,297
Structural steel.	41,279	35,155	D. 6,124
All other kinds.	130,901	124,475	D. 6,426

Imports of iron ore for the four months were: Manganiferous, 100,306 tons; other sorts, 2,147,937; total, 2,248,243 tons, an increase of 249,308 tons over last year. Of this year's imports, 1,787,673 tons were from Spain.

Birmingham. May 22.

Despite the fact that the market continues dull, the pig-iron manufacturers in Southern territory feel confident that there will shortly be a decided improvement. Inquiries are being received now, and manufacturers are being urged to deliver orders placed some months since as promptly as possible, indicating that there is need for the product and that the consumers have not a great supply on hand. Consumers will be bound to buy again for the third and fourth quarters before long. Two or three of the companies are still unable to accumulate any iron in this

district, being just able to fill contracts or supply their own needs. The Sloss-Sheffield Steel & Iron Co. is probably the only company able to accept heavy business with a guarantee to deliver promptly.

There has been no change in the production in the last week. Shipments are holding up well. The aggregate sales for this month promise to show up disappointingly, but so far none of the furnacemen speak apprehensively as to the future. The Tennessee Coal, Iron & Railroad Co. is giving every attention possible to the production of steel at Ensley. The furnaces at Ensley are producing basic iron to be used at the steel plant altogether, the furnaces in operation at Bessemer and other places belonging to this company manufacturing foundry iron.

The following quotations are given: No. 1 foundry, \$13.50@13.75; No. 2 foundry, \$13@13.25; No. 3 foundry, \$13.50@12.75; No. 4 foundry, \$12@12.25; gray forge, \$11.50@11.75; No. 1 soft, \$13.50@13.75; No. 2 soft, \$13@13.50.

There are occasional sales still made of special analysis iron at special prices. A well-known iron man, being asked as to the market, replied: "Iron can be purchased in the Southern territory at \$13 per ton, No. 2 foundry, but all the companies are not able to accept business or want much business at that price. There is a better inquiry and the indications are that there is not a great quantity of iron in the hands of the consumers."

The steel production at Ensley continues healthy. The steel rod, wire and nail mills in this district, property of the Alabama Steel & Wire Co., are very active and the product is being shipped about as rapidly as it is being manufactured.

An official denial is given to the rumors that the Woodward Iron Co. is making preparations for the early construction of a steel plant near the furnaces at Woodward.

Gadsden is to have two new furnaces. J. M. Elliott and associates are preparing to remove a furnace to Gadsden from St. Louis and the Alabama Consolidated Coal & Iron Co. is working a large force, preparing for the new furnace at that point.

There is no change in the cast-iron pipe and foundry trade in this section. The pipe makers have many orders on hand and a steady inquiry for the product is being received.

Chicago. May 22.

The iron market continues very quiet; indeed, by some it is said that the usual summer quietness has arrived, a month or two ahead of time. No apprehension is expressed by the leaders of the iron market—those that deal in pig iron particularly—about the prospects of the trade for the rest of the year. This lull in trade, they say, is indicative only of the lack of business sufficient to equal the expectations and the preparations of sanguine furnacemen. And there is doubtless some truth

in this; the total volume of business is great, though small compared with the expectations naturally engendered by the boom period of two or three months ago.

Though the volume of business in pig iron continues to be fair, it cannot be denied that prices have dropped, actually if not nominally. The leading agents still quote \$17.50 and \$13.50 Birmingham, as the price of Northern and Southern pig iron, respectively. As a matter of fact, any desired quantity of iron—above a very small lot—can undoubtedly be bought for the last half of 1905 for \$17 Northern, and \$13 Birmingham—\$16.65 Chicago—for Southern. This cut of 50c. has been made through force of necessity, and there are those in the business who prophesy a still further reduction within a month.

The general tone of trade, however, is confident—remarkably so, considering the record of cold figures. It is certain that the iron and steel business locally has improved greatly in the last six months, and the wave of optimism caused by this change may not yet have subsided. But on general considerations there would seem to be little to justify predictions of evil now; trade generally is good, and especially in finished materials. The trade talks of but one fear seriously—over-production.

Under-consumption, however, would seem to be shown somewhat at least by the coke market. Consumption of coke has fallen off, and Connellsville 72-hour is sold at \$5.15, while lower grades bring correspondingly reduced prices of 25@50c. Coke shipments should be considerably curtailed under present conditions.

Cleveland. May 23.

Iron Ore.—The movement is still extraordinarily heavy down the lakes, with good dispatch being given to the boats at this end of the line. The tendency is to use contract vessels altogether, growing out of a peculiarity of some contracts with the larger class of vessels, which stipulates that they shall run light to the head of the lakes to bring back ore. This indicates the intention to adhere to the contract vessels to the exclusion of those boats which are running wild. It also indicates a good, strong movement of ore in anticipation. Some wild boats are used. The rates are 75c. from Duluth, 70c. from Marquette and 60c. from Escanaba. There is a little inquiry for ore, but none has been bought recently. The prices hold at \$3.75 for bessemer Old Range; \$3.50 for bessemer Mesabi; \$3.25 for non-bessemer Old Range, and \$3 for non-bessemer Mesabi, all f. o. b. Lake Erie docks.

Pig Iron.—There is really no market for foundry iron at the present time. The market would have to be made on the appearance of a good buying order. There is still small buying of 50 to 100-ton lots at \$15.75@16 with some material sold at \$15.50 in the Valleys for No. 2. There is

no buying for future delivery. Southern furnaces are still offering material here at \$13 Birmingham, to which is added the \$3.85 freight rate to make up the Cleveland quotation. The bessemer and basic trades are dull, with producers expressing some concern as to the future of the market. They are not willing to force their material upon an unwilling market and the situation is dull.

Finished Material.—The shipbuilders are taking a good deal of tonnage, with six new contracts for ships recently placed and old orders on hand for which steel has not been bought, indicating a sale soon of about 20,000 tons of ship material, including structural and plates. Building contractors are still buying heavily from stock and from the small mills to piece out their needs. The billet situation is strong, with reports that a Southern producer is underselling the mills here on that material. The smaller mills have under-sold sheet mills of large size and have forced a reduction in all prices, stock included, of about \$3 a ton.

New York. May 24.

The market is generally quiet, small orders being the rule.

Pig Iron.—Business has been light, and there are no large contracts. There is some demand for small quantities of spot iron. There is no quotable change in prices, which are: For Northern iron, No. 1 X foundry, \$17.25@17.75; No. 2, \$16.75@17.25; No. 2 plain, \$16.25@16.75; gray forge, \$15@15.50. Virginia foundry can be obtained around \$17.15@17.65. Southern iron is now selling on a basis of \$13 at furnace for No. 2 foundry, though the large companies insist that they have not cut prices. For large lots on dock, New York, we quote as follows: No. 1 foundry, \$17.25@17.50; No. 2, \$16.75@17; No. 3, \$16.25@16.50; No. 4, \$15.75@16; No. 1 soft, \$17.25@17.50; No. 2 soft, \$16.75@17; gray forge, \$15.25@15.25, according to brand.

The warrant market on the Produce Exchange still continues quiet, but prices are steady. Latest quotations are \$15.20 bid, \$15.50 asked, June and July, regular warrants; \$15.35 bid, \$16 asked, June and July, foundry warrants.

Bars.—Bar iron continues in moderate demand, with no large orders. Quotations are unchanged at 1.595@1.645c. large lots on docks. Steel bars are held at 1.645c. Store trade continues pretty steady, with quotations 1.75@2c., delivered.

Plates.—Plates in small orders are in fair demand, and buyers who ask for concessions are not getting them. Tank plates are 1.745@1.795c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.645c. up, according to width.

Structural Material.—Business in small lots continues good. Prices remain unchanged. Beams under 15 in. are 1.745c.

for large lots; over 15 in., 1.845c.; angles are 1.745c. tidewater.

Steel Rails.—Standard sections continue \$28 per ton at mill, but hardly any business is done in this market. Girder and trolley rails are more active. Light rails are quiet, prices ranging from \$24 for 12-lb., up to \$21 for 35-lb. rails.

Old Material.—The market is dull, and dealers are inclined to take lower offers. No. 1 railroad wrought can be had for \$17.25@18; yard wrought, \$15@15.50; machinery cast, \$13.25@13.75. Heavy steel melting scrap is in better demand at \$14.50@15. These prices are on cars, Jersey City, or other terminal delivery.

Philadelphia. May 24.

Pig Iron.—Our pig-iron people have done a fair week's business in iron for early delivery, most of it for special purpose; but have done scarcely any business for late delivery, though they have inquiries before them asking for prices for summer delivery, in which they read between the lines that there is an expectation of concessions. There is very little probability, according to the opinions expressed today, that any weakness would be shown by the makers. The makers are disposed to wait a few weeks to get a more definite idea than they now have as to the probabilities of an increasing production during the latter half of the year. Several lots of No. 2 foundry were taken yesterday and today, and it is probable there will be a scattering business in all kinds of crude iron. It is evident to our people that the consumers of pig iron are still picking up a good deal of new business, and that these inquiries grow out of their desire to buy sufficient iron to cover these engagements. Quotations have not varied, and may be given at \$18 for No. 1 X, with some variations for quality; \$17.50 for No. 2 X; \$17 for No. 2 plain; \$16 for best standard gray forge; \$16.50 for basic and \$20.50 for low phosphorus.

Billets.—A good many billets are selling, but in rather small lots, under the easing-up tendency which has been developing for a few days past. The inquiries show that there are a good many billet requirements not yet covered. Business has been done at \$27.

Bars.—The bar mills are so well filled up with business that there is no disposition to court new orders by even the slightest concession. At the same time there are rumors that some car-building orders for common iron are likely to be placed at a trifle less than usual quotations. Steel bars are selling well in small lots on basis of 1.65 and the usual quotations for best refined are 1.75.

Sheets.—There is a somewhat better business in the best grades of sheet, but the quantities contracted for are not large. The bulk of our sheet-iron business is now being done for 30 days delivery.

Pipes and Tubes.—The tube conditions continue most satisfactory, and mills are unable to catch up, owing to the inflow of new business. Pipes are also strong though the urgency is not so great.

Merchant Steel.—There is an idea in some quarters that merchant steel in large lots will soon be had at a little less money, but even if so, this will not affect the sort of business which we are accustomed to do here. The consumption of merchant steel is somewhat larger than a month ago.

Plates.—The condition in the plate-iron department is as it was a week ago. A good deal of material is being bought for general tank and boiler purposes, and for construction requirements. The plate mills are well sold up and there is not the slightest evidence of any desire to attract business for late delivery.

Structural Material.—The statements that this month's business will foot up 100,000 tons is an under- rather than an over-estimate. There is pending this week an inquiry for a large lot of structural material for bridge building, but it is not stated who the buyer is nor the locality in which it is to be delivered. There are new requirements bobbing up almost every day and there is quite a struggle among the smaller buyers in arranging for deliveries, as the mills are pretty well tangled up.

Steel Rails.—Steel-rail orders continue to drop in and the inquiries within the past three or four days denote that some large buyers are about placing contracts. There is also additional inquiry for girder rails and for light rails.

Scrap.—The scrap market has not changed one way or the other. The weakness which was threatened a week ago has disappeared. We have considerable scrap piled up and contracted for. Quotations range from \$22.50 to \$23 for old iron rails. Choice railroad scrap sold this week at \$18.50; No. 1 steel scrap at \$16.25; machinery scrap at \$16.50, and some wrought-iron-pipe scrap at \$15 per ton.

Pittsburg. May 23.

There has been but little change in the iron and steel markets during the week. While no new business of any consequence has been placed, production continues as heavy as at any time this year, and stocks are not accumulating. Mills here appear to have enough orders on their books to keep them going for several months without new business. The bulk of orders in principal lines was placed months ago. This is shown in the tin-plate trade particularly. On Dec. 22 last, the American Sheet & Tin-Plate Co. advanced the price of tin-plate from \$3.45 to \$3.55 a box. The tin-plate workers in union mills operating under the scale of the Amalgamated Association are entitled to an advance in wages when

sales for two months average \$3.50 a box. The examination of the sales' sheets for March and April was made this week, and the result showed that the average was below \$3.50. The tin-plate mills of the American Co. have been in full operation all year and while some new business has been done at the rate fixed in December it has not been large enough to bring the average price for the past two months 5c. a box above the old price.

Pig-iron production has been enormous and all the iron made is going into consumption. The strain on the furnaces that have been running to capacity steadily all year is beginning to have an effect and a number will be forced to shut down for repairs and relining. This will not cause any embarrassment, as little new business is expected during the next month or two and present contracts will keep the majority of the furnaces busy for several months. Three of the large furnaces of the Carnegie Steel Co., one at Youngstown, one at Braddock, and one at Duquesne, have gone out of blast for repairs and several others may go out shortly. This, it is believed, will force the United States Steel Corporation to buy outside iron for June and it is expected to enter the market at any time. Furnace interests in the Valleys seem determined to maintain a minimum price of \$15.50, Valley furnaces, for bessemer iron, and a movement has been started to bring all the merchant furnaces into an agreement which will put the control of sales in the hands of the committee. If the Steel Corporation buys for June shipment there will be no difficulty in holding the bessemer pig-iron market at \$15.50, Valley. Foundry and forge prices are a trifle firmer this week and a number of small sales were made.

Fabricating concerns are booking many large contracts, but this is not having much effect on the structural trade, as the material required was anticipated and orders were placed long ago for shapes. The Jones & Laughlin Steel Co. contemplates engaging in this line, and will erect a large fabricating plant at West Economy on the opposite side of the Ohio river from Ambridge, where the works of the American Bridge Co. are located. The company has just bought 500 acres of land, but has not made announcement of its plans. Wire prices are being firmly held, and the threatened danger of shading has been averted by the recent action of the independent interests. Heavy specifications for plates from steel-car interests continue, and the plate mills are assured of business that will keep them going for the rest of the year. According to the most reliable information available, the car plants have unfilled orders on their books for 55,000 cars. The structural mills also are well filled with orders. The rail trade has been slow this year, but some of the mills are filled up to November. A good

export trade in rails is expected, and it is reported an order for 4,000 tons for the Russian government was placed this week. The total tonnage of rails this year will not likely be any larger than 1904, and will show a heavy decline from the two preceding years.

The officers of the Amalgamated Association of Iron, Steel & Tin Workers returned yesterday from Detroit, where the annual convention was in session for three weeks. As forecasted, the convention decided to demand a restoration of the wage scales of 1903-4, and a number of important changes were made in the foot notes. In the tin-plate scale the base remains at \$3.40 a box, but instead of an advance of 2% in wages with every 10c. a box increase in price above the base, the advance to be asked is 1% for every 5c. increase in price above the base. No changes were made in the limit-of-output rules. T. J. Shaffer did not make a fight for re-election to the presidency and was defeated, P. J. McArdle, of Muncie, Ind., being chosen for the position.

Pig Iron.—The market is extremely quiet, and the sales for the week did not aggregate more than 2,000 tons of all grades, divided in small lots. In the absence of large contracts, there was no shading and prices are quoted as follows: Bessemer, \$15.50, Valley furnaces; foundry No. 2, \$16.60@16.85, Pittsburg, and gray forge, \$15.60@15.85, Pittsburg.

Steel.—Billets and sheet-bars still command premiums of from \$2 to \$3.50 above the pool prices of \$21 for billets and \$23 for sheet-bars. A few sales of billets are reported at \$23 and \$24, and sheet-bars at \$26 and \$26.50. Plates remain firm at 1.60c., and steel bars at 1.50c.

Sheets.—The market is very quiet, and on a good order a concession of \$1 a ton could be obtained from the fixed price of 2.40c. for black sheets No. 28 gauge, and 3.45c. for galvanized sheets. Corrugated roofing is being shaded about 10c. a square on black, and 5 to 10c. on galvanized. Corrugated roofing remains at \$1.75 a square for painted and \$2.95 a square for galvanized.

Ferro-Manganese.—The market is quiet and domestic 80% is quoted at \$50@51 per ton.

Cartagena, Spain. May 6.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that the shipments for the week were two cargoes, 5,500 tons dry ore, to Great Britain. The local prices of iron and manganiferous ore are well maintained, especially with regard to dry Portman ore. Of this latter shippers are almost without stocks, and prices look like going better. There is good demand from all quarters, most especially from the United States, freight rates being favorable for prompt business. Owing to the bad crops caused by the drought, the price of fodder has been so increased that it has been necessary to put 10% on the

rates of cart and mule transport, which is almost the only form of carrying the ore in this district.

Quotations for ordinary 50% ore are 6s. 4d.@6s. 7d.; special low phosphorus, 7s.@ 7s. 8d.; specular ore, 58%, 9s. 4d.; S. P. Campanil, 9s. 1d. For manganiferous ores quotations vary from 10s. for 35% iron and 12% manganese, up to 14s. 7d. for 20% iron and 20% manganese.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton. No shipments reported.

Chemicals and Minerals.

NEW YORK, May 24.

Trade is quieter, but prices for the more important products are firmer.

Copper Sulphate.—Comparatively few large sales have been made by first hands, who ask \$4.75@\$5 per 100 pounds.

Acids.—Strong. Deliveries are mostly on contract.

Nitric acid, 36°, 100 lb.....	\$5.00
38°, 100 lb.....	5.25
40°, 100 lb.....	5.50
42°, 100 lb.....	5.75
Oxalic acid, com'l, 100 lb.....	\$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton.....	13.50@14.50
60°, 100 lb. in carboys.....	1.05
66°, bulk, ton.....	18.00@20.00
66°, 100 lb. in carboys.....	1.20
66°, bulk, ton.....	21.00@23.00

Sulphur and Pyrite.—Uninteresting. Domestic prime sulphur continues at \$21 per ton at New York, Philadelphia and Baltimore; \$21.25 at Boston, and \$21.50 at Portland, Me. Pyrite is quoted at 9@11c. per unit of sulphur for lump ore, and 8.5 @10c. for fines, f. o. b. Atlantic ports.

Nitrate of Soda.—The market remains firm at \$2.40 for spot 96%, and \$2.20@ \$2.27½ for futures, according to time of shipment. Ordinary quality is worth from 2.5@5c. per 100 pounds less.

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write, under date of April 15, that during the first week of the fortnight there was a demand for 95% prompt shipment to supply vessels which had arrived, and several parcels have changed hands at 7s. 6½d.@ 7s. 8d. alongside; two sales for monthly parcels, July-December, were effected at 7s. 7d., and another for the year 1907 at 6s. 8d. alongside. In 96% little has been done, excepting one sale for 1906 monthly lots of April-December at 7s. 4d. The production for the first three months was 9,099,320 qtl.; exports, 8,549,892 qtl.; and consumption, 13,316,120 qtl. In 1904 production was 6,331,459 qtl.; exports, 6,853,192 qtl.; and consumption, 12,550,139 qtl. We quote 95% April-June, 7s. 8d.; July-December, 7s. 8d.; all alongside sellers. The price of 7s. 8d. alongside, with an all-round freight of 20s., stands in 9s. 6d. per cwt., net cost and freight, without purchasing commission.

Sulphate of Ammonia.—Quiet. Good gas liquor is quoted at \$3.10@\$3.15 per 100 pounds.

Phosphates.—New orders are few, but

deliveries on running contracts are good. No change in prices.

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock.....	\$7.25@7.50	\$10.67@11.85
land pebble.....	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%.....	4.35@4.40	10.27@10.67
78%.....	3.75@4.00	.....
75%.....	3.40@3.50	.....
68@72%.....	3.00@3.25	.....
‡So. Car. land rock.....	3.75@4.00	.....
river rock.....	3.50@3.75	6.33@ 6.61
Algerian, 63@70%.....	.....	7.04@ 7.71
58@63%.....	.....	6.15@ 6.60
Tunis (Gafsa).....	.....	6.00@ 6.60
Christmas Isle.....	.....	13.28@14.11
Ocean Isle.....	.....	13.60@14.45
Somme, Fr.....	.....	11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Liverpool. May 11.

Messrs. Joseph P. Brunner & Co. report that the market for heavy chemicals is quiet.

Brunner, Mond & Co., limited, have just announced a dividend on the ordinary shares for the six months ending March 31 last at the rate of 40% per annum, which, with the interim dividend, is 35% for the twelve months. In addition to £100,000 written off Leasehold Mines, about £88,000 is carried forward. The dividend is 5% in excess of that paid for the previous 12 months.

The report of the Castner-Kellner Alkali Co., Limited, for the year ending March 31 last, shows a net profit of £52,558. Out of this, together with the amount brought forward from last account, £15,000 is transferred to depreciation reserve, £8,204 is written off plant and patents, and the shareholders get a dividend of 4%, leaving a balance of £12,797 to be carried forward. The dividend is the same as for the previous year.

Following are particulars of exports of bleaching materials and sodas for the month of April, as taken from the Board of Trade returns, recently issued:

Bleaching Materials: To United States, 58,927 cwt.; to other countries, 16,525 cwt.; total, 75,452 cwt.; soda ash, 92,256 cwt.; bicarbonate soda, 31,240; caustic soda, 110,313; soda crystals, 20,497; salt-cake, 55,188; other sorts, 25,147; total, 334,641 hundredweight.

Bleaching materials show a slight increase as compared with April, 1904, accounted for by the increased shipments to America, the shipments to other countries having fallen off considerably.

With regard to sodas, the total shipments of soda ash and salt cake are less than for April, 1904. Of bicarbonate, caustic soda and soda crystals, the exports are in excess of last year.

Soda ash continues steady at the usual range as to destination, the nearest value for tierces being about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@ £6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. Bags 5c. per ton under price for tierces. Soda crystals are in demand at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less

for bags, with special terms for a few favored markets. Caustic soda is moving off pretty freely and high strengths are rather scarce at the moment. Quotations are unchanged as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching powder outside of shipments to America receives little attention from export buyers, and hardwood is nominally quoted at £4 10s.@£4 15s. per ton, net cash, as to market.

Chlorate of potash is held for 3 1-16d. @ 3 3-16d. per lb., net cash, as to quantity and market.

Bicarbonate of soda is in steady demand at £6 15s. per ton, less 2½%, for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of ammonia is steady and a fair undercurrent of business is passing at about £12 17s. 6d.@£13 per ton, less 2½%, for good gray 24@25% in double bags f. o. b. here.

Nitrate of soda is in fair request, but with recent arrivals prices are easier at £11 per ton for ordinary, up to £11 5s. per ton for refined, in double bags f. o. b. here, less 2½% per cent.

Metal Market.

New York, May 24.

Gold and Silver Exports and Imports.

At all United States Ports in April and Year.

Metal.	April.		Year.	
	1904.	1905.	1904.	1905.
G'ld Exp	\$19,470,157	\$1,303,874	\$22,857,796	\$35,319,138
Imp	10,289,869	2,581,057	32,404,911	11,803,259
Exc Silv.	E. \$9,180,288	£ 1,277,183	£ 8,547,115	E. 23,515,879
Exp	3,832,758	2,317,599	16,839,052	14,930,051
Imp	2,115,436	2,559,858	9,089,839	9,075,214
Exc F.	\$1,617,332	£ 242,259	£ 7,619,213	E. \$5,854,837

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports. N.Y.

For the week ending May 20, and for years since January 1st.

Period.	Gold.		Silver	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$10 921	\$58 764	\$566,421	\$234,184
1905.....	32 914 546	5,038,242	12,068,639	1,459,809
1904.....	60,048,528	2,019,802	16 174,860	329,262
1903.....	5 763 129	2 862 937	7,911,420	817,522

Gold exports for the week small; imports were chiefly from Central America. Silver exports were mostly to London; imports principally from Central America.

Business generally is only moderately active in most lines. Manufacturers are busy, however, and present demand is good. The reports from the coming crops are still a little uncertain, though inclined to be favorable.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending May 20 gives the following totals, com-

parison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discount....	\$1,056,553,500	\$1,120,426,800
Deposits.....	1,100,686,100	1,165,151,700
Circulation.....	36,480,400	45,308,300
Specie.....	210,002,800	215,174,200
Legal tenders.....	78,143,000	84,333,700
Total reserve.....	\$288,145,800	\$299,507,900
Legal requirements....	275,141,585	291,287,925
Balance surplus.....	\$13,004,215	\$8,219,975

Changes for the week this year were \$20,709,900 in loans and discounts, \$14,932,000 in deposits, and \$609,600 in circulation; decreases of \$4,714,100 in specie, \$45,500 in legal tenders, and \$8,492,600 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York.....	\$215,174,200	.....
England.....	182,898,960	.....
France.....	573,557,485	\$221,369,745
Germany.....	196,710,000	65,570,000
Spain.....	73,905,000	107,785,000
Netherlands.....	33,638,500	31,191,500
Belgium.....	15,820,000	7,910,000
Italy.....	112,885,000	17,976,500
Russia.....	519,025,000	31,135,000
Austria.....	239,615,000	65,515,000

The returns of the Associated Banks of New York are of date May 20 and the others May 18, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has been strong, with rising tendency on China buying.

The United States Assay Office in New York reports receipts of 166,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to May 11 are reported by Messrs. Pixley & Abell's circular as follows:

	1904.	1905.	Changes.
India.....	£4,395,153	£2,835,771	D. £1,559,382
China.....	100,781	228,070	I. 127,289
Straits.....	58,103	2,800	D. 55,303
Totals.....	£4,554,037	£3,066,641	D. £1,487,396

Receipts for the week, this year, were £250,000 in bar silver from New York, £5,000 from Australia and £2,000 from Chile; total, £257,000. Shipments were £30,281 in bar silver to Bombay, £5,000 to Calcutta, £165,000 to Shanghai and £10,500 to Malta; total, £210,781.

Indian exchange has been steady, but with no special demand. The Council bills offered in London were taken at an average of 15.97d. per rupee. Buying of silver for Indian account has not been heavy.

The movement of gold in Great Britain for the four months ending April 30 is reported as follows:

	1904.	1905.
Imports.....	£11,506,384	£13,819,489
Exports.....	10,430,478	8,475,363
Excess, imports..	£1,075,906	£5,344,126

The movement of silver for the four months was as follows:

	1904.	1905.
Imports.....	£4,534,140	£4,329,068
Exports.....	5,017,772	4,461,591
Excess, exports...	£ 483,632	£ 132,523

Of the silver imported this year, £3,205,908, or 74.1% of the total, came from the United States.

Other Metals.

Daily Prices of Metals in New York.

May	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
18	14 1/2 @ 14 1/2	14 1/2 @ 14 1/2	64 1/2	30 1/2	4.50	5.35	5.20
19	14 1/2 @ 14 1/2	14 1/2 @ 14 1/2	64 1/2	30 1/2	4.50	5.35	5.20
20	14 1/2 @ 14 1/2	14 1/2 @ 14 1/2	....	30 1/2	4.50	5.35	5.20
22	14 1/2 @ 14 1/2	14 1/2 @ 14 1/2	64 1/2	30	4.50	5.35	5.20
23	14 1/2 @ 14 1/2	14 1/2 @ 14 1/2	64 1/2	30	4.50	5.35	5.20
24	14 1/2 @ 14 1/2	14 1/2 @ 14 1/2	64 1/2	30	4.50	5.35	5.20

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.25c. lower than that of electrolytic.

SILVER AND STERLING EXCHANGE.

May	Sterling Exchange.	Silver.		May.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
18	4.86 3/4	58 1/2	26 3/4	22	4.87	58 1/2	27
19	4.86 7/8	58 1/2	26 3/4	23	4.8705	58 1/2	27 1/2
20	4.86 9/8	58 1/2	27 1/4	24	4.8715	59 1/2	27 3/4

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

Copper.—The market continues rather nominal. It has been reported that for future business, material concessions are offered. The closing quotations are 14 3/4 @ 14 7/8c. for lake; 14 1/2 @ 14 3/8c. for electrolytic in cakes, wirebars and ingots; 14 1/4 @ 14 3/8c. for cathodes, and 14 1/8 @ 14 1/4c. for casting copper.

The standard market during the entire week moved within narrow limits, but shows at the close a decidedly better tendency. The closing quotations are £64 7s. 6d. for both spot and three months.

Refined and manufactured sorts we quote: English tough, £69 @ £69 10s.; best selected, £70 @ £70 10s.; strong sheets, £78; India sheets, £74; yellow metal, 6 5/8d.

Exports of copper from New York and Baltimore for the week ending May 23 were 2,539 long tons. Imports for the week of May 19 were 43 long tons copper, and \$2,980 worth of ore (quantity not given).

Imports and exports of copper and copper material in Great Britain, for the four months ending April 30, are given below, in long tons; the totals giving the fine copper content of all material:

	1904.	1905.	Changes.
Copper ore.....	26,745	31,036	I. 4,291
Matte and precip'te.	19,926	20,652	I. 726
Fine copper.....	30,432	25,057	D. 5,375
Total imp., fine copper..	43,070	38,487	D. 4,583
Exports.....	17,468	12,529	D. 4,939
Balance, imports.	25,602	25,958	I. 356

Of the imports this year, 40 tons of ore, 1,372 tons of matte and 11,968 tons of fine copper were from the United States; an increase of 19 tons of ore; a decrease of 665 tons of matte, and a decrease of 4,885 tons of fine copper.

Tin.—The market has followed closely the course of London prices and closes steady at 30c. for spot and 29 3/8 for future.

The London market, after declining to £135 15s. for spot and £134 15s. for three months, recovered at the close and is now quoted £136 7s. 6d. for spot and £135 7s. 6d. for three months.

Imports of tin into Great Britain, with re-exports of imported metal, for the four months ending April 30, were as follows, in long tons:

	1904.	1905.	Ch'ges.
Straits.....	9,042	9,876	I. 834
Australia.....	1,328	1,132	D. 196
Other countries.....	948	381	D. 567

Total imports..... 11,318 11,389 I. 71
Re-exports.... 8,910 8,415 D. 495

Net imports..... 2,408 2,974 I. 576

The re-exports are largely of Straits tin forwarded to the United States.

Lead.—A good business has been done at 4.42 1/2c. St. Louis, and 4.50c. New York.

The London market has re-acted somewhat, and the closing quotations are cabled as £12 15s. for Spanish lead and £12 17s. 6d. for English.

Imports and exports of lead in Great Britain for the four months ending April 30 were as follows, in long tons:

	1904.	1905.	Changes.
United States.....	11,564	7,481	D. 4,083
Spain.....	35,735	33,213	D. 2,522
Australia.....	23,294	30,547	I. 7,253
Germany.....	6,643	5,217	D. 1,431
Other countries....	1,863	1,054	D. 809
Total imports...	79,104	77,512	D. 1,592
Exports.....	12,030	13,162	I. 1,132
Balance, imp'ts..	67,074	64,350	D. 2,724

The lead credited to the United States is chiefly Mexican lead, refined in this country.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is firm but quiet. Missouri lead is selling at 4.40 @ 4.42 1/2c. basis.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 6, that the price of silver has been 14 reales per ounce. Exchange is 33.21 pesetas to £1. Local price for pig lead has been 68.25 reales per quintal, equivalent, on current exchange, to £11 8s. 5d. per long ton, f. o. b. Cartagena. Shipments for the week were, of argenteriferous, 120 tons, to Marseilles; of desilverized lead, 200 tons to Liverpool, 200 tons to Amsterdam, 65 tons to Marseilles, and 200 tons to Odessa.

Spelter.—Business in this metal is still rather restricted, but stocks in the hands of consumers are now so low that an early revival in the demand is expected. The closing quotations are 5.20c. St. Louis and 5.35c. New York.

The foreign market is steady and closes at £23 12s. 6d. for good ordinaries and £23 17s. 6d. for specials.

Imports and exports of spelter in Great Britain for the four months ending April 30 were as follows, in long tons:

	1904.	1905.	Changes.
Spelter....	28,939	27,278	D. 1,661
Zinc sheets, etc....	7,892	6,080	D. 1,812
Total imports....	36,830	33,358	D. 3,473
Exports....	2,427	2,698	I. 271
Balance, imports.	34,404	30,660	D. 3,744

Imports of zinc ores are not given separately in the returns.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is dull at the late decline, and the undercurrent still seems to be unsettled. Latest sales are on a basis of 5.25 @ 5.27½c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 6 that prices are firm, and there is talk of an advance. Blende, 35% zinc, is 74 fr.; calamine, 30% zinc, 54 fr. per ton. Shipments for the week were 1,120 tons blende to Antwerp.

Antimony.—The market is rather quiet, but there is no change in the prices as last reported.

Nickel.—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. For smaller quantities as high as 60c. is asked.

Platinum.—Quotations are firm at \$20.50 per oz. Gas-engine sparking points vary from 87c. each for "A," to \$1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated ware, 90c., and cones, \$1 per gram.

Quicksilver.—Quicksilver is a little firmer, at \$38@39 per flask in large lots, while \$40 is the price for smaller orders. San Francisco prices are \$37.50@39 per flask for domestic orders, with some discount for export. The London price is £7 7s. 6d., with the same figures quoted by second hands.

Imports of quicksilver into Great Britain for the four months ending April 30 were 1,587,730 lb. in 1904, and 1,906,528 lb. in 1905; an increase of 318,798 lb. Re-exports of imported metal were 514,176 lb. in 1904, and 649,054 lb. in 1905; an increase of 134,878 lb. this year.

Minor Metals and Alloys.—Prices for manganese alloys in Germany are given by Herr Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows,

per 100 kg.: Manganese copper, No. 1, guaranteed 30% manganese, 265 marks; No. 2, 28 to 30% manganese, for bronze, etc., 175 marks; No. 3, 25 to 20% manganese, with 2 to 4% iron, 165 marks. Manganese tin, No. 1, free of iron and guaranteed 55% manganese, 365 marks; No. 2, 55% manganese, with some iron, 225 marks. Manganese nickel, No. 1, free of iron, 450 marks; No. 2 carrying some iron, 270 marks.

For other minor metals and their alloys, wholesale prices are, f. o. b. works:

	Per lb.
Aluminum.	
No. 1, 99% ingots.....	33@37c.
No. 2, 99% ingots.....	31@34c.
Rolled Sheets.....	4c. up.
Aluminum-Bronze.....	20@23c.
Nickel-alum.....	33@39c.
Bismuth.....	\$2.10
Chromium, pure (N. Y.).....	80c.
Copper, red oxide.....	50c.
Ferro-Molybdenum (50%).....	\$1.00
Ferro-Titanium (20@25% N. Y.).....	75c.
Ferro-Chrom. (74%).....	12½c.
Ferro-Tungsten (37%).....	45c.
Magnesium, pure (N. Y.).....	\$1.60
Manganese (98@99% N. Y.).....	75c.
Manganese Cu. (30@70% N. Y.).....	40c.
Molybdenum (98@99% N. Y.).....	\$2.75
Tantalum acid (N. Y.).....	50c.
Phosphorus, foreign.....	45c.
Phosphorus, American.....	70c.
Tungsten (best).....	\$1.25

Variations in prices depend chiefly upon the size and conditions of orders.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	\$0.45	\$0.47½
Peruvian soles and Chilean pesos..	.41½	.44½
Victoria sovereigns.....	4.86	4.87
Twenty francs.....	3.87	3.90
Spanish 25 pesetas.....	4.78	4.82

Missouri Ore Market.

JOPLIN, May 20.

With the output of the week curtailed about 600 tons by heavy rains, and more spirited buying upon the part of the purchasing agents, there is left very little unsold reserve stock in the bins. The limited production will be further augmented during the next two weeks by a number of mine owners stopping for repair and development work. Buyers have at last succeeded in getting the lower grades of zinc ore down to a \$40 basis, with medium grades selling at \$41@42, and fancy grades at \$43 per ton of 60% zinc. The highest price of the week was \$46 per ton, one bin of ore being settled for at this price, while four other bins brought \$45.50. The restricted output is calculated, however, to make good ore scarce for a month, and it is doubtful if the price can be kept down long below a \$45 basis for the choicest ore. The importation of carbonate zinc ore from Mexico and shipments from New Mexico are being used to depress prices; but zinc producers here look upon the talk very much as they did on like talk a couple of years ago about Colorado and British Columbia ore; and about five years ago the same talk was made about Arkansas. An increased production from Wisconsin is also being

cited as a reason for lower prices here, but the producers know well that there is increased smelting capacity for all the outside ore coming in, and they know that the Mexican carbonates—33 to 35% zinc—carry too much lime to become serious competitors in the market with Joplin-district ore carrying 56 to 63% zinc, with a light iron and lime penalty. One smelter has found the lime a serious obstacle, in that it ruins the retorts by glazing them.

Lead prices remain the same for medium grades, but the higher prices have dropped from \$61.50 a week ago to \$59 per ton.

Following are the shipments of zinc and lead ores, their combined values for each camp, the total district value of each ore and their combined value, aggregating nearly \$5,000,000, for the week and for the year to date:

	Zinc, lb.	Lead, lb.	Value.
Joplin.....	2,528,050	329,990	\$66,270
Cartersville-Webb Cts.)	2,605,220	712,370	75,010
Duenweg.....	615,890	73,940	15,350
Galena-Empire.....	770,680	80,690	18,100
Aurora.....	599,100	.....	9,500
Carthage.....	162,540	.....	3,490
Badger.....	300,450	.....	6,330
Herwood.....	76,650	4,560	1,740
Alba.....	469,520	.....	10,330
Baxter Springs.....	212,190	22,650	4,370
Granby.....	453,000	19,000	6,360
Neck City.....	131,550	.....	2,960
Prosperity.....	176,590	89,880	6,090
Zincite.....	48,300	.....	1,010
Oronogo.....	114,030	12,820	2,765
Spurgeon.....	93,610	.....	1,780
Beef Branch.....	31,180	3,460	540
Totals.....	9,388,550	349,340	\$231,995
20 weeks.....	188,432,430	22,689,100	\$4,965,175

Zinc value, the week, \$193,550; 20 weeks, \$4,309,280
Lead value, the week, 38,445; 20 weeks, 645,895

Monthly Average Prices of Metals.

COPPER IN NEW YORK.

Month.	Electrolytic.		Lake.	
	1904.	1905.	1904.	1905.
January.....	12.410	15.008	12.553	15.128
February.....	12.063	15.011	12.245	15.136
March.....	12.299	15.125	12.551	15.250
April.....	12.923	14.920	13.120	15.045
May.....	12.758	.....	13.000	.....
June.....	12.269	.....	12.399	.....
July.....	12.380	.....	12.505	.....
August.....	12.343	.....	12.468	.....
September.....	12.495	.....	12.620	.....
October.....	12.993	.....	13.118	.....
November.....	14.284	.....	14.456	.....
December.....	14.661	.....	14.849	.....
Year.....	12.823	12.990	12.990	15.128

Prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c. lower.

COPPER IN LONDON.

Month.	1904.		1905.	
	1904.	1905.	1904.	1905.
Jan.....	57.500	68.262	July.....	57.256
Feb.....	56.500	67.963	August.....	56.952
March.....	57.321	68.174	Sept.....	57.645
April.....	58.247	67.017	Oct.....	60.012
May.....	57.321	.....	Nov.....	65.085
June.....	56.398	.....	Dec.....	66.384
Av., year.....	57.321	67.017	58.587	66.384

Prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.		1905.	
	1904.	1905.	1904.	1905.
Jan.....	28.845	29.325	July.....	26.573
Feb.....	28.087	29.262	August.....	27.012
Mar.....	28.317	29.523	Sept.....	27.780
April.....	28.132	30.525	Oct.....	28.596
May.....	27.718	.....	Nov.....	29.185
June.....	26.325	.....	Dec.....	29.286
Av., year.....	27.986	29.523	27.986	29.286

LEAD IN NEW YORK.

Month.	1904.		1905.	
	1904.	1905.	1904.	1905.
Jan.....	4.347	4.552	July.....	4.192
Feb.....	4.375	4.450	Aug.....	4.111
Mar.....	4.475	4.470	Sept.....	4.200
Apr.....	4.475	4.500	Oct.....	4.200
May.....	4.423		Nov.....	4.200
June.....	4.496		Dec.....	4.600
			Av., year.	4.309

SPELTER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January.....	4.863	6.190	4.673	6.032
February.....	4.916	6.139	4.717	5.989
March.....	5.057	6.067	4.841	5.917
April.....	5.219	5.817	5.038	5.667
May.....	5.031		4.853	
June.....	4.760		4.596	
July.....	4.873		4.723	
August.....	4.866		4.716	
September.....	5.046		4.896	
October.....	5.181		5.033	
November.....	5.513		5.363	
December.....	5.872		5.720	
Year.....	5.100		4.931	

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January.....	57.005	60.690	26.423	27.930
February.....	57.592	61.023	26.665	28.047
March.....	56.741	58.046	26.164	26.794
April.....	54.202	56.600	24.974	26.108
May.....	55.430		25.578	
June.....	55.673		25.644	
July.....	58.095		26.760	
August.....	57.806		26.591	
September.....	57.120		26.349	
October.....	57.923		26.760	
November.....	58.453		26.952	
December.....	60.563		27.930	
Year.....	57.221		26.399	

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

Late News.

NEVADA.

HUMBOLDT COUNTY.

Springfield-Nevada Co., Jeff. Pool, superintendent, has some development on five different claims, and has a small mill in operation. The Olinghouse mine, in this district, is operating in a small way. The Crown Point, owned by J. Sheehan, has shipped 250 tons of ore that ran \$72 per ton. The Oro was recently sold by Lieut.-Gov. Allen and associates for \$40,000. The group of J. A. Ingalls has been developed by shafts and adits, showing a 6-ft. vein of ore, said to run \$400 per ton. He shipped from it 36 sacks of assorted ore that brought him \$36,300. No. 2 mine is under lease and bond to Rice & Howard, the figure named being \$15,000. They have shipped ore that ran \$275 per ton. No. 1 mine, owned by Short Brothers, is under bond and lease to Elmer Fish, Mat. Baroch, A. G. Brownlee and others, of Denver. It is developed by a 165-ft. incline, with some drifting. The ore will average \$20 per ton. Vesuvius No. 1 is owned by Messrs. Baroch, Brownlee, Gehrman, of the Stanley mine, Idaho Springs, and others. Assays from its croppings ran 35 oz. gold per ton, being chiefly a sulphide. Vesuvius No. 2 has been opened by a 230-ft. crosscut, showing a 14-ft. vein, carrying free gold and sulphide. The Morning Star group of three claims, belonging to A. F. Sisson, has

been opened by an 185-ft. adit. The King & Haff group, belonging to L. E. King and E. L. Haff, formerly of Cripple Creek, comprises six claims in the central part of the mineralized area, where the development discloses equally good ore. It is asserted that the Olinghouse district has shipped ore of the value of \$550,000 thus far. At present 200 men are employed in the district. The treatment required is amalgamation, concentration and cyanide.

OREGON.

BAKER COUNTY.

Standard.—The ore from this property carries the only cobalt known in the West and in the United States in any quantity. The ore has been put through a concentrating process, crushed through screens of 30 mesh, hydraulic sizing resulting in three products, 60 and 80, 60 and 100 slime, and then put over the tables, and again over the slime tables, saving 95 and 96% of the ore values which run \$45 to the ton, including the cobalt, copper and gold. A gasoline engine and an electric motor, driving electric power drills and a ventilating apparatus for the mine, have been installed. It is the plan of the company to eventually produce its own bullion, cobalt oxide, and copper concentrate in order to save transportation charges.

Bonanza.—Albert Geiser, the original discoverer and developer of the Bonanza mine which has made the Sumpter camp famous, and who has just released the property from the Bonanza Gold Mines Co., has finished laying the rails in the main adit level and will connect with the 200 level shaft, which will give a depth of 40 ft. from the apex. Development work is under way.

Daines.—The Belcher and Golden Gate properties of the Daines Mining & Milling Co. have made good progress under contract labor, and orebodies have been blocked out during the winter. The roads are still in bad condition, but it is expected that within 30 days the new 20-stamp mill can be hauled over from the railroad station and installed and put in operation this summer. The ores show up well.

I. X. L.—This mine has remained idle during the winter, as the depth attained of 300 ft. got beyond the capacity of the small pumps to keep the water out. Manager Fred T. Kelly will be home from the East in a few days with a large pump, which will at once be installed and put in operation.

Snow Creek.—Manager Fred D. Smith, of this mine, is working a full force of men and is running a 10-stamp mill on ore from the 250 level. He is also operating the Psyche and Diadem, both of which have large quantities of valuable ore sacked ready for shipment as soon as the roads open. It is estimated that eight or ten carloads are now ready for the smelter. The Psyche 10-stamp mill is being overhauled and will be put in operation in about 10 days.

Dividends.

Company.	Payable.	Rate.	Amount.
†Amalgamated Copper.....	May 29	\$1.00	\$1,530,879
‡Anaconda Copper.....	May 18	.75	900,000
*Bunker Hill & Sull.....	May 16	.50	150,000
Calmet & Arizona.....	June 19	2.00	400,000
Claremont Oil.....	June 1	.01	4,500
Camp Bird, Colo.....	May 6	.18	147,600
Caribon Oil, Cal.....	May 15	.07	3,500
*Central Enreka, Cal.....	May 8	.07	5,000
Con. Mercury, Utah.....	June 6	.02½	25,000
De Lamar, Idaho.....	May 16	.72	129,600
Esperanza, Mex.....	May 15	.12	54,600
Federal Min. & Sm., com.....	June 15	2.50	125,000
Federal pf.....	June 15	1.75	175,000
†Gold King, Con., Colo.....	May 15	.01	57,505
Grand Central, Utah.....	Apr. 15	.05	12,500
§Greene Con. Gold, Mex.....	May 20	.20	100,000
*Hecla, Ida.....	Apr. 20	.01	10,000
*Homestake, S. D.....	May 25	.50	109,200
*Imperial Oil, Cal.....	May 6	.20	20,000
Iron Silver, Colo.....	May 1	.10	50,000
†Jamison, Cal.....	Apr. 18	.03	11,700
Kern River Oil, Cal.....	May 26	.13	2,600
La Belle Iron Works, O.....	May 1	1.50	105,000
‡Lehigh Coal & Nav.....	May 27	2.00	693,794
Monte Cristo Oil, Cal.....	May 15	.01	5,000
Montana Ore Purchasing.....	May 15	4.00	324,000
†National Carbon, pf.....	May 15	1.75	78,750
National Lead, pf.....	June 15	1.75	260,820
*New Century Zinc & L.....	May 1	.01	1,500
New Central Coal, Md.....	May 1	.40	20,000
*N. Y. & Hond. Rosario.....	May 27	.10	15,000
*Oil City Petroleum.....	Apr. 15	.00½	2,500
*Pacific Coast Borax.....	Apr. 29	1.00	19,000
*Penna. Con., Cal.....	Apr. 15	.10	5,150
Penna. Salt.....	Apr. 15	3.00	118,000
Pennsylvania Steel, pf.....	May 1	3.50	588,749
*Peerless Oil, Cal.....	May 1	.14	12,880
†Phila. Gas, com.....	May 1	.75	434,288
†Pittsburg Coal, pf.....	Apr. 25	1.75	519,771
†Pocahontas Coll'r's, pf.....	May 1	1.50	22,500
Providencia, Mex.....	May 1	.89	5,340
†Rock Run Fuel Gas, Pa.....	May 1	1.75	
*San Rafael, aviator.....	Apr. 19	12.18	14,616
*San Rafael, aviada.....	Apr. 19	3.48	4,176
Santa Maria de la Paz.....	Apr. 30	2.23	5,340
*Silver King, Utah.....	May 10	.66½	100,000
Shelby Iron.....	June 1	5.00	50,000
Silver Hill, Nev.....	May 17	.05	9,000
†Spearfish, S. D.....	Apr. 15	.01½	22,500
Standard Oil.....	June 15	9.00	8,730,000
Stirling Oil.....	May 20	.07	17,500
Stratton's Independence.....	May 22	.12	125,001
†Tenn. Coal & Iron, pf.....	May 1	2.00	4,960
†Tenn. Coal & Iron, com.....	May 1	1.00	225,536
*Thirty-three Oil, Cal.....	May 6	.10	10,000
Tonopah, Nev.....	Apr. 22	.25	250,000
Union Oil.....	May 20	.50	50,000
†United Copper, pf.....	May 15	3.00	159,007
United Petroleum.....	May 20	.80	11,728
†U. S. Steel, pf.....	May 8	1.75	6,305,497
Victoria y An., Mex.....	Apr. 29	2.23	5,563
†Vindicator Con., Colo.....	Apr. 25	.03	33,000
Work, Colo.....	May 15	.00½	7,500

*Monthly. †Bi-monthly. ‡Quarterly. §Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Alta, Nev.....	May 17	June 5	.05
Brunswick Con., Cal.....	June 2	June 30	.03
Bullion, Nev.....	May 23	June 12	.05
Canfield, Cal.....	May 16	June 14	.10
Centennial Copper, Mich.....	Ang. 10		2.00
Challenge Con., Nev.....	June 14	July 7	.10
Chollar, Nev.....	May 10	June 7	.10
Confidence, Nev.....	June 6	June 26	.20
Con. Cal. & Va., Nev.....	May 18	June 8	.25
Con. Imperial, Nev.....	May 24	June 20	.01
Crown Point, Nev.....	May 17	June 7	.10
Emerald, Utah.....	May 14	June 10	.01½
Fairview, Cal.....	May 29		.25
Gould & Curry, Nev.....	May 31	June 19	.10
Joe Bowers, Utah.....	Apr. 29	May 30	.00½
June, Utah.....	May 10	May 31	.00½
Justice, Nev.....	June 13	July 6	.05
Overman, Nev.....	June 16	July 7	.10
Potosi, Nev.....	June 5	June 26	.10
Sierra Nevada, Nev.....	May 16	June 5	.15
Union Con., Nev.....	May 19	June 8	.15
Utah Con., Nev.....	June 9	June 30	.10

STOCK QUOTATIONS.

Table with columns: Name of Company, Week, May 23 (High, Low), Closing (High, Low), Sales. Includes companies like Alice, Amalgamated, Anaconda, etc.

Total sales, 560,376.

Table with columns: Name of Company, Par Val., Week, May 23 (High, Low), Closing (High, Low), Sales. Includes companies like Allouez, Amalgamated, Atlantic, etc.

Total sales, 122,348 shares.

Table with columns: Company, Prices, Mex. (Bid, Ask), Company, Prices, Mex. (Bid, Ask). Includes companies like DURANGO: Penoles, San Andres de la Sierra, etc.

Table with columns: Company, Par Val., Latest dividend (Amt., Date), May 12 (Buyers, Sellers). Includes companies like American, Alaska Treadwell, Anaconda, etc.

* Ex-dividend.

Table with columns: Company, May 23 (£ s. d.), Company, May 23 (£ s. d.). Includes companies like Camp Bird, Consolidated Gold Fields, etc.

* Furnished by Wm. P. Bonbright & Co., 24 Broad St., New York.

Table with columns: Company, Location, Par value, Latest dividend (Fr., Fr.), May 11 (Opening, Closing). Includes companies like Acieries de Creusot, Anzin, etc.

POSITIONS VACANT

Advertisements under this heading, 50 cents for 50 words or less. Additional words, two cents a word. Cash or stamps must accompany order.

2469 WANTED—A man experienced in the electrolytic refining of Dore Bars. Give experience, education, where last employed, in what capacity and references. A good salary will be paid an acceptable man. Address "E. R.," Engineering and Mining Journal. 6.8

2474 TECHNICAL men of all kinds—Architects, Chemists, Draftsmen, Superintendents, Civil, Electrical, Marine, Mechanical and Mining Engineers—wanted at once for positions paying \$1,000-\$5,000. Capable men should write us to-day, stating position desired. Offices in 12 cities. HAPGOODS, Suite 511, 309 Broadway, N. Y. 6.1

2475 WANTED—Mill and Mine Superintendent; a graduate preferred, but must be practical and energetic, to take charge of 200-ton concentrating mill. Must be experienced concentrator. State salary and appoint place of interview. Address "Northern," Engineering and Mining Journal. 6.1

2476 WANTED—Two good converter foremen who can also take charge of blast furnaces for smelter in Arizona. State wages required. Address "C. C. S.," Engineering and Mining Journal. 6.22

2477 WANTED—By an old-established manufacturing concern, several more Draftsmen experienced in large and small hoisting engines for mining work. Address "Hoisting Engines," P. O. Box 1065, Chicago, Ill. 6.1

2478 WANTED—A mechanical draftsman who can design and supervise the construction of cars for mining and industrial uses; make estimates, etc. Address, with full particulars, "Business-Men's Clearing House, 305-6 Century Building, Denver, Colo. 6.1

SITUATIONS WANTED

Advertisements under this heading, 50 cents for 50 words or less. Additional words, two cents a word. Cash or stamps must accompany order.

CHEMIST, graduate of a leading Eastern university, desires position in the East with a reliable firm. Will be open for engagement July 1st. Address "R. M.," Engineering and Mining Journal. No. 21,594, June 8.

CYANIDE MANAGER, now with a Western company, desires a change; 8 years cyaniding, Mexico and U. S. Filter presses, and decantation methods for slimes. Practical and energetic. Mill superintendent also. Go anywhere, preferably Mexico or South America. Age 31. Address "Canadian," Engineering and Mining Journal. No. 21,595, t. f.

MANAGER and metallurgist, with 22 years' experience as superintendent and metallurgist in both lead and copper smelting of all characters of ore, and some experience in the management of mining properties, is open for engagement. Can give best of references. Address Cu. & Pb., care of Engineering and Mining Journal. No. 21,539, t. f.

METALLURGIST, technical education, with wide experience in both lead and copper smelting, desires position as superintendent or assistant superintendent with a reliable company. Speaks Spanish fluently. No objection to Mexico, Central or South American countries. Can furnish best of references as to character and ability. Address "Graza," Engineering and Mining Journal. No. 21,592, June 22.

MINING and Mechanical Engineer, having a thorough technical training and a wide range of practical experience in designing, construction, and management, is open to an engagement as consulting engineer. Thoroughly posted in power economy, and in the most up-to-date labor-saving equipments. Has installed many very important plants that meet every requirement. Address "Consultation," Engineering and Mining Journal. No. 21,523, t. f.

MINING ENGINEER, Columbia graduate, open for engagement as mine manager or superintendent, or for temporary work in exploration and examination of properties. Successful experience on these lines in Canada, United States and South Africa with large companies. Address W. Tudor, Jr., 82 Devonshire St., Boston, Mass. No. 21,582, t. f.

MINING ENGINEER, graduate Columbia, wants position Superintendent or Manager. Experienced in gold, silver, copper and zinc mining, milling and cyaniding. All business and executive ability. Speaks Spanish. Have you a property not paying what it should or being mismanaged? I am looking for that proposition. Address "Hustler," Engineering and Mining Journal. No. 21,586, June 8.

MINING ENGINEER, with technical training and nine years' practical experience in Western States and Mexico, is open for engagement as Superintendent or Mining Engineer of mine in Mexico. Experienced in assaying, cyaniding, amalgamating, surveying and superintendence. Specialty, opening and development of mines in Mexico. References. Spanish spoken. Four years' experience with Mexican labor. Address "Crisol," Engineering and Mining Journal. No. 21593, Aug. 8.

PRACTICAL MINING MAN, aged 38, exemplary habits, successful business manager and superintendent, technically capable, thorough accountant, proficient in Spanish and obtaining best results with tropical labor, desires position with company willing to pay according to services rendered. Latin Americas preferred. References. Address "Californian," Engineering and Mining Journal. No. 21,591, June 29.

SUPERINTENDENT, technical education, experienced in concentration and cyaniding, desires change of location. At present employed as superintendent of mine and mill in Mexico. Address "Lockwood," Engineering and Mining Journal. No. 21,588, June 8.

WANTED—Situation as Manager or Superintendent by Mining Engineer, technical education, with 20 years' active experience in Rocky Mountain region. Thoroughly posted in best modern underground methods and practice. Distinctly successful in handling men and business affairs. Highest references. Address "H. W.," Engineering and Mining Journal. No. 21,571, June 29.

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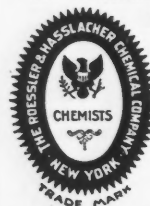
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THE ENGINEERING AND MINING JOURNAL

Present Mining Conditions in the Philippines.

The report of the Philippine Mining Bureau, from which an extract is made on another page, contains a concise statement of the present condition of mining work in the islands, a summary of which is here given. Mining development is at present being carried on in Lepanto-Bontoc, Benguet, Bulacan, Rizal, Tayabas, the Camarines, Albay, Masbate, Cebu and Mindanao.

In Lepanto, according to the report of Mr. Eveland, geologist, assessment work on gold and copper claims has been done to a considerable extent, although much work at Mancayan has been prospecting only in the softer rock. Some earnest development work has been done, however, particularly at Suyoc, and at the present time it is understood that further serious development is going ahead at Mancayan upon a larger scale than before since the American occupation. In Benguet much more important work has been done. On one lead at Antimok, Mr. Kelly has persistently developed his property, a promising gold lead, and has now gone to the United States, it is understood, for the purpose of purchasing a stamp-mill complete. A little farther south Messrs. Petersen and Clyde are developing their claims in a businesslike way, and are contemplating a stamp-mill with dam, flume, and a turbine-power plant. Farther south some unfortunate litigation has suspended work. The Philippine Gold Mining, Power & Development Company, of which Dr. J. F. Kemp is president, and H. J. Robinson is manager, are developing five gold claims about four miles from Kias, and have recently purchased, imported and shipped to their mines a 10-stamp Hendy mill, with a Woodbury concentrator, a Blake crusher, a Pelton water-wheel capable of operating 60 stamps, and an assay equipment complete. For some time past Mr. Hartwell has been operating at a profit, it is understood, a three-stamp mill built by himself in the Manila shops. This is the pioneer mill whose stamps have fallen during American occupation.

In Bulacan the iron deposits of San Miguel de Mayumo and Angat have been yielding sufficient ore for almost continuous smelting on a small scale for the casting of plowshares and points. Litigation, that should be brought to an early and definite conclusion, unfortunately is still afflicting this small but prosperous industry at Angat.

In Rizal some prospecting has been done for coal, gold and natural cement rock, and a number of gold placer claims have been located and worked to the north and west of the towns of Montalbon and

San Mateo. In some of these claims platinum occurs in small amounts.

In Tayabas a number of claims have been recorded during the past year, including 22 petroleum locations.

In the Camarines province, notwithstanding the valuable concessions granted by the Crown of Spain in the gold districts of Paracale and Mambulao, practically no work, beyond the original restaking required by law, has been performed upon these claims. Extension of time for the legal performance of labor required by the Spanish laws, under which concessions were granted, has been given by the Civil Governor upon requests by the British and German syndicates, favorably indorsed by this Bureau, but owing to difficulties, due chiefly in securing capital in Europe and the United States, it is understood, this time is drawing rapidly to a close, and the cancellation of the valuable concessions, upon which much money was expended during Spanish days, seems the inevitable end. This is greatly to be regretted, but it is hoped that future companies may develop the gold deposits of Mambulao and Paracale to the extent they seem to deserve. Much prospecting has been done in the Camarines during the past four years, and a number of locations have been made in the above districts under the present laws. Placer and dredge mining is reported as still capable of yielding important returns.

In Albay province, coal mining has been carried on, particularly in the island of Batan on the east coast.

Gil Brothers are reported to be developing a coal mine on the island of Batan in five seams, each a meter thick, of good black lignite, with a force of Spanish and Japanese miners, and the report of the Japanese engineer who examined the Bilbao mine, upon which work is now being done, estimated that when fully opened up this mine should be able to produce 1,000 tons of coal per day. These expectations are yet unfulfilled.

In Batan island, on the southwestern peninsula reserved for military purposes, Lieut. H. L. Wigmore, United States Engineers, assisted by a detail of men, is prosecuting a thorough examination of the coal deposits by means of the diamond drill. The coal there is of excellent reputation and suitable for steamer use.

In Masbate, much prospecting, assessment and development work has been done, particularly at Arroroy on the north coast. Three companies have been working there, and one of them has recently had completed in San Francisco and prepared for shipment a modern dredging plant complete. This company has also ordered a stamp-mill for crushing its free-milling ores. The prospects here seem bright.

In Cebu some prospecting and locating has been done upon coal deposits, but, so far as known, no real development has yet been accomplished since Spanish days.

Within the last few months, however, much interest has been shown in the extensive and valuable coal deposits of Cebu, and in the near future some activity in mining should be displayed.

In Mindanao, with the exception of the goldfields of Placer and Surigao, where a handful of earnest miners have been working for the past two years, the status is largely that of prospecting. New deposits are being looked for, and the island is being gradually, but extensively, explored.

There have been reported as located during the fiscal year ending June 30, 1904: Lode claims, 209; placer claims, 109; total, 318. Of these the following are represented: Gold, 132; silver, 1; copper, 11; petroleum, 22; coal, 8; guano, 23; stone, 8; iron, 3; lead, 3; not specified, 107.

Mining labor has not yet been developed, as such, to any great extent in the Philippines. The Tagalogs, Igorrotes and Bicolis are reported to be fairly good quarrymen and outside men, and, with able white foremen, should be able to furnish the bulk of the labor required. True, natives cannot perform the same amount of work as an equal number of white men in the mines, but this need not prevent their use. A Spanish mining superintendent is authority for the statement that he could secure 65 good Visayan miners in the city of Cebu today and begin the development of any coal mine in that island; that with these men instructing raw material, he could in time develop any reasonable number of miners required. He stated also that in mine timbering and other precautions of safety, the Visayan was as good a miner as could be desired.

The transportation problem is being rapidly solved. Vast sums of money are being expended annually by the insular and provincial governments in the all-important construction of bridges and roads; trails are being opened up and improved, railroad extension has already begun, and more is promised, with every indication of success. Conditions, so discouraging a few years ago, are improving so rapidly that it is not thought serious difficulty in transportation will much longer present itself.

Unsettled conditions due to brigandage and insurrection are no longer such as to delay the development of mines. The armed and organized insurrection against the United States has been effectually, and it is believed, forever, suppressed; and the sporadic ladronism existing among wandering malcontents and carabao thieves, far from preventing the development of mines, is not of sufficient importance to prevent prospectors or miners from working in any mining district in the Philippines.

In annealed steel, practically all the carbon is in the cement state; in hardened steel, scarcely any of it.

The Tien Pau Shan Mines.

BY JOHN C. SHENGLE.

Although mining has been prohibited in China, yet there are some instances where operations have been carried on either by the government or under semi-official supervision. These properties have generally been selected from surface indications or outcrops of rich ore; among them are the Tien Pau Shan mines, which take their name from a valley and range of hills known by the Chinese as the 'valley of minerals.' Although the ore carries silver, lead and copper, the Chinese worked only to recover the silver, and the description of their methods may prove interesting. The workings followed the outcrops; in one deposit five shafts were sunk, but all of them converge into one, the main shaft or No. 3. This shaft is 6 ft. at the opening and widens in depth; the walls on either side show traces of the ore, and at a depth of 230 ft., where work was stopped,



BLAST-FURNACE FOR PRODUCING MATTE.

the lode is 15 ft. wide, with the evidence of the orebody growing larger still. The average analysis, from samples taken from the mine dump and from the walls of shafts, shows 15% silica, 55% copper pyrite and 30% galena. The Chinese official records prove that some 4,300 tons of ore were taken out and over 400,000 oz. of silver recovered. The output of the mine was hand-picked, and the rejected portion, considered by the Chinese as too low-grade to smelt, was thrown over the dump. An analysis made of this rejected ore showed: 169 oz. silver per ton; 26.97% lead; 20.80% copper.

The first-class ore was roasted in heaps 2½ to 3 ft. high; the richest, six days; the poorest, four to five days; the degree of richness being determined by the proportion of galena and copper pyrite. They had 50 piles, or more, composed of a layer of wood, a layer of ore, etc., all roasting at one time.

The next process was to crush the roast-

ed ore by a cylindrical granite roller, 2 ft. diam. by 2 ft. 3 in. long, rotating on a circular granite floor 5 ft. diam. This crushed ore was mixed with charcoal and put into the blast-furnaces. The furnaces are roughly semi-circular in cross-section,

high; 2 ft. wide; 1½ ft. deep. The opening on top is 1 ft. diameter. The tuyere opening is from 6 to 10 in. from the floor and 3 to 4 in. square. There are 72 of these furnaces. The blast was supplied by a Chinese wind-box, consisting of a slide



GRINDING MILL.

with the walls tapering toward the top and inclining toward a long common wall against which some eight of these furnaces were backed. The long wall is 8 ft. high, 54 ft. long and 1½ ft. wide at the bottom, tapering to a narrow edge on the top.

inside of a plain air-tight box pulled and pushed by hand.

The matte thus produced was treated in another type of furnace, whereby the lead carrying the silver was melted out of the matte, leaving the copper behind; this was



CUPELLATION FURNACE.

The building material of the furnaces and walls consists of stones, earth, lime and straw. The furnaces have outside measurements of 2½ to 3 ft. high; 3½ to 4 ft. wide; 2½ to 3 ft. distance from wall. Inside measurements are: 2½ to 3 ft.

thrown away in the first few years. The furnaces are built of brick, with a dome-shaped covering of mud, lime and slag; at the back is a brick support for the wind-box. In the front is a long inclined trough 6 ft. long, 6 to 8 in. wide, laid in

brickwork and sloping downward at an angle of 5°; into this the matte was placed, the whole being covered with a roof of mud, slag and lime. The fire was built in the dome-shaped part and the blast

Mining Law in the Philippines.

In the mining laws enacted by Congress for the Philippine Islands, there are some important differences from the United States laws. The following notes are

confidence in mines located and worked under the restrictions it provides. It is superior to the United States mining laws in that the so-called 'apex system,' granting extralateral rights, has been entirely omitted in the framing of mining legislation for the Philippines.

On the other hand, section 33 of Act 235 provides: "That no holder shall be entitled to hold in his, its, or their own name, or in the name of any other person, corporation or association, more than one mineral claim upon the same vein or lode." This most unfortunate section will naturally operate against the development of any but the richest lodes, and in the Philippines, as in mining districts the world over, the bonanzas are few, and the deposits of low-grade ores relatively large. In Lepanto and Benguet, as well as in the Camarines, Masbate and Mindanao, there are important deposits that should be worked on a large scale, and which, under section 33, can never be worked at all.

The low-grade ore deposits in the Philippines are so extensive and valuable that section 33 tends to operate as an obstacle to the development of the greater part of our metalliferous resources. The chief of the Mining Bureau, the Secretary of the Interior, and the Civil Governor have repeatedly advocated and urged the repeal of this restriction in the act of July 1; and the sentiment of those interested in mining in the Philippines is safely unanimous in favor of such repeal. It is sincerely to be hoped that favorable action



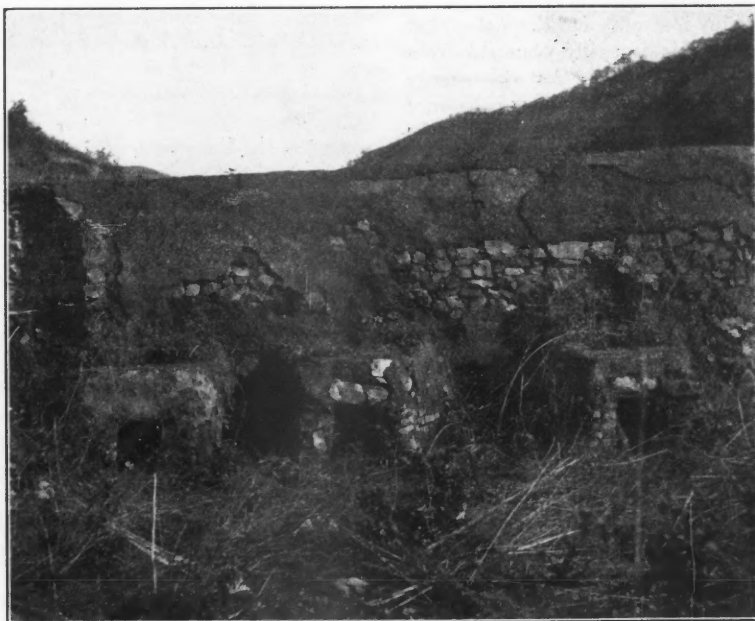
FURNACE FOR SMELTING LEAD FROM MATTE.

turned on; the tuyere opening being on a level with the trough, the matte would heat up and the lead was run out into a tank at the bottom. This lead-silver ingot was cupelled. Cupellation was accomplished in a basin about 1 ft. high, made of wood ashes and tightly pressed down; then, by means of a Chinese bowl, a cavity was made in the center, the bottom of the cavity being larger than the top. The lead-silver ingot was placed over the opening and close to the ingot; but, resting upon the wood ashes, were placed three bricks upon which were laid two semi-circular mud coverings 18 in. diam., the joint being sealed with mud; around this pile, but 4 in. from it, were arranged six to eight curved mud plates, 14 in. high, thus forming a wall. Charcoal was put in the space between the mud wall and the basin and also on the top of the mud plates. Until the charcoal was completely ignited, a tile covering was placed over the whole of it, resting upon the walls. This was removed when hot. The cupellation lasted 10 hours, and about 80 oz. of silver would be obtained from 100 catties (133 lb.) of silver-lead ingot. The only care exercised was in not allowing the fire to get too hot. The wasteful character of all these different processes is so obvious that comment is unnecessary.

The Japanese steel plant at Wakamatsu, and owned by that government, has produced over 30,000 tons of steel rails during the last year. Wakamatsu is a considerable city in the center of the largest island, Hondo (about 140 miles north of Tokio), and is in the center of a coal district.

abstracted from the latest report of the Mining Bureau, to which reference is made in another column:

It must be admitted that the present mining legislation comprised within the



BLAST-FURNACES, SHOWING WALL.

act of July 1 of the Congress of the United States and 624, 777, 859, 1,128, and 1,134 of the Philippine Commission, is far superior to the complex Spanish law, in that (1) it leads to the granting of absolute title instead of a mere concession; (2) its processes are simple and its language concise; and (3) it encourages *bona fide* mining and tends to establish

by Congress upon this important matter will not long be delayed.

The big diamond seal formerly belonging to King Charles I of England, and which mysteriously disappeared at the time of his execution, has been recently identified as in the possession of the Shah of Persia.

Electrostatic Concentration—I.*

BY LUCIEN I. BLAKE.

If a small portion of a substance be brought into contact with a charged body, it will tend to acquire the potential of that body. This will be accomplished, if at all, by the imparting of electricity to the small particle. The charge will diffuse itself over the surface and through the substance, until, finally, it will reside wholly upon the surface. This process may be practically instantaneous, or it may take an appreciable time. During this time, however, the particle is subjected to the inductive influence of the charge, and is therefore bodily attracted. Further, during the acquiring of the charge, this attraction is being offset by an increasing bodily repulsion, which finally prevails to repel the particle. Thus every kind of particle is, eventually, hurled from a charged surface. What is true of a single particle is true in general of a mass of particles; but the time of acquiring an individual charge is greatly modified by the mass. Each particle has a specific time-element for acquiring a given potential. If *V* be the potential of the charged surface, the time for a particle to acquire the potential is:

$$t = R C \int_0^Q \frac{dQ}{v c - Q} = -0.4343 R C \log_{10} \frac{v c - Q}{v c}$$

Where *C* is the electrical capacity of the particle in its position of contact; *Q* its charge at any instant; and *R* its electrical resistance. This is easily obtained from the differential equation for the energy supplied to a circuit containing resistance and capacity without inductance, namely:

$$V i dt = R i^2 dt + \frac{Q}{e} dQ.$$

Since *Q* is evidently very small, $\log \frac{(v c - Q)}{v c}$ is always exceedingly small, and its value will depend upon the other two factors, *R* and *C*. Of these factors, the resistance (or its reciprocal, the conductivity) is made up of the resistance of the material of the particle, together with the resistance at the surface of contact of the particle with the charged surface. This latter may be very great. Of these factors, the capacity of the particle depends not only upon the size, shape and position of the particle itself, but also, in an exceedingly interesting way, upon the number, relative proportion, character and arrangement of neighboring particles.

This capacity factor, *C*, I am led, by experiment and commercial experience, to believe plays an important role in the successful electrostatic separation of ores. Evidently, then, the time-element which thus controls the duration of adherence of particles to a charged surface depends, for a given potential, upon both conductivity

*From advance sheets, *Transactions of the American Electro-Chemical Society*.

PRODUCT OF ELECTRO-STATIC SEPARATION.

Description.	Product.	% Zinc.	% Lead.	% Iron.	Remarks.
Leadville, Colo.	Orig.	30.48	3.21	21.60	20 mesh.
Zinc middling	'Iron'	9.04	8.00	35.11	
Wilfley table	'Zinc'	51.20	0.62	6.40	Combined iron 4.87%.
Joplin, Mo.	Orig.	49.53	2.52	10.78	10 mesh.
Zinc middling	'Iron'	2.92	9.92	37.44	
From jig	'Zinc'	61.31	Trace	1.57	Lead practically all removed.
Benton, Wis.	Orig.	29.15	5.16	20.90	6 mesh.
Zinc middling	'Iron'	5.07	8.40	38.88	Sold to acid burners.
From jig	'Zinc'	58.44	0.23	2.16	
Silverton, Colo.	Orig.	23.12	8.00	23.87	24 mesh.
Zinc middling	'Iron'	9.04	15.56	30.35	
Wilfley table	'Zinc'	49.73	2.08	4.77	
Idaho	Orig.	25.87	20.40	12.02	High silver.
Lead and Zinc	'Lead'	4.45	50.58	16.14	
Table concentrate	'Zinc'	45.11	3.81	7.40	
Nevada	Orig.	3.20	.....	.....	12 mesh.
Chalcopyrite	Conc.	12.94	.....	.....	Saving 81% copper.
In garnet	Tlg.	0.40	.....	.....	Crude ore; no dust removed.
Arizona	Orig.	4.60	.....	.....	20 mesh.
Copper carbonate	.....	33.89	.....	.....	Saving 70% copper.
In limestone	.....	0.79	.....	.....	Crude ore, heated to redness.
Michigan	Orig.	2.68	.....	.....	30 mesh.
Native copper	Conc.	38.70	.....	.....	Saving 76% copper.
In sandstone	.....	0.27	.....	.....
Utah	Orig.	6.06	.....	.....	Saving 88% copper.
Chalcopyrite	Conc.	26.81	.....	.....
In heavy spar	Tlg.	0.93	.....	.....
New Mexico	Orig.	1.14	.....	.....
Gold bearing	Conc.	4.20	36.12	2.42	Saving 74% gold.
Pyrite in quartz	Tlg.	0.33	1.27	0.14	

and capacity. This dependence will be taken up somewhat in detail later. If these conceptions of conductivity and capacity be applied to a mass of crushed ore, it is clear that each particle may be considered to have its special time-element, during which it clings to the charged surface, and at the end of which it is repelled. The time range is practically from instantaneousness in good conductors, to many days in good insulators, with all intervals between. This time-element, which is characteristic of the different materials in ore, was first recognized and applied by L. N. Morscher, graduate student of the University of Kansas, together with the writer, as the basis of a practical method for the electrical sorting of ore. The commercial development of the machine has been largely due to W. G. Swart, mining engineer of Denver.

The elementary steps in the method are four: First, the crushing of the ore to a fineness sufficient to break apart the crystals; second, the drying of the ore; third, the suitable feeding of the ore to a charged surface; fourth, the collection and removal of the separated products.

The simplest form of the device involves the delivery of the ore, in a thin sheet, to an inclined and charged metallic surface, and then suitably collecting the repelled particles. The material of slow charging will slide gradually down the plate and be repelled at different points.

A second simple device is a horizontal slowly revolving charged metallic roller, with ore delivered in a thin sheet along its surface, and with bins arranged at selected places to collect and to deliver the separated products; both of these devices are in commercial form and use today. The size, arrangement of parts and general operation are essentially the same in each; and are shown diagrammatically in the sketch given herewith. While there natu-

rally exists a specific conductivity for each particular mineral, this may not be the same for any given mineral from different localities. The presence of impurities, surface change by oxidation, etc., may alter the conductivity. It is possible, however, to arrange the minerals roughly into two general classes which may be called (A) conductors and (B) non-conductors. The following list has been made out by W. G. Swart from his practical experience, both in the laboratory at Denver and from various commercial plants which he has supervised.

A. Conductors.	B. Non-Conductors.
Native metals	Quartz
Pyrite	Calcite
Chalcopyrite	Limestone
Galena	Porphyry
Graphite	Slate
Molybdenite	Sandstone
Copper glance	Garnet
Silver glance	Spinel
Gray copper	Zinc blende
Most sulphides	Lime carbonate
Most copper minerals	Barite
Most iron minerals	Gypsum
Most silver minerals	Granite
Most manganese min'ls	Fluorspar
Telluride	Most silicates
Black sands	Most gangue rock.

In the majority of cases it is commercially sufficient to separate the ore into two products which represent these two classes. Occasionally, however, two conductive minerals may be separated from each other if there is practically a marked difference in their time-elements. Among non-conductors, this time difference is ordinarily sufficient to make a commercial separation, as, for example zinc-blende from quartz, garnet, or barite.

To take advantage of the different conductivities and capacities of ore mixtures, as given herewith, the general plan of

a four-drum machine is shown in the accompanying sketch. A general view of a standard machine in operation is also given.

The machine is built, chiefly of wood, in two sections which may be set tandem or abreast, the dimensions being 12 ft. by 12 ft. by 7 ft. high, weight about 5,000 pounds. The two top drums work on the material first fed into the machine. By these, the ore is separated into two general classes; the one consisting largely of conductors. Each of these products is then re-treated on a lower drum. The potentials of the upper drums are naturally alike; but each of the lower drums is adjusted according to the particular ore. A middling product is taken from the lower drums and re-fed to the upper hoppers. The whole process is continuous and automatic. Thus it is seen a first separation is made into two general products, differing greatly in conductivity. Then each of these products is further separated by changing the voltage of the repelling surface—the feed, the speed of drum, etc.—these successive

tion those particles which are thus made to have the same time-element. This is done by the operator without interruption of the machine.

Further, the fact that the conductivity of the particles depends, chiefly, upon the nature of the surface of the particles, has led us to methods of artificially altering the surfaces. Already Mr. Swart has developed over two hundred treatments whereby, by chemical, thermal and other means, it is possible to alter the time-element of one or more of the ore ingredients and make them amenable to electrostatic separation.

The source of electricity for this process can be any static generator. The voltage sufficient at the generator is about 350,000 volts. This voltage is being successfully carried from a central generator-room to machines situated in any part of a mill.

From the constant-potential main, each machine receives the full voltage, which is then adjustable, by a simple device, to any range which may be different for the different drums. Three years of experience, in the dampness, dust and dirt of the usual concentrating mill, has proved that the transmission and use of static electricity is commercially and economically feasible.

Some lots contained gold and silver value, which largely follow the lead and iron. Commercial work has, also, been done in separating molybdenite from gangue; the resulting concentrate contains 96% molybdenite. Graphite has been commercially cleaned from silica and feldspar. Hornblende has been separated from apatite. Ilmenite has been separated from rutile and from phosphate rock.

From a scientific standpoint, the action of the individual ore particles, under the influence of electrostatic stress (due both to direct and induced charges); the effects of conductivity and capacity of the particles; the presence of air currents and leakage points within the machines; the questions of proper voltage, of mechanical

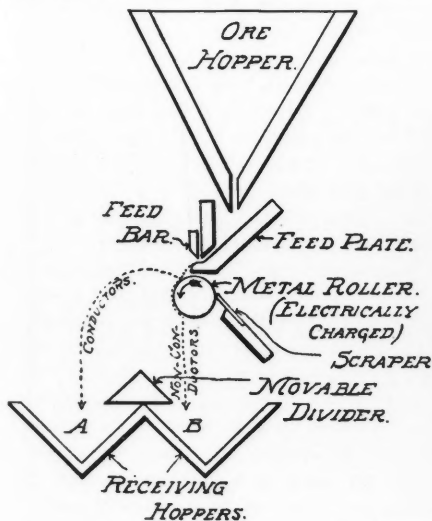
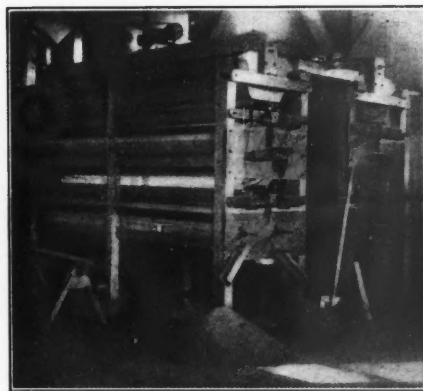


FIG. 1. SIMPLE SECTION.



TWO-SECTION SEPARATOR.

steps being carried out in the same machine. By suitably controlling these steps, four drums, in general, suffice to give the greatest capacity, and to keep the process continuous and to deliver finished products suitable for smelting.

It is in these successive steps after the first separation that the electrical capacity of the ore particles, as alluded to, plays its rôle. It is within our commercial experience to control, at least to a sufficient extent, the time-element of the metal content of most ores, by controlling the electrical capacity of the ore ingredients, subsequent to the first separation.

This is technically called 'balancing.' It is done by changing the capacity factor in the time equation. This control is obtained by properly proportioning the first two separation products in their feed to the lower drums; and then, by the use of adjustable dividers, change of feed, etc., it is possible, for one familiar with the practice, to divert into one general direc-

About 40 Wagner mica-plate static generators are running 24 hours each day, under care of the usual help of concentrating mills. At the high voltage used, the leakage at the machine is considerable; but, including this, the electric power per standard machine of 15 ton, 24-hour capacity, is only about ¼ h.p., the total expended per machine being only about 1 h.p. The generators may be run in battery.

Many thousand ore samples from all parts of the world have been tested in the laboratory at Denver, in my laboratory at the University of Kansas, and in the sampling mill of Henry E. Wood at Denver, where test machines are in operation, and the results of separation, treatment and other experimental facts are recorded. Some of the results obtained commercially are given herewith. In each case the assay of the original material as fed to the machine is given first, followed by the assays of the respective products made by the separator.

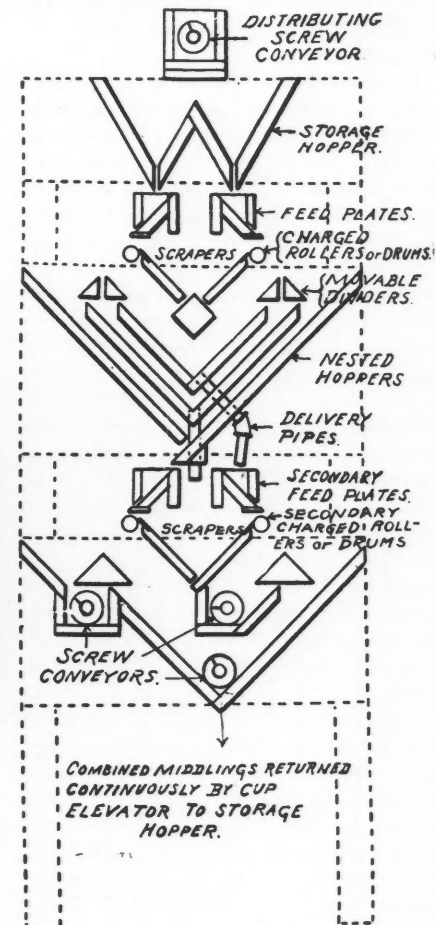


FIG. 2. SECTION OF FOUR-DRUM MACHINE.

feed of highly charged particles, of mutual electrostatic repulsion; these have all led to new problems in applied electrostatics, many of which for commercial reasons are not even alluded to in this paper.

A new molybdenite deposit is reported from Cooper, Washington county, in eastern Maine. It occurs both in pegmatite dikes and in the granite cut by these dikes. The report is credited by a bulletin of the United States Geological Survey. It is interesting to note that no successful machine for milling molybdenite on the large scale has yet been devised, unless it be the Blake-Morscher electrostatic separator.

The Moore Process.*

BY C. H. FULTON.

The Moore slime-filter is in successful operation at Terry, in South Dakota. The process has been in use somewhat over a year, during which time many changes and improvements have been made, and the difficulties incidental to the working out of a new process overcome. The general plan of the plant has already been described.¹ The changes made consist in an alteration of the hydraulic crane, whereby the frames are carried from four points of support instead of one; in the re-modeling of the frames, and in an arrangement to discharge the slime from the surface of the frames by means of water in place of compressed air, this change giving a much more perfect discharge.

It is difficult as yet to give operating costs, owing to the experiment and alteration made during the year. Some figures, however, can be given. The mill treats about 35 tons of slime per day, by means of one Moore filter, containing thirty-five 4½ by 6-ft. frames, the filtering area being 1,836 sq. ft. In the night shift the process is operated by the solution-man, who also attends to his regular duties, which are manifold, so that it is difficult to arrive at the exact amount of labor to be charged to the process. In the day shift a regular slime-man is employed, who, with a solution-man, handles the slime tailing from both shifts. The process is defectively installed, but the defects cannot at present be remedied. With a properly designed plant containing provision for sluicing, it is quite certain that the solution-men alone could satisfactorily attend the slime, and the work would not exceed that of a well-designed decantation-plant of similar capacity.

The repair cost on all pumps connected with the process over an extended period of time amounted to 1.46c. per ton of slime treated. The total cost of repairs would remain the same if the capacity of the plant were doubled, as the pumps have excess capacity. The life of the frames (which consist of wood and pipe) should be almost indefinite, as they are not subject to wear. The original canvas filters lasted eight months, equivalent to 2c. per ton of slime treated. The new filters with the improvements should last longer. For agitation of the slime with the solution, and for the Moore process proper, about 4 h.p. is required. This, at a cost of 40c. per h.p. day, is equal to a charge of 5.3c. per ton of slime. The total cost would not increase proportionately with the tonnage, as the vacuum pump used is much larger than is required, and the cost of

keeping the slime in suspension in the loading vat would be about the same as with a larger vat, or with two sets of plates used in one vat.

The consumption of cyanide at the mill is about 11.7c. per ton of ore treated, which is slightly under the average of the dry-crushing mills of the district, operating on similar ore. This shows very favorably for the Moore process, for the loss in cyanide in the mills using the decantation process is rarely less than 20c. per ton. Tests made show that there is practically no consumption of cyanide during the air agitation of the slime pulp. The loss of cyanide in slime tailing will not exceed 0.15 lb. per ton.

The Moore process is intended to recover only the dissolved value in the slime; but in the plant under discussion, owing to unexpected difficulties in dissolving the gold in the slime, it has to do both. This fact detracts somewhat from the efficiency of the process. For a period of four months, the average loss in dissolved gold has been 8c. per ton, in handling \$8 slime; and during this period the gold dissolved from the slime while passing through the Moore process has averaged 32c. per ton. This last fact explains, in great part, the 8c. loss.

The following results from a 13-day consecutive run show the possibilities of the process:

Slime going into the Moore process (sample washed free from dissolved value in the laboratory).....	\$1.154
This slime discharged as tailing (unwashed).....	0.984
This slime discharged as tailing (washed).....	0.970
This slime tailing cyanided again in the laboratory.....	0.956

Fine grinding, for high extraction and quick solution of gold and silver, has been emphasized recently; instead of the prevention, the production of slime seems to be favored. In this connection, however, the question arises: What method of slime treatment is available? With most ores, the slime will have a higher value than either the sand or the original ore; and, unless the filter-press commends itself on the score of cost, excessive sliming presents a doubtful advantage, owing to the loss of dissolved gold inherent in the decantation process; in the Black Hills the loss in dissolved gold ranges from 3 to 6 per cent of the original assay value of the ore, depending upon the relative amount of sand and slime made in the crushing. This fact has cooled any ardor to crush finer, and with ore that is too low grade to permit filter-pressing, the production of an excessive amount of slime is to be avoided. It is probable, however, that the filter-press will be so modified in the near future as to reduce the cost of operation and make it available for low-grade slime. The details of the Moore process are also being satisfactorily worked out, so that it promises to have quite a field. If it can be perfected—and there is good reason to hope that it

will—it would certainly prove a strong rival of filter-pressing.

Cinder Cement.

The growing use, importance and value of good cement is a feature of modern construction that promises even all that is predicted of it. Its service, adaptability, permanence and cheapness make it a kind of adjustable stone, when the quality is good. But the genuine is ever an advertisement of the probability of the imitation and the spurious. Cement tolerates, under certain conditions, a certain ratio of filling; but this filling must be of suitable material. Herein lies danger. The filling may be powdered stone, sand, or the like, or it may be something that may contribute to weakness and may invite danger. A mixture with a bad filling is illustrated by cinder cement.

Those who are in search of a specimen of this malicious adulteration may find it in almost any corner of a large and growing city; it is observable, for example, in going from Fourth to Madison avenue, on 21st street, of New York city. As noted there, the hand sample was in abundant evidence on the sidewalk. It seemed to consist largely of coarse coal ashes, and half-consumed particles of coal appeared to make up 8 or 10 per cent of the whole. The strength of this cinder cement was about that of good chalk—it broke easily in the fingers. What the history of such material would prove in a serious fire can be easily anticipated. It would slowly become red-hot, would shrink and crumble. There are adulterations which need a careful analysis for their detection; but this is so obvious that it implies something more than carelessness. Cinder cement, then, is a danger that can be caught and guarded against. It has no place in a building; neither in foundations, wall or floor, in a structure inhabited by men and liable to all the terrors of fire. Cinder cement is a humbug and a danger, without one redeeming feature. Let the public attention watch this material. The contractor will be just as honest as he is compelled to be.

An ingenious variety of reinforced cement, chronicled in *La Revue Metallurgique*, contains enclosed steel bracing, which is bent back and forth in corrugations with alternating wedge-shaped angles. The effect is to lock the two parts of the cement together in a continuous set of key-stone dovetailing, the result of which should be highly effective.

In the new rectifier of Flemming, an electric vacuum-valve is used, on the principle that "a current of electrons will proceed from a hot terminal to a cold terminal (or, in the older style of description, a 'current' will pass from the cold to the hot terminal), but not in the opposite direction." A metallic cylinder, cooled by water circulation, forms one pole, and an incandescent filament is the other.

*Partly from a private communication by J. V. N. Dorr to C. H. Fulton, in advance sheets of 'The Mineral Industry' for 1904.

¹Bulletin No. 7, South Dakota School of Mines, p. 58. *Transactions, American Institute Mining Engineers, 'Crushing in Cyanide Solution in the Black Hills of South Dakota,'* September, 1904. Pamphlet, Black Hills Mining Men's Association, 1904, p. 61.

A West Virginia Coal Mine Plan.

The accompanying engraving is a reproduction of a drawing showing the plan adopted for the development of the mines of the Federal Coal & Coke Company, near Fairmont, in Marion county, in one of the large productive fields of West Virginia. The plan has been worked out to avoid objections made to previous methods, and is approved by the mine inspector, who also recommends its adoption at other mines. The plan will explain itself.

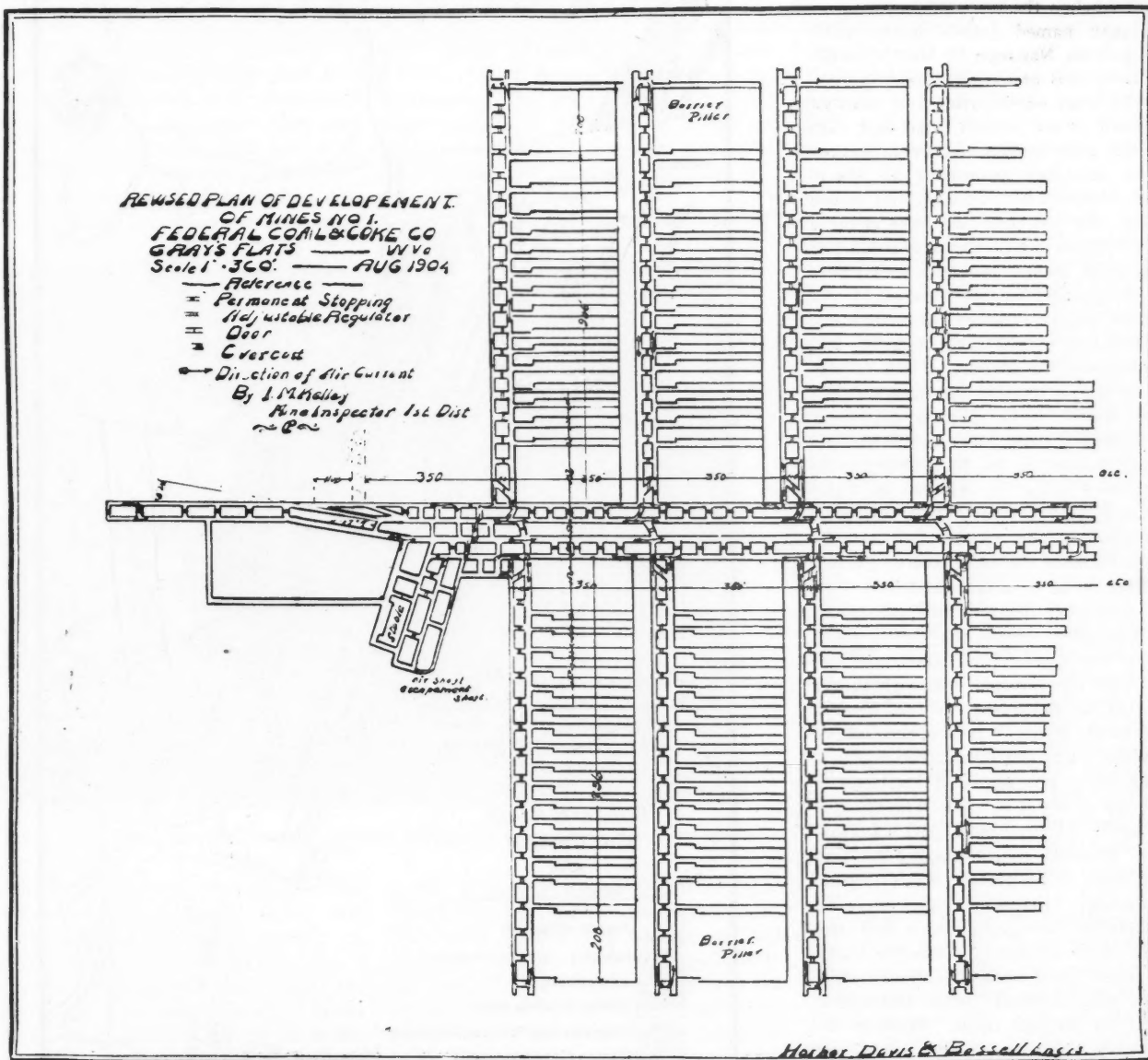
which must be opened each time a trip comes in or goes out, causing the current of air to be broken.

"2. Under this system all of the gases, thrown off from working places on the intake of air, including powder smoke and other impurities, are passed along the working face of all the places on the return heading, making it unhealthy and, where gas exists, dangerous.

"3. In case of any place on the intake heading or on the return heading breaking through to places coming to meet

Steel ingots free from 'piping' and 'settling' are said to be produced by the Harmet method. The same result is aimed at both by the Riemer hot gas-blast pipe, and by Goldschmidt's aluminothermite process.

A large electrical power plant is proposed to be developed at Grand Falls, New Brunswick, by a syndicate of New York, New England, and Canadian capitalists, comprising the Electro-Manganese Company; Messrs. B. E. Kingman,



In giving this drawing the inspector states the objections to the usual system—which this plan is intended to obviate—as follows: "The system generally followed, in the development of mines not only in this State, but in other States, is turning rooms off both heading and return air-courses. This should be discontinued, more particularly in all mines of a gaseous nature, for the following reasons: "1. Because it prevents the proper ventilation of each of these headings, on account of doors located between headings

them, from headings on their right or left, the air current is broken at that point and two districts are robbed of ventilation.

"4. With this system of development one-half of the coal must be worked to the dip. This means wet work and an up-hill haul."

Under the new system rooms are turned from the heading only, avoiding the difficulties attending proper ventilation, and the necessity of working coal to the dip, as under the usual plan.

New York; F. Sayles, Providence; and others. The plans are said to provide for extensive electrical ferro-manganese reduction works; pulp, paper, and saw-mills; power plant for the operation of international electrical trolley lines; and transmission of current for lighting and manufacturing along the St. John to St. John city. The estimated cost approaches \$5,000,000. A deposit of \$50,000 has been placed with the New Brunswick government, which will be returned with interest if the company expends \$3,000,000 within five years.

The Gympie Goldfield.

BY F. DANVERS POWER.

Gympie ranks as the third largest gold producer in Queensland; to Charters Towers and Mount Morgan belong the first and second places, respectively. Gympie is situated 106 miles north of Brisbane, with which it is connected by rail. The railway station is but 301 ft. above the sea, though some distance inland, while the valley through which the Mary river flows is only 115 ft. above sea-level; as a consequence, most of the mines are liable to be flooded when the river rises.

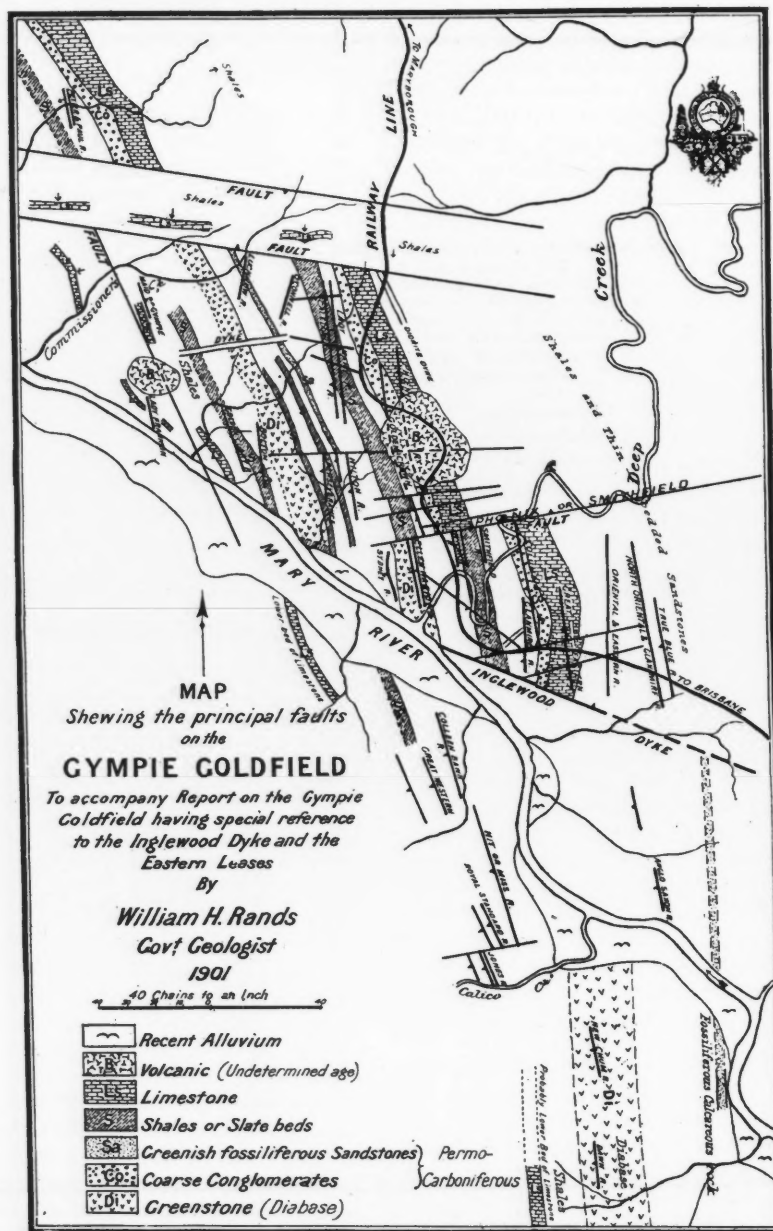
A digger named James Nash, while traveling from Nanango to Maryborough, in the early part of October, 1867, camped in a gully, since named after him, situated at the back of the present town hall. On trying the wash he obtained several ounces of gold, and then proceeded to Maryborough to report his discovery and secure his claim. In less than two months there were over 15,000 men on the new field. The alluvial gold, which was only a few feet below the ground, was easily worked and became exhausted in about twelve months, but not before several large nuggets had been obtained, the largest of which was found in Sailor's gully and weighed 804 oz. A month after Nash's discovery, Messrs. Pollock and Lawrence found the first reef, known as the Lady Mary; this was followed by the discovery of the Caledonia and other veins. The principal mines are confined to an area on the northern bank of the river Mary, about 2 miles long by $\frac{3}{4}$ of a mile wide.

The rocks of this goldfield consist of recent and older alluvial, the 'desert sandstone' of the Upper Cretaceous, and beneath these the Gympie beds, which are considered as belonging to the Permian-Carboniferous period. It is in the Gympie beds, which are estimated as 2,000 ft. thick, that the veins are found. These have a regular dip of about 21° east. The Gympie beds consist for the most part of graywackes, altered sandstones, gray and dark-colored carbonaceous shales, grits, conglomerates, limestones and breccias. Amygdaloidal dolerite, volcanic tuff and andesite (the Gympie 'greenstone') are found interbedded with the above, while dikes of much altered diorite and augite andesite cut through them. Most of the sedimentary rocks carry iron pyrite and calcite, and some of them have become indurated in the neighborhood of the igneous rocks.

From the local miner's point of view, the most important rocks are the so-called beds of 'slate,' which have been traced from Two Mile, at the northern end of the field, to the Inglewood dike at the southern, past which all prospecting has failed to find them. It is in, or near, these beds that the productive portions of the veins occur. There are four such beds recognized; their thickness and distance apart vary, so the following figures are only approximate; besides, some are miss-

ing on certain parts of the field, on account of faulting and denudation. The upper bed of slate is known as the Phoenix or Monkland, and is 200 ft. thick; about 130 ft. deeper is the 'first bed,' which is 15 ft. thick; from 76 to 100 ft. lower is the second bed, 13 ft. thick; and from 400 to 612 ft. lower still, the third is met with, which is from 200 to 300 ft. thick. Boring below this has been in dolerite, and has not led to the discovery of any further auriferous zones. Most of the mining has

and second 'slates,' because the Phoenix 'slide' had thrown the former down into the normal position of the latter. So far, no fossils have been discovered in the first and second beds. The third bed of 'slate' consists of fine-grained graywacke of a greenish-gray or black color, having a massive or laminated structure and splintery fracture. The gold in the third bed is very patchy; in fact, it is not distributed uniformly in any reef intersecting the other beds.



been done in the Phoenix or Monkland slates, which have proved to be the richest. The beds of 'slate' are not really of slate, but are composed of thick bedded shales, known locally as blocky shales, fissile shales and fine-grained argillaceous sandstones, which, when dark, are called 'black rock.' The shales carry a fair amount of graphite, and their points are coated with calcite. The 'Phoenix slates,' which are fossil-bearing, were formerly considered to be a thickening of the first

Interest in the Gympie deposits is not confined to the relation of the gold-bearing portion to the 'slates,' but is shared by the system of faults. The country is crossed by three distinct series of dislocations, which, given in the order of their occurrence, are the 'reefs,' the 'breaks,' and the cross-courses.

The country rocks have a general strike of a few degrees west of north and they dip to the east. The reefs run nearly parallel to them in strike, but if anything

a little more northerly; the reefs underlie, however, in the opposite direction. The accompanying plan prepared by W. H. Rands, formerly Government Geologist of Queensland, which was a portion of his fourth report on the Gympie Goldfield, shows the relation of the various fault-systems.

The reefs fault the strata, but are themselves dislocated by the breaks and cross-courses; they are strike-faults and may throw the rocks up or down for 60 ft. or more. The reefs may have one or two distinct walls, or neither wall may be defined; in the latter case the quartz, which is the matrix of the gold, consists of a number of parallel veins, which gradually get smaller and further apart until they cease to be worth working. One can often tell in the crosscut that a reef is being approached on account of the sheeting of the country, and on more than one occasion ore has been discovered by acci-

in quartz, which is picked out and kept till clean-up day at the battery. It is reported in the papers every week or fortnight as so many 'boxes of specimens'; this refers to dynamite boxes, which have a capacity of a little over one cubic foot. The weight of gold in a box naturally varies, but may be taken to average 50 oz. On account of the specimen ore it is exceedingly difficult to sample the lodes, and the difficulty is aggravated by the fact that the mines are not blocked out in such a manner as to enable a sufficient number of well-distributed samples to be taken. If the ore shows gold, it is considered good enough to crush, and all the quartz is then crushed, for fear any gold may be overlooked. The bullion from this field, when melted, is worth from \$16.80 to \$16.92 per oz. The larger reefs are often accompanied with dikes of diorite or andesite.

The next system of faults is represented

borhood of these that the richest ore is found; even the fissile shale between the two portions of a faulted reef often carries rich stuff. It would seem that the presence of graphite on this field, as on others, is favorable to the occurrence of gold. No researches have been made to determine the origin of the graphite, but as the shales are more or less carbonaceous and fossil-bearing, it is more likely to be due to organic matter than to any of the igneous rocks, and those that accompany the reefs have also been faulted by the breaks, showing that the rock was consolidated before the breaks were formed.

The third system of faults is represented by cross-courses or dip-faults, which cut across the strike of the strata and reefs almost at right angles, and hold for the most part northerly at a high angle, when they are not vertical. They generally consist of fault-rock, but at times they are dikes, each, however, evidently being due to the same force. The minor cross-courses scarcely heave the reefs at all, but when they do they are generally right-handed. The heave is probably more apparent than real, owing to the underlie of the reefs, as shown in the mine maps; for if a cross-course dipping north causes a reef underlying west to slide downward on its hanging wall, then the upper part of the reef, that was originally further east than the lower portion, when it slipped downward would still be to the east of the portion of the broken reef to which it was opposite. As the rocks dip to the east, the cross-course, that made the dropped portion of the reef appear heaved to the east, would make the dropped portion of the rock appear heaved in the opposite direction, that is, to the west. The larger faults have had the effect of altering the depth of the veins. According to Mr. Rands, one large fault between Two Mile and Gympie proper throws the beds down to the north, nearly 1,200 ft., and heaves the outcrop of the rocks of the Gympie side nearly three-quarters of a mile to the east. The Phoenix or Smithfield fault throws the country down to the north about 530 ft., and the outcrop of the rocks on the south side are 430 yd. to the east. The Inglewood dike cuts off the gold-bearing portion of the field completely, the rocks to the south of it being of different nature. A fair amount of prospecting and deep sinking has been done in the hopes of finding further auriferous ground, but so far without success. On the West of Scotland property there is the deepest shaft in Queensland, it being over 3,130 ft. down, and from the bottom of this a vertical diamond-drill bore has been made, giving a total depth of 4,011 ft., but nothing of importance was cut. The northern and shallower part of the Gympie field has been practically worked out. The principal work of the present day is centered in the Scottish Gympie,



NO. 2 REEF, GREAT EASTERN MINE, 1,320-FT. LEVEL, SHOWING SLATE BREAK IN ROOF.

dentally breaking down the supposed wall by means of a heavy blast. These reefs tend to split and die out in length; for instance, the No. 2 reef of the No. 2 South Great Eastern splits into the Glasgow No. 1 and Glasgow No. 2 in the South Glanmire & Monkland property, and these divide again; also the No. 3 reef of the South Glanmire & Monkland as it goes north splits into No. 3 and 2 reefs, and the former into the eastern, middle and western branches. That movement along these dislocations has continued after the reefs were filled is made manifest by slickensides. The reefs are not persistent in length. The minerals associated with the gold are iron pyrite, marcasite, mispickel, galena, massicot, zincblende, copper pyrite, tetrahedrite, malachite, stibnite, native arsenic and tellurides of gold. All the payable reefs appear to contain 'specimen stone.' This 'specimen stone' consists of coarse gold

by the 'breaks,' 'plumbago floors' or 'slips.' These, like the former, are strike-faults, but nearly parallel with the strata, and therefore have an inclination opposite to the vein. The main 'breaks' occur near the top and bottom of the 'beds of slate,' and lesser 'breaks' are found in the 'slate' itself. These breaks are sometimes downthrows and sometimes upthrows, generally the former. They often occur at such frequent intervals as to break the reefs into a series of steps (see map). This is apt to give a misleading impression to one who has not been underground, if he has only a plan of the workings without any cross-sections, as the reef would look either very wide or very flat. The breaks consist of crushed country, and may be of a grayish color or dark, owing to the presence of graphite; they are then called 'plumbago floors'; they are often highly polished and are liked by the miners, for it is in the neigh-

the No. 2 South Great Eastern and the South Glanmire & Monkland; these, together with other companies in their neighborhood, have combined to put down a drill-hole in search of the 'third bed of slates', which up to the present has not been proved so far south.

A Great Pumping Station.

SPECIAL CORRESPONDENCE.

The Delaware, Lackawanna & Western Company has recently completed a pumping station, which is one of the largest in the anthracite region. This station is nearly complete and was lately inspected by the officers of the company. It is near the Central mine, in Keyser valley, a suburb of Scranton. Work on the sinking of the shaft and equipping it with electrical machinery has been in progress for the past two years, and there is probably no pumping station of the kind which can equal it in any coalfield in the country. On its test it worked smoothly and fulfilled all expectations, so far as the mechanical features are concerned. The huge buckets are not yet attached, but the plant will be in operation very soon. The machinery will be almost automatic. Powerful electric hoists have been installed for the lifting of the water buckets up the shaft, and will work without the supervision of an engineer. The buckets will also be filled and emptied automatically. All the attendance necessary will be the service of one man for oiling the machinery and one man at the head of the shaft to prevent any accident happening to the bucket. Once the machinery is placed in motion, by turning on the electric current, it will control itself. When the bucket reaches the level of the water at the foot of the shaft there are apertures in the bottom which will be opened; these are opened again at the head of the shaft by coming in contact with another set of levers. Each bucket will hold 17 tons of water, and the plant will have a pumping capacity of 5,000,000 gal. in a working day of 24 hours.

When the plant is in operation, all the smaller pumping stations higher up in the valley will be abandoned. The new shaft has been sunk at the lower end of the Keyser Valley basin, so that all the water from the numerous mines above will gravitate to this point. In this manner the company will effect such marked economy that the great cost of the plant will soon be repaid.

The new plant will work during the night time only. In the day time the power from the electric power station is distributed between the mines in the vicinity, so that at night there will be ample time to operate the pumping plant. At least 2,000,000 gal. of water will be discharged into the Keyser creek daily. The water will first pass through the condensers at the boiler plant, near by, after which it will be discharged into the creek.

The Mineral Resources of the Philippines.

The annual report of the Mining Bureau of the Philippines, just issued, contains a concise and excellent statement of the mineral resources of the islands, prepared by Capt. H. D. McCaskey, Chief of the Bureau. It is based on the field-work done by the Bureau, on statements of explorers and prospectors, and on the best work of the Spanish authorities; it summarizes the information available up to date so comprehensively, that we give it, nearly in full, below:

Gold has been found in almost every island of importance of the group. It has been worked by natives in placers and in stringers from time immemorial, and the total production of the islands must have been considerable indeed, although no reliable statistics have ever been kept. The manager of one of the local banks is authority for the statement that at one time a great deal of nugget and other alluvial gold was received at the bank. Richard von Drasche, a German geologist who has done some field-work in the islands and has published important papers upon Philippine geology, states that at the time of his visit to Mambulao and Paracale (Camarines province) there were over 700 natives working the placer deposits for gold. It was estimated by a Spanish governor of Manila of the seventeenth century that the annual output of gold from Camarines Norte was about \$200,000. This seems well within possibility and is an indication of what was yielded to native methods. The natives in no part of the islands have been able to dredge or sluice, nor have they penetrated more than 50 or 100 ft. into the rock at any place. Abella states, in his 'Ligera Reseña de la Minera de las Islas Filipinas,' that from 3,000 to 4,000 pesos worth of gold was taken annually from the streams in the mountains of Bulacan near Santa Maria de Pandi. This statement has not appeared elsewhere, to the knowledge of this Bureau, and it is not known upon what information it is based. It is believed, however, that a great deal of placer gold has been obtained in the past by natives of Bulacan. It has been estimated by Centeno (1876) that the placer output of the Misamis and Pigtao fields in northern Mindanao has been, in the hands of the natives, about \$27,000 per annum; and William Asburner, an American mining engineer, states that he was informed that \$20,000 worth of gold had been taken by natives from the placer fields of Surigao, in northern Mindanao, in 1882. No figures are yet available from Benguet or Lepanto, but a prominent mining engineer recently stated that during his visit last year in Benguet two American miners obtained 20 lb. of gold from rich stringers in seven days. It is known that some of these stringers worked by the natives have been enormously rich. The greater number of the richer placers readily accessible to man have probably been

pretty thoroughly worked over from the surface, but it is known that the natives, and Spaniards also, have seldom gone to bedrock.

From the Pigholugan region, in northern Mindanao, J. Clayton Nichols, an American mining engineer, states that he was informed that \$4,000 was taken from one hole and \$2,500 from another. In the northern part of Masbate, near Arroyo, three American mining companies have recently staked out and recorded a large number of placer and lode claims, and work is going on upon these at the present time. It is understood that an American consulting engineer who has recently visited and reported upon this field was favorably impressed with the outlook for mining the alluvial gold in that region. A number of placer claims have also recently been staked and recorded by Americans in the head waters of the San Mateo river, in Rizal. In the Pigtao region of northern Mindanao Mr. Nichols estimates the value of the gravels to be from 15 to 25c. to the cubic yard, in such quantity as to suggest the careful study of that field with respect to the use of the steam dredge.

In addition to the districts mentioned above, gold has been worked to a greater or less extent by the natives in Fidelisan, Bontoc province; Suyoc, Dugon and Tuboc, Lepanto province; Acupan, Tabio, Capunga and Itogas, Benguet province; Capan and Peñaranda, Nueva Ecija province; and the islands of Polillo and Catanduanes, Labo, Capalongan and Maculabo, in the Camarines; Atimonan, in Tayabas; and in Cebu, Panay, Samar and Panaon.

The gold from Benguet, Lepanto, Surigao and Misamis has been found largely in small seams or stringers in quartz, although true veins have been found in all of these districts save the last. The most promising veins from Mambulao and Paracale are reported to be contact veins between gneiss and diorite. The best-defined veins appear to be entirely in the older crystalline rocks; those of the Camarines and Masbate notably so. Assay values of many veins sampled throughout the islands by prospectors and miners vary between a few cents to several hundred dollars to the ton. As it is not known by what method the samples were taken, a table of assay returns is not presented here. Suffice it to state that from present knowledge there are well-defined veins, of sufficient width and assay value, so far sampled in Lepanto, Benguet, the Camarines, and Masbate to justify extensive development work, and that such work is now in prospect of performance upon claims in these districts.

The above notes apply to placer or free-milling gold. There are deposits of low-grade, free-milling, and partially or wholly refractory ores in Lepanto and Benguet that have not yet received the investiga-

tion they deserve. Miners and prospectors have devoted their energies during the past four years entirely to the most promising fields so far found.

It is believed, from present information, that there is a future for hydraulic and dredge alluvial mining in the Camarines, in Masbate and in Mindanao, and for vein mining in Lepanto, Benguet, the Camarines, Masbate and Mindanao. Later and more detailed information must necessarily depend upon development work now in progress, and it is hoped that future work will extend rather than diminish the list given above.

The majority of Philippine gold ores now being worked are crushing and amalgamating ores; a few must be smelted, and cyanide plants will probably be erected for many of the works. Associated with the gold in some of the Camarines ores are the sulphides of iron and copper in the form of pyrites, zinc in sphalerite, and crocoite, the chromate of lead. Gold is also found associated with the sulphides, arsenides and antimonides of copper in the mines of Lepanto, district of Mancayan.

Copper has been reported from the islands of Luzon, Mindoro, Masbate, Panay and Mindanao; but the only important deposits so far known are those of the famous district of Mancayan, Lepanto province, in northern Luzon. The report of copper in the island of Balabac, the Paragua group, could not be verified by the mining engineer of this Bureau in a recent visit by him to that island; and Abella could find no evidence of valuable copper deposits among those reported from Panay. Samples of native copper, said to have been brought from Masbate, have been shown to the present chief of the Bureau, but no information of value was obtained from the prospector exhibiting them. The copper deposits so far known in Mindoro are all of copper pyrite, apparently of limited extent; and of the ores reported from Mindanao, nothing is known. There are veins of chalcopyrite in the Camarines and in Bontoc, but they have not yet been prospected or developed, and data concerning them are not available at the present time.

The important deposits of Lepanto are at Suyoc and Mancayan, within a few miles of each other in the southern part of the province. These veins carry the sulphides, arsenides and antimonides of copper, among them enargite, and its variety first identified here, luzonite. From samples obtained in the breasts of old workings at Mancayan, it has been estimated that the ores average 16% in copper, with a gangue of quartz. There is much of this ore in sight, and it is believed that in quantity and quality of copper, Mancayan is one of the most inviting of the mineral assets of the Philippines. The deposits have been prospected, staked and recorded, and the owners of claims are sanguine of success.

The working and smelting of the ores of Mancayan were carried on by the Igorrotes of Lepanto before the Spanish conquest. The metallurgical treatment was so ingenious, complicated and effective that it unquestionably points back to an older contact with civilization, probably with the Chinese from the north. The mining, of course, has been most avaricious, and the old workings will require thorough timbering before modern methods of exploitation can be employed. Of the many interesting features of the Igorrote metallurgy and of the first Spanish invasion of Mancayan nothing will be given here, save that the natives made such excellent implements and utensils of copper, exporting them to the extent of 200 tons annually, that the attention of the Spanish was attracted; and that after an invasion with an armed force as an escort, amicable arrangements were finally made between the Canabro-Filipino Mining Company and the Igorrotes, by which mines were opened and worked under the distinguished Spanish inspector of mines, Jose Maria Santos, and that from two mines for the 10 years following 1864 about 1,100 tons of copper were annually produced. Upon the death of Santos, who made a success of the Mancayan, mining was stopped.

It is hoped that as a result of field-work, recently completed in Lepanto by a party from this Bureau under A. J. Eveland, geologist, a fairly complete bulletin upon this interesting subject may soon be in press.

But little is known of lead deposits in the islands, and there is reason to believe that their distribution is not wide. Crocoite, the chromate of lead, occurs with gold ores in the Camarines, but it has not so far been found of economic importance. Galena, the sulphide and common ore of lead, has been found in Bontoc, the Camarines, Marinduque and Cebu. The ore from Torrijos, Marinduque, has been reported to assay over 56% lead, with small quantities of gold and silver; but no detailed account of the deposit is at hand. The galenas from Acsubing and Panopoy are reported by Abella as lying within true stockworks. Their content of metal by assays is 47% lead, with some silver and gold. These assays would appear to have been of specimens rather than of true samples of the ores.

Silver ores have not yet been discovered in the Philippines. The silver occurring is in argentiferous galena or alloyed with the gold.

The Mining Bureau is now investigating an occurrence of native platinum in the gold-gravel deposits of Rizal. From present information, platinum and associated rare metals do not seem to be of sufficient amount in these sands to be of economic importance; but the identification of platinum in the Philippines, after many reports of its occurrence hitherto uncon-

firmed, may lead to renewed search in similar fields.

Zinc has so far been found only as sphalerite in unimportant and unwelcome amount in a few of the gold veins of the northern Camarines.

Tin has not yet been discovered in the Philippines. A deposit of stream tin was reported at Alfonso XIII, on the west coast, by the natives of the east coast of Paragua, but opportunity has not yet been offered for a verification of this report. As the Moros of southern Paragua are affiliated with their Mohammedan brothers of Borneo and the Straits, and as the natives of the Straits are familiar with cassiterite and stream tin, there is a bare possibility of likelihood in the report.

A large deposit of rich manganese ore has recently been found upon the island of Masbate, but at the present time no details of its occurrence are at hand.

With regard to iron ores, important deposits of magnetite and hematite are found in Abra province, in San Miguel and Angat, Bulacan, in Bosoboso, Rizal, and in the Camarines. The deposits of Bulacan are extensive and can be readily worked. Several of the ores are suitable for the manufacture of bessemer steel, and one of the Angat ores is notable, in that it contains cobalt in appreciable amount.

The natives of San Miguel and Angat have worked these ores in small charcoal furnaces for over a century, and have established a good reputation and trade for the plowshares they produce. Analyses by the Bureau of Government Laboratories of samples of Bulacan ores, recently taken by the Mining Bureau, show high contents in iron, with low sulphur and phosphorus. The iron ores of Bulacan will undoubtedly furnish excellent charcoal pig iron. Vast quantities of limestone for flux are available in the immediate vicinity of the ore-beds; water transportation can be had upon the Rio Grande de Pampanga and the Angat river, and a branch of the Manila & Dagupan railway through San Miguel and within 10 miles of the mines will soon be built and in operation. The charcoal can be had of sufficient quality and amount, but not at present at a very low price.

Quicksilver has frequently been reported from various localities in the Camarines and in Panay, but in almost every case its occurrence has been disproved. On Mount Isarog, in the province of the Camarines, however, there is every reason to believe that cinnabar and native quicksilver have been found.

Specimens of the sulphide of antimony, stibnite, were found in small quantities in a nipa house on the south slope of Mount Maquiling in Batangas, by Capt. F. V. Krug, of the Twentieth Infantry, during the Malvar campaign. The native showing this to Capt. Krug told him that he could lead him to a deposit of the metal in the vicinity. This is the only informa-

tion now at hand, excepting that the sample brought to the Mining Bureau was a group of characteristic crystals of pure stibnite.

The most important of the mineral resources of the Philippines is probably the best grade of lignite coal. This is of Tertiary age and similar in all most important respects to that of Wyoming, Washington, and Japan. The best coal is free from sulphur and relatively low in moisture and ash. It is known in the island of Batan, Albay province; in Bulacao, and Semarara, southern Mindoro; in Danao and Compostela, Cebu; on the gulf of Sibuguey, in southeastern Mindanao; at Calatrava, Negros; and at Bislig, in eastern Mindanao. Some of the coal of Abra, Rizal and eastern Negros is also believed to be suitable for use in steamships and in stationary furnaces now burning Japanese and Australian coal. A division must be made between the jet black, comparatively hard coals, probably of Eocene age, and the brown, woody coals, much softer and more friable, of later age, and in large part not suitable for transportation. Both coals contain pyrites in some seams or portions of seams, but the black coal can, in most cases, be mined free from sulphur in this objectionable form. The brown coals are not of sufficient value, compared with older coals, to justify the expense of working at the present time. The best black coals are many of them strong enough for transportation, can be mined at reasonable cost, and presumably at a good profit, and should largely take the place of imported coals in the Philippines. Their fuel value is from two-thirds to three-fourths that of the best Welsh coal, very little short of that of the Australian, and equal to that of many of the Borneo and Japan coals, which they strongly resemble.

The thickness of the seams of the black coal varies from a few inches to 18 ft. A very large number of the best seams are from 3 to 5 ft. thick. They lie with variable dip from 0° to nearly 90°, and in some fields the beds are irregular, twisted, and faulted. Careful and thorough prospecting with drill, such as is being carried on by Lieutenant Wigmore in Batan, should precede extensive development in most of the fields of the Philippines. Sufficient mining has already been done in the Danao and Compostela coalfields of Cebu to demonstrate the value of the deposits there. It is hoped that a large, important, and profitable industry awaits the colliery companies of the Philippines.

A large and continued demand for coal is assured in Philippine waters, and it would seem that these islands are geographically situated favorably to the furnishing of coal to meet the enormous demand of Hongkong and other near-by ports.

Sulphur occurs in limited amount in the island of Biliran, province of Leyte, and has been worked there on a small

scale by natives for many years. No deposits of value and importance are at present known.

Petroleum has been found in Tayabas province, where it is understood some development is now going on, and at Toledo, Asturias and Alegria, on the west coast of Cebu. A well was operated for a short time in Toledo, but since the war work has not been resumed. There may be a future for the petroleum industry in the Philippines; and although but little is known of the value and amount of this important fuel at the present time, much interest of late has been shown in its exploitation, and it is hoped that before long reports of value can be made.

There is reason to believe that large beds of rock salt occur, without outcrops discovered as yet, in the mountains of Nueva Vizcaya. Streams gushing out from the hillside at Dapol are so heavily charged with brine that the natives by evaporation obtain important quantities of very pure salt.

The sulphate of lime in the form of crystalline gypsum and gypsum earth is found in Rizal, Laguna, and other provinces of the islands. Much of this might be calcined for the production of 'land plaster' and plaster of paris, but none of it seems to be so used. The natives work the beds of white gypsum earths for use in whitewashing, and so far as developed this business pays very well.

Large and important deposits of limestone are found throughout the islands. In many provinces the rock is quarried and calcined, producing excellent lime that brings a good price. A cream-colored limestone of Bulacan seems well adapted to the making of hydraulic cement, and a deposit of similar rock has already been located and recorded in Rizal province with the industry in view. An analysis made in the laboratories of Stanford University shows this rock to be a natural cement. This important and profitable use of Philippine limestone is now occupying the attention of the Mining Bureau and the Bureau of Government Laboratories.

Marble, or crystalline limestone, occurs in the islands of Romblon and Mindoro, and probably elsewhere in the group. This is a gray-blue mottled marble and much of it seems very suitable for decorative use. White crystalline marble has recently been found by the chief of this Bureau in Mindoro, in considerable amount.

White clays, or kaolin, have been found in the provinces of Abra, Camarines, Ilocos Norte, Antique, Benguet, Cagayan, Isabela, Laguna, Marinduque, Masbate, Pampanga, Pangasinan, Albay, Romblon, and Zambales. The suitability of these for the manufacture of porcelain and china is now being investigated. Red clays, from which natives make large amounts of pottery for local use, are found in almost every province in the islands. The statistics and technology of

this important industry are under investigation at the present time. Fire-clay has been found in the coal-beds, and may afford a profitable industry in the future. Red bricks are made in large quantities in Bulacan, Capiz, Rizal, Ilocos Norte, Isabela, Marinduque, Masbate and Pampanga.

The Philippine resources in stone for building and other construction work, and road metal, are almost unlimited. Among the hard, crystalline rocks, capable of standing heavy pressure, of resisting weathering, and of taking high polish, should be mentioned the fine gray diorites of the Cordillera, found in almost every province upon the western slopes of the range, and in Paragua, the gray tonalites or quartz diorites of Tinagon and Colasi, Panay, equal to many of the best granites, and a rock, apparently a true syenite, or hornblende granite, recently found in Masbate. Augite-andesite is now being extensively quarried by the Atlantic, Gulf & Pacific Company at Mariveles, for the works of the improvement of the port of Manila, and a volcanic tuff, soft when quarried but hardening rapidly upon exposure, is quarried in large amount and at good profit at Meycauayan, Bulacan, and Guadalupe, Rizal, and elsewhere, for building stone. This rock has been used in enormous quantity in the construction of churches and other buildings in the Philippines, and in the walls and fortresses of Manila. Crushed andesite has been extensively used in street work in Manila and has made excellent road metal. A large variety of the neo-volcanic rocks have been used, in addition to gravel, for similar purposes by the provincial supervisors in the construction of roads.

A number of important deposits of bat guano have been discovered throughout the islands, largely in the extensive limestone caves. Some of these have been located and recorded, but it is not known to what extent they have been worked. It is probable that they are all of limited amount.

With the exception of opal, reported from Binangonan in Rizal, and some very small rubies, reported from the head waters of streams flowing into the ocean near Mambulao and Paracale, no minerals have yet been identified as precious stones.

Capt. McCaskey's conclusions are summed up as follows: "From the above brief résumé it will probably be gathered that, although some of the common metals are absent, or not yet discovered, in the Philippines, there remain sufficient mineral resources to form the basis of an important industry. The stage at present is that of investigation and development; it is hoped, however, that we shall rapidly approach the period of production.

"Further development of the mineral resources of these islands is necessary to growth of the industries involved. Pros-

pecting has been done upon almost every island of the group, to the great credit of the pioneers who have laboriously blazed the trail; but capital for the development of prospects has been difficult to secure. It is hoped that the definite policy concerning the future of these islands, so earnestly desired by capitalists as a prerequisite to permanent investment, may soon be determined by the people of the United States, to the end that the Philippines may enter upon an undisturbed and prosperous career.

"A welcome feature of the present interest in Philippine mining is the increasing attention being given to the mineral resources by the natives of the islands. Their interests are those of all; with their hearty co-operation it is hoped that the labor required may be more rapidly secured, that they will realize the common benefit of all mining activity, and that they may in time point with pride to the work and worth of Philippine mines."

Replacement of Quartz by Pyrite.

The careful and elaborate proof of the substitution of quartz by pyrite, at least in some cases, is the substance of a scholarly paper by Professor C. H. Smyth, Jr., in the April number of the *American Journal of Science*. The occurrence is in beds of Oneida conglomerate in central parts of the State of New York. Briefly, the case is that of a sandstone, the quartz grains of which have been corroded, with ingrowing secondary pyrite crystals, into the corroded spaces of the quartz grain. Thus the relatively original and corroded quartz grain fit closely about the relatively secondary pyrite, as though the sharp pyrite crystals had pressed into the quartz. The description of the occurrence is carefully worked out by Professor Smyth both from the geologic and petrographic standpoint, and is a most valuable contribution to a growing subject. It will be remembered that W. Lindgren (*Transactions A. I. M. E.*, Vol. XXX, p. 615) has given some instances of the replacement of silicates by pyrite. W. H. Weed (United States Geological Survey, *Bulletin 213*, p. 178) has given instances of the replacement of silicates (hornblende and mica) by pyrite at Butte. In this *JOURNAL* (p. 169, January, 1905) there is described a possible chemical mode of replacement. J. D. Irving (United States Geological Survey, *Bulletin 260*, p. 65) describes "replacement deposits in quartzite at Ouray."

The paper of Professor Smyth is illustrated with several micro-petrographs in half-tones, and will rank at once as an original and classical contribution to the facts of ore deposition.

Metallic strontium may be prepared by the electrolysis of the fused chloride in a vessel with carbon sides and fire-clay bottom. The metal strontium has much the appearance of calcium; it is as white as zinc and as soft as lead.

The Origin and Classification of Placers—I.

BY H. L. SMYTH.*

Of late years the attention of physical geographers has been largely directed to the analysis of the destructive and constructive effects of the elements on the earth's surface; that is to say, to the details of the processes by which the land is worn away, to the forms into which it is carved or built, and to the transportation, distribution and reconstruction of the eroded matter. From these studies certain deductions may be drawn concerning an important group of ore deposits, which are numbered among the products of these actions. In this article I shall try to show in a broad way—and quite frankly, from the standpoint of an amateur in physiography—how the distribution and concentration of the valuable particles in placers are dependent on some of the varying conditions under which erosion, transportation and deposition take place. The considerations that will be brought forward are obvious enough and many of them are familiar, but, so far as I am aware, some of them have not appeared in print before.

A placer may be defined as an unconsolidated accumulation of rock and mineral fragments—boulders, gravel, sand, clay, etc.—formed at the earth's surface and containing in important quantity particles of valuable minerals of clastic derivation. The valuable minerals may be non-metallic¹—for example, phosphate or gems—but commonly they are metallic, such as gold, platinum, tinstone, magnetite, limonite, etc. Before being incorporated in the placer, these particles have been imprisoned in the rock.

How are they set free? Evidently, either by the rapid breaking or abrasion of the matrix, whether in the bed or banks of an actively cutting stream, or along the margin of the sea, or beneath moving ice, or else by its incalculably slower decay and disintegration through solution, changes of temperature, frost, or the impact of the rain. Abrasion, no doubt, has been instrumental in supplying at least part of the metallic materials for many placers, particularly to those containing unaltered sulphides, or attackable metals. Thus some of the pyrite-bearing gravels of the Sierras, described by Whitney,² derived their pyrite from the bed-rock slates into which the stream trenches are cut. The silver, pyrite and galena mentioned by Spurr³ as occurring in several of the gold-bearing creeks of the American Yukon were probably ground out of their matrix by glaciers. This is undeniably the case

with the native copper found by Brooks⁴ in glacial gravels on the head waters of the White river in Alaska.

Rapid breaching and abrasion have unquestionably played a still more important rôle in the interesting group of shore placers, of which, however, we have but few examples. When the sea advances over a stationary or sinking land, it may cut deeply into the solid rock, and from the fragments form important placer deposits in the vicinity of the parent ledge. The gold-bearing Cambrian conglomerate⁵ in the neighborhood of the Homestake lode, in the Black Hills, probably derived much of its gold from the direct attack of the sea on the lode. The consolidated iron-ore detritus at the bottom of the Upper Marquette series, in Michigan, rests in many places on older deposits, from which it was broken mainly by the action of the waves along an encroaching shore.

But in comparison with slow disintegration, the rapid mechanical breaking and wear of the fresh rock is a relatively unimportant factor in effecting the release of the metallic constituents of placers; and disintegration itself comes merely as the physical culmination to the series of chemical changes that had previously gone on beneath the surface, all tending to the same end. Therefore, before proceeding to the process and consequences of disintegration, it is desirable to dwell on these underground changes.

The reagents chiefly effective in the subterranean decay of rocks and alteration of ore deposits, are oxygen and carbonic acid in air and water. Under their attack some minerals form soluble compounds, while others remain unchanged or alter to insoluble forms. Therefore, from the region where these changes mainly occur, namely, that lying between the sub-aerial surface and the protective level of the groundwater, certain elements tend to be removed, while others tend to accumulate within it. After long-continued decay, the common rocks, except those whose constituents had reached chemical stability in a previous cycle of erosion, finally pass into silicious and more or less ferruginous clay. In the alteration of deposits of the metallic sulphides, the base metals—zinc and copper, together with silver—in time may completely vanish from the upper portion of the zone of oxidation, while iron and manganese, which readily form inert higher oxides, and lead, which, from the sulphide, passes into practically insoluble sulphate and carbonate, in large part remain. According to the nature of the deposit and its enclosing rocks, they may be accompanied by gold, platinum, cassiterite,

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¹R. W. Raymond: 'A Glossary of Mining and Metallurgical Terms,' *Trans. A. I. M. E.*, Vol. IX.

²J. D. Whitney: 'Auriferous Gravels,' pp. 91, 390.

³J. E. Spurr: 18th Ann. Rept. U. S. Geol. Survey, Part III, pp. 323, 334, 344, etc.

⁴A. H. Brooks: 21st Ann. Rept. U. S. Geol. Survey, Part II, pp. 377, 378, 381.

⁵W. B. Devereux: *Trans. A. I. M. E.*, Vol. X, pp. 465-469, 473. J. D. Irving: 'Economic Resources of the Northern Black Hills,' Chap. II.

magnetite, etc.—in a word, by minerals practically indestructible by the ordinary reagents from the surface.

While the zone of oxidation is, therefore, primarily a region of residual concentration for the stable elements, by reason of the subtraction of their less resistant associates, yet in places enrichment of a positive nature may occur, leading to the formation of new mineral aggregates through transportation, either mechanically or in solution, and re-deposition in favorable spots. Undoubtedly gold is sometimes transported in solution in the zone of oxidation, as is proved by the beautiful crystalline growths found mainly there; the conditions most favorable for this are probably those suggested by Pearce⁶ and by Don,⁷ where chlorine, a vigorous solvent of gold, is set free through the action of sulphuric acid and a salt solution on the higher oxides of manganese. The splendid gold crystals found in certain of the Leadville mines near California gulch were probably formed under these conditions.

Also, gold may be carried down mechanically in the zone of oxidation. When auriferous pyrite decomposes, the gold locked up in it is released in a state of division so fine that it is capable of sifting through minute openings. Thus working down with the aid of water from above, together with fine particles of other substances, it no doubt frequently constitutes a positive addition to the more open portions of veins. The clay seams containing free gold, described by Rickard⁸ as occurring over 100 ft. below the surface in the Rathgeb mine in California, perhaps owed part of their richness to such a mechanical settling of the metal from above. The same observer believes that the upper portions of some of the veins of Western Australia have been "enriched by the deposition of the gold left behind from lode-matter, which was long ago disintegrated and removed by erosion."⁹

But it is the oxides of iron that furnish the best examples of aggregated concentration in the zone of oxidation. Pyrite (and pyrrhotite and marcasite as well), when attacked by oxygen in water, yields ferrous sulphate, which oxidizes to limonite, or readily reacts with alkaline (or alkaline-earth) carbonates to form ferrous carbonate on the one hand, and an alkaline sulphate on the other.¹⁰ The ferrous carbonate is so much less soluble than the sulphate that precipitation of a large proportion of the iron would take place in that form if it were not often nearly simultaneously oxidized and laid down as hydrated ferric oxide. The precipitated carbonate is also subject to the same

change. Transported then both as sulphate and as carbonate, iron is deposited as limonite where oxidation is going on most actively, namely, in the cracks and fissures of the surface zone. On the other hand, with abundant alkaline carbonate, its journey is shortened or altogether avoided, and it is for this reason that pyritiferous limestone, when weathered not only carries abundant pseudomorphs of limonite after pyrite, but yields residual clays nearly always highly colored by well-distributed iron-oxide. Oxide of manganese descended from the carbonate, or through the carbonate from the silicate, is likewise subject to positive concentration through aggregation in the surface zone.

Decay is nearly everywhere in progress above the water level, but is rarely, if ever, complete. It is most nearly complete where denudation proceeds most slowly, when the streams almost cease to corrode and the water-level to sink—in a word, under the stagnant conditions of topographical maturity and age. Where erosion progresses rapidly, the surface is stripped before the chemical changes can reach their limit; or, looked at in another way, these changes are farthest advanced at the surface and are just beginning at the water-level; with rapid erosion, the surface is therefore constantly forced down to an horizon of incomplete or inchoate change.

Since decay results from the movement of water and air through the rocks, it is promoted by their permeability, and is hindered by any cause that prevents the free movement of these agents. Natural differences in permeability, as well as in power of resistance, produce great inequalities in the extent to which the rocks and ore deposits are affected, both in depth and laterally. When the circulation of air and water is entirely cut off, as it is at present in the superficially frozen crust of portions of northern Siberia, the Yukon Valley, and the Seward Peninsula, there can be no subterranean rock decay.

The foregoing considerations may be summed up in a few words: The zone of oxidation is a region that may be greatly enriched in metallic substances in consequence of decomposition and of separation through solution. When carried to the limit, these processes, acting on the rocks, leave behind an insoluble residue composed of quartz, clay and the oxides of iron; when acting on deposits of the metallic sulphides or carbonates, they finally remove all metals, with few exceptions, that do not form higher insoluble oxides or carbonates, and leave behind a residue thoroughly adapted to its chemical environment. The chief metallic constituents that survive are the oxides of iron, more rarely the oxides of manganese, and—unimportant in weight, but in value frequently of overshadowing importance—

the precious metals—gold, platinum, etc. Chloride of silver and native silver are also found in this mantle under certain climatic conditions. Most of the metallic minerals just mentioned are relatively concentrated in the zone of oxidation, because of the removal of their soluble associates; but some of them, by undergoing transportation themselves, whether in solution or suspension, may also form aggregates of positive enrichment. As a whole, however, the mantle of decay is probably enriched mainly through residual concentration, rather than by outside contributions.

The end products are strongly contrasted in many physical characters, and especially in hardness, weight and size. Quartz is light, hard, brittle, and may occur in large masses; clay is light and soft and composed of the finest particles; the iron oxides are generally hard and always heavy. Of the other constituents of the metallic residuum, some are malleable, others are brittle, but all are heavy and generally occur in small particles. The one property in common is that all these substances successfully resist the attack of the air and carbonated water.

New Coinage for Mexico.

A recent official decree gives the following description of the new coins to be turned out by the Mexican mints:

The gold coins of 10 and 5 pesos will be as follows: On the obverse the national coat of arms, the inscription, 'Estados Unidos Mexicanos,' ornamental scroll work, etc.; on the reverse the bust of Hidalgo, with inscriptions showing the denomination of the coin, the year in which it was struck, etc.

The silver peso will remain the same as at present, at any rate for the time being, but on the obverse it will display the inscription 'Estados Unidos Mexicanos.' The silver 50-, 20-, and 10-cent pieces will have an obverse the same as the gold coins. The reverse will display the denomination in large figures followed by the word 'centavos,' and will have a Phrygian cap with rays and a wreath of laurel and oak. Along the milling of the 50-cent piece the words "Independencia y Libertad" will be hollowed out. The milling of the 20- and 10-cent pieces will be only striated.

The nickel coins will have an obverse practically the same as the gold coins. The reverse will have an Arabic 'five,' the word 'centavos,' and the date of coinage, all inclosed in a grecque imitating the Aztec calendar.

The bronze coins will have an obverse similar to the gold coins; reverse, the figure indicating the value of the coin forming with the letter C (centavos) a monogram, surrounded by a laurel wreath.

All the coins will have on the reverse the initial of the mint at which they were coined.

⁶R. Pearce: *Proc. Col. Sci. Soc.*, Vol. I, 1883-4, p. 68.

⁷J. R. Don: *Trans. A. I. M. E.*, Vol. XXVII, 1897, pp. 598-601.

⁸T. A. Rickard: *Trans. A. I. M. E.*, Vol. XXXI, pp. 214-215.

⁹*Trans. A. I. M. E.*, Vol. XXVIII, p. 503.

¹⁰J. Roth: 'Allgemeine und Chemische Geologie,' I, pp. 234, 236, 237, 238.

Mining in Japan.

The mineral industry of Japan, in its original form, dates back to an early period. Copper, silver and gold mines were worked over a thousand years ago, and, in fact, the earlier history of the older mines has been lost in the lapse of centuries. When Japan was opened to commerce and intercourse with the United States, a new era began. The old mines were developed and supplied with modern machinery; at first, under the guidance of American, British and German engineers. With characteristic energy and thoroughness, however, the Japanese educated and trained a body of competent mining engi-

neers, and the mines are now almost entirely under the direction of their own native engineers, managers and superintendents. The extent to which the new development has been carried is not fully appreciated, and the Japanese exhibit, in the Mines Building at St. Louis, was a revelation to many.

The coal deposits of Japan are extensive, and those of Kiushiu and Hokkaido are worked on a large scale. Descriptions of the mines owned by the Mitsui-Bushen-Kaisha, and other important companies, have heretofore appeared in this JOURNAL. The mines not only supply the needs of

the country, but also furnish a surplus for export, and Japanese coal is an important factor in the coal markets of the Far East. As a steam coal, it ranks second only to the Newcastle coal from New South Wales.

In iron ores, Japan is not well supplied. The manufacture of iron and steel is carried on, but the native supply of ores, so far, is deficient, and foreign ores are imported. It is possible that this deficiency may be made good from Formosa, but this is not certain.

In copper, Japan has large resources, and its production of 34,850 tons in 1904 was exceeded only by that of the United States, Mexico and Spain. The ancient

companies, in connection with their other enterprises. Other products include antimony, which is largely exported to this country; and sulphur found in some of the extinct volcanoes, which is also exported, most of the acid-makers on our own Pacific Coast using Japanese sulphur.

In all branches of mining, excellent work is done. As already noted, the mines are worked by approved modern methods and with modern machinery. Most of the coal-mining machinery in use at present is of British manufacture, but Japanese engineers have carefully examined the mines of this country and there is every reason to believe that there will be a fair



KAMIOKA SILVER-LEAD MINE, JAPAN.

mines of Ashio and Besshi are now supplied with the latest appliances for mining and smelting the ores; and the same is the case with a number of smaller mines. The ownership of the latter has been largely concentrated in a few hands. Japan has been a large exporter of copper, especially to China, but the home needs for war material during the past year have absorbed practically all the production.

Gold is produced in moderate quantity. There are several important silver-lead mines, which are chiefly owned and worked by the Mitsui and other large

opening for American manufacturers, of which they should be ready to take advantage. The mining industry is a growing one and its need of machinery and supplies will, doubtless, increase with the development which will follow when the present war is ended.

The heat effects of the radium emanations seem to be due almost entirely to the alpha rays (not to the beta or gamma rays). This indicates that the alpha rays may consist of gross material particles, to the bombardment of which the heat effects are supposedly due.

Queensland Sapphire Mining.

A recent letter says that the quantity of sapphires exported from the Anakie field, in Queensland, during the months of February and March, is 850 oz., obtained from 1,200 loads. No fresh leads of gem-bearing wash have been opened up during the year; consequently, all stone obtained for the last quarter is principally from a few old claims that were opened up in the early part of 1904, and are still giving good returns (some as high as 5 oz. to the cubic yard). The market is fairly firm for good class and average parcels. Good blues are fetching from £2 to £4 per oz.; good yellows and greens from £4 to £12 per oz. Corundum is also in good demand, from 4s. to 6s. per lb. On the eastern end of the field a considerable amount of sinking has been done during the quarter in the deep ground, amounting to about 1,000 ft., and 200 ft. of drives in various claims. In the latter part of the year 1904, with the assistance of the Government, a prospecting party was organized and sent out from the field to prospect the gem-bearing region lying to the northwest of Anakie. It has now returned, and has been a disappointment to those that were prominent in the organizing of the expedition.

Carnotite from Colorado promises to be an important source of radium, but strangely enough it does not seem to carry helium. If helium had been formed in carnotite by the disintegration of radium, the former might have diffused away, as the sandstone is porous, and, as a rule, the minerals carrying helium are massive and impervious. The work on carnotite was described by E. P. Adams in a recent number of *The American Journal of Science*.

The oil found at Muscogee, Indian Territory, is distinctly promising both in quantity and quality. It is found at a lower geological horizon than is usual for the Kansas-Indian Territory field. This oil has a paraffine base, and occurs with Mississippian limestone. It is described in Bulletin 260 of the United States Geological Survey.

The gold production of the United States in 1904 was \$84,554,000, as reported. This is due partly to gains, in Cripple Creek; in California in dredging; in Utah in smelting auriferous copper; and to the new producer of Goldfield, Nevada. The division is as follows: From gold and silver quartz-lodes, \$62,754,000; from placers, \$12,900,000; copper ore, \$4,300,000, and lead ore \$4,600,000. Mr. Lindgren, of the United States Geological Survey, further analyzes the quartz-lode yield geologically as follows: Pre-Cambrian, \$5,454,000; Mesozoic, \$21,600,000; Tertiary, \$35,700,000.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

Black Spots in Mica.

Sir—I noticed in your JOURNAL, five or six weeks ago, an answer to a question on mica, stating that the mica spotted with black was unfit for electrical use. I think you will find this a mistake. I visited a mine in Mitchell county, N. C., last summer, the whole product of which was a dark green mica, with large and numerous black spots; so spotted, in fact, that light could scarcely pass through sheets $\frac{1}{8}$ in. thick. This mine had been working for a couple of years, and was at that time shipping regularly to electrical people. At the time of my visit, a block weighing 165 lb., it is said, was taken out. The dimensions were approximately 13 by 20 in., and 12 in. thick. This block was very badly spotted, but was split and trimmed for use.

DOUGLAS B. STERRETT.

Sylva, N. C., May 6, 1905.

Uniform International Coinage.

Sir—In connection with, or rather related to, the recent discussions of uniformity in weights and measures, which have appeared in the columns of the JOURNAL, there is a subject which I would like to bring forward again. That is uniformity in coinage values. It is not a new proposition, but the adoption of some system of the kind would do quite as much to promote trade, and to lessen labor, as the standardization of weights and measures, among the chief commercial nations.

By uniformity in coinage, I do not mean that any nation should be asked to abandon its national coins, or their names, but only that a uniform standard value should be established for the leading coins, as is now the case in the Latin Monetary Union. Thus, if we take one gold coin as a standard, a unit could easily be found which would require only changes so slight that the difference would hardly be perceptible. If the United States half-eagle, or five-dollar gold piece, the British sovereign, the German twenty-marks, the French 25-francs, the Austrian 25-kroner, the Russian 10-rubles, the Japanese 10-yen, the Mexican 10-pesos (under the new coinage), were all made of uniform weight and value, we would be very near to a universal coinage. The changes required to bring all the gold coins mentioned to a single standard would not be greater—in most cases not so great—as the wear or abrasion, allowed in most countries before a gold coin is thrown out as 'light' by the mints and the banks. In the subdivisions, or minor coins, the changes in value would be so small as to be imperceptible.

Moreover, there would be no sudden alterations. If the standard unit could be adopted, the new weight and value would be used for all coins minted after a certain date. There need be no calling in of coins, or re-coinage on a large scale. The change would come so gradually that most people would hardly know it. At the end, there would be a standard gold coinage, which would be accepted all over the commercial world—everywhere except in China, perhaps, and quite probably there also. The American traveler, for instance, in any country in Europe could hand out his five-dollar gold piece, and get his change in shillings, francs, marks, lire or kroner, according to the place. Then, also, there would be the vast saving in time and labor in all commercial transactions. Of course, there are differences in rates of exchange in large financial business, but the calculations of these would be immensely simplified. Small bankers' profits, derived from the exchange of foreign coins, might be cut down, but the large bankers and commercial houses would be greatly benefited.

Looking at it from all sides, the change seems so feasible, that I wonder it has not been urged long ago. No national susceptibilities need be touched, since the national coins would remain unchanged in name and relative values. I hope that others will think on this point and discuss it to some purpose.

New York, May 26, 1905. INVESTOR.

Silicon-spiegel is a ferro-alloy carrying both manganese and silicon.

The use of thermite in an emergency is well instanced in a recent issue of the *Iron Trade Review*. The tug *Schenck* broke her rudder-shoe on the rocks near Sault Ste. Marie, Mich. No blacksmith shop was at hand, and none was needed. A 125-lb. crucible of thermite did the work of welding, and time and money were saved. This is said to be the first application of the use of thermite in steamboat practice on the Great Lakes. It is time to hear something of this emergency weld from the mining and reduction mills in the West.

The quality of American rails, in respect of liability to breakage, seems to be degenerating. T. W. Johnson suggests the following causes and their interdependence: (1) Resistance is due to a fine grain; but this depends (2) on rolling at proper temperatures and with sufficient time for annealing during treatment; this in turn has been scant; (3) by the enormous tonnage recently attained in practice, which cuts down (4) the desirable high initial temperature of treatment. In general, rapidity, and consequent carelessness, in rolling, seems to be the prime reason for the alleged deterioration of the American rail.