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IN THIS ISSUE we have restored the Discussion Department to its former more dignified position immediately succeeding the editorial comment. The free interchange of ideas on current technical questions may often serve a better purpose than the writing or reading of finished essays on such subjects. To the busy man, with executive duties and details of every-day work, it is impossible to find time for the deliberate preparation of that minor thesis which we term an "article," but such a man may be able to snatch the few minutes required to interject his commentary into a discussion which interests him.

Many excellent ideas are lost because they do not warrant lengthy dissertation and many sonorous theories remain unpunctured for the lack of incisive comment, because the dignity of the transactions of a scientific society may not invite either one or the other. We shall welcome them. It will be our purpose to publish articles which by pressing the button on the right spot will call forth rejoinder, so that a cheerful exchange of views will result.

We hope that busy men who cannot obtain the opportunity to dress up in finished literary garb the considerations which occur to them in the course of technical practice will send them just as they are, in simple guise, to this department, where they are likely to start a train of inquiry or a line of investigation fruitful of result. Discussion is to ideas what the surf is to the stone, removing the rough edges, modifying, smoothing and shaping until the finished product stands out in perfect symmetry of line.

Criticism will, we trust, find its way into this department; not the unpleasantly personal or corrosive kind that is merely destructive, but the criticism which is constructive, which is penetrating while it is also polite, which tries to add to the scientific reasoning built by another, which amplifies another man's idea and emphasises a professional brother's suggestion. Thus we hope to add to the gaiety of the nations and to the usefulness of this JOURNAL.

THE COMPLETION of the cable to Hawaii is another link that binds remote places. It is a notable event, and following so soon the laying of the cable under the Pacific between Vancouver and New Zealand, it serves to emphasize the gradual abridgement of the distances which divide mankind. We welcome it, for technical advancement knows no geographical boundaries and desires an increasing field of activity, as well as a closer knitting together of those who are co-workers in the cause of progress.

✕

WE HAD hoped to complete the statistical statements for 1902 in our last issue. The weather, however, was against us, and an unusually stormy season on the Atlantic delayed the arrival of the valuable reports on the London metal markets prepared by our special correspondents. These are given in another part of this issue, and will be found to contain a complete record of the course of those markets in 1902. They show also how closely the London and American markets are now connected, and to how great an extent London depends upon New York.

✕

THE COMMISSION appointed by the Chamber of Deputies, to investigate coal mining conditions in France, has begun its work by addressing a circular, containing questions to be answered, to directors of mines, mining engineers, working syndicates and miners' delegates. The questions put by the Commission are comprised under five sections: (1) Situation of workmen; (2) disputes; (3) beneficial precautions; (4) general conditions under which mines are exploited; (5) causes of disputes in general.

The number of questions indicates a searching investigation into all the conditions of operating the mines, and the position of labor. It may be noted as a coincidence that the greater part of the questions follow closely the lines of investigation pointed out in the articles on "Problems of Life and Labor in the Anthracite Regions," by Mr. Frederick L. Hoffman, which were recently published in our columns.

✕

A BIT of interesting news in connection with the extending use of copper is the announcement that the Metal Plated Car & Lumber Company, of New York, has been awarded a contract for sheathing 500 cars for the new underground railroad with copper in its natural color. The advantages of the system are claimed to be protection of the wood against fire and saving in maintenance as compared with painting and varnishing.

Several copper-sheathed cars were put on the New York, New Haven & Hartford Railroad some years ago, and a few were tried on other roads. Those on the New Haven road gave very satisfactory results, showing a considerable saving in maintenance, as claimed, in comparison with painted cars. The copper sheathing quickly became oxidized in use, and showed a uniform neutral tint. The main reason why more cars were not sheathed was the rise in the

price of copper, which followed soon after the first cars were built.



DURING THE LAST days of the old year two good workers and upright professional men went across the range to the land whence none return. Prof. P. H. Van Diest was a well-known figure in Denver, and did a great deal of useful work, especially for the Colorado Scientific Society, where his genial contributions to discussion were always welcomed.

We publish a short notice of Mr. Henry A. Vezin, prepared by one of the many young fellows whom he delighted to help. He was characterized by an unflinching courtesy and patience in the giving or procuring of information when consulted by any brother professional and, being a very careful man, he was found to be a good authority on many matters.

Both Prof. Van Diest and Mr. Vezin were, above all, kind—that kindness of heart and manner which throws a ray of sunshine across the dark avenues of life, the warm glow which touches the cold places of earth and melts the selfishness of a fiercely competitive period. May their memory prompt those who knew them to pass on this gift of human kindness.



THERE WAS remarkable unanimity in the opinions of financial authorities which found expression in the annual reviews of the daily press at the end of 1902. All agreed that the issue of securities had been carried beyond the limit of assimilation, and that the financial constipation which has resulted is the cause of the present dearness of money.

Of all the opinions voiced by economists none seemed to us to formulate the true situation in this country, so concisely as that of Prof. W. G. Sumner, who, in response to the New York *Evening Post's* query as to the most encouraging factors making for continued prosperity in the United States, replied that "the encouraging factors are the realities; the resources in the ground, the geographical features, and the character of the people. So long as the people get at the resources we enjoy prosperity. When the politicians, editors, economists, trades unions and social philosophers begin to get prosperity for us, our trouble begins."

That is it exactly—the resources in the ground, as made manifest in bumper crops and a mineral production of colossal dimensions. We are mainly concerned with the latter; how they have built up great industries and a complex civilization still in process of growth it is not necessary to reiterate. Our columns tell the story throughout the year.



THE USE OF OIL IN SMELTING.

The development of the oil industry has proved very beneficial to California, which, possessing no coal-fields of her own, has always been dependent upon Australia, Wyoming, Vancouver and Japan for her supply of the fuel employed in manufacturing and smelting. In its application to smelting the use of crude oil is a comparatively new departure. At the Selby works, Mr. Alfred Von der Ropp has been very successful in this direction. He finds that a matting furnace, which ordinarily requires one ton of coal for every 3½ tons of ore, will smelt a ton of ore per barrel of oil, so that 3½ barrels of oil are the smelting equivalent of one ton of coal, in a lo-

cality where coal costs \$6 per ton and fuel oil 80 cents per barrel. Under the prevailing conditions the use of oil represents an economy of 50 per cent.

Besides this economy of first cost, the oil fuel has also been found advantageous because the oxidizing atmosphere of a roasting furnace can be maintained without those interruptions which take place when fresh coal is added, interruptions which are accompanied by the introduction of reducing gases which temporarily cause the process of oxidation to remain at a standstill. Moreover, it is possible with oil, by regulating the air inlet of the furnace, to control the smelting atmosphere so as to obtain oxidizing or reducing conditions, as the metallurgist may desire. The ability to increase the temperature of a metallurgical operation with notable ease is another good feature. It is an interesting example of adaptation to conditions, and the readiness with which it has been used is typical of that progressiveness which characterizes the energetic people of the West.



THE QUALIFICATIONS OF DIRECTORS OF MINING COMPANIES.

The ignorance and incompetence of the average director of London mining companies has long been a subject for ridicule, and, in spite of the fact that the absurdity of the present position is perfectly well known, and admitted alike by business men and engineers, no way has yet been devised for remedying the scandal and for putting the directorship of mining companies on a better basis. Attention is continually being drawn to the present state of affairs, and it is interesting to note that Mr. J. H. Curle, in the pages of the *Economist*, has recently championed the cause of reform.

It almost appears to be a platitude to say that nobody should assume the duties of a director of a mining company unless he has some qualifications for the post, but as a matter of fact this principle is continually ignored. We are not referring to wild-cat companies or to shady businesses, for in these cases one extra drawback does not matter much one way or the other. We refer to the average company brought out by men of character, and of admitted position in the social, financial or business world. It cannot be doubted that the business man and mining engineer is aware that lords, baronets, generals, admirals and retired members of the civil service as such are not of any help in the administration of the company or mine, but fashion and custom are too strong for them. To burst these bonds of fashion would require a heroic and almost superhuman effort, and the suggestion we have to make for the purpose of altering the present state of things may appear quixotic. Our suggestion is that the members of the Institution of Mining and Metallurgy, as the representative organization of the profession, should agree to refuse to allow their reports or names to be used in any prospectus or in any other way in the floatation of a new company, unless the directors of the company possess the necessary experience and qualifications for their positions. It would, no doubt, be difficult to lay down hard and fast rules, but generally speaking a director should be an engineer, metallurgist, accountant, or a merchant experienced in financial administration. We do not think the possession of a title or social position or ability to influence subscriptions of capital are qualifications. As for generals and admirals,

their training unsuits them for business ventures of any sort; to put it conversely, a member of the fighting professions would readily see the absurdity of the proposition to send a financier or metallurgist to relieve Ladysmith or bombard Santiago. We do not think lawyers or stock-brokers are suitable as directors, as they are apt to divert attention from the main purpose of mining, although, of course, their advice and assistance are indispensable when they keep their proper place. These are the main lines of demarcation. Their application in practice is obviously difficult, but with the growth of professional spirit these difficulties can be overcome. The big battalions of experience, the knowledge of men and the evolution of industry, are on the side of the mining engineer if he insists that the technical part of mining shall not be hampered by ignorant figure-heads, and that while he is at all times gladly amenable to the direction and advice of older men who have themselves been through the mill and have thereby qualified themselves as counsellors, he is unalterably in antagonism to the interference of men unfitted by training and disposition as managers of a mining enterprise. The subject is worthy of the most thorough deliberation, for it is fundamental to the well-being of mining as carried on to-day.



CANADIAN MINERS AND THE TARIFF ON LEAD.

We regret that the review of the mining progress of southern British Columbia arrived too late for our last issue. However, we publish it this week, and believe that Mr. Fowler's characterization of the conditions north of the international line would be interesting reading, even if printed still later. This review is supplemented on another page by a report of the proceedings of a meeting of the owners of lead mines in the Kootenay, at which resolutions were passed requesting the Government to impose a duty on lead equal to that now levied by the United States.

The lead tariff affects the mining industries of the United States, Canada and Mexico in varying degrees. In crossing the boundary line, the disgusted mine-owner of British Columbia finds a duty of 2½ cents per pound imposed upon his lead, and in addition to this, his financial sensibilities are lacerated still further when he finds that the market is not always open. During the past year the American Smelting and Refining Company has been unwilling to take British Columbia ores since the supply from the mines in the United States and that drawn from Mexico were enough to meet all the requirements of the market. The Canadian miner is therefore confined to the comparatively limited market of the Dominion or is compelled to send his lead to Europe. In the latter case he finds that the London market returns at the present time a price of about \$2.34 per 100 pounds, leaving him, after paying freight and all other charges, a return of not more than \$1.35 for the lead in his ore instead of \$3.50, which the Coeur d'Alene miners just across the line receive for theirs. Until very recently, moreover, no plant for the refining of lead and parting of the precious metals existed in Canada. Lately a refining plant has been added to the Trail Smelter under the stimulus of the bounty voted by the Dominion Parliament for lead refined in the country,

but the operations of this plant are still comparatively limited.

Southward of the Rio Grande the Mexican mine-owner is in a more cheerful mood, despite the fact that he also finds a barbed wire duty along the border and that the larger part of his product goes to foreign markets and is sold at London prices. By far the greater part of the Mexican lead bullion is sent to the United States where, under the present law, it can be refined in bond, no duty being levied if it is shipped abroad. The very small portion which is entered for consumption in the United States must pay the duty of 2½ cents per pound, but gets the New York price, which has for the past year been about \$4.10 per 100 pounds. In Mexico, as in Canada, the home consumption of lead is not large.

The terms of the present United States tariff law have stimulated the smelting industry of Mexico, and indirectly also its mining. It is much more profitable now to smelt the Mexican lead ores in that country in connection with the siliceous ores produced by the gold mines, and to ship the resulting bullion to our refineries. Before the passage of the McKinley bill the ores were shipped instead of the bullion, going to smelters in the United States, but since that time extensive smelting works have been established, and are profitably operated in Mexico, adding to the industry of that country in a notable degree.

In consequence of this there is a great activity in the mines south of the Rio Grande, which contrasts with the depression in the Kootenay. The latter, however, as Mr. Fowler suggests, has the promise of better days and the fulfillment may be hastened if the Canadian Government will pursue an enlightened policy toward the mining industry which has built up the country.

As regards the effect of the lead tariff on our own country, no comment is required, for it has certainly been of great assistance to the silver-lead mining interests and has proved a notable stimulus throughout the West. The price of lead is maintained at a figure just below the point at which imports would be profitable. This condition has, in fact, stimulated mining to a point which if unchecked would result in a production considerably in excess of the demand. The American Smelting and Refining Company, which practically controls the market, has been obliged during the past two years to limit the quantity of ore which it will take. This has caused more or less complaint among the miners, although it must be said that it has generally worked to their benefit in the end.



MARKET CONDITIONS.

The year opens with the metal markets generally in good condition, some of them indeed, in better shape than for months past. As we showed in our reviews in last week's issue, consumption is large, manufacturing is active and there is every reason why business should remain good for some time to come.

The copper market is especially strong and buoyant. Manufacturers are buying quite freely, and there is an evident impression abroad that it would be well to lay in stocks or to make contracts at the present time. Prices show an improvement and the general appearance of matters is encouraging. Some

attempt has been made in certain quarters to over-estimate the stocks of the metal on hand, and thus to lower the conditions of the market. We have every reason to believe, however, that our figures given last week were as nearly correct as it is possible to make such a statement, and that there is nothing on hand beyond the normal stock at the present time.

The other metals are also strong. The demand for tin is good and the business for the first week of the year makes an excellent showing. The buying of lead has been active though at unchanged prices and the temporary cessation of orders which was noticed for a week or so past has apparently ceased. The cause of this cessation was not very clear. Under the present conditions of the market, lead consumers do not lay in very large stocks, and there is no reason known why consumption should have diminished. However, the business has fully recovered. Spelter also shows more strength than for a few weeks past. Apparently it has reached something near its normal level—at least buyers think so—and the business has been large enough to prevent a further fall.

Even silver, which remains a weak spot in the metal market, has ceased to fall, and the price seems to be stationary for the time being. Part of this, as we recently noted, has been due to speculative covering in London, but a part also to a slightly increased demand from India. The Chinese question is still troublesome. It is announced that the powers have refused to receive the indemnity in silver as was proposed by China, and even threaten to seize some Chinese territory if the installments are not promptly paid.

Of the iron market there is little to be said. New business for 1903 has hardly made its appearance as yet, but there is no sign of any diminution of the demand. Mills and furnaces are still working hard to catch up with their contracts, but it will take some time to do so. Meanwhile transportation conditions continue poor, and delays in deliveries of fuel and raw material are still reported, while there are frequent complaints of the difficulty of shipping finished material from the works.

The Western coal trade has settled down somewhat but it is not yet in good condition, nor are the railroads giving service which miners and consumers would like to have. In the large cities, such as Chicago and Cleveland, while there is no actual scarcity of coal, there is difficulty in securing the better grades which consumers want, and in many cases it is not the coal wanted, but the coal which can be had.

The Seaboard bituminous trade continues unchanged. One of the many points of discussion is the high rate of freight asked of the mining companies by vessel owners which are embarrassing deliveries to the New England states.

The anthracite trade continues to be a struggle to deliver coal as fast as it is wanted. The stand taken by the independent operators in insisting upon marketing their own coal instead of turning it over to the railroad companies at a fixed rate is a matter of some importance. It seems doubtful yet whether their plans can be carried out, but if they should be, they will result in some important changes in the trade.

"Flouring" of mercury is the minute subdivision of it by mechanical causes and "sickening" is the rendering of such a condition permanent by the intervention of a coating of foreign substance, which prevents the coalescing of the globules.

DISCUSSION.

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

SECONDARY ENRICHMENT AT CRIPPLE CREEK.

To the Editor:

Sir:—Under this heading, in your issue of December 6, 1902, Mr. George J. Bancroft has recourse to the suggestion of a zone of secondary enrichment to explain certain occurrences of very rich gray-copper ore in association with the gold ores of some of the mines at Cripple Creek at depths ranging from 1,200 to 1,400 feet from the surface, which suggestion he says "opens up a fertile field for the imagination." Why not a field for the fertile imagination?

I cannot follow the argument that Mr. Bancroft puts forward in the matter of the double methods of secondary enrichment, with its nice distinctions between mechanical and chemical "forces," nor can I understand, in the face of the well-known conditions of ore-occurrence at Cripple Creek, how he can evolve his conception of three successive zones, namely: (1) Rich oxidized ore-bodies; (2) zone of impoverishment; (3) gray-copper zone (surpassingly rich).

Nevertheless, there is much that is interesting in Mr. Bancroft's note, and I would like to take advantage of the discussion which his item invites.

This association of gray-copper ore with telluride ores, or of telluride of gold and telluride ores of very high tenor—is, I believe, quite rare, and I can contribute an appropriate instance of a similar occurrence which I had some time ago noted in my studies of a mining district in a part of Colorado widely separated from Cripple Creek. The case of which I make mention is analogous in most respects to the association noted by Mr. Bancroft. It was in the case of some very rich ore produced by the East Notaway Mine in Gilpin County, Colorado, when this mine was in comparative bonanza. This ore carried visible sylvanite in association with some ore of copper, which, to all appearance, resembled tetrahedrite, though differing from it in some essential characteristics and yielding a peculiarly red and reddish-brown scratch to the knife. In small lots of a few hundred pounds the ore ran between 30 and 40 per cent copper, as high as 175 to 300 ounces in gold and a few ounces per ton in silver. The occurrence of sylvanite was confirmed for me by Dr. Richard Pearce, of Denver.

I selected some of the more solid copper ore, which had been mined between 320 and 400 feet in depth, and Mr. Charles W. Knight kindly made an analysis, with the following result:

	Per cent.
Copper	36.97
Sulphur	29.83
Antimony	12.44
Arsenic	7.99 or
Zinc	7.13
Iron	5.48
	99.84

{ 4 (Cu₂ S) + As₂ S₂
{ 4 (Cu₂ S) + Sb₂ S₂

with traces of bismuth and lead; being a mixed sulpharsenide and sulph-antimonide of copper, corresponding to tennantite and tetrahedrite. The assay value of this same ore was: Gold, 23.5 ounces per ton; silver, 19.40 ounces per ton, giving to the ore a very high value, while it also constituted an interesting association of minerals.

Further, my observation of the mine workings of the East Notaway vein led me to the conclusion that the fracture or fractures which contained this rich copper-gold ore were subsequent to the deposition of the main vein, or what are known as *post-mineral fractures*; the main vein consisting of a low-grade pyrite with inconsiderable (less than 1 per cent) copper contents. It is also pertinent to note here that tellurium had been found in association with the ores of several mines of this particular district, and to this subject I have made reference elsewhere. (*Transactions American Institute Mining Engineers. XXVIII, p. 119.*)

This rich vein of gray-copper at the East Notaway included fragments of the primary low-grade sulphide ore in such a way as to indicate that this was

truly a case of secondary enrichment through concentrations, which resulted in giving the ore many times its normal contents in gold and copper; and to such process I have ascribed the origin of this mixed sulphide of copper, antimony and arsenic.

The oxidized zone or superficial part of these deposits varies in this locality from a few feet of gossan to 200 feet deep, though seldom extending beyond 40 feet from the surface, and the usual occurrence of gold in these ores is in association with pyrite and chalcopyrite, and some galena.

FORBES RICKARD.

Denver, Dec. 19, 1902.

METALLICS.

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

"Metallics" is the term applied to those bits of ductile metal (usually native gold, silver or one of the malleable sulphides) which do not pass through the sieve of the assayer, in that process of final pulverization which the pulp undergoes before being weighed for the crucible.

The astrology of one age becomes the astronomy of the next; the magician disappears in the scientist.

In every mill or mine the management ought to be able to give a reason for doing anything in a particular way.

Gold is green when in very thin sheets and seen by transmitted light. When leaf-gold is heated to 316° C., the green is turned into a splendid ruby color.

The fewer the appliances required to extract the metal out of the ore the better; a marksman is not considered a good shot who misses with his first barrel. Don't overlook the vanners because you have got a canvas plant for your tailings.

Uranium, which is derived from pitchblende and uranium ochre, is employed in the manufacture of stained glass, giving a peculiar yellow color, with a greenish reflex, which is unique.

The road built by Ismail Pasha from the Mena House to the Pyramids at Giseh has a parapet 4 to 6 feet high. In summer, when a strong wind blows, this road is filled with sand up to the parapet in ten days.

The "verdigris," a greenish film which forms on the surface of amalgamating copper plates, is a hydrated oxide of copper, with sometimes a little carbonate. It is soluble in dilute acids, potassic cyanide and ammonia.

Pyritic smelting may be regarded as a process of concentration by fire, in contrast to water concentration. The extent of concentration may vary from 2 parts of ore turned into 1 part of matte, up to a ratio of 20 to 1.

The basis of pyritic smelting is the fact that pyrite is a combustible mineral, affording a source of heat which can be used in the blast furnace. By employing a rapid current of air—the blast—it is possible to attain a maximum temperature.

The Mexicans have a proverb which says that it takes a gold mine to work a silver mine; there is an equivalent saying current on this side of the Rio Grande to the effect that "you must not go mining with a shoestring."

"Have something to say, and say it," was the Duke of Wellington's theory of style; Huxley's was to say that which has to be said in such language that you can stand cross-examination on each word. This was the secret of his lucidity.

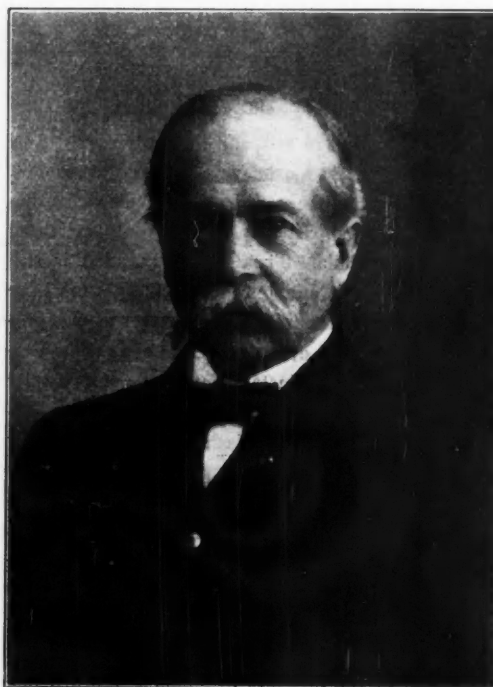
Certain people in delivering their opinions are

like Milton's angels who were in the habit of making didactic speeches which were received with respect and concluded with gratification.

Mercury solidifies at -40° C., and boils at 360° C. It emits vapor at 15° C., and perhaps at an even lower temperature. It is the worst conductor of heat of all the metals, its conductivity being only 5.33, that of silver being taken at 100.

The alloy of gold with mercury is known as its "amalgam." Mercury alloys with gold with great avidity, this being due not only to the marked affinity of the metals, but also to the fact that mercury is a metal in the molten state at ordinary temperature.

The first stamp-milling in the United States was done in Georgia, but the modern stamp-mill had its origin in California. The Georgian methods of milling were based on the older practice of Hungary. Hungary borrowed from Egypt.



HENRY AUGUSTUS VEZIN.

The management of a mine requires an organized staff. There is the manager, the superintendent, the surveyor, the bookkeeper, the assayer, the storekeeper, etc.—and the shift boss does the work. There is no more useful personality than the experienced, faithful shift boss, and there is no man more valuable to the mining company, except the other fellow who knows how to select a good shift boss—and that is the manager.

The advance of mankind has everywhere depended on the production of men of genius; and that production is a case of "spontaneous variation" becoming hereditary, not by physical propagation, but by the help of language, letters and the printing press.

The standard railroad gauge—4 feet $8\frac{1}{2}$ inches—is merely the old horse-cart gauge; for the locomotive was regarded at the time of its invention as a steam road wagon. Before every engine, as it were, trots the ghost of a discarded horse.

The mine pump was the ancestor of the steam locomotive. When coal mining began to require unprecedented pumping appliances, attention became directed to the possibilities of steam. After the steam pump had proved its capabilities Trevethick and Stevenson invented a locomotive, which was primarily a steam engine for pumping adapted to a new purpose and set on wheels.

HENRY AUGUSTUS VEZIN.

On Saturday evening, December 27, a distinguished mining and mechanical engineer died suddenly in his rooms in Denver, Colo., from an attack of angina pectoris.

Henry Augustus Vergin was well known among Western mining men, more particularly in Colorado, where he was not only a pioneer in these kindred industries, but also a leader in his chosen profession.

He was born in Philadelphia, Pa., about 67 years ago, and at the age of fifteen went to Germany to complete his education. After graduating he traveled in Europe, studying the mining and dressing of ores with that fullness of detail and accuracy of observation that marks all his work. On returning to this country Mr. Vezin began his career in Philadelphia, first as a mechanical engineer, and later in metallurgical work. At the breaking out of the Civil War he joined the Fifth Pennsylvania Cavalry, and served with distinction throughout the war. He left the army as captain, having also received brevets as major and lieutenant-colonel "for gallant and meritorious services."

At the close of the war he went West and resumed the practice of his profession at Central City, Colo., where he erected a roasting and lixiviation plant for the treatment of Gilpin County ores by the Monier process. He was next employed at the Saint John Smelter in Summit County, and during his connection with this plant produced probably the first silver-lead bullion on a commercial scale in Colorado; this was in 1872. Later he was employed in professional work in Leadville, in Montana and elsewhere in the West.

Mr. Vezin's most important foreign work was on the first Nicaraguan Canal survey under a French company; later he made a very extensive examination of coal and iron deposits in Russia, then under option to Philadelphia capitalists.

For the past 15 years Mr. Vezin has been established in Denver, his specialty being designs for smelters, sampling mills and concentration works. The automatic sampler that bears his name was invented by him about 20 years ago, but he did not succeed in securing its adoption until 10 years later. The Vezin ore sampler is now in common use throughout the metallurgical works in the West, and has given invariable satisfaction wherever introduced.

Mr. Vezin was distinguished by his unusual knowledge of his profession down to the minutest detail, as well as by his tenacity of purpose in following out a subject to its finality. He was a member of the Colorado Scientific Society, the North of England Institute of Mining Engineers, and the American Institute of Mining Engineers, and while he did not contribute many papers to these societies, yet he will be long remembered by his friends and associates for his detailed information on almost every subject of professional interest. These data, which he facetiously called "tapeworms," amply illustrated by blue prints, were ever at the disposal of those who sought information or assistance from him.

Kind-heartedness, good-nature and self-sacrifice were synonymous with the name of Henry A. Vezin, who was ever ready, no matter at what personal inconvenience, labor or expense, to help forward younger men by his sound philosophical reasoning and advice; by a "tapeworm" on the subject, either from his ample files, or if need be by an entirely new thesis, prepared often with much labor and at not a little expense. But for labor and expense in these matters he cared naught; the simple appreciation of his efforts to disseminate knowledge, to help a friend to assist a younger man, these were his full and complete reward.

P. H. A.

The object of a cam in a stamp mill is to convert uniform rotary motion into a uniform lift; the curve to be given to the face of the cam, in order to do this most efficiently, is one of the involutes of a circle, the radius of this circle being equal to the horizontal distance between the axis of the cam-shaft and that of the stamp-stem.

SOUTHERN BRITISH COLUMBIA IN 1902.

By S. S. FOWLER.

The greater part of the mineral product of British Columbia continues to be derived from the southern part, and particularly the southeastern part of the Province. In the north the output is entirely alluvial gold, as yet, and although the aggregate amount is important the writer is not particularly acquainted with these northern fields, and therefore makes only this passing reference to them. Atlin and Cariboo are the two important districts; from recent reports it would appear that the largest producing mines have not met with any pronounced success during the year.

In order to review briefly the industry of the southern portions of the Province, it may be well to consider the output according to its nature. The chief products of the year have been, as before: (a) silver-lead ores, (b) gold-copper ores, (c) gold milling ores, (d) coal and coke.

The silver-lead industry seems as though smitten by a plague. This is the result of very low prices and a distant market for its lead. Although we have the advantage of ample local smelting facilities, the fact that the Canadian market for lead is very limited, and that the American is not open to us, forces the bulk of our lead product to far-off and low-priced markets at great cost. Consequently, only those

produced during 1902, are employing at the close of the year probably not over 400 men. Such are the straits in which all manner of adverse external conditions have placed a large number of excellent properties.

The only other silver-lead district is that of Lardeau, which has not yet reached a stage of large production, owing, until recently, to its inaccessibility. Like the Slocan, its lead ores are high-grade in silver, and it suffers from the same adverse circumstances. The chief mines are the Nettie L., Silver Cup and Triune.

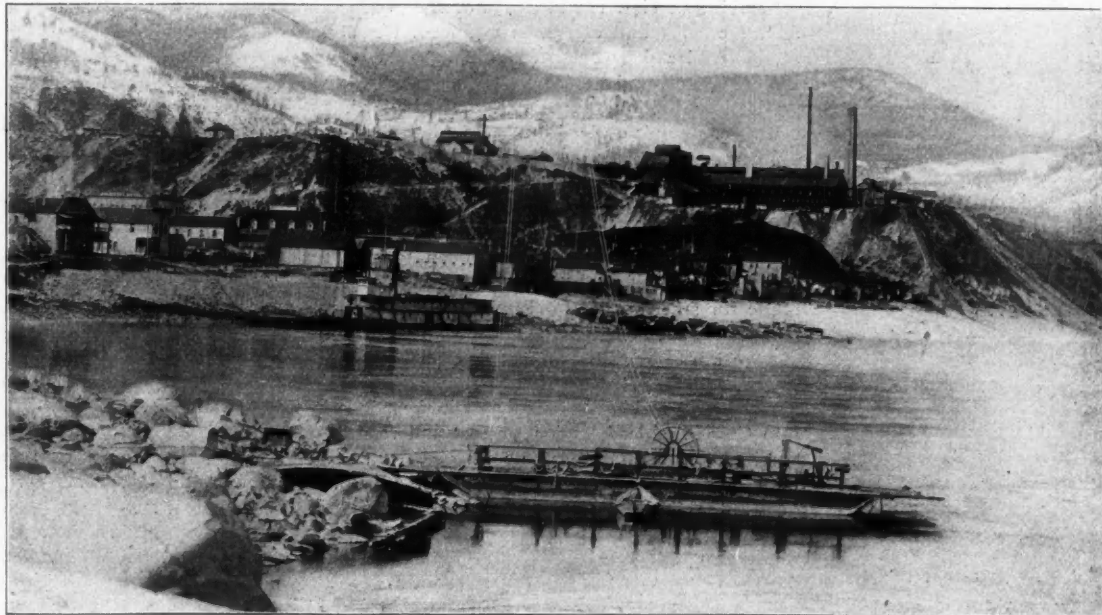
A determined effort is now being made by the lead producers to secure such changes in the Canadian customs tariff as will conserve the entire Canadian market for Canadian lead. Under the present tariff, and because of the absence of corroding works, it is possible for the refiner to dispose in Canada of only such lead as is used in the metallic form. This amounts to only 3,000 or 4,000 tons per annum. All lead mined in British Columbia is bought by the smelter according to the English price, and after deducting the costs of freight on the bullion and marketing charges, the miner now receives a miserable pittance—about \$1.35 per 100 pounds—for his product.

The gold-copper districts continue to be Rossland and the Boundary region. Rossland in 1902 turned out approximately 350,000 tons (an increase of about

daily runs from 350 to 425, and the resulting matte is converted (to blister copper) at one of the smelting plants. Thus, with the assistance of the most economical exploitation, these extremely low-grade ores are turned to profitable account. Although no new producers have been added to the list, the old ones have materially increased their output, and it is probable that there will have been nearly 500,000 tons smelted during 1902. Along with the other smelters of the Province, those of the Boundary suffered from shortage of coke supplies, and one of them was handicapped severely by a lack of water-power. These retarding factors kept the tonnage much lower than it might have been, but during the coming year the tonnage will probably be largely increased, and the costs decreased, by the use of the power of the Kettle River, generated at Cascade, where the Cascade Water Power and Light Company, Limited, has recently completed the installation of an extensive electric equipment, with transmission lines to Phoenix, the center of the chief mines.

The important mines of the year are the Snowshoe, the B. C., Knob Hill and Old Ironsides, all near Phoenix; and the Mother Lode and Sunset, west of Greenwood. Beside these the Emma for several months past has been putting out daily over 100 tons of iron flux which is used by the smelters at Trail and Nelson.

The gold-milling ores of the Province are, ap-



THE TRAIL SMELTER, BRITISH COLUMBIA.

mines whose ore is rich in silver can continue to operate.

In East Kootenay, the St. Eugene, capable of an output of 3,000 tons of 65 per cent lead concentrate monthly, has been idle throughout the year. The North Star has produced sparingly, and practically only enough to meet the expenses of development. The Paradise, the only mine in the Province having considerable amounts of carbonate of lead, is also low-grade in silver, and has shipped very little during the year. Here, again, development only is being done in hope of better times.

In the Slocan District of West Kootenay, famous for the high ratio of its silver to lead, the number of operating properties has continued about as in previous years, and the output of ore and concentrates will be about 26,000 tons, approximately the same as for 1901. It must be stated, however, that this figure is maintained by the considerable output of dry silver ores, and the actual tonnage of lead will probably be shown to be much less than that of the previous year, while both lead and silver will not bear comparison with the output of the banner years of 1897 and 1898. The chief producers of the year, as to tonnage, have been, Whitewater, Rambler-Cariboo, Payne, Enterprise, Arlington and Bosun, and these, with some 25 or 30 others, which have

50,000 over 1901), all of which is smelted either at Trail, B. C., or Northport, Washington. The camp has been free from any labor disturbances, which so much interfered with its output in 1901; and in spite of some distrust as to the result of "manipulation" in the shares of some of its mines in London, it appears to have entered on a period of permanent, if moderate, prosperity and progress. Aside from the large amounts of high-grade material which go direct to the smelters, Rossland's mines hold much larger quantities of low-grade ores, which are doubtless amenable to a preliminary concentration, and much thought is now being directed to the dressing of these ores, with success in sight. The great bulk of the tonnage of the year has come from the Le Roi No. 1, Le Roi No. 2, Center Star and War Eagle. No. 2 declared a dividend in May last, but No. 1, although it has published large operating profits for several months past, appears to have devoted its earnings to cancellation of debts.

The Boundary District continues to uncover astonishing bodies of very low-grade smelting ores. The ores are, and will be for a long time to come, won by quarrying, and, being self-fluxing, are cheaply smelted (in the ratio of about 25 tons of ore into 1 of matte), at three plants, all within a few miles of the mines. The tonnage smelted in each furnace

parently, not very abundant. They are found chiefly in the Nelson District, and the Ymir Mine continues to be the chief producer, having crushed about 50,000 tons of profitable ore during the year. At the Ymir mill about 60 per cent of the gold is amalgamable, although 7 per cent of concentrate is produced, carrying 20 per cent of lead, besides much zinc and iron sulphides. The Arlington, of Erie; the Wilcox, of Ymir, and the Poorman, near Nelson, help to make a respectable total for the year. Another important mine of this class is the Cariboo, at Camp McKinney, Yale District, which has been a steady and profitable property for eight years or more. The free-milling ores at Fairview, Yale District, have not as yet proved of any importance, although it seems probable that one or two properties may yet turn out to be valuable.

A portion of the Lardeau District, a few miles from the head of Arrow Lake, West Kootenay, has been the scene of a good deal of activity in the development of free-milling quartz, of which there appears to be extensive bodies. Thus far, however, little has been accomplished in actual output.

The Similkameen River portion of Yale District is still without railway communication, and its several excellent copper-gold properties are therefore unable to produce.

On Vancouver Island several discoveries of copper pyrite of low-grade in gold, but comparatively high in copper, have been made, and they are developing favorably. On the east side of the island the Lenora and Tye are important mines, and are now possessed of smelting facilities, recently described in the *ENGINEERING AND MINING JOURNAL*. The coming year will probably see a large production of copper from this district.

The coal measures of British Columbia are a source of much wealth to the Province. The mines of Vancouver Island continue, as they have for many years, to produce largely, mainly for export. The other producing mines are those of the Crow's Nest Pass Coal Company, in the southeastern corner of the Province. One of the company's mines suffered from a disastrous explosion in the early part of the year, and this was immediately followed by a prolonged strike of the employees. Agreement was finally reached in August, and, except during some minor labor disturbances, the several openings have since been outputting largely. The cessation of output seriously affected the operations of five smelters, and, through them, the whole community. Crow's Nest coke is exported in large quantity to Montana, and this demand, together with that of the local smelters, as well as the demand for coal for steam and other general fuel purposes, is causing a rapidly increasing yield from the mines.

Now, putting aside the material phases of the mineral industry of Southern British Columbia during 1902, if we shut our ears to the noise of alarmists, on the one hand, and the boasting of optimists on the other, we shall perceive three dominant notes. First, we shall realize that the prospectors are feeling severely the effects of the check in the flow of mining capital to the Province, as indicated by the fact that few, if any, properties of importance have been added to the list of mines during the year. Second, we see that the mining community, forced to live on its income, has made a decided advance in the economies of production, which will be of benefit as long as the industry is permitted to exist. Thirdly, we observe that not only has nothing been done by the Government to improve the conditions under which mining is conducted, but during the last session of the legislature further responsibilities were placed on those who operate mines, with a resultant increasing tendency to keep back capital, and an increased risk to that already invested.

Although the returns which will be published by the Minister of Mines will probably show a fairly well maintained output, it is significant of the burdens which the industry has to bear that the published dividends of the year are pitifully small in proportion to the aggregate value of the output of metals. It is to be observed not only that our home markets for base metals are very limited, but that all markets are as far away as they well can be; and, further, that the costs of labor and all supplies, except timber, are very great. If, therefore, the Province is to derive any permanent benefit from its bountiful mineral resources, the industry and the capital invested in it must be afforded every encouragement, and given every possible assistance, in its endeavor to sustain itself.

BRITISH COLUMBIA MINERS AND THE CANADIAN TARIFF ON LEAD.

A largely attended meeting of the owners and operators of silver lead mines in East and West Kootenay districts of British Columbia was held at Sandon recently. At this meeting resolutions were unanimously passed, which after calling attention to the depressed condition of mining in those districts, and comparing it with the prosperity of the Coeur d'Alene Mines across the boundary, proceed as follows:

"Whereas, our domestic market for the manufactured products of lead is chiefly supplied from the products of ores mined in Mexico and Europe, where the labor cost of production is much lower than in this country, a condition of affairs permitted by the wholly inadequate protection

afforded by the existing tariff, while the prices of white lead, lead pipe, sheet lead and shot, in the Dominion of Canada, are approximately equal to the prices charged for the same commodities in the United States, all to the detriment of the producers, consumers, and transporters of lead in this country. And

"Whereas, under the existing tariff, little or no protection is afforded to the lead producing industries; whilst adequate protection is afforded to all other industries of equal importance, known to us. And

"Whereas, these conditions result in the exportation of a preponderance of our crude ore and bullion, the former to American smelters and the latter to the markets of the world; there to enter into competition with the products of cheap European and Mexican labor, and the surplus product of the protected lead industry of the United States.

"Therefore, we, the silver-lead miners of the East and West Kootenay districts of British Columbia in convention assembled do hereby recommend and respectfully urge the enactment of a tariff act which will afford ample protection to the producers, manufacturers and transporters of lead, thereby, creating and fostering a new and expansive home industry, calculated to benefit all classes by the stimulation of national trade and commerce.

"Having in view the interests of the producers, manufacturers and consumers of lead, we would recommend a duty equal to that imposed by the United States, on lead in ores 1½ cents per pound; on lead in bullion, pigs, bars, and old lead, 2½ cents per pound; on lead in sheets, pipe, shot, etc., 2½ cents per pound; on white lead, etc., 2½ cents per pound; on all other products of lead as provided in the United States tariff act of July 24, 1897.

"Provided always that if at any time it shall be proved that a combination has been formed for the purpose of unduly increasing the charges made for smelting lead ores produced in Canada, or for refining or marketing lead bullion, or if the charge for smelting and refining in Canada is proved exorbitant, then the Governor-General-in-Council may at his discretion permit the admission into Canada of lead bullion smelted and refined, or smelted or refined in foreign countries, from Canadian lead ores, upon payment of an ad valorem duty of 15 per cent. upon the cost of such smelting and refining.

"And the Secretary is hereby instructed to forward copies of the foregoing resolutions to the senators and members of the Dominion Parliament, representing British Columbia, with the request that they present the same to the Federal Government as a memorial with their endorsement."

SODIUM SULPHIDE TITRATION OF ZINC.

—E. Prothière and A. Reraud report that light has no action on solutions of $N_2S_2O_8 \cdot H_2O$, they being affected only by air. If therefore the standardized solution be protected with oil, preferably olive oil, or almond oil, it will retain its strength for a long time. These oils, unlike the majority of other oils tried, do not yield flocculent deposits or form emulsions. (*Journal Pharm. Chim.*, 1902 (6), XVI, 484; *Chemiker Zeitung Repert.*, XXVI, xxxi, 325, December 6, 1902).

EXTRACTION OF NICKEL FROM LOW-GRADE ORE.

—In numerous places, among others in the Italian Alps, there are deposits of serpentine which contain a small percentage of nickel, but too little to extract by existing methods. C. Perron, of Rome, proposes (German patent No. 137,006, November 29, 1901) to leach in wooden vats or revolving barrels with a solution of ammonium sulphide, one to two hours' leaching being sufficient. The nickeliferous solution is then treated by well-known methods for precipitation of the metal and recovery of the ammonium salt.

THE LONDON METAL MARKETS IN 1902.

BY OUR SPECIAL CORRESPONDENT.

The London metal markets during the past year, taken all round, have not been satisfactory. During the early days copper underwent violent fluctuations, owing to realizations of large hidden stocks in America, and when the bulk of these had been disposed of, the whole of the copper trade, including consumers, had lost confidence in the article, so that dealings have been almost throughout on a hand-to-mouth basis. The war in South Africa, which was settled about the middle of the year, gave a stimulus to certain departments, but also had a depressing effect on genuine trade. When peace was proclaimed, the big demand for war material ceased and the long-wished-for improvement in business did not appear.

Tin has remained in the hands of speculators, and there has been a backwardation on forward metal for nearly the whole period. America, owing to her policy of not carrying large stocks, has on one or two occasions been squeezed, and this has caused a temporary strength in the European market. The production has increased about 5 per cent on last year, but consumption has hardly increased to a like extent. Towards the end of the year the severe fall in price of silver has had some effect on the market for the baser metal.

Iron and steel have been bad markets, but might have been very much worse had it not been for the fact that America has been a constant buyer of large quantities of raw and partially manufactured material. Speculation in warrants has been on quite a small scale, and the period through which we have passed has been a very depressing one for this article. The lower-priced metals have improved somewhat, more especially spelter, which has had a steady upward tendency, owing to the big demand for galvanized iron and for sheet zinc, while the purchases of yellow metal made by India have been on a much larger scale than for many years past.

COPPER.

The year under review opened with a total visible supply in Europe of 22,051 tons, whilst the total stocks in England and France were given as 15,701 tons. The month commenced with a steady tone, at £48 17s. 6d. cash and £49 10s. three months, prices, declining to £47 for cash standard, and after some slight improvement fell still further, until about the middle of the month £45 2s. 6d. was done for near dates and £45 15s. for forward. At this low level there was a considerable amount of bear covering, and many consumers, thinking that a favorable level had been reached, gave out considerable buying orders, so that the market quickly rallied until the close of the month, when prices had risen to £55 10s. During this time there was a fair consumers' trade doing in tough and best selected, but electrolytic copper, which had been shipped by the Americans, was depressing the prices of these descriptions. The Americans throughout were very free sellers, prices being reduced to 11 cents, but towards the end of the month they raised the price of Lake to 13½ cents and electrolytic to 13 cents. The chief European producing companies practically remained out of the market during the greatest period of depression, and did not make any sales to speak of until the market had recovered itself.

In February the total visible supply had increased to 23,312 tons, while the stocks in England and France were 17,037 tons, the increase being due to the arrival of American copper, which had been shipped towards the end of 1901. There was a renewal of the advance, and up to £57 was paid. The Americans then made another onslaught on the London Exchange, and this, combined with reductions in the American market, caused another sharp break; the value of standard being forced below £52, but whenever the pressure of selling was relaxed, the market showed renewed strength, and rallied to £55 10s. cash and £56 three months. The principal European producers made some good sales at £60 for

tough copper, which was £11 lower than the price at which they had previously sold.

March commenced with the visible supply standing at 25,000 tons, the stocks in England and on the Continent having increased to 18,948 tons. On March 1 £56 5s. was paid for cash and £55 17s. 6d. for three months, but the half-monthly increase in statistics had a depressing effect, and at every fresh advance speculators unloaded. Before the end of the month prices had declined to £52 2s. 6d. for cash and £51 17s. 6d. three months, closing at about the lowest. The British Government made large purchases of copper during this month, and consumers also covered their requirements with freedom. The unsatisfactory state of affairs in South Africa had also a continually depressing effect on all the markets. Owing to the large amount of metal being shipped from America by the Amalgamated Company, the prices of refined were reduced very considerably, sales being made of electrolytic copper at practically standard price.

At the beginning of April the visible supply had increased over 3,000 tons, to 28,124 tons, while the European stocks had swelled to 20,924 tons. The speculative market commenced at about £54 for cash and forward copper, but ultimately declined to about £52 10s. The market by this time had got into very dull grooves, and most of the business was of a professional nature, few speculators feeling any desire to go into a market which was entirely dominated by manipulators. A good business was being done with consumers, the lower level of prices stimulating the consumption of copper to a very large extent. Offers from America continued cheap, owing to the aggressive tactics of the different interests.

The commencement of May found the visible supply somewhat reduced, being 27,011 tons, while the total stocks in Europe were also somewhat less than at the end of the previous month, and were given as 20,411 tons. The standard market was fairly active, and helped by speculation in the share market values improved, touching £55 10s. for cash, but owing to cheap offers from America, there was an eventual reaction, the market closing at about £54 10s. for all positions. The demand throughout from consumers was good, but prompt delivery was, as a rule, required. The Amalgamated and the Calumet & Hecla companies were reported to have made large sales in America, and this fact helped the improvement in values.

For June a further decrease in the statistics was noticeable, the figures for the beginning of the month giving the visible supply as 24,264 tons. The signing of peace between Great Britain and the Transvaal was used as a bull point, and prices improved somewhat at the opening, but it was very soon found that the good news had been previously discounted, and after improving to £54 7s. 6d. for cash and £54 12s. 6d. three months, there was a considerable amount of realizations, which forced the price down to round about £52 10s. The serious illness of the King and the postponement of the coronation ceremonies all had a depressing effect on business, and the market remained flat. Trade on the Continent was good at this time, with large orders placed for electrical work. Consumers bought fair quantities, being tempted by the cheap margin then ruling between standard and refined sorts.

At the commencement of July the total visible supply was reduced to 23,219 tons, being a decrease of about 1,000 tons on the month. The reports from America were of a very contradictory nature, this rather tending to make consumers hold off with their orders in the hopes of getting in at lower values, and prices throughout the month were dull, without showing very much movement. America continued to offer on this side cheaply, especially electrolytic and other refined sorts, the market eventually closing at about £53 cash and about £53 5s. three months.

There was a further reduction in the figures published on August 1 of about 1,000 tons in the European stocks and about 2,000 tons in the total visible supply, and this improvement in the statistics gave

a fillip to speculation, and induced a considerable amount of bear covering, prices recovering about £1 per ton, but later on in the month, owing to fresh reductions in prices by the United Metals Selling Company there was a further setback in standard copper, and pessimism was the order of the day, so that prices soon slipped back again to about £51 5s. cash and £51 10s. three months, closing very near these figures. Following the lead of the American producers, European companies also reduced their prices for their articles, and the tone was one of weakness.

The shrinkage in stocks was again shown in the statistics published early in September, when the total visible supply was given as 20,275 tons against 21,313 tons at the end of the previous month. The month was ushered in with numerous rumors as to a change of policy amongst the Rockefeller clique, and it was tipped freely that copper was going to advance. A color was lent to this rumor by the strength of copper shares, which were quickly pushed, and all people interested in copper on this side received a statement from Messrs. Ledoux, of New York, giving the total stocks of copper as only 62,000 tons, which was generally believed, and imparted a strong tone to the market, prices rallying to round about £55 for cash and forward metal, but this in turn was again followed by a counterblast from other parties with bearish information, announcing that the total stocks in America were very much larger than those given by Ledoux, and, advising people not to buy, predicting lower values. Copper consequently became flat, and declined to about £51 15s. cash and about £52 three months, but recovered about 10s. before the close of the month. When the stock news was first published a large business was done with consumers, and when the more unsatisfactory advices came to hand it was found that they were covered for a fair time ahead. They then withdrew entirely, causing further weakness.

The statistics published on October 1 gave the visible supply as 17,245 tons, which figures showed a reduction of 3,030 tons. Notwithstanding the favorable statistics, heavy sales of Tinto shares caused a smart relapse on the Stock Exchange, and this was reflected on the standard market, prices declining again to the region of £51 10s. cash, but a recovery was noted later on owing to a good demand from sulphate makers and more sanguine ideas on the part of the public in anticipation of a speedy settlement of the American coal strike. Prices improved to about £53 7s. 6d. cash and three months, declining, however, before the close of the month, to about £52 all positions. A steady business was being done with consumers, the principal tonnage going to the Amalgamated interests, but the European producers also participated in the sales.

On November 1 the visible supply showed another shrinkage, standing at only 16,657 tons, the European stock being 11,532, but even these continual reductions in the figures had very little effect, owing to the repeated rumors—to which the public seemed to give more belief—that the stocks in America were accumulating, notwithstanding the good consumptive demand which had been experienced on the other side throughout the year. The share market also became exceedingly flat, owing to the continual weakness in American securities, one of the most noticeable of which was the Amalgamated Copper Company, whose shares showed a considerable fall. The opening prices for standard were £52 11s. 3d. cash, and about £52 15s. for three months, but before the month was over they had declined to £49 12s. 6d. spot and £49 17s. 6d. forward, the market closing flat at about the lowest figures. Most of the consumers reported a falling off in trade, and they in their turn had no pluck to make purchases which were to a certain extent speculative, owing to the poor demand they were experiencing. The American and European producers made considerable reductions in their prices in order to tempt buyers, but were unable to dispose of much material, except to meet immediate wants. The sulphate of copper

trade continued to be the chief support of the market, very large orders for Chile bars being placed, so that high premiums were paid for the better class of brands.

December was another month of considerable excitement, prices being very flat at the commencement, but in the first and second week, owing to renewed rumors of working arrangements amongst American producers, coupled with a rush upward in the price of Rio Tinto shares, the standard market, helped by good speculative buying, quickly jumped to £52 for three months. When this level was reached emphatic denials appeared in the press, accompanied by further "Casey" messages, causing a quick collapse, and dullness again became the order of the day. Consumers bought freely at the advance, more particularly on the Continent, and a large business was done at this time with India for copper and yellow metal, and as this came into the market at quite an unexpected time, it helped the upward move considerably. The year closes with a very firm tendency, spot standard being quoted at £52 15s. to £52 17s. 6d., with £53 2s. 6d. to £52 17s. 6d. named for three months or forward copper.

TIN.

The close of 1901 was marked by a general feeling of depression and weakness in this market; the gradual falling away from the high prices touched in the middle of the year, the expectation of increased production and the failure of a prominent dealer shortly before the New Year all tending to cause a lack of confidence in the future of the article. This feeling found evidence in the backwardation in forward tin prevailing at the end of the year, and prices at end of December closed at about £106 for cash and £103 for three months.

The visible supply at the end of December amounted to 17,523 tons, showing a decrease on the month of 1,394 tons, but an increase of about 2,000 tons, compared with the end of 1900.

In the first week of January prices declined gradually, and at one time touched £101 for spot and £98 15s. for three months. Towards the middle of the month, however, higher prices from the Straits and a good American demand caused values to firm up, and the market at the end of January was strong at £109 cash and £106 three months. Spot tin was very tightly held throughout the month and at one time touched £111 15s. Very good prices were obtained at the Banka sale in the last half of the month.

February started with a firm market for cash and near dates, spot tin being largely in the hands of the bulls, and values advanced until £111 was reached for cash and £106 for three months. Prices then eased off somewhat in consequence of free selling from the Straits. The tone was very firm, however, and cash being very scarce about the middle of the month prices ran up to £11 for spot, with a backwardation of £3 to £5 for forward, according to the position. As the end of the month drew near the scarcity of prompt stuff became still further accentuated, and as high as £119 was paid for cash, with three months selling at £111 to £112. In the last few days of the month the market was quieter, and prices receded, finally closing at £114 10s. for prompt and £110 10s. for three months. Consumption was very good, and the shipments from the Straits of 4,337 tons were not so heavy as had been anticipated.

The statistics published at the end of February gave the total visible supply as 17,063 tons as compared with 18,776 to at the beginning of January.

Prices throughout March were very steady indeed, and although an attempt was made by the bears to break prices, values remained during the first three weeks in the neighborhood of £114 for cash and £111 for three months. In the last few days, however, renewed buying from America, and the covering of bear sales by Straits dealers caused a sharp advance, and cash was done at £119, with a backwardation of £1 to £2 for forward. The wreck of the *Acara* with over 700 tons of tin on board, and delayed arrivals, caused a scarcity of spot tin in the States, which was reflected on the London market.

The month of April opened very firm at £118 for cash and £115 to £116 for three months, the London stocks showing a decrease of nearly 1,000 tons on the month. The total visible supply stood at about 2,000 tons over end of February figures, but this included about 2,500 tons ex. the Banka sale. With good buying from America and reports of good consumptive demand from all quarters, prices quickly rose and at the middle of the month touched £131 for spot and £127 10s. for forward. The rapid rise was assisted materially by considerable bull speculation and covering purchases from Chinese sources. In the last half of the month prices eased off slightly, but firmed up again towards the close, values finally standing at £129 10s. prompt with a backwardation of about £4 for forward. The decrease in production, owing to the scarcity of labor in the Straits, was largely responsible for the enhanced prices. Shipments for the month were about 4,000 tons.

During the first half of May the rumors of decreasing production and the report that the Dutch Government had oversold Banka tin gradually forced the market up, and after some small fluctuations spot tin was done at £137, three months being quoted at £135 10s. An effort was then made to depress the market by parties interested in the approaching Banka sale and prices fell away slightly, cash being done at £136 and three months at £131 15s. The prices realized at the Dutch sale were, however, high and the London market smartly reacted, values rising about £1. During the last week of the month the market was again dull—cash standing at £136 to £136 5s., and three months at £132 to £132 5s. A feature of the month was the firmness and continued speculative activity in the Straits. The statistical position throughout was very strong and the only weak spot was the uncertainty as to the tonnage of American stocks. Shipments for May were 4,185 tons.

The statistics published at the commencement of June were not so favorable, and with consumption on the decline, prices rapidly fell away until £132 10s. was touched for cash, whilst July dates sold at £132 to £130 15s. After a slight reaction there was a further relapse in prices towards the middle of the month, and with considerable fluctuations followed by a period of dulness values finally closed at £123 10s. cash, and about £121 three months. Consumers held off right through the month in expectation of a decline and a better business was done at the lower level. The King's illness also had a depressing influence on the market, and was in some measure responsible for the dull tone and heavy realizations.

July commenced with a total visible supply of 17,192 tons, the stock in London being only 3,539 tons. The opening prices were £123 12s. 6d. for cash and £120 three months, improving later on to £129 for spot, but before the month closed there was again a setback to £127 10s. for near dates and £125 15s. for three months. Trade in America was good, and in the early part of the month fair orders were sent over, but later on ceased, owing to slackening in the consumptive demand.

August was a flat month, with the statistics increasing to 17,708 tons visible supply, the increase in the former figure being due to the inclusion of a large amount of Banka. At this time many of the tin-plate works in America were shut down, and this also had a marked effect on prices. Disappointed holders were also free sellers, and Chinese speculators in the Straits seemed quite willing to sell ahead of current rates.

At the commencement of September the visible supply was 16,741 tons, and the stock in London 2,670 tons. About this time it was reported that the Dutch Government might not have enough tin to enable it to sell the usual quantities at the auctions during 1903, but notwithstanding this bull argument the market became very flat, declining from £124 for cash to £114, three months metal dropping from £120 to £113. The chief cause of this setback was the fact that Americans were practically out of the market, owing to the shutting down of their mills, the demand from this quarter being very much

missed, and preventing the withdrawal of much from this side.

October started with a visible supply of 18,289 tons, while the stock in London had increased to 3,683. The opening prices were £117 for cash and £115 10s. for three months, but ultimately declined to £113 10s. and £112, respectively. The settlement of the coal strike in America had a salutary effect on prices, cash being run up to £121 10s. and three months to £120 10s. Business in America showed signs of improving, many of the mills reopening, but while trade on this side remained apathetic, rather more speculation was noticeable.

The total visible supply at the commencement of November stood at 15,478 tons, whilst the total stock in London was 4,739 tons. Dealers in the Straits continued to sell freely, and America was taking fair quantities, most of their purchasing, however, being done direct with the East. Prices opened at £120 10s. cash and £118 15s. three months, but owing to the continual fall in the value of silver the market had a declining tendency, and final rates were no better than £112 10s. cash and £111 15s. three months.

December commenced with a visible supply of 17,350 tons, the increase being again due to the inclusion of metal sold at the last Banka sale. The market continued to fluctuate considerably, being depressed by the uncertainty of the future course of the silver market, but being helped at times by spasmodic demands from America. Towards the middle of the month there were one or two rallies, caused by purchases on behalf of prominent dealers, who seemed to be getting the control to a certain extent out of the hands of those who have been so closely identified with the article for some years past. Stimulated by a large demand from America the market developed considerable strength during the last week of the month, and closed very firm at £120 12s. 6d. to £120 15s. for spot; £121 5s. to £121 7s. 6d. for three months.

LEAD.

The year commenced with fair quantities being offered from America and Australia, and the nearest price at opening was £10 5s. for foreign, English offering at about 2s. 6d. more. This level brought out rather more denial, and caused a steady advance to £11, closing at about 5s. reduction from this figure.

February commenced with renewed purchases by consumers and a fair speculative inquiry, values consequently improving to £11 15s. and remaining steady until the end of the month, eventually closing at £11 12s. 6d. to £11 15s. cash.

March found the market very dull, and prices remained about £11 10s. for soft foreign, until late in the month, when they receded to £11 7s. 6d.

April saw a better demand from home consumers and from Germany, especially for early delivery, and this caused an advance to £11 15s., which was well maintained.

May opened at £11 12s. 6d. to £11 15s. for foreign, but owing to heavy arrivals, prices had a tendency to weaken, and just at the end of the month some of the English desilverizers made free sales, causing a speedy fall to £11 for both English and foreign.

The low level at the beginning of June soon attracted buyers, and when it was found that offerings were not so plentiful there was a quick rally to £11 7s. 6d. for foreign, English being held for a fraction more, but before the month was out 2s. 6d. to 5s. per ton was lost.

July opened with a steady demand, which was met without prices being raised, and when trade became quieter towards the end of the month values sagged away to £11 for soft foreign.

August was very dull, and consumers remained apathetic, the market remaining dull, with practically no alteration in price.

September began with a flat tone, owing to heavy Australian arrivals, which caused a fall to £10 15s. per ton. At this level consumers showed more desire to buy against their requirements, and prices rallied to £11, eventually dropping to £10 15s. again.

Early in October cable makers booked good orders

and covered their lead requirements, and this served to keep prices steady until the end of the month, when owing to large arrivals values became once more depressed and fell to £10 12s. 6d.

November opened with business at the last named figure, but a good inquiry was forthcoming, and prices improved to £10 10s. 3d., but a cessation of buying, and rather freer offerings from the Continent again depressed the market, and the nearest values at the beginning of December were £10 12s. 6d. for soft foreign and £10 15s. for English. During the early part of the month there was quite a good demand, especially from cable makers, and this, coupled with some speculative buying, soon put prices up to £11 for foreign. Later on, a somewhat easier tendency prevailed, and the year closes with Spanish lead at £10 17s. 6d. to £10 18s. 9d., with £11 to £11 1s. 3d. quoted for English lead.

SPELTER.

The month of January opened with a rather better demand at about £16 10s. for ordinaries and £16 15s. for special brands, but renewed negotiations between the principal producers on the Continent caused a more hopeful feeling, and prices improved to about £17 7s. 6d. for ordinaries. The demand at this time for sheet zinc and yellow metal was good, and this resulted in more liberal buying by consumers.

February commenced with a renewal of the strong tone, and under active trading prices quickly improved to £17 15s. for ordinaries. Producers of sheet zinc raised their prices by £1 per ton on account of the big demand.

March started with a firm tone, engendered by renewed inquiry from galvanizers, who were exceedingly busy, but towards the middle of the month, owing to sales of speculative parcels and second-hand metal, prices took a turn downward, and as low as £17 7s. 6d. was accepted, eventually rallying to £17 17s. 6d., which was about the opening price for April. A further active demand was experienced from makers of galvanized iron, and as large orders were placed for spelter, values rose steadily to about £18 2s. 6d., the month closing strong at the highest level. Makers on the Continent having sold freely and finding a scarcity of ores were inclined to hold for full prices.

May witnessed a large demand from all consumers, including brass and yellow metal makers, and producers being sold out for some time ahead allowed dealers to command high prices, up to £18 10s. being paid for Virgin brands. Just at the end of the month a few speculative sales were made, which reduced values to £18 5s. for ordinaries and £18 7s. 6d. for specials.

June saw the conclusion of peace in South Africa, which event was attended with large buying orders for galvanized iron, causing a rally in spelter values to £18 15s., and at this level the market remained until about the middle of July, when there was a spurt to £19 5s., based on the expectation of small supplies. Values remained steady until the first and second weeks of August, when there was a decline to £18 12s. 6d., owing to pressure of sales by dealers, but when the liquidation had ceased the continued good demand quickly caused values to again run up until by the commencement of September £19 7s. 6d. was paid. A large trade was done round about this level, but when consumers had bought freely there was a setback, owing to Continental bear selling, and as low as £18 15s. was accepted.

October saw an irregular market, but with a tendency towards a higher level, the highest point touched being £19 10s., but closing somewhat lower. A good business was done with Continental consumers, and galvanizers on this side also purchased with considerable freedom.

November commenced quietly with £19 5s. to £19 7s. 6d., ruling as the nearest figures, but owing to a scarcity of near metal and an increasing demand the price rose to £19 15s., only to fall later on to £19 7s. 6d. In consequence of severe weather on the Continent, which delayed metal in transit, there was

a recovery to £19 17s. 6d., which was practically the opening price for December, and was maintained throughout the month.

THE PATENT OFFICE LIBRARY, LONDON.

By EDWARD WALKER.

It is remarkable how little known among mining men is the Patent Office Library, London. The Library was originally formed to help patentees and their agents to search with regard to novelty, but it is not in this connection that I wish to refer to it here. It is rather of its value to the general reader and student in engineering, mining, metallurgy and industrial chemistry that I wish to speak. In addition to the collection of specifications of patents of all countries possessing patent laws, and of books relating to these laws, the library contains complete files of all technical journals and proceedings of learned societies other than those devoted to medicine and natural history. The collection of books on all technical subjects in which a patent is ever taken out is also very complete and well chosen. But the greatest advantage offered by the library is

regard to new departures are nowadays made principally to the weekly and monthly technical journals. To this section of literature therefore special attention is paid and every such publication in all parts of the world is carefully collected and preserved. There is probably no other library in the world that has such a collection of periodicals. The transactions of learned societies receive very nearly as much attention, and it must be a very out-of-the-way society not to be represented in the library. The choice of books is left to the discretion of the librarian. It is felt that nowadays the majority of books consist chiefly of the collation and classification of information and of critical treatises on special branches of knowledge, and do not as a rule contain new announcements of facts. Consequently, books have to be carefully chosen, and the most authoritative picked out. The majority of the books are English, American, German and French, but there are also many important books in other languages. It is due to the librarians to say that this work is done with rare discrimination.

During the present year an excellent innovation has been introduced by the preparation of depart-

pagnie Parisienne de Couleurs d'Aniline (French patent, No. 318,770, February 17, 1902), asbestos saturated with a solution of phosphoric acid and dried can be used as contact material for the oxidation of SO_2 to SO_3 , a conversion of 90 per cent being attainable.

THE USE OF CRUDE OIL IN SMELTING.*

By ALFRED VON DER ROFF.

The following metallurgical furnaces use oil at the works at the Selby Smelter: Four roasting furnaces, with a total of 11 burners; one matting furnace, with 3 burners; one copper furnace, with 1 burner; 14 lead furnaces, with 14 burners; 13 zinc retorts, with 13 burners; three cupel furnaces, with three burners; one antimony furnace, with one burner; one furnace for smelting fine silver, with one burner; total, 47.

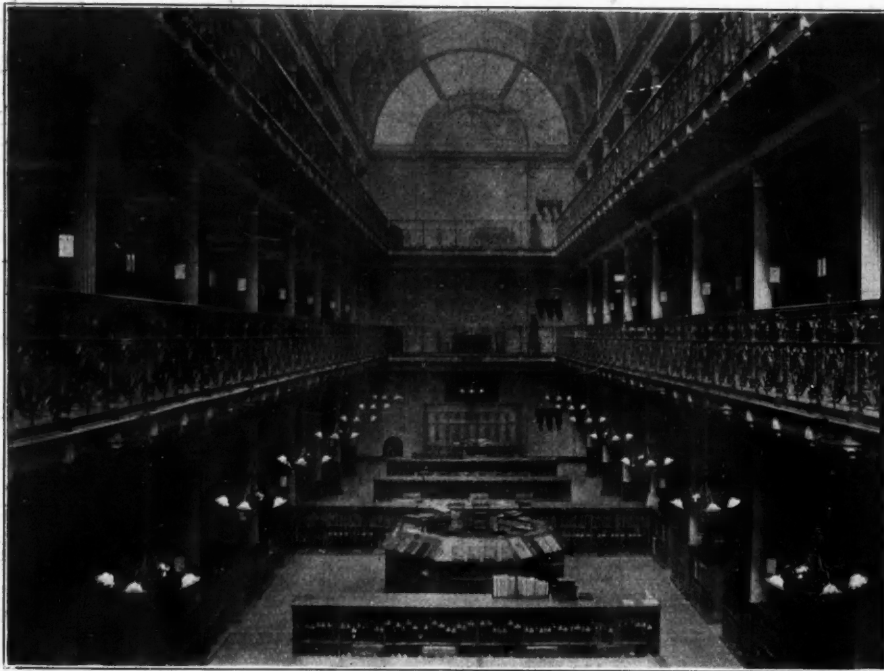
In all of these furnaces the use of crude oil has brought about a saving of from 40 to 60 per cent in the cost of fuel over coal. And this does not represent all the benefit to be derived from the use of liquid fuel in metallurgical establishments.

In the process of roasting, it is necessary that the atmosphere in the roasting furnace should contain as much free oxygen as possible to enable the sulphur in the raw material to oxidize or burn off in the shape of sulphur di-oxide (SO_2), and sulphur tri-oxide (SO_3). In using coal as a fuel it is impossible to maintain this oxidizing atmosphere all the time, because every time that fresh fuel is fed to the fire-box, black gases can be seen to fill the interior of the furnace, and during this period of incomplete combustion, the process of roasting, or oxidizing, is absolutely at a standstill. What happens? A certain amount of fuel and time are wasted, and nothing is accomplished.

Now look at the ideal conditions prevailing in the roasting furnace when liquid fuel is used. Once the flame is regulated by properly adjusting the oil and steam inlets, we have a clear flame, with not a trace of soot in the roasting chamber; and this ideal condition continues for 24 hours per day, enabling the sulphur in the ores to combine with the oxygen in the air during every fraction of a second. This means that we can crowd a roasting furnace using oil far beyond the capacity of a furnace using coal, and still we can produce a good end roast with the same per cent of sulphur remaining. This means that we can reduce the cost of fuel, labor and repairs per ton of ore treated. In all metallurgical furnaces where the aim is to oxidize, these same benefits are to be derived from the use of liquid fuel. I quote you, for instance, the cupel furnace, where the lead is oxidized to litharge, leaving the silver and gold on the hearth, or test, as dore silver.

But let me mention the matting furnace of the reverberatory type. In this furnace the roasted ore is subjected to a white heat to produce a quick sintering and melting down of the charge. The aim in this furnace is to produce, first, "a copper-iron matte, which acts as an accumulator for the precious metals"; and, secondly, "a slag which is formed from the earthy components of the ore." As matte is a compound of sulphur and heavy metals in fixed proportions, it is self-evident that the per cent of copper in the matte depends on the amount of sulphur remaining in the charge.

Suppose, now, that we use coal as fuel in the matting furnace, we will have a reducing atmosphere whenever the fireman gets busy and fills the grate with fresh coal, thus producing an incomplete combustion for a certain length of time. During this period no sulphur can be oxidized by the oxygen of the air. With oil we have an oxidizing atmosphere during every second, and consequently we find that we produce a higher grade copper matte in a furnace using liquid fuel than we can possibly produce in a furnace using coal. On the other hand, if it should be desirable to have a reducing atmosphere in metallurgical work, it is easy to change from an oxidizing atmosphere to a reducing one in an in-



LIBRARY OF THE BRITISH PATENT OFFICE.

that the books, transactions and journals are arranged under subjects and on shelves access to which is open to the public. In addition the librarians are particularly well-informed men, and willingly give their assistance to readers.

Some five years ago the contents of the library grew to be too extensive for the accommodation, so a new library has been built. The new building has been open for some months now, and the arrangements have been proved by experience to be excellent. The accompanying illustration gives an idea of the interior. The room is 140 feet long and the arched roof is 50 feet high. Down each side run two galleries, and the books, etc., are arranged in bays on the ground floor and on the galleries. Iron, bricks and glass are the chief constructional materials, and wood is only used for the flooring and for the individual shelves. The shelves are fitted to cast iron supports, which are held in iron frames. The glazing of the roof is made of glass in which is embedded wire netting, which prevents the glazing from collapse in case of fire. The side windows are made of small panes fitted into copper framework that has been electrolytically deposited, and are strong and fire resisting.

The selection of publications for the library is done on a very systematic plan. It is founded on the principle that communications to the public with

mental classified catalogues. Very few libraries (in fact, I am unable to quote a similar case) have anything but a general catalogue, sometimes under authors' names, and sometimes under subjects. The new departmental catalogues of the Patent Office Library are small books sold at sixpence a copy, and at present about twelve of the series have appeared. One of them contains a classified index of all periodicals and transactions; another contains a subject list of works in all languages on chemistry and chemical technology; a third deals with chemical industries, including paints, varnishes, paper, leather, soap, fats, gas, etc. One in preparation at the present time will be devoted to economic geology, mineralogy, mining, and metallurgy. There are also others devoted to subjects not of direct interest to this JOURNAL, such as photography, textiles, etc. These catalogues, besides being of great assistance to the habitue of the library, are of considerable value as records of literature on any particular subject. Each book has the date and place of publication noted, so that its historical value is recorded and assistance is given to the reader to obtain a copy for himself. These catalogues are obviously of great value to the student.

CONTACT MATERIAL FOR SULPHURIC ACID MANUFACTURE.—According to the Com-

* Abstract of paper read before the California Miners' Association, at San Francisco.

stant, by either choking the air inlet to the furnace, or increasing the flow of oil to the burner.

When deciding to use liquid fuel, it is necessary to decide whether steam or compressed air shall be used as an atomizer. Let me call your attention to the fact that the use of compressed air necessitates a compressor, and an apparatus for pre-heating the compressed air. This last addition is very much to be recommended, because, as you know, in allowing compressed air to expand the temperature of the surrounding air will be lowered. A cold or nearly freezing temperature will not be beneficial in atomizing liquid fuel preparatory to obtaining complete combustion. Steam, on the other hand, carries a certain amount of heat to the oil, and liquifies and even gasifies the same.

As the dimensions of metallurgical furnaces are variable ones, you will readily understand that we need flames of many different sizes for our metallurgical tools. For instance, at Selby, the extreme lengths of flames used are 8 inches and 6 feet. In the zinc retorts, which are our smallest furnaces, we need a flame of 8 inches. In the large matting furnace, 35 by 16 feet in the clear, we need a flame 6 feet or even more in length. The burner has to be adapted to the furnace and to the work to be performed. Hence you will find at metallurgical establishments a great variety of burners, or at least a great variety of sizes of burners, and I know of no better all-round burner than the one made of two concentric pipes, the smaller one being the oil pipe, and the larger one the steam carrier. By this arrangement the oil pipe is steam-jacketed, and the temperature of the oil is raised to such a degree that its fluidity is very much increased, and part of the lighter oils become gases. All this tends to break up, more or less, the viscous oil into minute particles, which ignite readily when brought in contact with the oxygen of the surrounding atmosphere.

The following advice to future users of oil may not be amiss: Do not use a mixture of different gravity oils. Do not use a mixture of heavy residues with light oils from the oil refineries, as this mixture will not remain mixed. Oil refineries are very fond of mixing heavy residues with some light oils, thus producing an oil of the gravity corresponding to the one contracted for.

When making a contract for liquid fuel, insist that nowhere in the contract shall appear the words "fuel oil," but call for crude petroleum of a certain gravity, and insist, if possible, on getting the crude petroleum from wells producing very near the same gravity of oil. Suppose you contract for "fuel oil" of, say, 20° gravity (and not for "crude petroleum"), it is possible, and also probable, that you will receive a fuel oil of 20° gravity, but you will not always receive crude petroleum at 20° gravity. The refiner has a perfect right by this contract, for "fuel oil" and not "crude petroleum," to send you a mixture of residuum of, say, 10° gravity and a distillate of crude oil of 35° gravity in such proportions that the mixture will show 20° gravity. This mixture will be pumped into your storage tanks, and in a very short time you will find lumps as big as 10 inches to 12 inches in diameter; and on top you will find the light oil, or distillate. These lumps will enter your pipes and burners, and will stop your oil system up very effectively. Another point that should be observed in making contracts for crude petroleum is the percentage of moisture and grit allowed in the oil. Two per cent is a liberal allowance to be made to the seller, and if the crude oil contains more than 2 per cent water and dirt, a proportionate deduction should be made from the oil received.

A very simple test for the determination of the grit, and water in the crude oil is the following: Place in a graduated tube 0.01 cubic centimeter of the oil to be tested; add to this 0.01 cubic centimeter of gasoline; shake this mixture well and let it remain in a fairly warm place for 24 hours. By counting the cubic centimeters that represent the water and grit, which are easy to be distinguished from the oil, you have the percentage without any figuring.

During the last few years I have been repeatedly

approached by parties asking me why I do not use oil in the blast furnace, and the only answer I can give them is the following: Solid carbon plays a very important role, especially in the upper level of the blast furnace shaft. Its function, especially with the fine ores, is largely to limber up the charge and allow the flow of gas to penetrate the charge evenly; besides, incandescent carbon has certain functions to perform in the blast furnace, which are of a chemical nature, and which need not be discussed. If coke or charcoal should be entirely replaced by oil in the blast-furnace, the blast-furnace charge would very likely become too dense to allow the combustion gases to escape freely. Besides, it seems to me, there would be considerable danger from explosions if oil should be used as a fuel in blast furnaces. However, I think it may be possible to replace part of the solid carbon fuel with liquid fuel, but I am not prepared at this time to state what percentage of liquid fuel could be used, or what mechanical arrangements should be introduced for the use of liquid fuel in blast furnaces.

AN ENGLISH VIEW OF SOME AMERICAN GOLD MINES.*

By J. H. CURLE.

In the foreground of American gold mines is the Homestake. It is more or less a close corporation, controlled by a few individuals in New York, and does not yield to a purchaser at to-day's price what I consider a sufficient return. But its figures are marvellous. For the first ten months of last year, crushing with 900 stamps, it treated 1,218,000 tons of ore, yielding \$4,303,000. In other words, it is now producing 21,500 fine ounces a month from ore that is yielding less than \$3.60 a ton.

The Homestake is now the biggest gold producer in the world. After it, in the quantity of ore treated, comes Alaska-Treadwell. Here is a mine with 540 stamps, treating nearly 700,000 tons a year, and the most cheaply worked gold mine there is. The total costs are only \$1.28 a ton, and the profit is 67 cents a ton. Alaska-Treadwell shares are a possible investment. Let us consider them from this point of view: Capital in £5 shares, £1,000,000; tons treated yearly, 680,000; profit on this, at 67 cents a ton, £93,000; dividend being earned, 9 per cent on par. But I have pointed out that a dividend of 10 per cent (still less 9 per cent) is not enough from a mine unless its ore reserves cover more than half its market value. How does the Treadwell stand this test? Ore reserves, 4,000,000 tons; net value, at 67 cents a ton profit, £546,000. Taking the market value of the mine at £900,000, the proportion of profit in sight works out at 60 per cent. This is satisfactory; and as the mine looks well in the lowest workings, and as also the profits show a tendency to increase, we may class the shares as a legitimate investment at about £4 10s. The Alaska Mexican and Alaska United, adjacent mines to this, have not ore reserves in sight to a proportionate extent, nor is their ore so good as that of the Treadwell. I do not consider that either of them can at present be classed as an investment. Some of the most substantial mines in the States are unknown to the English investor. Besides the Homestake, there is an adjacent mine—the Golden Reward—now turning out £25,000 a month, which promises before long to rival the bigger mine. At Cripple Creek, the Portland, Gold Coin, and other large producers, are also locally owned, while nearly all the Californian mines, which are mostly low-grade, are run by owners in San Francisco. The best of the locally-owned mines, at the price, I believe to be the Consolidated Mercur, of Utah. When I saw this mine a year ago I thought—if the figures given me were correct—that its profit in sight equaled its market value. It is a mine worth inspecting.

What shall I say about Stratton's Independence? There is nothing left in the bottom of the mine; it was expected that all the ore in the upper levels would have been exhausted before this, but small bunches are every now and then being met with, and it will be a few months yet before the mine is actual-

* Abstracted from "Gold Mining Investments," by the Special Mining Commissioner of the London Economist.

ly worked out. By that time the company will have cash in hand to the amount of, probably, £150,000. This is a substantial sum, and if there is an opportunity a mine elsewhere will no doubt be bought. There are two other English-owned mines in the States which are nearly worked out—Montana and De Lamar—and each of these has also built up a substantial reserve fund. The Montana has already started to work a new mine in Nevada, purchased out of its reserve fund, and has several other properties at present being prospected.

The two most interesting mines at present in the States are Tomboy and Camp Bird. These are in Colorado; they lie about two miles apart, but are separated by a mountain spur 14,000 feet high, which at this time of the year is covered deeply with snow. There are several other mines of note in this immediate locality, but these are owned locally. The reefs of this district are master lodes—traceable for miles over the mountains, and going to great depths. Their width is above the average, and the ore is always heavily mineralized. The Tomboy Company works two reefs. One of these, the Tomboy, is irregular in value, and though still workable at a profit, is an asset of no great account. The other is the Argentine. This reef was bought last year by the Tomboy, and already from it over 50,000 tons have been taken, yielding about \$13 a ton. Here is a reef running for over a mile through the Tomboy property, it averages, I should say, fully 7 feet wide, it is opened already at three levels, and, although driven on as yet for only half its distance, has already exposed seven different chutes or patches of payable ore. To my eye this Tomboy is becoming a permanent and valuable mine. At the present time, after a very recent inspection, I place the ore reserves at 300,000 tons—or three years' work. Being a new mine, development of ore is much more rapid than its exhaustion, and I am confident that the present year's work will add three more years to the ore reserves. I do not expect to see the mine go on producing ore of the recovery value of \$13; but the large bulk in sight ought to average about \$10, and I see no reason why this should not in future be the average yield. The Tomboy has now, at 11,000 feet up in the Rockies, one of the finest 60-stamp mills in existence—together with the old mill which will also be run in the summer months. The crushing capacity of the mine is now 100,000 tons a year. This should yield \$1,000,000, less expenses—or, say, £80,000 a year profit. This is equal to about a 25 per cent dividend on the capital of £300,000. Looked at strictly from the point of view of an investment, Tomboy shares hardly come up to the standard which we are looking for. Buying at £2, the investor would probably earn over 10 per cent on his money. On the other hand, however, he would be purchasing into a mine which has not got half its market value in sight. But Tomboy, or rather the Argentine, is a new mine, ore is being developed very fast, and the mine is rising to its zenith rather than declining therefrom. This fact must be taken into account. If to-day there is only, let us say, 16s. a share in sight, the chances are that in a year from now there will be nearly double that. The mine is exceptionally well managed, and taking all the factors into consideration, I believe that the shares are a legitimate mining investment at about £2.

Finally, there is Camp Bird. Here is a mine floated seven months ago for £820,000, which since then has paid two dividends, equal to about £51,000, and has accumulated profits over and above that of £120,000. In addition to this a further large profit has been put back into development, stores and equipment. I have just returned from inspecting Camp Bird. After going carefully through the mine, and summing up the plans and assays, the conclusion I arrive at is that the profit now in sight, including cash in hand, is £800,000—or practically £1 a share. Not only is this so, but the future probabilities of the company are immense. Not half of the ground has yet been opened up, nor are the real dimensions of several of the largest ore shoots yet defined. Here is a mine earning well over 20 per cent, and the value of ore in sight (at the time I write this) is

almost equal to the market value of the shares. I believe this is the best investment that the mining market can now offer.

MODERN SILVER-LEAD SMELTING.*

By ARTHUR S. DWIGHT.

The rectangular silver-lead blast furnace developed in the Rocky Mountains has an area of 42 by 120 to 48 by 160 inches at the tuyeres; 54 by 132 to 84 by 200 inches at the top; and height from tuyere level to top of charge of 15 to 21 feet. Such a furnace smelts 80 to 200 tons of charge (ore and flux, but not slag and coke) per 24 hours. The slag that has to be resmelted amounts to 20 to 60 per cent of the charge. Coke consumption is 12 to 16 per cent of the charge. The blast pressure ranges from 1.5 to 4 pounds per square inch, averaging close to 2 pounds. Gases of hand-charged furnaces are taken off through an opening below the charge floor, the furnace being fed through a slot (about 20 inches wide, extending nearly the whole length of the furnace) in the iron floor-plates; or through a hood (brick or sheet iron) above the charge-floor level, with a down-take to the flues, charge doors being provided on each side of the hood, extending preferably the whole length of the furnace and usually having a sill a few inches high which compels the feeder to lift his shovel.

When a silver-lead blast-furnace is operating satisfactorily, the following conditions should obtain: (1) A large proportion of the lead in the charge should appear as direct bullion-product at the lead-well. (2) The slag should be fluid and clean. (3) The matte should be low in lead. (4) The furnace should be cool and quiet on top, making a minimum quantity of lead-fume and flue-dust, and the charges should descend uniformly over the whole area of the shaft. (5) The furnace-speed should be good. (6) The furnace should be free from serious accretions and crusts; that is to say, the tuyeres should be reasonably bright and open, and the level of the lead in the lead-well should respond promptly to variations of pressure, caused by the blast and by the height of the column of molten slag and matte inside the furnace—an indication that ample connection exists between the smelting column and the crucible. Good reduction, using that term to express the degree in which the furnace is manifesting its reducing action, is obtained when the first three of the above conditions are satisfied.

For any given furnace there are five prime factors, the resultant of which determines the reduction, namely: (a) Chemical composition of the furnace charges; (b) proportion and character of fuel; (c) air-volume and pressure, to which might perhaps also be added temperature of blast; for, although hot-blast has not yet been successfully applied in lead-smelting practice, I believe it is only a question of time when it will be; (d) dimensions and proportions of smelting-furnace; (e) mechanical character and arrangement of the smelting-column.

All but one of the above factors can be intelligently gauged. The mechanical factor, however, can be expressed only in generalities and indefinite terms. A wise selection of ores and proper preliminary preparation, crushing the coarse and briquetting the fine, will do much to regulate it, but all this care may be largely nullified by careless feeding. The importance and possibilities of the mechanical factor are generally overlooked and its symptoms are wrongly diagnosed. For instance, the importance of slag-types has undoubtedly been considerably exaggerated at the expense of the mechanical factor. Slags seldom come down exactly as figured. We must know our ores and apply certain empirical corrections to the iron, sulphur, etc., based on previous experience with the ores, but these empirical corrections may represent also an unformulated expression of the influence of the mechanical factor on the reduction—a function therefore of the ruling physi-

cal complexion of the ores, and the peculiarities of the feeding habitually maintained in the works concerned. With a given ore-charge large reciprocal variations may be produced in the composition of slag and matte by merely changing the mechanical conditions of the smelting column, and since the efficient utilization of both fuel and blast must be controlled in the same way, the mechanical factor may be considered, perhaps, the dominating agent of reduction. Inasmuch as there is no way of gauging it, however, the only recourse is to seek a correct adjustment and maintain it as a positive constant, after which slag, fuel and blast may be with much greater certainty adjusted toward efficiency of furnace-work and metal-saving.

Behavior of Iron.—The output of lead is so dependent upon the reactions of the iron in the charge that the chief attention may well be fixed upon that metal as the key to the situation. The success of the process depends largely upon reducing just the right amount of iron to throw the lead out of the matte, the remainder of the iron being reduced only to ferrous oxide and entering the slag. Too much iron reduced will form a sow in the hearth. Iron is reduced from its oxides principally by contact with solid incandescent carbon, and by the action of hot carbon monoxide. Reduction by solid carbon is the more wasteful, but there is in lead smelting an even more serious objection to permitting the reduction to be accomplished by that means, which leads to comparatively hot top, and more or less volatilization of lead. Reduction by carbon monoxide is the ideal condition for the lead furnace. It means keeping the zone of incandescence low in the charge column, leaving plenty of room above for the gases to yield up their heat to, and exercise their reducing power on, the descending charge, so that by the time they escape they will be well-nigh spent. Their volume and temperature will be diminished, and the low velocity of their exit will tend to minimize the loss of lead in fume and flue dust.

The idea that high temperatures in lead blast furnaces should be avoided is based on a misconception. Temperatures must exist which are sufficiently high to volatilize all the lead in the charge, if other conditions permit. A high temperature before the tuyeres means fast smelting; and fast smelting, under proper conditions, means a shortening of the time during which the lead is subject to scorifying and volatilizing influences. A rapidly descending charge, constantly replenished with cold ore from above, absorbs effectively the heat of the gases and acts as a most efficient dust and fume collector. In considering long flues, bag-houses, etc., it should be kept in mind that the most effective dust collector ought to be the furnace itself.

In the practice of 12 years ago and earlier, particularly when using mixed coke and charcoal, reduction by carbon was probably the rule; and the percentage of fuel required was very high. There is good reason to think we have still much room for improvement along this line in our average practice of to-day.

Volume of Blast.—It is customary to supply a battery of furnaces from a large blast-main, connected with a number of blowers. Inasmuch as the air will take preferably the line of least resistance, if the internal resistance of any one furnace be increased the volume of air it will take will be diminished and the others will be favored unduly. Only by keeping all the furnaces on approximately the same charge, with the same height of smelting column can anything like uniformity of operation and close regulation be secured. The rational plan would seem to be to have a separate blower, of variable speed, directly connected to each furnace, but this plan, which has had a number of trials, has usually been abandoned in favor of the common blast main. Trials extending over considerable periods, by myself, have been so uniformly favorable, however, that I am forced to ascribe the failure of others to some outside reason.

The peculiar atmosphere required in the lead blast furnace depends upon the correct proportion of two

counter-active elements, carbon and oxygen. If given too much air the furnace will show signs of deficient reduction, commonly interpreted as calling for more fuel, which will be sheer waste since its object is to burn up surplus air. There will be an additional waste through the extra coal burned under the steam boilers. The true remedy would be to cut down the quantity of air. Burning up excessive coke is as hard work as smelting ore. Too much fuel invariably slows up a furnace; it also drives the fire upward and gives predominance to reduction by solid carbon. The maintenance of a minimum fuel percentage, with a correctly adjusted volume of air, will tend to promote the conditions under which iron will be reduced by the gases, rather than by solid carbon.

Pressure of Blast.—Pressure necessarily involves resistance; and the blast-pressure, as registered by a simple mercury-gauge on the bustle-pipe, may be increased in two ways: (1) By increasing the volume of air forced through the interstices in the charge. This is the wrong way; but, unfortunately, it is only too common in our practice, and therefore deserves to be mentioned, if only to be condemned. (2) By leaving the volume of air unchanged, but increasing the friction offered by the interstitial channels, either by making them smaller in aggregate cross-section (which means a finer charge), or by making them longer (which means a higher smelting-column). A correctly-graduated internal resistance is, therefore, the only true basis for a high blast-furnace, which, when so produced, will bring about rapid smelting, a low zone of incandescence, and a very vigorous action upon the ores by the gases in their retarded ascent through the charge column. These conditions promote the reduction of iron by CO. The adjustment of internal resistance, which is thus clearly the main factor, can only be accomplished by the correct feeding of the furnace.

Feeding the Charge.—It is self-evident that the more thorough the preliminary preparation of the charge before it reaches the zone of fusion, the more rapidly can the actual smelting proceed. A piece of raw ore that finds itself prematurely at the tuyeres, without having been subjected to the usual preparatory processes of drying, heating, reduction, etc., must remain there until it is gradually dissolved or carried away mechanically in the slag. Any such occurrence must greatly retard the process. It would seem, by the same reasoning, that an intimate mixture of the ingredients of the charge should expedite the smelting, and I advocate the intimate mixture of the charge ingredients in all cases.

The theory of feeding is simple, but not so the practice. If the charge column were composed of pieces of uniform size the ascending gases would find the channel of least resistance close to the furnace walls and would take it preferably to the center of the shaft. The more restricted channel would necessitate a higher velocity, so that not only would the center of the charge be deprived of the action of the gases, but also the portion traversed would be overheated; many particles of ore would be sintered to the walls or carried off as flue dust; slag would form prematurely; fuel would be wasted; in short, all the irregularities and losses which accompany over-fire would be experienced. In practice the charge is never uniform, but is a mixture of coarse and fine. By lodging the finer material close to the walls and placing the coarser in the center an adjustment may be made which will cause the gases to ascend uniformly through the smelting column. A furnace-top smoking quietly and uniformly over its whole area is the visible sign of a properly-fed furnace.

Effect of Large Charges.—It has frequently been remarked that, within certain limits, large charges give more favorable results than small ones; and numerous attempts have been made to account for this fact. My observations lead me to offer the following as a rational explanation—at least in cases where ore and fuel are charged in alternate layers. Large ore-charges mean correspondingly large fuel-charges. The gases can pass readily through the

* Abstract of portion of a paper presented at the Mexican meeting of the American Institute of Mining Engineers, under the title, "The Mechanical Feeding of Silver-Lead Blast Furnaces."

coke; and hence each fuel-zone tends to equalize the gas-currents by giving them another opportunity to distribute themselves over the whole furnace-area, while each layer of ore subsequently encountered will blanket the gases, and compel them to force a passage under pressure, which is the manner most favorable to effective chemical action.

In mechanically-fed furnaces the charges of ore and fuel are usually dropped in simultaneously from a car and the separate layers are thus obliterated, and the distributing zones which are such a safeguard against the consequences of bad feeding are lacking, wherefore more care must be exercised to secure proper placing of the coarse and fine material. This may throw some light on the failure of most of the early attempts at mechanical feeding.

Mechanical Character of Charge.—Very fine charges blanket the gases excessively and cause them to break through at a few points, forming blow-holes, which seriously disturb the operation, cause loss of raw ore in the slag and are accompanied by all the evils of over-fire. A charge containing a few massive pieces, the rest being fine, is a still more unfavorable combination. A very coarse charge permits too ready an exit to the gases, and in the end tends likewise to over-fire and poor reduction. The remedy is to briquette the fine ore (though preferably not all of it), and crush the coarse to such degree as to approach an ideal result, which may be roughly described as a mixture in which about one-third is composed of pieces of 5 to 2 inches in diameter, one-third pieces of 2 to 0.5 inch, and the remaining third from 0.5 inch down. The coke is better for being somewhat broken up before charging, and a reasonable amount of coke fines, such as usually accompanies a good quality of coke, is not in the least detrimental. The common practice of handling the coke by forks and throwing away the fines is to be condemned as an unwarranted waste of good fuel. The slag on the charge should be broken to pieces at most 6 inches in diameter. The common practice of throwing in whole butts of slag-shells is bad. There is no economy in using the slag hot; cold charges, not hot, are what we want. A reasonable amount of moisture in the charge is beneficial, providing it be in such form as to be readily dried out. It is often advantageous to wet the ore mixtures while bedding them, or to sprinkle the charges before feeding. The driving off of this water must consume fuel, but not so much as if the smelting zone crept up. Large doses of water applied directly to the furnace are unpardonable under any circumstances, however, though they are sometimes indulged in as a drastic measure to subdue excessive over-fire when other and surer means are not recognized. One of the chief merits of moderate sprinkling before charging is that it gives in many cases a more favorable mechanical character, approximating a lumpy condition in too fine a charge, and assisting to pack a too coarse one.

Different Behavior of Coarse and Fine Ore.—In taking up a shovelful of ore, the fine will be observed to predominate in the bottom and center, and the coarse on the top and sides. When thrown from the shovel, the coarse will outstrip the fine and fall beyond it. In making a conical pile the coarse ore will roll to the base, leaving the fine near the apex. This difference in the action of the mobile coarse ore and the sluggish fines is the key to the practical side of feeding, both manual and mechanical. It is not sufficient to tell the feeder to throw the coarse in the middle and the fine against the sides; if it be easier to do it some other way such instructions will count for little. The desired result can be best secured by making the right way easier than the wrong way.

It is generally conceded that the open-top furnaces, fed by hand through a slot in the floor-plates, do not give as satisfactory results as the hooded furnaces with long feed doors on both sides. In the open-top furnace it is comparatively difficult to throw to the sides; the narrower the slot the greater the difficulty. The major part of the charge will drop

near the center, making that place higher than the sides. The fine ore will tend to stay where it falls, while the coarse will tend to roll to the sides, thus leading to an arrangement of the charge just the reverse of what it ought to be. In the hooded furnace most of the material will naturally fall near the doors, causing the sides to be higher than the center toward which the coarse will roll, while the force of the throw as the ore is shoveled in will also have a tendency to concentrate the coarse material in the center.

Once a proper balance of conditions has been found, absolute regularity of routine is the secret of good results. An experienced and intelligent feeder owes his merit to his conscientious regularity of work. He may have to vary his programme somewhat when he encounters a furnace that is suffering from the results of bad feeding by a predecessor; but his guiding principle is first to restore regularity, and then maintain it. A poor feeder can bring about, in a single shift, disorders that will require many days to correct, if indeed they are corrected at all during the campaign. The personal element is productive of more harm than good.

Mechanical Feeding.—If it be admitted that the work of a feeder is the better the more it approximates the regularity of that of a machine, it ought to be desirable to eliminate the personal factor entirely and design a machine for the purpose, which would be a comparatively simple matter if it be known just what we want to accomplish. No valid ground now exists for prejudice against mechanical feeding in lead smelting. It is in successful operation in a number of large works, and is being installed in others. Our furnaces have outgrown the shovel; we have passed the limit of efficiency of the old methods of handling material for them. We must come to mechanical feeding in spite of ourselves. But whatever may be the motive leading to its introduction, its chief justification will be discovered, after it has been successfully installed and correctly adjusted, in the consequent great improvement of general operating results, metal saving, etc. It will remove one of the most uncertain factors with which the metallurgist has to deal, thereby bringing into clearer view for study and regulation the other factors (fuel and blast proportion, slag composition, etc.) in a way that has hardly been possible under the irregularities consequent upon hand-feeding.

DAYLIGHT OBSERVATION OF POLARIS TO ESTABLISH A MERIDIAN.

By W. O. OWENS.

The establishment of meridians by stellar observations, as carried on by surveyors of the public lands, and by others, has ever been a question of vital importance, and as the operation is generally carried on after dark there is always an element of uncertainty in the operator's mind as to the accuracy of his work. The writer has been a worker in the field for twenty-five years, and is familiar with the inconveniences and uncertainties attending a night observation of Polaris. For four years he has dispensed with these nocturnal observations and has established his meridians in broad daylight.

As the method may be of interest to others the details are given herewith. It is commonly supposed that Polaris is not visible to small instruments in daylight, but such not the case. With an ordinary surveyor's or engineer's transit the pole star may be found before or near sundown without difficulty, and thus the operation of staking out and working a meridian is carried on in the full light of day unattended with the disagreeable features of a night observation.

No special mechanism nor paraphernalia is required, the ordinary surveyor's transit being sufficient; and while the plan for finding the pole star will by no means answer the rigorous requirements of exact mathematics it is entirely practical and efficient. In any event, it is sufficiently accurate to enable the observer to find Polaris in daylight, and

that is the essential feature. Objections to the method can have no weight if it can be shown that by it Polaris can be readily found in daylight and a meridian established thereby. I am prepared for objections, and realize what the principal one will be, i. e., that one must know where north is before he can find the star, and consequently if he knows where north is he doesn't need the star. Theoretically, this is a plausible and valid objection, but practically it has no weight whatever.

This article is written for practical men, surveyors in the field and others who must occasionally have a true north and south line on which to test their solar instruments, or from which they may determine the declination of the magnetic needle.

With these preparatory remarks I pass on to a description of my method.

Having chosen my point for the establishment of a meridian I drive a peg firmly in the ground and center it carefully.

Some time during the day I set my solar instrument over this peg and determine an approximate meridian by means of the sun, and mark a point in this line at some convenient distance (say, 3 or 4 chains) northward of my station.

From an ordinary almanac or by calculation I then determine the hour of sunset in order to be at my station in time to observe the star, the most favorable period being about five to fifteen minutes before sundown. If Polaris is sought at that time he is easily found, and there is sufficient daylight in which to carry the operation to completion. Or, if one chooses, he may wait until the sun is actually set before observing the star, and still have plenty of time to mark his line in daylight. This remark will apply with greater force if the observation is to be made in high latitudes. Below 30° north latitude, twilight being quite short, it is best to observe before sundown.

Having determined the hour of sunset and at what moment I intend to observe Polaris, I take from the *Manual of Surveying Instructions* of the General Land Office, or from one of the numerous text books on surveying, the exact hour of the last preceding upper culmination of the star. The difference between this hour of culmination and the hour of observation enables me by a formula figured out by myself to calculate the approximate position of Polaris both in azimuth and altitude. This formula is extremely simple, and non-laborious, and gives the star's position at any moment with sufficient accuracy to insure its being found.

Having calculated the star's position I proceed to my station about fifteen to twenty minutes before I intend to observe it in order to be in readiness; and by data derived from my formula I set off on the horizontal plates of my transit the star's azimuth; and on the vertical are lies altitude, using my solar meridian from which to deflect the azimuth, and my approximate latitude (which can always be found near enough for our purpose) to give me the altitude of the pole.

I now find Polaris without difficulty before sundown, and the observation may be completed as soon as desired—in the broad light of day without artificial illumination.

An approximate meridian and close value for latitude may always be obtained; and as the field of the telescope of the ordinary surveyor's or engineer's transit is generally from 1¾° to 2° in diameter it is no trouble whatever to direct it, to that point in the heavens which will bring the star somewhere within the range of the instrument.

The formula and calculation for star's position are as follows:

As is well known, the plane of the circle in which Polaris seems to revolve, if one could view it from the equator, would be perpendicular to the plane of the horizon; and the west and east elongation points of the star would be exactly at the respective extremities of the horizontal diameter which cuts said circle and passes through the pole, the distance between upper culmination and western elongation and

that from the latter point to lower culmination being exactly equal. Hence for an observer on the equator, were Polaris visible from that point, my formula would give the exact position of the star at any time, refraction, of course, not considered.

The fact, however, that as one moves north from the equator the azimuth of Polaris increases and the star's elongation points move upward toward the point of upper culmination, introduces an irregularity which would upset exact calculations by my formula, but which, for the purpose under discussion, is by no means sufficiently serious practically to affect the result.

By the calculation of a factor or coefficient even the irregularities here referred to could be eliminated; but such a step would result in no practical good, and would only make more work for the observer. The formula will find the star and that is all we care for.

To find the position of Polaris at any hour and in any latitude proceed as follows:

Conceive the circle of Polaris' apparent revolution around the pole to be cut by vertical and horizontal diameters, the former equal to twice the polar distance of the star, and the latter equal to double the azimuth of Polaris at elongation for the given latitude, expressing these diameters in minutes of circular measure. Find the time, in hours and minutes, that has elapsed between the last preceding upper culmination of the star and the moment at which it is proposed to seek it, and reduce said elapsed time to degrees and minutes of angular measure, allowing fifteen degrees to an hour of time. Call the angle so found the star's "position angle." Find the natural sine and cosine of this angle. Multiply the horizontal radius, expressed in minutes of angular measure, by the sine of the star's position angle and we have the azimuth of Polaris, in minutes of angular measure, at the time of observation; and in the vertical radius, expressed in minutes of arc, be multiplied by the cosine of the star's position angle we shall have the number of minutes Polaris is above or below the pole at the time of our observation.

Thus, it will be seen, the formula shows us how far east or west of the meridian and how far above or below the pole Polaris will be at the time of our observation. To determine whether his azimuth is east or west, note that if the "position angle" lies between 0° and 180° , Polaris will be west of the meridian—if between 180° and 360° , he is east of it.

For altitudes, if the "position angle" lies between 0° and 90° , or between 270° and 360° the star will be found above the pole—if between 90° and 270° , he is below it.

The position angle tells which quadrant of the circle Polaris will be found in, giving both altitude above or below the pole, and his azimuth east or west of the meridian. The actual angular distance above or below the pole, or to the east or west of the meridian is shown by the multiplication described above, that by the sine giving azimuth, and that by the cosine giving altitude above or below the pole.

As an example I submit the following problem: In latitude $35^\circ 00'$ north, desiring to know Polaris' position near sundown, November 1, 1902, I find that sunset occurs about 5 p. m.

From the *United States Surveying Manual* I ascertain that Polaris reached his last upper culmination at 10 hours, 47 minutes p. m. October 31.

Desiring to find the star about 15 minutes before sundown I choose 4 hours 45 minutes for the time of my observation. From 10 hours 47 minutes p. m. October 31 to 4 hours 45 minutes p. m. November 1 equals 17 hours 58 minutes, which, reduced to circular measure, equals $269^\circ 30'$ equals the star's "position angle." The sine of this angle is .99996, its cosine .00873.

In latitude 35° north Polaris' azimuth at elongation is $1^\circ 29'$ equals $89'$ equals our assumed horizontal radius of Polaris' circle about the pole. The star's polar distance equals $1^\circ 13'$ equals $73'$ equals vertical radius of said circle. Eighty-nine

minutes $\times .99996 = 88.99'$ equals azimuth of Polaris at hour of our proposed observation, i. e., at 4.45 p. m. Seventy-three minutes $\times .00873 = 0.637'$ equals Polaris' distance above or below the pole at the hour of proposed observation.

The "position angle" here found, viz., $269^\circ - 30'$, being between 90° and 270° , the star should be slightly below the pole, as shown above—that is, $0.637'$, or about half a minute; and being between 180° and 360° his azimuth would be east of the pole, almost $89'$ —in other words, Polaris, at the time of our observation, would be just about at eastern elongation, a result agreeing practically with the actual facts.

And equally satisfactory results may be obtained at any hour in the day the period near sunrise or sunset being, of course, the most favorable for finding the star.

I have tested my formula for all possible values of the star's "position angle," and found it perfectly trustworthy in every particular. The error due to the varying azimuths of Polaris will never be sufficient practically to affect the result being rarely more than two or three minutes of a degree.

The azimuth of Polaris for different latitudes, and his polar distance, may always be found in text books or works on surveying usually in the possession of surveyors and engineers; but in case no such work is at hand the following formulas will be found useful:

$$\text{Sine of Polaris' azimuth at elongation} = \frac{\text{Sin of his polar distance}}{\text{cos. of latitude.}}$$

This polar distance is constantly growing less at the rate of $19.3''$ per year, and on January 1, 1903, it is approximately $1^\circ 12'$.

Should one desire to know the hour of sundown, in order to prepare for a daylight observation of the star, and no almanac is at hand to supply the information, it may be calculated very simply as follows:

Multiply tang. latitude by tang. sun's declination and the product will equal cos. sun's semi-diurnal arc when latitude and declination are of different signs; and of his semi-nocturnal arc when they are of the same sign.

The angle corresponding to the cosine thus found, reduced to hours and minutes, will be the apparent, time of sunset when latitude and declination are of different signs, and the hour of sunrise when they have the same sign. Refraction need not be considered.

For the benefit of those who may not be perfectly familiar with the tables of natural sines and cosines a suggestion may not be amiss. In calculating Polaris' "position angle" one will frequently obtain a result in excess of 90° —it may come out anywhere between 0° and 360° —and as the tables run only to 90° , proceed as follows: If the "position angle" does not exceed 90° , take the sine and cosine directly from the tables; if it lies between 90° and 180° , subtract it from 180° and find the sine and cosine of the remainder; if between 180° and 270° , subtract 180° from it and find sine and cosine of remainder; if between 270° and 360° , subtract it from 360° , and find sine and cosine of remainder.

Keeping ever in mind the important truth that the altitude of the pole is always equal to the observer's latitude, the operator will have no difficulty in setting off on his vertical arc the proper angle of elevation; and by reference to his approximate meridian it will be equally easy to define the star's azimuth at any time he may wish to make an observation.

There are numerous ways in which an approximate meridian may be obtained—a line sufficiently close to enable one to find the star in daylight—and these will suggest themselves to practical men. The solar instrument, of course, affords the best means; but as not all surveyors and engineers are provided with these, other methods must be resorted to. The magnetic needle, where its declination is known approximately, will be satisfactory; but if neither of the above is available an observation of the sun with a transit properly shaded will answer the purpose.

In this method, of course, time must be known very closely; but with our present system of railway and telegraph clocks this is perfectly attainable. The method is to make proper allowance for the equation of time and observe the sun on the meridian. This is a very simple operation and sufficiently close for our purpose.

I have tried each and all of the above methods, and in no case have I failed to find the star. The field of the telescope is large enough to cover any errors likely to be made; and if ordinary care and judgment are exercised there will be no difficulty in finding the star in daylight.

To be sure, if one's eyes are not sharp it will be best to defer the observation until the sun has disappeared below the horizon; but the majority of observers, I have no doubt, will readily find the star fifteen to twenty minutes before sundown.

Morning observations, either just before or after sunrise, are as good as those of the evening, but are, of course, not so convenient.

At certain times in the year the pole star reaches either eastern or western elongation at about the hour of sunrise or sunset; and these are excellent opportunities for stellar observation. But if Polaris cannot be taken at elongation, the hour angle method, fully set forth in the *United States Manual of Surveying Instructions*, must be used. In this way the observation may be made, whether the star is on or off the meridian.

The above statements are based on actual experience, and the formula here given may be depended upon to do what is claimed for it.

By means of it I have found Polaris 45 minutes before sundown with an absolutely cloudless sky on the glaring desert of Arizona, where bright white and intense blue were the only colors in the entire landscape—conditions highly unfavorable for finding fixed stars with an ordinary surveyor's or engineer's transit.

The method does away entirely with the uncertainties and inaccuracies which must, to a greater or less extent, always attend night operations, to say nothing of the personal inconveniences, and makes the observation of Polaris a pleasant and non-laborious undertaking.

I venture the prediction that night operations of this character will not much longer be in vogue; and that within two or three years they will be entirely superseded by the daylight method of observations.

One word of caution before closing: When the telescope is elevated to observe the star care must be taken to adjust the focus for celestial distances. A failure to do this often prevents the star's being found. This can be arranged very simply by observing the moon early in the evening, adjusting the focus carefully and making a slight scratch on the outside surface of the object glass slide to indicate the exact point of the celestial focus. Having done this a permanent focus is fixed, and no further trouble from that source will arise.

As a matter of course any of the planets, or other celestial body visible in early twilight, will serve the same purpose as the moon for fixing the celestial focus.

POLYNESIAN PHOSPHATE ROCK.—According to a United States consular report, November 20, 1902, phosphate rock imported at Stettin, Germany, from the recently discovered deposits on Ocean Island, northeast of the Solomon Islands, showed a tenor of 86.15 per cent tribasic phosphate of lime, and only 0.68 per cent alumina and oxide of iron. This is remarkably high grade material, being superior to the Christmas Island phosphate and much better than the high-grade Florida rock.

PHOSPHOR-ALUMINUM.—According to German patent No. 131,517 (W. Rübel, Berlin), the toughness, density and durability of aluminum are increased by the addition of 4 to 7 per cent phosphorus. In a subsequent patent (No. 137,003, November 1, 1901), it is stated that the same properties are imparted by larger and smaller addition of

phosphorus. The addition of 7 to 15 per cent makes the metal extraordinarily hard and tough, and well adapted for forgings. The addition of 3 per cent gives a metal suitable for horseshoes. With 2 per cent it is easily rolled.

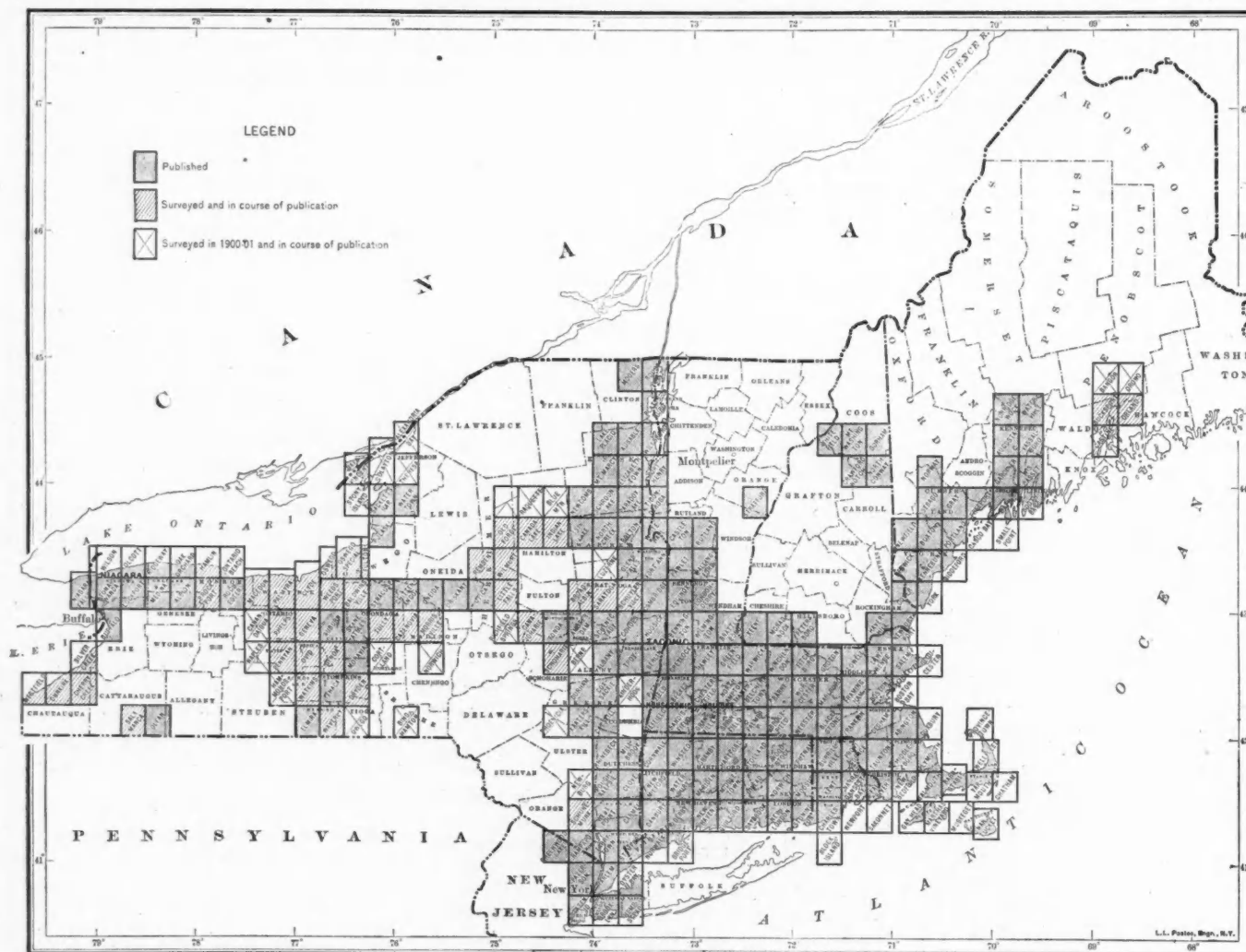
TOPOGRAPHIC MAPS AND GEOLOGIC FOLIOS OF NEW ENGLAND AND NEW YORK

The United States Geological Survey has been engaged since its organization in making a topographic survey and map, and in the preparation of a geologic map of the United States. Under the plan adopted, the unit of survey is a quadrangle 15', 30', or 1° in extent each way, covering an area of one-sixteenth, one-fourth, or one "square degree." The unit of publication is an atlas sheet 16½ inches wide by 20 inches high, and each sheet is a topographic

topographic survey has been made; and the name of the resulting atlas sheet, when published, is printed across its face. Maine, Massachusetts, Rhode Island, Connecticut and New York have co-operated with the Geological Survey in making the surveys of the respective States; and, except Maine and New York, these States are now completely mapped. Some progress has also been made in New Hampshire and Vermont. The unit of original publication is an atlas sheet showing a tract (quadrangle) 15' in extent each way (one-sixteenth of a "square degree"), or from 203 to 220 square miles, varying with the latitude. The scale is 1: 62,500, or about one mile to an inch, and the contour interval is 20 feet. These sheets are represented by the smaller rectangles on the index map. The larger rectangles, with the name horizontal, represent atlas sheets on the scale of 1:125,000, or about 2 miles to 1 inch.

disposed of by sale at practically the cost of paper and printing. Index maps of the topographic work in different sections of the country and a general circular on geologic folios may be had upon application to the Director of the United States Geological Survey, Washington, D. C., who will gladly give further information on the subject.

The topographic maps are sold at the rate of 5 cents a sheet of standard size; or, for 100 or more in one order, whether of the same sheet or of different sheets, the price is 2 cents a sheet for the standard size. When maps ordered are not in stock the right is reserved by the Survey to substitute other sheets rather than return very small amounts of money by mail, unless directions to the contrary are given in the order. The price of the geologic folios, Holyoke and New York City, is 50 cents each. The name of the county should be included in the



MAP OF NEW ENGLAND AND NEW YORK, SHOWING PROGRESS OF TOPOGRAPHICAL SURVEYING.

map of one of the above areas. As the atlas sheets are uniform in size, the greater the area covered the smaller the scale of the map. The scale of the full-degree sheet is 1: 250,000, that of the 30'-sheet is 1: 125,000, and that of the 15'-sheet is 1: 62,500. A sheet is designated by the name of some well-known place or feature appearing on it, and the names of adjoining published sheets are printed in the margins. The maps are engraved on copper and printed from stone in three colors. The cultural features, such as roads, railroads, cities, towns, etc., as well as all lettering, are in black; all water features are printed in blue; and the hill features are shown by brown contour lines. The contour interval varies with the scale of the map and the relief of the country. Maps of limited areas economically important are sometimes published which are not in conformity with the general scheme outlined above. These are called special maps.

The progress of this work in New England and New York is shown on the index map reproduced herewith. Each of the rectangles outlined shows the location and area of a quadrangle, of which a

Each of these shows a tract (quadrangle) 30' in extent each way (one-fourth of a "square degree"), or about 880 square miles, and is made by the reduction and combination, omitting some details, of the four one-mile-scale sheets shown within the same area. The contour interval is from 10 to 40 feet. The whole number of sheets published is: Maine, 29; New Hampshire, 21; Vermont, 28; Massachusetts, 58; Rhode Island, 15; Connecticut, 37; New York, 132.

Geologic maps corresponding in position, area and name with the topographic maps are being published in the form of folios. The areal geology, underground structure, and mineral deposits are represented by colors and patterns. Each folio contains topographic, geologic, economic and structural maps of the quadrangle and occasionally other illustrations, together with a general description. Two folios—Holyoke (No. 50), Massachusetts, and New York City (No. 83), New York—representing quadrangles of this area, have been issued, as shown on the index map by the horizontal names.

Under the existing law the maps and folios are

post-office address. Prepayment is required, and may be made by money order payable to the order of the Director of the United States Geological Survey, or in cash—the exact amount. Checks and postage stamps cannot be accepted.

The readers of this JOURNAL do not need any discussion of the value to the civil engineer, the mining engineer, the railroad contractor, and the prospector of these maps and folios. They have already saved to individuals and to corporations thousands of dollars that must otherwise have been expended.

A LARGE BLOCK OF SLATE.—Howell's quarry, at Bangor, Pa., recently hoisted a block of slate from which were made 5 squares and 43 feet of roofing slate. Two squares and 94 feet were cut into 12 by 24-inch pieces, 127 feet into 18, 20 and 22-inch pieces, and the balance into smaller sizes. A square is 100 square feet as laid on the roof. This block of slate is believed to be the largest ever quarried in Pennsylvania.

BRITISH COLUMBIA METAL PRODUCTION.

Through the courtesy of Mr. W. F. Robertson, Provincial Mineralogist, we have the following estimate of the metal production of British Columbia in 1902, which we have compared with the actual output for 1901 in the table below:

	1901.	1902.		Changes.
Placer gold	\$970,100	\$1,000,000	I.	\$29,900
Lode gold	4,348,603	4,600,000	I.	251,397
Silver, ounces	5,151,333	4,600,000	D.	551,333
Total gold	\$5,318,703	\$5,600,000	I.	\$281,297
Lead, pounds	51,582,906	26,000,000	D.	25,582,906
Copper, pounds	27,603,746	30,000,000	I.	2,396,254

The increase in copper was mainly from the mines and smelters of the Boundary District. The decrease in lead and silver was the result of the depression in the Kootenay District.

ONTARIO MINERAL PRODUCTION.

The Bureau of Mines of Ontario has kindly furnished us with an estimate of the chief items of mineral production for the year 1902. The figures given are, of course, subject to revision when the corrected returns for the last quarter of the year are received. The figures are in short tons:

	Quantity.	Values.
Gold	12,500 oz.	\$212,500
Silver	100,000 oz.	50,000
Copper	4,550 tons	637,000
Nickel	5,000 tons	2,000,000
Iron ore	380,000 tons	550,000
Zinc ore	950 tons	8,000
Pig iron	115,000 tons	1,650,000
Total values		\$5,107,500

It is believed that these figures will be found not far from the actual output, at any rate in point of quantity. As to value, the copper and nickel produced in Ontario, which bulk largely in the total, are not refined within the Province, and the practice of the Bureau of Mines has been to appraise these metals at their value in the form in which they are exported, namely, in the nickel-copper mattes of the Sudbury District, which are of varying richness.

As compared with the year 1901 this shows a decrease of about \$32,000 in gold and about 50,000 ounces in silver. The copper production shows but little change, while nickel increased about 570 tons in tons and correspondingly in value. Iron ores showed a gain of over 100,000 tons, but zinc ore a small falling off. The production of pig iron remains about stationary.

CANADIAN MINING INSTITUTE.

The sub-committee of the Council of the Canadian Mining Institute has recommended that the following awards be made for 1902 in the Students' competitions:

The president's gold medal to O. N. Scott, School of Mining, Kingston, Ont., for his paper "On the Ore Deposits of Copper Mountain Similkamenn District, B. C. Also two cash prizes of a value of \$25 each to the following: H. W. De Pencier, McGill University, Montreal, for his paper on "Mine Timbering in the Old Ironsides and Knob Hill Mines," and to L. P. Silver, School of Mining, Kingston, Ont., for his paper on "The Sulphide Ore Bodies of the Sudbury District." It is understood that one of the best papers contributed to the series, that by Mr. E. V. Corless, of McGill, last year's gold medallist, was at the special request of Mr. Corless withdrawn from the competition.

The committee recommend that in the future, in addition to the president's gold medal, the Institute offer three prizes of a cash value of \$25 each for papers contributed by Canadian mining students on the following subjects:

Group I.—Ore Deposits and Mining Geology.—The subject may be treated generally, or some particular district or single deposit may be discussed or described.

Group II.—Mining Practice.—Any and every branch of mining may be treated, such as pumping, hoisting, ventilation, timbering, ore extraction, development, etc. etc. or some particular method of mining, or some individual mine or group of mines, may be described or discussed.

Group III.—Ore Dressing and Metallurgy.—Any branch of ore dressing or metallurgy may be treated as, for example, crushing, jigging, milling, concentrating, smelting, roasting, cyaniding, etc.; or some particular plant may be described or discussed.

MINING AND MILLING IN THE COEUR D'ALENE, IDAHO.*

By J. R. FINLAY.

The geological formation of the Coeur d'Alenes comprises slates, graywackes and quartzite. The rocks in which the lead-bearing veins occur are usually light-colored, and can best be described as fine-grained graywacke, or something between slate and quartzite. Igneous intrusions are rare. The most important is a syenite, which makes an enormous boss or dike on the ridge between Canon and Nine Mile Creeks. This has exercised an important influence on the vein formation of its neighborhood. The important mines of Canon Creek are within a mile of it; and silver-lead veins of more or less value occur at intervals along its whole periphery. At a number of places in the district there are narrow dikes of basalt, which in some cases cut across the fissure veins, with no effect whatever on their mineralization, but the Hecla vein follows such a dike for its entire length, the mineralization having taken place along the walls of the dike, while in many places the basalt seems to have been actually replaced to some extent by galena.

All the veins of the district are mineralizations of fault fissures. As a rule only one principal plane of fissuring can be found in each vein. This is apt to occur near the middle of the vein, but often forms one of its walls. The minerals are in some cases scattered indiscriminately through the vein, but they are more likely to be arranged in streaks parallel to the principal fissure. The minerals of the veins are chiefly galena, siderite, blende, pyrite and quartz. In some veins they occur in distinct streaks, but in others they are intimately mixed. The ore bodies occur in every conceivable position, from horizontal to vertical. Some of them are very large, containing millions of tons of ore. Three of the most valuable deposits in the district do not reach the surface at all, their apexes lying several hundred feet below it. The Bunker Hill lode has been opened for 6,000 feet continuously. It dips 40° S.W. The country rock has been mineralized on the hanging wall side of a fault-fissure for a distance of 100 to 300 feet. The workable ore bodies are simply those portions of the country rock which contain sufficient galena. The Mammoth-Standard vein has been productive for a length of 2,400 feet. It dips about 77° N. The ore body worked in the Standard mine varies from 5 to 50 feet in width, and averages 17 feet. The ores mined in the district average about 10 per cent lead and 7 ounces silver per ton.

At least 70 per cent of all the ore thus far mined in the Coeur d'Alene has been extracted directly through tunnels. Of the remaining 30 per cent at least two-fifths has been hoisted through underground shafts to be subsequently hauled out through tunnels. The Tiger-Poorman is the only mine which has been operated by shafts from the surface. The Tiger-Poorman, Standard and Frisco mines have each been opened to depths of about 2,000 feet vertically below their outcrops. The methods of mining employed in the district are (1) back-stopping, and timbering; (2) back stopping, timbering and filling, and (3) back-stopping and filling without timbering. The timbering is done either with square sets or with stull sets. Massive and elaborate timbering is required, but in this respect the district is favored by its abundant supply of cheap timber. Another aid to the district is the excellent water power, which is utilized by all the mines to a more or less extent.

The milling practice is substantially the same

* Abstract of a paper read at the New York and Philadelphia meeting of the American Institute of Mining Engineers.

throughout the district and a description of that at the Standard Mill will exemplify the best. The crude ore is received in a bin of 600 tons capacity, whence it is drawn to a No. 5 Gates crusher, which breaks it to 1 inch size. A 15-inch belt-conveyor takes it to another bin, whence it passes to rolls, which crush to 0.5 or 0.67 inch size. The product from these rolls is sifted by two trains of trommels, which have holes 15, 10, 7 and 3 millimeters in diameter. The material coarser than 15 millimeters goes to "bull jigs." The sizes between 15 and 3 millimeters go to the fine jigs. The material finer than 3 millimeters goes to hydraulic classifiers. The slime passing over from the latter goes to settling tanks, from which the heavier material is washed on Wilfley tables and Frue vanners. The tailings from the tables and vanners, together with the overflow from the settling tanks, go to 52 canvas tables of 6 square yards each, the concentrate caught by the latter being reworked on two Wilfley tables.

The coarse jigs make clean tailings and middlings, the latter being recrushed to 40 mesh size, by passage through rolls, and then through Huntington mills. The fine jigs also make middlings which are similarly handled. The 40 mesh product is united with the material which goes to the hydraulic classifiers as above described and is washed on Wilfley tables and Frue vanners.

The mill dresses about 500 tons of ore per day. Its equipment comprises a No. 5 Gates crusher, two 15-inch belt conveyors, six sets of 15 by 26-inch rolls, four 5-foot Huntington mills, 28 Harz jigs (arranged in 14 pairs), two lines of trommels, an oversize trommel for middlings, four elevators, 18 Wilfley tables, three 4-foot Frue vanners, and 52 canvas tables. The power for the main mill is derived from a 4-foot Pelton wheel, under a 32-foot head, and a 6-foot wheel, under 235-foot head. A 24-inch wheel under 235-foot head runs the electric light dynamos and another one runs the Gates crusher.

The transportation of the crude ore from mines to mills is an important problem in the district. In most cases it is done by rail. The cost varies from 8 to 20 cents per ton. The total cost of mining and milling ranges from \$2.50 to \$3.50 per ton. The loss of values in dressing is 20 to 30 per cent.

ELECTRIC LIGHT HOIST SIGNALS FOR MINES.

—An installation recently made by Doerr, Mitchell & Co., of Spokane, Wash., at the Standard Mine in the Coeur d'Alene comprises electric light boxes with ground glass fronts on which are marked the signals. One of these is placed in the engine-room and at each station in the shaft. Switchboards enable the station tenders to turn on the lights, which burn until turned out by the engineer. The chairs for landing the cages in the shaft automatically turn on in view of the engineer a warning light marked with the number of the level at which the respective chairs are out. The signal lights show both at the stations where given and in the engine room, so the station tender can instantly see and correct a false signal, and the engineer knows the position of chairs which may be out in the shaft, wherefore there is no excuse for smashing cages.

MINERAL IMPORTS AND EXPORTS OF SPAIN.

—The imports of fuel into Spain for the ten months ending October 31 were 1,784,172 metric tons of coal and 146,224 tons of coke. Exports of minerals for the ten months are reported by the *Revista Minera* as follows, in metric tons:

	1901.	1902.	Changes.
Iron ore	5,490,099	6,173,755	I. 683,656
Copper ore	856,221	818,638	D. 37,583
Zinc ore	63,147	69,152	I. 6,005
Lead ore	2,993	2,697	D. 296
Pyrites	331,307	373,853	I. 42,546
Salt	260,547	222,905	D. 37,642

Exports of metals included 30,749 tons pig iron, against 25,578 in 1901; 22,883 tons copper, against 23,607; 1,498 tons spelter, against 2,111; 140,308 tons of lead against 123,271 tons in 1901.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALY REPORTED.

DUTY ON FLINT-STONES FOR POLISHING PURPOSES.—Flint-stones measuring about 4 inches in length, 3 in width, and 1 in thickness, partially ground and polished and designed to be used to impart a luster to surface-coated papers, are dutiable at the rate of 20 per cent ad valorem under Section 6, Act of July 24, 1897, as unenumerated manufactured articles, and are not free of duty as flint, flints, or flint-stones, unground, under paragraph 557 of said act, nor dutiable under paragraph 118 as building or monumental stones.—Appeal of Dejonge & Co. from Collector of Customs at New York; Board of General Appraisers.

MEANING OF "STRIKE CLAUSE" IN CONTRACT FOR DELIVERY OF COAL.—A contract requiring a coal company to deliver so many cars of coal a week for a certain period, at a point other than its mines, subject only to strikes, imposes a liability for a failure caused by the inability to procure cars. In a suit for damages, under such contract, evidence is admissible to show the meaning in the coal trade of the phrase "subject to strikes," as it may mean a strike in the mines of the seller or a general strike.—Hesser-Milton-Renahan Company, v. La Crosse Fuel Company (90 *Northwestern Reporter*, 1904); Supreme Court of Wisconsin.

RIGHT TO RE-FORMATION OF MINING CONTRACT.—One who seeks to re-form a mining contract on the ground of mistake should act promptly, and, if there is any great delay, he is called upon to explain and excuse it. Lapse of time is serious obstacle to the attainment of truth, and parties are entitled to its quieting effect on possible litigation. Where one was superintendent of a garnet mine belonging to other persons, and was himself the owner of an adjoining mine, which he was induced to convey to them, as a part consideration, he claimed that he was to be retained in his position as superintendent for 20 years at \$20 a week, which he was then receiving. This was not expressed in the written agreement between them, and according to the parol understanding set up he was merely to be retained, at the salary then being received for a term of years to be afterwards agreed upon. The court held that this was too indefinite and incomplete to warrant a re-formation of the contract; nor was it helped out by a provision in the contract that the royalties on ore mined there stipulated for should continue 20 years, unless the grantee should voluntarily leave his employment; nor by the further provision that they should be paid to his wife at a reduced rate—one-half—in case of his death during that period.—Sharp v. Behr (117 *Federal Reporter*, 864); Circuit Court of United States for Pennsylvania.

MEASURE OF DAMAGES FOR WILLFUL OR INNOCENT TRESPASS ON MINING LANDS.—The measure of damages for the willful or intentional taking of ore or timber from the land of another without right is the enhanced value of the ore or timber when it is finally converted to the use of the trespasser; but the limit of liability for damages of one who takes ore or timber from the land of another through inadvertence or mistake, or in the honest belief that he is acting within his legal rights, is the value of the ore in the mine or the value of the timber in the trees. The test which determines whether one was a willful or an innocent trespasser is not his violation or compliance with the law, but his honest belief and actual intention at the time he committed the trespass, and neither a justification of his acts nor any other complete defense to them is essential to establish the fact that he was not a willful trespasser. The fact that one acted on the advice of reputable counsel is persuasive evidence of his good faith; and one who honestly follows the erroneous advice of such counsel upon questions of legal right concerning which a layman would hardly have actual knowl-

edge is not chargeable with bad faith, or with the willful intent to commit a wrongful act, because his counsel was mistaken in his view of the law.—United States v. Homestake Mining Company (117 *Federal Reporter*, 481); United States Circuit Court of Appeals, Eighth Circuit.

VOLUNTARY PAYMENTS OF ROYALTY THROUGH MISTAKE NOT BINDING CONSTRUCTION.—By a written contract a party agreed to convey to others a farm on which there was a garnet mine, and which adjoined property on which the purchasers were also working mines. In consideration of the conveyance the buyers stipulated to pay the seller for a term of years a royalty "upon all ore shipped by them from their mines in the township, including not only the mines then operated by them, but also from the mines on the property then conveyed if possession thereof be obtained by them. The mines on the property conveyed were then leased, the lessee having an option to renew, which he exercised, and the purchasers did not obtain possession, but received only the royalty from the lessee. It was held that under the terms of the contract the obligation to pay royalty from the farm purchased was conditioned on their obtaining possession of the mines on same, and that under the facts stated they were not liable for such royalty. The construction of a contract which is plain and unambiguous cannot be affected by voluntary payments made by one party through mistake, and which were clearly not required by its terms, and were not demanded by the other party, although had they been required by the contract they would have been in arrears for over three years.—Sharp v. Behr (117 *Federal Reporter*, 465); Circuit Court of United States for Pennsylvania.

THE EXTENSIVE DEPOSITS OF OCHER found in the vicinity of Parkersville, Georgia, have been visited during the last season by Mr. E. C. Eckel, of the United States Geological Survey, for the purpose of studying the geological conditions of their occurrence and the utilization of the material. As mined, the ocher contains considerable sandy material which would injure its quality as a pigment. To remove these impurities, it is disintegrated in a log washer, and is carried by water through a long series of troughs. During its passage most of the sand is deposited, only the finer grains of ocher remaining in suspension. On issuing from the troughs the water, still carrying the fine ocher, is led to settling tanks and the material is slowly deposited. The water is then drained off and the ocher is left as a fine mud at the bottom of the tank. This ochereous mud is dried and pulverized, when it is ready for market. The origin of these deposits has been discussed by Dr. G. W. Hayes, of the Geological Survey, who considers that the ocher bodies represent replacements of the quartzites by which they are surrounded, silica having been dissolved and iron deposited by percolating waters.

ABSTRACTS OF OFFICIAL REPORTS.

Clifton Consolidated Mines of Arizona.

A report just issued from the London office of this company says: "Your directors have much pleasure in presenting to you the recent report of Mr. William A. Farish, consulting engineer to the company, on his inspection of the mines and of the development which has been prosecuted by electric rock drills during the past year, by which the No. 3 or main tunnel has been driven for a distance of 1,280 feet. Simultaneously with this development, work has been proceeding in the Olivette with most satisfactory results. A large body of rich ore is already at grass, and more is being opened up preparatory to the connection of No. 3 tunnel with these workings. . . .

"Acting upon the advice of Mr. Farish and Mr. Fontaine, a diamond drilling plant has been ordered and shipped, and will be at work during the present month. It will prove the value of the five veins which have been cut in No. 3 tunnel.

Your directors anticipate that some very important strikes will be made during the next two or three months, of which the shareholders will be kept fully advised. It is considered desirable that a short railway line should be made to connect our mill site with the Mexican Arizona Railway at the town of Clifton; and the ground is now being actively surveyed. . . .

"Estimates for the erection of reduction works of a daily capacity of 500 tons have been received, and as soon as Mr. Dunham's report of his investigations at Butte reaches the board, the matter will receive their immediate attention."

Mr. Farish's report is substantially as follows: "The No. 3 tunnel has passed through five veins or dikes; the first, 175 feet from mouth of tunnel; the second, 290 feet; the third, 420 feet; the fourth, 600 feet; and the fifth, 750 feet. The first four are from 6 to 15 feet across. The tunnel crosses the fifth one obliquely. On the line of the tunnel it measured 80 feet. They carry more or less mineral, but nothing that will pay. You are aware that there are numerous veins and formations, none of which have been prospected, and it would not pay to do so, except by the diamond drill, which will shortly arrive at the mine.

"On the Ollie ground the vertical shaft had reached the depth of 240 feet. The bottom of this shaft was in country rock, which showed heavy mineralization in seams and crevices. It is proposed to sink this shaft to the depth of 300 feet, when cross-cutting to the several veins will be commenced. The developments upon the Ollie Tunnel have been of the most satisfactory character, but unfortunately they were stopped when they should have been pushed. The body of ore developed in this tunnel is over 200 feet in length, and will average 15 feet wide and 6 or 7 per cent copper, and from \$1.50 to \$3 gold, with an ounce or two of silver. Near the face of the tunnel I had a drill-hole made into the wall of the tunnel, which passed through 4 feet of ore, assaying 14 per cent in copper and \$3 in gold. It is known that this ore body extends up to the end line of the Ollie claim and, while the ore is not blocked out, the winze from this tunnel is 70 feet deep, the bottom of which is in a fair grade of ore. This same body of ore is found in the little shaft 50 feet from the end line, and no doubt extends through your end line into the Cobra.

"I therefore think that the following will be a safe and conservative estimate of the probable amount of ore extending along the end of the tunnel to the end line of the claim, and from the bottom of the winze in the tunnel to within 30 or 40 feet of the surface; 400 feet long by 200 feet high and 15 feet wide equals 1,200,000 cubic feet; 13 cubic feet per one ton of ore equals 92,307 tons. Of course this ground is not blocked out as I have stated, but from the known developments made upon it I think the estimate will be more than verified on full development.

"The indications in the shaft are first-class, and I have no doubt but what this ore body will be found in it when the cross-cuts are run. It will undoubtedly extend down, but whether it will be long enough to reach the point at which the shaft is sunk I cannot tell, but from the heavy mineralization on the croppings of the veins I would feel disappointed if it did not do so.

"I examined the Black Mastodon Mine and have advised Mr. Dunham to sink a vertical shaft upon it. The incline shaft which has already been sunk is very flat; it exposes a very heavy body of iron sulphides with occasional bunches of good copper ore, particularly towards the bottom of the incline. This vein is traceable through the developed portion of the district, and has furnished a very large amount of good copper ore at different points. The indications that this property will develop satisfactorily are the best.

"No. 3 tunnel, in my opinion, should be run around the Cobra properties and in our own ground. This part of the property can be better prospected on either side of the tunnel by using

the diamond drill, for the veins and dikes are numerous, and some of them should carry, and no doubt will carry, valuable ore. I advised Mr. Dunham to sink a winze upon the ore body in the Ollie near the end of the tunnel, and drive the tunnel up to the end of the claim. This winze should go down to a depth sufficient to meet a drift to be run from the bottom of the vertical shaft. Should this body of ground develop as I believe it will by the proposed work, you will then be in a position to run a good sized plant, and investigations of various reduction methods should be commenced at once to determine the merits as applied to your ore."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Annuaire du Bureau des Longitudes pour l'An 1903. Paris, France; Gauthier-Villars. Pages, 808. Price (in New York), 50 cents.

Elektromagnetische Aufbereitung. By F. Langguth. Halle A. H., Germany; Wilhelm Knapp. Pages, 64; illustrated. Price (in New York), \$1.

Report of the Chief Inspector of Mines in India. 1901. George A. Stonier, Chief Inspector. Calcutta, India; Government Printing Office. Pages, 78.

A Text-book of Quantitative Chemical Analysis. By Frank Julian. St. Paul, Minn.; the Ramsey Publishing Company. Pages, 600; illustrated. Price, \$6.

Handbuch der Electrochemie. Lieferung I; Specielle Electrochemie. By Dr. H. Danneil. Halle A. S., Germany; Wilhelm Knapp. Pages, 80. Price (in New York), \$1.

Emploi des Explosifs dans les Mines de Houille de Belgique. By Victor Watteyne, Simon Stassart and Lucian Denoel. Brussels, Belgium; L. Narcisse. Pages, 168; illustrated.

The Oil-fields of California from a Commercial Standpoint. San Francisco, Cal.; prepared and published for the California Petroleum Miners' Association. Pamphlet, 28 pages.

Production and Properties of Zinc. By Walter Renton Ingalls. First Edition, 1902. New York and London; the ENGINEERING AND MINING JOURNAL. Pages, 328; illustrated. Price, \$3.

Einführung in die Elektrochemie. Nach der Elektrolytischen Dissociationstheorie. By Peter Gerd. Halle A. S., Germany; Wilhelm Knapp. Pages, 120; illustrated. Price (in New York), \$1.40.

Annual Report of the United States Mine Inspector of the Territory of New Mexico. 1902. J. E. Sheridan, Inspector. Washington; Government Printing Office. Pages, 104; with maps and illustrations.

Beitrag zur Kenntniss der Surinamischen Latent und Schutzrinden-biddungen. By G. C. Du Bois. Republished from Tschermak's Mineralogischen und Petrographischen Mitteilungen. Vienna, Austria; Alfred Hölder. Pages, 60; with plate.

Society for the Promotion of Engineering Education. Proceedings, Volume X. With Index to Volume I-X. Edited by Robert Fletcher, Calvin M. Woodward and Clarence A. Waldo. New York; Engineering News Publishing Company. Pages, 300. Price, to members, \$1.50; to others, \$2.50.

BOOKS REVIEWED.

Year Book and Directory of the Chamber of Commerce of Pittsburg, Pa. 1902. Edited by George H. Anderson, Secretary Pittsburg, P.; Published for the Chamber. Pages, 160.

In addition to the usual routine of information on the organization and transactions of the Cham-

ber of Commerce and with purely mining affairs, this report contains some valuable information on the coal trade of the Pittsburg District, on the production of coke, and on the iron trade, which forms an important part of the business of the city and the country tributary to it. The Chamber of Commerce is an active body, and takes an intelligent interest in all matters concerning the trade of the city, as is shown by its reports.

Annual Report Department of Mines, New South Wales, for the Year 1901. D. C. McLachlan, Under Secretary of Mines. Sydney, N. S. W.; Government Printer. Pages, 196; illustrated.

This volume, in addition to the report of the Under Secretary of Mines, showing the production and general progress for the year 1901, contains the reports of the mine inspectors of the different districts, and also a number of special articles describing the extensive mines and mining districts. It gives besides a number of short papers showing improvements in mining and mine appliances. Especial attention is given to coal mining during the year, and also to the production of the minor metals, such as antimony, bismuth, cobalt, platinum, etc., and the possibilities for development in this direction. The figures show the progress made in mining during the year, and the output of New South Wales, which was generally encouraging.

L'Anne Technique. 1901-1902. By A. da Cunha, Paris, France; Gauthier-Villars. Pages, 272; with 114 illustrations. Price (in New York), \$1.25.

Under this title, M. Da Cunha has gathered in one volume a study of the scientific and industrial progress realized during the past year in those lines of manufacture and trade which especially affect the engineer and architect. He has not, however, included mining in his yearly summary, the departments of which he treats especially being tramways and traction, cycles and automobiles, bridges and architectural works, maritime and naval construction and coast fortifications. He has added a chapter on aerial navigation which will interest some of our engineers who have been experimenting in that direction. Naturally many important subjects are briefly glanced at only; but the summary seems to be generally clear and well illustrated by drawings and diagrams of different kinds.

Transactions of the American Institute of Mining Engineers. Volume XXXI. Edited by Rossiter W. Raymond, Secretary. New York; Published by the Institute. Pages, 1080; illustrated.

This volume contains the papers presented at the Richmond meeting in February, and the Mexican meeting in November, 1901, excepting those which treated more or less directly with the industry in Mexico. It was found on account of the overwhelming amount of material furnished for this meeting, and accepted, that the *Transactions* would have to be issued in two volumes instead of one. Under this arrangement the special Mexican material will appear in Volume XXXII, which will be shortly issued, and which in addition to these papers will contain a full account of the Mexican meeting and of the various excursions connected with that meeting. The present volume contains a large number of very valuable papers and descriptions, many of which have been noted and abstracted in our columns at the time when they were first read. Among other topics there are considerable additions to the literature on ore deposits and the data on mining surveying instruments.

Report on the Mines of India for the Year 1901. G. A. Stonier, Chief Inspector of Mines. Calcutta, India; Government Printing Office. Pages, 80.

This report covers an extensive district including Baluchistan, besides India proper. It does

not cover the independent Native States which include some important mining districts, such as the Kolar Gold-field in Mysore, the Singareni coal-field in the Deccan and some less important districts. Making these exceptions, it appears that the Indian mines are of somewhat greater importance than is generally supposed. A considerable number of employees are engaged in the production of mica, salt, manganese ore, graphite and other minerals, while a still larger number are employed in the quarries and in the various clay industries. According to the returns, the average of persons employed in mining and quarrying in 1901 was 142,491. This however, is not a large proportion, as the total population of India is 210,000,000. It is a notable fact that of this total number of employed more than 20 per cent were women, who apparently play a considerable part in the Indian mining industry. The report shows that the number of accidents, especially in the coal mines, is gradually decreasing, although there is still a great deal to be done for the proper protection of the miners. A note, peculiar to India, refers to the suffering of the miners in various places, from the bubonic plague, and the efforts made by the mine inspectors to prevent the spreading of this plague among them. The report includes some interesting details as to Indian mining, besides the statistics and results.

New York. Twentieth Report of the State Geologist. Frederick J. H. Merrill, State Geologist. Albany, N. Y., 1902; published by the University of the State of New York. Pages, 192; with maps and illustrations. Price, 50 cents.

This report contains a statement of the work done by the State Geologist during the year 1900. Owing to the action of the Legislature in the previous year, the department was able to extend its operations during that year and to prepare some valuable reports. Among the work undertaken was included the resurvey of Westchester County under the charge of Mr. E. C. Eckel; an investigation into the water supply of the Willard State Hospital in Seneca County; the resurvey of Putnam and Dutchess Counties, and a continuation of the survey of the northeastern Adirondacks, begun by Prof. Cushing in 1893, and now again under his charge. Some additions to the study of the crystalline rocks of the Mohawk Valley by Prof. J. F. Kemp, were also made. Under the charge of J. B. Woodworth, detailed surveys were made on the Oyster Bay and Hempstead areas on Long Island. This latter survey was a part of the study of pleistocene deposits of Long Island. Among the other work undertaken was an examination of Lake Champlain and the Valley of the Upper Hudson, with the purpose of determining the nature and extent of the evidence of maritime transgression in that region. A study of the lime and cement industries of the State was in progress under the charge of Heinrich Ries of Cornell University, which is a continuation of the report on the clay industry of the State. This made up the work of the department during the year, with the addition of some minor studies of the bluestone and flagstone quarries, and some tests of rocks used in various parts of the State in road building. Besides the general description of the work done, this report contains special articles on recent geological work in Franklin, Essex, and St. Lawrence counties; a monograph on the pleistocene geology of western New York; another on the quarry industry in southeastern New York, and a short paper on the gypsum industry of the State. Most of these reports have also been issued separately as bulletins of the State Museum. These bulletins, as well as the annual report, are printed in very convenient forms for general distribution and are sold at a price which just covers the cost of printing and postage. This plan has been found of great advantage in putting the bulletins in the hands of those who need them, and many useful monographs are thus distributed.

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 MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

Transvaal Gold Returns.

Sir:—I would like to call attention to an error in the article in your number of November 8, which has just come to hand, on "Transvaal Gold Production." In this editorial you make the error, which is now common and perhaps natural, of comparing fine gold with bullion. Before the war the outputs of the Transvaal mines were given in ounces of bullion, but since the war everything is recorded in fine gold. Thus in the article referred to, you compare the production of September, 1902, which was 170,802 ounces of fine gold, and of October, 181,439 ounces of fine gold, with that of August, 1899, and October, 1898. The bullion production in August, 1899, was reported at 482,109 ounces, but this was equal only to 410,965 ounces fine gold. The output in October, 1898, was 423,217 ounces bullion, but only 356,233 ounces fine gold.

The reporting of output in fine gold is certainly a great advance, and I only wish it could be adopted everywhere.

ENGINEER.

Johannesburg, Transvaal, Dec. 5, 1902.

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 besides 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.

Molybdenum Ore.—What is the commercial value of molybdenum ore? What kind of machinery does it take to work it, and is there any mill in the United States to work such ore?—J. A. H.

Answer.—It is difficult to give a commercial value for molybdenum ore, as the market is limited only to two or three concerns in the United States, and as purchases are made entirely by assay. The treatment of molybdenum ore is a metallurgical proposition, and is entirely done at the works named, so far as the saving of the metal is concerned. All that is necessary at the point where it is mined is a simple concentration to free the ore from gangue and impurities. The purchasers of molybdenum ore are the Primos Chemical Company, Primos, Pa.; Asch & Denninger, Phoenixville, Pa.; the Tungsten & Rare Metals Company, 91 Blackfriar's Road, London, E. C., Eng., and George G. Blackwell Sons & Co., Liverpool, Eng.

Distillation of Barium-Holding Zinc Ore.—A note in your issue of December 6 states that K. Sander has shown the harmlessness of barytes in the distillation of roasted blende, the retort residues from barytic blende containing less zinc than residues from blende free from barytes. As the zinc smelters of Missouri and Kansas are almost unanimously of the opinion that both lime and baryta in zinc ores diminish very materially the actual yield of metallic zinc, and as zinc sulphide is volatile at the temperature employed in the distillation of zinc, it would appear that analysis of residues are not conclusive. Can you give us the actual yield of metal in Sander's experiments?—W. G. W.

Answer.—The paper referred to gave no further data than what we summarized in our note. Sander's experiments alone would surely not be considered conclusive, but they are confirmatory of other work in the same direction. It is true that assays of the residues do not tell the whole story, but they are nevertheless a good guide. We do not know that the volatility of zinc sulphide has been carefully investigated. Percy says that it is volatile at

very high temperature. Also it is said to be reducible by carbon.

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 receipt of 25 cents.

Week Ending December 16, 1902.

715,746. APPARATUS FOR HANDLING TUBE-PLATES.—John J. Boax, McKeesport, Pa., assignor to National Tube Company, Pittsburg, Pa., a Corporation of New Jersey. In a transferring apparatus, the combination with suitable hoisting apparatus, of tongs carried thereby, means connected to the tongs and arranged by contact with the work to automatically open the tongs.

715,748. PROCESS OF MAKING ACETIC ACID.—Paul Boessneck, Glauchau, Germany. The process for obtaining acetic acid from a mixture of an acetate with a strong mineral acid, consists in supplying the mixture continuously to the first of a series of liquid-receptacles, causing it to pass through the receptacles continuously one after another, and discharging it from the last, and at the same time causing a continuous supply of hot elastic fluid to pass through the series of liquid-receptacles one after another in the order and direction opposite to that of the liquid flow.

715,771. TREATMENT OF ZINC ORES.—Francis Ellershausen and Richard W. Western, London, England. The process for the treatment of zinc ores and other zinkiferous matter, consists in acting upon the ore or other matter with hydric ammoniac sulphate in solution, in treating the double sulphate of ammonium and zinc formed with aqueous ammonia and in subjecting the hydroxide precipitated to heat.

715,778. PROCESS OF CONCENTRATING GASES.—Hans A. Frasch, New York, N. Y. The method of recovering sulphur dioxide consists in passing gases containing sulphur dioxide under pressure through a saturated solution of sulphur dioxide, then washing the gases under pressure with fresh water, reducing the surcharged solution thereby obtained to atmospheric pressure when the surcharged amount of sulphur dioxide evaporates, and returning the surplus solution of sulphur dioxide accumulating by the introduction of the fresh water to an evaporating apparatus where it is exposed to heat and the evaporated sulphur dioxide is returned to the absorber.

715,802. COMBINED BALE AND TIE.—Watson M. Holmes, Hoosick Falls, N. Y., assignor, by mesne assignments, to Planters Compress Company of Maine, a Corporation of Maine. The combination with a bale of fibrous or other material capable of endwise expansion and having a central longitudinal orifice or opening therethrough, of sheet metal holder plates and securing devices arranged to pass through the longitudinal central orifice in the bale and connecting the plates together, whereby the bale is held against endwise expansion.

715,826. AUTOMATIC STOKER FOR MINE REFUSE OR OTHER VERY FINE FUEL.—John MacCormack, Bayonne, N. J., assignor to Royal C. Peabody, Brooklyn, N. Y. In an automatic stoker, the combination with a magazine and grate-bars arranged near the upper end thereof, of a vertically-movable platform in the magazine, means for supplying fine fuel to the platform, and a pivoted gate in the magazine arranged to open upwardly to permit the passage of fuel elevated by the platform.

715,830. CAM.—Volney W. Mason, Jr., New York, N. Y. A cam composed of a body and a removable engaging face connected thereto composed of a plate having ears provided with perforated plugs, and bolts connecting the removable engaging face with the body which pass through the plugs.

715,852. FURNACE-CHARGING MECHANISM.—Peter C. Patterson, McKeesport, Pa., assignor to National Tube Company, Pittsburg, Pa., a Corporation of New Jersey. In tube-making apparatus, the combination with a furnace having a charging-opening, of a support for the tube-blanks in line with the opening, mechanism arranged to engage a tube-blank and push the same into the furnace, and means for indicating the position for stopping the forward stroke of the mechanism.

715,854, 715,856, 715,857. APPARATUS FOR THE MANUFACTURE OF BUTT-WELD TUBING.—Peter Patterson, McKeesport, Pa., assignor to National Tube Company, New York, N. Y., a Corporation of New Jersey. In apparatus for the manufacture of double-length tubing, the combination of a welding-furnace, drawing apparatus in front thereof, a receiving-trough at the side of the drawing apparatus and adapted to feed the tube to finishing rolls, and a saw for severing the double length tube adapted to pass across the receiving trough.

715,855. TUBE-WELDING FURNACE.—Peter Patterson, McKeesport, Pa., assignor to National Tube Company, New York, N. Y., a Corporation of New Jersey. A furnace for heating tube-blanks or similar articles having a long heating-chamber provided with a hearth for supporting the blanks, a

plurality of sets of air and gas chambers, separate air and gas supply connections, ports leading from the chambers into the heating chamber at different points along the length of the latter, and separate reversing means for the air and gas supply for each of the sets of regenerative chambers.

715,868. SLAG-CASTING MACHINE.—Charles H. Rhoad, Pittsburg, Pa., assignor to Heyland Patterson, Pittsburg, Pa. In a slag-casting machine, the combination with a receiving reservoir, of a spout connected to the reservoir having a discharge opening therein, and a water box within the spout and supported above the discharge opening.

715,871. WATER PUMPING APPARATUS.—George J. Roberts, Dayton, Ohio. In a hydraulic motor and pumping apparatus, the combination with the motor, the pump and supply and discharge pipes therefor, of a valve in the motor-supply closing toward the motor and held closed by the pressure in the motor-supply, a spring for opening the valve, a cylinder open to the pressure of the pump discharge, a piston therein connected with the valve and under the influence of the pump discharge.

715,993. ROCK DRILL.—Frank Coyle, Graniteville, Vt., assignor of one-half to Nelson B. Ballard, Barre, Vt. The combination with a piston of a chuck, means for loosely connecting the chuck to the piston to permit of the rotary movement of one with respect to the other, means carried by the chuck for fixedly clamping a tool in position, a gib, and a screw for actuating the gib and locking the chuck to the piston.

716,008. WORKING ZINC AND SUBSTANCES CONTAINING SILICIC ACID IN ELECTRIC FURNACES.—Alfred Dorsemeagen, Wesel, Germany. A method of working a zinc-silicate ore consisting in preparing a charge of zinc silicate and carbon, then subjecting the charge to the action of an electric current sufficient to determine the reduction and volatilization of the zinc and the formation of carbide of silicon, and then suitably condensing the products of reduction and volatilization.

716,062. WELL-BORING DEVICE.—Rosamond L. Landry, Whitecastle, La. In a well-boring apparatus, the combination with the well-tubing of a reducer positioned in the tubing and means for supporting the reducer and provided with a valved inlet at its upper end and a water supply pipe attached to the reducer at the inlet.

716,132. METHOD OF TREATING MINERAL OILS OR THE DISTILLATES OR RESIDUALS THEREOF.—John S. Stewart-Wallace, Knock, Ireland, and William B. Cowell, London, England; said Cowell assignor to said Stewart-Wallace. A method of treating mineral oils of the kind hereinbefore stated, consisting in placing them in a suitable vessel, supplying thereto caustic soda and permanganate of potash, heating and agitating the mixture, collecting and condensing any desired light oils that may be present in the mixture and driven off during such heating, allowing the mixture to settle in order that the impurities may separate therefrom, supplying the remaining mixture to the still and collecting the distillates.

716,171. STONE DRESSING OR POLISHING TOOL.—Elmer C. Bassett, Milton, Mass., assignor to P. T. Maguire, Milton, Mass. An appliance of the character specified comprising a plate having a marginal flange projecting from one of its sides, a series of tubular wrought-metal scrapers attached to the plate and projecting into the space surrounded by the flange and a friable filling surrounding the tubular scrapers.

716,173. SUCTION DREDGE.—Lindon W. Bates, Chicago, Ill. In combination with a dredge, a hollow box-like suction pipe; a telescopic connection intermediate the pipe and the dredge; a strut pivotally connected to the suction pipe, and a swivel bearing for the upper end of the strut.

716,181. COAL MINING MACHINE.—Walter S. Bogle, Chicago, Ill. In a mining machine, the combination with a tool head provided with lateral trunnions of a carriage in which it is mounted, a track on which the carriage may travel, and means for locking the carriage in fixed position relatively to the track, the means comprising a rack disposed longitudinally of the track and between the rails thereof and a dog pivoted to the under side of the carriage and adapted to engage the track and thereby hold the carriage against travel in either direction.

716,182. CARBOPHOSPHIDE OF CALCIUM.—Charles S. Bradley, Avon, N. Y., and Robert H. Read and Charles B. Jacobs, East Orange, N. J., assignors to the Ampere Electro-Chemical Company, Ampere, East Orange, N. J., a Corporation of New Jersey. A new product consisting in a homogeneous compound of calcium carbide and calcium phosphide in proportions to be spontaneously inflammable on contact with water.

716,205. ORE CONCENTRATING TABLE.—Willis G. Dodd, San Francisco, Cal. A transversely-inclined concentrating table having a longitudinal movement and provided with a number of longitudinal riffles, the terminals of the riffles successively advancing and terminating upon the surface of the table in a curve line approximating an inverted parabola so as to permit of a band of discharge, leaving a smooth surface on to which the material collected by the riffles is discharged, washed and cleaned by being subjected to the action of clear water, and means whereby water is admitted on to the table for washing the material delivered on to the unriffled portion thereof.

716,246. EXCAVATING APPARATUS.—Albert Klatt, Collinsville, Cal., assignor to Fletcher Raymond, Collinsville, Cal. In excavating apparatus, a bucket open at the bottom

and one side, a pivoted arm near the top, a curved scoop mounted on the arm, adapted to close the bottom and open side, a lifting means secured to the scoop for opening and closing the same.

716,259. GUIDE FOR ROLLING MILLS.—John H. Mellors, Pittsburgh, Pa. A guide for rod mills, comprising the combination with rolls of guide members at the entrance and exit of the pass, plates secured to the frame of the mill and having slots, and a horizontal support bar seated in the slots and arranged between the rolls and the plates.

716,268. APPARATUS FOR REMOVING TAILINGS.—John H. A. McPhee, Dunedin, and John E. L. Cull, Christchurch, New Zealand. An apparatus for removing tailings and the like comprising a rotatable wheel, an axial entrance into the drum and curved vanes therein, the vanes at their inner ends being at a greater angle to the radius of the wheel than at their outer ends.

716,276. COMPOSITION OF MATTER AND PROCESS OF MANUFACTURING SAME.—Alonzo Ramsdell, Chicago, Ill. The composition of matter consists of cast iron of 100 lbs. of cast iron to from 9 to 15 oz. of lead, the ingredients being mixed and stirred while in a molten condition.

716,306. PROCESS OF ELECTROLYTICALLY PREPARING METALS AND ALLOYS FOR LITHOGRAPHIC PURPOSES.—Otto C. Strecker, Cologne, Germany. The process for preparing metal plates for lithographic printing consists in preparing the plate by preliminary grinding, rinsing, subjecting to an acidulated watery solution, washing and drying, fixing the negative upon the surface thus prepared, coating with gum-arabic, treating with lithophane after the gum arabic has dried, to dissolve the greasy substance, washing the plate with water to free it from the gum-arabic, dusting with powdered colophane and rubbing this off, then submitting the plate as an electrode to electrolytic action in a solution of salts and gum-arabic.

716,321. APPARATUS FOR SUPPLYING MOLTEN METAL TO MOLDS.—Cyrus C. Webster, Minneapolis, Minn. An apparatus for supplying molten metal to molds, consisting in combination with a melting pot and means for heating the same, of a pump chamber, a frame supporting the pump chamber below the surface of the molten metal in the melting pot, an egress pipe from the pump chamber, having a universal joint by which it is vertically and horizontally adjustable, an opening in the top of the pump chamber a valve in the opening having its handle extending above the molten metal in the melting pot, an air reservoir, a passageway from the pump chamber to the reservoir, an air cock in the passageway and a valve interposed between the cock and the air reservoir.

716,328. BUCKET DUMPING APPARATUS.—William R. Wilcox, Saratoga, Wyo. In a bucket dumping apparatus, the combination with a suitable frame of a dumping cradle suspended from the frame and arranged to swing across the vertical path of the bucket and a device mounted on the rear portion of the cradle and shaped to engage the bottom of the bucket.

716,330. PROCESS OF MAKING SULPHITE COMPOUNDS. Herbert H. Wing, Buffalo, N. Y. The process of producing sulphite compounds consists in submitting an oxycompound of an alkaline earth metal decomposable by sulphur dioxide in the presence of water to the action of gases containing sulphur dioxide whereby a monosulphite of such metal is formed; then separating such monosulphite from the water in which it was formed, subsequently adding it to a fresh quantity of water, and then bringing sulphur dioxide gas in contact therewith.

716,350. METHOD OF MAKING SODIUM CYANIDE.—Fritz Roessler, Frankfurt-on-the-Main, Germany, assignor to the Roessler & Hasslacher Chemical Company, New York, N. Y., a firm. The method of obtaining anhydrous cyanide of sodium consists in passing gases containing hydrocyanic acid through a highly-concentrated solution of caustic soda at a temperature above 33 degrees C.

Week Ending December 23, 1902.

716,371. PROCESS OF FINISHING ARTIFICIAL STONE.—William Black and Harry S. Richards, Chicago, Ill. The process of producing a natural finish on artificial stone composed of cement and particles of natural stone which consists in removing the cement from around the superficial ingredient particles of the composition.

716,375. CONVEYER.—John D. Buchanan, Oakwood, Ill. A conveyer comprising in combination, a frame having a horizontally-disposed member and a vertically-disposed member arranged about midway of the length thereof, guys connecting the upper portions of the vertical member to the horizontal member, supporting-struts arranged substantially in alignment with the vertical portions of said vertical member, and a conveyer-belt carried by the horizontal portion of said frame.

716,423. CONVEYER.—Charles W. Hunt, West New Brighton, N. Y. In a conveyer, the combination of a traveling, pivoted bucket, a gear carried with said bucket, and a rack mounted in the path of the gear to engage therewith and overturn the bucket, one of said co-operating parts being yieldingly supported in the direction of movement of the gear to cushion the impact of the gear against the rack.

716,455. METHOD OF PRODUCING GAS FROM PEAT.—Leonard L. Merrifield, Toronto, Canada, assignor to Edwin James Checkley and Economical Gas Apparatus Construction Company, Limited, Toronto, Canada. The herein-

described process of making gas from peat, and similar material containing an excess of moisture, which consists in feeding the said material into a suitable producer, raising the material in the lower part of the producer to incandescence, thereby vaporizing the excess of moisture of the fresh supplies in the upper part of the producer drawing off all the gas and vaporized moisture from a point between the freshly-fed fuel and the incandescent material.

716,538. STEAM SHOVEL OR EXCAVATING-MACHINE.—Chas. M. Harrison, Napoleon, Ohio. In an excavating apparatus the combination of a main boom having a bracket extending below and forward therefrom, a secondary boom mounted to reciprocate upon an axle in said bracket, a shovel pivotally connected with the secondary boom and means for operating shovel and boom.

716,559. DEPOSITION OF METALS ON EARTHENWARE ARTICLES.—Gerald W. Laybourn, Stoke-upon-Trent, England. The process of depositing metals on earthenware articles which consists in steeping the article in water, applying to it an electrical conducting medium and then depositing the metal on the body by electrolysis.

716,592. ALKALINE-EARTH SALTS OF METHYLENE DISALICYLIC ACID AND PROCESS OF MAKING SAME.—Samuel L. Summers, Philadelphia, Pa. A new product described, which is a salt wherein a metal of an alkaline earth is chemically united with the acid, radical of methylene disalicylic acid; a granular body, nearly insoluble in water and alcohol.

716,618. APPARATUS FOR ANNEALING.—Darwin Bates, Huyton, and George W. Peard, Prescott, England. An apparatus for annealing bright metals, comprising a closed annealing-chamber having a mouthpiece at each end, a liquid-containing vessel at one end forming a liquid seal for said end, external means for heating said chamber, and means operating through said liquid seal for withdrawing the articles from said chamber.

716,630. CRUCIBLE.—August Eimer, New York, N. Y. In a receptacle, the combination of a means for supplying a fluid to a receptacle, a pair of tubes connected to the said receptacle, one of said tubes having a bell adapted to direct the flow of an agent entering through the other of the said tubes, the said bell having an opening leading to its connected tube.

716,689. METHOD OF MANUFACTURING RED AGGREGATES FOR USE AS ARTIFICIAL STONE, ETC.—Herbert W. C. K. Dyson, London, England. The method of making a red aggregate which consists in heating sand in which brown basic ferric sulphate and oxyhydrates of iron have been precipitated by the decomposition of sulphate of iron which has been added in the form of a solution to the sand.

716,741. EXCAVATING-MACHINE.—Charles C. McBride, Redding, Cal. The combination of a traveling carriage having a vertical mast, a boom attached to the mast and projecting forwardly beyond the mast and the carriage, said boom adapted to occupy an overhanging relation to the end face of a bank and affording a track-surface, means for supporting and adjusting said carriage and the boom for movement in a path across, and substantially parallel to the end face of a cut or excavation, a shovel-carrier adapted to said track of the boom and arranged to travel toward and from said carriage, a swinging shovel having a hinged connection to the shovel-carrier, and means for operating the shovel-carrier and the shovel individually or collectively.

716,750. MACHINERY FOR CHARGING STEEL OR LIKE FURNACES.—Anthony Patterson, Cardiff, England. In machinery for charging furnaces, the combination of a suspended frame, means for gripping the charging-box carried by said frame, a ram for pushing the contents of the charging-box into the furnace, and means carried by said frame for operating said ram.

716,757. GAS-PURIFIER.—Ward J. Renwick and Joseph Heaton, Auburn, Me.—In gas-purifying apparatus, the closed tank, the inner mantle therein, and the outer mantle, having a depending upper end portion for discharge upon said inner mantle.

716,769. ORE STORAGE AND DELIVERY BIN.—John W. Seaver, Cleveland, Ohio, assignor to the Wellman Seaver Engineering Company, Cleveland, Ohio. A bin for the storage and delivery of ore or other like material, said bin having a delivery-throat, one wall of which presents a step-like formation in a plane inclined in respect to the opposite wall, the steps being separated from each other vertically by fixed spaces into which the descending mass of ore can expand.

716,787. WURTZILITE PRODUCT.—Robert M. Thompson, Sutton, Neb. A wurtzilite product combined with a hardening substance as mica, asbestos or soapstone, and a quantity of sulphur, in the proportions substantially as set forth.

716,789. MANUFACTURING CHLORATES.—Richard Threlfall, Birmingham, England. An improved method of manufacturing chlorates and perchlorates of the alkali metals consisting of subjecting the electrolyte from which such substances are to be derived, to unequal electrolytic action at the anode and main cathode respectively, the action at the anode being the greater.

716,803. PROCESS OF PURIFYING GAS.—Edward Zahm and John A. Just, Syracuse, N. Y. The process of purifying gases which consists in forcing the gas through a porous medium submerged in a purifying liquid.

716,804. APPARATUS FOR PRODUCING CAUSTIC SODA BY ELECTROLYSIS.—Edward A. Allen, Rumford, Falls, Me., and Hugh K. Moore, Lynn, Mass., assignors by mesne assignments, to Moore Electrolytic Company, Portland, Me., and Boston, Mass. A cell comprising a non-conducting substantially vertical diaphragm, sufficiently porous to permit the percolation of a considerable quantity of liquid, a suitable anode, and a cathode in contact with the outer face of the diaphragm, said cathode being formed of a porous layer of such thickness as to retain a considerable body of liquid in its pores, whereby the sodium deposited in the cathode is converted into hydrate by the water of the undecomposed solution which has passed through the diaphragm, and the electrolyzing of the undecomposed solution in the pores of the cathode is completed as it flows there-through from edge to edge.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending November 20, 1902.

21,738 of 1901. COPPER-SILVER-ALUMINUM ALLOY.—J. F. Duke, London. A copper-silver-aluminum alloy 950 parts of copper, 45 parts aluminum and 2 to 5 parts of silver, to imitate gold and capable of being worked and drawn into wire.

25,578 and 23,922 of 1901. COAL COMPRESSER.—J. H. Darby and A. J. Stevens, Brymbo. Improved machinery for stamping and compressing coal before it goes into the coke oven.

26,411 of 1901. COKE OVEN.—J. R. Nickolsen and H. Brown, Manchester. Means for preventing the escape of smoke and gases from coke ovens while charging.

23,885 of 1902. BALL MILL.—F. Hnndshagen, Muhlheim, Germany. A ball mill with pockets on the inside surface of the cylinder which carry up particles and throw them down when at top, an air blast extracting particles ground fine enough.

20,981 of 1902. ANTIMONY SMELTING.—N. C. Cookson, Newcastle-on-Tyne. Improvements in the method of smelting antimony ores in reverberatory furnaces to prevent volatilization.

Week Ending November 27, 1902.

23,820 of 1901. MINERS' LAMP TESTER.—J. Roby, Wigan. An improved apparatus for simultaneously trimming and testing miners' lamps.

25,924 of 1901. PIG IRON BREAKER.—H. Bentley, Whitehaven. Improvements in the inventor's machine for breaking pig iron.

295 of 1902. REFINING ALKALI METALS.—Chemische Fabrik Griesheim Elektron, Frankfurt, Germany. Making alkali metals by heating calcium carbide with fluoride of the alkali metal.

2,671 of 1902. SLAG DISINTEGRATOR.—Fellner & Ziegler, Frankfurt, Germany. Improvements in the inventor's machine for cooling and disintegrating slag by pouring the slag over a rotating cooling cone.

17,172 of 1902. COAL MINING MACHINE.—G. Watkins, Resolven, Glamorgan. A coal boring machine easily fixed in any position by being wedged to the roof.

17,928 of 1902. ROCK DRILL.—V. Schneider, Trimountain, Michigan, U. S. A. An improved method of rotating reciprocating rock drills.

19,914 of 1902. NICKEL MELTING.—H. L. Haas, New York, U. S. A. Melting nickel by mixing it with the fuel itself instead of in outside heated crucibles.

Week Ending December 4, 1902.

23,422 of 1901. GOLD RECOVERY FROM SEA WATER.—W. H. Martin, London. Spraying sulphate of alumina and chloride of mercury into sea water in reservoirs, in order to precipitate the gold.

25,334 of 1901. MINER'S LAMP.—L. N. Williams, Aberdare. Improved means of locking the tops of safety lamps.

25,444 of 1901. SEPARATING ARSENIC.—J. E. Riley and J. Barnes, Accrington. Splitting up sulphide of arsenic by boiling it in sulphuric acid, the sulphur rising to the top and arsenic remaining as arsenious acid.

25,476 of 1901. BASIC STEEL MAKING.—N. McConnell, Pittsburgh, U. S. A. Use of ferro-phosphorus for making steel comparatively high in phosphorus in a basic open-hearth furnace.

18,237 of 1902. ALUMINUM SOLDER.—J. M. Jackson and O. Kiesel, Munich, Germany. A solder for aluminum consisting of tin with a small admixture of aluminum.

20,220 of 1902. ALUMINA FROM MARL.—M. Packard, Buffalo, U. S. A. Igniting marl with carbonate of soda, leaching out the sodium aluminate and recovering the alumina.

20,914 of 1902. ROCK DRILL VALVE.—A. D. Foote, Grass Valley, Cal., U. S. A. Improvements in the valves for air and steam rock drills.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

PERSONAL.

Mr. John A. Church is now at Clifton, Ariz.

Mr. Carl Eilers is in New York City on a brief visit.

Mr. R. F. Bayliss, chairman of the Exploration Company, Limited, is in New York City.

Mr. Edward I. Field, of Denver, Colo., was in New York recently en route from California.

Mr. E. Fleming Lengle, of La Providencia Mine, at Durango, Mex., is visiting New York City.

Mr. Auguste Mathez has gone to the San Nicolas Mine, near Chacucua, State of Zacatecas, Mex.

Mr. Richard M. Atwater became manager of the Ymir Mine in British Columbia on January 1.

Mr. Frederick I. Cairns has resigned as manager of the Washoe Smelter at Anaconda, Mont.

Mr. W. J. Johnston, president of the ENGINEERING AND MINING JOURNAL, is at San Francisco, Cal.

Mr. T. Fitzgerald is superintendent of the Portland Mine, Cripple Creek, Colo., succeeding Mr. Garvin.

Mr. R. J. Grant, formerly assistant manager of Stratton's Independence Mine, is now at Denver, Colo.

Mr. T. L. Ayers, of San Francisco, Cal., has been examining his mining properties near Kingman, Ariz.

Mr. Charles E. Hayden is now in charge of the Paymaster Mine, 12 miles north of Boise City, Idaho.

Mr. T. R. Griffith, manager of the Augusta Mining Company at Breckenridge, Colo., has gone to Pittston, Pa.

Mr. R. P. Hunter, of Ogden, Utah, has been appointed president of the Boston-Idaho Mining Company.

Mr. R. H. McD. Hancock succeeds Mr. G. P. Mackler as mining engineer of the Adventure Mine, Houghton, Mich.

Mr. William Wood, of the Lyons-Kyle Mining Company, operating in Gilpin County, Colo., has been in Chicago, Ill.

Mr. S. F. Emmons has returned to Washington, D. C., after a visit to Europe and a professional trip to Nova Scotia.

Mr. George H. Robinson, superintendent of the Montana Ore Purchasing Company, at Butte, Mont., has resigned.

Mr. T. A. Patteson, Jr., superintendent of the American Hill Mine, near Forest City, Cal., is in New York for a few months.

Mr. L. W. Tatum, mining engineer, of Chicago, Ill., returned there recently, but left at once for Joplin, Mo., on professional business.

Mr. C. M. Fuller, of Denver, Colo., is consulting engineer to the Horeshoe Company, at Terry, S. Dak. Mr. Anson Higbee is manager.

Mr. B. F. Chenoweth, of Houghton, Mich., recently examined the Columbus Mine at Alta, Utah, in the interest of Eastern shareholders.

Mr. C. C. Higgins, of Salt Lake, Utah, recently returned from the Grant's Pass, Ore., where he has obtained control of the Baby Mine.

Mr. Smith McKay, of Denver, Colo., is superintending the erection of the new mill of the Hidden Fortune Company, near Deadwood, S. Dak.

Messrs. Henri Auerbach and Albert de Marchena, of Paris, France, have proceeded to Texas to investigate the occurrence of oil in that State.

Mr. E. M. Johnson, chief chemist of the Grant plant at Denver, Colo., has resigned to accept a position as manager of a smelter at Iola, Kan.

Mr. C. J. Garvin, superintendent of the Portland Gold Mining Company at Cripple Creek, Colo., has resigned to operate leases on his own account.

Mr. George B. Earnshaw left Salt Lake, Utah, recently, for Arizona and Mexico, where he will examine mining properties for Eastern capitalists.

Mr. Frank Pearce, lately manager of the Colorado Smelters, at Butte, Mont., is about to go to Singapore, Straits Settlements, in the interests of Mr. Burrage.

Mr. B. W. Sweet, who has been developing some valuable copper properties in the Battle Lake District of Wyoming, is spending a few weeks in Denver, Colo.

Dr. John Gower, formerly of Denver, Colo., who has been interesting English capital in Colorado mines, has been making a trip on mining business to Gilpin County, Colo.

Mr. George P. Blair, who is looking after a large mining and milling proposition at Mammoth, Ariz., was a visitor in Central City, Colo., during the holidays.

Mr. Llew Humphrey, of Central City, Colo., has gone to Caliacan on the west coast of Mexico to examine properties on behalf of Eastern and English capitalists.

Prof. James Douglas, general manager of the Copper Queen Mines at Bisbee, Ariz., recently made a donation of \$5,000 to the University of Arizona for a gymnasium.

Mr. G. H. Barnhart, for 4 years superintendent of the Ymir Mine and Mill, in British Columbia, has severed his connection with the company operating this well known property.

Mr. Ernest L. Godbe, who has charge of the April Fool Mine at De Lamar, Nev., recently went to Mexico, where he is making an examination of mining property for Eastern people.

Mr. Charles T. Durell, manager of the Central Montana Mines Company operating the Spotted Horse and Whiskey Gulch cyanide properties near Lewistown, spent the holidays in Denver, Colo.

Mr. G. C. Hewett, mining engineer of Colorado Springs, Colo., has been in the State of Durango, Mex., investigating various mining camps, and expects to be back at his office by January 10.

Mr. J. H. Collins and his son, Mr. Edgar Collins, sailed on the *Celtic* on December 31 for England. They were accompanied by the wife and family of the late Arthur L. Collins, of Telluride, Colo.

Mr. J. B. Fleming, who built the Silver King Mill and the Mackintosh sampling works at Park City, Utah, is now at Morenci, Ariz., where he will superintend the erection of reduction works.

Mr. J. L. Wells, lately superintendent of the Consolidated Mining and Smelting Company's works at Cerrillos, N. M., is now metallurgist for the Phelps-Dodge people at their smelter in Nacosari, Mex.

Mr. W. H. Kinnon, until lately general manager of the Nova Scotia General Mining and Smelting Company, Picton, N. S., has returned to Colorado, and expects to resume metallurgical practice in Denver.

Mr. William C. Ralston, general manager of the Melones Mining Company, of Melones, Cal., has been in Boston, Mass., to attend the annual meeting of the company.

Mr. Kisaburo Yamaguchi, of the Furukawa Central Office of Mines, Tokyo, Japan, was in Salt Lake, Utah, recently. He is to visit and study American smelters and other processes of ore reduction and treatment.

Prof. William P. Blake, director of School of Mines, Tucson, Ariz., has recently completed an examination of a group of promising gold veins upon the San Francisco River, a few miles above Clifton.

Mr. John Dowling has taken charge of the construction of the new furnace being built by the Valley Iron Company at Valley Head, on the Queen and Crescent route, between Birmingham, Ala., and Chattanooga, Tenn.

Mr. H. W. Hardinge, of Denver, Colo., who recently returned to Denver, Colo., after spending 8 months at the La Cananea copper mines in Sonora, Mex., installing a 600-ton concentrating plant, is now on a professional trip to Arizona.

Mr. A. Chester Beatty is making an examination of the Revenue Mines, near Ouray, Colo., for clients. Mr. Harold A. Titcomb assisting. Mr. Beatty has recently completed an examination of the United Copper Company's property in Montana.

Mr. James Bowron, one of the directors of the Valley Iron Company, recently visited the site of the new furnace and other works, including 300 coke ovens, at Valley Head, Ala. Mr. Bowron is starting a 5 months' pleasure trip to Egypt and Spain.

Mr. Henry A. Mather, formerly on the editorial staff of THE MINERAL INDUSTRY, has opened a metallurgical and analytical laboratory at 52 Beaver Street, New York City. He will make a specialty of organic analysis of all descriptions, besides making tests for processes and patents.

Mr. Edward F. White, who has been for the last 4 months in Mexico in the interest of the brimstone industry, has been on a short visit East. He makes promising reports of the brimstone supply from the Mexican deposits. Mr. White returns to the work the middle of this month.

Mr. J. F. Deems, general manager of the plant of the American Locomotive Company, at Schenectady, N. Y., under the control of which combine is also the Pittsburg Locomotive Works, in Allegheny, Pa., has been appointed general superintendent of motive power on the Indiana, Illinois & Iowa Railroad.

Mr. George J. Rockwell, who for many years has been connected with the Allis-Chalmers Company in Chicago, Ill., as metallurgist and salesman, has been transferred to Denver, Colo., to be associated with Mr. Robert J. Cory, the Western manager of the company, whose offices are at 1649 and 1651 Tremont Street.

Mr. Oscar Lachmund, who after spending some time in Australia, returned to Colorado in September, has accepted the position of metallurgist for the Majestic Copper Company, operating at Milford, Utah. Mr. Lachmund was formerly located at Idaho Springs, but afterwards connected with the Guggenheims in Mexico.

Mr. J. Trowbridge Bailey and Mr. A. A. Steel, mining engineers, associated with the Engineering Company of America, are making examinations of gold, silver and copper properties in the State of Oaxaca, Mex. They expect to spend several months in Mexico, visiting various mining districts in the interest of the above company.

Mr. A. Kennedy Ashworth, formerly of the firm of D. Ashworth & Son, consulting steam engineers and later for a number of years in charge of the engineering department of the Pittsburg Gage and Supply Company, of Pittsburg, Pa., is assistant manager of the Underfeed Stoker Company, with headquarters in the Marquette Building, Chicago.

Mr. W. F. Detert, manager of the Argonaut Mining Company, of Jackson, Cal., has been in Washington, D. C., to hear the argument before the United States Supreme Court in the case of the Argonaut Mining Company against the Kennedy Gold Mining Company. The ground in dispute between the two companies is thought to be valued at about \$2,000,000.

Mr. J. B. Keating, who a short time ago succeeded Mr. Austin H. Brown as superintendent of Capt. J. B. De La Mar's Bully Hill Smelter, has recently taken control of the company mines, succeeding in the latter management Mr. William Oxnam, resigned. Mr. Keating is a graduate of the University of Michigan, and was assistant in chemistry there for 2 years under Dr. Prescott. He is a native of Montana.

Mr. W. A. Farish, who last October went to Milford, Beaver County, Utah, to take charge of the Majestic Copper Mining and Milling Company's property, was in Denver, Colo., recently conferring with the Colorado Iron Works concerning the big smelting plant to be built for the Majestic Company. The matting plant is to have a daily capacity of 200 tons, and the lead furnace 100 tons. Mr. Farish says the intention is to erect additional furnaces until the total reduction capacity will be 2,000 tons daily. The company owns 100 claims in 5 or 6 different groups, on 4 of which plants of machinery are being installed.

Dr. T. Kirke Rose has been appointed chemist and assayer to the Royal Mint, London, Eng., in succession to the late Sir W. C. Roberts-Austen. Dr. Rose was born in London in 1865, and graduated at the Royal School of Mines in 1886. Afterwards he was engaged in metallurgical work in Colorado for 4 years, and in 1890 entered the service of the Mint. He received the degree of Doctor of Science at the University of London in 1894. He is well known as the author of "The Metallurgy of Gold," which is recognized as a standard text book. He has contributed also to the learned societies a number of papers giving the result of his investigations in connection with the metallurgy and chemistry of gold and other metals, and has written other papers in collaboration with the late Sir W. C. Roberts-Austen. He is a member of the council of the Institution of Mining and Metallurgy. His appointment is well deserved.

OBITUARY.

Eben Howell, Sr., secretary of the Illinois State Mining Board and prominent in mining circles, died December 28 at his home in Springfield, Ill., aged 53 years.

Addison E. Head, a pioneer miner and capitalist, of San Francisco, Cal., died in that city recently. He was one of the first to invest in the Comstock and derived a large fortune therefrom.

Mr. George Cumming, one of the pioneer engineers of California, died in San Francisco recently. He has been connected at different times with the Risdon, the Fulton and the Union Iron Works of that city. He was the inventor of a portable stamp mill, and also of a portable miner's forge. He was a designer of hydraulic plants, and his work was closely identified with the mining industry of the Pacific Coast.

Prof. Charles J. Bell, professor of chemistry in the University of Minnesota, died January 4 at the residence of his brother, Dr. William A. Bell, of Somerville, Mass., where he was spending the holidays. Prof. Bell was born in Somerville in 1855, graduated from Harvard in 1876, studied 4 years abroad, also at Johns Hopkins University, after which he was professor of chemistry in Pennsylvania State College until he accepted a similar position in the University of Minnesota. A widow survives him.

Achille Francois Migeon, of Torrington, Conn., died at Jacksonville, Fla. on December 31. Mr. Migeon was born of French parents at Milford, Mass., in 1833. He was at one time in company with Franklin Farrel, of Ansonia, Conn. He was a director of the Torrington Brass Manufacturing Company, the Turner-Seymour Manufacturing Company, the Hendey Machine Company, all of Torrington. He was the president of the Bridgeport Copper Company, vice-president of the Parrot Silver and Copper Company, of Butte, Mont., and was financially interested in a number of other concerns. He left a widow and two daughters.

Prof. P. H. Van Diest died suddenly at San Luis, Colo., on December 25. Prof. Van Diest was born in Edam, Holland. He studied geology at the Delft Academy, and in Germany and England. He went to the Dutch East Indies to be chief of mines in Java, and looked out for his government's interests there for years. The tropical climate undermined his health, and he was obliged to resign his post, the government granting a life pension. A stay in European cities did not improve his health, and his physicians advised him to go to Colorado, where he arrived in 1872. Prof. Van Diest's abilities immediately secured him a position as chief of the land department in the surveyor general's office. His post he held for 17 years. Prof. Van Diest held the chair of metallurgy in the State School of Mines. At the time of his death he was engaged with his son, Edmon C. Van Diest, at San Luis. He was an author of wide fame on scientific subjects, and contributed to technological societies in Europe and America. He left a son and 4 daughters.

SOCIETIES AND TECHNICAL SCHOOLS.

ENGINEERS' CLUB OF ST. LOUIS.—At the meeting on December 3, 27 members and 2 visitors were present.

The chairman announced that the executive committee had approved the report of the committee on prizes, and awarded the annual prize to Mr. H. H. Humphrey for his paper entitled "Notes on the Use of Beaumont Oil as Fuel," read before the club April 2, 1902.

As the president of the club was absent from the city, the annual report of the executive committee was not presented. The reports of the secretary, treasurer, librarian, board of managers and governing board were read and on motion were accepted and filed. The treasurer's report was referred to the executive committee.

ENGINEERS' CLUB OF PHILADELPHIA.—At the meeting on December 20, 55 members and visitors were present.

Mr. Henry S. Spackman presented the paper of the evening upon "The Manufacture of Portland Cement from Marl and Clay," and illustrated his remarks by a series of views projected by the electric lantern. The paper consisted of a description of the natural deposits of marl and clay, and of the method of manufacturing Portland cement by the wet process, with some details of a typical marl mill. The subject was discussed by Messrs. Herbert T. Grantham, James Christie, Eugene M. Nichols, Richard L. Humphrey and others.

Mr. F. C. Andrews was elected to active membership, Messrs. W. Jordan, Jr., Harold T. Moore and Charles J. Pfeiffer, to junior membership, and Mr. A. H. Bromley, Jr., to associate membership.

WESTERN PENNSYLVANIA CENTRAL MINING INSTITUTE.—At the recent annual meeting the following officers were elected for the year: President, Fred C. Keighley; vice-presidents, Charles Connor and Austin King; secretary and treasurer, J. G. Robe; assistant secretary, Elias Phillips; auditors, Ruben Street and John Britt; editor, Fred C. Keighley.

The opening address was delivered by President Keighley, of Uniontown. His talk was confined to the congested condition of the railroads and their failure to deliver enough fuel to keep mills and foundries running. Thomas K. Adams, a mine inspector of Mercer, discussed the lower productive coal measures of the bituminous regions and the methods used by engineers to secure these measures. John W. Byers, superintendent of farms and live stock for the H. C. Frick Coke Company at Fairchance, talked on pit stock and the proper care to secure the best results from their work.

INDUSTRIAL NOTES.

The M. Garland Company, of Bay City, Mich., has shipped one of its 4 saw edgers complete to the Elk Rapids Iron Company, Elk Rapids, Mich.

The Robins Conveying Belt Company, of New York City, has secured a contract for conveying machinery to be utilized for the feeding of lime kilns at Ambergate, Derby, England.

The Monterey Coal Company, with \$1,000,000 capital, has been formed at Monterey, Mex., by Jose

Castellot, of Campeche, and members of the Monterey Iron and Steel Company. The new concern proposes to develop a large tract of coal lands in the State of Coahuila.

The 300-mile pipe line from the Kern River, Cal., oil fields to Point Richmond, San Francisco Bay, being built by the Standard Oil Company is 8 in. in diameter and a flow of 10,000 barrels a day will be maintained at first. There are 10 pumping stations on the line, with an installation of 4 150-h.p. boilers each.

The Westinghouse Electric and Manufacturing Company, of Pittsburg, Pa., is making some very heavy shipments of electrical machinery to England, principally for the Mersey Tunnel Railway power house, the contract for the conversion of which road is being filled by the British Westinghouse Electric and Manufacturing Company.

The \$20,000,000 malleable castings' consolidation, announced last month as an assured thing, has gone to pieces. It is said the support of former Judge Elbert R. Gary, Max Pam and their associates in the United States Steel Corporation, was withdrawn on the ground that the conditions are not opportune for the launching of such a concern, and this lead to the deal being dropped for an indefinite time.

During the past few days the Colorado Iron Works of Denver, Colo., has received a large number of orders, among which were the following: 2 reverberatory roasting furnaces, 16 by 64 in. for the Ohio & Colorado Smelting and Refining Company; 1 36-in. round copper matting furnace for the Tacoma Smelting Company, Tacoma, Wash.; 1 5-stamp mill and 3 free vanners for the El Carmen Exploration Company, of Mexico.

The La Bell Iron Company, of Wheeling, W. Va., has raised its capitalization from \$5,000,000 to \$7,500,000, and will utilize some of the new funds for the purchase of its own coke sources in the Connellsville field. It has secured large tracts of coal in Eastern West Virginia. The company can use every pound of coal and coke it mines. Besides its mills in South Wheeling, it is completing at a cost of about \$3,000,000, tube, sheet, tin and plate plants at Steubenville, O.

The name of the Standard Traction Brake Company, of 26 Cortlandt Street, New York City, has been changed to the Westinghouse Traction Brake Company. This company sells all power brakes for street railway service manufactured by the Westinghouse Air Brake Company, including straight or automatic air-operated brakes with axle-driven or motor-driven compressors, the storage system of air-brakes and the Westinghouse combined magnetic brake and electric car-heating apparatus.

The Mine and Smelter Supply Company, through its New York office, recently secured orders for 2 Kinkead mills and 5 Wilfley tables for export. The main office in Denver, Colo., has purchased the entire stock and good will of the Standard Fire Brick Company, of Denver and Pueblo, Colo. The Mine and Smelter Supply Company will handle the entire product of the above company in assay supplies, and will carry a complete line of assay supplies in each of its branch houses as well as in Denver.

The old blast furnace at Newberry, west of Sault Ste. Marie, Mich., is being rebuilt and enlarged, and 40 large charcoal ovens are under way. The new owners of the furnace, including Berry Brothers, of Detroit, have bought some 19,000 acres of hard wood lands, into which railroad spurs are being run, and they have under option about 80,000 acres more. They will have one of the largest alcohol plants in the United States. The old charcoal furnace at St. Ignace, a few miles further east, which has been under repair and enlargement for some time, is about to blow in.

The C. O. Bartlett & Snow Company, of Cleveland, O., has lately received an order from the Illinois Central Railroad Company for a patent 4-compartment, style C, No. 3 direct heat dryer for drying 100 tons of coal per day, the coal to be burned in powdered form. The company has also received an order from the Bronson Portland Cement Company for dryer of same size for drying 100 tons of coal per day to be used for burning cement, and expects to make shipment within a few days. The St. Louis Portland Cement Company ordered a No. 1 large dryer for drying 150 tons of coal per day.

The Mansfield Technical Society, of Mansfield, O., has been organized among the officers and employees of the Ohio Brass Company, of that city. The object of the society is the promotion of technical knowledge among its members. Regular meetings of the society are held, at which papers pertaining to various branches of technical work are read and discussed. A reading and reference library has been established in connection with the society, and a number of technical papers, trade journals, etc., are kept on file for the use of the members. Any contributions in the way of scientific or trade papers will be thankfully received.

The Chicago Pneumatic Tool Company invited all

its representatives in this country and in Europe to attend a general meeting to be held at the general offices of the company, 1010 Fisher Building, Chicago, on January 5. At this meeting reports of representatives dealing with the trade conditions in the various parts of the civilized world were gone over very carefully, and a more thorough understanding of the requirements of both the foreign and domestic customers of the company secured. This general meeting will, in all probability, be repeated each year as it enables the company to fulfill customers' requirements more satisfactorily.

Following the negotiations with Speyer & Co. for a loan of \$3,500,000 by the Consolidated Lake Superior Company several changes have been made in the board of directors. To make places for representatives of the banking syndicate on the board, F. S. Lewis, W. P. Douglas, Edward C. Lee and James Butterworth offered their resignations, which were accepted, and the board elected Charles McDonald and Charles H. Tweed, Horatio G. Lloyd and Thomas Devitt Cuyler, of New York City. James S. Swartz, who has been a member of the board for several years, was elected vice-president to fill the vacancy due to the resignation of E. C. Lee.

The J. H. Montgomery Machinery Company, of Denver, Colo., reports a rush of orders for its celebrated wire rope tramways. It has orders for 4 at present on its books; one of 100 tons capacity per day for Baker City, Ore.; one of 50 tons capacity in 10 hours for the Silver King Mine at Dillon, Colo., which company erected one on another one of its mines last year. The J. H. Montgomery Company is also building one of 4 tons per hour capacity for Montezuma, Mex.; one for Fairbanks, Morse & Co., to be erected in Ariz., to have a capacity of 50 tons in 10 hours, and has booked an order for a set of 14 by 17 in. duplex swing frame rolls, fitted with Latrobe shells, and other machinery for a small concentrating plant near Cook's Peak, N. M.

The constant growth of demands for power has made it necessary for the New York Edison Company to arrange for new generators, rotary converters and transformers. The Stanley Electric Manufacturing Company, of Pittsfield, Mass., has secured, through its New York office, this contract, notable not only on account of the total amount involved, but also because of the unusual size of the units. It calls for 4 2,000 kw. S. K. C. rotary converters; 12 800 kw. S. K. C. static transformers of the air-blast type, and 4 auto-regulators. As is generally known, the largest rotaries hitherto built are the 1,500-kw. units in the Manhattan Elevated sub-stations, and therefore the construction of those of 2,000-kw. capacity marks a distinct advance. In addition, the contract calls for 10 1,000-kw. S. K. C. rotary converters, with 30 400-kw. S. K. C. static transformers, of the air-blast type, and 10 auto-regulators. The above apparatus is to be placed in various sub-stations of the Edison system. Furthermore, the Stanley Electric Manufacturing Company is to furnish 3 new generating units for the waterside station. The machines are to be 3,500 kw., 25 cycles, 3-phase, alternating-current generators, direct-connected to engines working at 75 revolutions per minute.

Robert W. Hunt & Co., of Chicago, Ill., have been given the inspection of 350 steel ore cars, to be built by the Pressed Steel Car Company for the Duluth, Missabe & Northern Railroad Company, and 450 of the same class of cars, to be built by the same company for the Duluth & Iron Range Railroad; in addition, for the latter railroad company, they have a small order of 75 flat and box cars to be built at Hegewisch, Ill.; the inspection of 500 steel under frame box cars, to be built at Berwick, Pa., for the Philadelphia & Reading Railroad Company, and 500 steel hopper coal cars for the same road, to be built at Butler, Pa. Robert W. Hunt & Co. have just been given the inspection of 1,600 box and 500 stock cars, with pressed steel under frames, to be built at Hegewisch, Ill., for the Southern Pacific Railroad Company, and 1,000 flats, with pressed steel under frames, to be built for the same company, by the Pressed Steel Car Company, at the McKee's Rocks, Pa., plant. They are engaged upon the inspection of 300 gondola cars for the Bellington & Beaver Creek Railroad Company, at Jeffersonville, Ind., and 110 coal cars for the East St. Louis & Suburban Railroad Company, to be built at Madison, Ill. The firm reports their locomotive inspection department very busy at various works. They have just received instructions to inspect 27 locomotives at the Baldwin Locomotive Works, for the Wheeling & Lake Erie Railway Company, and have been given an additional order by the Hocking Valley Railroad Company for the inspection of 12 switching engines, to be built at the Brooks Works.

TRADE CATALOGUES.

Catalogue No. 5, issued by the Borden-Selleck Company, of Chicago, Ill., is entitled "Conveying and Elevating Machinery," and gives a description of the

Harrison Conveyor as it is used for handling coal and ashes about boiler plants, or for packages, bundles and boxes about manufacturing establishments. The link-chain and the various attachments used in this conveyor are described in detail. The pamphlet also gives particulars of shaking and revolving screens, shafting, hangers, friction spur, bevel and miter gears, iron pulleys, etc.

"Brickworks Engineering" is the title of a 12-page pamphlet sent out by Willard D. Richardson, Cleveland, O. Mr. Richardson points out the enormous development of the clay industries in Germany, and the attention given clay work by German engineers, while American clay workers, in many instances, are struggling along with poorly designed and poorly equipped plants. Mr. Richardson will act as a consulting engineer, and will examine clay deposits, test clay and burned products, design brick dryers and kilns and also give advice on the superintendence of established plants, and act as manufacturers' agent for the various supplies used in the clay industry.

A pamphlet of 143 pages, published by the Eastwood Wire Manufacturing Company, of Belleville, N. J., contains descriptions of bronze valves of many designs, including the Belleville pattern, the Eastwood pressure valve, blow-off valves, bronze pipe fittings, hydraulic valves and fittings, copper tubing, oil cups, perforated metals and screen plates. The company states it has the largest plant in the world for the manufacture of Fourdrinier wires, and is in a position to supply both large and small customers with these goods very promptly, and with cylinder and washer wire cloth made of the same stock. The company also manufactures babbitt metals, and states that it is prepared to execute castings of the most difficult character in bronze, yellow metal, acid metal and aluminum for marine and stationary engine manufacturers, ship builders, sulphite and chemical works, or for general contractors.

ARIZONA.

GILA COUNTY.

(From Our Special Correspondent.)

Confederate Mining Company.—Good reports are at hand of the mines belonging to this company on Pinto Creek.

Pay Rock.—This mine, at Payson, is proving to be a good property.

Pinto Creek Mining Company.—Two Standard concentrators are being installed on this company's property on Pinto Creek. C. C. Clark is superintendent.

MARICOPA COUNTY.

(From Our Special Correspondent.)

Camelback Oil Company.—This company, composed of business men of Phoenix, has suspended operations. It exhausted its resources before getting deep enough, so decided to pay up all debts and wait till spring.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Black Mountain Gold Company.—A. J. Richardson has organized this company at Union Pass, and taken over a group of gold claims near the old Mass Mine.

Bodie.—The company that has been working this mine, 20 miles from Prescott, under lease, has made the first payment on the purchase price.

Briganza.—The 20-stamp mill belonging to this mine, near Prescott, recently sent in another 26-lb. bar of bullion.

Enterprise Mining Company.—This company has shipped a car-load of high-grade copper ore, with values in gold and silver from a claim in the Wallapai Mountains. W. A. Mensch, superintendent of this mine, is taking out mining supplies and engaging men.

Good Hope.—Dr. P. D. Carper, of Los Angeles, Cal., has taken a hand on this gold mine at Searchlight. The main shaft is being sunk to water level.

Lucky Boy.—The vein has been caught on a long cross-cut on the 500-ft. level on Cerbat Mountain. The ores carry good values in the precious metals.

Minnesota Connor.—This mine, at Chloride, continues to ship ore.

Mohave Gold Mining Company.—This company at Snowball is calling for bids for running from 1,500 to 2,000 ft. of drifting on the Leland Mine.

Rambler.—This mine, adjoining the Hidden Treasure Mine at Quartette, is showing up large bodies of good ore.

Standard Gold Mining Company.—This company having gold properties in the west end of the Chimehuevis Mountain, is sinking a deep shaft.

Tennessee.—This mine, at Chloride, has cut a station at the 600-ft. level, and drifting on the vein is under way.

Val Menta Mining Company.—This company has purchased the Brown ranch and water right in Mint

Valley, and ordered about 7,000 ft. of pipe and a 10-stamp mill.

YAVAPAI COUNTY.

(From Our Special Correspondent.)

Congress.—Work is resumed and 80 stamps are dropping. About 300 tons of ore are put through daily.

Hasayampa Placers.—Preparations are making to work the auriferous gravels of this valley by dredging under auspices of the California Gold Recovery Company.

Mudhole.—The 3 mills on this mine at Walker are reported running steadily.

Octave Extension Gold Mining Company.—This company organized by local men is to explore the claims adjoining the Octave Mine. A shaft is being sunk 1,500 ft. west of the main shaft of the Octave.

Oro Grande.—Extensive additions of machinery are planned for this property. It is proposed to test the extent and depth of the ore-body by a number of 1,000-ft. diamond drill borings. A new and powerful hoist is to be erected at the shaft about 1,000 ft. north of the old shaft.

Oro Grande Exploration and Development Company.—This company has been formed at Phoenix, under the presidency of Charles H. Akers, ex-secretary of Arizona, for prospecting and developing the ground adjoining the Oro Grande.

Senate Gold Company.—The main shaft is down about 500 ft., and is practically without water, which is abundant at the 400-level, where it will be intercepted by a 7,000-gal. reservoir, and raised to surface in the skip.

Verde Smelter.—This plant, at Jerome, has one furnace in operation, and another is soon to blow in.

YUMA COUNTY.

(From Our Special Correspondent.)

Masiquita.—Ex-Senator Dorsey has bonded this mine, near Picacho, for \$100,000.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Bunker Hill.—In this mine at Amador City, C. R. Downs superintendent, the 25-ft. vein of good ore cross-cut on the 1,400 level, is considered to be holding its own in size and value.

Central Eureka Mining Company.—At this mine, between Jackson and Sutter Creek, a trial test of rock drills is being made. The shaft is down 2,000 ft. W. R. Thomas is superintendent.

Defender Mining Company.—The new 10-stamp mill on this mine at Defender, F. B. Joyce superintendent, has started. Considerable development work has been done since the 4-stamp mill burned down some time ago.

Kennedy Mill and Mining Company.—The new machinery for this mine at Jackson, J. F. Parks superintendent, will have a capacity of hoisting 1,000 tons per day. The new shaft is down 2,600 ft. The hoist will be the largest in California.

Lincoln Mining Company.—This company at Sutter Creek, E. C. Voorhis superintendent, has spent \$171,000 on development work, but has not yet struck pay in the 2,000-ft. shaft or in the drifts.

Nixon Placer Mining Company.—This company, on the Pine ranch near Sutter Creek, is doing preliminary work on the mile of gravel channel it owns. G. F. Cluff is president of the company.

Oneida Mining Company.—In this mine at Jackson, E. Hampton general manager, the 2,000-ft. shaft is to be sunk 200 ft. deeper.

Pine Grove.—Joseph Oneto and H. H. Deacon, Jr., will shortly build a 10-stamp mill on their mine at Pine Grove.

South Eureka.—At this mine, between Sutter Creek and Jackson, John Truscott superintendent, the shaft is down 2,370 ft.

Slaughterhouse.—On this claim at Oleta a new shaft has been sunk 60 ft. There is talk of bonding the claim to an English company.

Wildman-Mahoney Mining Company.—This company at Sutter Creek, John Ross, Jr., superintendent, intends sinking the Emerson shaft from 600 to 2,500 ft.

BUTTE COUNTY.

(From Our Special Correspondent.)

North California Gold Mining Company.—This company, H. H. Yard manager, has bought the Hewitt of 87 acres, near Oroville. The company is now doing considerable work on claims on the North Fork of Feather River. Some of the land in Oroville will be used for terminal facilities for the Butte & Plumas Railroad Company, which is to run up the North Fork. The gravel from many of the claims will be hauled down to the flat lands and there washed.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

The miners' pay-roll at Angels now amounts to nearly \$100,000 per month. There will soon be 425 stamps dropping in and near the camp, counting those in operation and those being put in. The most productive gold mine in the State—the Utica—is situated at Angels.

Beatrice.—Work is pushed at this mine, near Murphy's, by Superintendent Ober. The Robles Mine is now part of the property.

Bear Creek District.—In this district, near Jenny Lind, the Big Six Mine is being developed under management of Thomas Williams. The shaft on the Comet, owned by Puroy & Nelson, will be sunk to 250 ft. On the Gold Standard the Mobley Brothers have a shaft down 100 ft.

Duchess.—This mine, near Vallecito, is to have a 1,600-ft. tramway to bring the rock from tunnel to mill.

Fannie-Marie Mining Company.—At the mine at Glencoe, F. O. Courtmarsh general manager, Charles H. Blake superintendent, the new mill is running satisfactorily. George W. Brown, 53 State Street, Boston, Mass., is secretary.

Forty-nine Placer.—J. Evans, superintendent of this mine, near Douglas Flat, is putting in 2 14-in. pumps and erecting a hoist. The company has bought the Wild Goose, Texas and Comet mines. The mines were abandoned on account of water.

Lightner Mining Company.—This company, at Angels, Alex. Chalmers superintendent, has a new hoist.

Lookout.—This mine, on the Calaveras River, near San Andreas, has been examined by W. P. McIntosh, with a view to purchase.

Mahala.—This mine, near Rich Gulch, is owned by Samuel Redmond and Casey Brothers. The tunnel is in 100 ft.

Mead Gold Mining Company.—At the mine in Rich Gulch, G. Gall, of San Francisco, owner, and Chas. Gall superintendent, a 2,500-ft. is being run to cut several veins, and the gravel channel of the Mead Mine.

Oriole.—The 10-stamp mill at this mine at Angels is nearly ready to run. It has uncovered a wide vein at the 240-ft. level. W. A. Hildreth is president and F. E. Dunlap manager. The company's offices are at Stockton, and J. B. Frietas is secretary.

Tom Smith.—This mine, supposed to be an extension of the Sheep Ranch Mine, at Sheep Ranch, is being opened by Mr. Harris and associates. It has been idle some time.

FRESNO COUNTY.

(From Our Special Correspondent.)

Copper King Mining Company.—There is considerable talk about this company having mines near Clovis, and a smelter at Seal Bluff Landing, on account of the change in management and the vagaries of its former manager. It is stated that the ores on the 600 level continue of good value and quantities are shipped to the smelter.

Mount Sterling.—This copper claim near the Copper King has been bonded to William P. Chapman and Jesse R. Grant for a reported price of \$150,000.

INYO COUNTY.

(From Our Special Correspondent.)

Amalie District.—The Zada is employing 15 men. The Zenda, Cowboy, Sadie and Hart properties are being developed.

Azalena.—This mine, 13 miles from Caliente, has been bonded to the Western Mining Company, of San Francisco.

Cecil R.—On the Santa Rosa claim at Ballarat, a 20-stamp mill is to be erected. Superintendent Tood has recently uncovered bodies of good ore.

Friday Gulch.—At this mine, near Havilah, a new company is cleaning out the shaft.

Golden Argus Mining Company.—This company, operating 20 miles from Ballarat, John C. Cress superintendent, has paid a dividend of 25c. a share on the 8,000 shares of stock issued. There is a new 5-stamp mill on the property.

Leidy Mining Company.—Work has started on a 3-stamp mill to work ores from the No Sabe and other claims bonded by the Leidy Brothers to W. C. Pidge. Development work is being done with 26 men at work. The mines are near Bishop, and W. C. Pidge is superintendent.

Mineral Hill.—This mine at Ballarat is expected to resume work in January.

Porphyry Peak.—On Rock Creek, near little Round Valley, C. A. Peak has begun work on this claim in a new mining section.

Sunshine.—In this claim at Randsburg the leasers, T. W. and William Atkinson, have found good ore at 100 ft. Five tons milled an average of \$301 per ton.

KERN COUNTY.

(From Our Special Correspondent.)

Butte.—The main shaft of this mine at Randsburg, P. H. McMahon superintendent, is down 500 ft.

Merced.—This mine, near Randsburg, has been sold to Ventura County men. R. W. Cloud will have charge.

Peerless Oil Company.—This company has contracted to sell 9,000,000 bbls. of oil to the Standard Oil Company at the ruling rate of 20c. per barrel, and deliver 150,000 bbls. monthly. The company is operating 18 producing wells, and has completed 3 new ones. The average depth is 1,000 ft. The contract with the Standard runs for 5 years.

Wedge.—This mine, now owned by the Consolidated Mines Company, P. H. McMahon superintendent, had recently 20 tons of ore milled that went \$75 per ton.

Yellow Aster Mining Company.—The big mill at Randsburg, John Singleton manager, is about to start again. Much development work has been done in the mine during its idleness.

MADERA COUNTY.

(From Our Special Correspondent.)

Gambetta and Josephine.—These mines at Grub Gulch are under bond to Senator W. A. Clark and Charles Clark, of Montana. Edmund D. North is in charge of the important development work now on.

Jesse Bell Mining and Milling Company.—This Los Angeles company has bought the S. C. Olinger claims near Daulton, known as the Copper Queen, General Shafter and Rising Sun, near the Raymond branch of the Southern Pacific Railroad. The ore is copper. S. H. Baker is superintendent.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

Mariposa Mining and Commercial Company.—A break in the new dam on the Merced River will necessitate the mines and mill at Mount Bullion being run by steam power for some time.

Princeton.—At this mine, belonging to the Mariposa Mining and Commercial Company at Mount Bullion, C. C. Derby manager, sinking has been resumed and the shaft is to go 1,000 ft. deeper or 2,300 ft. in all.

Thompson-Brown Placer.—This claim is 4 miles from Bagby's, on the south side of the Merced River, opposite Sherlock's Flat. J. L. Brown and his partner are taking out dirt which goes about 50c. to a wheelbarrow load. They are putting in a flume and will not wash any gravel until that is completed. The gravel deposit is about 90 ft. wide, but of unknown depth.

MENDOCINO COUNTY.

(From Our Special Correspondent.)

Copper Queen Mining Company.—The mine sometimes called the Ornborn, is 25 miles from Cloverdale, and is owned mainly by officials of the California Northwestern Railroad. A large body of sulphide ore has been opened. Edw. Leach has left the Mohican Mine in Tuolumne County, and gone to the Copper Queen to put in a leaching plant. There is plenty of water at the mine.

MONO COUNTY.

(From Our Special Correspondent.)

Dunderberg.—The New Clement Syndicate of London, England, has been organized to work this famous old mine near Bridgeport, at one time owned by the Castle Peak Company. It is expected that a tunnel will be run to tap the ledge and avoid pumping. The mine is being examined by an expert.

MONTEREY COUNTY.

(From Our Special Correspondent.)

Ajax.—Ore from this mine is being worked in the Pugh Mill at Mansfield.

Gold Ridge.—These mines, near Mansfield, are to be opened by a 1,000-ft. tunnel.

NEVADA COUNTY.

(From Our Special Correspondent.)

Brunswick Consolidated Gold Mining Company.—It is supposed that this company at Grass Valley, C. H. Mallon superintendent, has cut the old mill shoot for which it has been drifting some time. This shoot when formerly worked showed good ore and was reasonably wide. Considerable water has lately been encountered in the shaft.

Eureka Crown Mining Company.—W. W. Turney, as representative of this Minneapolis company, has purchased the Beckman Hill Diggings of 160 acres in Pleasant Valley, about 9 miles from Nevada City, from C. N. Hovey. Some of the ground was worked in early days and is believed to be a continuation of the San Juan Ridge gravel channel. An incline will be run until the channel is struck.

Buckeye.—At this mine in Willow Valley new build-

ings for the hoisting works are being put up. The mine is to be thoroughly prospected.

North Star Mines Company.—This company at Grass Valley, A. D. Foote general manager, gave as Christmas presents certain shares of stock to its foremen, \$10 to each man and \$5 to each boy. This company, at Grass Valley, is remodeling its mill. New Dodd buddle concentrators are being put in, and a slime plant is being constructed. An asphalt floor has been put in the mill.

Pennsylvania Mining Company.—This company at Grass Valley has elected the following officers and directors: T. H. Wilhelm, president; D. E. Matteson, vice-president; J. M. Thomas, treasurer; F. J. Thomas, secretary; Fred Zeitler and E. P. Fitzsimmons. Bennett Opie is superintendent.

Union Hill.—At this mine, near Grass Valley, E. C. Creller superintendent, the new mill is about half completed. Some rich ore has lately been uncovered.

W. Y. O. D.—This mine, at Grass Valley, is owned by the Pennsylvania Mining Company. The pumps have started after a month's idleness, due to a broken shaft. As soon as the mine is pumped out mining will start.

PLACER COUNTY.

(From Our Special Correspondent.)

Bear River Mining Company.—This company, near Auburn, after suspending work for several years, is preparing to resume.

Bonnie Bee.—In this mine, at Dutch Flat, J. L. Waggoner superintendent, the mill is nearly ready. There are 2,800 tons of ore ready for crushing. The tunnel is in 480 ft.

Calf Pasture.—At this mine, near Auburn, electric power is to be furnished by the South Yuba Company.

Great Channel.—This mine, near Forest Hill, Harold T. Power superintendent, has 1,700 ft. of tunnel. It was formerly the Sellier Mine.

Haskell.—At this mine, south of Auburn, E. C. Gaylord superintendent, more men are working.

Red Bird.—In this mine, 6 miles from Colfax, owned by A. A. Tubbs and Thomas E. Haydon, a rich body of ore has been struck.

Rising Sun.—This quartz mine at Colfax, one of the oldest claims in the county, is to be worked again. It will have an electric power plant.

PLUMAS COUNTY.

(From Our Special Correspondent.)

Crown Point.—Messrs. Gobert & Leshner, owners of this mine at Quincy, have completed the 10-stamp mill and made a test run on 50 tons of ore.

Elizabeth Gold Mining Company.—In this mine at Spanish Ranch, C. R. Thompson superintendent, a second tunnel is now in 180 ft. The mill is closed for the winter.

Hallsted.—A representative of W. P. Hammon, of Oroville, has men at this mine, near Spanish Ranch, investigating the property.

SACRAMENTO COUNTY.

(From Our Special Correspondent.)

Natoma Vineyard.—This bearing vineyard, near Folsom, the second largest in the world, has been bonded through R. G. Hanford by the Colorado-Pacific Gold Dredging Company and the Syndicate Dredging Company. The same companies have bonded large tracts of dredging land southeast of Folsom, and also between that place and Loomis. The Natoma vineyard has 2,000 acres of bearing vines, and there are several thousand acres on which it was intended to plant vines. The ground is supposed to cover about \$10,000,000 worth of gold.

Reed.—A contract has been let for a gold dredge on the Reed place, below Folsom. The ground has been thoroughly prospected.

SHASTA COUNTY.

(From Our Special Correspondent.)

Balaklala.—The title to this mine, 10 miles from Weswick, has been settled by a decision in a suit which has been pending over a year. The conclusion is that the Balaklala Company owns 179-180, and William M. Madden 1-180, that the plaintiff and the defendant mentioned are tenants in common, and that the property sought to be partitioned should be sold by a single referee at auction in one parcel. The claims affected were the Windy Camp, Cold Water, Huckleberry, Balaklala, Mule and Fortune in Flat Creek Mining District. At one time the Mountain Copper Company bonded the property, but did not take it on account of title.

Blue Jay.—A strike has been made in this mine in Old Diggings District, owned by Sutton & Leaming. The property is near the Keswick smelters, and the ore carries both gold and copper.

Connors Gold Mining Company.—Money has been received to start developments on two of the 6 claims owned at Shasta. E. P. Connors is superintendent.

Delamar Smelters.—It is announced from Redding that the smelters of the Delamar mines will remain closed as long as the Mountain Copper Company's smelters are closed on account of the strike. The Delamar is the second largest copper property in the State, ranking in point of production next to the Mountain Copper Company.

Mountain Copper Company.—The Western Federation of Miners has called out all the mechanics and miners doing contract annual assessment work on the company's claims. The company has also been unable to get men to work at the copper tanks. The company has sold all its giant and black powder to dealers in Redding. Lewis T. Wright, the general manager, recently announced that the mine will probably remain closed for two years. The machinery underground has all been removed and stored outside. The fire in the mine will probably be allowed to burn itself out.

South Fork Mining and Development Company.—This company, near Igo, B. F. Rogers superintendent, after running the tunnel nearly 2,000 ft., has encountered the ore-body sought. The mine is owned by a Boston company.

Washington.—In this mine at French Gulch, Chas. Webb superintendent, three shifts are working.

SIERRA COUNTY.

(From Our Special Correspondent.)

Poker Flat Mining Company.—At the mine, near Poker Flat, few men are at work, owing to deep snows. Mill machinery, on the ground, cannot be set up.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

Aromas.—George Berg, of San Francisco, is repairing the flumes and pipe, and may run a bedrock drift to tap the old channel before moving the elevator.

Cherry Hill.—This mine, near Yreka, is in litigation on account of a contract let by former manager. A recent decision has put the superintendent, Mr. Turner, again in possession. This quartz mine is closed by temporary injunction, and 30 men laid off. The injunction is in connection with a tunnel contract.

Consolidated Mining and Dredging Company.—This Company, at Calahans, is to pump out the pit made by the dredger by a hydraulic elevator, and clean out the crevices in bedrock. The bedrock is quite hard.

Eastlick.—The interest of W. W. Eastlick in this hydraulic mine at Oro Fino, has been sold to S. R. Gardner.

Ironside.—These claims recently bought by E. D. Baker from Whipp & Loud, near Yreka, have been sold to F. M. Ballard, who will start work at once.

Morrison & Carlock.—This quartz mine at Quartz Valley keeps 40 men at work.

Punch Creek.—The McCook Mill has been for some time crushing ore from this mine at Humbug.

Scott River.—This mine, at Scott Bar, J. F. Boyle manager, is to be furnished with a 40-stamp mill.

Siskiyou Mining and Development Association.—This company, owning the coal mine near Ager, is considering a proposition to erect a smelting plant near the coal mine for custom work.

Hawkinsville Dredge.—The boat has stopped work as wood for fuel cannot be hauled over the bad winter roads.

Shores.—This quartz mine is being prospected by Col. Cameron, with a view to purchase. It is in Quartz Valley.

TRINITY COUNTY.

(From Our Special Correspondent.)

Coffee Creek.—Most of the mines in the Coffee Creek section (except the Dorleska) have closed for the winter.

Globe.—At this mine at Dedrick, T. Crosier superintendent, two air drills have been ordered for the 2,000-ft. tunnel, which will cut the ledge at 1,500-ft. depth.

Enterprise.—On this claim the tunnel is in 400 ft. A new hoist and boiler have been installed.

Jenny Lind and Maple.—The tunnel being run in these mines at Dedrick, E. Ehrenberg superintendent, will cross-cut the lode at 400 ft. Considerable surface work has been done. On these gold mines, owned by the Maple Mining Company, the tunnel is expected to cut the ore shoot struck in the upper workings. It is in over 100 ft.

Shurtleff.—This mine, owned by John Boyce, is reported sold to the Sweepstakes Mining Company, of Weaverville.

Three Peaks.—This mine, near Abrams, is getting in supplies and machinery. Fifteen men are employed.

Trinity Mining Company.—The Chloride-Bailey Mine at Detrick, Mr. Ehrenberg superintendent, is taking ore from the deepest workings. The clean-up for the first 30 days is reported as about \$16,000. A new tunnel is to be started. Two air drills have recently been installed.

Trinity County Stamp Mills.—The following are the producing quartz mines: Bullychoop, Douglas City, 20 stamps; Bartlett, Weaverville, 2; Brown Bear, Deadwood, 20; Boomer, Denny, 20; Trinity Gold Mining Company at Detrick, 30; Union Consolidated, at Abrams, 10; Enterprise, Coleridge, 10; Fairview, Minersville, 10; Golden Jubilee, Carrville, 10; Golden Chest, Coleridge, 5; Globe, Detrick, 5; North Star Carrville, 10; Texas Jack, Douglas City, 2; Yellowstone, Coleridge, 10. The Bull of the Woods has 2 stamps; the Bucks, 5; and the Oriole, 2. The Lappin, Alaska and Ralston are also producers.

Union Consolidated Gold Mines Company.—At the Dorleska Mine at Abrams, H. Z. Osborne general manager, the long tunnel is completed. It is 1,315 ft. long. Work began September 1, 1901, and steadily continued. The tunnel will be used for drainage and hauling ore. A snow-shed 650 ft. long extends from the mouth of the tunnel to the bin at the top of the mill. The mine and mill will now run throughout the winter. Fifty men have been employed during the season and 25 are kept busy during the winter.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

Big Casino Mining Company.—This company operating the Mack and Wooten mines at Big Oak Flat, will, as soon as the engine for the compressor is in place, use air drills in both mines. This company is also working the Two Brothers Mine and employs 60 men.

Golden West.—This mine, with the Comstock ranch of 300 acres, 10 miles east of Sonora, has been sold to P. Marsicano, of San Francisco.

Hull.—J. D. Vandenberg, J. A. Froelich, of San Francisco, and others have purchased this mine at Groveland. A number of buildings are being put up, and ore is being hauled to the De Lay Mill. The main shaft will be enlarged and retimbered.

John Royal.—This mine, formerly owned by Mr. Beardsley, has been sold to a Detroit company. The shaft is down 130 ft. There are 1,000 tons of ore on the dump awaiting completion of the mill.

Jumper Gold Syndicate of California, Limited.—This company applied to the Superior Court, asking that the company be dissolved and the property transferred to the stockholders. The company has one of the best paying mines in the State, and will be reorganized. Mark B. Kerr, the manager, has given notice that no miner will be employed unless he can speak and understand the English language. This is intended as a precaution against accident.

Lost Fox.—At this mine, near Carters, Superintendent Ingalls has started 10 additional stamps, making 20 in all.

Mount Jefferson.—This mine, owned by the Meighan Mining Company, J. M. Meighan superintendent, has started its 20-stamp mill.

Sierra Gold Mining Company.—This company owns the Nona F., the Alethian and Even Chance claims.

Mount Hood.—The 10-stamp mill of this mine, J. H. Burkhardt superintendent, has started.

Victoria.—This mine, near Columbia, has been bought from A. H. Hiatt, by Dr. Bowers, of New York City, and George and Frank Lightfoot, of Los Angeles, who have organized a company. There is a 2-stamp mill on the property. The new company will run a 600-ft. tunnel and move the mill.

YUBA COUNTY.

(From Our Special Correspondent.)

Brown's Valley Mines.—These mines, known as the Victor, are under a working bond to the Standard Consolidated Mining Company. Lindsay Scrutton expended considerable money on these mines during the past year, but finally gave up the bond. The pumps have been kept at work, however. R. G. Brown is the general manager of the Standard Consolidated and John W. Pew secretary, with offices at 310 Pine Street, San Francisco. William McKinlay, late of the Providence Mine at Grass Valley, will be superintendent at Brown's Valley. The old Pennsylvania, Dannenbrog and Hawkeye mines are included in the bond. There is on the property a 20-stamp mill, with electric hoist and pumping plant, and a duplicate steam plant for reserve use.

COLORADO.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

Consolidated Stanley.—This company owning property at Idaho Springs is in considerable trouble. Litigation has followed litigation so that the property has

closed down. The trouble started about 2 years ago, when a deal was made for a sale to Montreal people for \$800,000. A partial payment was made by the Montreal men, and then a trusted promoter absconded and the property reverted to the Stanley Company. The owners then refused to put up money necessary to do certain work, and this caused an indebtedness to Idaho Springs people of \$36,000. One of those who had sold the mine to the Montreal people came in and claimed full commission. Then action was started for collecting \$70,000 balance commission, and while this was pending in the courts the local parties attached the mine for the \$36,000, and the claim was allowed in the courts on December 23. The property will now be sold by the sheriff to satisfy this judgment of \$36,000. During much of this time the property has been in the hands of a receiver, and a number of legal points must be carried to the Supreme Court before the mine can be operated.

Elkins-Hanna Syndicate.—Since this pool acquired the Terrible group at Silver Plume plans for the new power house have been completed, and a 150-h.p. boiler with engine is being placed as auxiliary to the water power. The new dam will give a fall of 250 ft. within a distance of 5,550 ft. Everything is going forward on a big scale. The shaft will be sunk to 2,000 ft., it now being 600 ft. below the tunnel and 1,200 ft. below the surface. B. C. Catren, Jr., of Georgetown, is manager.

Little Flat.—Corsicana, Texas, people have bought property at Idaho Springs, are erecting a steam hoist and intend to sink on a promising body of ore disclosed at 150 ft. W. A. Gable, Idaho Springs, is manager.

New Dunderberg Mining Company.—All of this company's property is being advertised by S. C. Hinsdale, master in chancery of the Circuit Court of the United States, for the district of Colorado, to satisfy a claim of \$25,300 in favor of the Morton Trust Company. The sale is advertised for January 20.

Pelican-Dives.—Work is again under way on all of this company holdings, near Georgetown, and most of the ground is under lease. The deeper workings are showing a fair streak of mineral running from \$37 to

Red Oak Company.—The company is now letting out all of the workings to lessees since the burning of its mill one year ago.

GILPIN COUNTY.

(From Our Special Correspondent.)

Gilpin Ore Shipments.—During December the shipments of smelting and crude ores, tailings and concentrates from the Black Hawk depot of the Colorado & Southern Railroad were 327 cars or 6,540 tons, showing an increase of 13 cars, or 731 tons over the corresponding month of 1901. An unusually large amount of smelting ore was sent to the sampling works and to the smelters during the last 2 weeks of December, mainly the product of leasers, and the ores have given better than average results. The coming year promises added activity through every district in the country on account of the advent of one and probably two railroads.

Boston-Cleveland Mining Company.—Boston and Cleveland parties own the Morning Star and Arizona properties, at the head of Elkhorn Gulch, and are resuming operations at the Morning Star. A new 80-h.p. boiler has been installed, and first motion hoist ordered from Hendrie & Bolthoff, of Denver, will be the first of its kind to be operated in the county. The shaft building has been renovated, and the 200-ft. shaft is being retimbered and made double compartment. Sinking on a 200-ft. lift will soon begin, and the company intends to install another boiler and air compressor. High-grade ore has been uncovered in both properties. Mr. Morgan, of Idaho Springs, is manager.

Boston-Occidental Mining Company.—Machinery has been received for this company operating in Pine Creek District, where a large building has been erected to try a chemical process of treating low-grade ores. George H. Waterbury, of Denver, who has the formula, says that iron contains gold, silver and copper, and that gold is not one of the elements, but can be made of other things. The experimental plant will cost about \$20,000, and will have a large laboratory. The company expects to resume operations on the Mascot group, which has been developed by a 200-ft. shaft, with 250 ft. of workings. C. S. Ripley, American City, near Apex, is manager.

Delmonico Gold Mining Company.—Sinking is still under way, with day and night shifts, and the shaft is down 1,100 ft., of which 650 ft. were sunk during 1902. For the past 30 ft. some splendid yellow copper ore has been showing up. E. Steffan, Central City, is in charge.

Gilpin & Boston Mining Company.—Bostonians are interested in the Nemaha and other property on Bob-

tail Hill and are contemplating the installation of heavier machinery. E. S. Moulton, Central City, is manager.

Freedom.—New York parties have taken a lease and bond on this mine in Gregory District. Will put in new machinery and sink deeper the 850-ft. shaft. The property is credited with a past production of from \$75,000 to \$100,000, and is owned by Hal Sayr, of Denver.

Perigo Mines Company.—Employment is given over 50 men on company and leasing account, and the production is fully 100 tons per day, the ores having improved in Gamble Gulch, and the tailings are hauled to Black Hawk, over 7 miles away. J. E. Lightbourn, of Central City, is manager.

Pierce.—Englishmen are interested in a lease and bond on this property in Central City District, and arrangements are being made for working the mine. As soon as new machinery is in place sinking will begin. The property is known as a very fair producer, considering development, and will be under the management of E. M. Messiter, Central City.

Old Town Consolidated Mining Company.—The Old Town and Wautauga properties in Russell District have been consolidated. The Old Town has been worked for 3 years by the Old Town Mining Company, and has made a handsome showing, its production in 1902 amounting to over \$100,000. The Wautauga property was formerly operated by the Calumet Gold Mining and Milling Company, composed of Pittsburg, Pa., parties. Operations stopped part of last year on account of litigation. The merger company will have a capitalization of \$3,000,000. Geo. K. Kimball, Jr., of Idaho Springs, a part owner, will be retained as manager. The plant will be increased with an 80-h.p. boiler. The company intends to sink 700 ft. more, which will make a total depth of 1,500 ft. If water does not interfere too much with sinking, the incline shaft will continue down to 2,400 ft., reaching the level of the Newhouse Tunnel, a vertical depth of 1,700 ft. New machinery will have to be installed to go below the 1,500-ft. mark.

Pewabic Group.—Operations were recently suspended pending an extension of the lease from the New York owners. The property had been leased with privilege of short time option to the Detroit, Mich., owners of the Saratoga property and Golden Smelter, and so much time was taken up in unwatering the property that no thorough examination could be had. E. R. Nelson, Russell Gulch, is in charge.

Shotburg.—Chicago parties have erected a shaft building, and will install machinery. A lift of 100 ft. has been completed, making the shaft 181 ft. deep and a contract calling for 500 ft. of drifting has been given out. O. B. Thompson, Black Hawk, is in charge.

Specie Payment.—The property is showing up as favorably as ever. Monthly shipments have averaged between 600 and 700 tons of milling ores, and over 100 tons of smelting ores, of very fair grade. E. W. Williams, Central City, is manager, and Rhode Islanders are interested.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Leadville Ore Output.—The tonnage for 1902 was a surprise in view of the very dull sulphide market in the early part of the year. The output of zinc is valued at more than silver, while lead came next, and gold fourth. The production at present is over 2,500 tons daily of all classes of material, but shows an increase over last week in both sulphide and iron ores.

Among the leading tonnage makers in 1902 were the Ibez, with 38,000 tons sulphides and 30,000 tons siliceous material; the Iron-Silver Mining Company, with 45,000 tons sulphides, 45,000 zinc and 2,600 tons carbonates, and 1,100 tons oxidized iron; the Small Hopes Mining Company, 10,200 sulphide, 8,000 zinc, 3,000 oxidized iron and 1,100 carbonates; Caribou Company, 36,000 oxidized iron, 800 carbonate; New Home Company, 53,000 tons oxidized iron; Phoenix Company, 53,000 tons oxidized iron; Midas, 67,000 tons oxidized iron; A. M. W., 90,000 tons sulphides, 2,500 tons carbonates, 3,500 oxidized iron; Yak Company, 36,000 tons sulphides; A. Y. & Minnie, 22,000 tons sulphides, 7,000 tons zinc; Penn Company, 12,000 siliceous. There were a large number of other producers that ran all the way from 2,000 to 10,000 for the year.

One of the heavy producers for the New Year will be the New Monarch group, where great low-grade ore deposits have been opened up, which will be handled by the new Salida Smelter and the new Republic Smelter here.

Bartlett.—The tunnel being run by lessees is in almost 750 ft. It will be 1,250 ft. long, and beside giving drainage will cut a number of valuable veins at great depth.

Cloud City Mining Company.—A meeting is to be held to decide what action will be taken about resump-

tion, the management having an opportunity to ship manganese ore. The higher grade iron bodies located with the diamond drill are below the present workings.

Corona.—Local lessees are making a good mine out of this small fraction next to the A. Y. & Minnie. They have both a carbonate and sulphide body.

Dolly B.—This property has been idle a year. The heavy water flow stopped work. Pumping in other gold belt properties has reduced the flow, and Manager P. K. Connolly has just resumed operations.

Fryer Hill Mines Company.—This big combination on Fryer Hill is making only light shipments of low-grade ore, but is pushing development drifts rapidly, and from the Bangkok Cora-Belle is shipping some 30 tons a day of ore, which will run from \$50 to \$100 a ton. The new shaft on the Pride of the West claim is down over 100 ft.

Gold Basin Mining Company.—The vein shows 3 to 4 oz. gold to the ton, but does not increase in size. Prospecting with a diamond drill shows the vein well below the old workings and the shaft will be deepened.

Greenback.—This property showed a very light production for 1902, because the company and smelters did not agree on prices. The mine could easily produce 400 tons daily of iron sulphides.

Iron-Silver Mining Company.—The big low-grade ore-bodies are improving, and the gold values are slightly increasing. The company is producing 200 tons daily from its Moyer workings.

Republic Smelting and Refining Company.—This new concern has ordered a large amount of new machinery, and is preparing for resumption. It has the Boston Gold-Copper Smelter.

Sunday.—Local leasers have begun work on this property on Breeze Hill. Development work is conducted from a 375-ft. shaft on a siliceous ore running almost 1 oz. gold.

Valentine Mining Company.—Steady pumping for 3 weeks has drained the shaft. Development work will start at once.

London.—Shipments will be resumed in the spring. Men are running 2 drifts to tap the workings.

TELLER COUNTY.—CRIPPLE CREEK.

(From Our Special Correspondent.)

Argua Mill.—From all accounts Mr. Heller, who is operating this mill is doing fairly well. He is making a specialty of low-grade, oxidized ores, principally dumps. At present teams are hauling down the Wild Horse dump. The mill belongs to the Colorado Ore Reduction Company, and is leased by Mr. Heller.

Bolivia.—The surface plant, including a compressor, burned down recently. The property is near the town of Gilette. Considerable work was done some time ago, but no ore of any value was found. The property belongs to the Dorcas Mining and Milling Company.

Golden Cycle Mining Company.—The fight between the directors still goes merrily on. The defendants, Messrs. Milliken and Hill, have been trying to get the case into the United States courts.

A circular recently issued shows the following statement for October: Receipts: Ore sales, \$39,850; royalties, \$1,129; Theresa lease, \$573; interest on loan, \$178; total, \$41,733. Disbursements: Machinery, \$4,487; operating expenses, \$22,813; dividend, \$11,250; total, \$38,550. Total receipts, \$41,733; total disbursements, \$38,551; carried to surplus, \$3,182; surplus November 1, \$103,180.

It is thought that the November profits will exceed \$25,000, and shipments for December indicate that month's profits will exceed \$30,000. There is about \$1,500,000 worth of ore in sight in the mine, and the greater part of the earnings are coming from development work. A large part of the company's acreage has not yet been explored. The shaft will be sunk another 200 or 300 ft. the first of the year, and the stockholders are looking forward to a more prosperous year than the one just past. The annual meeting of the stockholders takes place on January 29.

Ironclad.—A new cyanide plant having a capacity of 100 tons per day is to treat the ores of this mine on which the promoters of the mill have a long lease. The old Van Fleet sampler, near Goldfield, is to be used as the building. The Magna Charta property that adjoins the Ironclad property has several large tanks on the ground for a cyanide plant.

Isabella Gold Mining Company.—The annual meeting of the stockholders has been called for January 20 at Colorado Springs. Some time ago it was rumored that an effort would be made to consolidate the property with that of the Empire State Mines Company, but little has been heard of the matter lately. From all accounts, the company has done very well under the present management, who assumed control about a year ago.

Londonderry.—Work is at present being done to show up the apex of the Wild Horse vein claimed to be on Londonderry ground in part. At present the suit has not been set. The company tried several times to get an injunction against the Wild Horse people, restraining them from taking out certain ore, but without success.

Sedan-Sunshine Case.—The jury brought in a verdict in favor of the Sunshine on every point. The property is situated on Galena Hill, and is the only shipping property in that part of the county.

SAN JUAN COUNTY.

(From Our Special Correspondent.)

San Juan Mining and Development Company.—A cross-cut is being driven on the Blackberry lode, near Silverton, to catch the old Aspen vein. The tunnel is now in 1,000 ft.

Silver Lake.—This mill will be enlarged in the spring to 1,000 tons daily capacity.

IDAHO.

CUSTER COUNTY.

White Knob Copper Company.—This company is developing its mine at Mackay, and working on the metallurgy of its low-grade ores. The smelter, it is said, did not handle these satisfactorily. As soon as the problem is solved the smelter will start up again to handle a heavy output. The company will issue \$500,000 10-year 6 per cent sinking fund gold debenture bonds, convertible after April 1, 1904, at the rate of one bond for 80 shares of stock. In order to provide for the sale and conversion of the bonds, it is deemed advisable to reduce the par value of stock from \$100 per share to \$10 per share, and authorize an increase of \$500,000 of stock on 50,000 shares. A majority of the stock has approved the plan, and bonds will be offered to shareholders pro rata at par.

IDAHO COUNTY.

Stanley Gold Dredging Company.—This company has completed a \$50,000 dredge to work in the Stanley Basin.

Stanley Gold Mines, Limited.—On this property, in Stanley Basin, a 20-stamp mill has been erected. The mill will not be started up before spring, because there are not sufficient supplies in the camp, and the snow has stopped heavy traffic, the snow on the divides being over 20 ft. deep in places. Work on the mill has been in progress for 4 months. A gold-bearing ledge averaging 20 ft. in width has been opened up to a vertical depth of 200 ft. by a tunnel 800 ft. long.

Valley Creek.—This mill, in Stanley Basin, is completed. The machinery has been tested by a run of a few hours. The cyanide plant is not ready, however, and it will take 2 weeks' work of 4 men to complete it in the spring. The mining force has been reduced to 4 men, who will spend the winter in driving a tunnel.

SHOSHONE COUNTY.

Northwest Sampling Works.—Improvements to the extent of \$10,000 are to be made to these works, located just below Wallace. The improvements have already been started. The present capacity of the plant, from 400 to 500 tons every 24 hours, will be increased to from 800 to 1,000 tons. Electric power from Spokane will be used. The force will be increased from 50 to 75 men.

ILLINOIS.

SANGAMON COUNTY.

(From Our Special Correspondent.)

Six of the largest coal mines in the 5th district of this State have been taken over by a syndicate promoted by Newton Jackson, of Philadelphia, Pa. The mines have been purchased outright. They include a mine at Taylorville, 2 mines at Riverton, the Klondike Mine, near the Springfield Junction, the Black Diamond and Sangamon No. 1 mines of Springfield. The Riverton and Taylorville properties were purchased some time ago. In October the Klondike Mine was secured, and on January 1 the combine will come into possession of the Black Diamond and the Sangamon No. 1 mines. The mines are said to yield more than 1,250,000 tons of coal per annum. The Klondike Mine formerly belonged to the Junction Mining Company. The Black Diamond Mine is the Black Diamond Coal Company and Sangamon No. 1 is Stamas Coal Company. The Taylorville mines are the Taylorville Coal Company and Christian County Coal Company at Taylorville.

Kelleyville Coal Company.—This company, Michael Kelly president, has assumed control of the Himrod Coal Company mines. Mr. Kelly, however, denies that he will sell to the Illinois Steel Company.

INDIANA.

SULLIVAN COUNTY.

(From Our Special Correspondent.)

Mammoth Vein Coal Company.—This company, of Cleveland, has bought 1,000 acres of coal land for

\$65 an acre, and 2 mines will be opened at once. This is double the price for the same land a year ago.

Manufacturers Mining and Fuel Company.—This company recently bought 27,000 acres of coal land northeast of Sullivan.

Land is selling in this county at twice the figure it commanded a year ago, and \$800,000 worth of coal land has been purchased in the last year. Men in the coal mining industry predict a phenomenal development of the Indiana fields in 1903. They say of the consolidation of the Indiana coal mines into one combination that options have been extended until May 1, and it is thought before that time will be closed. The options represent an expenditure of \$10,000,000.

LOUISIANA.

CALCASIEU PARISH.

(From Our Special Correspondent.)

Crowley Oil Mineral Company.—Well No. 2, at Crowley, is in. Its owners claim a very large daily production, also the oil is free from sand and water.

Denver-Beaumont Company.—The well at Welch is being bailed. The owners are confident of having a good one. Oil men from all parts are awaiting the bringing in of this and the Southwestern Company's well.

Pelican Oil Company.—This company's well, nearly half a mile from the present wells at Crowley, is expected in shortly.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Franklin.—The December output of mineral amounted to 412¾ tons, the largest for any single month in the history of the company. The output for 1902 was away ahead of the output for 1901, being 5,226,506 lbs., as compared with 3,757,419 lbs. in 1901.

Quincy Mining Company.—The output for December was 1,032½ tons of copper, and for the year 13,198 tons.

Franklin.—The Peninsula shaft at the Franklin Junior branch is sinking to the 15th level, with drifting under way on the 14th. Thirty power drills are in commission, and rock shipments from the Junior branch average 750 tons daily.

Mohawk.—The December output of mineral amounted to 150¾ tons, showing a yield of 35 lbs. of mineral per ton of rock stamped.

Quincy.—The company has erected a warehouse, 50 by 250 ft., with corrugated iron roof, east of the smelters on Portage Lake for the storing of copper while it is being smelted and shipped. The stamp mills at Masón are treating 3,300 tons of rock daily, and will have greater capacity after the improvements are completed.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Mohawk.—The fissure veins of mohawkite have pinched out in the lower levels and shipments of the ore to the Balback Smelter at Hackensack Meadows, N. J., are discontinued for the present. The veins may be found at great depth. In all 1,650 tons of the ore were shipped, netting \$70 per ton. The second head at the new mill at Traverse Bay is in commission, and is stamping about 900 tons of rock daily.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Norwich.—It is reported that this property, west of the Ontonagon River, will be reopened by St. Louis, Mo., parties, who are negotiating for it. The mine has been kept free of water for several months by Neil J. Ferguson, the caretaker.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

At 2½ miles northwest of Carthage, near Spring River, a drill penetrated a fine body of zinc extending from 40 ft. to 60 ft., and at 100 ft. the drill penetrated good mill dirt. A shaft will be sunk at once.

Doogin Diggins.—This small mine, 1 mile east of Joplin, was sold recently for \$15,000. Its ore always commanded highest price. The mine had been in operation less than a year. The output was small from the want of facilities, but the new owners who are Chicago, Ill., men, and others, intend to equip the property with better machinery. The sales show that the zinc ore never assayed below 64 per cent, which is a phenomenally high grade.

Little Pitcher Mining Company.—This company has been organized under the laws of Arizona to operate 2 lots on the property of the United Zinc Company. The capital is \$100,000.

Mesark.—The parties who recently purchased this fee of 20 acres a few miles northwest of Joplin for \$20,000, have organized under the laws of Arizona as the Sterling Mining Company, with a capital of \$100,000. The tract 20 years ago was one of the

most valuable in the district. In the days of shallow mining or gophering over \$500,000 worth of zinc and lead ore at the low prices that then prevailed were taken from the property. In recent years it has been practically forgotten. Late last summer the Merrit Mining Company took a lease on a portion of the property, and completed a mill in October. Since that time, while draining and unwatering its lease, it has been running old dump piles over the mill, and paying expenses. The mill, out of the first run of 286 bucketfuls of ore from the new shaft, cleaned 36 barrows of high-grade ore. The tract promises to be one of the best producers near Joplin.

MONTANA.

GALLATIN COUNTY.

New Sapphire Mines Syndicate.—Fifteen men will be employed at the Yogo sapphire mines all winter, preparing the material for next summer's work. A much larger force was employed until recently, extracting the gems from the formation that was thrown out last winter and extensive development of the properties was made, including the opening up of the lead, and the erection of a new hoist. The season, it is claimed, was the best since the company began to operate the mines. During the winter the formation in which the sapphires are found will be mined and spread on the surface. About 60 men were employed the past season, and it is expected that as many more will be employed next spring and summer.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Ada.—Ax & Downey have leased this property to parties from Basin.

Basin & Bay State.—Judge Parker, of the Circuit Court, recently confirmed the lease on the company's concentrator given to the Montana Ore Purchasing Company.

Blue Bird.—The owner of this property, David Mathews, of Butte, has decided to place a cyanide mill on the ground in the spring to treat low-grade siliceous ore now opened in the upper workings. The ore-body is 300 ft. long, 6 ft. to 20 ft. wide, and 70 ft. deep. This ore averages by car shipments better than \$10 a ton. Exhaustive tests show that the cyanide process will extract 90 per cent of the values. A company will build the mill.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

Lexington.—This property is owned by the French Company. The shaft house containing the big first motion hoisting machinery, the machine shop and the ore crushing department of the mill are a total loss, owing to a fire. The loss will be fully \$30,000 on this portion of the plant. The old 60-stamp chlorination mill was partly saved. This mill has not operated for about 10 years, so its burning does not entail great loss. The 3-compartment mine shaft, 1,500 ft. deep, was under cover of the hoist, and was damaged. The French Company has not since the slump in silver actively worked the property. A few miners on the tribute system have found employment in the old workings, some of whom have secured quite a respectable bank account.

Mountain Consolidated.—This property of the Anaconda Copper Company has closed down. The main shaft will be thoroughly retimbered from top to bottom.

Pennsylvania.—The Supreme Court of Montana recently affirmed the order of the lower court in denying a new trial in this famous case on the application of the Boston & Montana Consolidated Copper and Silver Mining Company. The suit involved certain veins that were alleged to have their apex in the Johnstown claim, belonging to F. Augustus Heinze or the Montana Ore Purchasing Company, and which extended into the Pennsylvania ground, owned by the Boston & Montana. The suit was strated in May, 1898, the plaintiff seeking to recover damages for trespass and to have its title to the disputed property quieted. In the lower court a bill of costs aggregating more than \$324,000 was filed, but the Supreme Court allowed only \$265,016 in the plaintiff's favor. The defendant, under the decision of the court, is to recover one-half the costs of the appeal.

Travonia.—Senator W. A. Clark has again started up this old silver property, one of the very first quartz properties to be discovered in Butte. It is situated in the southwestern section of Butte, on what is known as the Black Chief Vein System. The 400-ft. shaft is being unwatered. It is said the shaft will be sunk much deeper.

NEW MEXICO.

BERNALILLO COUNTY.

(From Our Special Correspondent.)

For the past year great local interest has been taken in the copper developments in the Sandia Mountains, east of Albuquerque. The mine developed by

W. D. Kemp and J. A. Blondin is reported to have struck an 8-ft. vein of high-grade copper ore, carrying gold in paying quantities. The first car-load has been sent to the Cerrillos Smelter this week.

LINCOLN COUNTY.

(From Our Special Correspondent.)

American Gold Mining Company.—This company is connecting by a tunnel the American Mine and the Helen Rae Mine on the same vein a quarter of a mile away. The ore is free milling. The shaft on the American is down 240 ft. In the new shaft house a new double-gear 75-h.p. hoist has been installed. The tunnel on the Rae is nearly 1,000 ft. long. Work has begun for a 50-stamp mill, with a capacity of 150 tons a day. There will be 8 Bartlett tables and a cyanide plant in connection. The reservoir holds 400,000 gal. A gravity tram connects both mines with the mill.

Eagle Mining and Developing Company.—This company has plans for the erection of a large plant on the Parsons properties. A large amount of low-grade ore is reported in sight.

Rita.—This mine, which joins the North Homestake, and is situated near White Oaks, has resumed operations on its gold veins, and will soon begin regular development.

White Mountain Gold Mining and Milling Company.—This company has men erecting a shaft-house and blacksmith shop at Cliff Canyon, 22 miles from Nogal. Work on the properties has been going on more than a year, and the results are considered satisfactory. The Gun Shot vein is reported over 100 ft. wide, the ore carrying gold. Steam drills are working on both the shafts and tunnels. Two 8-in. wells are to be put down on the mill site.

SIERRA COUNTY.

(From Our Special Correspondent.)

Black Range Gold Mining Company.—This company has broken ground for a new stamp mill on Poverty Creek, 3 miles north of Grafton. It is proposed to take care of the ores of the Minnehaha Mine.

Mine Development Association.—This concern has for several months engaged in development of the New Era Mine. Over 300 ft. of drifting has been done of the 250-ft. level. The main shaft is being deepened. A large Cameron pump will soon be set up to handle the water.

Oliver Mining Company.—A new compressor has been installed at the Good Enough Mine on Chloride Creek. The company has nearly completed a cross-cut tunnel to intersect the main vein.

Silver Monument Mining and Milling Company.—This company is installing a 40-ton concentrating plant on Chloride Creek for treating ores from the Silver Mountain Mine. Most of the machinery is already on the ground. Mr. Montgomery, of Denver, is superintendent of construction.

SOCORRO COUNTY.

(From Our Special Correspondent.)

Cerrillos Consolidated Mining Company.—This company continues to make regular shipments from the Hardscrabble Mine.

Graphic Mining Company.—This company has been experimenting extensively preparatory to erecting a large concentrating plant to handle the Graphic ores. Capt. Fitch and Mr. Brown have returned from an Eastern trip of inspection and investigation.

Kelly.—This mine will shortly begin regular shipments. Babcock & Connelly are the lessees.

Socorro Gold Mining Company.—This company, which recently opened the new Cat Mountain camp, has for a year been developing the properties. A number of buildings have been erected and others are going up. Sinking has gone on without interruption. Preparations have been completed to erect a 150-ton mill.

South Juanita.—This mine, at Kelly, under the management of P. J. Savage, is weekly shipping several cars of ore.

PENNSYLVANIA.

ANTHRACITE COAL.

Abandoned workings of a mine at Olyphant caved in on January 1. Owing to the ground above being in the business center of the town, the damage done, including loss of property and cost of restoring streets, will amount to \$50,000. No lives were lost.

East End Land and Coal Company.—This company, of Shamokin, has recently been organized, the following being the officers: John T. Fisher, president; David J. Jones, vice-president; William Taby, secretary; Theodore Rhoades, treasurer; and Josiah Rhoads, superintendent. The company has purchased the Marshall tract, in Shamokin, comprising 26 acres of min-

eral right and 19 surface. This land was owned by J. Langdon & Co. A slope will be sunk at once.

BITUMINOUS COAL.

A tract of about 1,000 acres of coal in Greene and Washington counties, taken up 2 years ago by W. E. Crow and his father, Josiah B. Crow, of McClellandtown, at \$26 per acre, has been sold by them to Minor Boughner at \$75 an acre.

Washington Coal and Coke Company.—This company, at Star Junction, is erecting a new engine house, a new building in which to house the big electric plant, and a building for the air compressors. When completed the company will have the largest combined coal and coke plant in the Lower Connellsville region. At present it is the largest concern making coke in the lower district, with the exception of the United States Steel Corporation. At the 2 plants it has 700 ovens. The largest other group of ovens together is at Leckrone, where there are 516. Its mine is also the largest individual shipper of coal in the Pittsburg District.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Black Hills Porcelain Clay and Marble Company.—Work has suspended at the lithograph quarry, owing to bad weather. A car-load of mica a month is produced at present. The company is delivering the mica on cars at Custer under contract, receiving \$75 a ton.

Mayflower Gold Mining Company.—The property has been sold to Chicago men, who will seek the vein lost several years ago.

North Star Gold Mining Company.—The stamp mill is running at half capacity, pending the bringing in of more water. The company is negotiating for more mining ground.

Saginaw Gold Mining Company.—The new shaft is 175 ft. deep. A sawmill is in operation, and the shaft is being timbered with square sets. S. M. Miller is superintendent.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Columbia Gold Mining Company.—At the shaft on Silver Creek 3 shifts are employed. The company is prepared to build a plant in the spring for the reduction of the ore.

Columbus Consolidated Gold Mining Company.—Six tanks are to be added to the wet crushing cyanide plant in Gayville, increasing the capacity from 50 to 100 tons a day.

Custer Peak Gold Mining Company.—Development work is under way on mineral land on Box Elder Creek.

Dakota Mining and Milling Company.—The 100-ton cyanide mill in Deadwood is running again after a short idleness. Cheaper haulage rates have been granted by the railroads.

Denver & Black Hills Gold Mining Company.—The mill in Spruce Gulch is dropping 10 of the 20 stamps.

Hidden Spanish Gold Mining Company.—The working force has been increased. The ground comprises 250 acres.

Lucky Strike Mining Company.—Another payment of 20 per cent of the original purchase price has been made. The company purchased 210 acres last summer, paying \$19,000.

Maloney-Blue Lead Copper Mining Company.—The capitalization has been increased from \$750,000 to \$2,500,000. Work has been resumed at the property.

South Dakota Calumet Copper Company.—The superstructure is being raised for the new smelter at Copper Mountain. It is expected to be running in March.

Spearfish Gold Mining and Reduction Company.—The gold output for November is given as \$23,000.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Golden West Mining Company.—Sinking has begun on the Yellow Bird group, where the company has installed a steam hoist. Several parties of prospectors are at work at different places on the Benedict group.

Gregory Mining Company.—Patent has been applied for on 12 claims and fractions, and work suspended until the patent is issued. E. C. Smith, president of the Vermont Central Railway, is the principal owner.

National Smelter.—Both furnaces are running, and the smelter is receiving 300 tons of ore a day, most of it is from the mines of the Horseshoe Company. One of the furnaces built for lead smelting has been modified to make matte.

Sunflower Gold Mining Company.—Work has been resumed on the property, near Hill City. Christ Bay- sel, of Omaha, is superintendent.

TENNESSEE.

CUMBERLAND COUNTY.

Pennsylvania men have purchased 6,000 acres of coal land near the Clear Creek Company's mines, at Isoline. W. H. Dunn, representing the Pennsylvania parties. The property is underlaid with two veins of coal, averaging, it is thought, 6 ft. each in thickness.

TEXAS.

GALVESTON COUNTY.

(From Our Special Correspondent.)

Amsterdam Oil and Gas Company.—The company has contracted for a well at Chocolate Bayou to be drilled 2,000 ft. if necessary. The derrick and machinery are ready.

HARDIN COUNTY.

(From Our Special Correspondent.)

Sour Lake Springs Oil Field.—The Sour Lake Improvement Company's No. 1 well came in 325 ft. This widens the field 1,000 ft. to the south.

Guffey & Galey No. 5 well is stated to be pumping 400 bbls. daily.

Roach & Cullinan well No. 3 has started. The Guffey Petroleum Company pipe line from Beaumont only lacks 3 miles to be completed. The pump station machinery has been received at the railway station. The pumps have a capacity for 10,000 bbls. daily.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Beaumont Oil Field.—Herman Frash, of Sulphur Mine, La., has bought the well just brought in on Block 21, Gladys City tract.

The Fagin Investment Company has a new well in Block 32, Keith Ward.

The Texas Company has sued the Houston-Beaumont Oil Company, the Commonwealth Oil Company and the Springfield-Beaumont Oil Company for large amounts, claimed to be due for non-delivery of contract oil at 3c. per bbl.

Inman & Lee have brought in two wells on the National Company's land.

The Texas Oil Company has filed suits against the St. Louis-Texas Oil Company, the Fidelity Oil Company, and the Majestic Oil and Pipe Line Company for failure to deliver contract oil.

Impassable roads have stopped teaming, piping and machinery, and operations on Spindletop are nearly at a standstill. Damp weather has made the gas very dangerous, several laborers having been killed during the past week. Prices for crude are very firm, and fuel oil users are realizing that the residuum from the refineries will in a short time be the only liquid fuel they can afford to burn. The United States Engineer's office at Galveston has been unable to obtain a satisfactory tender for a supply of crude during the next six months for less than 90c. per bbl. Until September last the government dredges had been supplied at 50c. per bbl. delivered at Galveston, which is about 80 miles from Sabine, the water terminal of the pipe lines from Beaumont.

Shipments by water for December were large, but rail shipments show a decrease of 20 per cent, owing to scarcity of oil and also of cars. Fuel oil burners are experiencing serious delay in obtaining supplies, and at many places oil burners are being taken out. Prices for crude are steady at 43 to 45c. in tanks, and 50c. f. o. b. cars. The announcement that the Standard Oil Company controlled the Beaumont and Jennings fields is causing no anxiety. Crude oil is scarce, and the Standard Oil Company being a large purchaser for shipment to the Eastern coast by boat pays a higher price than formerly, and has been a prominent factor in the big advance in crude, which will only advance to a price based on its refining value. Figures for December and for 1902 will not be available for some time.

MEDINA COUNTY.

(From Our Special Correspondent.)

Squirrel Creek Oil Company.—This company has struck gas and oil in a 160-ft. well near D'Hanis.

NAVARRO COUNTY.

(From Our Special Correspondent.)

Corsicana Oil Field.—The Citizens Oil Company has brought in a good well 6 miles southeast of Corsicana. The oil is a lighter grade than that of the Powell field. Another wildcat will be drilled 19 miles farther southeast.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlement.—The Salt Lake banks report the following totals for the week ending December 27: American bullion, \$146,000; gold, silver, copper and lead ores, \$150,400; gold bars, \$16,500; making a total for the week of \$312,900.

BEAVER COUNTY.

(From Our Special Correspondent.)

Erie.—This property, near the O. K., has cut copper sulphides at a depth of 130 ft.

Majestic Company.—The new lead furnace is on the ground. Work on the plant is proceeding much faster than anticipated.

Wild Bill Company.—It is stated this company will increase the working force by adding 25 men.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—Returns for the week ending January 2 are: Carisa, 4 cars; Mammoth, 17 cars; Showers Consolidated, 1 car; Gemini, 10 cars; Bullion-Beck, 5 cars; Eagle & Blue Bell, 2 cars; Grand Central, 30 cars; Star Consolidated, 2 cars.

The following receipts are reported by the samplers for the week ending December 26: Mammoth, 19 cars ore; Carisa, 1 car; Eagle & Blue Bell, 3 cars ore; Gemini, 15 cars; Bullion-Beck, 5 cars; Brown, 1 car; Grand Central, 16 cars; Yankee Consolidated, 15 cars ore; Lower Mammoth, 4 cars ore; Star Consolidated, 2 cars ore.

Ajax.—A small hoist has been installed in the north drift on the 1,000-ft. level. Another is being placed in the south drift some 275 ft. from the line of the Lower Mammoth.

Mammoth Company.—The repairs to the hoist are about completed.

Swansea.—This property is renewing shipments.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Shipments.—The shipments for the week ending December 27 were: Columbia, 2 cars ore; B. C. & G., 1 car ore. The New England reports 1 car ore; United States, 3 cars, and Ben Butler, 4 cars, for the week ending January 2.

Black Bess.—This property, located in Big Cottonwood Canyon, is making preparations to block out ore during the winter.

Highland Boy Smelter.—There were sent east 4 cars of copper bullion in the week ending January 2 to the refineries at Perth Amboy, N. J.

Papa and Frida.—Acting for Eastern parties, W. H. Tibbals has purchased these two claims. They lie about 100 ft. from the Dewey mill. The price was \$5,000.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—For the week ending January 2 the receipts reported by the Mackintosh Sampler are: Daly-West, 2,972,710 lbs. ore; Ontario, 713,800 lbs. ore; Silver King-Clark Lease, 41,600 lbs. ore; Silver King-Crescent Lease, 53,800 lbs. ore; Anchor, 211,700 lbs. ore.

The Mackintosh Sampler reports the following receipts for the week ending December 26: Daly-West, 3,601,750 lbs. ore; Ontario, 754,260 lbs.; Anchor, 222,740 lbs. ore; Daly lease, 24,300 lbs. ore.

Ontario.—One-half the miners have been laid off. The cause assigned by Superintendent Read is the low price of silver. The remainder of the force will go on developing.

TOOELE COUNTY.

(From Our Special Correspondent.)

Stockton Shipments.—For the week ending January 2 the shipments reported are: Ophir-Hill, 6 cars concentrates.

The following shipments were reported for the week ending December 27: Cygnet, 2 cars ore; Ophir-Hill, 4 cars concentrates; Stockton Gold Mining Company, 1 car ore.

Chloride Point Company.—This property is again a shipper. It is stated the last shipment amounted to 19,650 lbs., bringing \$333. This shipment is said to be the first from the new body encountered lately.

Eureka-Ophir Company.—This company is operating the property known as the Eureka, of Dry Canyon. Pennsylvania parties are interested. J. W. Cairns is superintendent. From the bottom of a 150-ft. shaft a drift of 150 ft. has been following a fissure carrying copper and lead.

Flour Metals Company.—G. S. Moats, manager, reports 1,000 tons of ore on the dump, and the entire force of miners working in ore. He says a 4-ft. vein of good milling ore was opened in the 50-ft. tunnel.

Utah.—Manager Crisman reports a strike in the third level.

WASHINGTON.

FERRY COUNTY.

(From Our Special Correspondent.)

American Flag.—Seven men are employed on two

shifts driving a tunnel, now in 62 ft. Average width of vein is 5 ft. The ore assays from \$20 to \$100 per ton, chiefly in silver. If the values continue good another tunnel will be started near the creek, 200 ft. lower.

Ben Hur.—The south drift from the Trade Dollar 300-ft. level is 12 ft. over the line in Ben Hur ground, and advancing about 1 ft. a day.

Bryan & Sewell.—The company, after a year's idleness, has employed 2 men on the annual assessment work near Sheridan. The property is opened by a 150-ft. shaft, and a drift 200 or 300 ft. on the vein.

California.—The last returns from the Tacoma Smelter give net results 124 tons, \$16.50, and 41 tons, \$58 per ton. Nine teams are hauling ore on runners to the railroad.

Horseshoe.—The tunnel at this Sheridan claim is in 240 ft. A drift on the 30-in. vein assays from \$8 to \$35, principally in silver.

Insurgent.—In doing assessment on the fraction between the Lone Pine and Last Chance claims a shaft sunk 12 ft. deep found quartz paid to run \$16 per ton.

Lone Pine-Surprise.—The northeast drift, lower tunnel level, is in 88 ft. along the hanging wall. The present face exposes 7 ft. of the width of the vein, all in clean quartz, averaging \$19.41 per ton, of which \$17.60 runs in gold. A stope southwest of the upraise to upper level is 22 ft. long, 20 ft. high and averages 6 ft. wide. Another stope at the other end of the raise is 48 ft. long on 1 floor. Both stopes are on 1 shoot, the ore on this shoot giving an average of \$14 per ton. The main drift has entered 12 ft. on the second pay shoot. On the upper level two stopes have been opened. The southwest stope has 4 ft. of ore at the face, averaging \$13.60 in gold and 86c. in silver per ton. The face of the northeast stope assays \$12 in gold and \$1.80 in silver. Nine men constitute the present working force. Four car-loads (100 tons) of ore were shipped December 28.

Nova.—The lower tunnel is in 228 ft.

Quilp.—The past week 10 car-loads of ore were shipped to Grand Forks and 6 to Tacoma. The north drift on No. 4 level is in 108 ft. From a point 36 ft. in from the winze ore of average quality is being stoped 20 ft. wide. In the south drift on the No. 2 level a 2-ft. streak of \$30 ore shows at the face, and a Rand drill is driving on it. A little ore is being stoped between the Nos. 3 and 4 levels.

San Poil.—The engine bed is set and hoist partly installed. The balance of the machinery is expected to arrive January 12, and 3 days later work to be resumed in the winze.

OKANOGAN COUNTY.

Salmon River Mining and Milling Company.—This company is planning to install a 50-ton concentrator on its property, 5 miles south of Conconully, early in the spring, at a cost of approximately \$20,000. The company has 15 men at work, and has struck the vein on the lower level. The vein is reported about 8 ft. across, with assays averaging \$18 to the ton in silver, lead and copper. T. James is superintendent.

WEST VIRGINIA.

KANAWHA COUNTY.

Marmet Coal Company.—This company has purchased a large area of virgin land adjoining its present holdings. The Marmet Company has control of the West Virginia and Southern Railroad, which will be connected by a switch with the new coal field, and which in turn makes connection with the Chesapeake & Ohio Railroad. The Marmet Company has also purchased several sawmills, and the work of building a new mining town will be soon under way. It is the intention to equip the property with electrical machinery.

FOREIGN MINING NEWS.

AFRICA.

RHODESIA.

The report of the Chamber of Mines gives the gold output for November at 15,923 oz., crude. This makes for the 11 months ending November 30 a total of 178,058 oz. crude, against 156,886 oz. to the corresponding date in 1901; an increase of 21,172 oz., or 13.5 per cent. The total reported for 1902 was equal to 158,472 oz. fine gold, or \$3,275,616.

AUSTRALIA.

QUEENSLAND.

(From Our Special Correspondent.)

Mammoth Anthracite Coal Seam, Limited.—This company, at Mackenzie River, has its shaft completed. The seam of coal is 10 ft. thick, without any dirt.

At Gympie the mines are looking well, and all the mills are kept going. The South Glanmire & Monland treated during November 1,530 tons for 2,750 oz., and paid a dividend of 1s. 3d. per share. This yield is 300 oz. more than October, the bulk of the stone being of an improved quality.

At Charters Towers the Queen Cross is the leading mine at present. In October it crushed 1,643 tons for 4,425 oz. The reef is not large, but of good quality. The company is working the old Victorian shoot, which, after passing out of the Victoria into the Band of Hope, Victoria and Caledonia Block, and the Victoria and Queen, enters the Queen Cross at a still deeper level, and if it continues should pass into the Queen Central. The rock in the eastern levels looks excellent, the western levels only have 15 in. of poor looking rock in the faces. The Victoria & Queen has crushed 225 tons for 492 oz., and declared a dividend of 9d., the first dividend for 3 years. It recently cut the Queen Cross shoot. The returns for November from Charters shows that the mills crushed 22,800 tons for 23,900 oz. of gold, and the cyanide works treated 21,000 tons of residues for 10,300 oz. bullion. The dividends amounted to £33,500 and the calls to £7,300.

At Croyden Nos. 3 and 4, South Golden Gate, crushed 735 tons for 1,279 oz. gold during the past 4 weeks, and distributed a dividend amounting to £1,600. The No. 5 South Golden Gate cleaned up 320 tons for 2 weeks, which yielded 382 oz., worth £2 15s. 3d. per ounce, and declared a dividend of £50 per ¼ share.

Mount Morgan has paid its usual 3d dividend.

NEW SOUTH WALES.

(From Our Special Correspondent.)

The gold yield for November was 21,491 oz. crude, equal to 18,116 oz. fine, valued at £76,953, as against last year, 34,293 oz. crude, equal to 26,729 oz. fine, valued at £111,538. The yield for 11 months of 1902 was 263,273 oz. crude, equal to 221,653 oz. fine, worth £641,522, as compared with the same period last year, £941,522, as compared with the same period last year, £869,578.

At Cobar sufficient water has been obtained by the late rains for at least 6 months, so the Occidental and the Cobar Gold Mines, started work again. The Mount Boppy is working full handed.

At Lithgow the Cobar copper refining furnaces are working full time, but the furnaces of the Lloyd smelting works remain idle pending a start of the mine at Burranga, where there is still a water famine.

Burrangorang is the nearest metal mining field to Sydney, the silver-lead ore occurring in small but rich veins. Despite the low price of silver the Yerranderie Silver Mining Company has paid 4 monthly dividends of 6d. each, commencing in July last.

At White Cliffs, rain having fallen, there is more life and some good finds have been made. A party of 3 cleaned up opal for one week which realized £150; the same party had already obtained over £1,000 during the past month from their claim, and good opal still running. Another party of two sold the result of their work during a week for £90.

At Hillgrove the total crushing of the Bakers Creek Company and tributors for the 4 weeks ending November 21 was 369 tons for 505¼ oz., exclusive of 10 tons of concentrates estimated to contain 70 oz.

Copes Creek, near Inverell, is working at a profit. The company's debts are paid off, and a 2s. 6d. dividend has been distributed. This is the first tin dredging scheme to pay. Since October 2 it has dispatched 32½ tons of tin ore.

Broken Hill.—The crude ore raised and treated during the past 6 months by the Broken Hill Proprietary Block 10, was 42,815 tons, assaying 16.4 oz. silver, 17.9 per cent lead, and 20.5 per cent zinc; producing 8,117 tons of concentrates, assaying 34.82 oz. silver, 64.34 per cent lead, and 8.47 per cent zinc. The concentrates gave a recovery of 40.15 per cent silver and 68.16 per cent of the lead. The average quantity of ore raised per miner per shift was 2.69 ton, or per man employed underground 1.46 ton net. The magnetic plant is expected to be in operation in about a fortnight. At B. B. Block 14 operations during the past half years were confined to supplying a sufficiency of material, chiefly carbonate ore and slimes, to enable the running of 2 smelters that it was necessary to keep in blast during the currency of contracts for purchased concentrates. The contracts are now finished, and the furnaces are closed till the metal market improves. The Broken Hill Junction has confined its attention to development work for the past half year, and when the connections now in progress are completed, proposes to curtail operations till circumstances will permit of milling being profitably resumed. The magnetic zinc separation plant erected on the Central Mine by the Mechernich Company for the Sulphide Corporation over a year ago is running full time, and treating 700 tons of middle product per week, worth approximately 9.5 oz. silver, 8.5 per cent lead, and 28 per cent zinc, yielding (1) waste rhodonite, (2) zinc blende of commercial value, and (3) ore, containing siliceous matter. The Sulphide Corporation is also arranging for adopting the desulphurization process, and sintering works are to be erected at Silvertown.

SOUTH AUSTRALIA.

(From Our Special Correspondent.)

At the Kapunda copper mine a party of tributors have struck some splendid ore in a cross-cut at the

bottom of a 95-ft. shaft, which is equal to the class of ore turned out in its best days.

Tarcoola Blocks.—For the past half year this company has crushed 1,709 tons for 3,010 oz. gold, the profit being only £404. During the previous half year the company crushed 970 tons for 4,726 oz. The falling off in value is because the greater part of the stone came from Ward's reef, which is of lower grade than the others.

TASMANIA.

(From Our Special Correspondent.)

Briscis.—The new manager of this tin mine expects to have the bulk of the overburden from Briscis Hill removed by the end of August, and the whole of the overburden removed within 13 months, and that while this is being done he can win sufficient tin from the southern portion of the workings to pay all expenses. During October 46,840 cu. yds. of the overburden were removed, and the tin ore raised was 37 tons 18 cwt. From November 1 to 22, 24,480 cu. yds. of overburden were treated. The estimated output of tin for November is 30 tons. According to the summer gauging of the flow in Ringaroma and Morris rivers and Dunn's Creek, the minimum summer delivery of the race should not fall below 75 sluice heads, and then only during the driest portion of the summer.

VICTORIA.

(From Our Special Correspondent.)

The coal contracts of the Victorian Railway Department for the years 1903 to 1905 have been distributed as follows: Coal Creek Company, 25,000 tons, large, at 12s., and 2,500 tons, small, at 7s. per ton; Silkstone Co-operative Company, 4,000 tons, large, at 12s., and 500 tons, small, at 7s. per ton; Outtrim-Howitz & British Consolidated Company, 70,000 tons, large, at 12s. 6d., and 10,000 tons, small, at 10s. per ton.

The Jumbunna Company did not tender, its coal being so good that it has no difficulty in disposing of the whole output to other consumers.

The minimum wage clause in the Victorian contracts handicap these mines somewhat, and in addition the Victorian coal is inferior to that of New South Wales. New South Wales is to supply a minimum quantity of 230,000 tons per annum at prices varying from 11s. 2d., 12s. 10d., 13s. 10d., and 14s. 1d. per ton, delivered at Melbourne, the price depending on the mine from which the coal is obtained, some producing better coal than others. The New South Wales coal is expected to average 13s. 3d. per ton, as against 17s. 4½d. per ton, as at present. The New South Wales contracts are made with steamship owners, not with the mines direct. The Minister for Railways expects to save £50,550 per annum on the above rates compared with those prevailing last year.

At Gaffney's Creek, the Victorian A1, an English owned company, made a profit of £7,764 for the last 6 months, out of which £6,000 were paid in dividends. The rock yields a little over 1 oz. to the ton. The New Dempsey's Gold Mining Company cleaned up last crushing for 632 oz. from 220 tons. Up to date this company has crushed 1,400 tons for 3,927 oz., and average of 2 oz. 16 dwt. per ton, the working expenses only amounting to 4 dwt. to 5 dwt. per ton. It is increasing the capacity of the battery.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

British Columbia Copper Company.—This company is putting in a slag elevator at its Greenwood Smelter.

Cariboo.—The following statistics are for the year ended November 30, 1902: Ore crushed, 15,615 tons; bullion produced, 8,400 oz.; concentrates produced, 550 tons; value of bullion, \$112,300; value of concentrates, \$17,381; drifting done, 1,005 ft.; raising done, 190 ft. average number of men employed, 50; dividend paid, 4 per cent. The tonnage of ore mined and milled the previous year, as shown in the company's last annual report, was 16,862 tons, yielding 9,439 oz. of gold and 428 tons of concentrates.

Granby Consolidated.—This company has ordered 2 8 by 14 locomotives for a 36-in. gauge track for hauling slag from the furnaces to the dump at the company's smelter at Grand Forks.

Montreal & Boston Copper Company.—This company has ordered a 7 by 12 locomotive for a 40-in. gauge track for slag hauling purposes. The contract calls for delivery within 90 days.

BRITISH COLUMBIA—SLOCAN DISTRICT.

(From Our Special Correspondent.)

Molly Gibson.—On the night of December 25 a snow slide carried away the bunk house of this mine, about 12 miles from Molly Gibson Landing, and 22 miles from Nelson. The mine is at an elevation of 8,000 ft., and at the time of the slide there was from 10 to 15 ft. of snow on the ground. The avalanche carried all before it, breaking large trees into match wood. Nine miners were killed and 2 were badly injured. The manager, Capt. T. H. Tretheway, was away at the time, attending a company meeting at Sherbrooke, Que.

NEW ZEALAND.

The Mines Department reports the exports of gold and silver for October and the 10 months ending October 31, as follows, in ounces of bullion:

	Gold.		Silver.	
	1901.	1902.	1901.	1902.
October	40,474	45,610	41,810	82,143
Ten months	371,138	418,457	411,114	534,587

The increase in gold was 47,319 oz., or 12.8 per cent; in silver, 123,473 oz., or 30.1 per cent. The gold bullion reported this year was equal to 378,738 oz. fine gold, or \$7,828,910.

SOUTH AMERICA.

ECUADOR.

Playa de Oro Mining Company.—The board of directors has issued a circular to stockholders informing them that the mining estates and other property of the company in Ecuador have been sold at foreclosure sale under the company's mortgage of \$200,000. The principal of the mortgage matured on May 1 last, and the company was unable to provide funds to meet it. The directors are informed that the property has been bought in on behalf of a bondholders' committee in London, who are about to offer to all the bondholders and stockholders of the present company an opportunity to become interested in a new company to be organized under the laws of Great Britain.

MINING STOCKS.

(Full quotations are given on pages 106 and 107.)

New York. Jan. 7.

The copper shares show some animation; sales are larger and prices better. Amalgamated is more hopeful, and prices have risen to \$66½ from \$64½. Anaconda is sympathetically stronger, above par, sales being made at \$25@25.30. Prospects of greater political influence in Montana has helped Amalgamated shares materially.

On curb Greene Consolidated, of Mexico, is more active, and in order to interest speculation the price was broken from \$25 to \$23½. Later, when a 2 per cent dividend was announced, the stock rose to \$24½. This dividend is the second to be paid this year. Tennessee is also in better form, trading at \$19½@19¼. Small sales of United of Montana are noted around \$31½. On Monday, January 5, 100 shares of Daly-West gold, of Utah, a good dividend payer, sold at \$41¼. White Knob Copper, of Idaho, is weak at \$10@10½, and shows fewer transactions.

A sale of Quicksilver preferred, of California, is reported at \$8.

The Comstock stocks are higher. Both Best & Belcher and Caledonia have risen to \$2.50, and are strong.

Colorado shares are quiet. Isabella, of Cripple Creek continues to sell at 29c., pending the result of the annual meeting on January 20. Anaconda will hold its meeting on the same day.

Boston. Jan. 6.

(From Our Special Correspondent.)

The better feeling in the copper share market is the reflection of the better conditions prevailing in the metal market. Whereas all was blue everything has changed, and everybody is extremely optimistic, believing that copper shares are in for a marked advance. Already some stocks are up \$10 or more, and some of the lesser ones have doubled in market value since the turn came. Up to the present, however, the public has ventured sparingly, but this is due to caution on the part of brokers more particularly. Everything is working admirably, and if the traders continue to make the market as active as they have for a fortnight past, commission orders are sure to pour in on them. There has been more or less profit taking, as prices have advanced, but unlike the late former movements, the market takes the stocks well. Close students believe that the market was never in better shape for a wild bull movement than at present, but, of course, they are liable to modify this belief without notice. Bulls on copper shares say that the metal is going up to between 13½@14c. on legitimate demand, and the stock market will boil.

Stock market prices have followed the course of Amalgamated, and pretty much every stock on the list has advanced. Osceola has gone up \$6 to \$66, reacting \$2.50; Mohawk has risen \$6 also, to \$47, reacting \$2.50. A \$2 assessment has been called on Mohawk, payable January 19. The delay in completing the mill has caused a loss in operating and a debt has accumulated. Besides the \$200,000 will purchase necessary supplies, and pay for additional equipment. A regular production is now expected. Copper Range has been active, although the market price has changed but little. The stock touched \$60.50, against \$59.25 a week ago. Large holders of the stock are very confident. United States Mining has also been active, with but little variation in the market price. It touched \$23.25 Monday. The market has taken a considerable amount of stock,

which has been disposed of by an estate. This company has appointed selling agents in London and New York. The company has also made a contract with the De La Mar Company for the refining of its product on very satisfactory terms.

Lawson has been making Trinity very active, and has succeeded in marking the price up \$2 to \$12.50. Utah rose \$1.50 to \$26.50. Announcement is made that the company will be turned into an American company, which is satisfactory to the principal owners. Centennial has also shown considerable rallying power along with considerable activity, and has gone up \$2.75 to \$21. Winona has also shown marked strength, touching \$6.87½, against \$5.62½ a week ago. Parrot is up \$1.50 to \$28, Franklin \$1 to \$11, and Wolverine jumped up \$9 to \$71. Old Dominion has risen \$2.37½ to \$18.50, on limited dealings. Atlantic mining is up \$1.25 to \$9.75. Montana Coal and Coke has risen to \$6.25 on the report that the company has put all of the 225 ovens into commission.

Salt Lake City. Jan. 2.

(From Our Special Correspondent.)

The week has witnessed a very small business, the total sales amounting to 107,544 shares, that brought but \$65,483. But little change can be noted from last week's quotations. What fluctuations there were were towards the weaker side, with perhaps the exception of Daly-West, which reached \$40.75 per share. The outside orders seemed few, and the brokers did not care to trade among themselves.

California was dealt in up to 25½@22¼c., with 9,600 shares exchanged. Ingot passed out 24,800 at 11½@10¼c. Daly Judge still stands a little under \$10, with 1,660 shares floating. Wabash seems to have reached the bottom when it touched 52c. Its sales have been 16,300 at 66@52c. The general outlook and impression is that the new year will see some beneficial changes.

San Francisco. Jan. 3.

(From Our Special Correspondent.)

For a week broken by a holiday business has been very active. Prices have been strong for certain stocks, and fluctuations frequent.

Caledonia led the market, selling from \$2 up to \$2.40. Consolidated California & Virginia dropped from \$1.50 to \$1.35. On Ophir the range was from \$1.25 up to \$1.40; on Best & Belcher from 88c. to \$1.05. Mexican sold from 82 to 70c.; Overman, 53 to 58c.; Sierra Nevada from 52 to 45c.

In the oil stocks prices were firm on moderate dealings. There was one sale of Hanford at \$98, while Peerless brought \$12.50. In the prospects the chief dealings were in Sovereign, which sold at 27c.; Monarch at 19c., and Lion at 6c. Business was fair for a holiday week.

COAL TRADE REVIEW

ANTHRACITE.

New York, Jan. 8.

The miners have finally got through celebrating Christmas and all mines are working pretty near full capacity. Barring floods or other weather interruptions to production and transportation the output this month should easily be 5,500,000 tons, and break all records, no month yet having gone over 5,200,000 tons, though several have a record of over 5,000,000 tons. Mild weather is favoring transportation, and the movement of coal from the mines is now up to the limit of car supply, and the facilities for unloading at terminals. Demand will probably fall off toward the end of the month, as those consumers who have been placing orders with several dealers will have a little coal ahead and will not be in a hurry to get more. Of course, demand will be strong all winter, but the market is bound to be much quieter in a few weeks.

So far as can be seen everything indicates that 1903 will be a great year for the anthracite trade. Even though the finding of the Arbitration Committee should satisfy neither miners nor operators, there is little chance of serious labor troubles this year. The leaders of the United Mine Workers undoubtedly know enough to postpone making demands until they can get favor from politicians—that is, in 1904.

The independent operators have helped remove from the presidents of the anthracite railroads some of the odium heaped on the latter by newspapers during the strike and since. By deciding to abrogate their agreements of some years ago, under which the railroads paid them 65 per cent of the tidewater selling price for their coal they have become recipients of abuse, while the presidents of the anthracite roads can claim that the public is more likely to be oppressed by individual companies than by great combinations of capital. The abrogation of the 65 per cent agreement affects the Lehigh Valley chiefly, since the principal independent concerns ship over that road. The independents can make something by selling coal for \$10 at tidewater instead of at \$5 the price asked by the railroads, but there are a lot of things to be taken into considera-

tion in abrogating contracts, and it may be that the independents will find that they have sacrificed certain solid advantages for temporary profits.

Demand for anthracite continues strong in all consuming territories, and is most urgent at points beyond Cape Cod. At the head of Lake Superior, what supplies were on decks when navigation closed, are already nearly gone. Owing to the long haul and the demand for cars it is not likely that much coal will arrive by rail during the winter. At Minneapolis anthracite retails for \$10. At Chicago hard coal is already a luxury that most people cannot get. It is selling at retail for \$11, and the majority of householders burn bituminous, not because it's cheaper, but because they have to. All-rail arrivals are far below normal, owing to the great demand at points nearer the mines. Along the lower lakes the demand is heavier than ever known, while arrivals, though improving, are still insufficient. Along the Atlantic seaboard, owing to the action of the independent operators, there are wide variations in price, with coal in poor supply at nearly all points. Some cities between New York and the mines are best off for supplies. In New England the shortage of hard coal is acute, the oldest inhabitant never saw anything like it. At Boston hard coal sells as high as \$15, delivered alongside. At New York Harbor shipping ports the railroad companies ask \$5, f. o. b. for egg, stove and nut sizes of free burning white ash, while independent operators ask and get \$10, the coal retailing at \$12@14. At Philadelphia independent coal is selling for \$10, f. o. b.

BITUMINOUS.

In the Atlantic seaboard bituminous trade demand continues very heavy. Speculative prices, however, have fallen within a week from \$8@8.50 to \$7, f. o. b. New York Harbor shipping port, for Clearfield grades. This fall is partly due to coal arriving at tidewater a little more freely, but chiefly to some large purchases of English coal. This coal can be laid down in this country at \$4.50@5 alongside. The extreme prices of last week were bound to lead to importations and lower prices.

Some contracts for the coming year have been closed, and present indications are that contracts generally will be closed on a basis of higher prices, 50c. or \$1 a ton more than for the year closing. This advance is considerable, but to offset its advantage to the mining companies the railroads have announced that rates from the mines to tidewater will be advanced 10c. on April 1, while higher wages to miners are also in prospect. In fact, the Fairmont Company has already announced an advance affecting 5,000 men.

In the far East the market has lost its fever of a week or two ago, through the announcement of large purchases in England; most of the English coal being for points beyond Cape Cod. Demand along Long Island Sound is heavy and consumers are buying speculative when they need it to make up shortages. At New York Harbor points the trade is not getting as much coal as it was, and demand is urgent. The shortage in the all-rail trade continues, and many manufacturing concerns are obliged to curtail output from lack of fuel.

Car supply at the mines is about one-third of the demand. Transportation from the mines to tidewater is fairly prompt, coal coming through in a week. The railroads now say that transportation is hampered by trainmen being worn out by the strain of the past few weeks, the traffic movement having been beyond all precedent.

In the coastwise vessel market, captains under the inducement of high rates, have been making as quick trips as possible, vessels are in better supply at the loading ports, and rates have fallen to \$2 to Boston from Philadelphia and New York, and \$1.25 to Sound ports.

Birmingham. Jan. 5.

(From Our Special Correspondent.)

The coal production in Alabama is at its normal condition again, and efforts are holding up well.

The Alabama Consolidated Coal and Iron Company has placed eight coal cutting machines in its mines at Mary Lee, in Jefferson County, and will during the coming week begin operating the mines with these machines. The same company has opened a new mine at Mary Lee, and from the two expect to get out no less than 1,600 tons of coal daily. The Tennessee Coal, Iron and Railroad Company is considering the advisability of placing coal cutting machines in some of its mines a little later on.

The State is now digging coal with convicts for the Tennessee Coal, Iron and Railroad Company and Sloss-Sheffield Steel and Iron Company at a stipulated price per ton. The first week passed without any marked change in the production. W. L. Rogers, brother of P. J. Rogers, the well-known superintendent for the Tennessee Company at Enslay and Pratt City, has been named as State warden.

Coke is still in demand, but the erection of the large number of ovens gives promise of a full supply before the middle of the present year. Much coke is being

brought into the State from the Virginias, but reports show that furnaces and other coke using institutions are getting all they need.

Chicago. Jan. 5.

(From Our Special Correspondent.)

The coal market is somewhat easier than it was last week, though supplies are far from plentiful and prices have not gone down. Added to the comparatively mild weather there has come about a betterment of the railroad situation, through what appears to be general striving to clear the congestion of traffic on the part of the railroad managers. Illinois and Indiana coal—practically the only supply for the city now—sells at \$4@5 for the best grades, on track. Contract consumers are complaining loudly of confiscation of coal by the railroads, and of shortage in meeting the contract requirements of supply. The high prices for free coal are tempting to the operators, to a degree that naturally causes contracts to appear unprofitable. Eastern coal is coming in slowly, and is quoted at \$5.50 for Hocking and \$6@7 for Poca-hontas, the supply of the latter being greatly in deficiency of the demand.

With the resumption of work at the mines, after the holiday season of idleness on the part of the miners, there seems a prospect that the city and territory tributary to it will soon be supplied with a temporary abundance of bituminous. Anthracite is doubtless out of the question until the opening of navigation in the spring; not more than one-fifth to one-third of the normal supply on any of the railroads is coming forward, and no winter stock was laid in prior to the closing of navigation. The little anthracite in the market is being sold at \$7 on track to the retailers, but these are retailing their scanty supplies at \$10@15, in small lots, mostly of one-quarter and one-half ton quantities.

Two investigations by public officers have been made to determine the reason for the shortage of coal in Chicago, and the high prices. One has been conducted by the attorney-general of Illinois, the other by the aldermen composing the City Council's committee on railroads. Both railroad officers and coal dealers were examined by the attorney-general, in private; the investigation of the aldermen was designed for publicity, and was made in open meeting. The attorney-general's inquiry has been postponed for a week, in order to get information from the Illinois mines as to conditions there; the City Council's work will be continued also. Nothing definite has yet come from the investigations, beyond the conclusion, apparent to all persons not politicians, that the high prices are due to operation of the law of supply and demand, and the scarcity has been caused by the anthracite strike, and the inability of the railroads to haul the coal produced by the bituminous mines.

Cleveland. Jan. 6.

(From Our Special Correspondent.)

The coal situation in Cleveland is befogged by a contention as to whether or not there is a coal shortage sufficient to warrant the prices that are being demanded on the retail market. The coal dealers have formed an association for the regulation of prices to the retail trade, and statements more or less warped have been made about their methods of procedure. Whatever may be the purely local condition it is apparent that the manufacturing interests of the city which consume the greater part of the coal have not suffered in the least either through the prices or through the shortage of coal. Fuel to these concerns has been advanced in price, but not in the proportion which is noted in the price of coal to the family trade. The shortage of coal which appeared a week ago as the result of the snowstorm has disappeared in the better performance of the railroad equipment. Whether this better condition in the local coal trade can be considered as lasting is another question entirely as it seems quite possible that the material which has been received up to this date this year has been heavier than may be expected later when the general demand for railroad equipment is heavier, as it is expected to be within the next two weeks. Beginning with January 1 the railroad rates on coal from the Pittsburg district to the lake ports increased 15 per cent, and the same general advance was declared all through the territory. Lake shippers have done nothing yet about fixing the prices for next season, and will hardly take such steps until late in March. Until that has been done nothing need be expected on the lake rate situation.

Pittsburg. Dec. 6.

(From Our Special Correspondent.)

Coal.—High prices continue to rule for all new business, but many orders and inquiries are rejected, as it is impossible to get the railroad cars required to take care of all the trade offered. Premiums ranging from \$2 to \$3 a ton are paid for all coal not under contract. The Pittsburg Coal Company continues to add to its holdings, and during the week acquired the property of the Midland Coal Company. This

company owned 4,700 acres of valuable coal land in the Panhandle field of the Pittsburg District, and has been operating three mines. The price paid is said to be \$2,500,000. It is generally reported, but not confirmed, that the United States Steel Corporation is negotiating for the Pittsburg and the Honon-gabela River coal combinations.

Connellsville Coke.—The production has fallen to the lowest point reached within a year and railroad cars continue short. As a result half a dozen blast furnaces were forced to close, and the outlook is not encouraging. The contract price for furnace coke is \$3.50@4, and for foundry 50c. higher. Stiff premiums, however, are being paid for delivery this month. The H. C. Frick Coke Company is not selling any coke to concerns outside of the United States Steel Corporation except in exchange for pig iron. The *Courier*, in its last weekly report, gives the production of coke in the Connellsville region for the previous week at 212,080 tons, a decrease of over 15,000 tons, but this falling off was due to the closing of the ovens for a holiday. The shipments for the week aggregated 8,370 cars, distributed as follows: To Pittsburg and river tipples, 3,349 cars; to points west of Pittsburg, 3,880 cars; to points east of Connellsville, 1,141 cars. This was a decrease of 1,097 cars.

San Francisco. Jan. 3.

(From Our Special Correspondent.)

The coal market continues quiet. Supplies are fully equal to demand. The discussion on fuel oil, started by the recent accident, still continues.

Prices.—Yard prices for Pacific Coast coals to dealers are as follows: Wellington, \$8.50; Southfield, \$8; Roslyn, \$7; Seattle and Bryant, \$6.50; Coos Bay, \$5.50; White Ash, \$5. For Rocky Mountain coals quotations are: Colorado anthracite, \$14; Castle Gate, Clear Creek, Rock Springs and Sunnyside, \$8.50. For Eastern and foreign coals prices to dealers are: Pennsylvania anthracite, \$14; Welsh anthracite, \$13; Cumberland, \$12; Cannel, \$9; Brymbo, \$7.50; Wallsend, \$6.50.

Foreign Coal Trade. Jan. 7.

Export trade continues light, and is naturally more or less affected by the short supplies for home demand and the high prices at seaboard ports. Some imported coal is still arriving.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of December 24, that during the week tonnage has arrived up in large quantities, and this fact, combined with the Christmas holidays has given the market a firmer tone throughout. Monmouthshire and small coals are especially firm. Quotations are: Best Welsh steam coal, \$3.72@3.84; seconds, \$3.60; thirds, \$4.48; dry coals, \$3.48; best Monmouthshire, \$3.42@3.48; seconds, \$3.30; best small steam coal, \$2.34; seconds, \$2.16; other sorts, \$1.98.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

There is no change to report in the freight market. Chartering has been quiet. Some rates from Cardiff are: Marseilles, \$1.35; Genoa, \$1.38; Naples, \$1.32; Singapore, \$2.52; Las Palmas, \$1.44; St. Vincent, \$1.62; Rio Janeiro, \$2.28; Santos, \$2.52; Buenos Aires, \$1.80.

IRON TRADE REVIEW.

New York, Jan. 7.

The iron market generally opens the year in very prosperous condition, the demand being large in all directions. While there has been no notable change in conditions during the week, and while business is still not fully recovered from the stop customary at the close of the year, there is every evidence of abundant orders in prospect. One point is that some large concerns are evidently not as fully supplied as they had supposed themselves to be, and are urging deliveries of material besides asking for more. These additional supplies are not easy to find. No advances are noted, however, except on wire and wire nails in which a new basis was established at the opening of the year. This is largely a consequence of the recent action of the United States Steel Corporation in absorbing the Union Steel Company, one of the largest independent producers.

The general increase in freight rates which went into effect January 1 will not affect the situation materially.

Complaints continue frequent of railroad delays and furnaces in the Pittsburg District are suffering from slow deliveries of coke.

The preliminary statement of the United States Steel Corporation covers the calendar year and shows net earnings of \$132,662,617. After making all deductions for interest, sinking fund, etc., a balance remained of \$89,894,434. From this dividends of 7 per cent on preferred and 4 per cent on common stock were paid, leaving undivided profits applicable to re-

serve or new construction amounting to \$33,841,656. We hope to publish the report more fully in our next issue.

Birmingham.

Jan. 5.

(From Our Special Correspondent.)

Contracts are being cleaned up as quickly as possible, so that orders taken for delivery during the first part of the year can be commenced on. Some of the companies in this district will, two months hence, still be delivering on orders booked before October last, but the majority will be ready by the end of this month, if not before, to start on orders due this month. The Tennessee Coal, Iron and Railroad Company, at its five furnaces at Ensley, manufactured 24,239 tons of iron in December, while the Sloss-Sheffield Steel and Iron Company turned out 35,335 tons at its seven furnaces in this State.

Sales for the second half of 1903 have started in, though some weakness is shown in prices. The statement is made that 5,000 tons of No. 2 foundry iron has been sold at \$17 per ton, delivery the latter part of 1903. The sale cannot be traced, but it is understood that a local foundryman made the deal and delivery thereon is to be made in small lots. It is believed that the agreed minimum price of \$18.50 for No. 2 foundry iron will be maintained by the Southern furnaces.

The new furnace of the Alabama Consolidated Coal and Iron Company, located at Gadsden, will not be ready until about February 10. This will be the largest furnace in the Birmingham District, having a bosh diameter 6 in. larger than No. 3 furnace of the Republic Iron and Steel Company at Thomas, which has a 300-ton daily output. Col. T. G. Bush, president of the Alabama Company, says that if plans formulated are not changed, the erection of still another furnace is probable at Gadsden, in Etowah County. The Alabama Consolidated Coal and Iron is one of the strongest of the smaller companies in the State. It has three furnaces in full blast, and had not earnings been devoted to improvements and betterments, 10 per cent dividends could have been paid on the \$2,500,000.

The following quotations for pig iron are given: No. 1 foundry, \$21@22; No. 2 foundry, \$20@21; No. 3 foundry, \$18.50@19.50; No. 4 foundry, \$17@18; gray forge, \$16.50@17; No. 1 soft, \$21@22; No. 2 soft, \$20@21.

The steel plant at Ensley made during December 16,644 tons of steel, the largest month's production in the history of the mill. The steel rail mill has been changed so as to make billets for a few weeks, but this is only temporary.

The rolling mills in Alabama have resumed operation. Many men are employed, and large orders are on hand. Foundries and machine shops have their hands full, and are doing well.

The sale of the Austin-Bryan plow works at Ensley to the Empire Plow Company, of Cleveland, O., is announced. The sale was a cash \$200,000 transaction. Elias Hyman, of the Empire Plow Company, of Cleveland, is in the district now, and the probabilities are the plant will be put in operation again. The Austin-Bryan Company had to shut down for want of working capital.

Chicago.

Jan. 5.

(From Our Special Correspondent.)

Sales of pig iron show less improvement since the beginning of the new year than was hoped for by sellers, but are better than they were two weeks ago, and seem to be increasing slowly. The natural slackening of business on the part of consumers of iron, due to stock-taking and overhauling of plants, at this season, doubtless has retarded the advance of business somewhat. Prices are about the same. No. 2 Southern is quoted to-day at \$22.85@23.85, Chicago, for No. 2, with No. 1 the customary 50c. higher, and No. 3 the same amount lower, on lots of similar size and under generally similar conditions of sale. This price is for the second quarter of 1903, deliveries running over into the third quarter. There is still a little Northern obtainable for delivery in the same time, at \$24.50@25.50, for No. 2, and 50c. difference above and below the No. 2 price for No. 1 and No. 3. Nearly all the business is being done in Southern, as heretofore for two months. Spot lots of either Northern or Southern are much sought for, and command \$2 to \$3 premium. They are, of course, scarce.

There is little improvement in the coke situation, which has hampered both furnace and foundry proprietors sorely, for the last six months. The minimum quotation continues to be \$10, and there is exasperating delay in getting it at any price. No relief seems probable from the coke trouble until spring, at least.

Cleveland.

Jan. 6.

(From Our Special Correspondent.)

Iron Ore.—The Ore Association members are still talking of the increased prices for next season's ore, but as yet have done nothing. The introduction of F. H. Clergue, the steel producer from the Canadian

Soo, into the Mesabi Range may possibly have some slight effect on the prices. The general impression still is, however, that the occasion calls for a certain advance. The rate situation will not be settled until after the prices have been determined and sales made. It seems possible that higher rates will be paid during the coming year as the vessel tonnage is hardly near enough equal to the possible demand to permit of the same or approximately the same rates as were paid during the year just closed.

Pig Iron.—The shortage of coke has been one of the features of the week, and especially the effort to get rid of it. The slightly better supply at present is in a measure due to the lighter demand in the general merchandise trade for cars and engines which will not last long, being a post-holiday condition. The buying of foundry is light for present, first half and second half delivery. The consumers have, in a large measure, covered their needs, but many are still holding back, and while the capacity of the furnaces, especially for the first quarter, has been well sold up, there is a large need yet to be supplied, for which great dependence is being put on new furnaces. The prices have not changed from \$23 for No. 2, Valley furnace, for first half delivery, and \$21, Valley furnace, for second half delivery. Southern iron is bringing \$20, Birmingham, for first half delivery. The Steel Corporation still refuses to buy besemer and basic, and there is a question whether it proposes to increase its own supply by further absorption. The basic producers are inclined to believe that they will have a good deal to sell for second quarter delivery, but the besemer producers are not so sanguine, the production having been so greatly curtailed. The prices are \$23 for besemer and \$21 for basic for first half delivery.

Finished Material.—The demand for structural steel has not abated in the least, and the buying for first half delivery from the larger mills has continued. It must be said, however, that the smaller mills which have been getting premiums for quick shipment are not getting as much business as they might. This in part accounts for their reduction of the premium price to 1.70@1.80c., Pittsburg, for such material as they dispose of. The larger mills are still adhering to the quotation of 1.60c., Pittsburg. The jobbers are getting 2.25c. Plates have been in fair demand only, but it can hardly be expected that sales from now on will be as heavy, except among the smaller mills, which are demanding premiums. The volume of business already covered by the larger mills for this year's delivery has been so great that it is a question whether much more could be handled. The small mills see enough ahead to warrant them in holding for the high premium prices they have exacted for the last three or four months, and 2c. at the mill, is now the minimum. The buying of bars has been much heavier of late, and it is beginning to look as if the expected activity along that line was about to materialize. The situation is very encouraging, and the prices are strong. Besemer bars have been bringing 1.60c., Pittsburg, while open-hearth steel bars have been bringing 1.70c., Pittsburg, with bar iron running between 1.70c., Pittsburg, and 1.80c., Pittsburg. The sheet situation is slightly stronger with no marked changes in the prices which have been paid. The sales have been slightly heavier during the past few days, but they have not as yet reached the point where the mills are satisfied that there is not a productive capacity greater than the actual need of the market. The prices are still based upon a quotation of 3.10@3.25c. for No. 27 out of stock. The billet market is somewhat stronger, but with few sales, since most of the product of the Steel Corporation is now going into its own finishing mills.

New York

Jan. 8.

Pig Iron.—The market is quiet and buying limited to current needs. We quote for 1903 delivery, Northern irons at tidewater: No. 1X foundry, \$24.25@25; No. 2X, \$22.75@23.25; No. 2 plain, \$21.50@22. For Southern iron on dock, New York, No. 1 foundry, \$25.25; No. 2, \$23.75; No. 3, \$22.50. Middlesboro No. 3 pig is quoted at \$18.50, in large lots, but for small lots and spot delivery, \$20 is obtained.

Bar Iron and Steel.—We quote for large lots on dock: Refined bars, 2@2.05c.; common, 1.90@1.95c.; soft steel bars, 2@2.10c.

Plates.—Demand is better than last week. We quote for tidewater delivery in car-loads: Tank, ¼-in. and heavier, 2.09@2.15c.; flange, 2.24@2.30c.; marine, 2.34@2.40c.; universal, 2.05@2.15c.

Structural Material.—The market still shows strength. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.90@2.20c. For small lots and prompt delivery good premiums are paid.

Steel Rails.—Standard sections are still quoted at \$28, f. o. b. mills for 1903 delivery; light rails, \$30@36, according to weight. Relaying rails are \$28@30 for heavy sections and \$33@35 for light sections.

Philadelphia. Jan. 7.

(From Our Special Correspondent.)

Pig Iron.—From quite a number of reports from makers of pig iron in middle and eastern Pennsylvania and representatives of companies it appears that there is very little iron to be sold and very little capacity to be offered. The makers of pig iron are rather avoiding than inviting business, and claim that everything points to a hardening of prices. This probability is borne out by the fact that immediate deliveries are being called for by a large number of users of iron, notwithstanding the fact that a great deal of material has been contracted for in advance. It appears that quite a number of foundrymen are short of particular kinds of iron for mixing. In the aggregate, however, the business for early delivery is light. The opinion is expressed that there will not be any large influx of orders for some time to come. In forge iron the situation is blurred. All the forge iron makers have as much business booked as they are anxious to have. From the best information to be had it appears likely that there will be considerable purchases made in bessemer iron. There is also a probability that charcoal iron will be quite freely called for, but in small lots. The importers are very hopeful this week, and think that everything is turning their way. Quotations in the main are just where they were two weeks ago, excepting where freight rates have interfered.

Steel Billets.—There is no activity in steel billets at present. Importers are unable to bring any negotiations to a point. Most users are fairly well supplied. Quotations of imported billets are said to be uncertain, and until bottom prices are known there will not be much business done. Quotations are unchanged.

Bar Iron.—Some business has been done in bar steel at 2c. Common iron has moved up in price as much as \$2 a ton for quick deliveries. Production has been interfered with in a good many instances.

Sheets.—The sheet makers report an encouraging condition in the first week of the year. Storekeepers are hurrying to accumulate a little stock. Mill owners are prepared to fill these orders. All mills are running full time.

Merchant Steel.—Hardware manufacturers, vehicle interests and manufacturers of tools and machinery carry very little stock over from the old year. Many of them have contracts running up to spring. There are enough, however, to enliven the market each week, and agents report an encouraging revival of inquiry.

Plate Iron.—Representatives from the plate mills, who have been in town a day or two, expect to have on their books very soon some of the biggest orders of the season. Specifications are now under way, and it is confidently believed by the mill people that they will have all the business they can handle. Our ship builders have been successful in contracting for some important new work, and according to their custom they will very soon contract for whatever plate they want.

Structural Material.—The business of putting up big structures calling for structural material will be modified by the incoming of one or two big construction companies, which will operate in different cities. Structural work is likely to be more centralized hereafter. These companies will place contracts for large quantities of material, and gain some advantages in price. At present there is nothing doing in the way of new business, but all who are qualified to speak for this branch of trade are very well satisfied.

Steel Rails.—Notwithstanding the apparent quiet not a little business has been going to the steel rail mills, and the representatives here are still of the opinion that they have not yet heard from all of the urgent work that is to be hurried through the second quarter of the year. They say that unlike other years a great deal of railroad work will be undertaken during the second quarter of the year.

Scrap.—The scrap market is quiet, and the usually active dealers have nothing important to tell, neither have they any scrap for sale. Prices rule strong for all kinds.

Pittsburg. Dec. 6.

(From Our Special Correspondent.)

The new year opened with a remarkably encouraging outlook, even for the weak lines of last year. An advance of \$1 a ton for all wire products was announced by the American Steel and Wire Company, and a further increase is expected at any time. Prices that ruled before the heavy cut was made on October 1 soon may be restored. The two big plants of the American Tin-Plate Company at New Castle were put in full operation during the week, and three-fourths of the mills of the combine are now running. A larger tonnage is being produced than a year ago, when all the plants were in operation. The independent tin-plate concerns are doing but little, as they were unable to meet the cut in prices. A change in prices for this quarter is not likely, as considerable business has been booked at the new rate of \$3.60 a box. A big improvement in sheets, the other weak

line, is noticed. The American Sheet Steel Company has taken on a heavy tonnage for delivery during the first quarter. In addition it has renewed for another year the contract with the National Roofing and Corrugating Company. This calls for about 80,000 tons of black sheets and 30,000 tons of galvanized. An effort was made during the week to get the independent sheet and tin-plate interests together to decide upon some line of action for their protection, but nothing was accomplished. Less than a dozen mills were represented, and although the meeting was held in Pittsburg not an interest from this district attended. There are now but two outside wire interests in the market, the Pittsburg Steel Company and the Ashland Steel Company, and these are in harmony with the American Steel and Wire Company on prices. The new base prices announced this week are as follows for 100 lbs. to jobbers in car-load lots, f. o. b. Pittsburg, with full freight to destination added: Plain wire, \$1.80; galvanized, 30c. extra; barb wire, \$2.20 for painted and \$2.50 for galvanized; wire nails, \$1.90. In car-load lots to retailers the price is 5c. additional.

Inquiry for iron and steel for the opening week of the new year is much greater than usual, and indications point to production that will exceed all former years, and at even better prices than have ruled. Sales of bessemer pig iron are not large, as the merchant furnaces are well sold up for the first half. Nothing can be done for the first quarter, and there is but little available for the second. There is still due the United States Steel Corporation on its order placed last year with the Bessemer Furnace Association about 100,000 tons for delivery before April 1. The coke supply continues bad, and half a dozen furnaces in the Valleys are banked, and others are not being operated satisfactorily. The furnaces in the Pittsburg District are all in operation, and Furnace No. 4, of the Duquesne group, which has been relined, was blown in the other day.

The capacity of the steel mills will be fully taxed this year. The rail mills, with the business over from last year, have fully 2,500,000 booked, which will keep them busy for at least 10 months. The structural mills are sold into the third quarter, and premiums are now offered for deliveries within six months. Steel bar mills are sold up for four months.

Pig Iron.—About 15,000 tons of bessemer pig iron were sold during the week at \$21@22, Valley furnaces, the former price being for second quarter delivery. The freight rate from the Valleys is now 85c., an advance of 10c. over last year's rate. About 2,000 tons of gray forge iron sold this week at \$21.50, Pittsburg, for delivery in the first half. Foundry No. 2, for early shipment, is quoted at \$24, Pittsburg, and about 1,500 tons were sold. The price for first half delivery is \$22.50, Pittsburg.

Steel.—Several lots of bessemer steel billets have been sold at \$30@31, Pittsburg, and open-hearth billets are quoted from \$1 to \$2 higher. There is a heavy inquiry, and the market is strong. The demand for plates is increasing, and for prompt shipment command 2c. higher, and for delivery during the next three months 1.55c. is readily paid. Orders for delivery after July 1 are being taken at the base price of 1.60c. The steel bar market is firm at 1.60c. About 12,000 tons of structural material were sold during the week.

Sheets.—The market is strong, and it is believed prices soon will be advanced. The leading producer continues to quote black sheets, No. 28 gauge, at 2.75c., and galvanized at 75, 10 and 5 per cent off the list, or 3.65c., net for No. 28 gauge.

Ferro-manganese.—The market is quiet, and the price of the foreign product ranges from \$50 to \$51.50. **Cartagena, Spain. Dec. 20.** (Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments for the week include 2,000 tons dry and 5,870 tons manganiferous ores; a total to date of 343,360 tons. Demand continues good. Freight to Great Britain are low. A contract just reported is for a cargo from Cartagena to Philadelphia at 8s. 6d.—\$2.04—per ton, January shipment. The chief event of the passed week has been the collapse of the negotiations between the Government and the mining syndicate with regard to this latter taking over the collection of mining taxes. This has been due to the change in the Government before the contract was actually signed.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 3d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese

and 20 iron, to 9s. 9d. for 12 manganese and 35 iron. **Pyrites.**—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 11s. 3d. per ton.

CHEMICALS AND MINERALS.

(See also wholesale price-list on page 108.)

New York, Jan. 6.

The new year opens favorably for an increased business, but prices for manufactured articles will gradually weaken to the level of contract figures booked near the close of 1902. Profits will likely not equal those of last year, but earnings are expected to be heavier, as manufacturers hold larger orders.

Heavy Chemicals.—Much contracting is noticeable in American alkali and caustic soda at quotations below. In foreign alkali there has also been more doing; but caustic soda shows a falling off, as fully 40 per cent of our annual imports is re-exported. The domestic productoin is growing. The Solvay Process Company, at Syracuse, N. Y., has increased its crushing capacity, and the ill-fated American Alkali Company is urgently asking the co-operation of its stockholders to pay its debts and end the receivership. The company has again asked payment of the \$2.50 assessment levied on September 12, 1901. Unless it is collected by January 8, 1903, legal proceedings will be instituted to enforce payment. Bicarb. soda is in better request, and some export trade is reported. Bleaching powder is easier, and latest contracts are on a basis of \$1@1.15 per 100 lbs., for domestic, \$1.12½@1.15 for German and Belgian, and \$1.25 for prime Liverpool. It is interesting to note that of our imports of 867,925 cwts. in the 11 months ending November 30, 1902, Great Britain furnished 608,844 cwts., or about 70 per cent, the balance of 159,081 cwts. coming from the Continental countries. Our imports from Great Britain, though they constituted 72.3 per cent of that country's exports, were, however, about 8 per cent less than 1901. The total decrease in our imports from all countries amounted to about 5 per cent, or 47,995 cwts. On the other hand we re-exported in the 11 months of 1902 a total of 1,656 cwts., as against 116 cwts. in 1901. In this connection it will also be interesting to mention that the tide is turning in the British bleaching powder trade, as the imports have increased 10.5 per cent in 11 months. It is evident that the Continental makers, now that their agreement with the United Alkali Company has expired, are endeavoring to undersell the British in their home market.

Quotations are per 100 lbs., as follows:

Domestic, F. o. b. works.	Foreign, F. o. b. New York.
Prompt.	Prompt.
Futures.	Futures.
Alkali, high-test, in bags	90@92½c.
Caustic soda, high-test, in bags	\$1.90@2.00
Bicarb. soda, ordinary	\$1.50@1.60
Bicarb. soda, extra	80c.
Sal soda	67½c.
Chlorate of potash	\$7@7½
Bleaching powder, prime	\$1.25@1.62½

Phosphorus.—Consumption is good, and new contracts are being booked on the basis of 45c. per lb. for foreign and 70c. for American, less the usual discounts. Phosphorus compounds are to be manufactured at Niagara Falls, N. Y., by a new concern called the Phosphorus Chemical Company.

Arsenic.—Advices from abroad hint that a trade agreement between foreign and American producers of white powdered arsenic would prove beneficial to those interested. This suggestion is prompted by the keen competition that has arisen from an increased output in America and in certain Continental countries to the detriment of Great Britain, which has held the markets so long. This is another instance where the United States has awakened to the opportunities for cultivating profitably a new branch of its chemical industry. Present prices are firmly held at 3@3½c. per lb. for good quality white arsenic, while red brings about 6¼c. per lb.

Potassium Prussiate.—Competition and low prices have forced the receivership of a large manufacturer in Newark, N. J. The liabilities of the E. R. Carhuff & Sons Company are placed at \$138,000, while the assets, consisting almost exclusively of real estate and machinery, are given as \$153,000.

Barytes.—Although the bulk of the American production is controlled by a combination, new companies are being formed, and Virginia is the favorite field of operation. At Honaker, Va., the Clinch Valley Barytes Company, with \$100,000 capital, has begun work, and when in full operation will produce about 100 tons per day. Ohio and Virginia people are interested. Imports from Germany are moderate just now, but as this business is generally done on long-time contracts prices continue unchanged.

Acids.—Further season contracts are being booked for the commercial acids on basis of quotations below. Blue vitriol is firmer, as imports are letting up somewhat and domestic makers' stocks are light, owing to a decreased output last year. The exports of blue vitriol from the United States and Great Britain in

the 11 months ending November 30, 1902, were as below, in long tons, of 2,240 lbs.:

	1901	1902	Changes.
United States	21,136	13,446	D. 7,690
Great Britain	35,413	41,877	I. 6,464
Total	56,549	55,323	D. 1,226

The decrease in the United States exports is equal to 36.4 per cent, while the increase from Great Britain is 18.3 per cent, and the total decrease a little over 2 per cent.

The average value of the American exports was \$89.43 per ton, and the British \$6.89, or \$7.46 more than ours. Compared with 1901 these prices show a falling off of \$16.39 in the American, and of \$20.73 in the British exports.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars) delivered in New York and vicinity:

	1901	1902	Changes.
Blue vitriol	\$.42@\$.45	Oxalic com'l.	\$.52@\$.50
Muriatic, 18°	1.50	Sulphuric, 50°	1.60
Muriatic, 20°	1.60	bulk, ton	13.50@15.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 38°	4.37½	Sulphuric, 60°	1.05
Nitric, 38°	4.75	bulk	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°	1.20
Nitric, 42°	5.37½	bulk	21.00@23.00

Brimstone.—Spot business is small, sales ex-steamer being made at \$23.25@23.75 per ton, for best un-mixed seconds. Shipments are obtainable at \$22.50@22.75. Best thirds are \$1.75@2 less than seconds. Imports into the United States and Great Britain in the 11 months ending November 30, 1902, compare as follows:

	1901	1902	Changes.
United States	143,750	153,870	I. 10,120
Great Britain	19,820	21,332	I. 1,512
Total, long tons	163,570	175,202	I. 11,632
Exports from Sicily	436,283	425,347	D. 10,936

This statement shows that the United States took 36.2 per cent of the Sicilian exports in 1902, while Great Britain reported only about 5 per cent. Both countries, however, show a satisfactory increase in imports, owing to a heavier consumption in the sulphite pulp industry.

Exports and stocks of brimstone in Sicily in the 11 months ending with November, were as follows, in long tons:

Months.	Exports.		Stocks, end of month.	
	1901.	1902.	1901.	1902.
January	32,594	41,692	245,527	315,634
February	45,471	40,221	231,325	301,650
March	67,638	54,263	200,520	278,871
April	66,776	58,346	171,935	251,815
May	42,713	37,089	172,509	262,292
June	21,580	24,648	183,086	276,589
July	31,868	29,905	196,428	282,455
August	23,296	43,385	234,522	306,502
September	34,288	33,588	264,757	322,000
October	31,293	31,801	287,720	285,129
November	38,856	36,411	289,785	336,669
Total	436,283	425,347		

The decrease in exports in 1902 amounts to 10,936 tons, or 2½ per cent. Stocks on November 30, 1902, are the heaviest on record, and compared with the same day in 1901 show an increase of 46,884 tons, or 16.2 per cent.

Pyrites.—A cargo of 3,864 tons of Spanish iron pyrites arrived at New York this week. Business is healthy, and prices are good. In the 11 months ending November 30, 1902, the imports of pyrites into the United States and Great Britain compare as follows:

	1901	1902	Changes.
United States	237,191	384,578	I. 147,387
Great Britain	604,627	561,637	D. 42,990
Total, long tons	841,818	946,215	I. 104,397

The sulphur content of these imports is approximately as follows:

	1901.	1902.	Changes.
United States	187,880	184,597	I. 16,717
Great Britain	284,175	263,969	D. 20,206
Total, long tons	472,055	448,566	D. 3,489

Most of these pyrites have come from Spain though the United States also imported some from Norway and Pille's Island, Newfoundland.

Quotations for pyrites are f. o. b. Mineral City, Va.: Lump ore, \$5 per ton, and fines 10c. per unit; Charlemont, Mass., lump, \$5, and fines, \$4.75. Spanish pyrites, 13@13½c. per unit, New York and other Atlantic ports. Spanish pyrites contain from 46 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Nitrate of Soda.—The market is firm at \$1.97½ per 100 lbs, for spot, and \$1.87½ for futures, owing to the labor strike at Tocopilla, Chile. It is authoritatively estimated that the consumption in the United States last year amounted to 228,000 long tons, of which the Atlantic coast took 180,000 tons, and the Pacific 48,000 tons. This is a marked increase over 1901, and is encouraging to importers who are cultivating the agriculturists in this country to use more nitrate of soda for enriching the soil. The European deliveries in 1902 were 1,018,610 tons, as against 1,162,270 tons in 1901. With regard to the California niter deposits it is interesting to note that more capital is being invested principally by the American Niter Company.

A forecast of the industry in Chile indicates that the decrease in consumption in the past year, coupled with an increased production by new oficinas, make it necessary to reduce the quota allotted to the works

already in the combination. In some instances this reduction will amount to 10 and 16 per cent. This action is considered good business policy by the managers of the combination, who regulate market prices by adjusting the output to the actual quantity exported. While the question of production is being debated, it is interesting to note that nitrate of soda is selling to-day in Chile at about \$1.87 per ton less than a year ago. On the other hand, ocean freight rates have also fallen \$2.10 per ton. Hopes are entertained that the increased buying now for European account will strengthen prices. Ocean freights will also no doubt rise with heavier shipping.

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated New York, January 1, gives the following statistics:

	1902.	1901.	1900.
	Bags.	Bags.	Bags.
Imported into Atlantic Ports from West Coast from Jan. 1, 1902, to date	1,328,031	1,372,891	1,178,448
from Europe	.....	.....	2,063
Total	1,328,031	1,372,891	1,180,511

	1902.	1901.	1900.
Stock in store and afloat Dec. 31, 1902, in N. Y.	20,660	20,517	13,446
Boston	1,600	1,000	.....
Philadelphia	.....	10,000	.....
Baltimore	9,400	25,000	.....
Norfolk, Va.	6,460	17,000	.....
Charleston	.....	1,000	.....
Savannah	10,452	3,000	.....
Wilmington, N. C.	9,900	.....	.....
To arrive, due April 15, 1903	546,790	358,000	419,000

Visible supply to April 15, 1903 605,262 435,517 432,446

Stock on hand Jan. 1, 1902 77,517 13,446 9,586

Deliveries past month 88,117 166,412 103,007

Total yearly deliveries 1,347,076 1,308,820 1,176,651

Prices Current Dec. 31 1.97½c. 1.95c. 1.85@1.78½

Concerning the Chilean nitrate of soda market Messrs. Jackson Brothers, of Valparaiso, write us as follows under date of November 29: An active demand sprang up during the fortnight, both for prompt and forward shipments, and still continues. Transactions have been large, and over 1,500,000 qtls. have changed hands, principally in 95 per cent for December, at 6s. 7d.; January, 6s. 5½d. @ 6s. 6½d.; February, 6s. 4d. @ 6s. 4½d., and March, 6s. 4d. For refined, 6s. 7½d. has been paid for January, 6s. 5½d. for April—May, 6s. 4d. for June—July, and 6s. 4d. for April—December, all alongside terms, the market closing with buyers at these figures. Exports for October amounted to 3,424,417 qtls., making a total for the 10 months of 23,728,000 qtls., against 21,600,000 qtls. in the corresponding period last year. We estimate the shipments for November—December at 5,972,000 qtls., or, say, a total for the year 1902 of 29,700,000 qtls. more or less. We quote 95 per cent, December, 6s. 7d.; January, 6s. 6½d.; February, 6s. 4½d.; March, 6s. 3½d.; April—December, 6s. 1½d. @ 6s. 2d., and 96 per cent, December, 6s. 8d.; January, 6s. 7½d., all ordinary terms sellers. The price of 6s. 7d., with an all-round freight of 12s. 6d., stands in 7s. 11½d. per cwt., net cost and freight, without purchasing commission.

Sulphate of Ammonia.—Market is steady, and shipments this month hold at \$3.07½@3.10 per 100 lbs. for 24@25 per cent gas liquor. Abroad prices are higher, and conditions point to a further advance.

Phosphates.—Miners are inclined to hold for better prices; but consumers, notably those in Europe, seem unwilling to accept the situation, as they have already placed large orders at below present prices.

In Tennessee real estate agents are again active. Thirty-three acres, about 8 miles west of Columbia, and 6 miles north of Ashwood, have been bought, it is said, by J. A. Chapman, of Nashville, for \$13,000. This is a fancy price, and as the Virginia-Carolina Chemical Company owns land in the neighborhood, the deal looks like a speculation.

Phosphates.	Per ton F. o. b.	United Kingdom or European Ports.	
		Unit.	Long ton.
*Fla. hard rock (78@80%)	\$.60@\$.65	6@6½d.	\$9.48@10.07
*Fla. land pb. (68@73%)	3.00@3.25	4@5d.	6.65@7.00
*Tenn. (78@82%) export	3.25@3.50	5½@6d.	8.58@9.98
*Tenn. 78% domestic	3.00	.....	.....
*Tenn. 75% domestic	2.75@3.00	.....	.....
*Tenn. 73@74% domestic	2.30@2.40	.....	.....
*Tenn. 70@72% domestic	2.10@2.25	.....	.....
tSo. Car. land rock	.....@3.25	4½@4¼d.	5.07@5.94
tSo. Car. river rock	2.75@3.00	.....	.....
Algerian (63@68%)	.....	4%@4¼d.	6.18@6.34
Algerian (58@63%)	.....	4%@4¼d.	5.40@5.55
Algerian (53@58%)	.....	4%@4¼d.	4.90@5.04

*Fernandina, Brunswick or Savannah.
†Mt. Pleasant. tOn vessels, Ashley River.

Exports of phosphates from the United States in November, 1902, amounted to 59,473 long tons, making 758,685 tons for the 11 months, which compares with 696,161 tons in 1901; showing an increase of 62,524 tons, or nearly 9 per cent. Most of this was high-grade Florida rock.

Imports of phosphates into Great Britain in No-

vember, 1902, aggregated 34,101 tons, making 327,904 tons for the 11 months, as against 328,675 tons in 1901. A good part of these phosphates came from Algeria, although some was also from the United States.

Liverpool. Dec. 24.

(Special Report of Joseph P. Brunner & Co.)

Soda ash is in a firmer position, and business is passing at the usual varying prices as to market. For tierces the nearest range may be called about as follows: Leblanc ash, 48 per cent, £5 15s. @ £6; 58 per cent, £6 2s. 6d. @ £6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s. @ £4 10s.; 59 per cent, £4 10s. @ £4 15s. per ton, net cash. Bags 5s. per ton under price for tierces. Soda crystals are in request, and selling at generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special quotations for certain export quarters. Caustic Soda is in demand and strong at late rates, namely: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for certain export quarters.

Bleaching powder is flat, and buyers are holding aloof in view of the lower prices which come into force next month. For January delivery £4 @ £4 10s. per ton, net cash, may be called about range for hard-wood.

Chlorate of potash is neglected, and prices are nominal at about 2½ @ 2¾d. per lb., net cash.

Bicarb. soda is steadily maintained at £6 15s. per ton, less 2½ per cent, 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 in rather brisk demand, and prices favor sellers, the nearest spot range for good gray, 24@25 per cent, in double bags, f. o. b. here, being now £12 2s. 6d. @ £12 5s. per ton, less 2½ per cent.

Nitrate of soda is firm on spot at £9 5s. @ £9 7s. 6d. per ton, less 2½ per cent for double bags, f. o. b. here.

METAL MARKET.

New York, Jan. 7.

Gold and Silver Exports and Imports.

At all United States Ports in November and Year.

Metal	November.		Year.	
	1901.	1902.	1901.	1902.
Gold:				
Exports	\$16,292,500	\$714,915	\$63,089,816	\$33,172,063
Imports	7,431,678	3,836,307	51,870,358	39,861,245
Excess	E. \$8,860,822	I. \$3,121,392	E. \$1,089,458	I. \$6,680,182
Silver:				
Exports	\$4,689,301	\$3,784,674	\$50,914,919	\$43,727,779
Imports	2,736,532	2,199,353	28,358,192	23,701,933
Excess	E. \$1,952,769	\$1,585,321	E. \$22,556,727	E. \$20,025,846

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending January 7, and for years from January 1:

Period.	Gold.		Silver.		Total Excess, Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week	\$17,900	\$534,654	\$458,190	\$39,634	I. \$98,198
1903	1: 900	534 65	458 190	39 634	I. 98 198
1902	769,800	10 547	1,004 812	2 656	F. 1,733,909
1901	22,940	195,719	807,777	196,134	E. 438,864

Gold exports this week were chiefly to the West Indies, while the imports were principally from Europe. Silver exports were nearly all to London, and imports from Central and South America.

Financial Notes of the Week.

The year opens with business generally active, and trade everywhere in prosperous condition.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending January 3, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	\$803,989,600	\$869,546,600	\$875,352,100
Deposits	870,950,100	926,204,100	873,115,000
Circulation	30,982,500	31,874,200	45,705,200
Specie	164,827,800	164,808,800	154,998,700
Legal tenders	67,059,800	74,257,800	73,473,900
Total reserve	\$231,887,600	\$239,066,600	\$228,472,600
Legal requirements	217,737,525	231,551,025	218,278,750

Balance surplus \$14,150,075 \$7,515,575 \$10,193,850
Changes for the week, this year, were increases of \$30,600 in loans and discounts, \$7,161,400 in deposits, \$48,800 in circulation, \$1,264,400 in specie, \$4,180,600 in legal tenders, and \$3,644,650 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates cov-

ered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

Table with columns for Gold and Silver for 1902 and 1903, listing countries like N. Y. Ass'd, England, France, Germany, Spain, etc.

The returns of the Associated Banks of New York are of date January 3, and the others January 2, as reported by the Commercial and Financial Chronicle.

Silver has been steady. Indian exchanges have justified purchases for that quarter. No unusual features are apparent.

The United States Assay Office in New York reports receipts of 43,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to December 18 are reported by Messrs. Pixley & Abell's circular as follows:

Table showing India, China, The Straits, and Totals for 1901 and 1902 with changes.

Arrivals for the week were £308,000 in bar silver from New York, £9,000 from Australia and £4,000 from the West Indies; total, £321,000.

Indian exchange continues firm, the Council bills offered in London having been taken at an average of 16.03d. per rupee.

The coinage executed at the mints of the United States in the year ending December 31, 1902, is reported by the Bureau of the Mint, Treasury Department, as follows:

Table with columns for Denomination, Pieces, and Value, listing Double Eagles, Eagles, Half Eagles, Quarter Eagles, Total Gold, etc.

There were also coined in 1902 Louisiana Exposition gold dollars to the value of \$75,080; for Venezuela, 300,000 5 Bolivar pieces, valued in United States at \$300,000, and 250,000 2 Bolivar pieces, valued at \$92,777.70; for Colombia, 960,000 50 centavo pieces, valued in United States at \$445,333.34, and 400,000 5 centavo pieces, valued at \$14,800.

The Treasury Department's estimate of the amount of money in the United States on January 1, 1903, is as follows:

Table with columns for Total, In Treas., In Circulation, listing Gold Coin, Gold Certificates, Silver Dollars, Silver Certificates, etc.

Population of the United States January 1, 1903, estimated at 79,799,000; circulation per capita, \$29.43. For redemption of outstanding certificates...

Prices of Foreign Coins.

Table listing Mexican dollars, Peruvian soles and Chilean pesos, Victoria sovereigns, Twenty francs, Spanish marks, Spanish 25 pesetas with Bid and Asked prices.

Joplin Ore Market. Jan. 3.

(From Our Special Correspondent.)

The zinc ore shipments of the past week were only 72 per cent of the average shipments for the past year, owing principally to the holiday season, which reduced the output.

The highest price paid for zinc ore during the past week was \$33.50 per ton upon a straight basis. The assay basis ranged around \$31 for 60 per cent zinc ore, while some lots went slightly over this figure.

Following is the turn-in by camps of the Missouri-Kansas District for week ending January 3:

Table with columns for Location, Zinc, lbs., Lead, lbs., and Value, listing Joplin, Carterville-Webb City, Galena-Empire, etc.

The export movement of zinc ore continues, and at the close of the week the exporters claimed that over 1,700,000 lbs. loaded, with several more cars to be loaded early the present week.

OTHER METALS.

Daily Prices of Metals in New York.

Table with columns for Silver, Copper, Spelter, listing January prices for Sterling Exchange, London, Lake, Electrolytic, etc.

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 electrolytic cathodes is usually 1.25c lower than these figures.

Copper.—The firmer tendency reported last week has made further progress, and the market has developed considerable strength. There seems to be no doubt but what consumption in this country has been largely under-estimated for some time past, for the supplies available for immediate consumption are far from plentiful.

The market for standard copper in London, which closed last week at £53 5s., opened on Monday at £53 10s., and the closing quotations on Wednesday are cabled as £53 7s. 6d. @ £53 10s. for spot, £53 15s. @ £53 17s. 6d. for three months.

Statistics for the second half of December show an increase in the visible supplies of 500 tons. Refined and manufactured sorts we quote: English tough, £57 5s. @ £57 15s.; best selected, £58 10s. @ £59; strong sheets, £70 @ £70 10s.; India sheets, £72 @ £72 10s.; yellow metal, 6% @ 6 1/2 d.

Exports of copper from Atlantic ports in the 6 days ending January 5 are reported by our special correspondents as follows: Great Britain, 185 tons; Germany, 182; Holland, 500; Austria, 95; Italy, 18; Sweden, 45; Russia, 50; Japan, 41; Philippines, 4; Panama, 5; total tons. Imports were 65 tons copper.

Tin has ruled very strong throughout the week, and stimulated by speculative buying both here and abroad prices have advanced by leaps and bounds. There has also been a very good consumptive inquiry for both spot and future delivery.

The foreign market, which closed last week at £120 15s., opened on Monday at £122 15s., advanced another £2 on Tuesday, and the closing quotations on Wednesday are cabled as £125 @ £125 2s. 6d. for spot, £125 15s. @ £125 17s. 6d. for three months.

Statistics for the month of December show a decrease in the visible supplies of 2,400 tons.

Lead remains dull and neglected. The ruling quotations are 3.95 @ 4.05c., St. Louis; 4.05 @ 4.10c., New York.

During the last few days the foreign market has displayed considerable strength, Spanish lead being quoted at £11 @ £11 1s. 3d.; English lead, £11 2s. 6d. @ £11 3s. 9d.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is dull, 3.97 1/2 c. being asked for Missouri brands and 3.95c. bid. Argentiferous lead is unchanged at 4.05c.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of December 20, that the price of silver during the week has been 11.75 reales per ounce. Exchange has gone down by 34 centimos, making it at present 33.67 pesetas to £1. The local quotation for pig lead on wharf has been 58 reales per quintal, which on above exchange is equal to £9 13s. 10d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports of pig lead have been 406,904 kgs. to Naples; 424,561 kgs. to Marseilles; 831,465 kgs. in all.

Spelter.—The lower values which have been established are beginning to attract the attention of consumers, and a somewhat larger business is being reported. The present quotations are 4.40 @ 4.45c., St. Louis; 4.60 @ 4 1/2 c., New York.

The foreign market remains steady, good ordinaries being quoted at £19 15s.; specials 5s. higher.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is fairly steady at the late decline. Latest sales are on basis of 4.40 @ 4.45c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of December 20, that prices for zinc ores are steady and demand good. Shipments for the week were 11,225 tons blende to Antwerp.

Antimony has been in somewhat better demand. We quote Cookson's, 8 1/4 @ 8 1/2 c.; Hallett's, 7 @ 7 1/2 c.; Hungarian, Italian, U. S., French and Japanese, at 6 1/4 @ 6 1/2 c.

Nickel.—The price is now quoted by leading producers at 40 @ 47c. per lb for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quality, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings \$19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72 1/2 c. per grain.

Quicksilver.—Prices continue unchanged. The New York quotation is \$48 per flask for large lots, with a slightly higher price for smaller quantities. The London quotation is £8 15s. per flask, with the same figure named from second hands. In San Francisco, prices continue at \$45.50 @ \$46.50 per flask for domestic orders, while for export \$43.50 @ \$44 is quoted.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Table listing Aluminum, Ferro-Tungsten, Magnesium, Manganese, Rolled Sheets, Alum-bronze, Nickel-alum, Bismuth, Chromium, Copper, Ferro-Molybdum, Ferro-Titanium, etc.

Average Prices of Metals per lb., New York.

Table with columns for Month, Tin, Lead, Spelter, listing prices for January, February, March, April, May, June, July, August, September, October, November, December, and Year.

Average Prices of Copper.

Table with columns: Month, Electrolytic, New York, Lake, London Standard, 1902, 1901, 1901, 1901.

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper.

Average Prices of Silver, per ounce Troy.

Table with columns: Month, London, N.Y., 1902, 1901, 1900, Pence, Cents, Pence, Cents, Pence, Cents.

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

DIVIDENDS.

Table with columns: Name of Company, Date, Per Share, Total, Latest Dividend, Total to Date.

ASSESSMENTS.

Table with columns: Name of Company, Location No., Delinq., Sale, Amt.

STOCK QUOTATIONS.

NEW YORK.

Table with columns: Company and Location, par val, Dec. 31, Jan. 1, Jan. 2, Jan. 3, Jan. 5, Jan. 6, Sales.

Coal, Iron and Industrial Stocks.

Table with columns: Company and Location, par val, Dec. 31, Jan. 1, Jan. 2, Jan. 3, Jan. 5, Jan. 6, Sales.

BOSTON, MASS.*

Table with columns: Name of Company, par val, Shares listed, Dec. 31, Jan. 1, Jan. 2, Jan. 3, Jan. 5, Jan. 6, Sales.

* Holiday. † Ex Dividend. Total sales, 181,715 shares.

PHILADELPHIA, PA.‡

Table with columns: Name and Location of Company, par val, Dec. 31, Jan. 1, Jan. 2, Jan. 3, Jan. 5, Jan. 6, Sales.

‡ Reported by Townsend, Whelen & Co., 300 Walnut St., Philadelphia, Pa. Total sales 9,280 shares.

* Holiday.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.*

Table of stock quotations for Colorado Springs, Colo. listing companies like Acacia, Alamo, Anaconda, etc., with columns for par value, bid/ask prices, and sales.

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 141,700 shares.

COLORADO SPRINGS. (By Telegraph.)

Table of stock quotations for Colorado Springs via telegraph, listing companies like Acacia, Alamo, Anaconda, etc., with columns for par value, bid/ask prices, and sales.

*Holiday.

PARIS.

Dec. 18.

Table of stock quotations for Paris, listing companies like Acieries de Creusot, Anzin, Boleo, etc., with columns for country, product, capital stock, par value, latest dividends, and prices.

LONDON.

Dec. .

Table of stock quotations for London, listing companies like Alaska-Treadwell, Anaconda, Arizona, etc., with columns for name and country, authorized capital, par value, last dividend, and quotations.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

MEXICO.

Dec. 27.

Table of stock quotations for Mexico, listing companies like Durango, Guanajuato, Guaymas, etc., with columns for name of company, shares, last dividend, and price.

ST. LOUIS, MO.*

Jan. 2

TORONTO, ONT.

Jan. 5.

Table of stock quotations for St. Louis, Mo. and Toronto, Ont., listing companies like Am. Nettle, Catherine Lead, etc., with columns for name, shares, par value, bid/ask prices, and sales.

*From our Special Correspondent.

Total sales, 1,500 shares.

SALT LAKE CITY.*

Jan. 2.

Table of stock quotations for Salt Lake City, listing companies like Ajax, Ben Butler, Bullion-Beck, etc., with columns for name of company, shares, par value, high/low prices, and sales.

All mines are in Utah. *By our Special Correspondent. Total sales, 41,850 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.
(See also Market Reviews.)

ABRASIVES—		Cust. Meas. Price.		BARIUM		Cust. Meas. Price.		GRAPHITE—Am. f.o.b. Prov.		Cust. Meas. Price.		PAINTS AND COLOES—		Cust. Meas. Price.	
Carborundum, f.o.b. Niagara Falls, Powd., F.F.F.F.F.	lb.		\$0.08	Oxide, Am. hyd. cryst.	lb.		\$0.02%	Idence, R. I., lump	sh. ton		\$8.00	Metallic, brown	sh. ton		\$19.00
Grains	"		.10	Sulphate (Blanc Fixe)	"		.02	Pulverized	"		30.00	Red	"		16.00
Corundum, N. C.	"		.07@.10	BARYTES—				German, com. pulv.	lb.		.01% @ .01%	Ocher, Am. common	"		9.25@10.00
Chester, Mass.	"		.04% @ .05	Am. Crude, No. 1	sh. ton		9.00	Best pulverized	"		.01% @ .02	Best	"		21.25@25.00
Barry's Bay, Ont.	"		.07% @ .09%	Crude, No. 2	"		8.00	Ceylon, common pulv.	"		.02% @ .03%	Dutch, washed	lb.		.04%
Mont., car-lots, f.o.b., Chicago	"		.07 @ .07%	Crude, No. 3	"		7.75	Best pulverized	"		.04 @ .08	French, washed	"		.01% @ .01%
Crushed Steel, f.o.b. Pittsburg	"		.05%	German, gray	"		14.50	Italian, pulv.	"		.01%	Orange mineral, Am.	"		.07% @ .08
Emery, Turkish flour in kegs	"		.08%	Snow white	"		17.00	GYPSSUM—Ground				Foreign, as to make	"		.08% @ .11%
Grains, in kegs	"		.05 @ .05%	BAUXITE—Ga. or Ala. Mines:				Fertiliser	sh. ton		8.00@8.50	Paris green, pure, bulk	"		.12
Naxos flour, in kegs	"		.08%	First Grade	lg. ton		5.50	Rock	lg. ton		7.00	Red lead, American	"		.05% @ .06
Grains, in kegs	"		.05 @ .05%	Second grade	"		4.75	English and French	"		4.00	Foreign	"		.00% @ .08
Chester flour, in kegs	"		.08%	BISMUTH—Subnitrate				INFUSORIAL EARTH—Gr'd.				Turpentine, spirits	gal.		.55% @ .56
Grains, in kegs	"		.05 @ .05%	Subcarbonate	lb.		1.40	American best	"		20.00	White lead, Am., dry	lb.		.04% @ .04%
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"		.01%	" " " " " "	"		1.85	French	"		37.50	American, in oil	"		.05% @ .05%
Grains, in kegs	"		.02%	BITUMEN—"B"	"		.03%	German	"		40.00	Foreign, in oil	"		.06% @ .09%
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton		26.50@30.00	" " " " " "	"		.05	IODINE—Crude				Zinc, white, Am., ex dry	"		.04% @ .04%
Kuluk (Turkey)	"		22.00@24.00	BONE ASH	"		.02% @ .02%	100 lbs.			2.45	American, red seal	"		.06%
Naxos (Greek) h. gr.	"		26.00	BORAX	"		.07% @ .07%	lb.			.05	Green seal	"		.07
Garnet, as per quality	sh. ton		25.00@35.00	BROMINE	"		.40	Nitrate, com'l	"		.01%	Foreign, red seal, dry	"		.05% @ .08%
Pumice Stone, Am. powd.	lb.		.01% @ .02	CADMIUM—Metallic	"		1.40	True	"		.04	Green seal, dry	"		.06% @ .09%
Italian, powdered	"		.01%	100 lbs.			2.00@2.50	Oxide, pure copperas color	"		.05 @ .10	POTASH			
Lump, per quality	"		.04 @ .40	CALCIUM—Acetate, gray	"		1.80	Purple-brown	"		.02	Caustic, ordinary	"		.04% @ .04%
Stonestones, ground	"		.02% @ .04%	" " brown	"		.90	Venetian red	"		.01 @ .01%	Elect. (90%)	"		.06%
Lump, per quality	"		.06 @ .20	Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton		70.00	Scale	"		.01 @ .03	POTASSIUM—			
Rouge, per quality	"		.10 @ .50	Chloride	100 lbs.		.70 @ .90	KAOLIN—(See China Clay.)				Bicarbonate cryst	"		.08%
Steel Emery, f.o.b. Pittsburg	"		.07	CEMENT—				Finishing	"		.90	Powdered or gran.	"		.14
ACIDS—				Portland, Am., 400 lbs.	bbl.		1.70 @ 1.90	KRYOLITE—(See Cryolite.)				Bichromate, Am.	"		.08% @ .08%
Boracic, crystals	"		.10% @ .11	Foreign	"		1.85 @ 2.25	Brown	"		.06 @ .06%	Scotch	"		.08% @ .09
Powdered	"		.11% @ .11%	"Rosendale," 800 lbs.	"		.75	Nitrate, com'l	"		.06%	Carbonate (80@85%)	"		.02% @ .03
Carbonic, liquid gas	"		.12%	Slag cement, imported	"		1.65	" gran.	"		.08%	Chromate (98@99%)	"		.22%
Chromic, crude	"		.20	CERESINE—				LIME—Com., abt. 250 lbs.	bbl.		.80	Kalnit	lg. ton		6.05
Hydrofluoric, 30%	"		.03	Orange and Yellow	lb.		.12%	Finishing	"		.90	Manure salt, 30%	100 lbs.		.06
48%	"		.05	White	"		.13%	MAGNESITE—Greece.				D'le Manure Salt, 45@55%	"		1.12
60%	"		.11	CHALK—Lump, bulk	sh. ton		2.50	Crude (95%)	lg. ton		6.00 @ 6.50	Muriate, 80@85%	"		1.83
Sulphurous, liquid anhy.	"		.06	Ppt. per quality	lb.		.08% @ .08	Calced	sh. ton		17.50 @ 18.00	95%	"		1.98
f.o.b. Bound Brook, N.J.	"		.06	CHLORINE—Liquid	"		.80	Bricks	M		170.00	Permanganate	lb.		.09% @ .10
ALCOHOL—Grain				Water	"		.10	Am. Bricks, f.o.b. Pittsburg	"		175.00	Prussiate, yellow	"		.13 @ .13%
Refined wood 95@97%	gal.		2.45 @ 2.47	CHROME ORE—				Carbonate, light, fine pd.	lb.		.05	Red	"		.86
Purified	"		.90 @ .95	(50% ch.) ex-ship N. Y.	lg. ton		24.75	Blocks	"		.07 @ .08	Sulphate, 90%	100 lbs.		2.11
ALUM—Lump				Bricks f.o.b. Pittsburg	M		175.00	Chloride, com'l	"		.01%	98%	"		2.14
Ground	100 lbs.		1.75	CLAY, CHINA—Am. com., ex-dock, N. Y.				Fused	"		.20	Sylvinit	unit		.39%
Powdered	"		1.80	Am. best, ex-dock, N. Y.	lg. ton		8.00	Nitrate	"		.60	QUARTZ—(See Silica.)			
Chrome, com'l	"		2.75 @ 3.00	English, common	"		12.00	Sulphate	100 lbs.		.75 @ .95	SALT—N. Y. com. fine	bbl.		2.00
ALUMINUM—				Fire Clay, ordinary	sh. ton		4.25	MANGANESE—Powdered,				N. Y. agricultural	"		1.50
Nitrate	lb.		1.50	Best	"		6.00	70@75% binoxide	lb.		.01% @ .01%	SALTPETRE—Crude	100 lbs.		4.00
Oxide, com'l, common	"		.09%	Slip Clay	"		5.00	Crude pow'd.	"		.01% @ .02%	Refined	"		4.25 @ 4.62%
Best	"		.20	COAL TAR FITCH	gal.		.08	75@85% binoxide	"		.01% @ .02%	SILICA—Best foreign	lg. ton		10.00 @ 11.00
Pure	"		.80	COBALT—Carbonate	lb.		1.75	85@90% binoxide	"		.02% @ .03%	Ground quartz, ord.	sh. ton		6.00 @ 8.00
Hydrated	100 lbs.		2.00	Nitrate	"		1.50	90@95% binoxide	"		.02% @ .05%	Best	"		12.00 @ 13.00
Sulphate, pure	"		1.50 @ 2.00	Oxide—Black	"		2.26 @ 2.30	Carbonate	"		.16 @ .20	Lump quartz	"		2.50 @ 4.00
Com'l	"		1.15 @ 2.00	Gray	"		2.25 @ 2.40	Chloride	"		.04	Glass sand	"		2.75
AMMONIA—				Smalt, blue ordinary	"		.08	Ore, 50%, Foreign	unit		.18 @ .19	SILVER—Chloride	oz.		.95
Aqua, 16"	lb.		.03	Best	"		.20	Domestic	"		.30	Nitrate	"		.33
18"	"		.03%	Slip Clay	"		5.00	MARBLE—Flour	sh. ton		6.00 @ 7.00	Oxide	"		.85 @ 1.10
20"	"		.03%	COAL TAR FITCH	gal.		.08	MERCURY—Bichloride	lb.		.77	SODIUM—			
28"	"		.05%	COBALT—Carbonate	lb.		1.75	MICA—N. Y. gr'nd, coarse	sh. ton		33.00 @ 38.00	Bichromate	lb.		.04%
AMMONIUM—				Nitrate	"		1.50	Fine	lb.		.00% @ .02	Chlorate, com'l	"		.07 @ .07%
Carbonate, lump	"		.07% @ .08%	Oxide—Black	"		2.26 @ 2.30	Sheets, N. C., 2x4 in.	"		.30	Hyposulphite, Am.	100 lbs.		1.60 @ 1.95
Powdered	"		.08% @ .09	Gray	"		2.25 @ 2.40	3x3 in.	"		.80	German	"		1.70 @ 1.90
Muriate	"		.05%	Smalt, blue ordinary	"		.08	3x4 in.	"		1.50	Peroxide	lb.		.45
Lump	"		.08%	Best	"		.20	4x4 in.	"		2.00	Phosphate	"		.02% @ .02%
Nitrate, white, pure (90%)	"		.12	COPPERAS—in bulk	100 lbs.		.37%	6x6 in.	"		3.00	Prussiate	"		.09%
Phosphate, com'l	"		.09	In bbls.	"		.42%	MINERAL WOOL—				Silicate, conc.	"		.05
Pure	"		.12	COPPER—Carbonate	lb.		.18 @ .19	Slag, ordinary	sh. ton		19.00	Com'l	"		.01
ANTIMONY—Glass				Chloride	"		.25	Selected	"		25.00	Sulphate, com'l	100 lb.		.75 @ .82%
Needle, lump	"		.50 @ .40	Nitrate, crystals	"		.35	Rock, ordinary	"		32.00	Sulphide	lb.		.01%
Powdered, ordinary	"		.05% @ .07%	Oxide, com'l	"		.19	Selected	"		40.00	Sulphite crystals	"		.02%
Oxide, com'l white, 85%	"		.09%	CRYOLITE	"		.08%	NICHEL Oxide, No. 1	lb.		1.00	SULPHUR—Roll	100 lbs.		1.85
Com'l white, 85%	"		.12	Blasting powder, A.	25 lb. keg		.65	No. 2	"		.60	Flour	"		1.90
Com'l gray	"		.07	"Rackarock," A.	lb.		.18	Sulphate	"		.20 @ .21	Flowers, sublimed	"		2.15
Sulphuret, com'l	"		.16	"Rackarock," B.	"		.18	OILS—Black, reduced 20 gr.	gal.		.10% @ .12	TALC—N. C., 1st grade	sh. ton		18.75
ARSENIC—White powd.				Judson E. R. powder	"		.10	25@30, cold test	"		.10% @ .12	N. Y., Fibrous, best	"		10.20
Red	"		.06% @ .07	Dynamite (20% nitro-glycerine)	"		.13	15, cold test	"		.11% @ .12	French, best	100 lbs.		1.25
ASPHALTUM—				(30% nitro-glycerine)	"		.14	Zero	"		.12% @ .13	Italian, best	"		1.62%
Ventura, Cal.	sh. ton		\$2.00	(40% nitro-glycerine)	"		.15	Summer	"		.10 @ .11%	Oil barrels	"		4.20
Cuban	lb.		.01% @ .03%	(50% nitro-glycerine)	"		.16%	Cylinder, dark steam ref.	"		.15% @ .18%	TIN—Crystals	lb.		.23
Egyptian, crude	"		.05% @ .06	(60% nitro-glycerine)	"		.18	Dark, filtered	"		.14% @ .17	Oxide	"		.45
Trinidad, refined	sh. ton		\$5.00	(75% nitro-glycerine)	"		.21	Light, filtered	"		.15% @ .18%	URANIUM—Oxide	"		2.25 @ 3.00
San Valentino (Italian)	lg. ton		16.00	Glycerine for nitro, (32-3-10" Be.)	"		.15% @ .15%	Extra cold test	"		.22% @ .27	ZINC—Metallic, ch. pure	"		.07 @ .09%
Seyssel (French), mastic	sh. ton		21.00	FELDSPAR—Ground	sh. ton		8.00 @ 9.00	Gasoline, 88@90"	"		.15 @ .20	Carbonate, ppt.	"		.09
Gilsonite, Utah, ordinary	lb.		.08	FLINT PEBBLES—Dan. Best	lg. ton		14.75	Naphtha, crude, 68@72"	bbl.		9.05	Chloride solution, com'l	"		.02%
Select	"		.03%	FLUORESPAR—	"		11.75	"Stove"	gal.		.12	Chloride granular	"		.04% @ .04%
BARIUM—				Am. lump, 1st grade	sh. ton		14.40	Linseed, domestic raw	"		.45 @ .46	Dust	"		.04% @ .04%
Carb. Lump, 80@90%	sh. ton		\$5.00 @ 27.50	2d grade	"		13.90	Boiled	"		.48	Sulphate	"		.02% @ .02%
92@98%	"		26.00 @ 28.00	Gravel and crushed, 1st gr	"		13.40	Calcetta, raw	"		.75	THE RARE EARTHS.			
Powdered, 80@90%	lb.		.01% @ .02	2d grade	"		12.40	OZOKERITE	lb.		.11%	BORON—Nitrate	lb.		\$1.50
Chloride, com'l	100 lbs.		1.67% @ 1.76	Ground, 1st grade	"		17.90	PAINTS AND COLOES—				CALCIUM—Tungstate	"		.60
Chem. pure cryst.	lb.		.05	Ground, 2d grade	"		16.50	Chrome green, common	"		.05	(Scheelite)	"		.80
Nitrate, powdered	"		.05%	Ground, 2d grade	"		16.50	Pure	"		.16	CERIUM—Nitrate	"		10.00