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EDITORIAL.

FURTHER ADVICES as to the accident at the Virginia coal mines, in Alabama, confirm the first impression that it was a coal-dust explosion. We hope to receive full details as the investigation goes on, and reserve comment until then.

THE CONSOLIDATION of Southern iron companies, to which reference was made in this column last week, appears to be at a halt just now. It is probable, however, that it will be carried through, as the deal is in the hands of men who have sufficient capital behind them. We do not propose now to comment upon the matter at length, reserving such discussion until it takes final form. It is too probable that it is chiefly a stock operation, for the benefit of Wall Street operators, rather than of the properties themselves. Rumor has it that there is a purpose to sell out to the United States Steel Corporation, but such reports go with every iron consolidation, as a matter of course.

THE COMPANY LAW in Great Britain, which was intended to do away with certain abuses, has been continually evaded, as our London correspondent has told, by the registration of companies in the Island of Guernsey, one of the Channel islands, which belongs to Great Britain, but which has its separate law. The case is somewhat analogous to that of certain companies in this country, which incorporate in those States where the law is most accommodating. Of course, the companies which adopt this method in Great Britain are not those of the highest standing. A movement is being made to remedy certain loose points in the present law, but it will take some time to carry out this intention.

SOME INTERESTING experiments are being made in San Francisco, by Mr. E. Woltman, in making briquettes of peat and California petroleum. The peat is obtained from the tule islands, at the junction of the San Juanquin and Sacramento rivers, where there is a very large supply. As taken from the marshes, it carries about 80 per cent moisture, but this is to be removed by compression, and the crude oil is to be mixed in the remaining spongy mass of partially decomposed vegetable matter. In a country like California,

where coal is scarce and commands a high price, it is possible that these experiments may result in furnishing a practicable commercial fuel.

FEBRUARY HAS BEEN a good dividend-paying month in America, 43 mining and metallurgical companies reporting to THE ENGINEERING AND MINING JOURNAL a total of \$12,292,725. This is nearly double the amount declared in January, partly the result of the \$6,304,919 distributed as a quarterly dividend of 1.75% among the preferred shareholders of the United States Steel Corporation, and \$1,530,879, the 1% quarterly payment by the Amalgamated Copper Company. The distribution of dividends during the month was as follows: Copper, four companies, \$2,572,104; gold, silver and lead, 14 companies, \$679,733; zinc, two, \$301,500; iron and steel, three, \$6,984,879; coal and coke, five, \$832,311; oil, 13 companies, \$824,448; miscellaneous, two, \$97,750.

Continued strength in the metal markets, active development on economic principles of promising low-grade mines, concentrated management of metallurgical plants to effect a saving in the cost of operation, and a temporary cessation of labor troubles, combine to create hope of larger dividends in future.

THE PIERCING of the Swiss-Italian Alps by the Simplon tunnel crowns the efforts of seven years. In the twelve-mile bore there have been encountered many exceptional obstacles, to overcome which engineering skill of a high order has been required. Apart from the hardness of the rock in one portion of the tunnel, and the shiftiness of it in another, the engineers were handicapped by heavy flows of water and hot springs, which finally put an end to operations on the north side. The methods adopted to overcome these difficulties have been described in this JOURNAL during the progress of the work, and it remains but to point out that the Simplon is another of the numerous cross-sections of the earth's exterior which have failed to encounter metallic ore of commercial value. In the Alps, in the Pyrenees, in the Rocky Mountains, in the Selkirks and in the Andes, the needs of the railroad have led to the piercing of mountain ridges, often in localities near which profitable mining is, or has been, prosecuted—nevertheless, the railroad tunnel remains an unsuccessful prospector.

TWO MEASURES of interest to the California oil producers have been acted on in committee in the State legislature. The first, which makes oil pipe-lines common carriers, has been reported by the committee, with a recommendation that it pass. This bill, which has been favored by the small producers generally, will, if passed, oblige pipe lines to take all oil offered, and prohibit any discrimination in forwarding it. Should it become law, some interesting questions will probably come before the courts.

The bill providing for the establishment of an oil refinery by the State, to which reference has been made in our columns, is not approved by the committee, and will probably be dropped.

Depth at Cripple Creek.

The preliminary report covering the recent re-examination of the Cripple Creek district has provoked vigorous adverse criticism at the hands of the Denver press, mainly because Messrs. Waldemar Lindgren and F. L. Ransome dared to suggest that the ore-shoots are smaller and less abundant with increase of depth. It is only just to the officers of the Geological Survey to draw attention to the following statement by Mr. Victor G. Hills, consulting engineer, in the eleventh annual report of the Portland mine. Writing of the eleventh level, he says: "Much interest is naturally felt in the showing of ore found with increasing depth. In my judgment—and I believe this is the general opinion of mining engineers—with increasing depth in the Cripple Creek district the orebodies will be smaller and less numerous. But the deepest development of the Portland still shows ore of much value, and I have taken samples of what has developed to date." This frank statement, by an engineer who knows the Cripple Creek district as thoroughly as anyone, should warn the public against too easy an acquiescence with the indignant attitude of local papers which are prone to brand every truthful observer as a 'knocker.' Such indignation is often the mere froth which endeavors to obscure the growing realization of an unpleasant fact. Cripple Creek needs no falsehoods, and no half-truths, to win the interest of mining speculators; the depth already attained, when taken with the large area proved to be productive, is sufficient for the energies of resourceful

operators for many years to come. To bury one's beak in the sand and refuse to recognize actual conditions underground is not good business. Legitimate mining is based upon the recognition of facts; irresponsible scheming is hampered by them.

Spelter and Zinc Ores.

The zinc business continues very unprofitable to the smelters, but highly profitable to the miners, especially the miners of Colorado, who have lately experienced the excitement of active competition for their ore, which only two or three years ago was looked at rather askance and realized only a trifling price. In the meanwhile, the smelters who are not prepared to treat the Colorado ore and have no dominating position with respect to the Joplin market, are in a serious condition, and there are numerous furnaces under 'dead-fire' in the Kansas gas field. It is expensive to keep furnaces under dead-fire, but not nearly so expensive as it is to buy Joplin ore at the present scale of prices and to operate.

The reason for this situation is, of course, the excessive competition among the smelters for the Joplin product and the ability of a few smelters to command that market; and, on the other hand, the necessity of a high range of prices for ore in order to maintain the Joplin output. It may easily be conceived what a big, broad business there would be in spelter at the present time if ore were obtainable more cheaply. The increase in the production of Wisconsin and the Rocky Mountain States and territories, which is to be anticipated this year, will do something toward that condition; and as to the production in the Far West, at least, it may be predicted that, now it has been inaugurated, it will not be checked by a considerable decline in price, since it was established on a much lower basis than prevails now. We understand that most plans for opening mines and operating mills have been figured on a moderate price.

We are of the opinion that an industry is in an unhealthy condition when so important a factor in it as the smelter cannot make a proper earning on his investment. We think it would be to the interest of the Joplin district, in the long run, if some change in its methods could be made, so that the smelters could en-

ter into contracts for the delivery of ore on a sliding scale of price, instead of the present method of having to buy their ore supplies from week to week. We are aware that attempts to make such contracts in the past have been failures, but that is no reason why they should inevitably be so. If it should become possible for the large land-owning companies of the district to retain more control of the ore produced from their properties, it might then be possible for the smelters to enter into contracts with them. Some such innovation would help to alter the present "feast or famine" condition which governs the district.

Coal Legislation in Pennsylvania.

Coal mine legislation promises to receive a good deal of attention from the Pennsylvania legislature this year. The first and most important bill under consideration was introduced at the instance of the United Mine Workers, and is strongly advocated by the Union, while it will doubtless be opposed by the operators. It provides for a compulsory eight-hour day, not only for underground workers, but for all employed "in and about the mines."

The second bill, also promoted by the Union, prohibits the employment of boys under sixteen inside the anthracite mines, and of those under fourteen outside. This bill is entirely to be commended. Pennsylvania has been backward in child labor legislation, and it is quite time to begin, while the mines are a good place to start the reform.

Governor Pennypacker's tax recommendation finds expression in a bill providing that the State shall levy a tax on both anthracite and bituminous coal. Each coal-producing company and operator is required to make a quarterly report to the auditor-general of all coal sold, which shall pay a tax of 5 per cent on anthracite coal and 2 per cent on bituminous coal. This money is to be set apart in a special fund and be thus distributed: Two-fifths to the construction of good roads, two-fifths to the public schools, and the remaining one-fifth to be used for the benefit of those injured in mine work and for the widows and orphans of those killed in the mines.

The companion bill is based upon a recommendation that was embodied in the last report of Mr. Roderick, chief of the

Bureau of Mines. It provides for a commission of five, to be appointed by the governor, one of whom shall be an anthracite miner and one a bituminous miner, the other three to be selected by the governor from outside occupations. The duty of the commission will be to recommend to the next legislature a law providing a sufficient income for those that may be permanently injured in and about the coal mines, and for the widows and orphans of those who may be killed.

Both these bills have a rather socialistic tendency, and incline to place upon the State a burden which can be better provided for by private effort. In other words, they make compulsory and enforce by taxation the relief funds which have already been established by some operators, such as the Lehigh Coal & Navigation Company and the Philadelphia & Reading Coal & Iron Company. That some system of insurance and relief is desirable goes without saying; that it is the business of the State is quite another question, upon which there is room for wide differences of opinion.

Mr. Lawson Again.

We confess to a good deal of interest in Mr. Lawson's attacks upon sandbagging *in excelsis*, and we continue to find amusement in his vagaries; for, if truth sometimes be stranger than fiction, he certainly sandwiches the one between layers of the other, and adds the mustard of imagination in such a manner as to give appetite to humor. In his last installment, however, he deals with matters concerning which the editors of a mining periodical are supposed to possess accurate knowledge, and it must be confessed that his story of the copper industry, as epitomized for the benefit of Mr. Rogers, does not carry the conviction with which, he tells us, it overcame his arch-enemy. To mining engineers, his description of the essential features of copper mining—those features in which he held it to differ from any other kind of mining—will seem but the ordinary 'spoo' of a tricky promoter. To speak of the price of the metal as being "practically fixed between certain limits," so that the value of a copper mine, "present and future, can always be told to a certainty," is nonsense, if it is not worse. To laugh at Boston people because they expect dividends of twenty per cent per annum from copper mines,

which, in his (Lawson's) perfervid imagination, are so safe as to warrant being placed on a four or six per cent basis, is to play upon a worn-out string, and to appeal to that depth of ignorance which has injured legitimate mining from time immemorial. We doubt if he ever stated his case to Mr. Rogers in such terms, and we feel assured that that astute buccaneer never believed it, if the matter was so presented. However, it must be that Mr. Lawson expects the public to swallow such misinformation, and we presume that his experience on State Street has led him to know that the gullible are many, the well-informed few. It is our opinion that a young copper mine ought to pay twenty per cent on its capital, and, even when fully developed to a going concern, possessed of an assured life for, say, ten years, it ought to pay at least fifteen per cent—ten per cent as interest and five per cent for amortization. Copper is a metal at the mercy of a fluctuating market; the "fixed limits" of Mr. Lawson are of his own creation; each metal, save that which is the standard of money, is, as regards its market value, subject to the conditions of supply and demand, and each metal is, when its price rises abnormally, subject to attack from a substitute. Copper lodes are as erratic as any other; it does happen to be the case that the beds of the Lake Superior region are the most persistent ore deposits known to man, but they are in a class by themselves, exceptional. The ordinary lens of copper ore in schist, the copper vein in granite, and the replacement deposit in limestone, are all types of impermanence, sporadic in their distribution and uncertain in their continuity—hence the zest of mining, the risk on the one side and the big winning on the other. To speak of copper mining as though it were unlike other departments of our world-wide industry, is weak nonsense.

Market Conditions.

March 1.

Generally speaking, the metal markets continue firm, and prospects for a larger consumption are good.

In copper the undertone is strong, and notwithstanding the momentary quiet due to the inclement weather, demand may be expected to show expansion in the near future. Prices, though unchanged from last week, are steady, and if anything tend toward a higher level.

Tin is in a very good position by reason of the healthy consumption and firm quotations, recent heavy importations notwithstanding.

For lead there is an exceptionally active demand, but prices remain as heretofore.

Spelter is firmer than it has been, explained by the improved purchases, and the interference with production by the stormy weather.

The iron trade shows an active demand for pig iron and certain other lines, and the general tone promises further improvement.

Coal markets are experiencing a revival, which has been initiated largely by the improvement in transportation, especially on water, due to the breaking of ice.

Metallics.

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

Thorium is a remarkable element, in that its hydroxide and oxide are basic, though in the fourth degree of oxidation.

A blast furnace at Longwy, eastern France, was put out of commission last July, after a campaign of over 20 years, in which time it had produced 483,531 tons of iron.

Uranium has the highest atomic weight of all the known elements, though unconfirmed tests of suspected elements have repeatedly given equivalents leading to much higher figures.

In the ultra-violet part of the solar spectrum, just at the limit of visibility, are two enormously wide bands, the so-called 'K-group.' They are supposed to be due to calcium, which is also generously represented in other parts of the spectrum, notably in the 'gridiron' of the yellowish-green.

Thallium was called the "ornithorhynchus" of elements, by Dumas, from its peculiar mixture of chemical properties apparently contradicting each other. But as common an element as nitrogen, in as common a compound as ammonium nitrate, exhibits qualities much more contrasted than any shown by thallium.

Every man should go to college to find out how little college men really know. At the same time, in finding this out, he may find out a great deal to his advantage.

The report seems to be persistent from the authorities, to the effect that radium has spontaneously decomposed with the formation of helium.

Recovery of Tin from Old Cans.

The Bergse process for the recovery of tin from old tin cans, has been in use in Copenhagen, Denmark, for two years past, with much success. It is described in a recent number of the *Electrical Review*. It is claimed that, in this process, not only the tin in the tinning is recovered, but also that in the solder. The cans are worked without cleaning; a hole is cut into their bottom and they are thrown into baskets of iron wire, where they remain during detinning. A separation is made of the lacquered and unlacquered cans. This separation and perforation, as done by hand, costs about \$1 per ton. The baskets are then placed in the detinning tanks, which are arranged in such a manner that the dissolving solution flows through them in succession. The solution consists essentially of chloride of tin (stannic chloride), and contains about 2% of tin. This oxidizer removes the tin and forms stannous chloride, the solution becoming stronger during its passage from tank to tank.

The detinning of 10 tons of cans per 24 hours requires a capacity of 3,500 cu. ft. of tank-room. The leaching liquid remains fit for use during a period of three or four months, after which time it has to be rejected, as it then contains a considerable amount of iron. The amount of iron which goes into solution is given as about 20% of the weight of tin gained. The tin solution is made by the leaching of scrap with the addition of oxidizing substances or by dissolving old tin in acid. All the dirt from the cans gathers on the bottom of the tanks.

The enriched stannous chloride solution is pumped from the last tank by means of a small brass pump, and is distributed to the electrolytic cells, through which it flows. The anodes used in the cells are insoluble and the stannous chloride is split up into tin and chlorine, the tin falling down to the bottom of the tanks, while the chlorine liberated at the anode converts the stannous chloride there again into stannic chloride, the reaction being the reverse from that taking place in the leaching tanks. The tin is precipitated in small crystalline prisms about 0.1875 in. long. The stannic chloride flows back again to the leaching tanks, thus completing the cycle of operations. The current used is stated to amount to 47 kilowatts or 65 electric horsepower per ton of tin, and the latter is mechanically removed from the bottom of the electrolyzing tanks by means of a scraper run by machinery. All the solder touched by the liquid is claimed to be removed, only a grayish residue of chloride of lead being left. The process is carried out at about 70° F., heating being necessary only during winter. During electrolysis no ferric chloride is found when the quantity of tin is sufficiently great. It will appear only when

the amount of tin is lowered to a certain degree, but this is easily prevented by increasing the amount of tin.

The detinned iron is used by cement copper works and brings a good price, as it is better than other scrap, on account of its being free from rust.

Nova Scotia Coal in 1904.

Nova Scotia's coal output during 1904 showed a very slight gain over the record of the previous year, amounting to 4,622,823 tons, as compared with 4,586,649 tons. This failure to indicate the heavy increase that was confidently expected, is attributed to the severe weather that prevailed during the spring, by which shipments were diminished by 300,000 tons from the corresponding amount during the same season of 1903, and to the lighter demand from United States ports. Shipments up the St. Lawrence increased by 211,000 tons, but this advance was offset by a decrease of 200,000 tons in exports to the States.

The Dominion Coal Company's output—2,780,038 tons—was more than five times that of its nearest competitor. All the companies are in good condition to increase their outputs, if new markets can be found, and the Dominion Company is actively seeking these in distant foreign countries.

Scrap Copper.

Consider the enormous quantity of old metal that is being marketed in America, which consumes annually over 500,000,000 lb. of fine copper—more than half the world's supply. The bulk of this consumption is credited to the electrical industry, and as the telegraph and telephone companies renew their wires periodically, this class of scrap copper is quite abundant. Usually old copper wire of good quality commands a premium over other forms of scrap metal, and sells to-day at about 13.5c. per lb. at New York, a price that is only 0.5c. or 1c. less than casting copper. Wire is made from the purest of copper, and, because of its freedom from foreign substances, is preferred for brass-making and similar purposes, when marketed as scrap. Other sources of supply of scrap copper are in the form of boiler and kettle bottoms, worth about 12c. per lb.; tubing, nails, type-shells, sheet clippings and the like, marketable at 12.75 to 13c. per pound. The demand for copper bottoms is limited, because their value is impaired by their shape and the fact that nearly all are tinned and soldered, causing difficulty in melting, and making an impure casting.

A peculiarity, rather surprising to the uninitiated, is the small margin between the price for old and new copper. Only in recent years, however, has this difference caused comment, but the fact that the demand from experienced foundrymen is increasing, suggests a reason for the advance in the price of scrap copper.

DISCUSSION.

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

CYANIDATION IN THE UNITED STATES.

The Editor:

Sir—The inference to be drawn from the able article by Prof. Fulton on cyanide progress, in the JOURNAL (Jan. 5, 1905), is that, in the Black Hills, wet-crushing mills have nothing to gain by fine grinding, as the decantation process in general use there loses the additional amount as dissolved gold.

From a year's experience with the Moore process at the Lundberg, Dorr & Wilson mill, I believe that the recovery of the dissolved value, unavoidably lost in decantation, can be accomplished without recourse to filter-pressing, at present so expensive; the limit to fine grinding is the point where the additional cost of grinding equals the additional gold dissolved. Although somewhat of an experimental plant, the Moore process has been operated continuously; many improvements in details have been made, and these are to be adopted as soon as possible.

Without going into a minute comparison with the decantation process as practised in the Black Hills, it can be asserted that the additional cost of operating the Moore process, above that of decantation, is more than offset by the saving in cyanide, the cost of which with us has averaged, for the last five months, less than \$0.12 per ton of ore treated; so that the additional gold saved is all gain. The main fault we have found with the process, as installed in our mill, has been—if you will pardon the bull—not with the process itself, which is intended only to recover the dissolved gold, but with the means provided for bringing the gold into solution before treatment. Previous work on dust from similar ore dry-crushed, and information from some other mills, indicate that the solution of the gold in the slime can be accomplished rapidly; but we find that, after eight hours' settling in a cone, and one hour's agitation (with a centrifugal pump) of the thickened slime, the extraction is often not complete; we are now providing for additional exposure.

In every case, where the gold has been in solution before entering the Moore process, and where the barren solution has been reasonably clean, we have had no difficulty in removing all the dissolved gold; our extraction on slime as discharged has always been considerably higher than on sand. A recent sizing-test on our sand-tailing shows the following extraction, figured by assuming the same original value for all sizes: On 20-mesh, 65.8%; passed 20 on 40, 68.4%; 40 on 60, 77.6%; 60 on 100, 80.3%; 100 on 200, 84.2%; passed 200, 85.8 per cent.

Determinations of the distribution of the value in silicious ore pulp according to the size of the particles, made by the writer, would indicate that the extraction given for the size remaining on 200 mesh is too high, and for that passing 200 too low, but the difference is probably not enough to affect the conclusions to be drawn from the text.

Commercial work on filter-pressing to date, as far as I am informed, has been on higher-grade ores; the action of Mr. Winslow in installing the Moore process at the Liberty Bell (after exhaustive comparison with filter-pressing) would indicate that, when thoroughly investigated, the Moore process has at least an equal chance.

JOHN V. N. DORR.

Terry, S. D., Feb. 14, 1905.

MINE RESERVES.

The Editor:

Sir—When I wrote you, early last year, asking for an expression of opinion as to the wisdom of the practice of keeping a reserve of gold or bullion at a mine, it was because I had a premonition that the question would have to be settled in Western Australia sooner or later. The Boulder Perseverance scandal has brought the matter to a head in that State, just as the matter had been fought out earlier in the smaller companies in Victoria. When writing to you, the point that was put was that the practice was bad, inherently bad, inasmuch as it gave great opening for fraud. Nothing has occurred to shake that opinion.

If the evidence of the leading Kalgoorlie mine managers, given before the Boulder Perseverance commission, in favor of the retaining of a reserve at the mine, is analyzed, it will be found that the chief reason adduced in support is that the share market must be kept level by having level yields. The members of the royal commission were so impressed by this contention that in their finding they adopt the views put forward by the mine managers. Still, is it in any sense the duty of the mine manager to consider the share market? If he does, is there not always the risk that he will take a hand in it? With men receiving the regal salaries earned by the managers of the big Kalgoorlie mines, there ought not to be any temptation to go astray, by using the knowledge they obtain in their official position to speculate in their company's shares. But the history of Kalgoorlie mining is such as to enforce the conviction that, not only have wrong estimates of the value of the ore been given, but also that bullion reserves have been used to assist in market operations. With smaller companies, where salaries are low, how much greater must be the temptation to men to try to make themselves financially secure by manipulating the bullion reserve. But does the existence of a gold

reserve protect shares from fluctuations? Victorian experience says No. The grade of the ore falls off and the yield is kept up by the assistance of the gold reserve. No one, ostensibly, knows of the true state of affairs, except the manager and the directors—when the latter are kept posted as to the reserve—or the manager alone, and perhaps one of his trusted officials. Yet the market soon shows signs that something is wrong, although the yields have kept up to their average. Someone invariably learns of the changed circumstances of the property, and he gets rich at the expense of others. Is this good for the industry? It may be said that a study of the assay plans will convey the fact of the falling off in the grade of ore. But we in Victoria do not have assay plans, and even if we had, the ordinary shareholder, like the mine manager, hopes that pay-dirt may again be entered. As it is, however, the practice of keeping gold reserves has been practically abandoned here. And it is an answer to those who think that stocks would depreciate if yields were to fluctuate, that some of the most stable shares in the bullion market are those where no gold reserve is maintained. Shareholders are educated to know that they must expect variations in yield. All they want to be told is, that the mine is opened up well ahead of the picks, and that the average value of the dirt is maintained. Then they are not alarmed by poor patches.

One point touched upon in the evidence given before the royal commission deserves attention. Managers stated that they would not tell a shareholder the amount of the reserve if he made an inquiry on the point. The Victorian Companies Act provides that in a mining company a shareholder or a creditor can demand, and must be supplied with, three months accounts from the board. Just see the position the directors would be in if, while telling that the debts were so much and the assets so much, they omitted to state that there were so many ounces of gold held in reserve. Should the shareholder sell on the statement and the scrip rise, he could recover against them for furnishing a false return. If he held, and shares declined, he would still be in the same strong position. It is the duty of the directors to know if a gold reserve exists, and still more is it their duty to know how it is used. With this information in their hands, they have no right to refuse to tell a partner—that is, a fellow shareholder—how the reserve stands.

Under certain conditions only can a gold reserve at a mine owned by a company be justified. (1) That it shall be kept with the full knowledge and consent of the shareholders. (2) That every monthly yield shall be recorded truthfully—say, 10,000 tons for 8,250 oz.; taken from reserve, 1,750 oz.; total return, 10,000 oz.,

if the average to be kept up is an ounce. (3) That the extent of the reserve then started shall be disclosed; and (4) that every month the withdrawals from it, or the additions to it, shall be stated. Then the ordinary shareholder will know how he stands, and as he is the backbone of the industry, it is to everyone's interest that he shall not be deceived, and so led to withdraw his support from it.

F. H. BATHURST.

Melbourne, Victoria, Jan. 21, 1905.

MINE SAMPLING.

The Editor:

Sir—In the JOURNAL of Dec. 1, 1904, one of your contributors gives a description of a device used in taking samples. This should be useful when it is necessary to take a sample in 'a tight corner.' My experience in sampling is that tight corners are less frequent than inaccessible stopes and high drives; in such places the difficulty is to catch the sample; for, while a temporary scaffolding, such as a plank placed on a couple of candle-boxes, may afford the sampler a foothold, there is generally no room for the man—in this country usually a Kaffir boy—who holds the dish or box for catching the sample. I generally resort to a canvas cone (truncated), supported by an iron ring with a handle. The whole apparatus has the appearance of a magnified conical coffee-

ore is high-grade, especially with rich pyrite, the sampler would have to decide whether or not it is advisable to use it.

In this era of labor-saving inventions, it is rather surprising that someone has not patented a mechanical device for sampling, whereby brains would become more potent than brawn. The idea occurred to me that something on the principle of a light pneumatic hammer could be successfully used in sampling, where compressed air is available, and I induced a local firm to get one; unfortunately that procured was unsuited to the work, and the experiment was unsuccessful.

On large mines, such as those of the Rand, where the stopes and drives are sampled daily, enormous work is involved and a premium is set upon muscle combined with intelligence; when the rock is hard and the reef of fair size, 15 to 20 samples make a good day's work; consequently, on a large property, a big force of samplers is necessary. I believe a man's efficiency could be doubled with a good mechanical device, and the strain and fatigue would be much less. Sampling under the best of conditions is hard; but when one must face a quartz reef 4 or 5 ft. wide and often as smooth as glass, it becomes doubly so; however, if a proper sample is to be taken, there is nothing to do but hammer away until the

main air-pipe along the drives, for taking drive samples, and an extra length of tubing could be used in taking stope samples. For mines not having a compressor plant, something on the principle of a dentist's hammer might be made use of.

I offer the foregoing suggestions, in the hope that the matter may receive further attention from your readers.

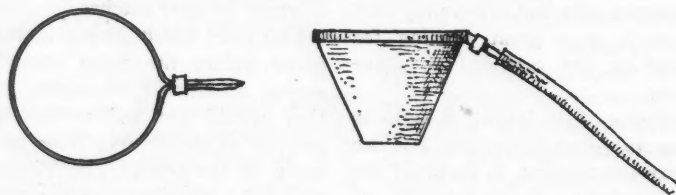
E. H. GARTHWAITE.

Bulawayo, Rhodesia, Jan. 18, 1905.

DOCTORS AND PROFESSORS.

The Editor:

Sir—Your editorial in the JOURNAL, Jan. 26, 1905, is very largely a well-deserved rebuke of the careless use of much that ought to be in disuse. Such titles and degrees belong to the little academic world where they take their birth, along with the gown and the mortar-board. They are in keeping with forms and customs of the special court of My Lady Learning—I am speaking now of the real student and professor. In college, the title and the dress fit the time and the place. Moreover, there is much that might be said regarding some curious but unwritten customs in the matter. At the small New England college where I attended, the title "Professor" was restricted to the real professors; tutors were addressed simply as "Mr." Any flattering use of "Professor" in addressing a tutor was popularly regarded as a case of open and unmitigated "stacking rank." When some of the boys left this little college to enter the larger institution near Boston, and used the title "Professor" in addressing teachers of that dignity, a smile and a shrug ran over the room. Everyone knew that the blunderer was from a country college. The real Harvard man addressed his professor as plain "Mr." When we went to the young and vigorous institution at Baltimore we found still another custom. The head professors were addressed as "Professor"; assistant professors and tutors were addressed as "Doctor," if they had the title, otherwise as plain "Mr." There was a careful use of title, pedantic, possibly, but certainly honest. The graduate title, doctor, means much to one of the guild. With the renaissance which came over the thinking world thirty years ago there came also a keen sense of the worth of specialized training. The college could give no more than the elements of any subject. To be a master of mathematics, physics, of chemistry or biology, of classical philology, of psychology or history, a man must give at least three years, after college graduation, to the study of the respective subject, under competent specialists, and with the expectation of producing, by himself, some original contribution, however small. This ideal marked, and still marks, a standard; it is not always recognized, but genuine academic enthusiasts understand each



strainer, or an entomologist's butterfly-net. The diameter of the ring is 15 in., and the depth of the cone 18 in. (truncated to 12 in.). The canvas is sewn to a ring of one-quarter inch round iron; the iron is bent in the manner shown, with the ends projecting and fitting into a socket of an old shovel-handle. The one who catches the sample can stand far enough away not to interfere with the sampler; he does not run the risk of getting chips in his eyes, and consequently he can see what the sampler is doing and can hold the bag accordingly. At the same time, there is little risk of having the sample spilled by a glancing blow from the hammer. This will appeal to those who have worked for hours in a cramped position, taking a sample from a reef which is like chilled steel, only to see the whole sample upset by an untimely blow.

By using a shorter handle the bag can be used for taking ordinary samples as well; care must be taken that the bag is turned inside out and thoroughly brushed after each sample. Where the ore is low-grade I consider it safe; but where the

proportional quantities are taken across the entire width, no matter how long it takes. When this process must be repeated over and over again for hundreds of feet of driving, it becomes wearisome. There is probably nothing so irksome to the young engineer as this class of work. If, however, the sampler could make use of a pneumatic hammer, he could face his task with a much lighter heart, take his samples in probably half the time, and the chances are that the samples would be more accurate than by hand labor, as the hard portions of the reef would not be more difficult than the softer parts; the only requirement would be to see that the sample is proportionate. Inasmuch as a pneumatic hammer would strike light but rapid blows, the sample would be fine and uniform, and there would not be so much risk of losing portions of it from the dish. The use of the pneumatic hammer pre-supposes the existence of a compressor plant. My plan would be to have, say, 100 ft. of pneumatic tubing (5-16-in. inner, 3/4-in. outer diameter) for each hammer; a valve should be placed at every 200 ft. on the

other. Moreover, the title "Doctor," with the implied Ph.D. (doctor of philosophy in the broad sense of high world-scholarship), this represents an outlay of time, effort and self-denial; even the money is worth considering. It means about \$6,000—no small sum for the impecunious student. This can be figured easily, from the \$1,200 or \$1,500 salary per annum that the average candidate temporarily relinquishes when he goes to the two-to-four-year course, plus the actual expenses incurred in study; indeed, \$6,000 is a low estimate. But beyond this is the honest attempt to know all about some little region of inquiry, coupled with a careful general training on the work, the method, the result and the bibliography of the respective specialty. The dignity and the worth of this ambition are greater than the title; this is all understood as a matter of custom in the university, but it should be kept there. The dress suit has its place and its occasion—so has the gown and the title; but these would be farcically out of place in the street, the factory or the shop. Careless misplacing calls for such censure as your editorial justly conveys. It is often gratifying to see an author publish his degrees with his books; the intention is to show his ability to speak with authority on his chosen subject. But no "Ph.D." can entitle any one man to pose as an authority on all subjects; happy is the man who can use his own plain name in labeling his own products. Beecher was not a D.D., neither was Darwin a Ph.D. In describing common men, it is to be hoped that more care will be taken, not only in the accuracy of that title which can be worthily assumed by the respective specialist, but particularly in the matter of good taste—and here we certainly look for more care on the part of the editor of *Science*, the respected weekly gazeteer of education and science in the United States.

DOCTORUM MINIMUS.

Boston, Feb. 7, 1905.

It is estimated that the world's annual consumption of rubber is about 60,000 tons, valued at about \$80,000,000 in all.

A graphite mine is now being worked in the State of Queensland, in Australia. It is situated on one of the slopes of Mount Bopple, about three miles from the Netherley station, on the North Coast line, and within 35 miles of the seaport of Maryborough. The material found is of very good quality. At a depth of 32 ft., 35 tons of graphite were obtained in cutting through a large mass, and on continued sinking operations fine seams varying from 1 ft. to 6 ft. have been reached. Several shipments have been made to paint manufacturing firms in Australia, and have brought about \$50 a ton. Trial specimens have also been sent to some large firms in England and Germany.

The Birmingham Disaster.

BY OUR SPECIAL CORRESPONDENT.

On Monday, February 20, 1905, an explosion occurred in the Virginia City mines, Jefferson county, Alabama (A. W. Reed & Company, lessees; Alabama Steel & Wire Company, owners). It was 4 o'clock in the afternoon, when the miners were about making the usual shot, preparatory to quitting work for the day. As a consequence of this explosion, 108 men (including miners, heading men, trapper drivers and boss driver) lost their lives, and 13 mules were killed. The first statement was to the effect that a 'dust' explosion had taken place, and that those men in the mines who were not killed outright had died from suffocation by the strong 'black-damp' following. The force of the explosion was felt in every part of the mine, blowing down brattices and knocking out props. One heavy timber was blown out of the mine and on to the tipple 500 yd. away. Immediately after the explosion, a flash was seen to burst from the mouth of the mine; but there was no subsequent fire. Probably the exact cause will never be determined, as not a single man of those at work at the time of the explosion escaped. A rescuing party started within an hour; they had to carry air into the place, repair brattices to provide a regular air-supply, and replace props. The first victim was found in the main slope, some distance from the mouth of the mine; the mutilation of the majority of the bodies was significant in showing that the explosion was terrific. The remains were charred and covered with dust, from which it is inferred that it was a 'dust' explosion. While the mine was known to have a little gas, yet casual, though not official, remark gave evidence to the bad reputation of this mine as regards dust.

The Virginia City mine is a slope, now down 1,800 ft. From the mouth there is an incline of about 33°; and, after the first 'lift' or 'entry,' the pitch is greater, about 42.5°. There are six entries, the last not being turned very long and only on one side. The other five entries go to the two sides, right and left. The first, 300 ft., and the second 500 ft., respectively, from the mouth of the mine, have been worked out and there was not a soul in them. The indications point to the view that the explosion took place in the third-left entry. It is believed that a 'windy' shot was made; the miner either charged too much or too little, and the shot set fire to the dust, which, being presumably charged with gas, exploded with terrible effect. The fire from the explosion consumed the oxygen in the air, and black-damp (also called after-damp, or CO₂) filled the mine in short order. In one entry ten bodies were found in a bunch; they were headed toward the air course. One of the unfortunates had taken off his shirt and covered his face and mouth to

prevent the inhaling of the foul air. He lay on his face, and his son was by his side. His left arm was so placed that the indications are that he was leading his son in the effort to get to better air. But, with the brattices blown out, there was no chance of a free circulation of air, and it is figured that in less than half an hour the men and mules were all dead. It took five days after the explosion to remove all the bodies from the mine.

Upon being notified, the State mine inspector, Mr. Gray, went to the scene immediately (your correspondent accompanying him); to a considerable extent he directed the work of the rescuing party. There were all the indications of the black-damp, the replacing of brattices and securing of a full current of air being difficult. The pipes to the pumps were wrecked and the pumps themselves displaced. Water began seeping and this was also troublesome. The State inspector will begin at once a full investigation, entering every room and making a thorough examination to ascertain, if possible, exactly what caused the explosion. It is not denied that there was much dust in this mine.

Acting Governor R. M. Cunningham has ordered a strict investigation. 'Windy' shots are frequent in Alabama; and dust explosions, on a small scale, have previously occurred. The Tutweiler Coal & Iron Company have introduced a sprinkling system to prevent these dust explosions; such an accident killed four men in their Short Creek mine a few years ago.

Many widows and fatherless children were left destitute by this accident. The people of the Birmingham district collected a fund of \$25,000, which is being distributed among the families of the victims, with no discrimination on account of color. Three-fourths of the victims were white.

The "reversing layer" in the sun is just over the photosphere, and just below the chromosphere; it contains the lighter gases, as hydrogen and helium, and the vapors of sodium, calcium, magnesium, etc.

A method of producing or repairing quartz articles has been invented by P. Askenasy, of Pansdorf, near Liegnitz. He places a quantity of quartz sand on a support of the same material and fuses it into the desired shape by an electric arc, which is moved over the surface to be melted. The arc is struck between sloping electrodes of small diameter, high voltages being employed, and the operation is conducted in an atmosphere of CO. In certain cases it may be desirable to add to the sand some metallic oxides, like alumina, stannic acid, titanitic acid, etc., which lower the melting point.

Mining Stocks.

(Full quotations on pages 438 and 439.)

New York. March 1.

There has been more attention paid to mining shares this week, and the market as a whole looks stronger. Amalgamated Copper was elevated from \$75.50 to \$77.625, and Anaconda fluctuated between \$26.875 and \$27.25. Tennessee was steady at \$30@32, the deficit of \$31,754 on last year's operations having apparently little effect on the market, as President Channing's explanation of the important changes made, including the saving of by-products, restored confidence. Greene Consolidated, of Mexico, was moderately dealt in at \$29.125@28.125. Some interest was shown in the flotation of a new Mexican property, capitalized at \$15,000,000, and known as the Greene Gold-Silver Co. President Greene, of the Greene Consolidated Copper Co., is also president of the new company, which owns the Mulatos group, in the district of Sahuaiapa, Sonora, the Balvanera mines, in the Canton of Rayon, Chihuahua, the Santa Juliana mine, at Ocampo, Chihuahua; the Veta Grande mine, adjoining the Pinos Altos mine, and the Cerro Boluda, besides many undeveloped properties, and 500,000 shares of the capital stock of the Guaynopita Copper Co. are also owned by the Greene Gold-Silver Co. Of the 1,500,000 shares of stock of the new company, 500,000 are in the treasury, 100,000 of which are offered at par—\$10 per share—for construction purposes.

A sale of Homestake Gold, of South Dakota, is reported at \$75, and of Standard Consolidated, of California, at \$1.75. One transaction of Quicksilver common is noted at \$1.375.

Two hundred shares of the Mines Security Company, of New York, brought \$2 each on curb, and there were also exchanged 350 shares of Newhouse Smelting, of Utah, at \$19@19.50. An attempt was made to interest the public in Stratton's Independence, of which 700 shares were reported sold at \$2.06.

The Comstocks were quiet, Ophir dropping to \$6.50. Colorado shares were dealt in sparingly. Portland changed hands at \$1.85. A little was done on the Consolidated Exchange in Tonopah gold shares, the effort being to create a market here. Tonopah Co. sold at \$11.75, and Tonopah-Belmont at \$1.10.

Auction sales were 250 shares Santiago Gold Mining Co. and 115 shares Parley's Park Silver Mining Co., \$2 for lot, and 700 shares preferred of Houston Oil Co., of Texas, at \$15.875 per share.

Boston. Feb. 28.

The general comment is that, while copper is selling for 15c. or better, the shares are selling on a 12c. basis, and there is little doing even at that. It has been a languid market the past week, with little or no interest taken except by the professional element, and prices are somewhat lower as a result. The Osceola mining report, issued to-day, was a favorable one, showing about \$7 earned on the stock for 1904, against \$3 paid. The stock is off \$2 for the week, to \$92. The company added \$347,370 to the surplus, making the total December 31 \$505,929. It produced and sold 20,472,429 pounds of copper, at 13.19c. per pound.

The increase in the Calumet & Hecla dividend to \$15, \$5 of which was extra, was without effect on the stock, which is off \$15, for the week to \$660. Quincy is \$7 lower, at \$105. The fire at the mine

was passed unnoticed, as was also the strike at the Osceola mine. Centennial fell \$2, to \$19, on the probability of a \$3 or \$4 assessment to be called in the near future. The news of a rich strike in the Allouez brought buying from the lake district. After rising to \$23.50, the stock fell to \$22.50 on realizing. Atlantic is off \$1.50, to \$16, on light offerings, and Adventure \$1.12½, to \$6. Copper Range fell \$2.50 to \$69.50. The decline was started by a broker who acts for Lawson. Trinity rose over \$1, to \$12.37½, on the expected announcement that a smelter would be built, but sagged to \$10.75 on an unsatisfactory statement issued by Lawson. The general impression is that arrangements will be made for treatment of Trinity ores by an outside smelter.

Shannon has been active and firm, closing at \$8 to-night. A lengthy report made to the president is in substance that development work the past few months has shown excellent results. United States, which has been very strong, suddenly broke \$1.25, to \$24, on free offering, but thought to be without significance. Winona rose \$1, to \$15.37½, assessment paid, but is now off to \$13.87½. Profit taking caused Greene to break over \$1, to \$28. Massachusetts Mining is off \$1, to \$12, and Michigan, which rose to \$15.25, is off to \$14. Tamarack dropped \$9, to \$125, on very light offerings. Dominion Iron rose almost \$3, to \$20.87½, on the improved outlook of the company, but yielded to \$19.75 under pressure. Boston Consolidated is off to \$6.50 on lack of support. According to the report of the St. Mary's Mineral Land Company, the Champion mined 12,212,954 pounds of copper last year, and yielded 28.9 pounds of copper per ton of rock.

Colorado Springs. Feb. 24.

The local exchange during the past week has experienced a strong market in Cripple Creek shares and the prices have been firm in most cases with advances in a number of stocks.

El Paso is now the highest priced stock on the exchange selling up to \$2 during the week. Portland has held this position for five years, but is now selling about 15c. below El Paso.

The El Paso management positively denies the rumor that a deal is pending for the sale of that bonanza mine.

Findley has made a gain of several cents, selling as high as 90½. Acacia is selling for 12¼; C. K. & N. at 21; Elkton at 70; Isabella at 34; C. C. Consolidated at 13½; Vindicator at 86, and Work at 16.

With conditions in the prosperous and healthy state in which they are, there seems little doubt but that prices of stocks on the average are bound to advance very noticeably in the near future.

San Francisco. Feb. 23.

Business in the Comstocks was active, but at rather lower prices. This was the result of free liquidation. Ophir brought \$7@6.75; Consolidated California & Virginia, \$2@1.90; Mexican, \$1.85; Hale & Norcross, \$1.25; Sierra Nevada, 45c.; Savage, 30c. per share.

On the San Francisco & Tonopah exchange business was good and prices fairly steady. Tonopah, of Nevada, sold at \$12; Montana Tonopah, \$2.95@3.10; MacNamara, 63c.; Original Bullfrog, 43c.; Rescue, 18c.; Black Ant, 6c. per share.

On the California exchange trading in oil stocks was very slow. Cariboo was quoted at \$12; Claremont, 75c.; Four Oil, 58c.; Honor, 40c. per share.

Salt Lake City. Feb. 24.

During the month of February only two Utah mines paid dividends—the United States and Silver King, in the sums of \$250,000 and \$100,000. Trading on the floor of the Salt Lake Stock & Mining Exchange during the past week has been light, with prices ruling quite even. Probably the main feature was furnished by May Day, which seems to have the confidence of many of the citizens of the camp to which it belongs, as the orders for the stock came principally from that source. While officers of the company insist there has been no change in the physical condition of the mine, the Tinticites contend that the stock, at the prices which prevailed during the week is a good buy. Consequently the sales of the week exceeded, 20,000 shares. The Park City stocks listed on the exchange have held up to stiff prices, but with the exception of New York Bonanza they have participated in the transactions only to a limited extent. This stock, however, closed weaker. Only 15 shares of Daly-West were brought out, these at \$17.50. Daly-Judge recorded no sales. Utah Copper is not listed, but there has been a great deal of inquiry. The stock is difficult to get, however, at this time, although \$10.25 was bid for it. A small block of Ontario brought \$4.50. Uncle Sam Consolidated closed higher and in good demand. United States and Boston Consolidated have continued strong in the bidding, but there is no local selling.

Monterey. Feb. 21.

Exchange on New York continues at 202. Mining stocks were somewhat more active, and sales reported were Dos Estrellas, at \$3,580; Luz de Borda, \$10; La Paz, San Luis Potosi, \$250; Providencia, Guanajuato, \$152; Augustias, Guanajuato, \$50; Rosano, Oaxaca, \$42, and in Pachuca, San Rafael, \$2,150; Amistad y Concordia, \$66; San Francisco, \$90; Santa Gertrudis, \$73; La Blanca, \$335, and Carmen, \$240.

Coal Trade Review.**NEW YORK, March 1.****ANTHRACITE.**

The announced shortage in the February output is easily accounted for by the lesser number of working days, Pennsylvania having had an election day in addition to the two national holidays of the month.

Traffic in and around New York is greatly improved, and with the approach of warmer weather, buyers are getting over their anxieties. Trade with the East is greatly improved; Boston shipments return to their customary route through the Sound and are relieving the stringency suffered in that city last week.

New York prices remain at the same level, domestic sizes selling at \$4.75 for broken, and \$5 for egg; steam sizes range \$3 for pea, \$2.25@2.50 for buckwheat, \$1.45@1.50 for rice, and \$1.30@1.35 for barley; prices quoted are those asked at harbor shipping points.

BITUMINOUS.

The severe ice conditions which have so seriously interfered with coast-wise traffic are greatly improved, and all boats that have been tied up are now relieved. On the railroads, also, things are running more smoothly, and shipments are coming in regularly. At this writing the prices

quoted for a good quality of steam coal range from \$2.75 to \$2.80 f. o. b. New York harbor shipping points.

In new business for the coming year little is being done. It is being discussed, however, and soon will become the leading issue in the trade. One large yearly contract has been placed by the Boston & Maine Railroad, and the price quoted is the same as that of the past year. This fact lends encouragement to the expectation of good prices throughout the coming year. Railroads, however, have not yet stated their intentions as to through rates, and the labor situation is not yet settled, as the important meeting of coal mine workers at Altoona will not be held for a week or ten days yet, both of which facts make it impossible to state definitely how prices will stand during the coming season.

The Far East shows a strong inquiry, and orders are accumulating rapidly in dealers' hands. A little shortage is reported from those cities that have been most seriously affected by ice. Trade along the Sound has recovered from its acute stages, and trade in New York harbor is much easier on account of recent heavy arrivals at the shipping ports and on account of improved vessel traffic conditions.

All-rail trade is active, demands and prices being strong. Transportation is irregular, and embargoes are placed upon shipments to certain New York points. Car supply is bad, remaining at under one-quarter of the needs, even favored shippers complaining that they are not satisfactorily supplied. Baltimore and Philadelphia are anticipating relief from their ice-bound condition by the middle of this month, when freight rates will be about 75@80c. to around the Capes.

Coastwise coal shipments for the two years 1903 and 1904 compare as follows:

	1904.	1903.
From New York:		
Anthracite.....	12,841,063	18,040,094
Bituminous.....	8,455,337	
From Philadelphia:		
Anthracite.....	1,911,322	6,215,321
Bituminous.....	3,630,942	
From Baltimore:		
Anthracite.....	238,728	1,731,896
Bituminous.....	2,064,060	
From Newport News:		
Bituminous.....	2,655,697	1,790,479
From Norfolk:		
Bituminous.....	2,119,513	1,673,940
Total coal shipments....	33,916,662	29,451,730

These figures include the coal supplied to the coastwise vessels for their own use as fuel. In 1904 such coal amounted to 3,436,084 tons. Of the New York shipments, the largest single item—nearly half of the total—covers the tonnage ferried from the several New Jersey termini to Manhattan. Boston receives the heaviest shipments from all the above ports, but New York City receives almost no coal by water from other than the immediate harbor points, as above mentioned.

Trade on the Great Lakes during the two years, among all domestic shipping and receiving ports, may be stated thus:

	1903.	1904.
Shipments:		
Anthracite.....	3,931,693	3,459,212
Bituminous.....	10,876,111	10,666,012
Total shipments..	14,807,804	14,125,224
Receipts:		
Anthracite.....	3,829,389	3,463,102
Bituminous.....	9,516,954	9,568,941
Total receipts.....	13,346,343	13,032,043

Shipments, as in the Atlantic coastwise trade, include coal supplied for vessel fuel. Shipments to Canadian lake ports, not included in the above totals, were, in 1904: Anthracite, 1,660,453 tons; bituminous, 4,656,900 tons, showing, as compared with

1903, an increase of 25,649 tons of anthracite and a decrease of 362,514 tons of soft coal.

Birmingham. Feb. 27.

With several small towns in Etowah county still to be heard from, and estimating those mines which cannot be reached for a report, the coal production of Alabama for the year 1904 is placed at 11,272,517 tons, against 11,700,753 in 1903. The following figures of the production by counties has been given out (incomplete): Blount county, 59,132 tons; Bibb, 1,369,575; Cullman, 142,218; Etowah (several mines not yet reported), 200,000; De Kalb, 35,514; Jefferson, 5,816,375; Jackson, 14,295; Marion, 71,352; Shelby, 111,476; St. Clair, 154,813; Tuscaloosa, 662,929; Walker, 2,512,337; Winston, 42,371; smaller mines, 80,000; total, 11,272,517.

The strike of the union miners, which began July 1, 1904, affected the coal production more than was at first admitted. In Jefferson county, where the most strength is shown by the union miners, notwithstanding a production of 1,000,000 tons of coal by the Pratt and Globe coal companies, which did very little the previous year, there is a loss of 444,473 tons as compared to the production of 1903. Walker county, where there are no union men employed, shows a gain of 134,418 tons in the comparison with the production in 1903. Bibb county, which also felt the effects of the strike, showed a loss of 290,037 tons. Tuscaloosa made a gain of 44,405 tons, while Marion, where time was lost through the strike, showed a loss of 2,055 tons. Jackson county showed a loss of 1,112 tons, while gains were shown in De Kalb, Blount, Cullman, St. Clair and Winston counties.

The production now is not very active. The fire which started three weeks ago in the Sumter mines, Blue Creek region, Jefferson county (Tennessee Coal, Iron & Railroad Co.) is still burning.

BY TELEGRAPH.

Feb. 28.—Republic Company's rolling mills have closed down, as temporary conditions are not favorable for steady operation.

Cleveland. Feb. 28.

The meeting of the railroad coal rate men on the lines running to the lakes, which was held last week, resulted in the establishment of the same rates as prevailed during the preceding year. The coal shippers have not met yet to fix their prices, although the possibilities are that there will be no change in that quarter. The lake coal men are beginning to ask for shipments of coal to the lake docks for movement up the lakes, with the opening of the season of navigation; but it will probably be about two or three weeks before this movement begins. If labor troubles ensue, it may be longer.

The steam coal situation in this territory is not much changed. There is still an abundance of coal, indicating something of over-production by the mines, and the prices, in consequence, are easier. The market is steady at 95c. to \$1 at the mines for both Pittsburg and Ohio coal of the run-of-mine grade. There is a good demand for slack, and the market is strong. The best Ohio slack is selling 70c. at the mines, while Pennsylvania mines are selling their slack at 70c. to 75c. at the mines.

The coke situation is stronger. The standard 72-hour coke is selling at \$3 at the oven, with a good deal of off coke selling at \$2.75. The furnace coke is selling at \$2.50 to \$2.60 at the oven.

Chicago. Feb. 27.

While orders have been numerous and have aggregated a large tonnage in the last week, there has been much trouble over transportation. The end of the week, however, and to-day, have seen a return to nearly normal conditions over much of the Western territory. Shipments of both anthracite and bituminous have been greatly delayed by the snow and ice. The coming week doubtless will see the railroads busy taking care of delayed shipments, but new business is hardly likely to be so good. Several dealers in anthracite report that orders have been cancelled as a result of the mild weather lately prevailing. The fact is that retail dealers are following more closely than in former winters the fluctuations of their sales, and are very unlikely, after March 1, to buy more than will supply from week to week—almost from day to day—their customers. This is true of both city and country trade.

Chestnut is still scarce in the anthracite market, all-rail business having been greatly delayed by the weather. Small egg is also scarce, though the demand for it is not so keen as for chestnut. Egg and grate are in good supply. Dock supplies are not yet exhausted, though smaller than were laid in last year, and probably will last through at least half of March.

Western bituminous has profited out of the weather conditions, but is not holding up to the higher prices caused two weeks ago by the transportation difficulties. Even domestic grades are sagging. Steam grades beginning to fall into dullness again, as shipments increase. Run-of-mine is \$1.60@1.80; steam lump, \$2@2.15; screenings, \$1.40@1.60. Smokeless is firm at \$3@3.15, with the supply well adjusted to the demand, despite the weather. Hocking has been somewhat scarce, and has held in most sales above the \$3 mark. Youghiogeny is in somewhat light demand at \$3.

Pittsburg. Feb. 28.

Coal.—The mines in the Pittsburg district are being operated irregularly, due partly to a shortage of cars, and also the cold weather. One day last week not more than twenty mines were running, and another day about 75% were in operation. Yesterday there was a good supply of railroad cars, and the production was very satisfactory. The demand is good, and prices remain firm at a basis of \$1.10 for run-of-mine at the mine. The Pittsburg Coal Co. is booking some large contracts for delivery in the northwestern markets during the lake season, and will be prepared to rush shipments as soon as the lakes are navigable.

Connellsville Coke.—A shortage of railroad cars was responsible for a slight falling off in shipments, but the production was greater than the preceding week. The demand is increasing, and prices are very firm. Furnace coke is quoted at \$2.50@2.75, and foundry coke at \$2.75@3. The production for the week was 259,756 tons, an increase of 1,756 tons. The shipments aggregated 11,293 cars, distributed as follows: To Pittsburg and river points, 4,440 cars; to points west of Pittsburg, 5,745 cars; to points east of Everson, 1,108 cars. This was a decrease of 59 cars, compared with the previous week.

San Francisco. Feb. 23.

Mr. J. W. Harrison's circular of this date, says: "Since our last, no Australian coal has arrived. This shows only two arrivals, with 4,604 tons, since the beginning of the year to date. There are

twenty-three vessels on the chartered list to carry coal from Newcastle to this port; their carrying capacity is about 65,000 tons, but six of the above vessels are already on the way; their cargoes should come to a good market, as the stock of Australian now on hand is becoming very light. Freight quotations from the Colonies remain firm, so that no low-price coal can possibly arrive here for several months to come. Local jobbers report good sales at fair figures; our continuous rainy weather has created a liberal demand for household coals during the month. There have been so far this month six coal deliveries by steamers from British Columbia, aggregating 14,432 tons. Fuel oil is still in control of the market for steam uses, and is offered at prices to suit the consumers, so that the small deliveries of coal here since the first of January have made no change in values."

For Pacific Coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, \$8; Richmond, \$7.50; Roslyn, \$7; Seattle and Bryant, \$6.50; Beaver Hill and Coos Bay, \$5.50; white ash, \$5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are \$8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings \$4. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is \$14, and Cumberland \$13. For English coal, quotations are, ex-ship: Welsh anthracite, \$13; cannel, \$8.50; Wallsend and Brymbo, \$7.50 per ton.

Foreign Coal Trade.

March 1.

Imports of fuel into France for the full year are reported as follows, in metric tons:

	1903.	1904.	Changes.
Coal	11,208,283	10,888,370	D. 319,913
Coke	1,521,646	1,656,250	I. 134,604
Briquettes	611,771	528,030	D. 83,741
Totals	13,341,700	13,072,650	D. 269,050

The more important receipts of coal were from Great Britain, Belgium and Germany; of coke from Germany and Belgium.

Exports of fuel from France for the full year were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	938,530	1,120,140	I. 181,610
Coke	106,341	160,580	I. 54,239
Briquettes	72,650	66,960	D. 5,690
Totals	1,117,521	1,347,680	I. 230,159

The exports in 1904 included 137,050 tons of coal and 50,470 tons of briquettes sent abroad for the use of French steamships; an increase of 6,680 tons of coal and a decrease of 7,730 tons of briquettes, as compared with the previous year.

The production of coke in the Nord and the Pas-de-Calais in France in 1904 was 1,543,339 tons, a decrease of 19,043 tons. The output of briquettes was 913,314 tons, an increase of 45,517 tons.

Exports of fuel from Belgium for the full year were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	4,923,367	5,066,390	I. 143,023
Coke	841,143	879,798	I. 38,655
Totals	5,764,510	5,946,188	I. 181,678

The coke exported went chiefly to France and Luxemburg. Coal exports were to France, Germany and Holland, chiefly.

Imports of coke into Belgium were 308,877 tons in 1903, and 338,791 tons in 1904; an increase of 29,914 tons. Most of this coke was from Germany.

Iron Trade Review.

NEW YORK, March 1.

Trade continues good, and new contracts are increasing in number. In pig iron especially, the demand is strong. The Steel Corporation is said to be arranging for further purchases from outside furnaces. There has been some suspicion of speculative buying; it is quite probable that it exists, but it is extremely difficult to trace it, or determine its amount.

In finished material, buying of structural steel is improving, and there are prospects of more active work in the building trades. Some large orders have been placed for railroad equipment, especially steel cars, which will require large quantities of material. The railroads are still holding back on rail orders, however, and the volume so far placed is below expectations.

There has been some talk of the revival of imports to supply the demand; but the time for that does not seem to have come yet. The largely increased mill and furnace capacity can probably take care of all the business offered.

The proposed consolidation of iron companies in the South is discussed in our editorial columns.

Belgian Iron Trade.—Exports of iron and steel from Belgium for the full year were as follows, in metric tons:

	1903.	1904.	Changes
Pig iron and castings	101,376	85,066	D. 16,310
Wrought iron	381,100	426,596	I. 45,496
Steel	363,784	283,249	D. 80,535
Totals	846,260	794,911	D. 51,349

The notable point about this statement is the high proportion of wrought iron. This includes all forms, such as bars, plates, shapes and sheets.

Birmingham. Feb. 27.

The Alabama pig iron market is stronger now than it has been in some time. The demand is healthy and the quotations firm. Furnaces are sold ahead for the first half of the year, with a number of sales already made for the third quarter of the year. No. 2 foundry iron sells at \$13.75 and \$14. The production in this district is far from being satisfactory. In addition to the strike of the union miners, which has been on since last July, the Sumter mines (Tennessee Coal, Iron & Railroad Co.) have been on fire for the past three weeks, and the explosion of the Virginia City mines (Alabama Steel & Wire Co.), on Feb. 20, has cut down the supplies of coal and coke, which has had great effect on the iron production.

The sales of iron made during the past week were quite considerable. Orders are being received from all directions, while the line of inquiry shows that there is need yet for more iron.

The negotiations being carried on in New York looking to a consolidation or merger of interests of Alabama iron and coal interests, the Sloss-Sheffield Steel & Iron Company, Alabama Consolidated Coal & Iron Company, Republic Iron & Steel Company (Alabama properties) and the Tennessee Coal, Iron & Railroad Company has not disturbed the active iron market. There have been many orders booked since the negotiations have been on.

The following pig iron quotations prevail in the Birmingham district: No. 1 foundry, \$14 to \$14.25; No. 2 foundry, \$13.75 to \$14; No. 3 foundry, \$13.25 to \$13.50; No. 4 foundry, \$12.75 to \$13;

gray forge, \$12.50; No. 1 soft, \$14 to \$14.25; No. 2 soft, \$13.75 to \$14.

Cast-iron pipe-makers in the Birmingham district report their trade still very active, the production good, and the demand strong, with indication of these conditions for some time to come. Almost every pipe factory in the Birmingham district is to be improved and the capacities enlarged. The Dimmick Pipe Co. has already started the work of enlarging its plant, and in a few weeks a new pit will be installed. The United States Cast Iron Pipe & Foundry Co. will make improvements at their Anniston and Bessemer plants. Good prices prevail for pipe. These concerns have purchased a good supply of pig iron for future use.

Chicago. Feb. 27.

Sales of pig iron and finished products have been rather quiet in the last week, but there are no signs of a decided change for the worse in the trade. The consumer is still taking in pig iron in small lots, and the seller is unwilling to contract into the second half under terms that the buyer will accept. This relates chiefly to Southern furnaces, Northern furnaces having been somewhat freer on contracts. That the Southern agents are confident of the market for the future hardly needs saying, in the light of facts. The tendency of the market is toward continuing the light-order, constant buying that has been developed in the uncertainties of the last year. There has been no change in prices, Southern No. 2 bringing \$13.50, Birmingham, or \$17.15, Chicago, and Northern, \$17.50.

Coke is easy and probably will drop in price, with the railroad conditions improved and demand no greater, as the trade forecasts the coming week. For 72-hour Connellsville the price is \$5.65, as last week. Southern coke brings 15c. to 40c less.

Cleveland. Feb. 28.

Iron Ore.—Buying has been in small amounts, most of the contracting—for the time being, at least—having been done. On the basis of recent sales, an estimate has been sent out by some of the upper lake mines showing production for the mines at the head of the lakes alone of 20,500,000 tons. This, of course, does not include the outputs of the mines shipping through Marquette and Escanaba. On this material the prices remain unchanged at \$3.75 for Bessemer Old Range; \$3.50 for Bessemer Mesaba; \$3.25 for non-Bessemer Old Range, and \$3 for non-Bessemer Mesaba. The dock managers on the lakes have agreed to meet the longshoremen, to discuss wages, March 27. This offsets in part the action of the Lake Carriers' Association that they would not treat with the unions this year. Since the longshoremen have taken the pilots into affiliation it is considered to be assured that this conference will lead to entanglements which will work for a delay in the opening of navigation. Based on this possibility vessel owners are offering to make season contracts from the head of the lakes at 85c. on the movement of ore, while the shippers are offering to pay 75c. The possible compromise will be 80c.

Pig Iron.—The pig iron market has grown stronger in tone, if not through actual transactions. The steel situation is looked upon as established for some time to come; hence the heavy buying of Bessemer and basic iron. The buyers and sellers of foundry iron have been assured by this demonstration, and the result is a stronger tone to the market. Foundry

iron has held steady at \$16 in the Valleys for No. 2, although there have been only a few spot sales and no contracts to speak of. The market has not been overly strong as to new contracts for the second half, the buyers holding aloof. There is a good demand for spot iron, and for shipments on old contracts. Basic iron seems to be scarce, and needs are not easily filled. The second quarter buying is heavy, and a shortage is threatened. Under this influence the price has strengthened, a few sales going at \$15.50 in the Valleys, which is a little above the ruling price on big lots. There is a little buying of bessemer by the smaller consumers at \$15.50 to \$16 in the Valleys, supplementing the larger buying elsewhere.

New York. March 1.

Pig Iron.—The buying movement has again increased, and some large sales have been made, while others are under negotiation. Northern furnaces have taken a large part of the business, but Southern iron is also in good demand and holding firm on prices. There is no material change in prices, and we quote as follows: No. 1X foundry, \$17.75; No. 2X, \$17.50; No. 2 plain, \$16.75; gray forge, \$16.50. Southern iron is firmer, but no change in price can be given. We continue to quote for large lots on dock: No. 1 foundry, \$17.75; No. 2, \$17.25@17.50; No. 3, \$16.75; No. 4, \$16.25; No. 1 soft, \$17.75; No. 2 soft, \$17.25; gray forge, \$16.25. Business in pig iron warrants has been very dull. March deliveries are \$16 bid, \$16.50 asked.

Bars.—Bar iron is 1.745c.@1.845c. for large lots at tidewater. Steel bars are quoted at 1.645@1.745c. Store trade is steady.

Plates.—Plates are in good demand. Tank plates are 1.745@1.845c., New York delivery; boiler plates, 1.845@1.945. Extra charges are made for extra widths.

Structural Material.—Business promises well. Beams and channels up to 15 in. are now 1.745c. for large lots; over 15 in., 1.845c. Angles are 1.745c. for large orders. The advance is \$2 per ton.

Steel Rails.—The regular quotation continues \$28 per ton at mill for standard sections. Very little business is done in this market. Light rails continue in good demand, prices varying from \$23 for 35-lb. sections up to \$28 for 12-lb. rails.

Philadelphia. March 1.

The eastern and middle Pennsylvania territory is more affected by what is going on outside in iron and steel than what is taking place within its own territory. The heavy buying which is taking place farther west and south has stimulated the closing of a number of heavy contracts on New England account and on local account. The actual business transacted is rather light. The same applies to forge iron, but mill men say they will be active buyers during March, unless the situation would change materially. The tone of the market is stronger and better, but opinions are very much divided as to whether foundry and forge iron will advance or decline. It is claimed by large consumers here that more iron is being made than consumed, and that a reaction is bound to come. There are no evidences of the correctness of this opinion. Quotations may be given at \$18 for No. 1 X foundry. Some lots of No. 2 have been taken at \$17.50; No. 2 plain could be had at \$17; standard gray forge is \$16 to \$16.25; basic iron is very strong at \$16.50.

Steel Billets.—The larger consumers of steel billets are in a quandary what to do, and are doing nothing. Small lots are selling at about \$28 for certain kinds, and negotiations are said to be pending between eastern consumers and mills, but information on this point is very closely guarded. The rumor is abroad, and it probably has some foundation.

Merchant Bar.—A number of our small merchant bar mills are again in the market seeking orders for spring work, but no shadings have been made, and none are probable. Best refined is quoted at 1.62½ to 1.83½, and steel bars at 1.53½ to 1.60.

Sheet Iron.—The only business reported this week has been done at a premium, as the material was wanted for immediate delivery.

Merchant Steel.—Merchant steel is quiet but very firm in price, and no business of importance has been done.

Pipes and Tubes.—Both pipe and tube work is plenty, prices are very firm, and supplies are coming forward regularly under orders placed early in the year.

Plate.—Orders for plate are again coming in for bridge work, and almost every kind of construction into which plate enters. The mills are crowded with work, and our manufacturers think that within thirty days they will book considerable business for summer delivery at the outside prices which have been quoted for some time past.

Structural Material.—The structural people give an excellent account of trade conditions; within the past three days contracts have been placed for something over 15,000 tons of steel, 10,000 tons of which will be used in the construction of the elevated railroad in Philadelphia; 2,000 tons have been ordered for the Pennsylvania station at Washington. Bridge requirements that have been placed this week foot up something over 2,000 tons, but there are inquiries for extraordinary supplies which may be placed any hour for delivery during the coming season in connection with Pennsylvania Railroad improvements.

Rails.—The demand for light rails is now attracting a good deal of attention. Favorable rates have been made, and a great deal of business has been done, and more is in sight. The makers of light rails say that this promises to be the best year in their line they have ever had.

Scrap.—The cold weather has interrupted the accumulation of scrap from country districts, where a good deal has been bought. The yard supplies are rather light, and prices continue to be where they have been for the past month.

Muckbars.—One or two lots of muckbars were taken this week at \$28.50, which is a trifle below prices quoted two weeks ago.

Pittsburg. Feb. 28.

The pig iron market has been greatly strengthened on account of the purchase by the United States Steel Corporation of 40,000 tons of bessemer iron for March delivery, being the fourth big pig iron deal made by the leading interest within two months. All the iron bought was at the uniform price of \$15.50 a ton at the valley furnaces. The corporation early last month bought 25,000 tons for January delivery, and duplicated the order for February, later adding 5,000 tons to the order. These contracts have been filled, and shipments on the last order began to-day. It is believed that the corporation will be forced to buy more bessemer iron before the end of March, for, despite the fact

that nearly all of its furnace capacity is in operation, its needs appear to be greater than at any time this year. Of the 51 blast furnaces of the Carnegie Steel Co., the only idle one is the practically abandoned furnace at Zanesville, O. Most of the pig iron just bought will go to the mills of the Carnegie company, and some will be sent to Lorain to the new plant of the National Tube Co., which is now in partial operation, and is expected to be running full within the coming week. The 40,000-ton contract was divided, the Bessemer Furnace Association getting 25,000 tons and W. P. Snyder & Co. 15,000 tons. The Snyder company is operating two of its three furnaces at Sharpsville, and will put No. 3 furnace in blast this week. It has been out for repairs, which were delayed, a start having been scheduled for early in February. The company will not obtain possession of the Mabel furnace, purchased last year, until May 1. While \$15.50 is now recognized as the minimum price for bessemer, it is impossible to buy small lots at that figure, and several sales are reported at \$15.75 and \$16. Before the announcement of the corporation's latest purchase it was believed the pig iron market was weakening. This was due to the placing of several contracts by the Standard Sanitary Manufacturing Co. for foundry iron aggregating 21,000 tons, at a shade under the prevailing price of \$16, valley furnace, for No. 2 grade. Some of this iron was bought as low as \$15.75, and part of the tonnage was placed at \$15.85. Of the total tonnage, 8,000 tons was for southern iron at \$13.50, Birmingham, and is intended for the Louisville works of the company. The northern iron is for the New Brighton and Allegheny plants, and deliveries extend through the second and third quarters. It is announced to-day that these prices cannot be duplicated. There are a number of inquiries for all grades of pig iron in the market, and it is believed some important contracts will be closed before the end of the week. The Wheeling Mold and Foundry Co. is about to place an order for 12,000 tons of foundry iron for delivery during the first half. Although the demand for pig iron is heavy and the outlook is remarkably bright, furnace interests seem to have adopted a conservative policy, and no effort is being made to take advantage of the situation to boom prices.

The steel market is very strong, many mills being over-sold, and nearly all are behind in deliveries from two or three weeks. The advance in prices of structural material and plates has resulted in the closing of a number of options, but no new business of any consequence in these lines has been placed at the advance. Billets and sheet bars command higher premiums over the pool price than have ruled for some time past, and, as a result, some of the independent sheet and tin plate concerns that are not covered for their requirements of steel may be forced to close their plants. One large concern operating two works in the Wheeling district has already suspended, and, it is understood, will not resume unless some concession in wages is made by the workers. The National Tube Co. is crowded with orders, and yesterday added an order for from 12,000 to 15,000 tons of 10, 14 and 16 inch pipe from the United States Natural Gas Co., a concern recently incorporated under the laws of West Virginia. Considerable new rail business is being booked, the latest order calling for 49,000 tons for the Rock Island Railroad. It will be filled by the United States Steel Corporation. The tonnage so far placed exceeds 1,000,000 tons, or more than half

of the production of the past year. It is announced here that the Baltimore and Ohio Railroad will shortly award contracts for equipment that will aggregate \$13,000,000. It will consist of 175 consolidation type freight locomotives, 35 Pacific type passenger locomotives, 40 six-wheel coupled switching locomotives, 2,000 double-hopper steel gondola cars, 2,000 box cars, 1,500 drop-end gondola cars, 250 40-ft. refrigerator and ventilator cars, and 250 steel cars of 100,000 pounds capacity. The deliveries of the new cars is to begin early in April.

Pig Iron.—In addition to the purchase of 40,000 tons of bessemer iron by the United States Steel Corporation at \$15.50, valley, several other sales are reported at prices ranging up to \$16. While the purchase by the Standard Sanitary Manufacturing Co. of foundry No. 2 as low as \$15.75, valley, for a part of the tonnage placed, the transaction has not resulted in weakening the market. Furnaces are holding No. 2 iron firmly at \$16, valley, or \$16.85, Pittsburg. Gray forge is quoted at \$16.10@16.25, Pittsburg.

Steel.—Premiums over the pool prices for billets and sheet bars are about \$1 higher this week. The mills seem to be over-sold, and premiums of \$3 and \$4 a ton are being asked over the pool price of \$21 for billets and \$23 for sheet bars. The Steel Bar Association met on February 28 and advanced prices \$2 a ton. This puts price of bessemer and open hearth steel bars at 1.50c. The demand was reported good, and conditions in all lines of the steel trade are very favorable.

Chemicals and Minerals.

NEW YORK, March 1.

There is more contracting for future supplies, and although prompt business is quiet, prices continue firm.

The foreign trade of Great Britain in January is shown below:

	Exports.	Imports.
Bleaching powder, lb	7,328,944	2,203,936
Borax, lb.		2,063,936
Brimstone, long tons.		1,949
Cement, tons.	28,185	14,523
Chemical manures, tons	30,898	
Copper sulphate, tons	6,041	
Gunpowder, lb.	345,744	
Muriate of Ammonia, lb.	1,135,568	
Nitrate of soda, tons.		5,508
Phosphate, tons		33,577
Salt, tons	46,203	
Salt-peter, lb		1,670,368
Soda ash, lb.	15,132,880	
Soda bicarb., lb	4,183,648	
Soda, caustic, lb.	15,418,368	3,502,464
Soda crystals, lb.	2,118,592	
Soda, sulphate, lb.	2,854,656	
Soda, other sorts, lb.	3,374,224	
Sulphuric acid, lb.	995,120	
Tartaric acid, lb.	20,272	

There is still a marked falling off in exports of most heavy chemicals; but in muriate of ammonia, and tartaric acid trade shows expansion. Imports were moderate.

Copper Sulphate.—Quiet at \$5.10@5.25 per 100 lb., according to seller.

Acids.—Good demand at firm prices.

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

Sulphur and Pyrite.—Business is seasonably quiet. Foreign brimstone seconds are quoted \$21.25 per ton, and thirds about 50c. less. Domestic seconds at New York are worth \$21.45, and prime \$21.75. For delivery at Baltimore and Philadelphia prices are 25c. per ton high-

er, and to Portland, Maine, 15c. per ton. Pyrite, Spanish unwashed fines, are quoted at 9@9.5c. per unit, and lump, 10@11c., f. o. b. Atlantic ports, and domestic fines at 8.5@9c., and lump, 9.5@10c. per unit of sulphur. Foreign pyrite contains from 44 to 52% sulphur, and domestic, 42@44 per cent.

Commenting on the pending renewal of the agreement with the Anglo-Sicilian Sulphur Co., Messrs. Emil Fog & Sons, of Messina, write, under date of Jan. 31, that this subject is debatable. The abolition of the export duty in 1896 was decreed for purpose of enabling Sicilian brimstone to compete with substitutes, of which pyrite is the most formidable. After the constitution of the Anglo-Sicilian Co. this company has raised prices so considerably that the difference between the price paid to the producers and that at which it resells to exporters attained the amount of the abolished export duty, which goes into the pocket of the foreign shareholders, instead of benefiting the Sicilian industry. Before ratifying a prolongation of the Anglo-Sicilian contract the Italian government will certainly seriously examine the question whether the policy of free trade is not the best to follow.

The arrivals of iron and copper pyrite at Atlantic ports from Europe and Newfoundland in the year 1904 are reported by Ladenburg, Thalmann & Co., of New York, as follows: From Rio Tinto Co., 143,000 tons; Mason & Barry, Limited, 80,900; Terra Nova, 65,100; Peña de Hierro, 61,000; Tharsis, 60,700; Perrunal, 39,700; Tilt Cove, 33,200; York Harbor, 7,400; sundries, 1,000; total, 492,000 tons. Of this quantity New York, Baltimore and Philadelphia received 294,000 tons; Boston and Portland, Me., 11,000 tons; and southern ports the balance of 187,000 tons.

Nitrate of Soda.—Firmer freights and higher prices in the European markets have initiated a stronger tone in New York. We quote refined quality, for prompt delivery, \$2.325@2.35 per 100 lb., and for shipment, \$2.25@2.30, according to position. Ordinary quality is 2.5c. per 100 lb. less.

Sulphate of Ammonia.—Quiet. Spot and near by foreign gas liquor is worth \$3.25@3.30 per 100 lb., and futures, \$3.30@3.35. Domestic for immediate delivery is quoted at \$3.225@3.25; futures, \$3.25@3.30.

Phosphates.—Conditions show little change, while prices are firm. Shipments from Charleston, S. C., in January were 4,616 tons phosphate and 4,153 tons acid phosphate. Reports are current that Japan is in the market for phosphate, owing to the inability of the Polynesian islands to make prompt shipments. A Tokio firm is understood to have ordered 4,000 tons of American phosphate for early delivery. At one time the Florida pebble miners did quite a business with Japan, but with the development of the Christmas and Ocean island deposits the situation has changed. A factor of importance to our exporters is the high freight rate to Japan, which is equal to the f. o. b. price of the phosphate.

An indication that mining is active in Africa is the increased shipment, especially to France and Italy. In January the exports from Sfax, Tunis, amounted to 42,779 metric tons, which compares with 40,632 tons in December, and 33,392 tons in 1904.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla., hard rock	\$7.25@7.50	\$11.45@11.85
land pebble.	3.75@4.00	7.70@8.40
†Tenn., 78@80%	4.00@4.25	10.27@10.67
78%	3.75@4.00	
75%	3.25@3.50	
‡So. Car. land rock	3.25@3.50	
river rock	3.00@3.25	6.38@6.67
Algerian, 63@70%		7.04@7.71
58@63%		6.15@6.60
Tunis (Gafsa)		6.00@6.60
Christmas Isle.		13.28@14.11
Ocean Isle		13.60@14.45
Somme, Fr.		11.39

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

Liverpool Feb. 15.

Messrs. Joseph P. Brunner & Co. write that there is nothing of special importance to report as regards heavy chemicals.

Soda ash is steady. For tierces the nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals are moving off at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is inquired for and spot supplies are only moderate, while prices are firm as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

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

Bleaching powder is still in light export request, and for hardwood £4 15s.@£5 per ton, net cash, is about the nominal range, as to market.

Sulphate of ammonia is rather less active, but there is little offering, and £13 7s. 6d.@£13 10s. per ton, less 2½% is about nearest value for good gray 24@25% in double bags f. o. b. here.

Nitrate of soda is well maintained, spot quotations being still £11 10s. per ton, for ordinary, up to £11 15s. for refined, for double bags f. o. b. here, less 2½% per cent.

Metal Market.

New York, March 1.

Gold and Silver Exports and Imports.

At all United States Ports in January.

Metal.	1904.	1905.
Gold Exports	\$591,567	\$16,828,168
Imports	8,225,508	1,895,691
Excess	I.\$7,633,941E.	\$14,932,477
Silver Exports	4,986,894	4,364,745
Imports	2,609,372	1,922,202
Excess	E.\$2,377,522	E.\$2,442,543

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

Gold and Silver Exports and Imports, N.Y.

For the week ending February 25 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	\$ 945,031	\$221,485	\$1,039,206	\$52,222
1905.	29,456,196	714,423	5,681,440	177,153
1904.	1,107,805	1,267,744	6,000,932	162,202
1903.	740,933	894,525	3,090,662	142,207

Gold exports were to Argentina and the West Indies; imports mostly from France. Silver exports were largely to London; imports principally from Central America.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending February 26, gives the following totals, comparisons being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts..	\$990,209,100	\$1,141,281,400
Deposits.....	1,027,920,400	1,179,824,900
Circulation.....	40,219,300	42,829,800
Specie.....	217,351,700	223,170,400
Legal tenders.....	71,778,600	86,431,900
Total reserve.....	\$289,130,300	\$309,602,300
Legal requirements...	256,980,100	294,956,225

Balance surplus ... \$32,150,200. \$14,646,075

Changes for the week, this year, were increases of \$2,216,600 in specie, and \$42,300 in legal tenders and \$5,441,650 in surplus reserve; decreases of \$14,730,700 in deposits, \$22,300 in circulation and \$14,730,700 in loans.

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

	Gold.	Silver.
N. Y. Associated.....	\$223,170,400	.....
England.....	194,266,115	.....
France.....	599,187,375	\$220,651,810
Germany.....	208,175,000	69,395,000
Spain.....	74,685,000	101,540,000
Netherlands.....	30,016,500	31,459,000
Belgium.....	15,946,665	7,973,335
Italy.....	111,320,000	16,253,000
Russia.....	515,280,000	30,930,000
Austria.....	241,120,000	63,505,000

The returns of the Associated Banks of New York are of date February 25, and the others February 23, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The market for silver closes at the opening figure, 27 11-16d., steady and quiet. The sudden spurt of February 25 was not maintained, but was forced back on the 27th. Indian bazaars at present are not very active.

The United States Assay Office in New York reports receipts at 78,000 oz. of silver during the week.

Shipments of silver from London to the East for the year up to February 16 are reported by Messrs. Pixley & Abell's circular as follows:

	1904.	1905.	Changes.
India.....	£2,463,239	£1,011,900	D. £1,451,339
China.....	4,500	.....	D. 4,500
Straits.....	38,103	2,800	D. 35,303
Total.....	£2,505,842	£1,014,700	D. £1,491,142

Receipts for the week, this year, were \$208,000 in bar silver from New York, and £9,000 from Australia; total, £217,000. Shipments were £84,400 in bar silver to India.

Imports and exports of gold at San Francisco for the full year 1904 were as follows:

	Imports.	Exports.	Excess
Coin.....	\$37,297,119	\$350,866	I. \$36,946,256
Bullion....	2,046,593	3,885,119	E. 1,838,523
Total...	\$39,343,612	\$4,235,985	I. \$35,107,627
Total, 1903.	11,046,976	1,798,168	I. 9,247,848
Changes. I.	28,297,636	2,437,817	I. 25,859,819

The large increase in imports was in great part due to receipts from Japan. The exports of gold bullion were made up entirely of a special shipment in December, understood to be intended for Japan.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	\$0.46 1/2	\$0.49
Peruvian soles and Chilean pesos..	.43	.45 1/2
Victoria sovereigns.....	4.85	4.87
Twenty francs.....	3.87	3.90
Spanish 25 pesetas.....	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

Feb.-Mar.	Cooper.		Tin.	Lead.	Spelter	
	Lake. Cts. per lb.	Electrolytic. Cts. per lb.			New York. Cts. per lb.	St. Louis. Cts. per lb.
23 @ 15 1/2	@ 15 1/2	68 1/2	29 1/2	4.45	6.10	5.95
24 @ 15 1/2	@ 15 1/2	68 1/2	29	4.45	6.10	5.95
25 @ 15 1/2	@ 15 1/2	.....	28 1/2	4.45	6.12 1/2	5.97 1/2
27 @ 15 1/2	@ 15 1/2	68 1/2	28 1/2	4.45	6.15	6.00
28 @ 15 1/2	@ 15 1/2	68 1/2	29	4.45	6.20	6.05
1 @ 15 1/2	@ 15 1/2	68 1/2	29	4.45	6.15	6.00

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b. a. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars. Cathodes are 0.25c. per lb. below the price of electrolytic copper.

SILVER AND STERLING EXCHANGE.

February.	Sterling Exchange.	Silver.		Feb.-Mar.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
23	4.8720	60 1/2	27 1/2	27	4.86 1/2	60	27 1/2
24	4.86 1/2	60 1/2	27 1/2	28	4.86 1/2	60	27 1/2
25	4.86 1/2	60 1/2	27 1/2	1	4.86 1/2	60	27 1/2

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

Copper.—While the business from abroad continues at a very satisfactory rate, there is very little doing on the part of domestic consumers. It seems that they are taking a rather indifferent view of the market, and do not consider it wise to anticipate their wants at the present level of prices. This conservatism, however, safeguards the future of the market, as it keeps in reserve a large outlet. The market closes entirely unchanged at 15@15 1/4c. for Lake copper; 14 7/8@15 1/8c. for electrolytic in ingots, cakes and wire bars, 14 5/8@14 7/8c. in cathodes; 14 1/2@14 3/4c. for casting copper.

The market for standard copper in London has fluctuated within narrow limits during the entire week, and the closing quotations on Wednesday are cabled as £68 5s. for spot, £68 10s. for three months.

Statistics for the second half of February show an increase in the visible supplies of 1,300 tons.

Refined and manufactured sorts we quote: English tough, £71@£71 5s.; best selected, £71 10s.@£72 10s.; strong sheets, £79 10s.@£80; India sheets, £76@£76 10s.; yellow metal, 6 3/4@6 3/4d.

Exports of copper from New York and Baltimore for the week ending February 28 were 3,469 long tons; also \$800 worth of matte. Imports were 751 tons copper.

Tin.—The large arrivals had a depressing effect upon the market, and as low as 28.75c. has been accepted for nearby shipment. There was, however, a sharp reaction upon the report from London that the tin statistics show a decrease in the visible supplies of 3,000 tons, and the market closes firmer at 29c. for spot, 28.75c. for futures.

The foreign market, which closed last week at £130 10s. for spot, £130 7s. 6d. for three months, opened on Monday at £130 for spot, and since then there has been a recovery, the closing quotations on Wed-

nesday being cabled at £131 5s. for spot, £130 15s. for three months.

Lead.—Conditions in the lead market have not changed in any respect, and the quotations are the same at 4.375c. St. Louis, 4.45c. New York.

The foreign market has been rather depressed, owing to large arrivals of Australian lead, which is being pressed for sale, and the closing is easier at £12 1s. 3d. for Spanish, £12 3s. 9d. for English lead.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us that lead is quiet at 4.35@4.37 1/2c.

Spelter.—The improvement of which we spoke last week has continued, and a large business has been done at advancing prices. The closing quotations are 6.15@6.20c. New York, 6@6.05c. St. Louis.

The foreign market is rather easier, good ordinaries being quoted at £24 2s. 6d., specials at £24 5s.

Exports and imports of spelter in Germany for the full year are reported as follows, in metric tons:

	1903.	1904.	Changes.
Spelter, pigs and scrap.	67,057	70,062	I. 3,005
Zinc sheets.....	15,715	17,917	I. 2,202
Total exports.....	82,772	87,979	I. 5,207
Imports, all forms.....	25,985	26,540	I. 555
Balance, exports.....	56,787	61,439	I. 4,652

Exports of zinc white were 18,676 tons in 1903, and 18,661 tons in 1904; the imports being 4,568 and 6,088 tons respectively. Exports of lithophone were 8,850 tons in 1903, and 8,237 tons in 1904. The imports of zinc ore increased largely, from 67,156 tons in 1903, to 93,515 tons in 1904. Exports of ore were nearly stationary, 40,460 tons in 1903, and 40,488 tons last year.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us that spelter is strong at the late advance to 6.10@6.15c. The ore situation remains unsettled, and unless production increases very materially in the near future we would not be surprised to witness higher prices.

Antimony is unchanged. We quote: Cookson's at 8 3/4@8 1/2c.; Hallett's, 8@8 1/4c.; United States, Hungarian, French, Japanese, Italian and Chinese, 8@8 1/4c. per pound.

Nickel.—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots is higher, according to quantity, running up to 60c. for small orders.

Platinum.—Quotations are firm, at \$10.50 per ounce.

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 74c.; crucibles and dishes, 78c.; perforated ware, 85c., and cones, \$1 per gram.

Quicksilver.—Quicksilver continues quiet but steady, at \$40 per flask in large lots, while \$41.50 is the price for smaller orders. San Francisco prices are lower, \$37.50@39 per flask being quoted for domestic orders, with some discount for export. The London price is £7 12s. 6d., with the same figures quoted by second hands.

Cadmium.—Metallic cadmium, guaranteed 99.5%, is selling in quantities of 100 kgs. or over at 710 marks per 100 kgs., packing included, f. o. b. Hamburg. This is equivalent to 76.6c. per lb. Prices are for net cash.

Minor Metals and Alloys.—Thallium is

STOCK QUOTATIONS.

Colorado Springs (By Telegraph).

Table with 4 columns: Company, Feb. 27 (H, L), Feb. 28 (H, L). Includes companies like Anaconda, C. K. & N., Cripple Ck. Con., etc.

Ishpeming, Mich.* Week, Feb. 25.

Table with 4 columns: Company, Par Val., H., L. Includes Black Mountain (\$2 paid), Calumet & Arizona, etc.

*By The Wallace H. Hopkins Co.

St. Louis, Mo.* Feb. 25.

Table with 4 columns: Company, Par Val., Bid., Ask. Includes Am. Nettie, Colo., Center Creek, etc.

*By our Special Correspondent.

Montreal.* Feb. 25.

Table with 5 columns: Company, Par Val., High., Low., Sales. Includes Dominion Coal, Dom. I. & St., etc.

*Montreal Stock Exchange. Total sales, 1,283 shares.

San Francisco.* Feb. 23.

Table with 5 columns: Company, Location, Opening (H, L), Closing (H, L), Sales. Includes MacNamara, Mont. Tonopah, etc.

*San Francisco & Tonopah Exchange. Total sales, 107,300 shares.

San Francisco (By Telegraph).

Table with 3 columns: Company, February (27, 28), Sales. Includes Belcher, Best & Belcher, Caledonia, etc.

New York.

Large table with 14 columns: Company, Par Val., Feb. 21 (H, L), Feb. 23 (H, L), Feb. 24 (H, L), Feb. 25 (H, L), Feb. 27 (H, L), Feb. 28 (H, L), Sales. Includes Alice, Amalgamated, Anaconda, etc.

Total sales, 377,798 shares. Feb. 22, Holiday.

Boston.

Table with 14 columns: Company, Par Val., Feb. 21 (H, L), Feb. 23 (H, L), Feb. 24 (H, L), Feb. 25 (H, L), Feb. 27 (H, L), Feb. 28 (H, L), Sales. Includes Adventure Con, Allouez, Amalgamated, etc.

Total sales, 204,016 shares. †Ex-dividend. ‡Assessment Paid. Feb. 22, Holiday.

STOCK QUOTATIONS.

Coal, Iron and Industrial Shares.

Table with columns: Company, Par Val., Feb. 21, Feb. 23, Feb. 24, Feb. 25, Feb. 27, Feb. 28, Sales. Lists various companies like Allis-Chalmers, Am. Agri. Chem., etc.

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange Total sales, 1,926,588 shares. Feb. 22 Holiday.

London. Feb. 17.

Table with columns: Company, Par Val., Latest dividend. Amt., Date., Quotations. Buyers, Sellers. Lists companies like American, Alaska-Treadwell, Anaconda, etc.

Mexico. Feb. 17.

Table with columns: Company, Shares Issued, Prices, Mex. Bid., Ask., Company, Shares Issued, Prices, Mex. Bid., Ask. Lists companies like DURANGO, Penoles, San Andres de la Sierra, etc.

Paris. Feb.

Table with columns: Company, Location, Par value, Latest dividend, Prices. Opening, Closing. Lists companies like Acieries de Creusot, Anzin, Coal, Biache-St. Vaast, etc.

c-Copper. g-Gold. i-Iron. l-Lead. n-Nickel. s-Silver. z-Zinc.

London (By Cable).*

Table with columns: Company, Feb. 28, Company, Feb. 28. Lists companies like Camp Bird, Con. Gold Fields, De Beers, etc.

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

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.

Pyrrhotite in Pyrite Smelting.—What is the possibility of smelting a pure pyrrhotite ore, containing little or no gangue, by the pyrite method in a blast furnace, without preliminary roasting?—B. V.

Answer.—You will find repeated statements to the effect that pyrrhotite is an ore suitable for the conditions required in your question. Thus, in the *JOURNAL* (June 2, 1904, p. 882); in F. R. Carpenter's paper in 'The Mineral Industry' (Vol IX, 1901, p. 698); in H. Lang's book on 'Matte Smelting' (p. 88); in 'Modern Copper Smelting,' by E. D. Peters, Jr. (12th edition, pp. 390 and 394, and footnote, p. 287); here and elsewhere it is distinctly stated that pyrrhotite is "exactly adapted to a pyritic process." We have not space here to go as fully into this subject as your question merits; and therefore we refer you not only to the authorities herewith quoted, but also to the *JOURNAL*'s series of papers on 'Pyrite Smelting,' which are soon to be reprinted in book form.

Rare Minerals.—Where is there a market for, and what is the price of, amblygonite (containing 4.71% lithia, soda 4.3%, 43.71% P_2O_5 and 32.77% Al_2O_3), wolframite (69@72% tungstic acid), lepidolite, and uranium ore (containing torbernite and autunite)? Can you give the f. o. b. price at Spanish or Portuguese ports?—P. N.

Answer.—In America, amblygonite, mined at Pala, Cal., and analyzing nearly double the lithium oxide shown by your product, is valued as a source of lithia for medicinal purposes, and in the preparation of the carbonate and nitrate that furnish red fire in pyrotechnics. Lepidolite is marketed in the same channels, because the consumption of lithium salts in this country amounts annually to about 55,000 or 60,000 lb., of which only one-third is imported. What lithia minerals are worth as mined, it is difficult to say, as it is the custom of manufacturing chemists to make long-time contracts for the entire output at a stipulated price. Judging from contracts made in recent years, we should say that lepidolite is worth from \$20 to \$25 per short ton of 2,000 lb. at railroad in vicinity of mine. The price is dependent largely upon the quantity of ore purchased and the period of contract. For wolframite analyzing as high as your product, New York dealers quote, f. o. b. here, \$6 per unit per short ton of tungstic acid. Momentarily the

market here has more ore than it can carry conveniently, hence the price is lower than it has been of late. The bulk of the wolfram mined is converted into metal and alloys (ferro-tungsten), suitable for hardening steel. Domestic dealers and exporters are E. P. Earle, 29 Liberty street, New York; A. B. Frenzel, Denver, Colo., and the Primos Chemical Co., Primos, Pa. (the last-named is a large consumer of ore). Prominent dealers abroad are Geo. G. Blackwell's Sons Co., The Albany, Liverpool, England and the Tungsten & Rare Metals Co., 91 Blackfriars road, London, S. E., England. The same dealers may be recommended for uranium ore, as also the Syndicat International du Vanadium, Paris, France. This mineral, used as a pigment in the manufacture of porcelain and glass, and in photography, is now being experimented with as an alloy of iron and aluminum. Unfortunately, at \$1 per unit, quoted f. o. b. New York for uranium oxide, the price is too high to favor an increase in consumption. Moreover, purchasers seek an ore that will average at least 10% metal, and it is known that one dealer has a large quantity of ore, containing 3% or thereabouts, which still awaits a market. Besides the small production of uranium in Colorado, the United States imports annually between \$12,000 and \$14,000 of uranium salts, principally from Germany. Supplementing the data given, we might say that the custom of purchasers of the rare minerals is to acknowledge contracts only after their personal analyses compare with those of the seller. This stand taken by the consumer will be appreciated when it is learned that the high price paid and the limited demand suggest care and economy in order to make possible further experiments that will tend toward expansion in consumption.

Recent Legal Decisions.

SPECIALLY REPORTED.

CONSTRUCTION OF AN INDIANA GAS LEASE.—Where a gas lease is for such a period as the lessee should pay the lessor a specified annual sum in advance, or until gas shall be found in paying quantities, and the lessor refuses at the beginning of any year to accept payment, the lessee is then bound to develop the property within a reasonable time, but the acceptance of an annual payment in advance is a waiver of performance in the development of the property for that year. Where such lessor demanded forfeiture for lessee's failure to drill for oil at a time when he was not entitled to forfeiture, such demand was ineffectual as a notice to the lessee to start operations, the claim of forfeiture being equivalent to a denial of the lessee's right thereafter to enter the premises for the purpose of conducting such operations. The failure of the lessee to afterwards commence

operations cannot be regarded as a lack of diligence, entitling lessor to a forfeiture.—*Consumers' Gas Trust Co. v. Worth* (71 *Northeastern Reporter*, 489); Supreme Court of Indiana.

LOCATING CLAIMS—NEW REGULATIONS.

—An order from the Secretary of the Interior approves certain changes in paragraph 37 of the mining regulations, made by the General Land Office. The paragraph now reads as follows:

"Promptly upon the approval of a mineral survey the surveyor-general will advise both this office and the appropriate local land office, by letter, of the date of approval, number of the survey, name and area of the claim, name and survey number of each approved mineral survey with which actually in conflict, name and address of the applicant for survey, and name of the mineral surveyor who made the survey; and will also briefly describe therein the locus of the claim, specifying each legal subdivision or portion thereof, when upon surveyed lands, covered in whole or in part by the survey.

"It is also provided that when an application to make agricultural entry of the residue of any original lot or legal subdivision of forty acres, reduced by mining claims for which patent applications have been filed and which residue has been already re-allotted in accordance therewith is made, the local officers will accept and approve the applications as usual, if found to be regular. When such an application is filed for any original lot or subdivision, reduced in available area by duly asserted mining claims, but not yet relotted accordingly, the local officers will promptly advise the surveyor-general's office thereof, and will also report and identify any pending application for mineral patent affecting such subdivision which the agricultural applicant does not desire to contest.

"The register and receiver will allow no agricultural claim for any portion of an original lot or legal forty-acre subdivision, where the reduced area is made to appear by reason of approved surveys of mining claims, and for which applications for patent have not been filed, until there is submitted by such agricultural applicant a satisfactory showing that such surveyed claims are in fact mineral or mining locations, segregated by survey with the view to agricultural appropriation of the remainder. This will be made to the register and receiver for submission to the commissioner of the general land office, for his consideration and direction, and must be supported by the affidavit of the party in interest, duly corroborated by two or more disinterested persons."

According to an hypothesis advanced by Nernst, there is a close parallel between the dissociating-strength of a solvent and its di-electric constant.

Abstracts of Official Reports.

American Iron & Steel Manufacturing Company.

This company owns several manufacturing plants in Eastern Pennsylvania. Its capital consists of \$3,000,000 preferred and \$1,700,000 common stock. The reserve fund amounts to \$550,000. The report of President J. H. Sternbergh, for the year 1904, says:

"In our line of manufacture the year 1904 has been characterized by a very conservative demand on the part of buyers and a correspondingly active competition for orders on the part of the manufacturers resulting in an extremely low range of prices. Your company's sales in money value of all manufactured goods during 1904 were about 20% less than in 1903, notwithstanding the total tonnage sold in 1904 was a little greater than in 1903. An improvement, however, both in demand and in prices has lately appeared, and the prospects are for better business in 1905 than we realized in 1904. During a period of five or six months in 1904, about half of our machinery for the production of bolts, nuts, rivets, etc., was standing idle for want of orders. However, we have paid the regular quarterly dividends on our preferred stock amounting to \$150,000, and have paid \$157,162 for betterments and extensions, and have charged \$50,000 to the reserve fund to provide for depreciation of buildings and machinery, and have written off the balance of \$24,896 to our charter and organization account, and have added \$46,625 to individual profits. All things considered, we regard this as a very fair showing for an off-year.

"A call has been made by your board of directors of \$2.50 per share on the 340,000 shares of our common stock payable Feb. 28 next, with which we hope to pay off our note indebtedness and thus place our company in a more satisfactory financial condition. At the same time the common stock will be reduced from 340,000 shares to 51,000, and by the exchange of 6 2-3 shares of the former for one of the latter will be made full paid at \$50 per share, and thereafter non-assessable. The consummation of this project together with the work referred to in our second annual report, of placing our plants in first-class physical condition, completes the object the present administration has long had in view."

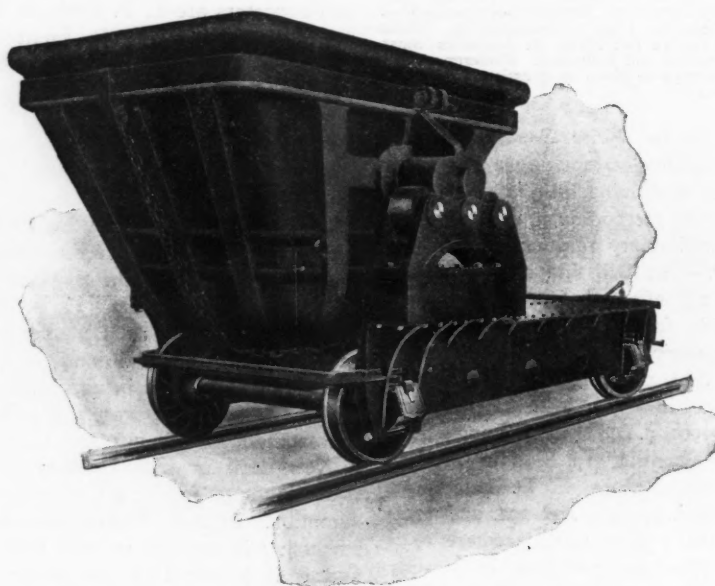
The true efficiency of a machine is the ratio of the useful-work-done to the energy-input.

The ultra-violet spectrum of hydrogen was photographed by Huggins from the star Vega in Lyra, before it was discovered in the laboratory; but there is another hydrogen series in Zeta Puppis, which still awaits terrestrial duplication.

Dewhurst Slag Ladles and Cars.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, has sole American rights for the manufacture and sale of the Dewhurst slag ladles and cars. These ladles

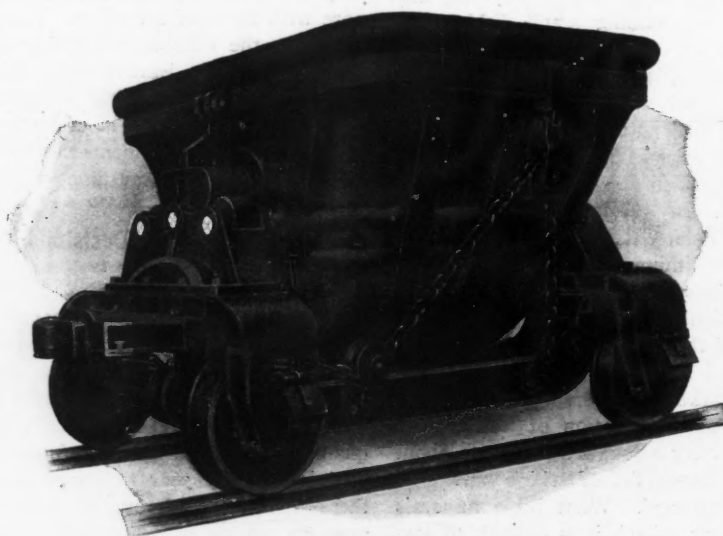
chain is provided with hooks at each end, one for hooking to the car and the other for hooking to the locomotive. This chain may be hooked to either end of the car as required. The locomotive pulls away from



DEWHURST SLAG LADLE AND CAR. END TIPPING.

embody a number of distinctive features which will be noted by reference to the accompanying illustrations. Hand tipping is done away with, thus reducing the cost of operation and increasing the speed. The tipping device is at once simple and efficient. The ladles are tipped by a pull

the ladle while dumping, hence if the chain should break the locomotive is not endangered, but will run away from the ladle instead of toward it. When the slag has been dumped the ladle rights itself by gravity by merely backing the locomotive. A train of side-tipping ladles can



DEWHURST SLAG LADLE AND CAR. SIDE TIPPING.

of the locomotive on the tipping chain. There are no power cylinders, gears or tipping poles required.

The chain and tipping mechanism for side-tipping ladles can be placed on whichever side of the car the dumping is to be done. The chain runs over steel snatch-blocks and guide-pulleys, the latter and two of the snatch-blocks being attached to the car and the other snatch-block being attached to the ladle, as shown. The

be tipped in series by attaching the hook of each ladle to the car ahead of it. The end-tipping ladles are tipped by a direct pull of the locomotive from the opposite end of the car, the locomotive pulling away from the car.

On all ladles a forged-steel band is attached, running around the ladle slightly below the rim. By means of this band the pull is evenly distributed around the ladle, thus obviating any tendency of the

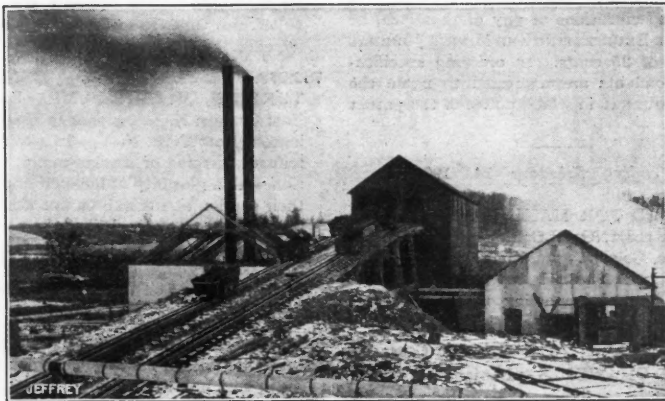
pull causing the ladle to spring outward at the front, which might cause it to crack transversely. By fixing the tipping point high on the ladle the leverage is increased and the tipping process is made proportionately easier.

210 cu. ft. in the end-dumping pattern; the 210-cu. ft. car of each is the standard size. The illustrations show a side-tipping and an end-tipping car, both of the four-wheel type. In the eight-wheel car, the frame is lengthened and a

A Flexible Cable Car-Haul.

The advantages of a wire-cable haul as installed by the Jeffrey Manufacturing Company at the works of the Midway Coal Company, Byesville, Ohio, are so marked that they should be widely known. This system notes an advance in the handling of coal at mines. The illustrations herewith show views up and down the slope, with a side plan of the entire installation. Chain car-hauls still have strong points for short distance haulage. As the wire-cable haul, however, is flexible, it can be used for short hauls, while it excels more especially in long distance hauls.

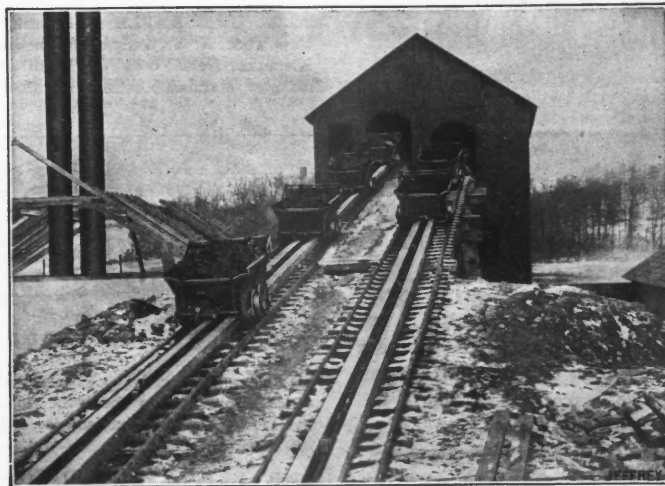
At the Midway plant the distance from the gathering point in the mine to the tippie is 325 ft. In this operation a single steel cable is used, which passes over an adjustable special cable wheel in the mine, while at the tippie it operates over two sheaves connecting with a third, located immediately underneath, set at right



WIRE-ROPE HAULAGE, MIDWAY COAL COMPANY.

Double trunnions are cast on each side of the ladle, being located slightly above the axis, so that the ladle will right itself from any point to which it might be tipped. Roller bearings are provided, on which the trunnions rest, thus greatly reducing the power required for tipping. The ladles are of special shape, to facilitate the stripping of the slag and skull. Hence, in dumping, the skull follows the molten slag, requiring no hand work for its removal. The whole of the work is handled by the locomotive and its crew. The ladle is cast in a single piece, and heavily ribbed on the outside to stiffen it and increase its strength. There are no ladle linings to require renewal. The absence of linings also obviates all possibility of the skull pulling out the lining and taking it with it in dumping.

Cars are built for standard-gauge



TOP OF INCLINE AND TIPPLE.



ENTRANCE TO SLOPE.

tracks, and are equipped with either four or eight wheels as may be required. They are built in a variety of sizes, ranging in capacity from 70 to 280 cu. ft. in the side-dumping pattern, and from 70 to

four-wheeled truck substituted for the single axle at each end of the car.

Siemens and Huntington produced the first practicable electric furnace.

angles. These wheels are made with pockets, which receive the special cable attachments, and carriers, being guided over, down and around the lower wheel, which acts as the main drive for the whole system. The features which make this system a pronounced success are its design, the special dogs which are attached to the cable for carrying the car, the special clamps and the adjustable cable sheaves, all of which are protected by patents issued and pending, and are common only to Jeffrey installations.

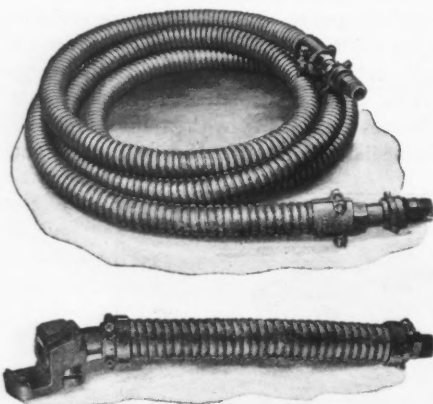
The Midway plant is designed for a capacity of 2,000 cars, each with a load of 1.5 tons, in ten hours.

All overhead telephone wires at Johannesburg in the Transvaal are to be replaced by underground wires. Each cable, consisting of from 104 to 612 wires, will be laid in an earthenware duct of 3 1/4 in. diameter. The number of ducts in a route varies between 3 and 45. There will be about seven route-miles of ducts altogether.

Flexible Steel-Armored Hose.

The demand for a steam or air hose which can be absolutely relied upon has led the Sprague Electric Company, of New York, to design a new product which meets the requirements, and the miner, the mechanic or the quarryman can feel assured that he is safe from serious accident due to defective hose.

This new product is known as flexible steel-armored hose, and consists of a suitable rubber hose encased in a steel armor which prevents expansion and thus greatly increases the life of the hose. It also protects the hose from mechanical injury and insures flexibility by making it impossible to flatten or kink when handling.



FLEXIBLE STEEL-ARMORED HOSE.

In ordinary rubber hose, when over-vulcanization occurs, it bursts and is immediately useless, whereas if a crack should occur through over-vulcanization in this hose, the steel armor binds the rupture so tightly that very little pressure is lost and the work in progress does not stop. This permits the hose to be used until a new piece can be obtained, and not only saves time but, in many cases, prevents accidents. In any case it is a money saver.

The accompanying illustration shows the general appearance of the hose. Further information can be obtained from the makers.

Explosive Mixtures.

According to the *Revue des Produits Chimiques*, a mixture of 87% ammonium nitrate and 13% anilin nitrate possesses extraordinary shattering power. If it is desirable to limit the deliquescence of the ammonium salt, to permit storage of the mixture, a portion of potassium nitrate may be added. To get the maximum power, as well as to insure against danger of igniting fire-damp, picric acid may be included, according to the following composition: Ammonium nitrate, 80%; anilin nitrate, 10%; potassium nitrate, 5%; picric acid, 5 per cent.

Fluorine is a pale greenish-yellow gas; it is very active and corrosive.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

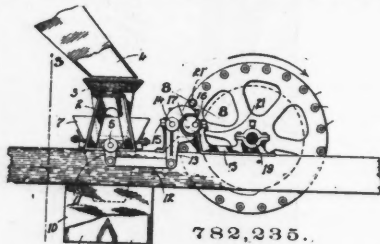
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon receipt of 25 cents. In ordering specifications correspondents are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

Week ending February 14, 1905.

782,230. MOLD FOR MAKING ARTIFICIAL-STONE BUILDING BLOCKS.—Jonas Finger, Fort Collins, Colo. A mold-box for the formation of sectional blocks having tie-rod connections, and tie-rod-supporting means arranged within the box.

782,233. PROCESS OF INDUCING A FLOW OF OIL FROM OIL-WELLS.—Benjamin F. Gardner, Chicago, Ill., assignor of one-half to Charles K. Woolner and Sigmund Woolner, Chicago, Ill. A process for inducing a flow of oil from an oil-well which consists in producing a pressure by heat at the bottom of the well.

782,235. ORE-SAMPLER.—Andrew G. Gullberg, New York, N. Y., assignor of one-half to Frank Klepetko, New York, N. Y. In an automatic sampler, a suitable oscillating cutter or sample-



hopper, an oscillating lock-lever, intermediate connections between the lever and cutter, and suitable driving mechanism for actuating the lock-lever and cutter.

782,259. RETORT COKE-OVEN.—Clyde S. Mason, Buffalo, N. Y. In a retort coking-oven, the combination of a series of horizontal retort-ovens, combustion-chambers below the same, vertical heating-flues arranged between adjacent ovens and communicating at their lower ends with the combustion-chambers, and a plurality of horizontal flues between adjacent ovens, one of said flues communicating with the upper ends of the vertical flues and another of said flues extending from side to side of the series of ovens, the wall or walls separating said horizontal flues being provided with openings for equalizing the flow of the gases.

782,260. TUBULAR PEAT-COLLECTOR.—William A. Milne, Brown's Corners, Canada. In a peat-collector, the combination with the suction-tube having a bent outer end and an external flange attached to said end, of the mouth provided with an external flange designed to abut the aforesaid flange, and an internal grooved ring separate from both the suction-tube and the mouth and designed to straddle both abutting flanges.

782,264. MACHINE FOR CRUSHING ORES OR OTHER USES.—David J. Nevill, Salt Lake City, Utah. In a machine for crushing ores, etc., the combination with a pair of rolls and a movable bearing at each end of one of said rolls, of a spring for each of said bearings, two pressure-plates which are independently movable and between which the spring is supported, and means for transmitting the movement of the bearings in one direction to one of the plates, and means for transmitting the movement of the bearing in the

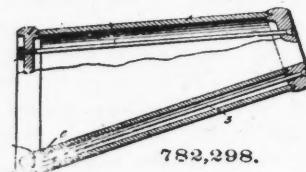
opposite direction to the other plate, and an adjustable rigid abutment for the plates farthest from the bearing.

782,271. CENTRIFUGAL, TURBINE OR LIKE PUMP.—Frederick Ray, East Orange, N. J., assignor to Henry R. Worthington, New York, N. Y. In a centrifugal, turbine or similar pump, the combination with an inclosed impeller, of air-chambers on the opposite sides of the impeller, and vanes in said chambers carried by the impeller.

782,272. MULTI-STAGE CENTRIFUGAL, TURBINE, OR LIKE PUMP.—Frederick Ray, East Orange, N. J., assignor to Henry R. Worthington, New York, N. Y. In a multi-stage centrifugal, turbine or similar pump, the combination with a plurality of inclosed impellers having their suction at the hub on one side and balancing surfaces on their delivery sides opposite the suction, of diaphragms between the impellers and their delivery-passages terminating outside the balance-surfaces on the delivery sides of the impellers.

782,273. CENTRIFUGAL, TURBINE, OR SIMILAR PUMP.—Frederick Ray, East Orange, N. J., assignor to Henry R. Worthington, New York, N. Y. A multi-stage centrifugal, turbine or similar pump having between the impellers integral partition-sections consisting of single side disks forming the adjacent side walls of successive impeller-chambers and separated to form delivery-passages between the disks through which the fluid passes to the central suction of the next impeller, and fixed guide-vanes in said passages connecting the disks.

782,298. SPOUT FOR BLAST-FURNACES.—James T. White, Anaconda, Mont., assignor of one-half to Charles S. Palmer, Anaconda, Mont. A furnace-spout comprising a hollow shell pro-



vided in its outer side near one end with a plurality of water-inlet supply-openings arranged in alignment and longitudinally of the spout, and near the other end with a water-outlet opening, and heads detachably connected with the shell.

782,308. ELECTROLYTIC APPARATUS.—Arthur Wright, Brighton, England. In an electrolytic apparatus with a mercury anode, a screen separating the anode from the cathode consisting of a material which is not wetted by mercury and has passages of such size as will prevent the flow therethrough of the mercury, but will permit the free flow of the electrolyte.

782,320. UNDER-REAMER FOR WELLS.—John J. Brewster, San Francisco, Cal. A tool of the class described, comprising a body, and a bit or cutter movably mounted on the body in a longitudinal direction and arranged to extend beyond the lower end of the body, whereby the weight of the latter will move the same upward on it when the tool comes in contact with the bottom of a well, said bit or cutter having an oppositely beveled lower end and tapered upwardly above the same at both the sides and back to present inclined inner and side faces.

782,321. MANUFACTURE OF CRYSTALLINE GYPSUM APPLICABLE FOR FILLING PURPOSES.—William Brothers, Prestwich, England. The process of preparing a loose crystalline mass of calcium sulphate (CaSO₄·2H₂O) known as pearl hardening, satin finish, crystal finish or by other name, from calcium sulphate comprising the cooking or boiling of such calcium sulphate in the presence of water, cooling the crystals so formed before removing the water and agitating the mass during the process of cooling to cause such crystals to form or precipitate separately.

and subsequently removing the water and drying them.

782,334. HOT-AIR BLAST-STOVE.—Charles M. Gunn, Sausalito, and William D. Mulloy, Canyon, Cal., assignors to Union Iron Works, San Francisco, Cal. In a hot-air-blast stove, the combination with the heating-chamber, of a series of air-circulating tubes suspended therein, comprising vertically arranged communicating coils, and solid connections between the tubes at the upper and lower ends, comprising heads extending over and connected to the communicating ends of the tubes, said heads having inwardly turned flanges between adjacent coils, and bolts securing adjacent flanges.

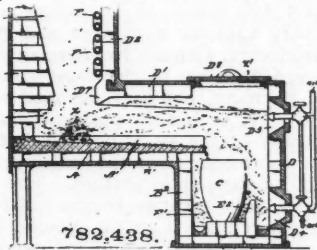
782,351. ARTIFICIAL-STONE BLOCK.—Marcellus Q. Mullenix, Springfield, Ohio. An artificial built block of cement or other suitable composition, comprising a composition body having a substantially flat back, and a flat fastening-strip of thin sheet metal embedded in said body in a plane forward of the back of the block in a vertical position, said strip being anchored in said body by having its inclosed terminal portion bent at an angle, said strip extending rearward from the point where it issues from the block to the rear of the block, said rearward-extending portion being flush with the adjacent surface of the edge of the block, and said strip having a projecting portion extending outward from the block with its rear surface in the plane of the back of the block.

782,401. METALLIC ALLOY.—Louis H. E. Lacroix, Pont de Chéry, France, assignor to Joseph Louis Routin and Leon Martial Eugene Mourraile, Lyons, France. A metallic alloy consisting of lead, antimony, and sodium, the lead being in excess of the antimony and the latter in excess of the sodium.

782,425. GOLD-SEPARATING MACHINE.—Fred C. Stevenson and Charles E. Heft, Grants Pass, Oreg., assignors of one-half to George W. Sanford, Honeoye Falls, and Charles M. Smith, Marion, N. Y. In a gold-separating machine, an inner cylinder mounted upon a shaft, an outer cylinder mounted upon independent bearings, a train of gear-wheels connecting the cylinders to rotate them in opposite directions and at different speeds, annular ribs within the outer cylinder, the inner cylinder divided longitudinally and perforated, and a hopper and screen connected therewith.

782,429. ROCK-DRILL.—Robert Temple, Denver, Colo., assignor to the Temple Gas Engine & Machine Company, Denver, Colo. In a rock-drill of the class described, the combination of a cylinder portion, a reciprocating piston movably

reservoir adapted to contain a crucible below the lower end of the hearth, a draw-off spout from the bottom of the reservoir a furnace-front having burners projecting therethrough, one discharging



within the reservoir, and the other directed upon the hearth, a closed opening through the said roof coincident with the reservoir, a depending lip from the said roof at the angle of the flue, and a projection of the rear wall overhanging the head of the said hearth.

782,470. BRIQUETTE-MACHINE.—Robert Schorr, San Francisco, Cal. In a briquette-machine, a rotatable mold-ring, a gear-wheel connected therewith, both mounted on a common shaft, means for driving said gear-wheel and mold-ring, the latter being provided with radial mold-apertures, means to supply material to said mold-apertures from the inside of the rotatable mold-ring, sliding plungers in said mold-apertures, with heads on the outside, eccentric guides outside of said heads to press the plungers inward, guides to move the plungers outward by engagement with the under sides of the heads, and a pressing-wheel outside of the mold-ring, between said guides, bearing against said plunger-heads in succession to give the final compressive thrusts thereto.

782,485. MEANS FOR DISTRIBUTING COAL OR OTHER MATERIAL.—Jeremiah Campbell, Newton, Mass. A device for distributing coal or other material, comprising a stationary tubular member, a curved swivel tubular coupling adapted to rotate on said stationary tubular member, and a chute, said chute having a circular cross-section at one end and being pivoted to said coupling so as to swing on a diameter of said cross-section whereby the coal or other material may be distributed to a large area without leakage.

782,507. ROOFING AND SHEATHING CEMENT.—Josiah R. Kelly, Quincy, Ill. A roofing and sheathing cement consisting of dehydrated sand, 25%, dehydrated silicate of alumina, 60%, subcarbonate of iron, 15%, and a fixed oil to insure a proper consistency.

782,587. PROCESS OF PREPARING PEAT FOR FUEL.—J. W. Vaughan and Charles S. Horner, Eaton Rapids, Mich. A process of drying peat, consisting of first mechanically separating from the peat the contained water to as great an extent as is practically possible, next subjecting the partially dried peat to an electric current to disintegrate the same and liberate contained water and finally again mechanically separating the liberated water from the mass.

782,602. APPARATUS FOR MAKING BRICKS.—Johannes Draenert, Eilenburg, Germany. An apparatus for making bricks with very hard corners and edges, consisting of a holder for the material, a table having a series of molds therein, to rotate under said holder, wings and outlets in the said holder, through which the material is fed to the molds, reciprocatory frame-shaped dies to fit into said molds through said outlets, and means for reciprocating said dies and rotating said wings to first fill the mold, then stamp down the edges and then refill the mold.

782,609. PROCESS OF OBTAINING OXYGEN.—George F. Jaubert, Paris, France. A process of preparing oxygen, which consists in adding a solution of the salt of a metal of the iron group to a mixture containing chloride of lime and a salt of copper.

782,611. AMALGAMATOR.—Martin V. Lasswell, Oakland, Cal. In a fine-gold amalgamator, a plurality of containers communicating with each other and provided with openings in their bottoms, a sluice-box communicating with the initial container, yoke-shaped bearings secured to the sluice-box, a shaft rotatably and removably journaled in the bearings, and provided with grate-bars depending across the sluice-box, a pipe having one end communicating with a receptacle and its other end open, a removable plug mounted in said open end, couplings connected to the pipe and the bottoms of the containers and through which the openings communicate with the pipe, valve-plugs rotatably mounted within the openings, and operating-rods each having one of its ends connected to one of the plugs and its other end extending upwardly through the cover of the container.

782,622. APPARATUS FOR TREATING LIQUIDS WITH GASES.—Rodolphe Quarez, Amiens, France. In an apparatus for saturating liquid with gases, embodying a downflow-column for the liquids and gases, means for supplying the liquids and gases to the said column, deflectors arranged within said column, and means for forming contracted passages interposed.

782,637. AMMONIUM-SULPHATE SATURATOR.—Karl Zimpell, Stettin, Germany. The combination with a sulphate-of-ammonia saturator, comprising a saturator-tank, a bell, having a cover, suspended therein, and means for conducting the gases into the saturator, of an auxiliary saturator comprising an auxiliary saturator-tank having a bottom formed by the said bell-cover, a pipe extending upward from said bottom and connecting the space in the above-mentioned bell with that in the auxiliary saturator-tank, a bell covering said pipe, and means for leading off unabsorbed gases from the space outside said bell.

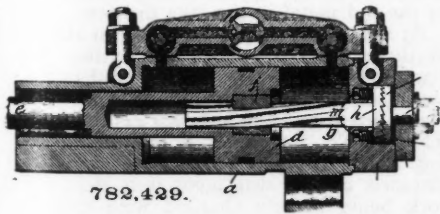
782,677. APPARATUS FOR CONVEYING MATERIAL.—Hermann Marcus, Cologne, Germany. A reciprocating conveyor comprising frames each having a rocker, races working in conjunction with the rocker, and supports for the frames.

782,681. OIL-WELL SYSTEM.—Fred J. Moser, Kane, Pa. A controller-valve, comprising an air-chamber, a valve member mounted therein and provided with two seats, each of which closes an air-exit, and means controllable by movements of a fluid for shifting said valve member from one of its seats to the other.

782,694. STORAGE APPARATUS.—Charles Piez, Philadelphia, Pa., assignor to The Dodge Coal Storage Company, Naugatuck, Conn. In a storage apparatus, the combination of a segmental storage-floor, a fixed structure at one side of said floor, a horizontal truss structure pivoted to the fixed structure at a given distance from the floor and arranged to swing over said floor, a segmental track for supporting the outer end of the pivoted structure, a conveyor on the pivoted structure, and means on the fixed structure for feeding said conveyor with material to be conveyed and piled on the floor.

782,697. CONTINUOUS HEATING-FURNACE.—Josef Reuleaux, Wilkinsburg, Pa., assignor to Alexander Loughlin, Sewickley, Pa. A furnace having in combination therewith bearings arranged longitudinally thereof, a hearth intersecting said bearings and on to which the billets are received from the bearings, said hearth having spaces therein in line with the bearings for the admission of the gases against the under sides of the billets on the hearth, and means for pushing the billets over the bearings and hearth.

782,782. PROCESS OF REVIVIFYING PLATINUM CONTACT SUBSTANCES.—Rudolf Knietzsch and Maximilian Scharff, Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik, Ludwigshafen-on-the-Rhine, Germany. A process for revivifying platinum contact substances employed in the manufacture of sulphuric anhydride and sulphuric acid by treating the contact substance with dry sulphurous acid.



mounted therein, a rifled nut in engagement with said piston-head, a rifled bar in engagement with said nut and provided with a radially arranged face-ratchet at its outer end, a second radially arranged face-ratchet frictionally held in the cylinder-head, a stem portion therefor extending through the cylinder-head and provided with a threaded end portion, a threaded nut on the threaded end of said stem portion, a yielding washer inserted between the second ratchet and the cylinder-head to hold the same in frictional engagement with said cylinder-head, and spring mechanism engaging the first-named ratchet, so as to normally hold it and thereby the rifled bar in engagement with the second ratchet.

782,438. FURNACE.—Louis De Rome, San Francisco, Cal. A furnace consisting of an inclined hearth with an escape-flue rising from near the head thereof, a roof overhanging the hearth, a

Special Correspondence.

San Francisco. Feb. 23.

Officials of the Tacoma Smelting Co., including William R. Rust, the general manager, and D. O. Mills, the controlling owner, have been in conference in San Francisco during the present week, which again brings up the current rumor that the American Smelting & Refining Co. will soon be in control of that plant. The negotiations, however, have not as yet been brought down to a business basis, so that whatever has thus far been done has not been made public. The Tacoma smelter is quite a successful institution and handles all the sulphurets coming from the quartz mills at Douglas Island, Alaska, as well as large quantities of ores from Idaho, Oregon, Washington and neighboring territory.

The Assembly committee in oil interests, in the State legislature now in session, has resolved to recommend the passage of the bill making the Standard Oil pipe lines in the State common carriers. The measure for the proposed State oil refinery, however, has been returned to the Assembly without recommendation one way or another. The smaller oil producers of the State, especially in the Fresno and Kern county fields, are very anxious to compel the owners of pipe lines to transport their oil as common carriers, without preference for favored companies.

The great smelter towns of Keswick and De La Mar, in Shasta county, have never tolerated oriental labor, so that no Chinese or Japanese have settled there. At first the Chinese were barred from Keswick, and later, when Japanese came, they also were sent away. This month at Kennett, the new smelter town of Shasta county, a committee of laboring men visited the lessee of a hotel who had brought up some Japanese waiters and informed him that none of the miners or workmen around the smelters would board there if Japanese help were employed, so the Japanese were sent back to Oakland, and further trouble avoided. Redding, Eureka and Truckee are three prominent towns which do not tolerate Chinese within their borders; now these three smelter towns of Shasta county have also barred out all oriental labor.

In recognition of the valuable services done in geological and anthropological research in limestone caves in Shasta county, the Archaeological Institute of America has appropriated \$500, to be expended by the University of California in continuing the excavations and explorations in these caverns.

The Union Trust Co., of this city, as executor and trustee of the estate of the late Charles F. Doe, is to sell at public auction on March 6, 99,080 shares of the famous Rawhide Gold Mining Co.; 144,975 shares of the App Consolidated Gold Mining Co., and 99,950 shares of the Guild Mining Co., together with certain shares of vineyard property, comprising the holdings of W. A. Nevills, of Jamestown, Tuolumne county, in these properties. The sale is to satisfy a debt of about \$200,000 owed by Captain Nevills to the Doe estate. Some years since Captain Nevills became involved in litigation with his partners, William H. Martin and John Ballard, and in order to fight the suits and pay certain moneys to these partners, he borrowed the money of Mr. Doe. Since then he has been in other litigation, and lawyers' and witnesses' fees prevented his paying the interest on the

Doe debt promptly, so the Union Trust Co. has given public notice of the sale of enough of the stock held as collateral at auction to liquidate the indebtedness. The properties are considered to be worth between \$1,000,000 and \$2,000,000, the Rawhide and App mines of Tuolumne county being very valuable and large and steady gold producers. Captain Nevills claims that he offered \$100,000 to the trust company as part payment, but they declined to accept this. It is hardly probable that he will let any of the stock be sold, but will arrange for payment of the full indebtedness before the public auction. The matter comes as a surprise to the California mining community, Captain Nevills being rated generally as a mining millionaire.

The case of Charles Shiverley vs. the Eureka Tellurium Mining Co., of Shasta county, is being tried before the superior court of Tehama county. The suit was brought by the assignees of the former directors of the company for moneys advanced and services performed for the benefit of the company. The defendants made allegations of fraud in contracting debts. The case has been once tried in the superior court of Shasta county, and was transferred to Tehama county. At the former trial the judge allowed the claim of plaintiff to the extent of \$20,000, but at the same time allowed a counter claim of unpaid assessments of plaintiff sufficient to wipe out the amount allowed by the court on plaintiff's claim. An appeal was taken to the supreme court and that court reversed the judgment and eliminated the counter claim, but sent the case back for retrial as to other matters.

The long pending suit of W. H. Meinfeld against the Maryland Mining Company of Grass Valley for \$20,000 damages has been compromised; it is said on a basis of \$2,000 instead of the \$20,000 demanded.

Denver. Feb. 24.

In the United States Court of Appeals at St. Louis, presided over by Judge Elmer B. Adams, an opinion has been rendered in the celebrated case of the Stratton's Independence Co., Ltd., of London, against the Winfield S. Stratton estate. The former company claimed \$6,000,000. Originally the case was tried before Judge Riner, in the United States Circuit Court of this State, where the decision was in favor of the estate, and this decision was sustained by the higher court. This settles the question of the great mine having been 'salted' at the time of the examination in behalf of the purchasers, who claimed such to have been the case. Until all the litigation against the estate is settled, the executors will not proceed with carrying out the provisions of the will, and several months will probably elapse before this is the case.

It is understood here that the control of the Guggenheim Exploration Co. has passed to the American Smelting & Refining Co., and that a joint corporation, consolidating the two companies, has been formed.

The senior class of the State School of Mines expects soon to start on its final mining and metallurgical trip before graduating. This will be under the direction of Professors Young and Traphagen. The trip will include the Leadville and Breckenridge districts in this State, the mines and smelters in the vicinity of Salt Lake City, the Black Hills and part of Montana.

During the past few years a number of the metallurgical plants, especially in the

southwestern part of the State, have been hampered by running short of water during the late summer, but the snowfall has been very large during the past winter, and, while that has interfered more or less with mining operations, a plentiful supply of water is assured this year.

The leasing system at the Stratton's Independence mine has proven successful. Previous to its adoption the company was losing money, but during the past six months about \$250,000 has been paid in dividends.

A bill has been introduced in the legislature establishing a state oil refinery. The effect of the agitation against the Standard Oil Co. in this State is shown in the Florence oil field, where a large number of oil wells which were closed down by the United Oil Co. last fall have resumed operations. This company is an adjunct of the Standard Oil Company.

A number of wealthy mine operators in this city intend to establish a generating plant on Bishop creek, California, just across the Nevada line, to develop electric power by the construction of dams, and to transmit it to Tonopah, 75 miles distant. This will assist materially in the development of the new mining districts in that State.

Notwithstanding the persistent rumors of the sale of the Denver, Northwestern & Pacific railroad, the "Moffat line," it seems that no deal of any kind was made by Mr. Moffat, while he was East. He intends to operate the line independent of any other and to continue construction work.

The El Paso mine in the Cripple Creek district still keeps up its reputation. The net earnings this month will be close to \$75,000, and a large surplus is being collected in the treasury is already over \$400,000, lected, which will make a three per cent. dividend probably before long. The reserve and is constantly increasing.

Houghton. Feb. 24.

Rich ground has been encountered on the Kearsarge amygdaloid lode at the Allouez and Centennial mines, causing greater interest in this master copper-bearing formation than ever, and the lode, which has furnished a number of highly important developments in the last few years, seems to be destined to become the most important source of supply for the mining of the red metal in the lake district.

At the Allouez the lode has been struck at three different places during the last few days. It was first encountered in the shaft, and, immediately following the No. 1 and No. 2 cross-cuts, penetrated the formation. No. 1 cross-cut is the only opening which has entered the lode for any distance, and at that point it is rich, the rock being heavily charged with copper, both shot and mass. The lode has been penetrated for about 10 ft., but owing to the richness of the formation, the work of getting through to the footwall is slow.

No. 1 cross-cut is opened at a depth of 1,260 ft. It struck the lode 183 ft. from the shaft. This is identical with the place from which the rich diamond drill core was extracted a few months ago, the results being surprisingly good. In No. 2 cross-cut, which is opened at a depth of 1,348 ft., the lode has been barely penetrated, but it shows a healthy appearance. In the shaft the lode is showing copper in good quantity, but it will take a few more days to obtain sufficient data to form a conclusive opinion of its value at that point. From present indications, the Allouez is assured of becoming a large

and profitable mine, but it will take time and considerable money to reach that point. The question of milling facilities will not be a troublesome one, as the Centennial, under the same management, will lease the Allouez a head in its mill at Grosse Pointe just as soon as the necessary rock supply can be furnished.

Work at the Centennial has reached a crucial point, and the results of the next few weeks' extension of the underground openings will be awaited with intense interest. It is the belief of the management, and this theory is substantiated by the best authentic data available, that the workings are just entering the rich shoots of copper ground making southward from the Wolverine mine. It is pointed out in support of this theory that the Centennial's No. 1 shaft, now bottomed at a depth of 2,800 ft., is opened in the richest ground penetrated anywhere in the course of sinking. Furthermore, the drift going north on the twenty-fifth level has for the last 35 ft. been penetrating the very richest copper yet opened anywhere in the mine.

According to the figures of the engineers of the Centennial and Wolverine mines, the upper limitation of the rich shoots of copper which are being wrought in No. 3 shaft of the Wolverine makes southward on the plane of the Kearsarge lode at an angle of 35 to 40 degrees. Extending this line southward, it brings it to the point where the Centennial's No. 1 shaft is now bottomed. In view of these deductions, the Centennial management has decided to push sinking in No. 1 shaft, and after a suspension of 14 months it has been resumed.

Operations at the North Kearsarge branch of the Osceola Consolidated mine have been resumed after an enforced idleness lasting 11 days. Repairs of the damage caused by the dynamite explosion are nearly completed, and in a few days the property will be making its usual output. Other than the loss of life, the most serious phase of the accident was the loss in production and profits, the actual damage to the shaft and mine workings being less than was reported at first. As soon as the fire had been extinguished and the shafts unsealed, the water which had risen in the shafts was bailed out. No. 3 suffered less than expected. The magazine, in which the 10,000 lb. of dynamite was stored, was in a drift on a lode parallel to the Kearsarge and 21 ft. eastward. It was immediately under the shaft, or on the footwall side, consequently the rock intervening between it and the shaft was blown out. From the seventh to the 11th levels the skip road was damaged. Plats at the eighth, ninth and 10th levels were burned out by the fire, and the timbering in the shafts at those points also suffered. No damage was done to any of the workings other than the shaft proper.

Scranton. Feb. 27.

The annual report of the Delaware, Lackawanna & Western railroad for 1904 shows that the total number of gross tons of coal transported over the road was 8,615,798, and the average rate earned per ton \$1.54; the earnings from coal transportation alone aggregating \$12,968,328, or nearly 60% of the gross earnings. The earnings, ton for ton, on coal transportation were over 33% greater than that on ordinary merchandise carried over the line.

President Lewis A. Riley, of the Lehigh Coal & Navigation Co., in his annual

report, makes a number of statements of public interest. One of the company's mines, near Tamaqua, has been on fire for 47 years. Regarding the efforts now made to quench these subterranean fires, the report says that a portion of the outcrop of the Mammoth vein in that locality has been on fire since 1858, the fire being confined by the water filling the workings below water level and cut-offs on the outcrop. Before opening the colliery below water level it is necessary to extinguish the fire or get it under control. During the past year efforts have been made with this end in view, which have met with a large measure of success. A boiler plant and pumping machinery have been erected on the banks of the Little Schuylkill river near Tamaqua, for the purpose of pumping water to the level of the outcrop. A branch of the Panther Creek railroad has been extended nearly two miles to reach the outcrop, and bore-holes have been put down at various places where there are indications of fire. The fire is being extinguished by washing fine coal dirt through bore-holes on the fire and filling up the vacant spaces so as to cut off the air supply. After the fire has been extinguished the company will erect a mammoth breaker to handle the coal saved from the fire, which, it is estimated, will amount to 1,000 tons a day, giving employment to 900 men and boys.

The Delaware & Hudson company is contemplating the advisability of laying two more tracks on the Pennsylvania division between Carbondale and Wilkes-Barre, making it a quadruple line through the coal fields. The traffic on this line is growing very heavy, the largest part of the increase coming from the anthracite output.

A suit for \$100,000 damages has been filed in the Luzerne county court against the Delaware & Hudson company by George W. Barney, of Plymouth township. Barney alleges that the Delaware & Hudson company, in May, 1904, broke into his coal mine, in Plymouth township, and with force and arms, dynamite and electrical batteries, tore down his coal and mined it against his wishes and commands.

The Johnson colliery No. 2 at Dickson City has been shut down for extensive repairs. The superintendent says that the mine will not be operated during the next eight weeks, when it will undergo a thorough overhauling. The shaft will be thoroughly repaired, the interior of the mine will be newly lumbered throughout and other renovations made in the inside and on the outside workings of this large colliery.

A strike unique in its order took place on Feb. 25 at the Hollister & Bawman mine at Avoca. In common with the other mines this colliery has a checking boss appointed by the miners. The wages of this man were collected by the company, but for doing so the company claimed a percentage of the collection, as it took all the time of one of the clerks. Accordingly they deducted from the pay of each miner such a sum as in the aggregate would pay the clerk's salary. About 300 men and boys are on strike and the mine is idle.

The annual report of Inspector Martin of the seventh anthracite district is just published. It shows a total production of coal in that district of 5,066,397 tons, or 140,000 tons more than in 1903, when it is believed the high water mark in mining coal had been reached. There are 19 collieries in the district, all in operation; two new mines were opened, and 63 lives were lost, one to every 99,341 tons produced.

Duluth. Feb. 26.

Jas. C. Hunter, of Duluth, acting for himself, his brother, and A. Stanford White, of Chicago, owners of the explored portion of the so-called Atikokan iron ore range, has succeeded in forming a company to operate the mine and develop associate industries. The Atikokan is north of Ely, Minn., and is about 135 miles west of Lake Superior at Thunder Bay. The new company is capitalized at \$1,000,000 and has secured abundant capital for carrying out its plans. These include the opening of the mines, the erection and operation of a 100-ton coke furnace at Thunder Bay, either Fort William or Port Arthur, rival and adjacent towns on the Canadian side of the international line, of by-product coke ovens to supply the furnace, and the erection of ore docks. The Canadian Northern railway, which passes close to the mine, will build thereto, and a contract has been closed between the Canadian Northern and the Pittsburg Coal Co. for the erection of one of the largest coal receiving docks on the upper lakes.

The iron company has elected the following officers: President, D. D. Mann, vice-president of the Canadian Northern; vice-president, Jas. C. Hunter, cashier of the American Exchange Bank, of Duluth; treasurer, Hugh Sutherland, of Winnipeg, a leading owner of the Canadian Northern, and secretary, R. M. Hunter, of Duluth. These, with Wm. McKenzie, president of the Canadian Northern, C. A. Lash, its attorney, Gerald O'Grady, manager of the Crown Bank of Canada, and A. Stanford White, of Chicago, form the directorate. The Messrs. Hunter have been chief owners of the lands of the Atikokan Iron Co.

An offer has been made the company by the town of Fort William to give it a 40-acre tract for a site for its works, tax exemption for 20 years, and a subscription of \$200,000 to its proposed bond issue. This has not yet been accepted, and possibly may not be.

The plans of the company contemplate a much more important metallurgical development than has been outlined above, dependent upon the growth of the Canadian Northwest and the demand there for finished iron and steel. The promoters can secure ample capital for any probable extension of their operations.

Four years ago the American Steel & Wire Co. spent \$30,000 in exploration on this property, and decided to take it over, but at the organization of the United States Steel Corporation all these matters were held up. In all, some \$40,000 has been put into the ground on the 4,000 ft. of outcroppings on this property and about 5,000,000 tons have been shown up, of an ore running from 57 to 62% natural iron, .04 phos., and about .5 sulphur. The exploration has been but partial, and the company owns or controls five miles of the strike of the range. Mining will be by tunneling for some time, as there is a considerable height of outcrop above the surrounding valley. The company will install crushers and rolls at the mine and will roast its ores at the furnace by waste gases. It is estimated that this will be a very cheap process.

The present developments about Crystal Falls exceed those of any point on the Menominee range. All the mines there, many of which have been idle for some years, are being reopened and prepared for extensive operations; new hoisting plants, pumps of large capacity, and large and modern crushing apparatus, are going in. Much of this work is under charge of W. J. Richards, of the firm of Corrigan, McKinney & Co., and the firm will

soon have in operation Dunn, Great Western and Lamont, in addition to its Crystal Falls, Tobin and Armenia. Dunn, it may be remembered, has been sinking a new shaft, and this is now in shape for tapping the water in the mine's large open pit and in its old underground workings. A contract has been given the drilling firm of Cole & McDonald, of Duluth, and three horizontal holes are being bored from the breast of the drift in the new shaft to the old workings. These are cased solidly at the collar, and fitted with valves, so the flow of water is under absolute regulation, and it will be cared for through the new shaft. As the tapping will be about 600 ft. below the water level, air pressure will be utilized to force it to surface, and it is estimated that there will be a good head for several hundred feet of water. It will be conducted to its level in the new shaft by gravity through a large pipe running up the shaft, and will be blown from that point out of the mine. This will insure a very inexpensive manner of taking out much of the water. A 1,200-gal. Prescott pump is being installed underground. At Lamont the mine is dry and mining commenced this week. A Gates No. 8K crusher and a 1,200-gal. pump are going in here, and not very much mining can be done till they are in operation. Lamont is not a large mine, and would not probably have been bothered with but for the present sharp demand for ore.

Butte. Feb. 22.

Lucian Eaves and others have bought, on the installment plan, all of the stock held by H. L. Frank, of Butte, in the Southern Cross Mining Co., and have an option on 100,000 shares held by others. Mr. Frank's block comprised 62% of the entire issue of 400,000 shares. The Southern Cross is a gold-producing property, 40 miles west of Butte. It was located years ago, but the company could not find a process for saving the values in the ore. Mr. Eaves took hold of it about a year ago, since which time he has spent about \$50,000 in equipping it with a new mill, cyanide plant and other machinery for treating the ore. He says it will be a year before everything at the mine is running full blast. Experiments in treating the product have proved that the gold can be saved to a high percentage. He purposes first to change the character of the ore by roasting it and then cyaniding it. The company is to be reorganized.

The Watseca company has suspended work on its new mine in the Rochester district, which makes a complete shutdown of that company's operations in Montana. The district is not entirely dead, there being a number of lessees at work, but the suspension by the company has reduced its prosperity to a minimum.

With the exception of some of the mines of the United Copper Co., all of the large producers of the Butte district are yielding their customary quantity of copper-silver ore. Amalgamated is working all its mines to their full capacity and is preparing to place the Poulin in shape for production. This mine is developed to a depth of 1,200 ft., and its vein is a continuation of the large vein traversing the Mountain Consolidated, one of the largest producers of the Anaconda. Its orebodies have been held in reserve. The demand from the company smelters for ore is so great now that the management deems it advisable to prepare the Poulin for production. United Copper is buying all the ore it can get hold of on the outside, the

output of its own mines not being sufficient to keep the smelter running full blast. Its Rarus mine is yielding less ore at present than it has for years, a heavy flow of water in its lower workings being partly responsible for its crippled condition.

Leslie gulch, six miles southeast of Butte, will soon be the scene of gold mining activity. Some of those who have been holding claims there for 20 years have recently tied up the Cobban interests on a bond and announced their intention of commencing work on a scale commensurate with the supposed value of the section. Individuals have shipped considerable ore from the gulch during the last year, but the principal holders have been holding back in order to secure control of ground they desired.

The Butte Sampling Works is receiving about 2,000 tons of Butte ore per month. This ore is mined by lessees and companies operating on a small scale, some of it coming from the Alice and some the Lexington. Its last consignment consisted of two carloads of silver-gold ore from the Goldsmith mine, under lease to C. W. Ellingwood. The ore is high grade, running from 150 to 200 oz. in silver per ton.

Deadwood. Feb. 24.

The Horseshoe Mining Co. has issued, through its Pittsburg office, a report covering the operations of the company from May 1, 1904, to December 31, 1904. Considering all the points, it is a good showing for the property. The company has been to a considerable expense in mill construction and improvement and mine construction; has been operating at partial capacity, and is hardly on a first-class basis yet, but the report shows that money is being earned on the present operations, and we may hope for a continuation of, and even a decided betterment of, the situation expressed in the next report.

Without going deeply into detail, it may be said that in the eight months the total cost of mining and milling has been gradually decreased from \$2.91 in May to \$2.83 in December—a difference of eight cents per ton. The average value of the mill heads per assay was \$7.22; the May recovery, 64.4%; December recovery, 73.3%, or an increase of saving, per ton of ore, of 65 cents. Adding this to the economy practiced in mining and milling, and the increase in actual profit per ton of ore will be seen to have increased 73 cents per ton.

Mining for the year cost an average of \$1.75; milling, \$1.47. In December these figures had been lessened to \$1.58 for mining and \$1.25 for milling. The tonnage has varied from 5,483 in June to 9,088 in October. During the year the company expended on payment of old accounts \$49,278; mill construction, \$12,472; mine construction, \$8,789; mill improvement, \$3,996; mine improvements, \$2,850. During the year 1275.65 tons of smelting ore were shipped, netting \$12,817.

General Manager McLaughlin's statement shows the mine to be in excellent shape; the various properties being drawn on for a daily ore supply as follows: Ben Hur, 70 to 80 tons; Mark Twain and May Queen, 60 tons; Horseshoe, 20 to 30 tons; Hardscrabble and Welcome, 40 to 50 tons. The balance of the ore comes in varying quantities from such openings as the North Lode, Sunnyside, McDonnell No. 4 and Passaic group.

At the meeting of the Black Hills Mining Men's association, held on Feb. 15, C. W. Merrill, of the Homestake, in the course of a short discussion on the relative merits of wet and dry crushing in cyanidation, made the statement that the Home-

stake was crushing ore in the Amicus 240-stamp mill for 18 cents per ton. Considering the fineness of the finished product, this is a remarkable figure. Mr. Merrill's sizing tests gave the following results: 28% coarser than 100 mesh, 18% between 100 and 200 mesh, and 54% finer than 200 mesh. A slot screen is used, the opening being equivalent to 35 mesh. Other members of the association who took part in the discussion were Paul Danckwardt, of the Golden Reward; J. V. N. Dorr, of the Lundborg, Dorr & Wilson mill, and John Gross, superintendent of the Horseshoe mill. The association announces that it will publish these papers in full at some future time.

The rumor to the effect that Chas. M. Schwab, the former steel magnate, had become interested in the Oro Hondo company, has been substantiated. Mr. Schwab and his associates are prepared to furnish all the money necessary to exploit the Oro Hondo property for the continuation of the Homestake vein and fully equip it in case sufficient ore is blocked out to warrant such action.

Salt Lake City. Feb. 23.

At the annual meeting of the stockholders of the Mammoth Mining Co., operating in the Tintic mining district, a financial statement was submitted, showing that the receipts from all sources during the past year aggregated \$309,370, and among the items of disbursement were \$87,791 for wages, \$36,878 for supplies and \$118,537 in dividends. The report of the superintendent shows that a large amount of development work has been done during the year and that on the 2,100-ft. level a drift was run for a distance of 160 ft. into practically virgin territory—to the north of the shaft—and a raise is now being made with indications favorable to encountering a large body of ore. From the west side of the shaft a drift has been run to the northwest and has cut a 4-ft. fissure containing copper ore. Explorations conducted in other portions of the mine have been encouraging and, on the whole, they are considered satisfactory. The officers for the ensuing year will be Samuel McIntyre, president; Samuel McIntyre, Jr., vice-president, and R. M. Wilkinson, secretary. The offices of the company are in the Hooper block, Salt Lake City.

The Utah Copper Co. has completed the tunnel connecting the main workings with the shaft sunk on the All's Well vein on the opposite side of Bingham cañon. The adit runs under the cañon road to the United States and other mines in Upper Bingham cañon and is 1,800 ft. in length. The driving of the adit was important for the reason that it opens the All's Well ledge to extraction, which is an important part of the company's reserves.

A suit to quiet title to the Supreme lode has been filed against the Bingham-New Haven Mining Co., operating in Bingham.

The ore and bullion settlements reported by Salt Lake City banks during the last week aggregated \$438,000.

The copper bullion shipment from the copper smelters during the past week aggregated 943,383 lb., as follows: Utah Consolidated, 360,423 lb.; Bingham Consolidated, 300,112 lb.; United States, 282,848 pounds.

The Paymaster mine is to be equipped with smelting facilities; the plant to be located near St. George. S. L. Adams, of Provo, Utah, is manager.

Sudbury. Feb. 27.

A new company has been organized with head offices at Sault Ste. Marie, Ont., for the purpose of developing the Montague copper claim, about five miles from the village of Massey Station. The claim is about one-half mile from the Massey Station Mining Co.'s mine, at present in operation. The capitalization of the new company is \$250,000.

Recently an application was made by F. H. Clergue on behalf of the Sault industries to the Dominion government for an additional bounty of \$3 per ton on rails. His application was referred by the Dominion government to A. B. Aylsworth, for a correct interpretation of the act. The decision has been given in favor of Mr. Clergue's contention, with the result that the bounty now received by the industries at Sault Ste. Marie is \$10 per ton on steel rails instead of \$7.

The Algoma Steel Co. have purchased 10,000 tons of spiegel from Liverpool, to be used in the manufacture of pig iron at the steel rail mill; the first shipment of 5,000 tons has arrived via the Canadian Pacific railway.

The North Star nickel mine, near Sudbury, has been transferred from A. McCharles, of Sudbury, to the Monde Nickel Co., operating at Victoria mines; \$100,000 is the consideration mentioned in the transfer for the property.

On Feb. 9 the steel plant at Sault Ste. Marie made a record run, having 93 heats in 12 hours. This figures out as 922 rails, or 362 tons, equaling $5\frac{1}{8}$ miles of track. This is at the rate of 724 gross tons of rails in one day, which is much in excess of what the mill was designed for.

Notwithstanding the climatic conditions, the Canadian Copper Co., at Copper Cliff, has been amply demonstrating the value of the new plant. Several record runs have been made, which will undoubtedly be exceeded under more favorable weather conditions.

Another copper discovery has been recently made in the township of Hudson near the village of New Liskeard, Timiskaming.

Toronto. Feb. 25.

A series of experiments is being conducted at the School of Practical Science, in connection with Toronto University, by G. S. Haines, under direction of Professor Mickle, to determine the commercial value of an ammonia-nickel process devised by Mr. Haines. It is designed to be used in separating nickel from high-grade ores, with which it works best. Its special value in this province lies in the fact that when both nickel and cobalt are present in the ore—as in the lately discovered deposits at Cobalt, in the Timiskaming district—the ammonia process separates the cobalt from the nickel. As the Cobalt mine yields ore holding about 28% of nickel, the discovery if it can be put on a practical basis may have an important effect on that industry.

Sir Henry C. Wilkinson, of London, one of the principal owners of the Regina gold mine, in the Lake of the Woods district, is at Toronto. It is the intention of the owners to re-open and operate the mine, and machinery for that purpose has been ordered.

The provincial bureau of mines has received an inquiry from London as to portland cement, asking whether the Canadian product could not be shipped to England, as a combine to keep up the price of the article exists there. It is considered, however, that the price quoted of 20s. a ton would hardly pay Canadian manufacturers.

The Aberdeen mica mine, near Kingsmere, Que., an exhibit from which secured a silver medal at the Louisiana Purchase Exposition at St. Louis, has been sold at a high figure by the firm of Brown Brothers to the Laurentides Mica Company.

Clay suitable for pressed brick has been discovered at Sidney, 93 miles west of Winnipeg, Man. Samples of the clay have been made into brick by the Boyd Brick Press Co., of Chicago. As all the red ornamental brick used for building in Winnipeg is now brought from St. Louis, the discovery is regarded as one of importance to the building trade.

An oil well was shot on Feb. 22 on the Sam Jackson farm, near Leamington, Ont., which flowed 350 bbl. for the first 15 hours. This well lies 100 yards south from the Leamington Oil Co.'s lands. An oil refinery will shortly be located in this district, as the permanency of the yield appears assured.

The Dunbar Fire Brick Co., of Dunbar, Pa., has commenced an action here against the Crow's Nest Pass Coal Co., claiming \$5,000 on an account for fire brick and fire clay.

F. H. Clergue, of Sault Ste. Marie, was in Toronto on Feb. 22, en route to New York. He stated that work would be started in the spring on the construction of the Algoma Central railroad to a junction with the Canadian Pacific. One hundred miles of the road are already graded and railed and 125 miles more graded ready for the rails.

Frederic Nicholls, of Toronto, vice-president of the Dominion Iron & Steel Co., attempted last week to visit the works at Sydney, but was stalled for three days at Truro, N. S., by the snow blockade and had to return. He states that the snow has delayed on the road much of the machinery intended for the company's rail-mill and interfered greatly with their shipments. Otherwise the outlook is highly favorable and heavy orders for rails have been received. Mr. Plummer, the manager, whose protracted illness caused some anxiety, is rapidly recovering.

Victoria. Feb. 22.

An attempt made by a prominent Socialist member of the provincial legislature to obtain the passage through the House of a bill designated The Labor Regulation Act, 1905, failed to-day, the bill having been defeated, on its second reading, by a vote of 25 to 12. The two chief sections were to the effect that no person shall be employed in or about any smelter, sorting, handling, removing or smelting ores or matte in any stage of preparation, for a longer period than eight hours in any 24 hours, such 24 hours, for the purpose of this act, meaning from midnight to midnight, and that any owner, agent or manager, or anyone acting on their behalf, employing any workman or person in contravention of this act, shall be liable to a penalty not exceeding \$100, nor less than \$20, for each workman or person so employed, and any workman or person so working for a longer period than specified in the foregoing section of this act shall be liable to similar penalties.

There was general opposition among smelter managers, and many mine managers as well, the latter knowing that if the act were passed and the smelters compelled to pay a similar daily wage for eight hours to that they now pay for 12, smelting rates would be increased accordingly. A significant occurrence in connection with the agitation this pro-

posed legislation has aroused was a mass meeting, held last night at Trail, where are the Canadian Smelting Works and lead refinery, the most important metallurgical works in British Columbia. All the smelter employees who could do so attended the meeting and voted unanimously against the proposal, notwithstanding a recent announcement made by the secretary of the miners' union at Nelson, B. C., that if the bill were rejected the smelter men would strike. The large Boundary mining and smelting companies, which, under present conditions, have only a small margin of profit, had plainly intimated that if the bill were passed they would close their mines and smelters until its repeal had been secured.

Rossland and Nelson branches of the Provincial Mining Association lately passed resolutions along similar lines to the proposal of the Associated Silver-Lead Mines of British Columbia, in effect that the provincial government be urged to appoint a commission to inquire into the incidence of the two per cent mineral tax, which has long been objected to by certain of the mining sections of the province. This matter will shortly be formally brought to the attention of the government, with the object of obtaining the appointment of such a commission.

The executive committee of the Provincial Mining Association has been sitting in Victoria the last three days, and closes its sessions Feb. 22. Among many matters dealt with, that of the intended visit to British Columbia of the American Institute of Mining Engineers next July was considered, and it was decided to hold the third annual convention of the Mining Association in Vancouver City at the end of July, just about the time the visiting mining engineers may be expected to return from Alaska, whence they purpose going after holding their business sessions in Victoria.

Monterey. Feb. 21.

The deal for the transfer of La Luz properties, in Guanajuato, from John W. Wiley, who holds the title, to a New York and New Jersey syndicate has been indefinitely postponed, because of some disagreement between the two parties. Examinations were made and samples taken by G. I. Troop, the mining engineer for the Eastern people, and it was believed that the transfer was assured. It was for a while promoted by E. L. Dwyer, and was afterwards turned over to John W. Wiley, who has the concession for the Intercontinental Railway Syndicate, to erect a 200-ton smelter in the States of Guanajuato or Jalisco. It is not believed that the deal has fallen through finally, however, for J. J. Gosper has had additional samples taken, which he will carry with him on his return to Los Angeles, and if they are satisfactory, will continue his efforts to close the transaction.

There is no abatement in the work of the Guanajuato Reduction & Mines Co., which owns the Valenciana, Cata and surrounding properties, and C. W. Van Law, the general manager, is now in the States placing the orders for the cyanide mill and other machinery. It is expected that he will return to Guanajuato next month with Charles L. Kurtz, the president of the company. In the meantime a little mining is being done to hold the men and to keep the mines open and in condition. Another recent deal in Guanajuato is the transfer of the Peregrina from Wm. McCord to Messrs. Bryant and McIlheney

for \$480,000 (Mexican). C. H. Gibson, formerly with the Buena Vista mines, of Tepic, will be manager. Messrs. Bryant and McIlheney have also obtained an extension of their concession for the dredging in Guanajuato river. Mr. D. V. A. Williams, a mining engineer of Mexico City, is endeavoring to organize a \$200,000 (gold) company for the erection and running of a 100-ton cyanide mill at Marfil, near Guanajuato, to treat the old dumps and low-grade ores of the district.

At Velardeña, in Durango, the American Smelting & Refining Co. has practically closed the mines, cutting the force of Americans from about fifty to four, pending the construction of the smelter, in order that there should not be such an accumulation of ores on hand, and also that there may be plenty of labor for rushing the construction of the smelter. The finishing touches to the matte plant of the American-Mexico Mining & Development Co., at San Lorenzo, just out of Velardeña, are being made. W. H. Van Dusen, manager of the Vacas mines, between Nombre de Dios and La Parrilla, is preparing to reopen them after about eighteen months of idleness.

London. Feb. 18.

We hear a good deal about the unfortunate Smelting & Refining Co. of Australia nowadays. A month ago I mentioned that the finances were in a bad way, and that the directors were at a loss to know how to raise further capital. This week the past history of the company has been raked up in the law courts in an action by certain shareholders against two of the directors for damages for "alleged misrepresentation and conspiracy, by means of which they were induced to subscribe for preference shares in the company, and sustained a serious loss in consequence." As your readers will remember, two years ago the directors announced that certain unnamed people had entered into a big contract with the company, by means of which large supplies of ore were to be obtained and the dividends guaranteed. On the strength of this announcement additional capital was raised, and the market quotation of the shares went up with a bound. It turned out afterwards that the agreement was never consummated, and that the unknown parties had backed out. The plaintiffs alleged that this big contract was a sham from beginning to end, and that it was talked about with no other object than to help to launch the new issue of shares. They claimed that the directors were responsible for the loss of capital sustained by those shareholders who were induced to go in at the time. The action promised to be an exceedingly interesting one, for all the leading company lawyers were in the case, and it was natural to expect many side lights on company finance to be exhibited. The case, however, came to a sudden termination, owing to the fact being conclusively shown that the two directors in question had lost just as much money over the transaction as had the plaintiffs. Under the circumstances, it was impossible to prove conspiracy or fraud; the directors had obviously believed in the parties who came forward with the grand proposition. Curiosity to know more of the mysterious contract and the status of the contractors was balked by this sudden collapse of the case.

The first annual report of the reconstructed Exploration Co. shows that the business is progressing steadily, if slowly. Some of the holdings in South African

gold mines have been realized, but the bulk of the profits has been in the form of income from real estate in Johannesburg and from various gold mines, such as El Oro. The two chief items of new business undertaken during the year have been the flotation of the Mexico mines of El Oro, Ltd., a property adjoining El Oro and Esperanza, and the examination of new copper properties in Chile, both of which have been already referred to in this column. The net profits during the year amounted to £30,000, which was not sufficient to pay any notable dividend on the capital of \$750,000, so it has been carried forward in order to strengthen the financial resources of the company. In these days of depression of the mining market it is desirable to proceed cautiously. The shareholders may wonder that no dividend is distributed now, but they cannot fail to endorse the policy of the board.

Sydney Jan. 23.

The quantity of ore treated by the Mount Lyell company (Tasmania) during the four weeks ended January 4 was slightly below the average of previous terms and amounted to 30,500 tons. The metal produced was, copper, 566 tons; silver, 52,646 oz., and gold, 1,839 oz. The return from the Mount Lyell blocks during the same period was 57 tons of copper.

The coal exported from New South Wales during 1904 amounted to 2,951,301 tons, being a decrease of 468,896 tons in the quantity exported during the previous year, the shipments to the United States showing a falling off of 132,000 tons.

Interest is at present centered in a strike which has occurred at the coal mines working on the Borehole seam, at Newcastle, N. S. W., and involving about half the collieries of the district. In previous letters I have stated that the arbitration court had upheld the action of the northern colliery employers in reducing the declared selling price of best coal from 10s. to 9s. a ton. The rate of pay is governed by the selling price of coal, and the miners and all employees were thus bound to accept a reduction of 10% on previous rates of pay. The miners professed to submit to the decision, but the wheelers, who number some 300, and comprise youths mainly, refused to agree to any reduction and came out on strike. As the miners refused to do their own wheeling, the collieries had to lie idle, and some 4,000 men are out. The fact that 300 youths can thus be permitted to disorganize trade and keep some 4,000 men out of employment is regarded with much concern. It is contended that the miners are but using the wheelers as a cat's-paw, knowing that if they openly engaged in a strike the funds of their unions would be jeopardized. Color is lent to this view by the fact that, notwithstanding that the arbitration court advised the miners to do their own wheeling pending a settlement of the dispute, they have refused to do so. The strike has put the Arbitration and Conciliation Act to a crucial test, with the result that it has been proved that it utterly fails in its objects, which are to prevent and prohibit strikes and industrial disputes. The government has finally instituted proceedings in terms of the act against some thirty of the prominent strikers, but this has in no way acted as a deterrent to the others. If this action has no moral effect on the majority of the strikers, the futility of proceeding against another batch is apparent. The harshness and inequity of the law as it stands are emphasized by

the fact that it compels the employer to abide by the conditions which the court may lay down, while in effect leaving it optional to the employees to maintain their side of the bargain only so long as it suits them to do so. In these circumstances it is not to be wondered at that the owners have taken a united stand, and are determined not to concede the demands which the men have made.

Johannesburg. Jan. 30.

There was great excitement in town last week over the phenomenal find at the Premier diamond mine of the largest diamond ever seen by man, weighing 3,032 carats and of good quality. One reason, no doubt, of the public jubilation over the wonderful stone lies in the fact that the government owns the larger part of the diamond, only four-tenths of its value going to the company. The day following the discovery of this monster, a fine, blue-white octahedron, weighing 120 carats and worth £10,000, was found.

All the other great diamonds pale before this newly found gem, as far as size is concerned, the "Excelsior," of Jagersfontein, the previous world's record, being one-third the size of the stone at the Premier mine. The question naturally arises as to the value of it. People here, who think they know all about it, declare that the stone is worth anything from £300,000 to £500,000. The fact of the matter is that the diamond is only worth what some one is willing to pay for it. It is doubtful whether there is a multi-millionaire living who would be foolish enough to pay such an enormous sum for a single diamond. A syndicate of foolish men might be formed to buy the stone, but it is more probable that they would want to start a diamond mine of their own, if such a sum were collected. Like the huge Jagersfontein diamond, it is highly probable that this Premier diamond will lie in a strong-room in the future. No one has yet been found, not even a wealthy Jew, who will give the price asked for the Jagersfontein diamond. It will be no easy task to get rid of this, the largest diamond in the world.

This find has added enormously to the popularity and prestige of this wonderful mine, and has, of course, sent the shares "sky high." There is no more fascinating mining story in the world than that of the Premier diamond mine, which has mounted like a huge, dazzling meteor. The most extraordinary thing about it is that it has arisen in spite of the skepticism of the great mining firms, like De Beers Consolidated, Consolidated Gold Fields of South Africa, etc., and has brought fame and fortune to men who were rather poor and unknown. One cannot help wondering what the final outcome will be, and what will happen if another Premier mine is found somewhere. The diamond industry is built on no sure foundation.

No trouble is expected during the Chinese holidays, which begin on Feb. 3. We are hoping that the celestials will be content with two days, Saturday and Sunday, and that they will go back to work Monday morning. These two days will make a big hole in the running time of the mills during February. Some of the small mines with 60 stamps will be able to pile up stuff and run through, but the mills with 120 stamps and more will be forced to close down for two or three days. On some mines elaborate preparations are being made by the Chinese to have a very enjoyable time in their fashion, during their New Year holidays.

Personal.

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

Mr. C. J. Alford is in Egypt.
 Mr. W. H. Kinnon is in Nevada.
 Mr. D. P. Rohlfing is in Chicago.
 Mr. T. A. Rickard has returned from London.
 Mr. O. A. Fairchild, of Chicago, is on the Pacific Coast.
 Mr. P. Kirkegaard returned from London on the *Baltic*.
 Mr. Arthur Pearce has returned to New York from Bolivia.
 Mr. Arthur L. Pearce has returned to London from Chile.
 Mr. Samuel Newhouse, of Salt Lake City, is in New York.
 Mr. Chas. M. Rolker has returned to London from Rhodesia.
 Mr. W. R. Feldtmann leaves London for Ashanti on March 4.
 Mr. F. H. Dixon has returned to England from the Argentine.
 Mr. Harold J. Read, of Wallace, Idaho, is visiting New York.
 Mr. Robert Brewster Stanton is making examinations in California.
 Mr. Theodore Tobish is making examinations at Goldfield, Nevada.
 Mr. R. W. Macfarlane passed through New York on his way to Mexico.
 Mr. Hennen Jennings has left London to take up residence at Washington.
 Mr. N. C. Bonnevie has returned to Denver from a month's visit in the East.
 Mr. Thomas E. Brown is making examinations in the State of Durango, Mexico.
 Mr. Norval T. Welsh is in the State of Chihuahua, Mex., on professional business.
 Mr. Marshall D. Draper is superintendent of the Tonopah Club mine in Nevada.
 Mr. E. L. Ish is superintendent for the Jarillas Mining Co. in Santa Cruz county, Arizona.
 Mr. A. G. Charleton, of London, who has been ill, is again able to attend to business.
 Mr. C. H. Gibson has been appointed manager of the Peregrina mine at Guanajuato, Mexico.
 Mr. J. A. Czizek, manager of the Lost Packer mine, Utah, has returned from a trip to Montana.
 Mr. George S. Waterlow and Mr. A. J. McMillan passed through New York on their way to Rosslund.
 Mr. Thomas G. Blackstock, of Toronto, returned from England on the *Baltic*, arriving on February 24.
 Mr. F. B. Whitmore has been appointed superintendent of the Columbus Consolidated mill at Alta, Utah.
 Mr. G. H. Stanley has been appointed professor of metallurgy to the Technical Institute, at Johannesburg.
 Mr. Hugh G. Elwes has been examining low-grade silver ore mines in the State of Zacatecas, Mexico.
 Mr. P. G. Lidner is examining mining prospects at Guanajuato, Mexico. He will be absent about two months.
 Mr. Thos. H. Leggett sailed by the *Kronprinz Wilhelm*, which arrived at Southampton on February 27.

Mr. R. W. Foster, superintendent for the Sevier Consolidated Company, at Gold Mountain, Utah, is seriously ill.

Mr. Robert H. Richards has recently made a visit to Pennsylvania looking up the matter of bituminous coal washing.

Mr. Francis A. Thomson is superintending the construction of the mill for the Western Reduction Co., at Goldfield, Nevada.

Mr. C. E. McHugh, general manager for the Homestake Extension Mining Co., has returned to Deadwood from New York.

Mr. C. W. Van Law, general manager for the Guanajuato Reduction & Mines Co., of Guanajuato, Mexico, is now in this country.

Mr. H. Nestor-Schnurmann leaves England this month to take a position with the Mazapil Copper Co., Saltillo, Coahuila, Mexico.

Mr. S. E. Bretherton has resigned as smelter manager and metallurgist for the Bradshaw Mountain Copper Mining Co., of Arizona.

Mr. George W. Jennings has been appointed manager of the iron mines and manufacturing plant at Ferreira de Tula, Jalisco, Mexico.

Mr. J. P. Casey has been making a tour of inspection of the properties of the Greene Consolidated Copper Co. in the State of Chihuahua, Mexico.

Mr. Sydney Fawns is proceeding to Devonshire, England, to open up copper and arsenic properties near the once famous Devon Great Consols mine.

Mr. Frederick Hobart, associate editor of THE ENGINEERING AND MINING JOURNAL, is attending the annual meeting of the Canadian Mining Institute, at Montreal, Canada.

Mr. C. H. Fulton has been chosen president of the South Dakota School of Mines, at Rapid, to succeed Mr. R. L. Stagle, who is now president of the State Agricultural College.

Mr. Homer C. Bosworth, for several years manager for the Denver Fire Clay Co., has been made a member of the firm of Hoffman & Pinther, and the style is now Hoffman, Pinther & Bosworth.

Mr. George Hardy, formerly superintendent for the Philadelphia Mining and Milling Co., at Andrews, N. M., has been appointed consulting engineer to the Carnegie Copper Co., with headquarters at Carnegie, Pa.

Messrs. Thos. F. Chalmers and Ralph Sprado, of the firm of Chalmers & Williams, Chicago, are leaving on an extended trip through Mexico, Arizona, and the surrounding territory. Mr. Sprado is consulting engineer for the firm.

Mr. Chas. W. Cross, formerly of the Roberts & Abbott Co., consulting engineers, of Cleveland, O., and later electrical engineer for the Eastern Ohio Traction Co., has entered the employ of Crocker-Wheeler Co., of Ampere, N. J., and is attached to the Cleveland office of the company at 816 New England Building.

Messrs. J. H. Devereux, George L. Smith, and A. B. Mason are surveying a route for an electrical power transmission line from Cananea to the junction of the Arros and Bavaspe rivers, Mexico, where the Cananea Consolidated Copper Co. purposes to erect an 80,000-horsepower hydro-electric power plant. The line will be about 150 miles in length.

Obituary.

Edward Cooper, a former mayor of New York City and a son of Peter Cooper, the philanthropist and founder of Cooper Union, died in New York on Feb. 25, from apoplexy, aged 81 years. Under his management the Trenton Iron Works, the Trenton Iron Co., the Pequest furnace, in Oxford, N. J., and the Dunham Iron Works, at Riegelsville, Pa., increased their production. Mr. Cooper was a director of the American Sulphur Co., the New Jersey Steel & Iron Co. and the Chrysolite Silver Mining Company.

James L. Crawford, president and chief owner of the Peoples' Coal Co., of Scranton, Pa., died suddenly of heart disease, Feb. 17, aged 54 years, at Indian River, Florida. Mr. Crawford began life in a coal breaker. He was remarkable for his strong individuality and philanthropic sympathy. His first official position was with the Wyoming Valley Coal Co., ultimately becoming its civil engineer. In 1884 he moved into the Lackawanna valley and became identified with the collieries of Simpson & Watkins. He had charge of opening and developing the following mines: Edgerton, North West, Grasse Island, Babylon, Mount Look Out, Forty-fourth and Harry E. In 1901 he purchased the Peoples' Coal Co., of which he held nearly all the stock.

Societies and Technical Schools.

Virginia Polytechnic Institute.—Science Hall, a large, five-story brick building at this institution, at Blacksburg, Va., was burned, on Feb. 23, causing a loss of \$100,000. The fire started in the chemical laboratory. The cadet fire brigade fought the fire with six streams of water and saved a considerable amount of the apparatus, but in a damaged condition.

Trade Catalogues.

A. C. Stalknecht, of Saginaw, Mich., has prepared a unique notice of the U. S. A. cable grease, in the form of a cable message.

The A. Wyckoff & Son Co., of Elmira, N. Y., is sending out an announcement of the fact that 1905 is the 50th anniversary of the founding of the company.

Riehle Bros. Testing Machine Co., Inc., of Philadelphia, Pa., has issued supplementary sheets for Catalogue A, describing the Riehle U. S. standard testing machines.

C. W. Thomas, successor to the Michigan Brass & Iron Works, of Detroit, Mich., has issued Catalogue A, an illustrated price-list of brass products, including gates, radiator valves and union elbows.

Catalogue No. 28, of the H. W. Caldwell & Son Co., of Chicago, Ill., is an impressive cloth-bound volume of 736 pages. It contains detailed descriptions, illustrations and price-lists of this company's well-known productions.

A catalogue of the Westcott's patent lathe chucks and Little Giant drill chucks, manufactured by the Westcott Chuck Co., of Oneida, N. Y., has been prepared by that company. It is provided with illustrations and convenient price lists.

The bottom-dumping buckets, made by the Cyclopean Iron Works, of Jersey City, N. J., are described in a tasteful and comprehensive catalogue, which contains also several well-executed illustra-

tions of the plant and manufactured products.

The Starr Electric Fuse Works, of Wilkes-Barre, Pa., which received a silver medal at the World's Fair, has issued a little booklet entitled 'Blasting by Electricity,' in which are described their types of blasting with electric fuse, and other instruments and materials.

The Redwood Manufacturers' Co., of San Francisco, Cal., manufacturers of cyanide plants for hyposulphite lixiviation, copper leaching and chlorination, has prepared a comprehensive catalogue of its products. It contains an essay on the cyanide process by R. Stuart Browne.

Bulletin No. 1,061, issued by the Fort Wayne Electric Works, of Fort Wayne, Ind., manufacturers of the "Wood" systems, describes and illustrates the multi-phase induction integrating type K wattmeters. The company issues also a convenient index to its bulletins 1,001 to 1,061.

The digging machinery catalogue of the Haywood Co., of New York, is an unusually creditable production. It contains excellent reproductions of many of the company's dredges and half-tone illustrations of the dredges in operation. The text is on a level with the excellence of the illustrations.

The Harrisburg Foundry & Machine Works, of Harrisburg, Pa., has issued a leaflet entitled 'Fleming-Harrisburg Engine at the International Exposition, St. Louis, Mo.' This publication is a reproduction of an article published in the *Engineer*, of London, and describes the design, construction and performance of one of this company's latest productions in its No. 4 valve compound type.

Industrial.

The newly organized Russian Sakhalin Oil Co., of Charkoff, Russia, will require for its oil properties, on the island of Sakhalin, drills, drilling rigs, tools and necessary machinery.

The advertisement of the Ingersoll-Sergent Drill Co., which appears in this issue of the *JOURNAL*, is the first choice in an advertising contest recently conducted by the publication department of that company.

The Canadian Metal Co., Ltd., at Frank, Alberta, Canada, will be pleased to receive prices on castings and machinery suitable for a zinc-smelting plant to be built at Frank, Alberta, Canada, from firms in Pittsburg, Pa., and Chicago, Ill.

The Nordberg Manufacturing Co., of Milwaukee, announces that it has opened a New York office at 42 Broadway, in charge of F. W. O'Neil, mechanical and mining engineer, who will be glad to furnish any information concerning heavy mining machinery, air compressors, Corliss engines and pumping machinery.

The Laclede Fire Brick Co., St. Louis, has installed in its plant a complete laboratory, which is in charge of A. J. Aubrey, a graduate of the School of Mines, Ohio State University, Columbus. This company manufactures fire brick, cupola blocks, tiles, sewer and culvert pipe, etc., and analyzes all the raw materials entering into the manufacture of its products.

The Westinghouse Electric & Manufacturing Co. has closed a contract with the United Railways & Electric Co., of Baltimore, Md., for an alternating current generator, to be rated at 5,000 kw. It will be of the flywheel type, with 32 poles, and

will run at 94 r.p.m. The generator will be wound for 13,000 volts, three-phase, with a frequency of 25 cycles. The 5,000-kw. generator now on order is to have the same characteristics and to run in parallel with the five 2,000-kw. generators, which the Westinghouse company has just finished installing in the Pratt street station in Baltimore.

The Northern Electrical Manufacturing Company, of Madison, Wis., has found extensive sale for its single voltage, two-wire, variable-speed motors in all lines of industrial work. The field of the variable-speed motor is primarily the machine shop, as no other line of work calls for so many individual machines. However, Northern variable-speed motors are used in all kinds of industries for operating pumps, for boiler feed, circulation, etc., ventilating and blowing fans, elevators, hoists, conveyors, etc. An extensive field for Northern variable-speed motors has been found in the cement industry, where variable-speed drive is especially advantageous.

The A. S. Cameron Steam Pump Works, New York city, have entered another order from the Girls' Industrial Home of Ohio for the delivery of a regular horizontal piston pump, having the water ends made entirely of acid metal. This pump is for delivery at the institution, located at Hyatts, O., where it is required for station duty in pumping sulphur water to the surrounding cottages. Mr. Layton, the engineer for the above institution, writes: "We have one of your make of pumps which has been doing service for about 23 years." The transfer of the A. S. Cameron Steam Pump Works' agency at Birmingham, Ala., to the Crane Co. was made on account of the sale of the Milner & Kettig Co.'s stock to their successors, the Crane Co. W. H. Kettig, formerly president of the Milner & Kettig Co., is local manager for the Crane Co. The Crane Co. have already taken over the stock of the Cameron pumps, which will enable them to supply the trade in their vicinity. Through their agents, the Miller Supply Co., of Huntington, W. Va., the A. S. Cameron Steam Pump Works are in receipt of an order for a 5 x 12 power-driven pump, to be used for the water supply of the Crescent Glass Co., of Weston, W. Va. The pump is composition fitted and will have a capacity of 150,000 gal. per day at ordinary speed.

Owing to the greatly increased traffic on the interurban railway system of the Los Angeles-Pacific Railroad Co., the officers of that company have decided to increase the capacity of their central power house at Vineyard, and to install an additional sub-station in Los Angeles. The new electrical equipment has recently been contracted for with the Crocker-Wheeler Co., through its Pacific coast managers, the Abner Doble Co., of San Francisco. The contract comprises one 1,200-kw., three-phase, 50-cycle, 2,300-volt, engine-type generator, with a speed of 125 r.p.m.; one 300-kw. motor-generator set; one 400-kw. motor-generator set, three 400-kw. transformers, three 160-kw. transformers, three 120-kw. transformers and a 60-kw. engine-type exciter. The 1,200-kw. alternator will be of the Crocker-Wheeler Co.'s new revolving-field type, similar in construction to the three 4,000-kw. alternators recently ordered by the California Gas & Electric Corporation. The Los Angeles generator will be driven by a 2,000-h.p. compound-condensing McIntosh & Seymour engine. The motor-generator sets will consist of 2,300-volt synchronous motors, driving 600-volt direct-current railway generators.

General Mining News.

ARIZONA.

COCHISE COUNTY.

Paradise.—At the Cochise Consolidated Copper Co.'s property work is progressing rapidly. Good headway is being made in the adit to tap the zinc vein. The company is arranging for machinery, which will be installed as soon as possible.

At the Mayflower group work is going ahead in the adit to cut the vein at a depth of about 300 ft.

At the Hans Brothers' property, near the west end of the district and pretty well up toward the top of the mountain, development is going on steadily. A fine galena ore is being produced. Samples run 63% lead and carry some gold and silver, with traces of copper. From the north vein some high-grade copper, of mixed carbonate and sulphide, is found.

The Oregon group property has been leased and bonded to Tombstone parties, who have started an adit to cut the ledge under the old shaft. It will give a depth of 175 ft. There is some high-grade copper carbonate in the shaft. The last assays from an average of the vein gave 14% copper, 10 oz. in silver, \$3 in gold and 8% lead. They will begin shipping the ore as soon as they complete their connections.

Roe, Gill and Epply, owners of 24 claims adjoining the Savage mine on the southeast, have sold under bond and lease the entire group to Wm. H. Pratt and associates, of San Francisco, who have made the first cash payment, and will begin development work at the earliest moment.

CALIFORNIA.

CALAVERAS COUNTY.

Chapman.—Walter Doe and Charles Davis have put up a mill in this mine at Railroad Flat.

O'Connell Gold Mining Co.—This property, adjoining the San Andreas Gold Channel mine near San Andreas, is to be developed by the company.

Ranch Mining Co.—R. B. Stanford, of this company, has interested New York capital in the opening up of the Woodside mine at Table mountain.

"49."—This mine at Douglas Flat has been leased to a company who have put W. Moyle, of Vallecito, in charge of the underground work. Arrangements have been made to pay the outstanding indebtedness.

ELDORADO COUNTY.

Gopher-Boulder.—This property at Kelsey will shortly put on a force of men under Superintendent John Sipp.

Lost Chance.—Operations on these quarries at Slatington are to be prosecuted on a much larger scale than heretofore. Contracts have been let to clear a large tract of land to the north of the pit through which the main slater belt is known to pass.

Witmer & Fuller.—The E. E. Witmer mine at Clay Hill, which is opened by a tunnel and has a mill, has been bonded by Thomas Clark, of the River Hill Mining Co., who will give it a deeper development.

HUMBOLDT COUNTY.

Blazed Trail.—The tunnel on this property is now in over 300 ft., and it is estimated 65 ft. more will reach the ledge. They have passed through several narrow streaks of granulated quartz giving assays running into the hundreds.

Bonanza and Fernleaf.—These properties are under bond to some San Francisco

parties for \$20,000, and development work is being pushed under their direction. Little & Doney are working meanwhile opening their adjoining locations.

Le Peron.—This copper mine, at Red Cap, has been opened up by extending the tunnel this winter, and now shows more promisingly than ever before. The ledge runs generally 25 to 33%.

Orleans Bar Gold Mining Co.—This company is opening up the north and east sides of its property with an extension of ditches and flumes to Bacon flat and the river; a large reservoir will be put in service, and a pressure of about 400 ft. used on the lower flat, where a 1,000-ft. bed rock cut is being run to the river. One mile of 15-in. No. 14 pipe is being constructed at present, and will be put in as soon as trails are open. Work on the west side is now in the third year; the average of ground moved is over an acre per month. Both saw-mills have been run all winter, and every preparation made to operate the property to its fullest water capacity. H. DeC. Richards is the manager.

Pioneer.—The Las Perlas company has been shut down for the last 90 days, but will open up with the trails, it is said. Too much gophering seems to be the trouble at Pioneer.

Starritt & Strauss.—This ledge of free milling quartz is attracting more attention than any late discovery in this section. It is strong outcropping, and the quartz from the tunnel assays from \$50 to \$250 per ton.

Tip-Top and Humboldt Discovery.—These claims are being opened by a new tunnel that will cut the ledge in less than 200 ft. and give about 800 ft. of backs.

INYO COUNTY.

Bishop Creek Gold Co.—Work will be resumed in these mines at Bishop creek as soon as weather permits. The snow is at present quite heavy in the mountains.

Mount Whitney.—In these mines near Lone Pine a body of rich ore has recently been uncovered.

MONO COUNTY.

Masonic District.—The Field of Gold Mining Co., owning the Jump-Up-Joe claim at Masonic, is about to commence work on a power plant on Walker river to transmit electric power to this district and Bodie. Operations will be started at once. This same company owns the Syndicate group at Bodie, which has of late been worked by lessees, but the company is now to work the mines on its own account.

MONTEREY COUNTY.

Los Burros Camp.—The Spruce Creek & Gold Ridge Mining Co. has been organized in San Francisco to work quartz properties at this camp. John T. Taylor has bonded the New Era quartz mine from James Krenkel.

NEVADA COUNTY.

California-Grass Valley Gold Mining Co.—This company has decided to take over the Chicago mine at Gold Flat, and operations are to be pushed at once under superintendence of Wm. P. Martin.

Mountaineer.—This mine at Nevada City, J. C. Campbell, superintendent, is employing 35 men and running its 10-stamp mill night and day on ore of good quality. The drain tunnel is now over 2,000 ft. and is being driven ahead at a good rate.

PLACER COUNTY.

Alameda.—A contract has been let to extend the tunnel of this mine at Black

Cafion. The mine has been closed since October, 1903. It is equipped with a 20-stamp mill, concentrators, etc. The mine will be started up to full capacity in the spring.

Mars.—This mine at Italian Bar, Thos. Wolford, superintendent, has its 3-stamp mill completed and ready to run.

X-Ray.—This mine at Sailor Canyon has been bonded to G. E. Ward at Santa Cruz, who has set men at work driving a tunnel to tap the gravel channel.

PLUMAS COUNTY.

New York.—At this mine near Greenville, Burleigh drills have been started and the mill is now running after several months of idleness.

SHASTA COUNTY.

Morrison & Carlock.—At this mine, Quartz valley, 45 men are now employed; and the mill is crushing about 600 tons of ore per month.

SONOMA COUNTY.

Culver-Baer Quicksilver.—The new machinery recently installed at this property, Pine Flat, is about ready for use.

TUOLUMNE COUNTY.

Banner.—This mine, near Big Oak Flat, has been purchased from Louis Farr by E. A. Langford and R. J. Walton, of San Rafael.

Bourbon.—A shoot of rich ore is reported in this mine on Knights creek.

Clio.—In this property crosscutting is going on, and the mill is being overhauled preparatory to being started up.

Columbia Gravel Co.—As soon as a lot of new pipe is put in place on this claim at Columbia, operations will commence.

Eagle Bluff.—A contract has been let for deepening the shaft of this mine, and drifting and crosscutting will be commenced.

New Calico Gold Mining Co.—Joseph Lucio has transferred the Calico claim, near Stent, to this company, and it will at once be developed.

COLORADO.

BOULDER COUNTY.

Boulder Gorge Mining, Milling & Power Co.—This company has taken over the holdings of George Teal, embracing a large acreage on the Livingstone gold dyke in the Sugar Loaf district, and they have commenced the work of sinking a deep shaft and intend to install additional machinery. The property adjoins the famous Potato Patch ore shoot, out of which over \$100,000 has been taken out within the past two years, the ores being among the richest in the history of that section. G. W. Teal, of Boulder, is consulting engineer for the Boulder Gorge Company.

Holmes Ore Co.—Boulder parties have incorporated this company for the purpose of purchasing Boulder county ores, and they are erecting a building for sampling works in Boulder. The officers are: President, L. R. Johnson; manager and treasurer, H. B. Holmes; secretary, F. G. Folsom.

CLEAR CREEK COUNTY.

Independent Sampling Works.—New crushers and rolls have been installed at the plant in Idaho Springs, which handles ores for the Independent Smelting & Refining Co., of Golden, and electric power has been installed for operating purposes. J. H. Kemp, Idaho Springs, is manager.

Little Mattie.—A 10-ton shipment as a test lot from a drift on the Pike lease re-

turned values of \$100 per ton. The pay streak is 18 in. wide. Heavy shipments will follow.

Seaton.—This property on Seaton mountain has been started up since the beginning of the year with H. E. Machol, Idaho Springs, as manager, and is being worked entirely under leasing conditions. Both milling and smelting ores are being taken out, some of the latter going up to \$100 per ton.

Signal Mines Co.—This company is operating the Helen tunnel in Virginia cañon and is making preparations for installation of hoisting plant. The company is opening up good ore both in tunnel and shaft. J. M. Marsh, Idaho Springs, is manager.

GILPIN COUNTY.

Bonnie Belle.—It is reported that a one-half interest in this property on Colorado hill, in the Pine creek district, has been sold to Chicago parties for \$15,000 cash. M. Stedman and others, of Apex, are the owners.

Cashier Gold Mining & Reduction Co.—A shipment from the 600 east level gave net returns of \$253 per ton, and a shipment from the 500 east level gave net returns of \$296 per ton. The property, operated entirely on the leasing system, paid out \$10,000 in dividends in 1904. B. L. Campbell, Central City, is superintendent.

Castle Rock.—A one-half interest has been sold by California to Denver parties for the consideration of \$3,000, and it is reported that this property, in Chase gulch, is to be re-operated at an early date.

Cyrene.—Kansas City, Mo., parties are organizing a company to operate this group, in the Pine and Wisconsin districts. The main shaft is down 165 ft., has been a shipper of \$60 smelting ores, but has been idle for several years on account of differences between owners. It is equipped with plant of machinery and liberal developments are planned, with L. J. Mountz, Apex, in charge of operations.

Evergreen Gold & Copper Mining Co.—Returns from a carload shipment to Argo smelters show values of 31% copper, 24 oz. silver and 11-100 oz. gold, or net value of \$86 per ton, the second class ores running 15% copper, or net value of \$38 per ton. The property is in Pine district, and J. L. Walters, Apex, is manager.

Mackey.—Returns from a carload shipment of first-class ore gave returns of eight ounces gold, 14 oz. silver, and nearly 15% copper, or a value of \$207 to the ton, at Argo smelter. The property is operated by the Imperial Mining & Milling Co., with L. J. Mountz, Apex, manager.

Old Tom Consolidated Mining Co.—Another dividend of one-half cent per share amounting to \$15,000 was paid to the stockholders on Feb. 10. This company operates the Old Town property in Russell district, employing 50 men, and shipping about 100 tons per day, largely of the concentrating product. G. K. Kimball, Jr., Idaho Springs, is manager. They have recently installed an electric pump, which is saving them \$500 per month.

Prompt Pay.—Eastern and Denver parties are going to start up this property, after an idleness of about two or three years, it being formerly worked under lease by local parties, who took out smelting ores running as high as 12 oz. gold per ton, with milling ores ranging to six and seven ounces gold per cord. Denver parties are owners.

Russell No. 4.—Craze & Co. shipped surface ores from this claim in Russell district, giving net values of \$85 to the ton, and a steam plant of machinery will be installed at an early date.

Town Topics Gold Mining Co.—A strike in sinking a winze below the west 555-ft. level in East Nottaway mine shows 6 in. of smelting ores, averaging from 15 to 20 oz. gold per ton, alongside of which there is a 4-ft. crevice of milling ores. A lessee shipped ores from the 420 west level which showed values of 22.07 oz. gold, 4.45 oz. silver, or \$425.96 net per ton. The property is successfully worked on the leasing system and has paid out over \$50,000 in dividends. T. G. Martin, Central City, is superintendent.

Wilkes-Barre Mining & Milling Co.—This company has taken a two years' lease and bond in the sum of \$11,000 on the Alva Adams, Baldwin and West Baldwin claims, Russell district, from Mrs. C. Sutton, Central City.

JEFFERSON COUNTY.

Mikado Mining & Milling Co.—Eastern parties have become interested in a copper and gold property at Cliff, and steps are being taken for the installation of machinery, as well as a plant for the treatment of the ores, which are iron and copper sulphides, carrying gold and silver values. J. S. Miller, of Colorado Springs, interested the eastern parties.

SUMMIT COUNTY.

Copper Queen.—Parties who are interested in this property, at Frisco, are so well pleased with their prospects that they contemplate the erection of a concentrating plant during the coming spring or summer months.

Oro.—John McGarvie, of Breckenridge, who has been receiver of this property for a number of years, has resumed operations, and expects to be able to make shipments again at an early date. The property was formerly one of the heaviest operating and shipping properties in the county.

TELLER COUNTY—CRIPPLE CREEK.

Forest Queen.—A decision has been rendered in the district court in this now quite celebrated case as to the ownership of the Forest Queen. The application for a receiver for the property is denied, and a decision was also rendered against the plaintiff, Murray, who claimed a one-half interest in the lease. It is understood that the case will be taken to the Supreme Court. It is suspected, however, in the meantime that considerable ore will be extracted from the property.

Henry Adney.—A strike of considerable importance is reported in this property, on Beacon Hill. Just what the extent of the strike is has not yet been made public, but it is understood that it is quite important, and the stocks of the company in Denver have gone up accordingly.

Modoc Mining & Milling Co.—It is understood that a number of leases will be let on some of the levels of this property, which is in the saddle between Battle Mountain and Bull Hill, and is close to the Last Dollar mine. The property has been working for a number of years, and at one time produced a large amount of ore.

Pony Gulch.—Machinery for a cyanide plant to be erected in Pony Gulch is arriving, and it is understood it will not be long before the mill is in operation. The property is situated in Pony gulch, several miles southwest of the town of Cripple Creek, and is outside of what is usually

known as the producing district. A considerable body of low-grade ore is said to have been developed, and the results of the mill will be watched with interest. Mr. Burch, of Cripple Creek, is in charge of the enterprise.

Stratton's Independence, Ltd.—The suit of the Stratton's Independence Co., Ltd., against the Stratton estate was decided this week in favor of the estate. The case was heard before the United States Court of Appeals in St. Louis, and was for \$6,000,000. It was claimed by the company that Mr. Stratton had used fraudulent means in selling the property, and a suit for this large amount of money was brought. The suit was originally brought in the United States Circuit Court of Colorado, whence it was appealed by the plaintiff in the case. Now that this suit is settled, it is probable that the administrators of the Stratton estate will proceed to carry out the will of the late W. S. Stratton in founding a home for indigent miners. Just what effect the decision will have on the mining property of the estate is not yet known, though it is reported that the ground will be more generally leased than at present. A number of leases are already in operation, especially on the Gold and Globe Hill portions of the estate, but there is still a considerable amount of the Bull Hill property not being worked.

IDAHO.

CUSTER COUNTY.

White Knob Copper Co.—The judge of the district court has signed an order directing Receivers N. H. Clark and Wilbur K. Matthews to sell at public auction all of the properties of whatsoever character, including water works, electric railway, smelter and mining property of this company, at Mackay. The value of the property is estimated at \$2,800,000. There is a mortgage on the property of \$1,000,000, and the court directs that the minimum bid holds the \$1,000,000 lien, but the court directs that all creditors shall be paid out of the proceeds of the sale. About \$50,000 of the claims are held in Salt Lake City. Other creditors are Denver and Butte firms, whose claims aggregate \$70,000. The receivers have set the sale for March 18, at Mackay.

INDIANA.

GREENE COUNTY.

A vein of coal measuring 13 ft. in thickness has been struck at a depth of 40 ft. below the surface on an island in White river, near Bloomfield. It was discovered by laborers who are attempting to excavate for a bridge pier to be constructed by the Indianapolis Southern railroad. The quality of the coal is not of the best, but it is believed a much better quality can be found back a short distance from the bed of the river.

The Chicago and Big Muddy Coal & Coke Co., of Chicago, has been granted franchise authority to do business in Indiana. The company is capitalized at \$100,000, and \$25,000 is to be invested in Indiana.

OWEN COUNTY.

A five and a half foot vein of coal has been found near Patricksburg. In view of the immediate building of a branch of the Monon railroad through this territory, there is great activity in the securing of leases.

SULLIVAN COUNTY.

During the past week Judge D. W. Henry closed a deal for 2,000 acres of coal land in Sullivan county for Chicago parties. The several railroad companies now in the county, and others which are to build soon, have been alive to the necessity of getting control, through subsidiary companies, of the Indiana coal field. The bill pending in the Indiana legislature prohibiting railway companies from operating coal mines other than for their own use is likely to fail of passage.

MISSOURI.

JASPER COUNTY.

Edgar Zinc Co.—The Homestead mining plant of this company, near Carterville, burned Feb. 23; loss, \$11,000; insurance, \$5,000.

OREGON.

BAKER COUNTY.

California.—This mine, in the Cable Cave district, under the management of L. R. Bellman, is doing active work and is beginning to ship ore to the Sumpter smelter.

Emma.—At this mine, in the Old Virtue district, six miles east of Baker City, under the management of W. L. Vinson, the new stamp mill has been put in operation and the mine placed on the producing list. Recent artesian well-boring operations produced sufficient water for all mining purposes.

Golconda.—After a year of litigation, arrangements have been completed for re-opening this mine, in the Cracker Creek district, on a satisfactory basis. James A. Howard, secretary and ex-manager of the company, expects to have all details completed this week for the recapitalization and operation of the properties.

Iron Dyke Copper Mining Co.—The federal court in Erie, Pa., has dissolved the injunction in the foreclosure cases of Conrad Curtze et al. against this company's property, on Snake river, 60 miles east of Baker City. This permits a sale of the property under a decree of the Baker county circuit court, for about \$191,000, including the title and transfer of the Northwestern railroad.

Mattoon Mining Co.—This company, under the management of E. W. Butler, has opened a rich ledge on the property and is pushing development work with a large force of men.

Mayflower.—A big strike has been made in this mine, in the Cornucopia district, and under the management of George W. Boggs, of this city. The Mayflower is well developed by several tunnels and cross-cuts, and has parallel veins or ledges of ore. The ore matter runs from four to seven and eight feet in width, and carries values of \$50 to the ton, and the shipping ore runs from \$150 to \$300 to the ton, while some of the assays returned within the past two days show values of \$800 to \$3,000 to the ton.

Nine Strike Extension.—The ledge has been cut in the 115-ft. cross-cut tunnel in this mine, on Little Cracker creek, owned by the Western Gold Mining Co., of which Anthony Mohr is manager. The Nine Strike promises the making of a good mine, and it is expected that shipments of ore will begin shortly to the Sumpter smelter.

Standard.—This mine, at Quartzburg, one of the properties of Killen-Warner-

Stewart Co., has developed a new ledge of ore.

Sumpter Smelter.—This plant, which has been operating for more than three months and has proved a great aid to mining in the camps west of Baker City, has commenced working both day and night shifts, and has ore sufficient, contracted in advance for a year, to keep the plant running day and night. The plant can take care of 100 tons or more every 24 hours.

TENNESSEE.

POLK COUNTY.

Tennessee Copper Co.—At the annual meeting of this company, on Feb. 23, the retiring directors were re-elected with the exception of E. Buffington, who is succeeded by Philip S. Henry. Earnings for the year ended Dec. 31, 1904, were \$266,996, and net profits after payment of interest on bonds, etc., \$186,996. The dividend paid during the year amounted to \$218,750, leaving a deficit of \$31,754, which reduced the surplus account to \$466,396. In his report to the stockholders, President Channing explains that changes made during the year in the method of treating the company's ores resulted in a considerable reduction in outputs as well as an increase in cost. The changes that have been made, however, and the arrangement made for the saving of by-products, are expected to materially add to the efficiency of the company's plant.

UTAH.

SALT LAKE COUNTY.

Bingham Consolidated.—This company will shortly curtail its output from its own mines in order to take care of its increasing custom smelting ore business. A contract was recently signed with the management of the Boston Consolidated for 200 tons daily, and with the output of the Cactus mine in Beaver county, which is to come to the Bingham in the form of concentrate from the mill at Newhouse, the company is compelled to cut down its own production until such time as additional smelting facilities are provided.

New England Gold & Copper Co.—This company, which is operating the Nast mine in Bingham, has installed machine drills. Henry M. Adkinson is manager.

Scottish Chief.—This property at the head of Big Cottonwood canyon has resumed after a shut down due to a breakage of machinery.

Silver Shield.—A statement issued by H. S. Joseph, of Salt Lake, the manager, recommends the building of a concentrating mill during the present year, in order to handle the extensive bodies of low grade ores at a profit. The manager states that the end of the year ought to see the mine paying its own way.

South Columbus.—Development work is going ahead at a very satisfactory rate. The ground is breaking easier and indications point that the tunnel being driven is approaching close to an orebody, satisfactory gold-silver values and a large percentage of iron, but the management of the company believes so long as it can obtain the character of ore necessary to make up a proper smelter charge elsewhere the commercial ores can be held in reserve. It is from this property particularly that the curtailment in shipments will be made.

TOOELE COUNTY.

Consolidated Mercur.—Cinnebar ore, showing the presence of 18.6 per cent

quicksilver has been encountered in what is designated as raise No. 148. The ledge varies from 10 inches to three ft. in thickness.

WASHINGTON.

FERRY COUNTY.

Ben Hur.—A contract having been made with the Greenwood, B. C., smelter, under which the Ben Hur Gold Mining Co. agrees to deliver not less than 400 tons of ore a day, for a year, commencing March 1, the mine will be put in operation without more delay than will be required to install a 40-h.p. steam hoisting engine, and 60-h.p. boiler, purchased from the Republic Power & Cyaniding Co., and delivered on the ground.

Mountain Boy.—Some ore is being shipped from the upper workings, but the working force is reduced to four men, on account of present inability to handle the water, with five feet deep of melting snow on the mountain. The lower tunnel is being driven ahead.

Oversight.—The miners have been taken from the old workings to do location work on three fractional claims, located this year contiguous to the four original claims. The company is considering the driving of a long tunnel, to tap the vein at a considerable depth and facilitate haulage of ore to the railroads.

Ramore.—A crosscut has been driven into the porphyry of the footwall of the first vein encountered in the adit tunnel, and a vertical winze sunk 25 ft., from which a short crosscut was driven to intercept the rich streak of chalcopyrite struck on the adit level. Rich ore was encountered, but water rushed in, drove the men out and filled the winze to overflowing. Work is suspended, to arrange for drainage.

OKANOGAN COUNTY.

Kimberly.—This property consists of 14 mining claims, and is owned by De Merchant & Gamble. The same ledge passing through the Triune and Spokane Mining Co.'s property runs through the entire length of the Alpha and Kimberly claims. Several other well defined ledges pass through the various claims, one of the most promising being the Buzzard lead. This lead runs through the Buzzard, Troy and Swift claims, and shows a width of four feet of solid ore. Assays made from this ledge show values from \$31 to \$42 in gold, silver and lead, the principal value being silver. Negotiations are now pending for the organization of a company to develop and operate this property, and it is expected that in a very short time active operations will be begun.

Similkameen Falls Power & Development Co.—This enterprise is nearing completion and work is being pushed with vigor to get the work finished above high water mark, while the present low stage of water remains. The mines in this locality all need power, and this enterprise when completed will furnish abundance of power for commercial purposes, thus affording the opportunity to the mining companies which are now compelled to use the slow and expensive process of hand drilling to discard this plan and adopt the modern electric system of drilling.

Spokane Mining Co.—This property is owned by Spokane parties, and at present is not in operation. Previous work has disclosed a mammoth ledge, being a southerly extension of the ledge now being operated by the Triune company. Many tons of ore were treated in the stamp mill which the company had erected on Wannicutt lake, near its property, but the ore

proving refractory, milling was abandoned. With the assurances that a railroad will soon be constructed up the Similkameen valley, it is understood that the owners are now contemplating a resumption of work in the spring.

Triune Gold Mining Co.—This company at Golden, on Palmer mountain, has recently made a trial run of 100 tons, which is understood to have been very satisfactory. The water supply at its present low stage proving inadequate, the mill has been temporarily shut down until the spring freshets furnish the needed supply, when, it is understood, the mill will again be put in operation. The company is now running a tunnel a distance of 320 ft. to strike the large ledge of ore at a depth of 150 ft.

WEST VIRGINIA.

M'DOWELL COUNTY.

United States Coal & Coke Co.—As a result of an explosion in shaft No. 1 of this company, near Welch, on Feb. 26, 23 miners are supposed to have lost their lives, and it is possible that the number will exceed this. Fifteen dead bodies have been taken from the shaft. The explosion was of terrific force and shattered glass windows a mile distant. The United States Coal & Coke Co., with principal offices in Pittsburg, Pa., is a part of the United States Steel Corporation. The cause of the explosion has not yet been determined.

Foreign Mining News.

AFRICA.

RHODESIA.

The gold output for January was 32,531 oz. bullion, equal to 28,953 oz. fine gold, or \$598,459. This is the largest monthly output ever reported; it exceeds that of December by 4,431 oz., and that of January, 1903, by 13,171 oz. bullion.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending Feb. 18 were as follows, in tons: Granby smelter, 10,020; Mother Lode, 3,040; Brooklyn, 2,434; Rawhide, 1,879; Mountain Rose, 132; Emma, 231; Oro Denoro, 99; Senator, 198; Skylark, 24; Last Chance, 55; E. P. U., 20; total output for week, 18,341 tons; total for year to date, 109,809 tons.

BRITISH COLUMBIA—VANCOUVER ISLAND.

Tyee Copper Co.—The smelter of this company ran 23 days and smelted 5,065 tons of Tyee ore, giving a return, after deduction of freight and refining charges, of \$68,662.

NOVA SCOTIA.

Dominion Coal Co.—This company, at Sydney, is about to make a number of alterations and improvements. Among them is the installation of Denton hoists for the raising and lowering of the shoots by which coal is loaded on the ships. These were previously operated by ordinary winches and required the attention of two men for 20 minutes. The new hoist will lower the shoot in less than a minute, and is operated by one man. The coal company will also erect a large power house at the piers and supply its own power for lighting, etc. The contract for the supplying of the new electric power house has already been let to the Canadian General Electric Company.

DIVIDENDS.

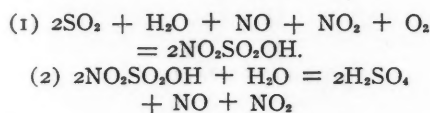
Gold, Silver, Lead, Quicksilver and Zinc Companies—U. S. Coal, Iron and Other Industrials—United States.

Main table containing dividend information for Gold, Silver, Lead, Quicksilver and Zinc Companies, and Coal, Iron and Other Industrials. Columns include Name of Company and Location, Authorized Capital, Shares Issued, Par Value, Total to Date, Latest Date, and Latest Amount.

NOTE.—These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list

The Lead Chamber.

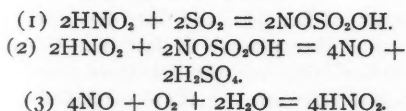
The oldest questions are the newest. Dr. E. Divers¹ has recently given an interesting critique of the latest on the chamber reactions,² followed by a discussion by Prof. Tilden. In brief, Lunge long ago established the probability of the mode of oxidation of sulphurous to sulphuric sulphur, as directly connected with the alternate formation and destruction of nitrosulphonic acid, $\text{NO}_2\text{SO}_2\text{OH}$, the well-known chamber crystals. The reactions are given in all standard text-books dealing with the manufacture of sulphuric acid, but no apology is needed for introducing them here. They are:



Equation (1) shows the condensation of the reagents (including water), to nitrosulphonic acid; equation (2) shows the action of water in hydrating to sulphuric acid proper, with the attendant regeneration of nitric oxide and dioxide, NO and NO_2 . The nitrosulphonic acid is a white crystalline substance which may be made in large crystals, from feathery incrustations to units an inch long, as the writer can testify from personal experience. It will be remembered that, about 20 years ago, there was a long and incisive controversy between Lunge and Ramsay, as a result of which it was definitely shown (by the latter) that nitrous anhydride, N_2O_3 , can not exist in the gaseous state in quantity, as over 95% of it breaks down to $\text{NO} + \text{NO}_2$.

Now, Raschig argues against Lunge's nitrosulphonic acid, and proposes a new candidate, nitroso-sulphonic acid, for catalytic honors in the lead chamber.

The equations involved are:



The experimentation and the inference of Raschig are definite and plausible; but the difficulty is that little is known of the possibility of gaseous nitrous acid, to say nothing of the more mysterious nitroso-sulphonic acid.

Prof. Tilden in his discussion clings to the old view regarding nitrosulphonic acid, with the correlated equations of Lunge; he also reminds us that the chamber gas is red, and shows the absorption spectrum of nitric dioxide, NO_2 .

It will be impossible to cover all the ground in an abstracted abstract and a discussed discussion such as this, but there are some points that it is well to hold clearly and to remember.

Many of Raschig's experiments were apparently conducted in well cooled solutions, where nitrous acid, or nitrous anhydride, and nitroso derivatives can exist, as they might not in the heat of the Glover's tower, or in the lead chamber. On the other hand, the mist of the chamber, which is well discussed by both Divers and Tilden, may allow of the condensation of otherwise unstable nitroso derivatives.

Regarding the comparative claims of the Lunge and the Raschig modes of catalytic oxidation, it is probable that either theory would be gladly accepted in the absence of the other; and yet both together are incomplete in that more detail must be filled in for the full mechanism of chemical exchange. When one sees Prof. Tilden explaining nitrosulphonic acid on a 'type' comparison, running from pyro-sulphuric acid to nitric anhydride, it is good to be reminded that the nitro group carries nitric or pentad nitrogen; but it does not help with sulphonic acid. One trouble is that nitro- and nitroso-sulphonic acids have been wrongly named; they are sulphuric acids, while sulphonic acid proper is something which is rarely defined accurately. Perhaps one easy and accurate way is to say that sulphurous acid represents the 4th degree of oxidation of the theoretical ' H_6S '; and that sulphuric acid represents the 6th degree of oxidation of the theoretical ' H_6S '; while sulphonic acid proper, HSO_2OH or RSO_2OH , represents only the 5th degree of oxidation of the theoretical ' H_6S '. And here is a nice point, which is too often overlooked. By what the Germans call *umlagerung* (re-arrangement) of the molecule, sulphurous acid can metamorphose from sulphurous to sulphonic acid. If nitrogen has any such proclivity toward molecular metamorphism, the problem of the oxidation of sulphurous to sulphuric sulphur in the chamber becomes doubly complicated. It is no argument against Raschig's nitroso compounds that they are unstable and unknown in the free state. The history of the 'azo' compounds under Peter Griess is testimony to the efficiency of unstable compounds. On the other hand, Raschig should not assume that Lunge's crystals are necessarily an evil instead of an index of hydration and nitrification, as has been supposed; but this does not ignore the possibility of better practice.

Probably no research of 1904 will be more far-reaching to the betterment of chemistry than this of Raschig; but it is safe to say that when it shall be dissected and applied, it will be shown to be only a phase of the other side of the shield, so long and so well pictured by Lunge.

International Mining Congress.

A preliminary notice of the congress has been already published in the JOURNAL. A later official bulletin announces the date more definitely, namely, from June 25 to July 1, 1905. The congress is under the patronage of the Belgian government, and a generous programme has been planned, including: (1) General meetings; (2) section meetings; (3) lectures, and (4) visits to the exhibition proper, to various scientific and industrial establishments, and to geological localities of special interest. The detailed programme is as follows: (1) Mining section: sinking deep shafts through sterile rocks; winding engines and plant; modern pumping engines; air-compressors; recent improvements in timbering and gobbing; shifting of measures consequent on coal workings; mechanical preparation of ore and coal; firedamp; conditions to be satisfied by electric mine plant; unification of official mineral statistics. (2) Metallurgy section: utilization of non-caking coals for making coke; study of the blast-furnace; influence of foreign substances on pig-iron and steel; methods for intercepting dust from blast-furnace gases with a view to their utilization; slag brick and cement; utilization of poor gas with a view to producing power for driving roll-trains; new methods for making open-hearth steel; special steels; forging by the press and steam-hammer, hardening and annealing; electro-metallurgy; metallography. (3) Mechanical section: construction of engine parts; internal-combustion motors; mechanical application of electricity; turbo-machines; steam engines and boilers; practical and economical conditions of motor-wagon construction and use. (4) Applied Geology section: tectonics of coal basins; sedimentary deposits; metalliferous lodes; hydrology.

The printing of papers begins March 1, and the organizing committee requests all who desire full privileges to address their applications at once to M. J. Libert, Ingénieur-en-Chef, Directeur des Mines, Treasurer of the Organizing Committee, 16, Quai de l'Université, Liège. The applicant should state whether he desires to become a donor-member (cost 100 francs, \$25), or a subscriber member (cost 25 francs, \$5), to one of the four respective sections of Mining, Metallurgy, Mechanics, or Applied Geology. With the enclosure of fee, should be given the full name, profession and address.

Besides general advantages and courtesies, membership will entitle the holder to the publications of his respective section or sections. Those who wish, may receive the publication of any other section for an additional 4 francs (\$0.80), and thus one may evidently obtain all the proceedings for 25 francs, plus 12 francs, or 37 francs (\$7.40), as a full subscription-member.

¹Journal Society Chemical Industry, Dec. 31, 1904.

²Dr. F. Raschig, of Ludwigshafen, in *Zeitschrift für angewandte Chemie*, 1904, Vol. XVII, p. 1777.

Characteristics of Gold-Quartz Veins in Victoria.

By WALDEMAR LINDGREN.

In climate, scenery, and geological features there is much similarity between the goldbearing region of Victoria and that of California. Each region has also, since the middle of the last century, produced gold to the enormous value of \$1,300,000,000, most of which was taken out in the first two decades after discovery. Although in both cases the amount produced from the quartz veins is far less than that extracted from alluvial deposits, yet the former claim the greater attention of the geologist as the ultimate source of the gold.

The Victorian quartz-veins have received careful investigation, from the early work of Selwyn and the still valuable volume of Brough Smyth, to the recent monographs and papers of Messrs. Dunn, Bradford, Lidgley, Herman, Moon, and Baragwanath. If some criticism be permitted of so much excellent work, it would be that, while vein structure has received great attention and is admirably and profusely illustrated, the mineralogical and petrographical aspects have been somewhat neglected. The lack of a modern and comprehensive review of the present state of our knowledge is also painfully apparent. Mr. T. A. Rickard has done a great service to American engineers in bringing before them his experience relating to several interesting features of these veins, particularly 'saddle reefs' and 'indicators.'

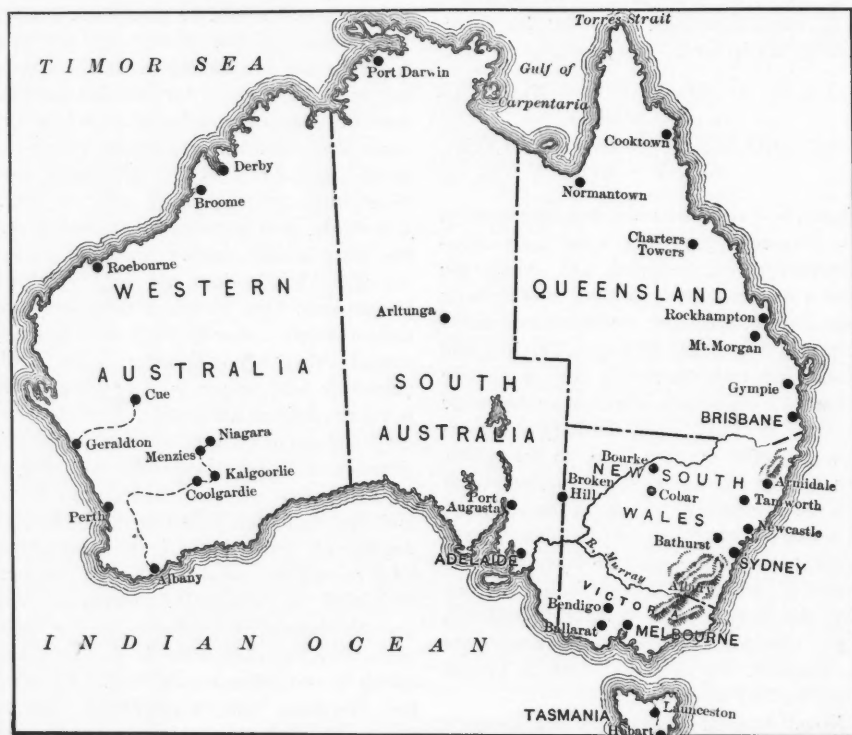
The most productive goldbearing region lies in the central part of Victoria and would easily be encompassed by a circle with a radius of 60 miles, the center of which would be placed near Clunes; it is a country of low ranges and rolling hills, the elevation of which rarely exceeds 2,400 feet. Here we have the old and celebrated localities of Ballarat, Bendigo, Castlemaine, Avoca, and Ararat. The eastern part of the State, the topography of which is much more accentuated, contains chiefly two important belts. The first includes Walhalla and Woods Point. The second and most easterly comprises the goldfields between the Ovens and Mitta-Mitta rivers, both draining northward into the Murray near the New South Wales boundary, and includes the Chiltern, Rutherglen, Beechworth, Yackandandah, and Harrierville districts.

The Australian cordillera traverses Victoria from east to west in a belt 50 to 100 miles wide, between the basaltic and Tertiary terranes of the coast and the great interior plains of the Murray basin. In the western goldfields of Ballarat and Bendigo, Lower Silurian (Ordovician) slates and sandstones prevail. They are little altered, sometimes rather soft, contain much carbonaceous matter, and are thrown in a series of sharply compressed but usually well recognizable anticlines

and synclines. Intrusive into these slates are two large batholiths of granitic rock, probably quartz-monzonite, each about 7 by 20 miles long, the largest being that between Castlemaine and Bendigo, and innumerable smaller bodies of the same kind. Dikes of quartz porphyry or aplite cut the slate at the contacts, which are marked by narrow aureoles of contact metamorphism, changing sandstone to quartzite and slate to hornfels. These intrusions took place after the folding of the slates, probably in late Silurian time.

Erosion, since that time, has planed down the mountains at least three thousand feet to the undulating surface de-

the hanging or the foot, or both. These flat 'makes'—masses of solid quartz cutting across the slate with jagged, sharply defined contacts—are particularly characteristic and usually contain the best pay, at Ballarat East, Daylesford, and many other places. Another type is represented by belts of mixed quartz and slate in which there is rarely much evidence of replacement of the rock by quartz. The 'saddle reefs' comprise an interesting division in which masses of quartz fill cavities produced at the anticlines by stresses subsequent to the principal folding; these saddles usually continue on both sides as 'legs' between corresponding strata on both sides of the anticline, but they do not always strictly follow the stratification. Bendigo is by no means the only



AUSTRALIA.

termined by the crest lines of the present ridges; this peneplain surface is again trenched by broad, flat valleys.

In the eastern part of the State, slates of Upper Silurian age prevail, also folded and cut by dioritic intrusions, both dikes and massives. The following remarks apply chiefly to the principal or western area of auriferous ground, including Ballarat and Bendigo.

Within the folded Silurian rocks, veins of quartz are abundant, and generally follow the strike of the strata, bending with the latter around the curves of the granite bosses. Frequently they lie conformably between the shale or sandstone for a considerable distance, but local divergences often exist, and sometimes they cut across both dip and strike. A common type has a single well-defined wall and more or less continuous quartz, from which flat or irregular bodies of quartz project into

place where saddle reefs occur. They are found at Castlemaine and at Russell, south of Bendigo, and, less developed, at many other places; in fact, like the flat 'makes,' they are the necessary result of compressive stress perhaps combined with torsional stress on folded masses of little altered sediments, the strata of which vary considerably in hardness. Normal fissure veins and gaping cavities filled by flat 'makes' accompany the saddle reefs, even where best developed, as at Bendigo. The granite rarely contains quartz veins, and these are still more rarely of payable character.

The vein filling is almost always a massive, milk-white and sometimes glassy quartz, containing gold and a small percentage of sulphides, chiefly pyrite and arsenopyrite, but also a little galena, zincblende, molybdenite, and stibnite; fluorite and tellurides seem to be absent. Barite

is rare. As a rule, there is little evidence of crushing and pressure, so often seen in California mines. The gold is usually coarse, and, in part, the much criticised absence of proper assay methods, and other peculiarities in the milling practice, are due to this coarse character of the gold.

A calcite with some iron and magnesium is a pretty constant accessory gangue mineral, and is most abundant near the walls; some veins from Bendigo show a complete lining of these carbonates, another analogy, not before brought out, with the California veins. In the South New Moon mine at Bendigo, I found finely developed and abundant albite in grains and crystals intergrown with quartz in just the same way in which it occurs in many of the veins from Eldorado county, California, southward. In places, the Bendigo and Ballarat quartz contains a little chlorite in well-defined, often curved, hexagonal prisms. This is duplicated in some of the quartz veins of Alaska. The slate and sandstone are not very susceptible to metasomatic changes, yet cubic pyrite and a calcitic carbonate are pretty well distributed through them near the vein. The calcite replaces the slate, often forming roughly rhomboidal sections; calcite veinlets are common near the vein and are often cut off by it. This is again the same process characteristic of California veins; carbonatization of the country rock preceding the filling of the veins by massive quartz.

'Book-quartz' is a structure especially common at the foot or hanging-wall of the Victorian veins. The quartz contains a great number of parallel, thin sheets of slate sometimes delicately curved and contorted. Probably the origin of this should be sought in expansion and forcing apart of the slate foils by the crystallizing force. Exact counterparts of this do not often occur in California.

Shoots of normal character, dipping steeply on the plane of a well-defined fissure vein, are not uncommon, but the gold often occurs in different and unusual form. As mentioned above, the flat 'makes' are frequently rich, one above the other, or the gold may be concentrated in the anticlines of the saddle reefs. At Bendigo there are three principal anticlinal axes, or 'lines of reef,' the Hustler's, New Chum, and Garden Gully, along which successive saddles have yielded much gold, down to a depth of 4,000 feet. Another most interesting type is the 'indicator,' described by Lidgey, Don, Rickard, and others. In these, coarse gold is found at the intersection of flat bodies of quartz with certain thin pyritic and carbonaceous seams of the almost vertical slate, which are the 'indicators.' Mr. Rickard inclines to the belief that the gold has been precipitated by the organic matter in the slate-band, and, fortified by illustrations, states that the flat 'makes' fault the indi-

cator. These peculiar deposits were first described from Ballarat East, where they are peculiarly well developed. There are, however, other shoots in the same mines not directly connected with the indicators.

Similar phenomena have been described from other parts of Victoria. Recently, Mr. William Bradford, of Ballarat, has, in a series of bulletins on the various gold-fields of Victoria, published by the Geological Survey, clearly shown that the indicators are a common feature of the Victorian quartz veins, and strongly contends that they are not a part of the slate series, but represent narrow fissure lines in which solutions descended. Further, that they cut across the flat 'makes' and enrich them at the point of crossing. He compares the partly crushed quartz vein at the point of intersection to a filter. With this view Prof. J. W. Gregory, the former chief of the Geological Survey, is in accord.

From what I saw of the indicator at Ballarat, I am fully convinced that it is here a narrow fissure in the slate, and not a band of sediment. It is usually filled with pyrite and arsenopyrite; frequently a little quartz occurs on it, and evidences of dislocation are often seen; moreover, the best evidence seems to show that it does sometimes diverge from the dip of the slate. I also believe that it is later than the flat 'makes,' which the 'indicator' crosses, and which have been enriched by it. From Maldon, Mr. R. A. Moon describes a secondary feature here called 'droppers,' or thin seams of quartz or pyrite, which slightly fault and greatly enrich the flat 'makes' crossed by them. This is evidently another form of the 'indicator' which I believe represents a widespread phenomenon of secondary enrichment, though probably not caused by surface waters. A thoroughly scientific treatment of these problems is as yet lacking.

Developments at Bendigo have shown that the deposition of gold in the slate has taken place over a vertical range of 4,000 ft., the deepest workings having lately attained that depth. From the vast amount of placer gold the evidence is pretty conclusive that at least a thousand feet of slate and sandstone above the present surface were auriferous, making a total minimum range of deposition of 5,000 ft. Somewhat similar conditions prevailed in California, where there is evidence of a vertical range of 3,500 ft., as I have shown in a report on Nevada City and Grass Valley. The available quantity of ore—not the tenor—seems, however, to diminish as depth is attained. I am reliably informed that the saddle reefs of Bendigo have not proved payable as a whole below a depth of 2,500 ft.; the present great increase in the production of that district comes from relatively shallow mines at the northern end of the field; these are not 'saddle reefs' but rather big flat

'makes.' At Ballarat West, and many other places, the developments at depths over 1,500 ft. have not been encouraging.

A peculiar feature is presented by the frequent arrangement of the richest reefs in distinct lines or belts following the N-S strike of the slates and separated by barren zones, in which the quartz is not less abundant. The most celebrated of these productive belts are the Ballarat-Creswick line, continued 50 miles northward by the Tarnagulla reefs, further by the Maldon-Daylesford line and the Bendigo-Castlemaine-Fryerstown line.

It is conceded that the veins were formed later than the deposition and the foldings of the slate, which is, therefore, post-Ordovician; Mr. R. A. F. Murray, and other Australian geologists, also have presented strong evidence that the deposition of the quartz was completed before the Devonian rocks were laid down, and the age is thus determined within narrow limits. The intrusion of the granitic rocks followed the plication of the slates and preceded the Devonian sedimentation; consequently the granitic intrusion and the formation of the quartz veins were closely associated events. Field evidence shows that the quartz veins are later than the granite and the attendant aplitic dikes. The fact that so few lodes occur in the granite is probably to be explained by the great resistance of the hard granite bosses to compressive stresses compared with the yielding nature of the soft sediments. Quartz veins could and probably did form at intervals since the main epoch in the Middle Paleozoic. Even the supposedly Tertiary basaltic dikes show in places at Bendigo a slight mineralization. The hot alkaline water, which some time ago was struck in the 180 mine, is no doubt connected with these late basaltic eruptions so abundant in Victoria, and has probably no direct bearing on the original formation of the vein quartz. But I am forced to disagree with Mr. T. A. Rickard when he says in his paper on Bendigo that "the origin of the deposits of goldbearing quartz belongs to no particular period."

The geologists of Victoria, among them Daintree, Howitt, and Murray, have long been convinced that "hydrothermal action arising out of deep-seated Plutonic action played an important part in the formation of quartz lodes" (Murray).

A distinct and ingenious theory has been advocated by Mr. A. W. Howitt, the distinguished and veteran geologist of Victoria; it is set forth and explained by Mr. R. A. F. Murray in his book on the "Geology and Physical Geography of Victoria," and further elaborated in detail in Mr. Rickard's most interesting paper on Bendigo. Briefly, the existence of gold in Paleozoic seas is assumed, much of which was occluded in or precipitated by the sediments. Heated by the granitic intrusions at the close of the Silurian period, the mineralized sea-water included

in the sediments would find passage through fissures and fractures, and deposit their dissolved material. The rich 'lines of reef' represent extensive fractures extending downwards to the contact of the igneous rocks and the sediments. Mr. Rickard believes that the organic matter in the sediments partly caused the precipitation of the gold, though it must be confessed it is not apparent why this precipitation should not have taken place long before the solution reached the fissures. A notable feature in these veins is that the active solvent is believed to be occluded sea-water, and not circulating surface waters.

Mr. W. Bradford, a keen observer of the occurrence of gold, has a somewhat similar theory. His terms of expression are original and sometimes obscure; facts and theories are rather intermingled; but there is no question of his intimate knowledge of the various forms in which the goldbearing quartz occurs. He believes that hot solutions brought up the gold from great depth and accumulated it in the upper rock zones; when these were fractured, waters again concentrated the gold and quartz into the fissures; the richest portions are those where obstructions caused the waters to partly stagnate.

Mr. Don gave the marine theory some hard knocks when he showed that the sediments away from the veins contain no gold, and that the increasing richness close to the fissures is dependent on the amount of pyrite introduced from the vein. His results were also in general unfavorable to the view of precipitation of gold by carbon.

Mr. E. J. Dunn, in his excellent report on Bendigo, attributes the deposition of the goldbearing quartz to hot solutions, but does not believe it was derived from the sedimentary rocks.

In the above paragraphs I have repeatedly called attention to remarkable similarities in vein-filling and metasomatic action between the Victorian quartz veins and those of Sierra Nevada. Another striking similarity is that in both of these regions the veins were formed just after the intrusions of vast masses of granite or dioritic magma into crumpled and compressed sediments. I am convinced that these similarities are due to closely similar mode of formation. With some confidence, I would formulate the hypothesis that the gold and the quartz in this type of veins have been deposited chiefly by "eruptive after-effects"; in other words, chiefly by hot ascending waters originally contained in the granitic magma and released from it by decreasing pressure, due to its irruption into the upper parts of the lithosphere. It is quite possible that atmospheric waters may have played a certain part by aiding the precipitation and by effecting certain forms of concentration in the deposits.

Making Basic Open-hearth Steel Without Scrap.*

The success of the practice at Ensley, Ala., whereby what is substantially the basic open-hearth steel process is carried on without the use of scrap, is worthy of attention. One of the vital problems in the development of the steel industry is the question whether the increase in basic open-hearth steel manufacture will be checked by the obvious inadequacy of the scrap supply for indefinite expansion in that direction. Open-hearth steel production has doubled four times in the past fourteen years. While bessemer steel production has in several years shown a decrease, open-hearth steel production has not shown a single decrease since the annual production first passed 200,000 tons.

Solutions of the problem of open-hearth steel without scrap were in the past few years supposed to have been found in the use of direct metal and in the employment of certain other means. However successful these may have been from a purely technical standpoint, they have not prevented the market for heavy melting scrap from reaching a parity with pig iron, and in some cases passing it. The leading steel interest has itself made several purchases of heavy melting stock, at higher delivered prices than bessemer or basic pig iron. By the scramble to obtain scrap, the position of the scrap factor has been changed from that of a merchant doing what was in essence a brokerage business, to a dealer who is in substance a speculator against the advances and declines in the whole crude material market.

That further expansion in the basic open-hearth steel industry will not be lightly curbed by the deficiency in the scrap supply is a certainty. The industry has shown wonderful vitality. Its first extensive use was at Pittsburg, in 1895, when its employment was induced by the fact that very cheap southern basic pig iron could meet scrap arising out of bessemer steel manufacture. The Alabama pig iron was regarded simply as a convenient means of utilizing this scrap.

The basic open-hearth steel industry is no longer a mere convenience for the utilization of what was substantially a by-product. It has a vitality of its own. Instead of Alabama basic pig being made into steel at Pittsburg, it is kept in Alabama, and there made into steel, despite the fact that there is no adequate scrap supply in the South, largely because the South is too recent a consumer of steel.

It is at Ensley that the most radical innovation has been made in the practice of the basic open-hearth steel process. The plan starts with the idea of furnishing the regular furnaces with mixed direct metal, but goes farther than this in partially desiliconizing and decarburizing this mixed metal, and furnishes the regular furnaces,

in addition, metal which has been blown in a standard bessemer converter. What is simply a metal mixer in the North, is at Ensley a 250-ton rolling open-hearth furnace, known as a 'primary' furnace, while there is provided in addition a standard 15-ton bessemer converter. With these adjuncts there is furnished the regular basic open-hearth furnaces a metal which requires the removal of but little silicon and carbon, while the elimination of the phosphorus can be readily accomplished. All but one of the ten 50-ton basic open-hearth furnaces are of the rolling type, the stationary one being desirable from the fact that, with a removable top, it can be used for the melting of very large pieces, such as skulls, molds, rolls, etc., which have a relatively lower value as scrap in the open market.

The cost of making steel at Ensley by this combination is not known. The information would not necessarily be of great value in any event, since it must be accepted, for the time being, that there is no standard practice in the North to which to refer it. The cost of making steel depends largely upon the cost of the raw materials, and no one can now say, except for the briefest period, what scrap is worth in the open market relatively to pig iron. Rarely in years past did heavy melting scrap approach the price of pig iron; of late it has reached that level, and in the very recent past it has averaged, for many delivered points, a measurably higher level. The old "talking point" of the scrap dealer, that heavy melting stock is worth 15% more than pig iron, may easily become a realized fact.

Ten years ago, when Alabama basic pig was found to be a convenience at Pittsburg for the utilization of bessemer steel scrap, it could hardly have been predicted that ultimately the scene of its conversion into steel would be removed to Alabama, and that the scrap arising would itself be sold for use at Pittsburg. The vitality and flexibility of the process is established.

The reform of the Hindu Calendar is one of the reasons for 'A Plea for a Hindu Observatory,' by Joges Chandra Roy, of Cutlack, India. The Bengali almanac purports to count from the vernal equinox; but it actually dates from April 13. The discrepancy is largely due to the ignorance of the precession of the equinoxes (about 50 seconds per year), and this has accumulated nearly 21° of displacement. The incidental conflict of old custom with modern science is always an interesting phenomenon. Russia is a close companion with the orthodox Hindu in tardiness of reform. Perhaps there is some connection between the spirit of conservatism and misfortune, in the competition of nations and civilizations.

*From the *Iron Trade Review*, Cleveland, Feb. 23, 1905.

Recent German Gas Engines.*

The first gas engine of high power was introduced by the Oechelhäuser company for pumping purposes, but the credit of the earliest attempt to increase the cylinder diameter of this type of prime mover belongs to the Cockerill company, which also made the first gas-blowing engine. The practice of cooling the piston was introduced independently by Cockerill and Körting, the latter firm being also the first to use stuffing-boxes in gas engines, in the construction of a small tandem engine in 1895. This principle was also ap-

plied to large engines by the Cockerill company and by the Maschinenbaugesellschaft Nürnberg, the latter firm also constructing the largest single-acting engines up to 750 horse-power.

Dealing with the most advanced types now in use, the author starts with the Oechelhäuser engine, constructed by A. Borsig, of Tegel. This, for engines over 600 h.p., is of the ordinary double-cylinder class (Fig. 1). The longitudinal section through the cylinder shows that it is composed of two tubes, meeting at the center and completely separated from the water-jacket, in order to prevent strains from unequal expansion. The water-jacket on the combustion chamber is connected with that cooling the rest of the cyl-

inder at the top only, so that the cold water is first compelled to circulate round the combustion chamber. The pistons have single walls, and are closed by removable heads, so that the interior can be easily cleansed. No difficulty seems to have arisen with the exhaust ports or on account of excessive wear of the piston. The engine is governed by regulating the

quantity of gas entering through the admission ports. To reduce pumping, the gas is drawn in through the suction stroke, that in the gas main being forced back into the suction-pipe during the compression stroke, the opening of the valve being regulated by the governor, so that the gas is not compressed until it reaches the chamber next the ports. As it was also found advisable to check the influx of air when working under reduced load, a return valve, operated by the governor, has been mounted in the air-pipe. Both valves are actuated by the Neuhaus-Hochwald gear, used in the Borsig steam en-

gines. The air main is also fitted with a throttle valve, which assists in distributing the air for purifying the cylinder and mixing with the gas. The gas and air-valve apertures can also be varied by slides, both of which can be set by hand when poor gas is being used. For rich gas, however, it is preferred to control the valve slides by the governor, so that in the intermediate strokes the gas ports are closed, except those on about the same line as the igniter, in order to maintain a rich mixture next to the igniter all the time. The newest form of Oechelhäuser engine, constructed by the Aschersleben Maschinenbau-Aktiengesellschaft, is illustrated in Fig. 2. The cylinder is in three parts, the middle portion, surrounding the combustion chamber, being separate, but also of cast iron with a solid wall. The gas and air-return system is the same as in the Borsig engine, but is operated by König valve gear; and a valve, worked by

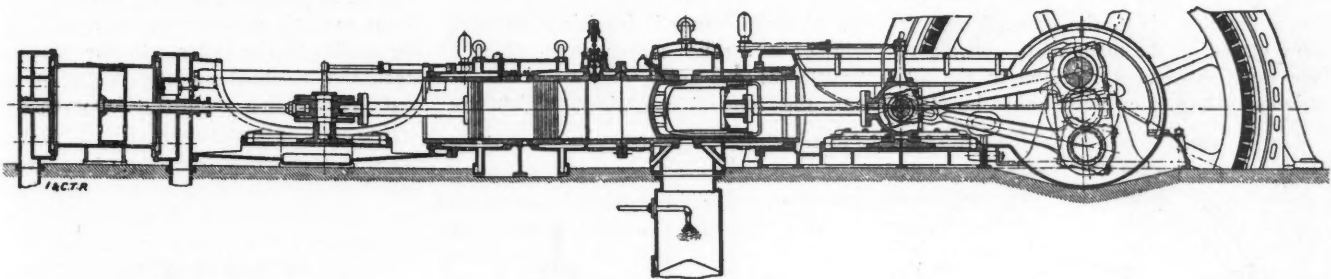


FIG. 1.

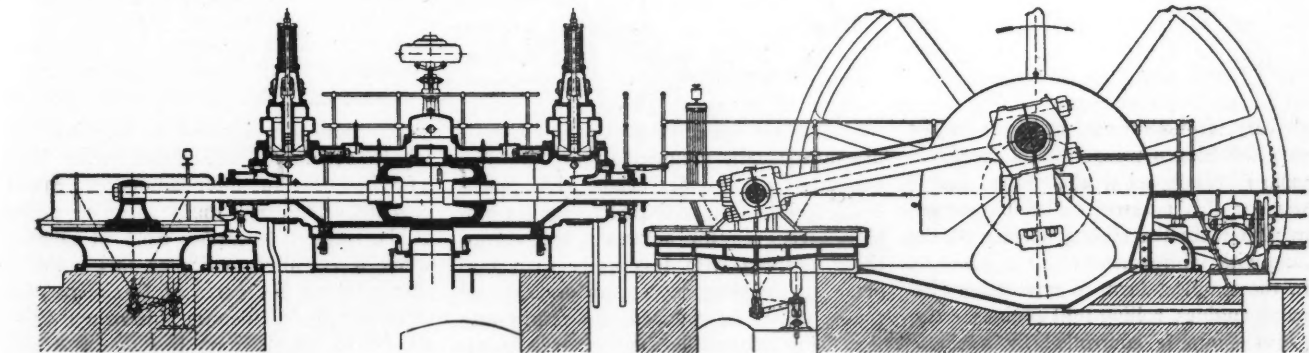


FIG. 2.

but as it was recognized that this type could hardly compete with the popular single-acting four-cycle type, the necessity arose of extending the same principle to the four-cycle engine, which was done by both Deutz and Cockerill early in the same year. True, similar engines had already been constructed by Körting and the Berlin-Anhalt company, but these were little known. Later in the year the Nürnberg company abandoned its old type in favor of the double-acting tandem en-

quantity of gas entering through the admission ports. To reduce pumping, the gas is drawn in through the suction stroke, that in the gas main being forced back into the suction-pipe during the compression stroke, the opening of the valve being regulated by the governor, so that the gas is not compressed until it reaches the chamber next the ports. As it was also found advisable to check the influx of air when working under reduced load, a return valve, operated by the governor, has been mounted in the air-pipe. Both valves are actuated by the Neuhaus-Hochwald gear, used in the Borsig steam en-

a valve gear, is also provided in the air main for distributing the air for purifying the cylinder and mixing with the gas. There are no slides on the admission ports, and the return valves are rendered more accessible by being mounted above the ports on the cylinder, instead of below the base-plate. The charging pumps are fitted with simple clack valves. The gas consumption and other points in connection with these engines will be referred to later.

In the Körting engine, which is illustrated in Fig. 3, the cylinder was formerly cast in one piece with the water-jacket,

*From a paper read by Professor E. Meyer before the Verein Deutscher Eisenhüttenleute; published in the *Iron and Coal Trades Review*, Feb. 10, 1905.

but the strains caused by irregular expansion produced distortion of the admission ports, so that now the cylinder is made in two parts, surrounded by the jacket. The ports are cut out of the solid wall, so that the stay edges are not so hard as when the ports were made in the casting. Underneath, where the piston rests, there are no ports, and here provision is made for cooling the cylinder. The engine is fitted with a piston tail-rod and guide. The piston rods are turned in such a manner that the weight of the piston makes them perfectly true. The cylinder heads are cast solid, except at the upper part, where the igniter is mounted. The igniting gear is no longer mounted on a separate shaft, the eccentrics being now placed on the main shaft. Owing to the rapid movement required in the admission valves, they must either be fitted

ber in front of the working cylinder. It is, however, possible for gas to return from the pump to the suction pipe, at the commencement of the compression stroke, through a bore in the Rider valve. The closing of this bore depends on the load put on the engine, and it is only when this closing has occurred that the gas can pass through the said valves into the storage chamber next the working cylinder. In this system there is no working against a vacuum, and the excess pressure in the compression stroke is reduced to a minimum. The governor, too, only comes into action in the compression stroke, instead of in the previous suction stroke, so that the effect of any alteration of the governor is felt in the working cylinder a stroke earlier than when a throttle valve is used.

In the four-cycle engines, which are

Structure of Steel.

When a solvent absorbs a solute, as common salt, there is a wide variation possible in the proportions of the two as long as the temperature is fairly high. But when the mixture freezes, one or the other of the solution-ingredients will separate, as it happens to be in excess of the eutectic equilibrium. If a dilute water-solution of salt is cooled, water will separate till the limit is reached marked by 76.4% of water and 23.6% of salt. On further cooling this mixture will remain in liquid till minus 22° C., when it will congeal as one physical unit, without separation of either salt or water. This is the *eutectic* of water and salt, containing 23.6% of the latter. In the case of steel, the assumed eutectic is cementite, Fe_3C . (containing about 6.7% of carbon),

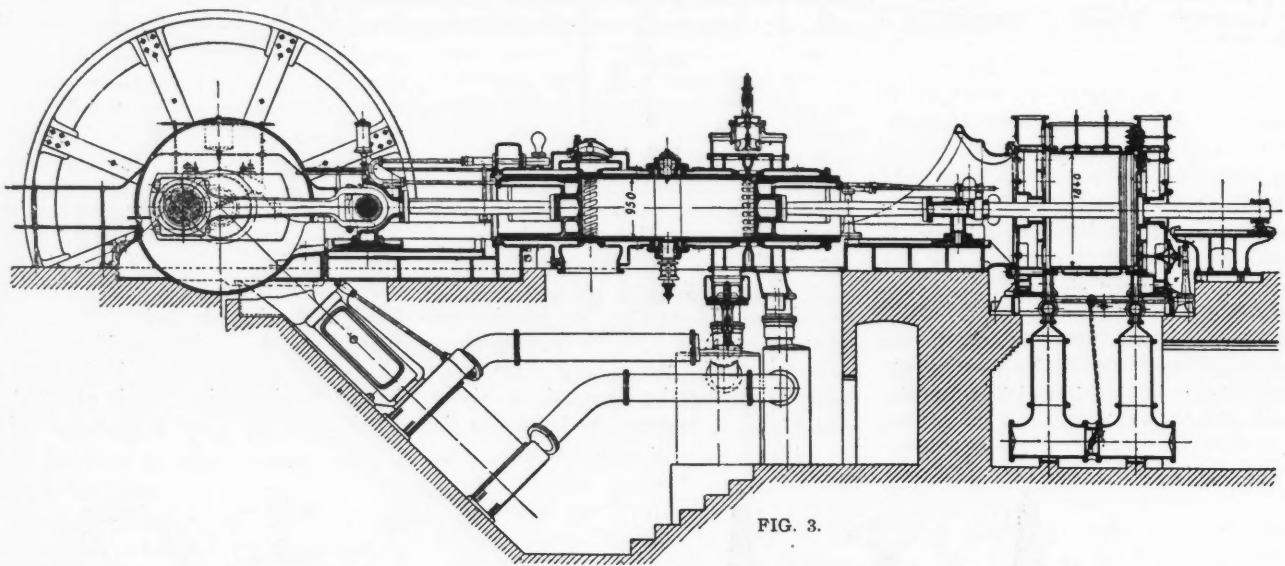


FIG. 3.

with very strong springs, or else actuated direct, the Siegen company and the Klein company (Dalbusch) employing double bowls for this purpose. The first-named firm also faces the sliding surface of the piston with white metal.

In the simplest form of governing (for blowing engines, rolling-mill engines, etc.), the gas pump is controlled by a single valve, with a constant cut-off of 60% in the suction stroke. The governor regulates the volume of gas by a throttle valve, placed in the gas main just in front of the valve chest. The precision governors are shown in Fig. 4, a Rider valve, controlled by the governor, being mounted in the main slide valve of the gas pump. In the position shown, the compression stroke for the rear side of the pump is just commencing, and the left edge of the main valve has just cut off the connection between the suction pipe and the pump. On the other hand, the right edge is on the point of establishing communication between the pump cylinder and a compression chamber, which is separated by valves from the storage cham-

ber in front of the working cylinder. It is, however, possible for gas to return from the pump to the suction pipe, at the commencement of the compression stroke, through a bore in the Rider valve. The closing of this bore depends on the load put on the engine, and it is only when this closing has occurred that the gas can pass through the said valves into the storage chamber next the working cylinder. In this system there is no working against a vacuum, and the excess pressure in the compression stroke is reduced to a minimum. The governor, too, only comes into action in the compression stroke, instead of in the previous suction stroke, so that the effect of any alteration of the governor is felt in the working cylinder a stroke earlier than when a throttle valve is used.

most of the tandem type, the valve chests are now usually mounted on the cylinder, instead of the cylinder heads. The Nürnberg, Müllhausen and Soest engines employ eccentrics for actuating the valves, these running with less noise than tappets, and enabling the spring pressure on the valves to be reduced, the return motion being effected by the eccentrics themselves. On the other hand, only 15% of the eccentric stroke can be utilized in four-cycle engines, and, therefore, the size and friction of the eccentrics must be increased. The rods have also to move at high speed at the moment of opening and shutting the valves, thus necessitating the use of roller levers if a gentle opening and closing movement is desired. These levers also considerably diminish the pressure required for lifting the valves, and are therefore used in the Deutz engines for working the exhaust valves with tappet gear.

Arc-lamp carbons, when made with 50 per cent mixture of calcium carbide, are said to emit a more brilliant light.

which does not succeed in forming the whole residuum, but unites with iron (ferrite) in an inter-lamination called pearlite. This pearlite is assumed to be at the mean if it carries 0.9% of carbon, when it is called æolic; at this point it carries about six parts of ferrite to one of cementite. Cementite is hard and brittle, ferrite (pure iron) is tough and pliable; hence good carbon-steel or pearlite is a network of enmeshed hard cementite and tough ferrite, an ideal warp-and-woof molecular weaving for the basis of structural iron.

For glass making, red lead should be quite pure and free from iron and copper.

The radium mine near Issy l'Évêque, France, promises to be an important source of this rare substance. It is reported as a curious instance of a pitch-blendé carrying no uranium. Surely the reporter's pencil has blundered herein. The reference is undoubtedly to a radioactive pyromorphite at the same locality.

United States Mining Laws.*

By JOSEPH H. HARPER.

Mr. Goodale has called attention to the difficulties that attend a determination of the rights conveyed by a patent that grants, in addition to the usual surface title, an extra-lateral right upon the dip or downward course of all veins, lodes or ledges, the top or apex of which lies within the area ceded. I have endeavored to appreciate these difficulties, and later you will see that I attribute them mainly to causes that are in no way related to any provision in our mining law, and I have full faith that relief can usually be found, and that practical immunity can be secured without revising the statutes for this purpose.

Before going further I would have it clearly understood that I am not taking issue with those who propose to amend the law, for it is doubtless very imperfect; it probably stands in sad need of amendment, and it may even be possible that the proposed change is the best solution of many difficult problems; but the arguments usually advanced by those who are advocating this particular change have failed to impress me. On the other hand, it does not seem that those who propose the abrogation of all extra-lateral rights take the question seriously enough, for experience has taught me to regard all departures from established practice seriously, and I cannot help regarding a change so radical as the one proposed otherwise than as profoundly serious. It is always an easy matter to find fault with a law or a practice that is in operation, and very difficult to formulate a substitute that will satisfy every interest and be beyond criticism, for the defects and complications are exposed in the one that is being enforced, while in the other they remain hidden and unexplored.

My experience in years past has led me to believe that our lateral provisions are based upon an equitable principle applied to conditions that actually exist in our mining industry, and in spite of the volumes of testimony that have accumulated regarding the erratic conduct of some of the veins in this locality, I still hold to the opinion that our ledges here, as elsewhere in the State and throughout the Northwest, do, as a general thing, extend laterally on courses fairly continuous, and that they usually dip upon angles that are fairly uniform. You gentlemen all know this to be a fact, for there is hardly an underground map in the district, either in plan, profile or cross section, that does not demonstrate it, hardly a stope sheet in the camp, of work performed outside of the area of hostilities, that will not convince the most skeptical of this general truth.

And this leads to the question whether or not an exhaustive study of Butte's liti-

gation is altogether profitable, for in doing this we obtain a distorted view of the natural and prevailing conditions of mining in general—a view so obscured by legal issues, quibbles and technicalities that pertain to every question under the sun, rather than one pertaining to legitimate mining, that I fear our conclusions are prejudiced in the extreme, if not perverted altogether. I do not think it possible to fairly estimate the merits of this provision of our statutes, as applied to our mining industry, without disregarding almost entirely by far the larger part of the issues involved in mining litigation in Silver Bow county, and I feel that a large part of that furnished by bitterly contested cases in other localities is equally untrustworthy.

This statement is predicated upon a condition that always seems to exist when a legal contest becomes severe—a spirit that is rarely confined to one side of the controversy, but is manifested in the settled purpose of both parties to make the best possible showing, with but little regard for the facts of the case or the equities that may be involved. That conclusions are conscientiously reached signifies nothing, as this is accomplished for both parties by giving prominence to all features favorable to the theory they are advancing and quietly ignoring everything that is not in harmony with it, a professional convention for perverting the truth.

The merits and value of the extra-lateral provisions of the law should be studied in the light of experience furnished by men, who, single-handed and alone, are following veins and ledges for the valuable ores they produce, the smaller operators that are dotting the hill-tops and mountain sides in every mineralized section of the State—the men who are spending the best years of an active life in following an evidence of mineralization for what it may at some future time be found to contain.

It is charged that this law contemplates that all deposits shall be true planes with a regular strike and constant dip, and that, as but few veins possess these characteristics, the law fails in not anticipating this complex condition and cannot be applied under all circumstances. It must be granted that erratic conditions as to both dip and strike are frequently exhibited in our precious ore deposits, but the fact remains that they are, for the most part, fairly regular, that the locator is given full latitude in determining the course, and that, failing in this, a penalty is enforced against him by withholding these extra-lateral rights and confining within vertical boundaries. This is the substance of the old Flag Staff decision, which enunciates a principle that I yet expect to see the courts constantly enforcing.

The geological construction of our precious metal veins, the fact that the ores generally occur in fissures through the

country rock and along contacts between different formations, the fact that they rise to the surface and outcrop on lines that can be traced with a fair degree of assurance, the fact that their extension is lineal and not superficial, to my mind suggest the manner in which they should be located and claimed. In fact, the present form and dimensions of a location allowed by the statutes appeals to me as admirably adapted to secure the visible portion of the ordinary vein, with sufficient surface ground for developing it; and if perchance there are other veins within the limits of this surface they also are granted under like conditions.

Personal experience in my practice, which covers a period of over thirty years, during which time I have been in close touch with some of the heaviest operations in the State, with hundreds of smaller concerns and with thousands of individual miners, has convinced me that the extra-lateral privilege is a powerful incentive to the development of our mineral resources. The industry of mining our precious metals possesses a charm that is peculiarly its own. The alluring excitement of a hazardous game is presented with an element of legitimate business, in a manner to lend character to the enterprise and remove the curse of gambling. There is a fascination in pursuing day by day and step by step a bare trace, or perhaps a mere streak without a trace, in the hope of exposing in the not far distant future another of nature's secrets, and one of the world's bonanzas. To confine these anticipations within vertical side walls is to break the charm, for 600 by 1,500 ft. is hardly large enough to circumscribe the development these operators contemplate.

Personally I do not know, but if I have read aright, the prospector and small operator, as we know him, is almost unknown in regions where extra-lateral rights are denied, and I believe that capital in contemplating development work unconsciously pays tribute for the extra-lateral privileges secured by our mining laws.

Thus far have I discussed but one issue presented by Mr. Goodale's paper, and from what I have said it will be seen that we occupy opposing positions regarding the retention of the extra-lateral principle in our mining laws. That we have both reached our conclusions by an honest and conscientious consideration of the points involved, I think, goes without saying, and that we differ so radically is owing to the fact that we have studied the question from different points of view. I most heartily concur upon nearly all other points presented in his paper, presuming only to question the proportion of Butte's troublesome litigation that is properly chargeable to the condition of our mining laws, and must insist that the prejudices of a jury, the attitude of a judge or the temper of the litigants are not conditions

*Discussion of paper read by Mr. C. W. Goodale, before the Montana Society of Engineers, and published in this JOURNAL, February 2, 1905.

for which the statutes should in the remotest degree be held responsible. By inference, from the general tone of Mr. Goodale's article one is forced to conclude that he attributes by far the larger part of our troublesome litigation to the condition of our mining laws. I cannot take this view, but incline to the belief that with the same incentive—that is, the same valuable ore deposits, with the same man in charge of affairs and the same temper between litigants—the results could not have differed greatly, no matter what the provisions of the statutes might have been.

Another feature of our local unpleasantness, I think, is worth noting, and that is that much of it has arisen from an overweening confidence in the extra-lateral right, by a straining of this principle that it is now proposed to abrogate, to the point of rupture, by an apparent determination to continue to live in the old glass house and yet persist in throwing stones. That those directly responsible are now off the stage does not mend matters, for the present management is reaping the fruit of this short-sighted policy.

Mr. Goodale in his paper has pointed to the course pursued by the wise prospector and prudent purchaser, a policy that, had it been introduced earlier, would without question have avoided a world of trouble. It should be remembered as pertinent to this discussion that the remedy suggested is as readily applied under the present law, without amendment, as it would be under the one proposed, where the ground is vacant: that if the adjoining lands are appropriated all attempts under either provision will be futile, unless the appropriator of the lands can be pacified, and that if this be impossible, the law, as it stands, will furnish a measure of protection through the extra-lateral provision, provided the claim has been properly located; while the proposed amendments furnish none whatever.

Do not understand from all that precedes that I am unalterably opposed to a change in the law, or to the abrogation of all extra-lateral provisions even, for I have only intended to say that, in my estimation, the arguments advanced, when applied to our mining industry in general, including even the distressing local conditions prevailing with us, and studied under the light in which my personal experience has taught me to regard them, in no wise warrant a change from established practice.

On the other hand, let me say that, to my mind, a more potent reason for modifying the extra-lateral provisions, appears in the difficulties that arise when we attempt to apply them to flat or bedded deposits, as distinguished from fissure, fault, or contact enrichment. I am not prepared to state my position with regard to these difficulties at the present time, and, as a satisfactory discussion thereof would probably fill the hours allotted to another

meeting, I close with the following brief observation on this point:

First—That I am not convinced that congressional action is required.

Second—That I incline to the opinion that local action may be able to accomplish every purpose.

Third—That Colorado has passed through a crisis of this character, without amending the statutes.

Fourth—That I incline to the belief that a solution may be attained along the lines above mentioned.

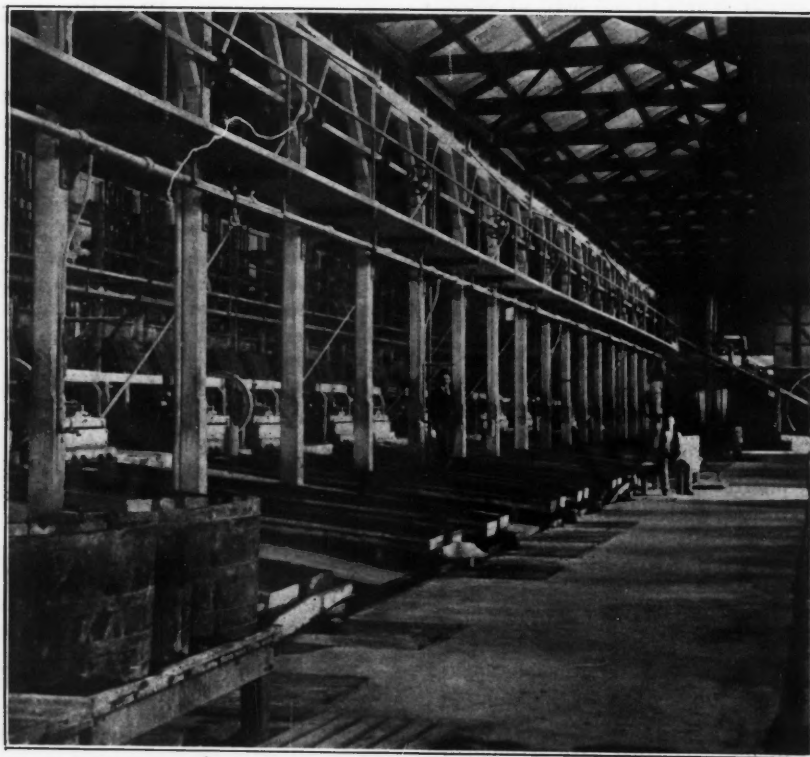
According to recent investigation, slaty cleavage may be regarded as a fault fractionized and distributed over an infinite number of infinitesimal steps.

Fluorine is one of the paradoxes of modern chemistry. It is so active that its isolation (by Moissan) is a matter of re-

Gold Mining in Victoria.

SPECIAL CORRESPONDENCE.

Now that the year's records are out, it is possible to make a comparison of the results of mining work in the State of Victoria during 1904. The output, calculated from figures supplied by the Mines Department and the banks, shows that 771,298 oz. fine were won, against 764,822 oz. fine for 1903. The gross output as reported by the Mines Department was 821,017 oz., as against 822,424 oz. for 1903, but the first set of figures may be taken to be accurate. The position of the State as a gold producer is very satisfactory when it is seen that the return is fairly well up to the higher average maintained by the State since 1897. There can be no doubt that the result of the profitable work done during the past year at the leading mining centers in Victoria has



17A BENDIGO STAMP-MILL.

cent history; yet its acid is dissociated to only a slight degree in water.

Thallium has an 'alum.' The type formula of the alums shows double sulphates of an alkali (monad) metal, with an 'earth' (triad) metal like aluminum. It must be remembered that, in its alum, thallium does not replace the aluminum (the triad), but the monad alkali-metal.

Helium is the only gas which has not been yet satisfactorily liquefied.

Sirius, the brightest star in the northern heavens, is only two and one-half times as massive, but it radiates twenty-one times as much light, as the sun.

helped to alleviate the shortage occasioned by the drought of three seasons ago. As a matter of fact, Victoria is now the most solid State of the Australian group, and is lending freely to its neighbors. The Mines Department, in an interesting chart, shows that the average earnings per miner in the State during the last two or three years have gone up steadily. Thus, in 1903 the sum reached £130 10s. per head, which is the highest figure since 1854, the days of the gold rushes to the magnificent alluvial deposits at Forest Creek and other districts. The cause for this is the concentration of men in the big mines of the State and the gradual extinction of alluvial mining, apart from deep lead mining.

Bendigo, as of yore, is the Cinderella of the industry. Four years ago its permanent decadence seemed assured. But the developments on the Moon mine and the opening up of gold on some of the lines of those saddle formations, which have been the great gold producers of the past, have brought the field to the front. Compared with it, Ballarat—famous for the wealth obtained from its deep leads—sinks into insignificance. The only field comparable with it in the Eastern States of Australia is Charters Towers. The figures of the two districts for 1904 may be of interest, and, therefore, I give them.

	Bendigo.	Charters Towers.
Tons crushed.	389,707	240,250
Gold won, oz.	248,000	235,131
Cyanide bullion, oz. ....	.....	128,541
Calls.	£168,094	£83,067
Dividends.	£367,896	£399,128
Surplus of dividends.	£199,801	£316,060

In examining these figures it will be seen that the dividends paid by Bendigo mines were equal to nearly 30s. per ounce of gold won, and when the average of the stone is taken, this will be admitted to be a very good record. No cyanide work is done, the recovery being so close that it is never attempted. At Charters Towers, however, the mineral in the ore necessitates cyanide work. The value of the bullion there is low, the 128,541 oz. won being set down as worth £245,999. The supremacy of Charters Towers has very largely been due to the productiveness of the Queen Cross-reef, which paid £220,000 in dividends during the year; the Brilliant & St. George, which distributed £70,000; and the Brilliant Center, which paid £60,000. The chief dividend earners at Bendigo were South New Moon, £120,000; the New Moon, £48,000, and United Ulster, £32,800.

Bendigo to date has produced 13,977,439 oz. and the State of Victoria 67,500,000 oz. of gold, of the value of £270,000,000. This is not a bad record to set up in 54 years.

Metallic calcium has a specific gravity of 1.5 and a melting point of 792° C.

Portland cement is a calcined mixture of alumino-silicates and limestone. One of the problems of economy is to use the slag of the stack furnace (whether iron, lead or copper) as an ingredient and agent for the making of portland cement.

The resistance of tantalum increases strongly with a rise in temperature, as opposed to carbon, which diminishes in resistance as it becomes heated. This fact has been made use of in the construction of a new form of incandescent lamp. Tantalum, originally brittle, has, by treatment, been made sufficiently ductile to be drawn into wire, which has been used with great success as a filament for the tantalum lamp. It has a life of about 1,000 hours, and burns at once on being connected, without any previous heating.

Bleaching Barytes.*

By EDWIN HIGGINS, JR.

In preparing barytes for market, the mineral is first crushed and then washed, after which it is ready for bleaching. The size to which the mineral should be crushed depends on the amount and character of the iron present, varying from pea-size, if the iron be in the form of a scale, to ½-in. size if the mineral be only iron stained. In the former case, the bulk of the iron can sometimes be removed by jiggling.

The crushed mineral is bleached in wooden tanks, lined with sheet lead, tanks holding from 5 to 25 tons of mineral being commonly employed. Each tank is provided with a steam pipe, to which is connected 1.5 or 2-in. lead pipe, this lead pipe being coiled in the bottom of the tank, closed at the end, and provided with small perforations from 6 to 8 inches apart. Steam escaping from the perforations agitates and heats the bleaching solution.

The bleaching solution is sulphuric acid diluted to about 20° to 30° B. The mineral is charged into the tanks to a depth of about 3 ft., after which the acid solution is run in and steam is turned on. The time required to bleach the mineral varies from 6 to 80 hours, depending entirely on the iron content of the mineral. It is the usual practice to leave the steam on continuously, although good results may be obtained by cutting it off for half an hour at intervals of one hour.

After the bleaching is finished, which is determined by inspection of samples of the mineral, the cleaned mineral is discharged either through a spout, or else by shoveling over the side of the tank. It is then transferred to a washer, where the last traces of clay and acid are removed, after which the mineral is dried on a pan, or by means of a rotary dryer.

The cleaned dry mineral is reduced to the size of fine sand by means of rolls, and finally to an impalpable powder by means of buhr-stones. The powdered mineral is then ready for barreling and shipping.

The quantity of mineral that can be bleached and milled in 24 hours depends upon its iron content, and also its friability. However, the average mineral can be bleached in 24 hours, and from 30 to 40 tons can be milled per 24 hours by 12 buhr-stones of 3.5 ft. diameter.

A slight reddish or yellowish tint in the finished product, caused by incomplete bleaching or washing, is sometimes removed by the use of a small quantity of blueing, from 0.5 to 3 ounces per ton of mineral, but this practice is not general, being objectionable to some of the trade.

Manganese dioxide, a common impurity in barytes, cannot be removed by the use of sulphuric acid alone. Such mineral

*Abstract of an article in *Engineering News*, Feb. 23, 1905.

has to be ground to pass a 40-mesh screen, mixed with nitrate of soda, salt, and sulphuric acid in proper proportions, and transferred to a specially constructed furnace. This process converts the iron and manganese into chlorides, which are very soluble in water, and are completely removed by washing and settling the mineral in a series of tanks, generally three in number.

In bleaching barytes, a circular tank is preferable to a rectangular one, for the reason that the steaming can be more uniformly done. A tank 4.5 ft. high, and 8 ft. in diameter, is a convenient size. Reckoning that the average crushed mineral weighs 160 lb. per cu. ft., a tank of that size charged to a depth of 3.5 ft. will contain approximately 14 tons. A larger tank would require two steam inlets, which would complicate the arrangement of the lead pipes in the bottom of the tank. The tank should be made of stout, well-seasoned wood, preferably cypress, should be well braced on the outside, and lined on the inside with heavy sheet lead. Connections should be made so that either steam or water may be supplied through the perforations in the lead pipes. These perforations are best located at an angle of 45° off the vertical diameter of the pipe, rather than directly on top, in order to prevent clogging of the pipes with fines.

One of the greatest items of expense in the process is the steam for heating and agitating the bath. This expense may be greatly reduced by use of an ordinary injector, a mixture of air and steam being used instead of steam alone. The amount of air used can easily be regulated, so that the acid will not be cooled too much. The temperature may be kept at 200° F.; better agitation will result; the acid will suffer less dilution from condensing steam, and the steam consumption will be reduced one-half.

The weak acid drawn off from the bleaching tanks, containing more or less iron in solution, is run into a special tank, wherein the iron can be precipitated together with sulphate of lime by means of milk of lime. This precipitate, when dried and roasted, makes a very good red pigment.

The artificial sulphate of barium, known as blanc fixe, is prepared by mixing finely ground barytes with one-fourth its volume of coal and heating to a high temperature in a crucible or retort. The barium sulphate is reduced to sulphide, which is dissolved in water, and the solution filtered. From this solution barium sulphate is precipitated with sulphuric acid. The resulting product is absolutely white, and entirely free from grit, and is more valuable than the best grade of barytes produced by any other process.

No large use has yet been found for tellurium. Here is a field for invention.

The Mesabi Iron Ore Range.—VII.

By DWIGHT E. WOODBRIDGE.

Methods of sampling ore in the ground vary with mine management or with conditions, and so do the accounts kept of ore as produced. Mines that ship to market under certain specified guarantees, with a bonus for an excess of iron or diminished quantity of phosphorus, or a penalty for the reversed conditions, must be more careful of their grades, both in mining them or in sampling, than properties that ship direct to owners. This is more especially true when the works owning the mines is a small consumer, and where the additional expense of the detail of thorough system would bear more heavily on each ton of ore. In the past few years the selling price of Lake ores has reached so close an adjustment that it is figured out to fractions of the cent, and the premium or penalty for phosphorus reduced below .045%, or in excess thereof, is definitely and accurately figured for each .005%. Ores sold under certain guarantees are paid for on the basis of those guarantees, with the penalty or premium figured out, and the actual settlement price may vary materially from the figure named in the contract, unless the final assay values are similar to the guaranteed grades. Great care is therefore necessary in grading and sampling ores as they are mined and shipped.

At some mines, preparatory to open-pit operations and after the surface has been removed, pits are sunk all over the orebody at distances varying with the discovered rapidity of changes in grade, but averaging from 70 to 100 ft. apart, and these are sampled to the depth of the first cut, say 23 to 25 ft. With the results of this sampling plotted on the mine plan, it is easy to determine just how many tons of specified grades can be mined over a certain area and to the depth figured. The particular portion of the mine from which the different grades shall be taken is also determined, and it is an easy matter to direct shovel work to any desired tonnages.

At the Mahoning mine, which is an open pit of great size and easily handled, Manager W. C. Agnew worked out a system of grading, sampling and shipping that is in quite general use. It keeps him in very close touch with the daily situation. In this system the orebody as a whole is known, for a considerable distance ahead of the mine shovels, by pits that have been dug to the depth of a cut at every intersection of lines drawn 50 ft. apart each way, and have been thoroughly sampled and assayed. If it so happens that the ore shows unusual changes between adjacent pits, additional sampling is done directly ahead of the shovel at close intervals. It happens that Mahoning ore varies little in iron, though running to a much wider divergence in phosphorus. As the ore is mined and loaded into cars,

samples are taken of each 150-ton lot; if in 50-ton cars, of every three, if in 30-ton cars, of each five, which is about the capacity of a dock pocket. Analyses of these samples are sent to the ore-shipping dock, and so rapid is the work that often results are known before the train leaves the mine yard, always before it reaches the dock. In the mine office is a receptacle containing a series of envelopes numbered and arranged to correspond to the pockets of the shipping dock, and as soon as made out, a copy of the assay card for each set of cars is slipped into its place. Usually trains are not broken between mine and dock, and it is an easy matter to direct where the cars shall be put and to check the pockets into which they have been dumped. When a vessel is loaded the pockets from which the cargo has been taken are reported to the mine office, and by averaging the assays of cars filling these pockets a very close figure of the cargo analysis is determined. This gives a cargo determination more exact than can be secured by any practicable manner of direct cargo sampling.

Mahoning ore is sold on a guarantee of 63.5% iron and .045% phosphorus for its Mahoning grade, and 62% iron for its non-bessemer Beaver, and the ore assaying at the mine within certain limits is classed as firsts, and that between certain other lower limits as seconds. By knowledge of the iron and phosphorus values in each 150-ton lot, it is easy for the mine management so to handle shipments to dock as to bring down to guarantee a 66% or 68% ore by the addition of such a volume of seconds as will make the average of the whole 63.5%. This avoids the mixing of ores in cars by the shovel, as is sometimes done, and requires merely the simplest mathematical calculation to preserve the equality of the shipment. Cars are marked 'first' or 'second' upon leaving the mine yard, and the dock superintendent knows where to put them when they arrive within his ken. The railway company is put to a trifling inconvenience, but receives its cars without the delay incident to a different method.

The close correspondence between mine assays and those of cargoes taken at receiving docks or furnaces is remarkable. One case I have in mind made these equalities:

Average cargo analyses as calculated in mine office from individual samples:

Mine first grade; iron, 65.57, phos., .0483.

Mine second grade; iron, 63.13, phos., .0890.

Average cargo analyses as determined from cargo samples of the same ores taken at Cleveland docks:

Mine first grade; iron, 65.35, phos., .0450.

Mine second grade; iron, 63.30, phos., .0860.

These are for the entire season and on a business aggregating about 1,000,000 tons. It will be seen that there is a difference in iron of but .22 and .17% respectively, and in phosphorus .0033 and .003% respectively. This remarkably close concurrence is not unusual, but can be duplicated at many mines.

There does not appear to be any law for the occurrence of high- or low-phosphorus ores in a deposit. Some years ago, at Mountain Iron, Mr. W. J. Olcott made a plot of the different stopes removed by the steam shovel, and found that in cutting, the first 50 ft. might be low and the next high, and the third would as frequently be between the former as anywhere else. He came to the conclusion that frequent and careful sampling was the only way to sort this ore. Different deposits show varying conditions, and with the structure of Mesabi ores, as has been shown, it is sometimes hard for a shovel to maintain grade even in one cut. These cuts vary somewhat in width. At Mahoning the shovels are built with low-swung booms, and a machine will make a cut 50 ft. wide while working along a stope. In this way it is able to save one series of moves in each four or five cuts. The wider the cut taken the more uniform the grade is likely to be.

An understanding of the occurrence of the various values of ore in the mine, its iron content, and its percentage of phosphorus, silica, manganese, moisture and the various minor elements making up the ore, is the basis of all underground operations, and enables the management to work steadily toward a definite end. This understanding is based on a careful exploration and sampling.

Underground sampling is first, of course, on the original results of drill-hole exploration. These are used merely as a general guide for the purpose of determining where development shall be driven for securing ores within certain limits. When levels are opened subsequent to the information received from drill analyses, they are sampled thoroughly, usually every five sets, or about each 35 ft., and the figures obtained are plotted on the mine plans. The actual mining follows these results and the superintendent is able, by watching his plans and directing where stoping shall be done, to bring to surface just about what he wants. A set of samples to corroborate those from levels is taken out of the cars as they are dumped into the shaft pockets. From these the grades of the daily hoist are ascertained, so that shipments or stockpile averages are always at hand. Car samples are also taken in a manner similar to that referred to as for Mahoning, and the delivery of ore at dock is directed from the mine. All these various samples of each set are combined, quartered down to laboratory size, dried and analyzed in

the customary manner, though some Mesabi range firms have special methods of analysis that give the results in much less time than is usually required. Their methods are, however, professional secrets that are their own property. Methods of sampling vary with the accuracy demanded, but within limits that are common to mining in general.

Sampling is kept so close to mining that after the sampler on the night shift has completed his work, pulverized and delivered his pulp, it is but a short time before the determinations are completed, and a few hours after the sampling is done the results are known. The management is thus able to judge the grade of all mined ore at any time almost at once, and of the exposed faces as well. At some mines, in order to accurately locate the source of all samples, a tracing of each working is prepared, and on this tracing at the end of each shift the various analyses are marked. In the additional check of car samples, the cars are taken by diagonally crossing the car twice with handfuls at frequent stated intervals. In some mines the sampling of stopes is done daily, at others less frequently, the basis being the tonnage, the regularity of grades, the fact of ownership of mine, that is whether or not the mine is shipping to its own owner, in which case the sampling is sometimes less frequently done, and for other reasons. There are cases on the Mesabi in which mines owned by iron works have very rarely, if ever, taken a determination for anything but iron and phosphorus. A few years ago it was the rule that samples should be taken at the shipping port, but this system is falling into disrepute as being an unnecessary expense and trouble. During stock-piling season samples are taken underground and at pockets, and the grade of the pile is thus determined. When shipping from the stock the cars are sampled.

At some mines the matter of sampling is a matter of personal attention on the part of the captain, who is familiar with results from every part of the mine, and changes men about, whenever thought best, to get out a larger or smaller proportion of certain percentages, to make the desired shipping grade.

Lake Superior ores vary considerably in moisture, from more than 17% in the case of one Mesabi range property, to less than 0.4%, as in the case of the Cliffs shaft, Marquette, and Soudan lump, Vermilion range. No range averages as high as the Mesabi and none so low as the adjacent Vermilion. Some 33 grades of ore carry moisture in excess of 12% of their weight, and still more vary from 10 to 12%. The figures of the analyses of Mesabi range mines, for 1904, are given herewith; the samples for the determinations were dried at 212° F.

The tendency is to reduce the number of grades and widen the limits within

ORE.	Iron.	Phos.	Silica.	Mang.	Alumina.	Lime.	Magnesia.	Sulphur.	Loss by Ignition.	Moist.
Adams.....	61.0446	.0362	4.5891	.5687	.....	.....	.....	.....	.....	10.4545
Adams No. 2...	57.7159	.0757	5.2713	.7016	.....	.....	.....	.....	.....	14.8332
Admiral.....	63.800	.027	49.00	.300	.620	.230	.180	.006	2.140	7.800
Agnew.....	59.93	.056	5.24	.87	2.34	.16	.13	.....	4.82	15.66
Albany.....	60.00	.077	3.74	.75	1.80	.30	.19	.008	7.04	11.60
Beaver.....	63.20	.079	2.39	.28	1.39	.23	.15	.016	4.45	10.438
Bessemer.....	60.50	.038	.....	.....	.....	.....	.....	.....	.....	8.00
Biwabik.....	61.93	.044	4.54	.49	1.37	.32	.08	.010	4.47	8.75
Butler.....	62.00	.055	4.50	.49	1.20	.32	.08	.010	4.47	8.00
Cass.....	59.00	.040	9.32	.939	1.765	.24	.05	.014	5.20	9.00
Chisholm.....	61.2441	.0457	4.9473	.7585	.....	.....	.....	.....	.....	10.1166
Clairton.....	60.00	.059	.....	.....	.....	.....	.....	.....	.....	10.00
Clark.....	62.7307	.0321	3.5830	.6361	.....	.....	.....	.....	.....	9.5759
Commodore.....	63.100	.039	4.150	.200	1.210	.240	.060	.004	3.400	9.30
Corsica.....	57.00	.044	9.05	.98	1.27	.19	.18	.009	6.22	12.15
Crosby.....	58.00	.040	.....	.....	.....	.....	.....	.....	.....	10.50
Croxton.....	58.87	.057	6.38	.718	1.446	.22	.16	.010	6.04	10.102
Cyprus.....	60.25	.064	3.78	.98	1.77	.29	.22	.009	6.35	11.76
Duluth.....	60.7764	.0453	5.0045	.....	.....	.....	.....	.....	.....	10.1379
Elba.....	61.67	.036	4.13	.96	1.03	.20	.11	.008	4.70	8.72
Fayal.....	63.0445	.0328	3.9870	.....	.....	.....	.....	.....	.....	8.5917
Franklin.....	62.00	.037	.....	.....	.....	.....	.....	.....	.....	6.39
Genoa.....	62.6554	.0295	4.1599	.....	.....	.....	.....	.....	.....	8.9500
Grant.....	60.84	.073	5.05	.....	.....	.....	.....	.....	.....	13.47
Hawkins.....	56.89	.047	11.59	.27	2.13	.19	.14	.....	3.95	11.79
Higgins.....	62.00	.035	8.00	.....	.....	.....	.....	.....	.....	8.50
Holland.....	61.00	.040	5.27	.41	.92	.29	.11	.012	3.37	10.00
Island.....	61.5846	.0610	3.8914	.....	.....	.....	.....	.....	.....	10.9440
Jordan.....	62.10	.057	4.150	.625	.628	.153	.154	.006	3.584	10.200
Juniata.....	61.1178	.0490	6.1829	.2879	2.3817	.....	.....	.....	.....	13.4426
Kanawha.....	53.691	.0826	.....	.....	.....	.....	.....	.....	.....	12.514
Kinney.....	58.50	.09	5.00	.60	2.50	.70	.40	.....	.....	11.00
LaRue.....	60.00	.045	7.87	.423	.958	.16	.03	.012	2.72	8.9500
Leetonia.....	61.00	.061	3.81	.975	.924	.05	.04	.009	6.93	13.47
Leonard.....	59.95	.071	3.24	.38	1.67	.24	.12	.008	6.50	11.75
Lincoln.....	58.41	.039	10.22	.....	.....	.....	.....	.....	.....	8.50
Longyear.....	57.675	.0621	.....	.....	.....	.....	.....	.....	.....	10.00
Mahoning.....	65.20	.047	1.90	.28	1.06	.15	.05	.019	3.20	10.9440
Malta.....	62.63	.027	5.60	.70	.80	.28	.18	.012	2.45	10.200
Minorca.....	60.00	.035	8.62	.64	1.76	.29	.18	.008	2.53	13.4426
Morris.....	60.00	.060	.....	.....	.....	.....	.....	.....	.....	12.514
Morrow.....	60.00	.061	7.52	.810	1.391	.22	.05	.016	4.94	11.00
Mountain.....	63.4528	.0429	4.3351	.2092	1.9757	.....	.....	.....	.....	13.2577
Oliver.....	62.3949	.0491	5.1103	.2417	2.1360	.....	.....	.....	.....	10.00
Pearce.....	60.00	.045	7.00	1.10	1.50	.18	.30	.020	5.62	9.1644
Penobscot.....	59.8843	.0540	6.6604	.....	.....	.....	.....	.....	.....	10.2784
Pillsbury.....	62.5452	.0412	4.1964	.....	.....	.....	.....	.....	.....	12.8377
Preble.....	60.3268	.0503	6.6447	.3198	2.3682	.....	.....	.....	.....	10.00
Sauntry.....	60.50	.065	4.75	.....	.....	.....	.....	.....	.....	12.5276
Sharon.....	57.4201	.0599	7.6562	.....	.....	.....	.....	.....	.....	12.00
Shenango.....	60.00	.040	.....	.....	.....	.....	.....	.....	.....	9.93
Shilling.....	62.18	.063	3.81	.65	1.36	.10	.05	.010	6.09	8.29
Sparta.....	62.53	.028	6.44	.52	.89	.17	.13	.010	2.25	17.0307
Spruce No. 2...	58.4383	.0690	4.3472	.6192	.....	.....	.....	.....	.....	11.0574
St. Clair.....	57.9121	.0776	6.8596	.....	.....	.....	.....	.....	.....	14.4956
Stephens.....	59.4478	.0621	4.5467	.4409	2.6804	.....	.....	.....	.....	8.250
Stephenson.....	64.100	.038	3.600	.350	.760	.315	.148	.004	1.420	10.1612
Thompson.....	62.4480	.0363	3.4253	.6451	.....	.....	.....	.....	.....	9.99
Top Brown.....	61.00	.037	7.34	.59	1.11	.29	.21	.010	2.86	12.00
Troy.....	55.00	.035	10.68	.69	3.17	.25	.74	.138	5.43	13.4497
Tubal.....	59.6991	.0633	5.4679	.....	.....	.....	.....	.....	.....	9.867
Union.....	59.02	.052	.....	.....	.....	.....	.....	.....	.....	7.90
Victoria.....	61.00	.051	.....	.....	.....	.....	.....	.....	.....	10.00
Virginia Mines.	62.60	.075	3.00	.....	.....	.....	.....	.....	.....	8.570
Wallace.....	62.950	.051	3.670	.392	8.58	.215	.157	.006	2.100	.....

which one ore can be shipped. Some years ago ore mined at the Soudan mine, Vermilion range, was sorted into no less than seven different classifications, some of them very close together. This may have been necessary then, but would be so no longer, even if the Soudan production was as large now as in earlier years. But there, going through each of the docks of the head of the lake railways, are as many as 40 to 50 different grades of ore. Large shippers show a tendency to eliminate mine classification in favor of grades chemically similar, though from widely separated mines. Still, there are going through docks, on long-term contracts yet unfilled, large amounts of ores that vary from each other by specifications from 0.5 to 1.5% in iron, and from 5-1000ths to 20-1000ths in phosphorus, distinctions so slight as to make them especially exacting.

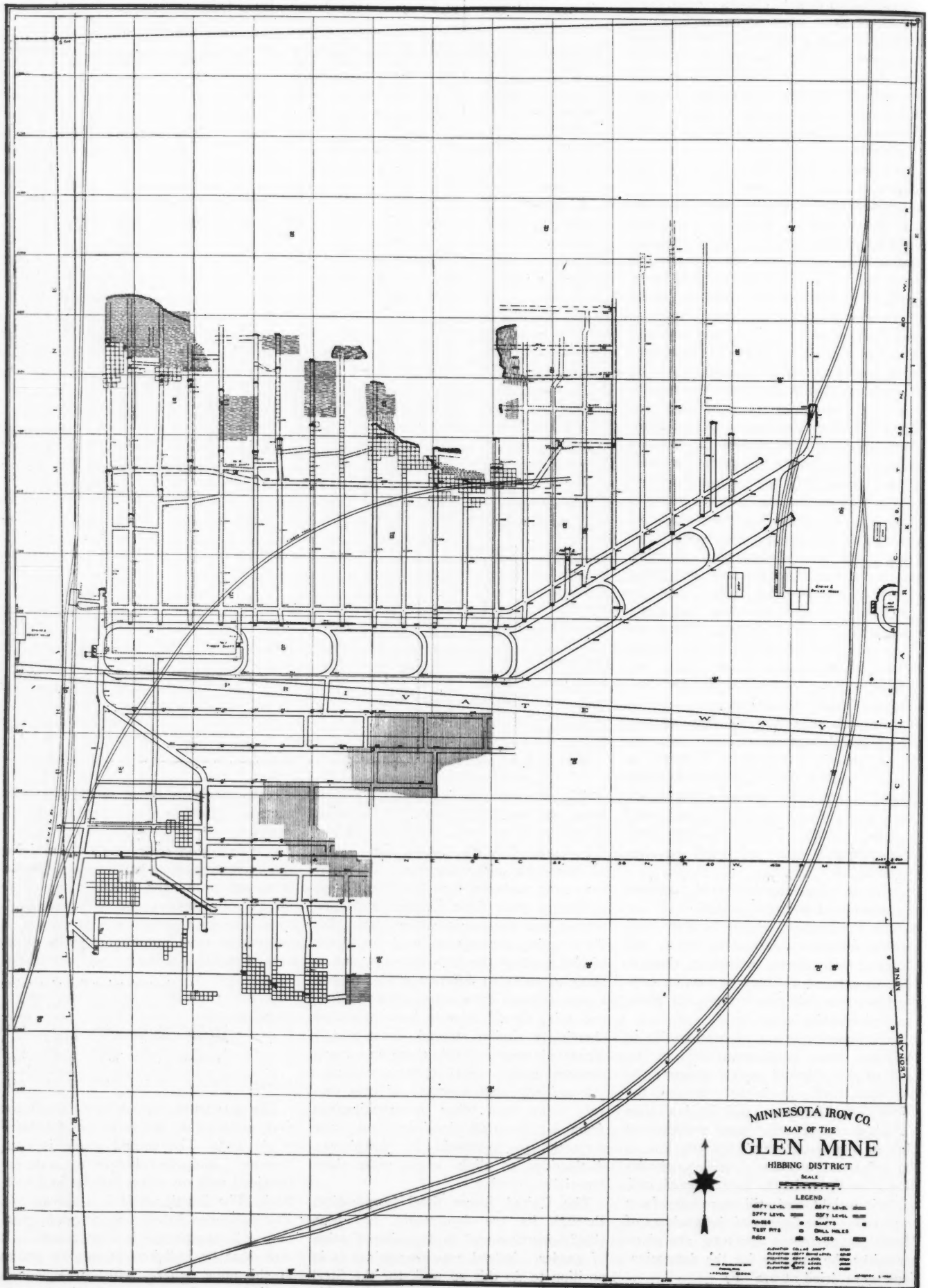
The United States Steel Corporation, through its ore department, has been chiefly instrumental in the simplification of grades. Indeed, no other miner is in position to do this so well, for the Steel Corporation has the advantage of a wide choice of mines from which to ship, and

a correspondingly broad selection of furnaces to which its ore product can be diverted.

The following table shows the weights and average analyses of all grades shipped from one prominent Mesabi range mine for an entire season, and the correspondence between the two sets of figures is one of the most remarkable in its closeness of checking that has ever been made:

Grade.	Tons.	Samples taken from cars at mine averaged:		Samples taken from boat at Cleveland.	
		Iron.	Phos.	Iron.	Phos.
1.	307,752	62.08	.0448	61.93	.0444
2.	363,647	60.87	.....	60.82	.....
3.	115,245	61.36	.0547	61.20	.0538
4.	12,789	63.12	.0471	62.91	.0458
Average..	799,433	61.43	.0488	61.33	.0478

The guarantee for phosphorus on the first grade was .045, and on the third grade .055. The second grade is non-bessemer, and the phosphorus was determined only on a few cargoes at Cleveland. The fourth grade is a special ore. The accuracy of these ores to grade guaranteed in phosphorus is most notable. It was done by judicious mixing of grades at the mine, where, with three shovels loading ore, five were maintained ready for operation, two of them in diverse



grades, to either of which a shovel crew might be readily shifted if the exigency arose of bringing ores to a specified guarantee. These special shovels would be maintained with banked fires ready for immediate service, and the only delay was that of changing a crew and switching cars to the new location.

In sampling these cars 27 samples were taken from each car, nine on each side and nine down the center. It has been found that it is better to sample in small lots and more frequently than *vice versa*. This is especially necessary among Mesabi mines, as the variation of phosphorus is often 20 points in the width of a face. It is rather remarkable that there should be such close concurrence between the car and cargo samples, as the former determinations are always made from samples along the top of the filled car, and there may be a difference between the ore on top and that in the bottom of the car; but the steam shovel is a better mixer of the ore it drops into the car than is generally considered.

The map accompanying this number illustrates, in part, the method of plotting and arranging bore-holes, which was described in No. 5 of this series of articles. We hope to publish in this connection several other maps illustrating very fully this part of the method of prospecting and mining on the Mesabi range.

TIN IN DAKOTA.—Among recent discoveries of tin ore is that at Tinton, in Lawrence county, South Dakota, near the Wyoming boundary. The cassiterite is found in a granitic rock, which intrudes among mica and hornblende schists; the tin-bearing pegmatite is 245 ft. thick, and of this thickness 104 ft. is said to contain 0.69%, or, say, two-thirds of one per cent metallic tin. An adit 400 ft. long cuts this width of ore at 80 ft. below the surface. Open-cuts exhibit an extension of the deposit, and have yielded the material which has been sent to a mill, 3,000 ft. from the mine. The mill contains Gates crushers, roughing rolls, finishing rolls, a bucket elevator, spitzkasten, impact screens and Bartlett tables. It was intended to crush dry, but the mica in the ore rendered screening so difficult that wet methods were adopted. The concentrate obtained assayed 63% tin, and the loss in treatment was nearly 16%. It is expected that total costs of operation, with a large mill, would not exceed \$2 per ton, but this is on the assumption that a large and continuous supply of ore is forthcoming, which remains to be proved.

* The Zeeman effect produced by an electro-magnetic field on light is to double or triple or quadruple certain lines of the spectrum. All lines do not behave the same.

Grading Analyses.*

By H. S. DENNY.

In reducing an ore to pass a 25-mesh sieve, it may be taken as an axiom that we have practically every variation of fineness between that mesh and infinity in the finished product. In other words, the means adopted to obtain the product required will also ensure the passing of a large percentage of that product through a much finer mesh. Hence arises the necessity for what we are accustomed to term a grading analysis. A grading analysis is the determination in any finely ground mineral product of the percentage and value of two or more size-classified divisions of it.

The objects of the analysis are:

1. To show clearly the percentage of certain arbitrarily fixed degrees of fineness.
2. To enable the operator to arrive at the metallic contents of each of such percentages.
3. To judge the relative amenability to treatment of ores in the various stages of comminution.
4. To fashion the treatment practice, so as to gain the maximum extraction.
5. To assist in ascertaining where extraction is at fault and where the loss is made.

I admit frankly that I am still in doubt as to which particular method gives the most reliable results, and in order to make my perplexity quite apparent, I cannot do better than quote from the reports of four different mine managers.

Report A.—Sieving.—The screening, sand charges and sand residue are all graded dry (the slime only being graded wet), using sieves of 60, 100, 150 and 200-mesh; these four sieves all fit into each other with a cover and tight-fitting bottom compartment. When grading, the sieves are all superimposed, the weighed sample being placed in the top or coarsest sieve, and the series is well shaken, the cover being occasionally removed and the ore rubbed over with a camel-hair brush, each grade being finally finished separately over a sheet of glazed paper; when no more will pass that particular sieve, the contents are emptied out and put aside for weighing, the same routine being repeated until all that is possible is obtained of each grade, the balance having passed into the bottom of the compartment.

Sampling.—Out of each daily product of screening, sand charges and sand residues samples, 2,000 grains are kept, which is put aside until the end of the month, when the whole sample is placed on the sample table, well mixed and quartered down to a convenient size, sufficiently large to allow for repeating should it be necessary.

Quantities.—There are 20,000 grains graded from the screening sample, and

* Abstract of paper read before the South African Association of Engineers, January 25, 1905.

40,000 grains from sand charges, sand residues and slime samples.

Slime.—In grading the slime sample there are only two products to be considered, namely, sand and slime. The 40,000 grains of slime is weighed, and a portion is then put into the 200-mesh sieve, a large enameled dish is placed on the bench, and the clean water tap is connected with a short piece of india rubber tubing, the other end of which is used for playing a gentle stream of water on the sample, so as to wash all the slime through the sieve. The water hangs back in the sieve owing to the fineness of the mesh, but by frequently rubbing over the slime and water with a large camel-hair brush the slime is all gradually washed through, and only clean sand remains on the sieve. This sand is dried and weighed, and the percentage of slime obtained by difference.

Wet and Dry Methods.—From our experience in comparing wet and dry grading analyses, it is noticeable that, when using a nest of sieves constantly for wet work, the wire-cloth stretches so as to cause irregularity in the results obtained, as proved by the differences in running two lots of the same original sample through. On the other hand, when grading dry, and using a tight-fitting cover and nest of sieves, with a minimum of dusting, concordant results can be obtained over and over again.

Report B.—The wet method is adopted. The japanned sieves are arranged in their correct order, and the sand is gradually fed into the top sieve and washed through as far as possible. When this sieve is cleared of all slime (this point is denoted by the clearness of the water), it is removed, and the remaining sieves in order treated in the same manner. After the various products have been thoroughly dried, they are returned to their original sieves, and shaken for a few minutes to ensure that none of No. 2 product has remained with No. 1, or No. 3 with No. 2.

The amount of ore taken is 1,000 grams, equal to about 2 lb. avoirdupois. This quantity is chosen to simplify the working out of percentages.

Wet and Dry Methods.—Although the wet method takes a longer time, it has the advantage that the point when the finest product (that which passes 200-mesh) has been eliminated, is more clearly defined. There is also some doubt as to whether in the dry method the original condition of the ore under examination may not be altered by attrition.

Report C.—Both wet and dry methods have been tried, and lately the wet has been adopted, because of:

(1) Entire absence of loss from dusting, which is always in evidence with the dry method.

(2) Much less time is occupied, as the operation can be pushed without fear of loss.

(3) The results of the wet method show much less variation.

The one objection to the wet process is that it necessitates settling slime, decanting water, and subsequent drying of the product. As regards the wear of the screens, there is not much difference in this respect between the two methods.

Report D.—Locally made sieves 18 in. diam. and 3 in. deep are used, with the wire-cloth specially supplied; 1,500 grams are taken of the sample, and first treated on the 200-mesh. The reason for separating the finest portion first is that the presence of the coarse particles keeps the mass more open, avoids the clogging of the fine mesh, and thus facilitates passage; the amount of fine product is also at once eliminated. The actual separation is then made by gently shaking the sieve laterally, varied with the circular motion as in panning, and constant tapping on the frame of sieve. The latter method appears most effective, especially when nearing the end. The separation is considered complete when, by placing a clean sheet of paper under the sieve, and continuing the shaking for a few minutes longer, an unweighable quantity only is obtained. During the operation no brush or other means is used to assist the material through the mesh.

The residue is then transferred to the coarsest (60-mesh) sieve, the operation as before repeated and subsequently continued with the 100-mesh and 150-mesh, respectively. In the earliest stage of grading practice a nest of sieves was procured, the diameter being nine inches, and the depth two inches, but the sieving was found to be tedious and slow, and in order to deal expeditiously with the comparatively large amount of sample that was required in order to get sufficient of each product to determine its gold value, water was used both with a jet, and by partly immersing in the water the sieve and contents, and agitating, etc. This method answered admirably for the quick separation of the fine, or slimy, portion, but it was not at all satisfactory in separating the coarse particles; the difficulty lay in getting a satisfactory ending to the small particles persistently and in small quantities going through. This could not be obtained by the gentle impinging of a jet, or by the continuous and prolonged shaking and mixing with or without a spatula or brush, or by any other manner that could be devised. An average of four separate analyses by the wet method gave a 20% higher result for the product that remained on the 60-mesh than a similar number by the dry. This is due to the fact that the particles of the 100-mesh (and finer) product have not sufficient weight in themselves to at once settle in disturbed water, and find their way through the mesh (this point will be clear if the suspensory effect on slime is considered), and, furthermore, the wetness itself causes adherence of the particles.

It might be thought that a jet of water must necessarily carry through the mesh any particles sufficiently small, but mention must be made that only a weak jet can be employed, otherwise loss of sample by splashing would occur, and any pressure that would expand the mesh is to be avoided. The impracticability of using the wet method with sand and slime residues after cyanidation is demonstrated by the soluble gold being carried away in the wash water.

It may be assumed that all the particles of quartz upon their exit from the mortar-box are in a more or less fractured condition, and, therefore, all shaking, etc., in the subsequent sieving operations (in addition to self-attrition), must increase the fineness. The use of a brush or other means to assist the passage through the sieve has the effect of expanding the mesh, especially the fine, hair-like wires of the small sizes. A similar danger may arise from the weight of a large sample pressing on the mesh of a large sieve. After a sieve has been in use a few times the threads become worn and stretched.

A study of these reports will show that there is much diversity of opinion as to the relative merits of the 'wet' and 'dry' methods.

The questions arising are briefly as follows:

Dry Method.—1. Of what material should the screen be made?

2. What should be its dimensions?

3. What weight of sample should be taken?

4. Should the sample be treated first on the 200-mesh screen? (See report D.)

5. Should a brush or other instrument be used to agitate the sample on the screen? (See report A.) Or should a gentle shaking or tapping on the screen be adopted? (See report D.)

6. By placing glazed paper under the screen, can we determine the completion of the operation?

7. In view of the danger of wearing the screen down quickly or of enlarging its meshes, how often should a screen be used, and what check can be applied to determine its conditions?

8. Is the possibility of loss from dusting a serious drawback to the dry method?

9. Is the possibility of attrition more accentuated in the dry than in the wet method?

Wet Method.—1 to 5. Same as under dry method.

6. Is the screen worn more rapidly by the wet than by the dry method?

7. Same as under dry method.

8. In sand and slime residue, is the point raised in report D, regarding gold in solution being washed away, important enough to condemn the method?

The Mount Bischoff Tin Mine.*

BY SYDNEY FAWNS.

This is situated in the northwest of Tasmania, about 45 miles from the coast, and on the top of Mount Bischoff, which is 3,500 ft. above sea-level, and 1,200 ft. above the surrounding table-land of basalt. The whole country is covered with dense vegetation. The port is Emu Bay, on the north coast; the railway (narrow gauge) freight rate is \$14.40 per ton.

The geological features of Mount Bischoff are interesting. Mr. Thureau,¹ the late Government Geologist of Tasmania, considers that the stanniferous gossan is due to direct hydrothermal action; but later developments in the mine do not bear out this theory. Baron Von Groddeck,² late Director of the Royal Prussian Academy of Mines at Clausthal, has analyzed the tin-bearing porphyry; he concludes that the tin matrix is not a quartz porphyry, but a porphyritic topaz-rock, and that, like the topaz rock at Auerbach, in Germany, this deposit forms in itself a lode of tin ore. The Mount Bischoff deposit has been recently described by W. von Fricks in a paper³ in which he writes as follows: "The tin deposits appear in an area of quartzite and clay-slate with dikes of quartz porphyry. Granite is present, but at some distance from the mine. These deposits are in part fissure veins carrying cassiterite, pyrite, arsenopyrite, fluorite, wolframite, tourmaline and siderite. The latter mineral is notable, because it is not usually present in veins of this character. Another part of this deposit is formed by replacement, chiefly of porphyry dikes. All rocks in the vicinity of the mine are much altered. The schist and slate contain some tourmaline, and are in part changed to typical 'tourmaline-fels' by complete replacement, only a few grains of the original rock remaining." Where the dikes intruded the schist, the rock has been much folded; some anticlinal sections have been exposed in the excavations. In one instance a pure topaz-dike was discovered on the southern section of the mine; it was 3 ft. thick and contained high-grade black ore; a noticeable feature is the presence of iron pyrite.

There are six bodies, known locally as the Don and Stanhope sections, the White, Brown, Slaughter-yard and Alluvial North faces.

The following minerals are found at the Mount Bischoff mine: Azurite, arsenopyrite, cassiterite, chalcopyrite, feldspar, fluorite, hematite, pyrite, mispickel, malachite, sulphur, quartz, siderite, tourmaline, topaz, talc and wolfram.

The method of mining is open-quarry. In soft ground a miner can excavate 12 tons a day, but only 4 tons in the harder porphyry. The rate of wages is \$1.92 per

*Abstract from *The Proceedings of Mining and Metallurgy*, Jan. 19, 1905.

¹ *Tasmanian Gov. Report*, 1879.

² *Geology of Tasmania*, Johnson, p. 241.

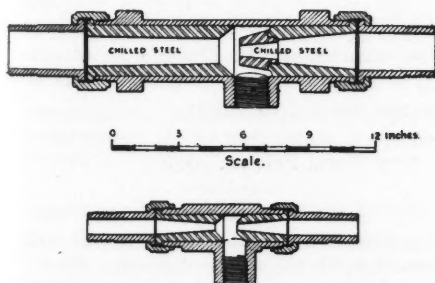
³ *Zeitschr. d.d. Geol. Ges. Bd. U.*, p. 433, 1899.

day for miners, and \$1.68 to \$1.80 per day for truckers and laborers. The present method can be much improved.

Cost of firewood is very high, and as the boilers are old, horse power is between 8c. and 12c. per unit; this can be reduced by electric power. There is a splendid supply of water-power near the mine; with proper installation, the power should not cost more than a fraction of a cent per unit. Hauling by electricity, instead of by locomotive, as at present, would have the additional advantage that the motor could be worked in the tunnel. At the Waratah dressing-sheds, water is the sole motive power; for that and for dressing purposes 41,600 gallons of water are used hourly. To obtain this, a series of dams has been constructed at a cost of \$107,496. Permanent supply can be relied on. It is an exceedingly wet climate, although very healthful, the rainfall being 86 in. per annum.

The dressing-sheds are 1¼ miles from the mine, in the valley of the Waratah river, and form an ideal site, as ample fall can be obtained. Transport from the mine costs under a cent per ton. The ore, before transport, is reduced to a diameter of 2.5 in. by rock-breakers. This is hand-fed into a battery, with stamps of the California type, 75 heads being in use. Each stamp has a falling weight of 5 cwt., with a drop of 8 in., and works at 72 blows per minute. The ore crushed was 50,649 tons for the six months. The screens are woven steel wire, 14-mesh, two to each box, 19 in. long by 20 in. wide, and are in use 18 days. The shoes weigh 128 lb., and last six months. The dies weigh 70 lb., and last twelve months. The ore is more easily crushed than the Cornish tin ore; service per stamp is 4.546 tons of ore per 24 hours.

The crushed ore, after leaving the battery, passes through a classification by the double-trough rising-current classifiers, 30 in number; these are used in pairs, separating the coarse ore from the slime, the overflow carrying the latter away. The accompanying illustration shows the hy-



HYDRAULIC JET ELEVATOR.

draulic-jet elevator used in the Bischoff sheds; the jet works silently and requires little attention, the only wearing part being the nipple, which can be replaced in five minutes. From the classifiers the coarse ore passes into 30 two-compartment Hartz jigs; then to rotating tables, which

are made of wood, to which is fastened sheet iron, 1-16 in. thick; upon this is cement 1 in. thick, the outer rim being secured by a ½-in. tire of pine wood. A mixture of 25% turpentine and 75% coal tar is laid on the cement, and requires renewal only once in two years. The tables are from 10 to 15 ft. diam., with a slope of 1 in 12. The slime deposited is swept off by jets of clean water, which require 23 gal. per hour. The tables are rotated by worm gearing once in 2½ min., the table treating 7 cwt. of slime per hour and requiring ⅛ h.p. to drive it. The slime carries, before treatment on this table, from 0.10 to 1%, and the concentrate from 15 to 20%. The cost of each table at Mount Bischoff is \$461. Kayser concave buddles are 14 ft. and 20 ft. in diam., working at a speed of 6½ rev. per min., and take ¾ h.p. each. The slime and sand fed on to these buddles carry 0.25% of ore. First buddling raises the concentrate to 7%, and re-buddling to 60%. These machines save 4.75% of the ore recovered from the mine. The great advantages that the Mount Bischoff tin mine possesses are the natural position, and the fact that it can follow the slime down the bed of the river, which remains the property of the company. Fifty tons of ore are saved annually by one man and a boy at the slime sheds further down stream, where the ore is buddled, passed through a Chilean mill and classified on rotary tables. The loss in tailing averages 0.01 to 0.2% of tin. In the dressing-sheds there are 37 men and boys, 13 on day shifts and 12 each on afternoon and night shifts. They are paid as follows:

	Per day.
1 supervising.....	\$2.20
3 on 60 heads of stamps..... each	1.92
1 on 15 heads of stamps..... "	1.80
3 on jiggers..... "	1.80
2 on tables..... "	1.32
1 on buddles.....	1.32
1 on tables and buddles slime sheds.....	1.32
1 day-shift general work.....	1.92

The average percentage of ore obtained from the whole mine is 1.322. The cost of mining, crushing and dressing a ton of stanniferous material is as follows:

	Cents.
Mining, including new works, maintenance and other expenses.....	69.672
Trucking.....	11.132
Dressing.....	19.924
Slime shed.....	2.342
Ringtail shed.....	4.222
Management.....	14.958
Machinery.....	4.104
Development.....	5.254
Diamond drilling.....	14.448
Waterworks.....	0.062
Ore bagging.....	1.054
Stores.....	11.260
Sundries.....	1.434
Total.....	\$1.59.866

The ore obtained is as follows: During the first six months of 1904, 636 tons; total since the formation of the company, 62,866 tons. No. 1 quality assays 70½%, and No. 2 quality 65%, of metallic tin. The Mount Bischoff company has its smelting works at Launceston, the nearest large town. The ore is shipped there from Emu bay; these works also do all the smelting for the Tasmania tin mines, either buying the ore—the price being

fixed daily on the value of the metal in London—or smelting for the owners of the ore at a uniform charge of \$14.40 per ton. The furnaces are reverberatory. The charge for each furnace is 50 cwt. of ore and 10 cwt. of small coal; eight hours are allowed for complete reduction. The metal is tapped into a float or brick-lined vessel, the slag on partial cooling being skimmed off; the metal is refined in a large kettle by poling, and the dross is skimmed off. The refined metal assays 99.80%, and is shipped to England in the form of ingots weighing 75 lb. each. The slag assays 5.3%; it is re-smelted. The ore from the smelters' standpoint is pure; the iron and the alluvial ore-silica make a clean slag. When smelting ore for the public, a deduction of 2% is made to cover loss in smelting. This is for ore of 70% or over; when the quality falls below that, a further reduction is made; public ore averages 45% of the total output.

Mr. H. W. F. Kayser has had the management since 1875, and credit is due him for the manner in which he has carried out the work. The first dividend was paid in 1878; and since then they have been paid regularly, the total amount up to June, 1904, being \$9,180,000 from an output of 62,866 tons of tin ore.

A Romance of Suspended Judgment.

On the island of Elba there occur two minerals which, from their peculiar association, were named castorite and polluxite, in fanciful allusion to the devoted twins of ancient mythology. Castorite is a variety of petalite, a double silicate of aluminum and lithium. Polluxite is—here is where the romance comes in. In 1846, Plattner, a careful specialist in blow-pipe analysis, an art now almost neglected, examined this mineral polluxite. His published report stated the composition as a hydrated-silicate of aluminum, sodium and potassium; the only alkali metals known at that day were lithium, sodium and potassium. There was nothing specially remarkable about his analysis except that the sum of the ingredients, instead of approximating the theoretical 100%, amounted to only about 92%. The margin of error was too great to pass unnoticed, and it did not. Critics were not wanting. Even our great and genial Dana the Elder, in his mineralogy, noted the glaring discrepancy and gave gratuitous explanation therefor. But in the little storm of controversy—for the mineral was rare—Plattner was cool, intelligent and candid. He had no explanation to make for the missing 8 per cent. But he insisted on the general accuracy of his work and his result. What self-control it demanded may be imagined, for the honest scientist does not rashly blunder into published absurdity. But Plattner held his peace—he trusted his own work, and it must be right. A charlatan would have burned his figures; or, if publishing, he

would have 'cooked' them up to 100 per cent. Not so Plattner; he waited the vindication of scientific method. Along in the sixties, the scientific world was electrified by the truly wonderful discoveries of the then-new spectrum analysis. Among the noted finds were two new alkali metals, rubidium, the rosy- and caesium, the blue-lined spectrum-maker. Caesium was identified in polluxite; it makes up 30% of that mineral. Then Bunsen, the just, went over the old calculation of Plattner, showed where the veteran had honestly mistaken the unknown high-atomic-weight element caesium for sodium and potassium with their lower atomic weights; and further showed that a re-calculation of Plattner's original figures gave a result that is still approximately correct. The illustration is striking but not solitary in the history of chemistry. The lesson is too obvious to spoil by comment. The example of rectitude is undying.

Books Received.

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

Marketing Goods in Foreign Countries. Washington, D. C.; Government Printing Office. Pages, 164.

Preliminary Report on the Operations of the Coal-Testing Plant of the United States Geological Survey at the Louisiana Purchase Exposition, St. Louis, Mo., 1904. Edward W. Parker, Joseph A. Holmes, and Marius R. Campbell, Committee in Charge. Washington, D. C., Government Printing Office. Pages, 172.

University of Minnesota. Agricultural Experiment Station. Bulletin No. 87—Potatoes at University Farm. Bulletin No. 88—Injurious Insects of 1904. St. Anthony Park, Minn.; Printed for the University.

United States Geological Survey. Geology of the Hudson Valley Between the Hoosic and the Kinderhook. By T. Nelson Dale. Washington, D. C.; Government Printing Office. Pages, 63; illustrated by colored plates and map.

United States Geological Survey. Economic Geology of the Iola Quadrangle, Kansas. By George I. Adams, Erasmus Haworth, and W. R. Crane. Washington, D. C.; Government Printing Office. Pages, 80; with map and illustrations.

Interstate Commerce Brief, as to Proposed New Legislation. Prepared by Samuel Spencer and David Willcox. New York; Published for the authors. Pamphlet, pages, 54.

The Work of the Interstate Commerce Commission. By H. T. Newcomb, Washington, D. C.; Published for the author. Pamphlet, pages, 102.

The Temperature-Entropy Diagram. By

Charles W. Berry. New York; John Wiley & Sons, London; Chapman & Hall, Ltd. Pages, 148; illustrated. Price, \$1.25.

Fourth Biennial Report of the Bureau of Labor of the State of Washington. 1903-1904; William Blackman, Commissioner. Olympia, Washington; State Printer. Pages, 360.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

The Discovery of Gold in California.

Sir—I sent Mr. Stanton's note concerning the discovery of gold in California (appearing in your issue of February 23) to W. C. Dodge, of Washington, an original 'forty-niner,' and he has sent me a letter, from which I quote as follows:

"Mr. Stanton is correct in saying that it was not at Sutter's fort. As to the discovery in 1833 by Lopez, I have no knowledge, though I have read statements that long before that small quantities of gold were gathered by the early Spanish missionaries, who settled in Lower California and built the old churches of adobe, some of which yet remain.

"But the discovery of gold by Americans was in 1848, by Marshall, at Sutter's mill, or, as it is now called, Coloma, on the south fork of the American river, fifty miles east of Sacramento, in the foothills of the Sierra Nevada, on their western slope. I think the party got Sutter's fort and Sutter's mill mixed up, a not uncommon error with those not familiar with the country. Sutter's fort is near Sacramento, a mile and a half or two miles out, on ground a little higher than in the city, where the people took refuge at the time of the great flood in January, 1849, when the water was eight feet deep in the main street, and the steamer *Senator*, which went around the Horn from Long Island Sound, and ran between San Francisco and Sacramento, went up the main street several squares, to what was then known as 'The Horse Market.'

"The flood came on in the night, and so suddenly that it was impossible for all to get out to the higher ground near the fort, though every boat and other means of convenience was used, and scores of men lying sick in tents were drowned! It was an awful time. Fortunately, I had left Sacramento for Sutter's mill a short time before, and thus escaped. I spent some six months at Sutter's mill, which was the supply point for the miners in that region, and was often at the saw-mill, where I paid a dollar apiece for slabs, which we used as the framework for a

small building! Marshall lived there at the time and built a hotel, called the Marshall House. I met him daily and knew him well. At the time of the discovery he was employed by Sutter to build a saw-mill, and while the men were digging a raceway for the water as it passed from the water-wheel, one of them picked up a small nugget—whether Marshall or one of the other men, is uncertain; but at any rate Marshall thought it was gold, and he took it with a few more small pieces at once down to the fort, the only settlement or building there was there then, and Sutter and others confirmed his idea that it really was gold. That is the true history of the discovery of gold in California, which resulted in the rush of '49, when 30,000 crossed the so-called 'plains,' but which, in fact, were mainly mountains, after leaving the rolling prairies of Nebraska, at Fort Laramie, about 350 miles from St. Joseph, where we crossed the Missouri river on a flat-boat ferry, worked by hand along a cable stretched across the river.

"As many more went around the Horn and across the isthmus, and as they could not go to the mines during the winter or rainy season for want of supplies and conveyance, they congregated at Sacramento, so that the population was estimated at 30,000, and there were 5,000 deaths there in six months, from exposure, diarrhoea, fever, and scurvy, as there was not a vegetable of any kind to be had at any price! There were but about a dozen frame buildings, all the rest being tents, and frames of poles, etc., covered with common cotton cloth, through which the heavy rains beat as through a sieve, so everything was saturated. I saw sick men crawl on their hands and knees through the mud to get under a wagon for shelter! Then, to add to our troubles, Chile, from whence our supply of flour was obtained, put an embargo on its shipment to prevent a shortage at home, and the price went up in a week from \$16 to \$50, and everything else in proportion!"

This is first-hand testimony, and will probably stir up some of the old veterans. The balance of Mr. Dodge's letter concerns his personal experience, of interest to me, but not to others.

T. J. JOHNSTON.

New York, Feb. 27, 1905.

Out of 20,000 solar spectral lines mapped by Rowland, more than one-half are awaiting laboratory identification.

The intense red color of ferric sulphocyanate is said to be due to undissociated molecules of the substance.

Petrus Perigrinus, a French engineer of the middle ages (A. D. 1269), was one of the first to assign a definite position to the poles of the magnet, which he also used in surveying.