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EDITORIAL.

THE INAUGURATION of the President is an event which should be chronicled even in the pages of a technical paper. It is the triumph of a striking personality. Whether as the spokesman of national impulses or a politician playing a difficult game with a masterly hand, whether as the representative of university culture or the type of those breezy men of action who have conquered the West, Mr. Roosevelt has been able to command the applause of the gallery while winning the respect of the critic. To us he seems in a peculiar way to epitomize the great nation which has chosen him Chief Executive. In the lustiness of his manhood, in his untiring activity, in the giving of much advice and the taking of little, in the cocksureness of his philosophy, in sensitiveness to criticism, in the breadth of his enthusiasms, in directness of speech, and in superb self-confidence, in all of these, he is—from the crown of his masterful head to the sole of his confident foot—an American!

MUCH INTEREST was felt in the meeting of the Canadian Mining Institute this year, because a contest was anticipated, and attempts had been made to magnify certain manifestations of local feeling into an undue importance, which might have had serious consequences. Fortunately, better counsels prevailed. Such differences as, wisely or unwisely, have been allowed to arise, were adjusted by a gracefully concluded compromise, which satisfied all parties. A careful revision of the by-laws was completed. There is no doubt that the Institute is now established on a firmer basis than ever, and it enters upon its new year with enlarged capacity for work which will be of benefit, not only to the members, but to the mining interests of Canada generally.

The technical side of the meeting was excellent, as a number of good papers were included in the program; while some sharp discussions on several of these papers added to the interest of the meeting.

IT IS ANNOUNCED that the proposed consolidation of Southern iron companies is postponed for the present, and the probability seems to be that the deal is off altogether. The reasons for the postponement are not very clearly stated, reference be-

ing made chiefly to the difficulty of adjusting conflicting interests in the Tennessee Coal, Iron & Railroad Company. A further reason—which, of course, is not publicly expressed—may be found in the probable difficulty in floating the securities of a large new combination. Nothing more will be done at present, although it is said that negotiation may be reopened at a later date.

THE STATEMENT of the mineral production of Canada, given on another page, shows that last year the Dominion about held its own in all except gold. There were increases in some metals, such as copper; but these were offset by decreases in others, so that the total values, omitting gold, in 1903 and 1904 were not far apart. In gold production there was a material falling off, due chiefly to the lower output of the Yukon. The cause for this loss is readily traced to the fact that the Yukon is passing through a period of transition from the first working of the richer placers to more systematic exploitation on a larger scale of the lower-grade deposits. In copper, Canada has made a notable gain, while prospects have improved for lead mines of the West, and the exploitation of the zinc ores promises much for the future. Upon the whole, the Dominion has no cause for discouragement over the year's showing.

The Mines Section of the Geological Survey deserves much credit for the completeness of this statement, and for the early date at which the figures are obtained and placed before the public.

REPORTS FROM THE Indiana coal fields are very unfavorable, and it is quite probable that there has never been a time in their history when trade was so poor as at present. While March has only just begun, conditions are worse than usually prevail in the summer, with no apparent relief in sight. Although the winter has been severe, and the demand for coal ought to have been large, most mines in the Indiana field have worked irregularly, while recently a number of large mines have closed down for an indefinite period. The worst condition prevailed in the block-coal field, in Clay County, where fully 1,000 miners are without work. At Diamond, Perth, Coal Bluff and other mining towns there is real distress; many miners

there have had only irregular work through the winter, so that when the mines closed they were absolutely without resources, and many of them were in debt. These conditions are attributed in part to over-production, resulting from the opening of many new mines during the past two years. At the same time, there is reported an actual falling off in the demand for coal from mills and factories. It was expected that the many factories, which started up in the gas belt, would become consumers of coal, owing to the gradual exhaustion of the gas supplies; but so far the mills thus affected seem to have closed down altogether, and have not helped the demand for coal.

#### Mining Laws.

In this issue we publish a discussion of Mr. C. W. Goodale's recent article on the mining laws by another mining engineer of Butte, Mr. Joseph H. Harper. We confess that our sympathy is with Mr. Goodale in his exposure of the iniquitous conditions created by laws which were based on that little knowledge which is proverbially a dangerous thing; nevertheless, we recognize that Mr. Harper has made a good case, the consideration of which is necessary to any intelligent understanding of the subject. The claim for uniformity and continuity of lodes, as made evident by maps and sections, is rather a specious argument, and is not likely to commend itself to experienced men. All of those who go underground are aware that the wonderful regularity of lode boundaries and courses, as exhibited on maps, is largely a matter of convention, and no more a fact to be taken at its face value than the maps of railroad companies which draw straight lines across creation at the imminent risk of local geography. Ore deposits, on the contrary, are peculiarly irregular; the largest are apt to be the least amenable to the discipline of definition; and it is only for convenience in drafting, in order to express certain features of rock structure of immediate importance to mining operations, that the behavior of a lode is expressed in straight lines. A mine map is not a portrait; it is a diagram. The whole trouble with the mining laws lies in this fact, that they are rooted in a conception of simplicity of structure not to be found in nature. The Australian and the Spaniard were unbiased by geological theory; the pioneers

of Ballarat and Bendigo were navvies, sailors, herders, government clerks and soldiers of fortune, men of all sorts—but unhampered by notions of lode structure. In the same way the *conquistadores* were soldiers and explorers first, and miners afterward. But of those who opened up the West, many had already mined in Georgia, in Nova Scotia, in the several mineral districts of the Eastern seaboard; they were a sophisticated lot of men with ideas regarding "true fissure veins" and other monstrosities of regularity unknown to nature. Hence the incorporation into the mining regulations of the idea of the 'apex,' with its co-ordinate conception of an ore deposit of tabular form standing on end like a sheet of paper. The Australian and Mexican, both blissfully ignorant of the crude geology then available, drew up regulations based on common sense; our people, burdened with preconceived ideas, drew up laws which it takes a lawyer, a geologist and a casuist to interpret.

#### A Feminine Notion.

Our San Francisco correspondent recently made mention of the movement of the California Federation of Women's Clubs to hamper the dredge-mining interests of California. A member from Fair-oaks, Sacramento County, where some dredging is being done, was responsible for the introduction of the resolutions referred to; and, of course, the other women voted for it on general principles, without inquiring as to the rights in the case. They have succeeded, however, in causing a bill to be brought before the Legislature now in session, which they say is designed "to prevent the wanton destruction of lands valuable to the State for agricultural purposes, that they may be saved for future use and benefit of the people for all time." By this bill it is declared to be unlawful for any person or persons, corporations, syndicate, or other legalized body, to use, or cause to be used, for purposes of dredge mining, any implement, tool, machine or mechanical contrivances whatever, which shall not be so constructed, arranged or improved that it will leave the land over which it has operated in a reasonably level condition, to the extent that it may be cultivated and tilled without difficulty and covered with a surface coating of soil to a depth of at least eighteen inches. Any violation of the provisions of the act are to be punished by a fine not to exceed \$500

or six months' imprisonment, or both. While it is hardly probable that such an absurd bill as this will pass, the action is noted to show that a feeling exists against the operations of the mining dredge. Of course, no man may use his property in a way to injure others; but this bill is designed to prohibit injury to land by its owners. No such law as provided by this bill, is likely to be considered constitutional. The big dredges which are throwing up high levees, for reclamation of marsh and *tule* lands and islands, could not leave the land in "a reasonably level condition," nor cover their levees with arable soil; so they would transgress no less than the mining dredges.

Some of the newspapers of the State are urging such a modification of the dredging machinery as will deposit the cobbles and gravel at the bottom of the tailing heap, and distribute the finer material on top, so as to leave the land available for agricultural purposes. This would involve radical changes, subversive of the present system. The cobbles, gravel and fine material are all elevated at once, by the action of the buckets, to the hopper at the top of the dredger; there the mixture is washed and separated, the cobbles and gravel being carried still higher by the 'stacker,' or endless conveying-belt, to the dump. But the fine material carrying all the gold must descend in order to be washed in the sluices; and this gradient must, perforce, be provided on the dredge itself; for this reason, the fine must come down to the level of the deck of the dredge to be discharged finally at the rear end. If it had to be put on top of the cobbles, this fine material would have to be caught at the lower end of the sluices and again elevated, and to a point above that where the cobbles and gravel have been dumped, thus causing a second handling of a large amount of material and vastly increasing the operating cost. As the men carrying on this work are doing it on land which they own, and as they are interested neither in the agriculturist of the next generation nor in agriculture at all, they are not inclined to increase their expense materially, as a matter of sentiment, to please other people with no direct interest in the property.

Meantime the search for available dredging land continues, and is even spreading into the southern counties of the State, where horticulture is the pre-

vailing occupation. Thus Mr. Irving R. Bush, of Rialto, San Bernardino county, has become convinced that there is more profit in the gold in the sub-soil of his orchard than in the raising of oranges on the surface, and he is now engaged in careful prospecting. He has interested other orange-growers of the vicinity in his project; and, if the results of tests are satisfactory, he will root up the whole orange grove and dredge the ground. It is evident that gold dredging as an industry has "come to stay"; the introduction of a bill before a Legislature does not necessitate legislation, and the advocacy of it by women's clubs should emphasize the impracticability of the measure. The ladies in California remind us of a Spanish gentleman who came to a mine manager at Linares to protest against the destruction of a fine bit of scenery by the intrusion of the dumps distributed over a tract more valuable for its silver deposits than its crops of hay. The manager expressed his regret and asked the hidalgo to suggest a remedy. He mentioned one; it was, to dig holes for the burial of the unsightly refuse of the mines!

#### Mexican Duty on Dynamite.

The topic is by no means novel, either in the history of mining or in our columns of editorial comment. Eighteen months ago we called attention to the tariff then obtaining for dynamite, and also to the proposal to raise the rate; at that time it was three cents Mexican per kilogram, or \$30 Mexican per ton. The increase now announced calls for a duty of \$210 Mexican, or \$49.50 gold, per ton, over and above the \$30 Mexican already imposed. According to *The Mexican Herald* of February 19, the new tariff went into effect on March 1. The fact is that the price of the explosive is advanced two cents per pound; it is only one of the many signs that mining is not to be encouraged.

The Mexican National Explosives Company enjoys the concession for the protected manufacture of dynamite. One factory has been erected near Gomez Palacio in Durango, and others are likely; one on the west coast, probably, and another near Mexico City. Of the stock of this company, one-third was taken by the Société Centrale de Dynamite, which owns factories not only in France, but also in Spain, Italy and South Africa; the other two-thirds is said to have been taken by

the Société Financière pour l'Industrie au Mexique. The flavor of monopoly is sufficiently distinct to provoke comment, even by the disinterested. Competition in the sale of dynamite in Mexico appears already to have been secured by an understanding with the other large manufacturers of the world. It is urged that the Mexican Government should own, or control, within its borders, a factory of high explosives, both for war and for peace. It is said that the interests of the consumer will be safeguarded by provision for abundance of supply, and stability of price; but the advance of two cents per pound is a grim fact, and coupled with this is the discrimination of an extra \$1 per case (50 lb.) for lots of more than 200 cases, and less than a car; and a further burden of \$1.50 per case for lots less than 200 cases. These extortions are but thinly veiled behind "the 5 per cent discount made to the public" on the prices just quoted. The intent is obvious. It is stated, from some roundabout figures, that this dynamite tariff adds only 3 per cent to the total cost of mining. But even this is not to be neglected in the great majority of mines.

We doubt not that the scheme seems clever from the standpoint of both the Mexican Government and the Société; but it affords evidence that the Mexican Government is not at all alive to its own best interests. Its general attitude toward the mining industry needs correction and adjustment. Our southern neighbor may have her share of corruptionists, and some of them may be in close touch with high departmental officials; but we cannot believe that this clumsy scheme for pirating mining profits is endorsed by a far-sighted statesman. Does Mexico realize her present opportunity to advance both the interests of mining and her own exchequer by a generous policy? Or does she prefer to frighten away capital and enterprise by extortion which smacks of the régime of Kruger? The attitude of the Mexican Government toward mining is one that will bear watching, and by none better than by the Mexicans themselves. We shall revert to this question until the exactions, not only on dynamite but in other departments, such as the tax on bullion export, shall be considered from the standpoint of wise and just statesmanship. Mining capital, in particular, has a keen scent for danger. Mexico is not encouraging mining.

### The Canadian Mining Institute.

The annual meeting of the Canadian Mining Institute opened in the Windsor Hotel in Montreal, Wednesday morning, March 1. There was a large attendance, although a number of members had been delayed by the snow-storm of the preceding day, especially those from Nova Scotia and eastern Quebec. The morning session was a business meeting, and was opened by a few words of congratulation from the president, after which business was directly taken up. The slight friction which had occurred over the somewhat irregular sending out of the ballots by the nominating committee was adjusted, and after two brief speeches from Mr. Drummond and Mr. Coste, scrutineers were appointed, to whom the ballots were referred. The annual report of the Council was read, showing that fair progress had been made during the previous year, and that the total membership, including students, was now about 480. Three members died during the year, and special mention was made of the loss of Mr. Cornelius Shields and Mr. B. T. A. Bell. The treasurer's report showed a comfortable balance on hand. Other routine business was disposed of, and the amendments to the by-laws were referred to a special committee.

A number of papers were furnished for this meeting, 51 in all, the list of which has already been published. At the afternoon session, papers by Mr. E. P. Jennings, Dr. Bell, Mr. George Fergie and Dr. Ami were read, and Dr. W. A. Parks made an interesting address on the need of a provincial museum in Ontario. Other papers presented and read by title or in brief summary were by Mr. W. M. Brewer and Mr. John A. Dresser. At the evening session Dr. F. D. Adams read a very interesting geological paper, illustrated by large maps, on the geology of the Island of Montreal as illustrated by artesian and other deep well borings. This was followed by an interesting discussion. Prof. G. R. Mickle presented a paper on the 'Value of Undeveloped Mining Claims,' illustrating by diagrams the methods which could be employed to ascertain it. Several papers were read by title. Mr. Hobart read a brief paper on Canadian metallurgical products for the Far East, which was discussed at some length by Messrs. Gibson, Goodwin, Gardé, Williams and the author. Before the close Mr. Eugene Coste delivered his presidential address. He referred to the fact that Canada was admitted to be one of the great mining countries of the world, and asked, could not all of them do more than they were doing to hasten the more rapid, healthy development and progress of the country's mixed mineral wealth? He had no hesitation in saying that they could do much more, and it was their duty to do it—their duty to themselves, to their fellow professionals, and to their great country. The Dominion was growing very rapidly. Mil-

lions of dollars were going to be spent in constructing railways through vast new stretches of country, and many opportunities to develop new mining districts would be opened up. The problems at present confronting mining engineers would soon multiply, and they must be ready to consider them and overcome them.

The Thursday morning session was devoted, according to custom, to the reading of the competitive papers by student members. The list included the following: 'Prospecting in Western Canada,' by D. D. Cairns, Queen's University, Kingston; 'Mine Surveying Methods used in the Centre Star Mine, Rossland, B. C.,' by L. H. Cole, McGill University; 'Notes on the Centre Star and War Eagle Mines, Rossland, B. C.,' by G. C. Bateman, Queen's University; 'Drilling for Oil in the Petrolia Field,' by G. P. Stirrett, School of Practical Science, Toronto; 'Properties of Nickel Chloride,' by N. F. Rutherford, School of Practical Science; 'Notes on Graphite—Its Occurrence, Uses and Production,' by G. C. Bateman, Queen's University; 'Notes on Recent Reverberatory Smelting Practice at Anaconda, Montana,' by A. McL. Hamilton, McGill University; 'Notes on Mining in the Slocan, B. C.,' by D. Sloan, Queen's University; 'Solubility of Cobalt and Nickel Arsenides in Ammonia,' by G. S. Hanes, School of Practical Science. Some excellent papers were presented.

At the afternoon session an interesting paper on platinum, by Dr. C. W. Dickson, was read. He made special reference to the discovery of platinum and palladium in the residues left after the separation of nickel and copper from Sudbury mattes, and referred to other sources of the metal which were accessible. The paper was discussed at some length, and during the discussion Mr. Dresser called attention to the existence of platinum in some of the Quebec serpentines. This was followed by three interesting papers on the coal mines in the Northwest Territories east of the Rocky Mountains, especially Alberta. These papers were by D. B. Dowling, J. C. Gwillim and C. M. Henretta. They called out an interesting discussion on the geology and some features in the mining of the Alberta lignites, and the possibilities of further discoveries in the Northwest. Messrs. Eugene Coste and F. Hobart read papers on mining statistics, treating them respectively from the theoretical and the practical point of view.

The evening session on Thursday was held by special invitation in the lecture room of the Canadian Society of Civil Engineers. Dr. Eugene Haanel read a very valuable paper on 'Electric Smelting of Iron and Steel,' giving some conclusions reached by the commission on which he was head, and to which reference has heretofore been made in this JOURNAL. Mr. Obalski described some explorations made, including the possible discovery of a valuable new mineral region in northern

Quebec, north of the Height of Land. The discoveries there include indications of iron ore, asbestos, pyrite and possibly copper and gold, and certainly appeared to warrant further explorations. Mr. A. P. Low then gave an extremely interesting description of his work in the Arctic, around Davis Straits, Lancaster Sound and other regions in the far North, during the past year and a half. This was illustrated by a number of lantern slides. Mr. Low said that this northern region undoubtedly possessed some iron ore deposits, and that there were extensive outcrops of coal; but owing to the extremely rigorous climate and the difficulty of access, it would probably be a very long time before these could be made available. Mr. F. N. Speller read a paper on 'Steel and Iron Pipe.'

The Friday morning session was devoted to the report of the committee on amendments of the by-laws. The report was presented by Dr. Porter, chairman of the committee, and was taken up and discussed, paragraph by paragraph, the committee's report being accepted with some slight verbal modifications. The most important change made from the old by-laws is found in a provision that hereafter members of the Council shall be chosen from among the members of the Institute at large, and not by provinces.

At the afternoon session the scrutineers, Messrs. A. W. Stevenson, A. P. Low and F. Hobart, to whom the ballots had been referred, reported the election of the following officers for the ensuing year: President, George R. Smith, Thetford Mines, Quebec; vice-presidents, Thomas Cantley, New Glasgow, Nova Scotia; Dr. W. L. Goodwin, Kingston, Ontario; Dr. F. D. Adams, Montreal; secretary, H. Mortimer Lamb; treasurer, J. Stevenson Brown, Montreal; members of Council for Nova Scotia, Charles J. Coll, Stellarton; C. A. Meissner, Sydney; W. B. Robb, Amherst; for Ontario, A. E. Barlow, Ottawa; A. B. Willmott, Sault Ste. Marie; for Quebec, J. Obalski, Quebec; R. T. Hopper, Montreal; H. J. Williams, Danville; for British Columbia, R. R. Hedley, Nelson.

The new president was then inducted in the chair by the retiring officer, Mr. Coste, with a few graceful remarks, and accepted the position in a brief speech, promising to do his best to forward the interests of the Institute.

Several papers were then read by summary, including 'The Iron Pyrite of Eastern Ontario,' by Mr. E. A. Fraleck; 'The Cobalt-Silver-Nickel Arsenic Ores of the Timiskaming District,' by Prof. W. G. Miller, and 'Los Reyes Gold Mines, Mexico,' by Mr. A. Smith. A vote of thanks to the retiring president was passed.

The meeting was closed on Friday evening by a reception and smoking concert, which was largely attended and very much enjoyed, the proceedings being finally terminated at an early hour on Saturday.

**DISCUSSION.**

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

**THE COST OF MINING.**

Sir—Mr. Ingalls' timely article on the above subject calls attention, not only to the desirability of uniform methods of keeping mine costs, but also to the publication of itemized statements of costs. On the latter point there is much difference of opinion.

There should be no difference of opinion regarding what enters into the cost of mining. Nothing short of the total cost can be correct, and anything less is, to say the least, misleading. No matter how the costs may be divided up or distributed, the net profit per ton deducted from the market value equals the cost of mining, or, as Mr. Ingalls puts it,  $X - Y = A$ .

The tabulated costs quoted by Mr. Ingalls, and admitted imperfect, are simply *ex parte* statements. No charge is shown for maintenance of plant, taxes, insurance and many other items of substantial expense inseparable from ordinary mining operations.

Here is a more complete statement, taken from the balance sheet of another Cripple Creek property (*Mining Reporter*, December 8, 1904), and, I presume, represents English methods:

**COST FOR YEAR ENDING JUNE 30, 1904.**

Blocking out ore, etc. ....	\$4.131
Ore breaking. ....	5.182
Timbering. ....	0.744
Pumping. ....	0.933
Hoisting and tramming. ....	1.469
Ore sorting and loading. ....	0.608
General lighting. ....	0.112
Surveying. ....	0.080
Mine sampling. ....	0.066
Wages of foreman, etc. ....	0.265
Watchman. ....	0.134
	<hr/>
	\$13.7240
Repairs and improvements to buildings and plants. ....	\$0.2986
Shipping and selling ore, sampling and assaying. ....	0.1793
Salaries of consulting engineer and mgr. ....	0.8923
Salaries of clerks. ....	0.0323
Auditing fees and expenses. ....	0.0244
Assay plans. ....	0.0364
Traveling expenses. ....	0.0050
Exploitation expenses. ....	0.0770
Insurance. ....	0.1494
Taxes (less adjustment). ....	0.1693
Compensation, etc., cage accidents. ....	0.2502
Strike expenses. ....	0.0875
Legal expenses. ....	0.0252
Loss on cottages. ....	0.0110
Miscellaneous. ....	0.0730
Total. ....	<hr/>
	\$2.310
Freight and treatment on 43,758 tons. ....	\$7.743
London office expenses, including \$5,178.80 for a special report on the mine. ....	0.513
Total cost. ....	<hr/>
	\$24.290

A good system of cost keeping, not necessarily an elaborate one, is an essential requirement of any well-managed mine, nevertheless it is very often, through faulty methods or tediously minute classifications, a matter of considerable expense. When the ordinary shift bosses are overloaded with cost keeping or cost distribution methods the general work suffers, and the cost of breaking rock goes

up, as it were, in an effort to keep it down. In other words, while the foremen or bosses are endeavoring to find out how many nails, caps and candles are consumed in breaking a ton of rock in one stope, the men may be idling in another.

The minute elaboration of mine costs is largely academic—the result, perhaps, of autocratic mine management with fledglings instead of experienced birds in charge of the operations. The autocrat, seated in his office chair at some financial center, in his endeavor to direct the operation of some score or more mines, often attaches undue importance to mere items of cost, which are seldom strictly comparable for any two mines, paying little if any attention to the practical mining ability of those in charge of the operations. Should not the ability to discover ore, or even not to lose it, when discovered, rank fully as high as mere cost of production? The most elaborate cost system ever devised will never successfully displace mining skill acquired by years of close, intelligent observation and experience in actual mining work. I have known mines where the cost of producing and milling or marketing a ton of ore was steadily lowered by one expedient or another, but somehow, before the total cost reached a minus quantity profits vanished, the stockholders kicked, or something else happened, a strike, like as not, and the mine was eventually leased, with results entirely satisfactory to the stockholders.

We have, here in Colorado, scores of cases where lessees (practical and experienced miners) have taken up unprofitable and practically abandoned mines, made them pay handsomely, and turned them over at the expiration of their leases in condition where even the Rodomont autocrat could for some time work them profitably from his observation point, perhaps thousands of miles distant from the field of operation. Now, lessees do not depend on any elaboration of mining costs to secure these results, but rely almost entirely on their ability as miners and on their practical experience, which has taught them that mining is the art of making money from ore deposits; that the cost per ton is only one factor; and that breaking the ore as free as possible from waste, and properly sorting it, is often of more importance, for the reason that, while it increases the cost of raising a ton of ore, it also increases the net profit of the operation, which should be the objective point in mining. Therefore I hold, the successful miner in any given mine is *he who returns the largest percentage of profit from the gross value of the ore*, not necessarily the one who can show the lowest mining cost. To reach this desirable condition, the cost of milling or smelting must be studied, together with the cost of the actual mining and sorting or dressing of the ore; hence these charges, very properly grouped separately in the item-

ized costs, are brought together to form the total mining cost as previously defined.

I favor a simple system of cost keeping, where the distribution of supplies, etc., is made direct from the mine store, on the orders of the superintendent or shift bosses, and charged at once to the particular place or work indicated.

The general classifications of mine costs that suggest themselves are: (1) Winning (blocking out ore), (2) stoping the ore, (3) dressing or milling or smelting the ore, the sum of these being the entire cost of producing and disposing of one ton of ore, provided always, the amount won during the period under review equals the amount of ore stoped, otherwise corrections must be made for increased or decreased ore reserves; or, at least, the condition of the ore reserves should be clearly stated. The average stockholder is satisfied with the totals as above, together with the value of the ore and profit per ton, or the usual balance sheet and profit and loss statement. Then why bewilder him with itemized statements of costs? Useful and indispensable though they may be to the management, they are as invariably useless to stockholders.

The matter of publishing itemized mining costs is one that mining companies do not, as a rule, approve. As the president of a large company once said to me, "It is our private business, and why should we give it to the world to satisfy the curious, or help educate young mining engineers who have not had practical experience along those lines, or to furnish ammunition for the stockholders to make erroneous comparison between two mines of perhaps very different type?" Throughout the Rocky Mountain region the average mining companies have dealings with the railroads and smelters in marketing their ores, and, rightly or wrongly, very often believe that these corporations are anxious to secure as high a tariff as they believe the ore will stand; and so, in places as far apart as British Columbia and the San Juan, and once in Old Mexico, I have at various times heard mine-owners say something like this: "Why should we publish the itemized costs of producing a ton of marketable ore? Neither the railroads nor the smelters publish itemized costs for hauling or for smelting a ton of ore, and, furthermore, we do not believe that it costs the railway corporations any more to haul a ton of \$50 ore than it would to move a ton of \$15 ore over the same distance, and yet the charge is often double. And so with the smelters, the charges on some ores are based simply on their precious metal value."

A full discussion of the various methods of classifying mine costs may, and I hope will, result in the gradual adoption of a uniform system, from which tentative comparisons can readily be made between mines of similar type, etc.; but under the present economic conditions that obtain in

the West, the great majority of mining companies will, as now, refrain from publishing itemized statements of costs.

PHILIP ARGALL.

Denver, Dec. 12, 1904.

COMMERCIAL ANALYSIS.

The Editor:

Sir—Your editorial comment in a recent number of the JOURNAL (Jan. 19, 1905) gives me occasion to mention some defects. First, the writers of some text-books on quantitative analysis for metallurgical chemists hide, behind their empirical information, a defective knowledge of chemical reaction. Thus a well-known text-book, in describing the method for estimation of arsenic with silver nitrate, uses zinc oxide as a neutralizing agent, overlooking the insolubility of zinc arsenate. Another seems to forget that arsenic is volatile, as is also arsenious oxide. Inaccuracy in the cyanide method for copper may be due to incomplete reduction, the reagent being partly oxidized to cyanate, etc.

Second, instruction of mining students in inorganic qualitative analysis is often incomplete, and they must work by rule of thumb. The writer finds many mining and engineering chemists to be loaded up with secret methods, but ignorant of analytical equations, general reactions, and qualitative separations; they go solely by quantities given in their text-books in making volumetric solutions.

Third, impurity of reagents, and inability to test them, are responsible for poor figures. Thus, a would-be chemist reported 15% arsenic in an ore, not suspecting that the flux contained chlorides. Ammonia water, contaminated with carbonate, even led the writer astray, no reagent being at hand to test its purity.

Lastly, a lack of cleanliness and order is responsible for much poor work. Reform in the matters noted would produce much better analytical work. I hope this discussion will continue in the columns of the JOURNAL.

LOUIS HOGREFE.

New York, Feb. 24, 1905.

The total quantity of crude rubber imported into the United States in 1884 was 23,672,563 lb., valued at \$10,000,000; the imports in 1904 amounted to 61,889,759 lb., valued at \$44,000,000. The price has advanced, in the twenty years, from 43c. to 70c. per pound.

If a bit of zinc be dipped in dilute sulphuric acid, hydrogen is evolved. If this is connected with a wire to a piece of platinum or carbon dipped in the same solution of acid, the hydrogen is evolved, but at the surface of the carbon or platinum. This is the condition and result of the electric current. The evolution of the hydrogen away from the zinc is a case of 'action at a distance.'

Mineral Production of Canada.

The following table shows the returns of the mineral production of Canada for the year 1904, as compiled from the preliminary figures collected by the Mines Section of the Geological Survey by Elfric Drew Ingall, chief of the Section, and J. McLeish, assistant. The figures are subject to some slight corrections when full returns are received.

Product.	Quantity.	Value.
<b>METALLIC.</b>		
Copper (b).....Lb.	42,970,594	\$5,510,119
Gold.....Lb.	16,400,000	16,400,000
Iron ore (exports).....Tons.	168,828	401,738
Pig iron from Canadian ore.....	68,297	901,880
Lead (c).....Lb.	38,000,000	1,637,420
Nickel (d).....Lb.	10,547,883	4,219,153
Silver (e).....Oz.	3,718,668	2,127,859
Zinc (f).....Lb.	477,568	24,356
Total metallic.....		\$31,222,525
<b>NON-METALLIC.</b>		
Arsenic (exports).....Tons.	73	\$6,900
Asbestos.....	35,635	1,167,238
Asbestic.....	13,011	13,006
Chromite.....	6,074	67,146
Coal.....	7,509,860	14,599,090
Coke (f).....	543,557	1,884,219
Corundum.....	919	101,050
Feldspar.....	11,083	21,166
Graphite.....	452	11,760
Grindstones.....	4,509	42,782
Gypsum.....	340,761	372,924
Limestone for flux.....	200,646	176,973
Manganese ore (exports).....	123	2,706
Mica.....		152,170
Mineral pigments—		
Barytes.....	1,382	3,702
Ochers.....	3,925	24,995
Mineral water.....		80,000
Moulding sand.....Tons.	3,423	6,790
Natural gas (g).....		247,370
Petroleum (h).....Bbl.	552,575	984,310
Phosphate.....Tons.	917	4,590
Pyrites.....	33,039	94,797
Salt.....	68,777	318,628
Talc.....	840	1,875
Tripolite.....	320	6,400
Total non-metallic.....		\$20,392,987

STRUCTURAL MATERIALS AND CLAY PRODUCTS.		
Cement, natural rock.Bbl.	56,814	[\$49,397
Cement, Portland... "	850,358	1,197,992
Flagstone.....		6,720
Granite.....		100,000
Pottery.....		200,000
Sands and gravels (exports).....Tons.	399,809	129,803
Sewer pipe.....		378,894
Slate.....		23,247
Terra-cotta, pressed brick, etc.....		400,000
Tiles.....		275,000
Building material, including bricks, building stone, lime, etc.....		5,667,000
Total structural materials and clay products.....		\$8,428,053
Estimated value of mineral products not returned.....		300,000

Total, 1904, all products..... \$60,343,165

(a) Quantity or value of product marketed. The ton used is that of 2,000 lb.  
 (b) Copper contents of ore, matte, etc., at 12.823c. per lb.  
 (c) Lead contents of ores, etc., at 4.309 c. per lb.  
 (d) Nickel contents of ore, matte, etc., at 40c. per lb.  
 (e) Silver contents of ore at 57.221c. per oz.  
 (f) Oven coke, all the production of Nova Scotia, British Columbia and the Northwest Territories.  
 (g) Gross return from sale of gas.  
 (h) Includes crude oil sold to refiners and oil sold for fuel and other purposes.  
 (i) Zinc contents of ores at 5.100c. per lb.

The total value for 19 years, since these returns were first compiled, has been as follows:

1886.....	\$10,221,255	1896.....	\$22,584,513
1887.....	11,321,331	1897.....	28,661,430
1888.....	12,518,894	1898.....	38,697,021
1889.....	14,013,113	1899.....	49,584,027
1890.....	16,763,353	1900.....	64,618,268
1891.....	18,976,616	1901.....	66,339,158
1892.....	16,623,417	1902.....	63,885,999
1893.....	20,035,082	1903.....	62,600,434
1894.....	19,931,158	1904.....	60,343,165
1895.....	20,648,964		

In the table it is shown that the value of the mineral products of Canada during 1904 aggregated over \$60,000,000. In comparing this record with that of previous years, it must be borne in mind that complete figures are never available at this time of the year, so that in a number of items the data are necessarily partly estimated. Allowing for this, there nevertheless remains a falling off of about \$2,250,000 in the grand total. This does not necessarily indicate a general slackening in the permanent mineral industries of the country, but rather a gradual return to natural conditions after a few years of abnormal inflation due to the rapid exploitation of the richer and easily accessible portions of the Yukon placers. To this cause can be attributed nearly \$2,000,000 of the decrease shown. Taking the figures of the actual variation in the values of items given, aggregating nearly 85% of the whole production, it will be seen that, if the Yukon gold yield be eliminated, the decreases in some industries are practically offset by increases in others, bringing about practical equality in the two years.

The percentages of the various items to the total last year were as follows: Coal and coke, 27.3; gold, 27.2; building materials, 9.4; copper, 9.1; nickel, 7.0; silver, 3.5; lead, 2.7; cement, 2.1; asbestos, 2.0; petroleum, 1.6; pig iron, from Canadian ore, 1.5 per cent.

The figures given account for all but 6.6% of the whole. They omit all those contributing less than 1%, although some of these, such as mica and corundum industries, are otherwise interesting and important. As formerly, the coal and coke output when added to the value of the gold constitute considerably more than half the mineral values produced, while, if the whole of the metal-producing industries, together with coal and coke, be considered, a little less than 10% of the whole remains to be accounted for. The per capita of the total mineral products for 1904 was about \$10.40, as compared with \$11.89 in 1903, and \$2.23 in 1866, the first year for which figures are available.

Gold.—Practically every province in Canada shows a falling off in gold production, in 1904, as compared with 1903. Nova Scotia, which ordinarily has an output of about half a million dollars, shows a decrease of nearly half its production. Several reasons are given for this, among which may be mentioned (1) the extreme drought during the past season, (2) the closing down, owing to financial difficulties, of a number of the best producing mines, and (3) the cessation of production at the Richardson mine owing to the destruction of the shaft and workings by an extensive crush.

In Ontario, although a considerable amount of prospecting and development work has been done, most of the mines that were formerly important producers were not operated during the year.

In British Columbia an increased output from placer mines is indicated, while a smaller production was obtained from the lode mines. The ore shipments from Rossland and vicinity, the chief gold-producing district, were less than in 1903 by about 20,000 tons.

The Yukon output for the year, \$10,337,000, is based on the receipts of Yukon gold at the United States mint at San Francisco and other receiving offices.

**Silver.**—The bounty granted by the Dominion government on the production of lead ores seems to have stimulated the operations of the silver-lead mines. The St. Eugene mine, in East Kootenay, was reopened and its production probably accounts for the greater part of the increase. Silver .999 fine is now turned out at the refinery of the Canadian Smelting Works at Trail, B. C., as is also gold, .994 fine. Refined silver has been shipped to New York, San Francisco and to China. The average price per ounce of fine silver in New York during the year was 57.221c., as compared with 53.45c. in 1903.

**Lead.**—Although over twice as much lead was produced in 1904 as in 1903, the output is still far from its former maximum, 31,584 tons in 1900. The production in 1904 was about 19,000 tons, as compared with 9,070 tons in 1903. The exports of lead from Canada in 1904 were 12,913 tons of lead in ore, etc., and about 21 tons of pig lead. An electrolytic lead refinery is now in operation at the Canadian Smelting Works, Trail, B. C., producing pig lead, lead pipe, sheet lead, etc. It is said that lead-corroding works are to be established at Montreal by a Chicago firm for the manufacture of white lead and other pigments which will require a large amount of pig lead per annum.

**Copper.**—The copper contained in ore, matte, etc., shipped from Canadian mines in 1904 was about 21,485 tons, as compared with 21,342 tons in 1903. In Ontario there was a falling off of over a thousand tons, which was more than made up by the increased production from the Boundary district and the Coast district of British Columbia. From Sudbury district, Ontario, 10,154 tons of matte were shipped, containing 2,455 tons of copper. In British Columbia ore shipments from the Boundary district were approximately 818,000 tons in 1904, and from Rossland 342,000 tons, as compared with 697,284 tons from the Boundary district and 360,786 tons from Rossland in 1903. The average price per pound of electrolytic copper in New York in 1904 was 12.823c., as compared with 13.235c. in 1903.

**Cobalt, etc.**—The discovery of certain cobalt, nickel, arsenic and silver ores which was made public in November, 1903, promises to add, in the near future, largely to the production of these metals. The deposits were found during the building of the Timiskaming & Northern Ontario Railway, the roadbed running almost over the top of the first of the outcrops dis-

covered. The ores are contained in a series of almost vertical veins varying in width from 8 in. up to 6 ft., although the wider portions always contain more or less rocky matter. The veins intersect the conglomerate and slate usually classified as Huronian. All of the deposits thus far discovered possess certain features in common. The minerals represented are chiefly smaltite, niccolite and native silver, with smaller quantities of erythrite, dyscrasite, chloanthite and tetrahedrite. In some the native silver is very abundant, and a sample which was fairly representative of one of the smaller veins showed an assay value of \$5,237 per ton. Analysis of the ore from one of the veins composed mainly of smaltite showed from 16 to 19% of cobalt, 4 to 7% of nickel, 60 to 66% of arsenic, and 3 to 7% of sulphur. The ores are thus so rich that comparatively small veins could be worked at a handsome profit. Although no returns have yet been received, it is stated that several car-loads of ore have been shipped from this district, which realized very high values.

**Nickel.**—The following were the results of operations on the nickel-copper deposits of Ontario in 1903: Ore mined, 203,388 tons; ore smelted, 118,470 tons; matte produced, 8,924 tons; matte shipped, 10,154 tons; copper contents of matte shipped, 2,455 tons; nickel contents in matte, 5,274 tons; value of matte shipped, \$2,193,198. According to customs returns, exports of nickel in matte, etc., were as follows, in pounds:

To Great Britain.....	2,028,908
" United States.....	9,204,961
Total.....	11,233,869

The price of refined nickel in New York remained steady throughout the year at from 40 to 47c. per pound.

**Zinc.**—About 533 tons of zinc ore, worth \$3,700, were shipped during the year from the Long Lake zinc mine in the county of Frontenac, Ont. No returns have been received of zinc production in British Columbia.

**Iron.**—Exports of iron ore were 168,828 tons, valued at \$401,738. In addition to the ore exported, about 180,932 tons of ore, worth about \$489,687, were mined in Canada and charged to Canadian blast furnaces. Besides the above Canadian ore, 454,671 tons of imported ore, valued at \$922,594, were used in Canadian furnaces. The total amount of pig iron manufactured from both Canadian and imported ores was 303,454 tons, of which 21,583 tons were made with charcoal as fuel and 281,871 tons with coke. The quantity of charcoal used was 3,477,470 bushels, and of coke 387,392 tons. The pig iron was made by three firms in Nova Scotia, two in Quebec and four in Ontario.

**Coal and Coke.**—With the exception of a small decrease in shipments, coal production in Nova Scotia in 1904 shows but little change. A smaller amount of coke was made owing to the smaller production

of pig iron by the Dominion Iron & Steel Company. Efforts are being made to find new markets farther west in Ontario, as well as to increase the exportation. In the Northwest territories many small mines have been opened, and the output shows a substantial growth. Coke is now being made in Alberta. On Dec. 31, 1904, there were 56 beehive ovens in operation at Coleman, Alta, and 34 Belgian ovens, Bernard type, were in operation at Lille, Alta. In British Columbia the output of the Western Fuel Company in Vancouver Island was considerably diminished, owing to the destruction by fire of the head works at No. 1 mine. The Crow's Nest Pass Company, however, continued to increase its output, over 1,000,000 tons of coal being produced, of which more than half was used in making coke. This company has now 1,128 coke ovens completed.

**Asbestos.**—The production of asbestos, divided into crude and mill stock, was as follows: Crude, 4,239 tons; value, \$509,001; mill stock, 31,996 tons; value, \$658,277; total, 35,635 tons; value, \$1,167,278. The exports of asbestos, according to Customs returns, were 37,272 tons, valued at \$1,160,887.

**Natural Gas.**—There was a somewhat increased production of natural gas in Ontario, due entirely to operations in the Welland field, production in the Essex field having dropped to very small amounts. The development of the gas field at Medicine Hat, Northwest territories, seems to have been continued with much success. The gas commission of the town of Medicine Hat has now six producing wells, one of which has been put down to a depth of nearly 1,000 ft., yielding 1,125,000 ft. per 24 hours. The Canadian Pacific Railway Company has just completed drilling a well to a depth of 989 ft. with 4½-in. casing to 941 ft. The pressure per square inch developed in 18 hours was 525 pounds.

**Cement.**—The production of natural rock cement, which has for a number of years been small in comparison with the output of portland cement, shows another large decrease in 1904, the sales being only 56,814 barrels, valued at \$49,397, as compared with 92,252 barrels, valued at \$74,655, in 1903. Although a much larger quantity of portland cement was sold in 1904, the total value, owing to the fall in price, is only slightly in excess of that in 1903. In the absence of complete returns, portland cement statistics have been partially estimated. The following is, however, a close approximation: Portland cement sold, 900,358 bbl., valued at \$1,272,992; portland cement manufactured, 908,990 bbl.; stock on hand Jan. 1, 124,919 bbl.; stock on hand Dec. 31, 133,551 bbl. The imports of portland cement in 1904 were 2,746,208 cwt., valued at \$1,061,056. This is equivalent to about 784,630 bbl. of 350 lb. each, at an average price per bbl. of \$1.35. The duty is 12.5c. per 100 pounds.

**Mining Stocks.**

(Full quotations on pages 487 and 488.)

**New York.** March 8.

The stock market has broadened, and the strength of prices suggests that public buying is in evidence. Amalgamated Copper has made larger sales at advancing prices, selling up to \$78.88, while Anaconda reached \$28.25. Tennessee was quiet at \$28.75@31.00, and Greene Consolidated at \$28@28.50. Greene Consolidated Gold, upon declaration of the initial dividend of 2%, or 20c. per share, sold at \$6.50@8.25. British Columbia Copper was unattractive, being quoted at \$6@6.25.

The gold and silver shares were moderately dealt in at slightly better prices.

**Boston.** March 7.

Some few stocks record higher prices for the week, but the majority show recessions. Prominent among the latter was the sharp break and heavy selling of Utah Consolidated, which broke \$3.25 to \$39.25, but subsequently rallied to \$41.25. The selling was caused by a report that the lower levels were showing ore that runs but 2% copper and under, but this was modified somewhat. The whole thing, however, had the earmarks of a stock market movement. Mohawk advanced \$2 to \$55.75 losing a part. The annual report, to be issued shortly, is expected to show mining profits before construction of about \$5 per share. Copper Range has been active and higher, on the expected dividend declaration this week. The stock rallied from \$69.50 to \$72.75. Osceola has also been in good demand, advancing \$2.50 to \$94.50. Centennial fell \$1 to \$18.50. It is now said that the forthcoming assessment will be \$4 per share.

There has been buoyancy in Dominion Coal and Dominion Iron and Steel, the former advancing \$3.50 to \$71.50, and the latter, on heavy trading, \$4.5c to \$24.25. The Canadian people are reported to be in a better financial position now, and have been buying these stocks again. Greene Consolidated has been heavy, touching \$27.75. United States rose over \$1 to \$25.12½. The private expert's report is very favorable. Disappointment is still shown in Trinity in the action of the stock, which broke \$1 to \$10, with partial recovery. Michigan fell to \$13.50 on realizing, but recovered to \$14.50. Mass has improved fractionally to \$12.62½. The annual report was favorable, showing a profit of \$4,421 for 1904, against a deficit of \$110,644 for 1903. The Tamarack annual report is expected to be unfavorable, although conditions have improved since.

Allouez is a trifle better at \$22.75. Bingham fell off \$1.50 to \$31. Reports are current of a strike in one of the company's mines. The declaration of a 60-cent quarterly dividend by Daly-West is well received, although it is not reflected in the price of the shares. It is now said that the \$5 extra Calumet & Hecla dividend was paid on money received at not above 13c. for the metal. The company has sold as high as 15¼c. in the meantime, and is now holding for 15½ cents.

**Salt Lake City.** March 3.

The week has passed with little improvement in the market. What business was done was confined largely to the stocks belonging to the Tintic district. Some of these show improvement, but not very much. May Day and Uncle Sam Consoli-

dated were the favorites. In the case of the former a new contract entered into with the smelters gives the company a chance to market its low-grade ore at a profit. Uncle Sam is developing a large tonnage of this same class of ore, and, having its own mill, the product can be handled very advantageously. Improved conditions in Ajax caused that stock to advance. Excepting New York Bonanza, Park City stocks were inactive; the latter has weakened again. Columbus Consolidated received some inquiry, and a few small lots changed around 90c. a share. Tetro has improved, and the stock closed the week considerably stronger. Consolidator Mercur found little demand, only 900 shares being transferred.

**San Francisco.** March 2.

A period of dullness in Comstock sales marked the first part of the week; but this was followed by greater activity and demand, with a slight rise in prices. Some quotations noted are: Ophir, \$7@7.15; Consolidated California & Virginia, \$1.90@1.95; Mexican, \$1.85@1.90; Hale & Norcross, \$1.45; Best & Belcher, \$1.05; Sierra Nevada, 49c.; Gould & Curry, 29c.; Potosi, 17c. per share.

Dealings in Tonopah stocks on the old exchange were quite active. On the San Francisco & Tonopah exchange there was also a good deal of business done. Montana Tonopah brought \$3@3.05; MacNamara, 58c.; Tonopah North Star, 58c.; Original Bullfrog, 47c. per share.

On the California exchange business in oil stocks continues light, with only moderate sales. Twenty-eight brought \$12; West Shore, \$1.75; Esperanza, \$1.50; Oil City, 70c. per share.

**Colorado Springs.** March 3.

The market in Cripple Creek shares on the local exchange has been fairly strong during the past week, with trading well distributed throughout the list; but prices of the majority of the mines list have had a tendency to decline, although but a fraction. The amount of business during February exceeded the same month of 1904 on the local exchange by \$500,000 in sales, and over 3,500,000 shares.

Portland has sold during the week at \$1.95, a gain of 5c. over one week ago. On the report of a strike, Gold Dollar Consolidated advanced from 8¾c. to 10c. Practically all the others sold to-day for a fraction less than one week ago. El Paso sold for \$1.95½; Acacia for 11½c.; Cripple Creek Consolidated, 12¼c.; Elkton, 68c.; Findley, 82½c.; Gold Sovereign, 125¾c.; Work, 16½c.; United Gold Mines, 27c. Isabella was quoted at 32½@32¾c.; Gold Coin, 30@38c.; Vindicator, 83@90c. per share.

**Monterey.** March 1.

Exchange on New York remains at 202. Sales in mining stocks were: Victoria at \$69; La Paz, San Luis Potosi, \$258; Neuva Quebradillas, Zacatecas, \$8; Roma, San Felipe, Guanajuato, \$12; and in Pachuca, Sorpresa, \$310; Santa Gertrudis, \$73, and Amistad y Concordia, \$69.

**Coal Trade Review.****NEW YORK, March 8.****ANTHRACITE.**

The anthracite trade is showing greater activity, as a result of improved transportation facilities. March, however, is always a month of dull business, but this year the sales seem to be somewhat more

numerous than usual. Large buyers, however, are holding back in anticipation of the 50c. discount, which will go into force on the first of April, and besides this, no one would think of buying large stocks of coal just now, to carry him along.

The difficulties, in the way of float service, between the terminal points and Manhattan, seem to have been removed for the rest of this season.

Prices remain at the same level, domestic sizes selling for \$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.

The reported shipments of anthracite coal for February and the two months of the year to February 28 are as follows:

	1904.	1905.	Changes.
January.....	4,134,245	4,408,578	I. 274,333
February.....	4,326,269	3,922,604	D. 403,665
Two months.....	8,460,514	8,331,182	D. 129,332

The decrease in February was chiefly due to bad weather and slow transportation. The total decrease is only 1.5% for the two months.

**BITUMINOUS.**

The Atlantic seaboard soft coal trade shows greatly improved conditions. The severe weather and the ice blockades seem to be fairly out of the way for the rest of the year, and car supply and transportation show some improvement, although they still remain irregular. The prices on soft coal vary from day to day, but at this writing \$2.90, f. o. b. New York harbor shipping points, is a fair quotation for ordinary grades of steam coal, prices ranging up and down from this, according to quality.

The contract season for the coming year has opened, and a considerable amount of trade has been closed. It is hard to name a specific price, as qualities vary to a great extent, but as an average quotation for a fair grade of steam coal, \$2.65@2.70, f. o. b. New York shipping points, may be stated as the figure at which business is being done. This is slightly lower than the quotation at which contracts were closed at the beginning of last year, although, in some cases, prices were reduced slightly, after the contracts for that year were made. By reducing the opening quotations for this year, it is hoped that a steadier contract price will prevail. The main line roads have notified producers that the same through freight rates to tide, that were in force last year, will stand without change for the coming season, beginning April 1.

Trade in the far East seems to be calling more strongly for coal, and is urging a prompt shipment of accumulated orders. Philadelphia expects to be relieved of its ice-bound condition very soon, and when this occurs, the Eastern situation will be materially assisted. Trade along the Sound has quieted down. During the siege of bad weather that prevailed for several weeks, a strong sentimental demand arose outside of the regular customers, pointing to a desire to accumulate stocks, in case of trouble; now that the situation is relieved, this additional demand has ceased, and even regular demand has fallen off a little.

Trade in New York harbor shows a strong enquiry for spot coal, strong prices prevailing, being quoted at \$2.90 f. o. b.

All-rail trade is active, showing strong demand and high prices, owing to the desire of consumers to keep their stocks intact. Transportation from mines to tide, and over the all-rail routes in general, shows marked improvement, although a certain amount of irregularity causes coal



to arrive at the shipping points in blocks, which fact causes shippers some trouble in keeping things running smoothly. The main line railroads require prompt release of cars standing at terminal points, and any delay here is immediately followed up from headquarters. Car supply shows an improvement, some producers stating that they receive nearly one-half of their requirements.

The coastwise vessel market will soon have recovered from its winter stagnation. At present, vessels are not in large supply, though sufficient for ordinary needs. Rates from New York to around the Cape range from 80@85c. alongside. As soon as Philadelphia is opened, prices from that city will be 75c. to around the Cape, and 65c. to the Sound ports.

**Birmingham.** March 6.

The coal production in Alabama shows little improvement. The fire in the Sumter mines, in the Blue Creek region, still prevents any production at that place. The Virginia mine will be out for several weeks as yet, all the bodies of victims of the terrible explosion of Feb. 20 not yet being removed. At other places there is a curtailment of production. The weather is fast growing milder, and there is promise of such conditions as to make mining strong.

The Alabama Mining Co. has been organized with \$100,000 capitalization. The company expects to develop coal lands in Walker County on a large scale. S. J. Simpson is president and E. D. Stone vice-president.

The production of coke in Alabama is not as healthy as it was a few weeks ago. At least 300 coke ovens have been shut down in the past four weeks. Coke is bringing good prices, and is in strong demand.

**Chicago.** March 6.

Spring dullness has begun in both anthracite and bituminous business. The weather conditions of March can hardly bring about a revival of winter briskness, and wholesalers are preparing for the usual run of small orders, to carry the stocks of retailers into the summer season of little or no trade. Anthracite all-rail supplies are now not subject to much delay, but chestnut is still scarce. Dock supplies are very low, but will last probably until the beginning of the lake-shiping season. There is no apprehension about supplies, in view of the generally good railroad conditions, even though a relapse into winter weather should come. Business in anthracite will also be dull for the retailers during March; in view of the April discount of 50c. consumers will buy very little coal this month.

The trade in bituminous is practically about as good as last week, but indications are plain that the business will fall away even in domestic sizes. As regards Indiana and Illinois coals, too much is undoubtedly being mined to give a fair market. Eastern bituminous is more stable. But little congestion of shipments of bituminous on the railroads is reported now, and the cheaper grades of western coal have been pouring in by the release of previous congestions.

There have been no changes of importance in prices. Western lump and egg bring \$2.10@2.40 and steam lump 1 1/4-in. is quoted at \$1.80@2.10. Run-of-mine from Indiana and Illinois mines brings \$1.60@1.85. Smokeless holds well up to the established prices, \$3@3.15 for run-of-mine; the demand is fair and supplies are coming forward more promptly. Hock-

ing is steady and in good supply, with the list price of \$3 generally adhered to. Youghiogeny is not in heavy demand, and there is no trouble with supplies; it is quoted at \$3 per ton.

**Cleveland.** March 7.

The coal situation in Cleveland has not changed. There is a moderate demand for steam coal and a great abundance of it on hand. This naturally makes for a rather weak market. The tendency is to hover a little above midsummer levels, while the evidences of over-production are abundant. Prices for steam coal are a little stronger than they were last week, with \$1 at the mines now about the minimum for Ohio and Pennsylvania, run-of-mine grade, at the mine, with some producers asking \$1.05. Very few if any sales are made at that price, however; the generality go at the lower figure, with one or two mines offering steam coal at 95c. at mines.

The slack market is a little stronger. Pennsylvania slack is selling at 70c. at mine, with Ohio slack bringing 65@70c. at mine. These prices compare with \$1 and upward at this time a year ago.

With the milder weather which has come to rule, the consumption of domestic coal is decreasing. Massillon coal is quoted at \$2.30 at the mines for selected lump.

**Pittsburg.** March 7.

**Coal.**—Most of the mines in the Pittsburg district are in operation and the supply of railroad cars is very satisfactory. The demand is fairly good but prices are a trifle weaker, run-of-mine being quoted at from \$1@1.10 at the mine. The price of slack has advanced to 75c. a ton. Some heavy contract for northwestern shipment during the lake season, are being booked, and if the railroads are able to take care of the business that will be offered, the production of coal in this district for the year will be several million tons greater than 1904. The Pittsburg Coal Co. is preparing for an enormous trade. It has just absorbed the Jones & Adams Co.'s holdings. This concern has extensive coal docks at Superior, Duluth and Ashland, large retail yards at Minneapolis, and does a wholesale shipping business from Chicago. The rivers are not navigable, the ice gorges still holding, but a satisfactory stage of water is expected in a short time, and preparations are being made for a heavy shipment of coal to the southern ports.

**Connellsville Coke.**—The advance in coke workers' wages ordered by the H. C. Frick Coke Co., effective March 1, was a surprise to both the men and independent operators. The advance was promptly made by all operators. It ranges from 8 to 11%, or an average of almost 10% and affects nearly 30,000 operatives. This was the sixth voluntary advance made by the Frick company in 10 years and during that time there was but one reduction and that was made in December, 1903, when prices were extremely low. The railroad car supply during the past week was remarkably good and premiums for prompt shipments have disappeared. Connellsville coke is now quoted at \$2@2.25 for furnace and \$2.75@3 for foundry. The production for the week is given at 260,728 tons, an increase of 972 tons. The shipments aggregated 11,325 cars distributed as follows: To Pittsburg and river points, 4,560 cars; to points west of Pittsburg, 5,678 cars; to points east of Everson, 1,087 cars. This was an increase of 503 cars compared with the previous week.

**San Francisco.** March 2.

The coal market continues quiet, but fairly steady, with no change in prices. Fuel oil is in good demand.

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 8.

The exports of coal and coke from the United States during January of this year, as compared with the same month of 1904, stand as follows:

	1904.	1905.
Anthracite.....	91,957	142,201
Bituminous.....	298,544	414,978
Total Coal.....	390,501	557,179
Coke.....	32,635	38,557
Totals.....	423,136	595,736

The exports of both classes of coal were distributed as follows:

	1904.	1905.
Canada.....	223,485	410,466
Mexico.....	81,839	67,761
Cuba.....	31,881	23,602
Other West Indies.....	20,079	18,621
France.....	3,682	95
Italy.....	1,360	503
Other Europe.....	1,797	1,320
Other countries.....	26,378	34,811
Totals.....	390,501	557,179

Next to Canada, Cuba and the West Indies are the largest consumers of our anthracite. No hard coal was shipped to Europe during January.

The shipments to Canada, stated in detail, were:

	1904.	1905.
Anthracite.....	90,290	140,799
Bituminous.....	133,195	269,667
Totals.....	223,485	410,466

Imports of coal during the first month of the two years compare thus:

	1904.	1905.
Canada.....	148,264	114,743
Great Britain.....	15,225	8,826
Other Europe.....	.....	110
Japan.....	10,292	6,000
Australia.....	39,901	10,724
Other countries.....	7	37
Totals.....	213,689	140,440

About one-third of the coal received from Great Britain this year consisted of Welsh anthracite. All other imports were of bituminous coal.

**Iron Trade Review.**

**NEW YORK,** March 8.

Active business, with every sign of increase in demand, marks the condition of the iron market. The majority of blast furnaces are now well sold up for the second quarter of the year, and business for third-quarter delivery continues to come in. The United States Steel Corporation has practically all of its furnaces in blast, and is further setting the pace by considerable buying from outside furnaces in the Pittsburg district and the Mahoning and Shenango valleys.

Foundry iron is in good demand also. Southern furnaces are holding firmly at slight advances, and \$14, Birmingham, for No. 2 foundry seems likely to be the basis on which second-half deliveries are taken.

In finished materials demand also continues very good. The principal incident of the week has been an advance in steel bars, and in pipe, which are referred to by our Pittsburg correspondent. Structural business is good, and the only dull spot in the market is in rails, the volume of orders being still disappointing.

The proposed southern iron consolidation, it is announced, is postponed for the present. This probably means that it is off altogether, though possibly negotiations may be renewed later.

**Exports and Imports.**—The value of the iron, steel and all their manufactured products, exported from the United States during January last was \$8,957,989, as compared with \$8,171,738 during the same month of the previous year. The leading items of the month's exports in the two years compare, in long tons:

	1904.	1905.
Pig iron .....	6,742	10,458
Bars .....	3,342	5,250
Rails .....	5,565	12,232
Structural .....	2,340	3,780
Wire .....	7,601	8,308
Nails and spikes .....	3,275	3,297

In the item of rails, January, 1905, shows a falling off of 6,767 tons when compared with January of 1904. The heaviest shipments go to Eastern Asia, South America and Europe, in the order named.

Imports of iron, steel and manufactures thereof, during the first month of this year, had a value of \$2,110,815, as compared with \$1,959,132 during the same month in the previous year. The principal items were:

	1904.	1905.
Pig iron .....	10,812	8,804
Billets, blooms, etc. ....	1,860	3,363
Scrap iron and steel .....	827	1,370
Bars .....	2,781	1,739
Rails .....	1,740	667
Wire-rods .....	1,337	1,430
Tin-plates .....	5,432	7,910

Of iron ore, 46,620 tons were imported and 885 tons exported. Re-exports of foreign pig iron amounted to 329 tons, and of scrap, to 30 tons.

#### Birmingham. March 6.

The Alabama iron market still presents a strong front, with quotations advancing. Iron in considerable quantity has been sold above \$13.75 per ton for No. 2 foundry, and there are many inquiries being received. The Sloss-Sheffield Steel & Iron Co. on Friday of the past week sold 1,000 tons of No. 1 foundry iron to one consumer at \$14.45 per ton. The same day a 1,000-ton lot of No. 2 foundry iron was sold at \$13.95, without the usual commissions off, and smaller sales were made at \$14 per ton, No. 2 foundry. The first half of the year has been well covered by the Alabama manufacturers of iron, and sales are now being made for delivery during the third quarter. Some of the manufacturers in this district are behind in their deliveries. Coal and coke supplies are still giving more or less trouble. The other raw material supplies are sufficient for all purposes.

It is learned that a well-known iron concern purchased a large quantity of iron from Alabama manufacturers recently. Lately a part of this iron was placed on the market at \$1 per ton lower than it was purchased for. The object of this can hardly be surmised, except that it was intended to break the market and then buy again at new prices established.

The following quotations are given: No. 1 foundry, \$14.25@14.50; No. 2 foundry, \$13.75@14; No. 3 foundry, \$13.25@13.50; No. 4 foundry, \$12.50@13; gray forge, \$12@12.50; No. 1 soft, \$14.25@14.50; No. 2 soft, \$13.75@14.

The finished iron market is not as satisfactory as it might be. The closing down of the Birmingham rolling mills caused considerable surprise in industrial circles. There is continued activity at the steel plants.

The Birmingham Stove & Foundry Co., capital stock \$25,000, was incorporated during the past week by H. F. Maus, J. M. Jolley, E. M. Chestnutt, J. B. Gibson, W. E. Estess, C. E. Thomas and T. F. Wimberly. The company will erect stove works at once.

Both the Dimmick Pipe Co. and the United States Cast Iron Pipe Co. have started the work of improving their works in this district.

#### Chicago. March 6.

There has been little change in the local iron market in the last week, but there are no signs of weakening on the part of the furnace representatives, and firmness marks the general conditions. Buying of iron is perhaps a little heavier as regards sales for the latter half of the year. Talk about consolidation of southern furnace interests has stimulated buying, without doubt, but probably the real reason for the market not declining is the feeling by consumers of iron that the furnacemen are strong enough to maintain present prices. The consumer, as heretofore, wants to order in small quantities, but often, and to this system the selling agents have little objection. Several large contracts are being figured upon. On orders for the last half of the year, such as are now in order for the needs of the foundrymen, southern furnaces are trying to hold prices 25 to 50c. above quotations for general sales, but contracts are being made in competition with northern furnaces at practically the prices that have prevailed for the last month—\$13.50, Birmingham, for southern No. 2, or \$17.15, Chicago, and \$17.50 for northern No. 2.

Sales of manufactured shapes in general have been larger than in previous weeks. Rails and track supplies have been in heavy demand, and the increase in the price of steel bars has not apparently diminished the trade in these or other shapes. For both the pig iron and the manufactured iron market the outlook is better than it has been for several weeks, and the coke market is correspondingly firmer. Shipments of Connellsville are still delayed somewhat by the storms and cold weather, but there is no real scarcity, and conditions will doubtless be easier by the end of the present week. Connellsville 72-hour brings \$5.65, and standard grades \$5@5.50 per ton.

#### Cleveland. March 7.

**Iron Ore.**—The buying of iron ore has about stopped for the time being. The demand has been satisfied. There are some few sales on the old basis of prices—\$3.75 for bessemer old range; \$3.50 for bessemer Mesabi; \$3.25 for non-bessemer old range, and \$3 for non-bessemer Mesabi. The lake vessel owners have lost their fight with the shippers over the rates which are to apply this year on contracts, and have begun to make season charters on the basis of 75c. from Duluth, 70c. from Marquette, and 60c. from Escanaba. This is 5c. higher than the rate on season contracts a year ago. The prospects

are for an early opening of navigation, but there is a prospective hindrance in the attitude of the mates, who have become affiliated with the Longshoremen's Union, and demand recognition, whereas the Lake Carriers' Association has legislated against them.

**Pig Iron.**—Some of the foundrymen have come into the market during the past week to buy material for second-half delivery. They have been merely testing the market by buying part of what they will need. The furnaces are, however, disposed to sell in some instances, and the amounts which have been taken were sold at \$16 in the Valleys for No. 2. One or two furnaces are holding for \$16.50 for No. 2 strong foundry, and the same for No. 2 Scotch. The report is that one or two furnaces are holding for \$17 in the Valleys. The basic situation has also strengthened. The buyers see a possible shortage ahead within the next 60 days, and are inclined to cover their needs at the present time. On the other hand, the furnaces are not disposed to sell, expecting to get better prices later on. There is a good demand for bessemer on the basis of the old prices of \$15.50@16 in the Valleys.

**Finished Material.**—The price on bars has advanced to 1.50c., Pittsburg, for bessemer, and 1.60c., Pittsburg, for open-hearth, re-establishing the differential on open-hearth. This has lessened the difference in price between bar iron and steel, and has permitted a resumption of the buying in bar iron, which is also increased by the seasonable needs. Billets are selling at a premium of \$2, at \$25@26, Pittsburg, for bessemer 4 by 4. There is also a good demand for the forging quality. In the structural and plate market it is largely a question of deliveries, the demand being strong enough to absorb all that is being made, and then to eat into the stock piles. The rail trade is disappointing. The sheet market is firm, but the mills are holding it down by refusing to sell further than 60 days ahead on the present basis of prices.

#### New York. March 8.

The local market continues steady, with generally a fair demand for all sorts of material. Considerable business is being done here with Eastern buyers.

**Pig Iron.**—The market is, on the whole, a little firmer. There is a good deal of business being done in small lots to local buyers, with somewhat larger orders in sight. Inquiries for basic iron are also noticed.

Prices are, on the whole, a shade firmer. For Northern iron we quote as follows for large lots: No. 1 X foundry, \$17.75@18; No. 2 X, \$17.50@17.75; No. 2 plain, \$16.75@17; gray forge, \$16@16.25. Some Virginia foundry, No. 2, has been sold at \$17.65@17.90, while Virginia basic brings \$17.15@17.65. Southern iron is firmly held, and we quote for large lots on dock as follows: No. 1 foundry, \$17.75@18; No. 2, \$17.25@17.50; No. 3, \$16.75@17; No. 4, \$16.25@16.50; No. 1 soft, \$17.75@18; No. 2 soft, \$17.25@17.50; gray forge, \$16.25@16.50.

Business in pig iron warrants on the Produce Exchange has been a little better, but is still only fair. The latest quotations range \$16.60 bid and \$16.90 asked for March, April and May delivery; \$16.80 bid and \$17 asked for June iron.

**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 at 2@2.25c. base.

**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 still 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.

**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 fair demand, prices varying from \$23 for 35-lb. sections up to \$28 for 12-lb. rails.

**Old Material.**—Scrap of all kinds is in good demand, and prices are firm. Old steel rails are called for, and one sale is reported at \$18, delivered. Railroad wrought is quoted \$20@\$21; best yard wrought, \$17@\$18; heavy steel melting scrap, \$16@\$17; machinery cast, \$13.50@\$14.50. These prices are on cars, Jersey City or other terminal delivery.

**Pittsburg. March 7.**

The voluntary advance in the wages of coke-workers is regarded as positive evidence that 1905 will be a record-breaking year in the iron and steel industry. An increase was considered about Jan. 1, but it was decided to wait until there was a certainty that favorable conditions would continue throughout the year. All the ovens are in operation and the car supply is very satisfactory. The blast furnaces are now producing pig iron at the rate of 21,000,000 tons a year, and it is not accumulating, being shipped promptly. The United States Steel Corporation is expected to place another large contract for pig iron and the 40,000 tons ordered for March delivery will be shipped before the end of the month. The Corporation is increasing its steel capacity and, as it is operating nearly all of its blast furnaces, will be forced to buy outside iron. The shading of the price of foundry iron on the big order placed by the Standard Sanitary Manufacturing Co., week before last, did not weaken the market and it is stronger to-day than it was a fortnight ago. Both the eastern and southern pig iron markets have been active, and southern foundry in this district rules from 25 to 50c. a ton higher than a week ago, No. 2 being quoted at \$13.75 @ \$14. Birmingham. The Standard Co.'s southern iron was bought at \$13.50. The largest transaction during the week was the closing of contracts for foundry and forge by the Westinghouse Air Brake Co. It has bought between 7,000 and 8,000 tons, both northern and Virginia iron being taken. The price of the foundry iron was on a basis of \$16, Valley furnace, or \$16.85 delivered, an advance of 25c. a ton over the price paid by the Standard Co. A sale of foundry No. 2 amounting to 500 tons, was reported to-day at \$16.50, Valley furnace. The Westinghouse Electric & Manufacturing Co. is in the market for 10,000 tons of foundry and may close this week.

The demand for finished steel products is increasing to such an extent that it is impossible to fill orders promptly and several large concerns are planning to increase their capacity. The Carnegie Steel Co. is getting its Columbus plant ready for resumption, and it will be started before the end of the week. This plant has been idle for a long time and is only operated in an emergency. Sheet and tin-plate bars are produced, and it has a capacity of from 12,000 to 15,000 tons a month. The Carnegie Co. to-day put the skelp mill at Sharon in operation. It has never

been operated, having been obtained in the Union-Sharon Steel Co. absorption about two years ago. By next Monday the Carnegie Co. will have every wheel controlled by it running. The scarcity of steel has again revived the report that the merchant furnace interests in the Valleys will build a large bessemer steel plant in the Youngstown district. The Republic Iron & Steel Co. is enlarging its bessemer plant and the Youngstown Iron Sheet & Tube Co. will also build a steel plant. Prices of finished steel products are firm and advances are being made in lines that were cut last year owing to depressed conditions. Following the advance of \$2 a ton in merchant steel bars was one of \$2 a ton in chain, ordered at a meeting of the Association of Chain-makers held here last Wednesday. A similar advance in chain-rods had previously been made. On March 1 an advance of \$1 a ton in merchant pipe was made by the leading producer; this is the third this year and the fifth since the stiff cut was made on Sept. 2. At that time pipe was reduced from \$2 to \$6 a ton or an average of \$4. On Oct. 19 an advance of \$2 was ordered and on Nov. 1 a like advance was made and with the \$3 increase this year, prices of pipe are \$7 higher than last September. The tin-plate trade is phenomenal, and premiums of 5 and 10c. a box are freely paid to obtain satisfactory deliveries. An advance in prices is expected at any time but may not become effective until April 1. The American Sheet & Tin-Plate Co. is operating all of its mills to full capacity and is preparing to enlarge the finishing department at the Sharon tin-plate plant. It is estimated that the production of tin-plate this year will reach 12,000,000 boxes. New business in structural material, plates and merchant steel bars is being placed almost daily and there is considerable inquiry for all lines.

It is rumored here that the United States Steel Corporation contemplates a general advance in wages at all of the plants under its control, effective on April 1, but no official information on the subject has been given out. It is regarded as certain that the wages of puddlers and finishers in the union rolling mills of the country and the tin-plate plants operating under the sliding scale of the Amalgamated Association, will be advanced for March and April. The bi-monthly adjustments will be made this week. The puddlers are receiving \$4.90 a ton on the basis of bar iron at 1.3c. At 1.4c. under the scale, the rate will be \$5.12½ and at 1.5c. it will be \$5.37½ a ton. Bar iron has been selling during the past month at 1.65c. and it is believed the average sales for January and February on which wages will be based, will be at least 1.4c. and possibly 1.5c. Tin-plate has been selling at \$3.55 a box and the base of the scale is \$3.40 a box. Wages increase 2% with each 10c. a box advance above the base.

**Pig Iron.**—There was but little bessemer iron sold during the week and prices are firm at \$15.50@\$16, Valley. Sales of foundry and forge iron amount to over 10,000 tons, including the purchase by the Westinghouse Air Brake Co. Foundry No. 2 is quoted at \$16.85@\$17.10, Pittsburg, although it is reported a sale of 500 tons was made at \$17.35. Gray forge is quoted at \$15.85@\$16.10, Pittsburg.

**Steel.**—There is considerable inquiry for billets, but prices are high and no sales of importance are recorded. Billets and sheet-bars are held at from \$3 to \$3.50 above the pool prices of \$21 for billets and \$23 for sheet-bars. Plates are firm at 1.60c. and merchant steel bars are now 1.50c.

**Sheets.**—The market and prices remain unchanged. There is a good demand and an advance is expected about April 1. Black sheets No. 28 gauge are quoted at 2.30c. and galvanized at 3.45c.

**Ferro-Manganese.**—Domestic 80% is still quoted at \$45 a ton.

**Chemicals and Minerals.**

NEW YORK, March 8.

Better transportation has accelerated deliveries, and as prices generally continue firm, sellers look more cheerful.

The foreign trade of the United States in January is shown in part below:

	Imports.	Re-exports
Asphalt, tons.....	6,534	18
Bleaching powder, lb.....	7,451,254	.....
Cement, lb.....	34,603,800	3,928,301
Chlorate potash, lb.....	1,127	.....
Clay or earths, tons.....	17,739	16
Graphite, tons.....	1,053	1
Nitrate soda, tons.....	21,098	28
Salt, lb.....	21,533,325	.....
Saltpeter, lb.....	488,338	380,134
Soda ash, lb.....	1,682,058	.....
Soda, caustic, lb.....	148,589	68,613
Soda, sal, lb.....	328,595	1,101

Exports of domestic products in the same month of this and last year were:

	1904.	1905.
Cement, bbl.....	11,388	42,152
Gunpowder, lb.....	12,047	52,545
Lime, bbl.....	3,101	8,029
Lime acetate, lb.....	5,362,173	4,909,143
Salt, lb.....	1,025,787	4,509,566

Most of these exports were to Germany, the West Indies, and Central and South America.

**Acids.**—More expensive raw material has sent the price of acetic acid of commercial grade to \$2.60 per 100 lb. Both muriatic and sulphuric acid are in good request at firm prices.

Nitric acid, 36°, 100 lb.....	\$5.00
28°, 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

**Copper Sulphate.**—Apparently jobbers control spot business, for they are selling at \$5.05@\$5.10 per 100 lb., while makers, who are well sold forward, continue to quote \$5.20@\$5.25.

Exports of copper sulphate from the United States in January, principally to Europe, amounted to only 1,847,974 lb., as against 3,196,384 lb. in the same month last year.

**Sulphur and Pyrite.**—Excepting for the arrival of 6,000 tons of Louisiana sulphur to be delivered on contract, the market is uninteresting. Domestic prime sulphur is quoted at \$21.75 per ton at New York; seconds at \$21.45. Deliveries at Philadelphia and Baltimore cost 25c. per ton more; to Portland, Me., 15c. Foreign best seconds remain nominal at \$21.25, while thirds are quoted at 50 to 75c. per ton less. Pyrite, Spanish unwashed fines, (44 @ 52% sulphur) are worth 9 @ 9.5c. per unit, and lump, 10 @ 11c., f. o. b. Atlantic ports. Domestic fines (42 @ 44% sulphur), continue at 8.5 @ 9c. per unit, and lump, 9.5 @ 10c.

Imports of sulphur and pyrite into the United States in January were, in long tons:

	1904.	1905.	Changes.
Brimstone.....	9,073	5,358	D. 3,715
Pyrite.....	24,963	38,156	I. 13,193
Total sulphur.....	21,055	23,673	I. 2,618

Although imports of pyrite have grown, the increase in the yield of sulphur does not equal the falling off in the receipts of brimstone from Sicily.

**Nitrate of Soda.**—Market conditions are generally firm. Refined quality at New York for prompt and nearby arrivals is worth \$2.35 per 100 lb., while futures are \$2.225@2.275, according to position. Ordinary quality is 2.5c. per 100 lb. less than refined.

Messrs. Mortimer & Wisner's statement of nitrate of soda, dated New York, March 1, gives the following interesting statistics in long tons:

	1904.	1905.
Imported into Atlantic ports from West Coast S. A. from Jan. 1 to date.....	49,260	28,600
Stock in store and afloat Mar. 1, N. Y.....	1,700	.....
Boston.....	800	.....
Philadelphia.....	2,400	.....
Baltimore.....	.....	500
New Orleans.....	.....	30
To arrive, due June 15, 1905	76,100	100,000
Visible supply to June 15, '05	81,000	100,530
Stock on hand Jan. 1.....	8,100	8,380
Deliveries past month.....	27,879	17,470
Deliveries since Jan. 1 to date	52,460	36,450
Prices current, Mar. 1, per lb. 2.12½@2.15c. 2.32½c		

Quotations are for 96%; 95% can be had at 2½@5c. per 100 lb. cheaper. The deliveries this year show a decrease of 16,010 tons.

**Sulphate of Ammonia.**—Quiet at \$3.20@3.25 per 100 lb. for domestic gas liquor, and \$3.22@3.275 for foreign, according to time of delivery.

**Phosphates.**—There is a better feeling manifest, as the approach of spring gives promise of an increased consumption. Miners and exporters incline toward the belief that higher prices for phosphates pending cannot but benefit superphosphate manufacturers, whose goods have been selling at a discount. The European situation appears brighter than the domestic, and considering that over half our phosphate mined is exported, the balance sheets of sellers at the end of the year will still show a profit. Of course some miners, as is always the case, will suffer from competition, but the concentration of the larger interests has initiated economy that foretells better earnings.

Exports of phosphates from the United States in January were 45,076 long tons, showing a decrease of 5,460 tons as compared with the same month last year. The bulk of these exports were in Florida land pebble and rock to Germany, France, Italy and Great Britain. Imports of phosphatic materials, especially from Belgium, were 18,183 tons, as against 15,750 tons in January, 1904.

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock.....	\$7.25@7.50	\$11.45@11.65
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
Basic slag, 42@50%.....	.....	10.21@10.44
38@45%.....	.....	9.48@ 9.72
30@35%.....	.....	7.78@ 7.90

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

### Liverpool. Feb. 21.

There is a quiet but steady trade passing in most lines of heavy chemicals, write Joseph P. Brunner & Co.

For the year ending December 31, the United Alkali Company have announced the full preference dividend at the rate of 7% per annum, carrying forward about £90,000, this sum including the £80,000 brought forward from the previous year, so that apparently they have made about £10,000 more during 1904 than in the previous 12 months.

Soda ash continues firm and in fair demand. For tierces, 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. Bags, 5s. per ton under price for tierces. Soda crystals find a steady outlet at £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda, while not active, is moving off pretty freely, and supplies are limited, 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.

Bleaching powder is in good demand for home consumption, but export business is dull. For hardwood, £4 15s. @ £5 per ton is the nominal range, as to market.

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

Nitrate of soda has become dull, and prices have declined, £11 2s. 6d. per ton for ordinary, and £11 5s. for refined, being about present nearest spot range for double bags f. o. b. here, less 2½%.

### Metal Market.

New York, March 8.

#### 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.....	1.\$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 March 4 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$44,309	\$1,107,937	\$167,426	
1905.....	\$29,456,196	758,732	\$789,378	344,579
1904.....	1,359,160	1,383,658	640,945	166,449
1903.....	757,933	1,137,408	3,607,978	144,731

There were no gold exports this week, and imports were principally from Central America. Silver exports were chiefly to London; imports mostly from Central and South America.

The course of general business remains unchanged. The speculative markets are chiefly interesting to insiders at present, as the public is doing little.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending March 4, gives the following totals, com-

parisons being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts.....	\$999,918,400	\$1,134,425,300
Deposits.....	1,040,593,800	1,189,970,000
Circulation.....	39,169,500	42,851,300
Specie.....	219,192,400	219,628,400
Legal tenders.....	70,899,400	86,253,800
Total reserve.....	\$290,091,800	\$305,588,200
Legal requirements.....	260,148,450	297,492,500
Balance surplus.....	\$29,943,350	\$8,389,700

Changes for the week this year were increase of \$10,145,100 in deposits, and \$21,500 in circulation; decreases of \$6,856,100 in loans and discounts, \$3,542,000 in specie, \$178,100 in legal tenders, and \$6,256,375 in surplus reserve.

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

	Gold.	Silver.
N. Y. Ass'd.....	\$219,628,400	.....
England.....	194,974,945	.....
France.....	562,351,510	\$220,415,965
Germany.....	205,565,000	68,525,000
Spain.....	74,705,000	102,650,000
Netherlands.....	30,016,500	31,459,000
Belgium.....	15,923,335	7,961,665
Italy.....	111,320,000	16,253,000
Russia.....	510,150,000	30,730,000
Austria.....	241,270,000	64,140,000

The returns of the Associated Banks of New York are of date March 4, and the others March 2, 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 United States Assay Office in New York reports receipts at 123,000 oz. of silver during the week.

Shipments of silver from London to the East for the year up to February 23 are reported by Messrs. Pixley & Abell's circular as follows:

	1904.	1905.	Changes.
India.....	£2,576,039	£1,212,687	D. £1,363,352
China.....	71,000	1,370	D. 69,630
Straits.....	58,103	2,800	D. 55,303
Totals.....	£2,705,142	£1,216,857	D. £1,488,285

Receipts for the week were £228,000 in bar silver from New York, £5,000 from the West Indies, and £8,000 from Australia; total £341,000. Shipments were £200,787 in bar silver to Bombay, and £1,370 to Shanghai; total, £202,157.

Indian exchange has been easier, as exports from India are falling off. The Council bills offered in London were taken at an average of 16.03d. per rupee. Buying of silver for India has not been heavy.

The coinage executed at the Mints of the United States in February is reported by the Bureau of the Mint, Treasury Department, as below:

Denomination.	Pieces.	Value.
Double eagles.....	186,829	\$3,736,580
Eagles.....	21,000	210,000
Half eagles.....	72,000	360,000
Total gold.....	279,829	\$4,306,580
Half dollars.....	112,000	\$56,000
Quarter dollars.....	960,000	240,000
Dimes.....	2,630,000	263,000
Total silver.....	3,702,000	\$559,000
Five c., nickels.....	2,286,000	\$114,300
One c., bronze.....	2,131,000	21,310
Total minor.....	4,417,000	\$135,610
Total coinage.....	8,398,829	\$5,001,190

In addition to the above there were coined in the Philippines 1,044,000 pesos, and for Panama 1,724,862 pieces, or \$928,986.18.

The Treasury Department's estimate of the amount and kinds of money in the United States on March 1 is as follows:

	In treasury.	In circulation.
Gold coin (including bullion in Treasury)	\$164,264,031	\$645,751,720
Gold certificates	38,593,150	482,556,819
Silver dollars	14,409,162	74,329,719
Silver certificates	7,893,101	461,761,899
Subsidiary silver	12,947,985	100,214,885
Treasury of 1890	46,417	10,283,583
U. S. Notes	14,061,633	332,619,383
Currency certificates		
National bank notes	16,107,136	453,096,704

Totals..... \$268,322,615 \$2,560,614,712

Population of the United States March 1, 1905, estimated at 82,794,000; circulation per capita, \$30.93. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the Treasury as assets of the Government does not include deposits of public money in National Bank depositaries, to the credit of the Treasurer of the United States, and amounting to \$93,146,289.83. The total amount in circulation shows a decrease of \$9,434,453 as compared with February 1, and an increase of \$57,132,815 over March 1, 1904.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	\$0.45 1/2	\$0.48 1/2
Peruvian soles and Chilean pesos	.42	.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.

March.	Cooper.		Tin.	Lead.	Spelter.		
	Lake. Cts. per lb.	Electrolytic. Cts. per lb.	London, £ per ton.	Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
2	15 1/2 @ 15 1/2	14 1/2 @ 15 1/2	68 1/2	29	4.45	@ 6.20	@ 6.05
3	15 1/2 @ 15 1/2	14 1/2 @ 15 1/2	68 1/2	28 1/2	4.45	@ 6.25	@ 6.10
4	15 1/2 @ 15 1/2	14 1/2 @ 15 1/2	68 1/2	28 1/2	4.45	@ 6.25	@ 6.10
6	15 1/2 @ 15 1/2	14 1/2 @ 15 1/2	68 1/2	28 1/2	4.45	@ 6.25	@ 6.10
7	15 1/2 @ 15 1/2	14 1/2 @ 15 1/2	68 1/2	29 1/2	4.45	@ 6.25	@ 6.10
8	15 1/2 @ 15 1/2	14 1/2 @ 15 1/2	68 1/2	29 1/2	4.45	@ 6.25	@ 6.10

SILVER AND STERLING EXCHANGE.

March	Sterling Exchange.	Silver.		March	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
2	4.8650	59 1/2	27 1/2	6	4.86 1/2	58 1/2	27 1/2
3	4.8650	59 1/2	27 1/2	7	4.8650	58 1/2	27 1/2
4	4.86 1/2	59	27 1/2	8	4.8650	58 1/2	27 1/2

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

**Copper.**—During the latter part of last week the copper market ruled very dull. However, since then there has been a more active demand from home consumers, which developed a somewhat firmer feeling.

The market closes firm at 15 1/2 @ 15 1/4 c. for lake copper; 15 @ 15 1/8 c. for electrolytic in cakes, wirebars or ingots, 14 3/4 @ 14 1/2 c. for cathodes; 14 1/2 @ 14 1/4 c. for casting copper.

Bear operations caused a temporary depression in the standard market in London, but there has been a recovery, the tendency at the close being still upward. The last quotations on Wednesday are cabled as £68 5s. for spot and £68 12s. 6d. for three months.

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 1/2 @ 6 3/4 d.

Exports of copper from New York and Baltimore for the week ending March 7 were 5,554 long tons; also 1,600 tons copper cinder to Cuba. Imports for the week of March 3 were 62 tons copper, and \$25 worth of ore.

Exports of copper from the United States in January are reported as below by the Bureau of Statistics of the Department of Commerce and Labor; the figures given being in long tons, of 2,240 lb. each:

	1904.	1905.	Changes.
Copper	28,306	19,307	D. 8,999
Copper ores	1,792	2,319	I. 527

The copper contents of ore are not given. Estimating them, chiefly on the basis of values, we find that the total exports of material this year were equal to 19,743 tons of fine copper. There was a marked decrease from January of last year. Exports to China this year were 502 tons.

Imports of copper and copper material into the United States in January are reported as follows, in long tons:

	On metal.	In ores, etc.	Total.
Mexico	3,937	929	4,866
Canada	786	428	1,214
Great Britain	351	—	351
Other countries	279	103	382

	1904.	1905.	Changes.
Totals	5,353	1,460	6,813
Re-exports	50	—	50

Net imports..... 5,303 1,460 6,763

In January, 1904, the equivalent copper imports were 7,015 tons, showing a decrease of 202 tons this year. The tonnage of ore and matte from Mexico this year was 6,998 tons, carrying 929 tons copper; from Canada 10,011 tons, carrying 428 tons of copper.

**Tin.**—It seems that quite a tonnage of the tin which arrived lately has been shipped for account of weak holders, who have right along been forced to sacrifice their metal at prices considerably below the import point. Sales were made late last week and the early part of this week at as low as 28.75. The close is somewhat firmer at 29 1/8 for spot; 28 7/8 for futures.

The foreign market received a decided stimulus through the announcement by the Dutch government of a reduction in each Banka sale amounting to 350 tons per sale. The market, which last week closed weak, at £130 15s. for spot, £129 15s. for three months, opened firmer on Monday at £131 for spot, and on account of the aforesaid development a further advance has taken place, the closing quotations on Wednesday being cabled as £133 for spot, £131 12s. 6d. for three months.

Imports of tin into the United States in January are reported as below; the figures being given in long tons of 2,240 lb. each:

	1904.	1905.	Changes.
Straits	874	1,106	I. 232
Australia	30	5	D. 25
Great Britain	1,091	1,579	I. 488
Holland	77	21	D. 56
Other Europe	15	—	D. 15
Other countries	1	48	I. 47

Totals..... 2,088 2,759 I. 671

The large increase this year was chiefly due to receipts from British ports.

**Lead.**—The market rules steady, and consumption keeps up at a normal rate. Quotations are unchanged at 437 1/2 St. Louis, 445 New York.

The foreign market, which at one time ruled as low as £11 17s. 6d., has advanced on account of a decided increase in the foreign consumption, and closes firm at £12 5s. for Spanish lead, £12 7s. 6d. for English lead.

Imports of lead into the United States in January, with re-exports of foreign

lead, are reported by the Bureau of Statistics as follows; the figures being given in short tons:

	1904.	1905.	Changes.
Lead, metallic	790	539	D. 251
Lead in ores and base bullion	7,341	9,164	I. 1,823
Total imports	8,131	9,703	I. 1,572
Re-exports	5,876	3,516	D. 2,360

Net imports..... 2,255 6,187 I. 3,932

Of the lead imported this year, 9,226 tons were from Mexico, 384 tons from Canada and the balance from other countries. There were no exports of domestic lead reported this year.

**St. Louis Lead Market.**—The John Wahl Commission Co. telegraphs us as follows: Lead is quiet at 437 1/2 c. for both argentiferous lead and Missouri brands.

**Spelter.**—The demand from all sources is on a very large scale, and all available metal has been readily absorbed at current prices. The closing quotations are 6.05 @ 6.10 St. Louis and 6.20 @ 6.25 New York.

The foreign market had a dip to £23 15s., but recovered, and the closing quotations are cabled at £24 for good ordinaries, £24 5s. for specials.

Exports of spelter from the United States in January were 1,080 short tons, against 163 tons in January, 1904; an increase of 917 tons. Exports of zinc ore were 1,515 tons, against 98 tons last year; an increase of 1,417 tons. Imports of spelter amounting to 29 tons were reported in January of this year.

**St. Louis Spelter Market.**—The John Wahl Commission Co. telegraphs us as follows: Spelter is strong, and apparently as scarce as ever. The latest sales are on a basis of 6.15c. East St. Louis. At this price there are more buyers than sellers.

**Antimony** is somewhat weaker. While the standard brands are still held at the figures we reported last week, outside brands can be bought at 7.50 @ 7.75c. per pound.

Imports of antimony into the United States in January were, in pounds:

	1904.	1905.	Changes.
Metal and regulus	221,396	170,220	D. 51,176
Antimony ore	100,994	262,065	I. 161,071

The content of the increased quantity of ore imported this year more than equalled the falling off shown in the receipts of metal and regulus.

**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.

Exports of nickel, nickel oxide and nickel matte from the United States in January were 669,535 lb.; in 1904 no exports were noted in January. Imports of nickel ore and matte were 669 tons, against 643 tons in January of last year.

**Platinum.**—Quotations are firm, at \$19.50 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.

Imports of platinum into the United States in January were 1,099 lb., against 363 lb. in January, 1904; an increase of 736 lb. this year.

**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 ex-

port. The London price is £7 12s. 6d., with the same figures quoted by second hands.

Exports of quicksilver from the United States in January were 67,929 lb., against 221,283 lb. in 1904; a decrease of 153,354 lb. this year.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany; of coke from Germany and quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f. o. b. Bremen.

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

Table listing prices for various metals and alloys per lb. including Aluminum, Bismuth, Chromium, Copper, Ferro-Molybdenum, Ferro-Titanium, Ferro-Chrom, Ferro-Tungsten, Magnesium, Manganese, Molybdenum, Phosphorus, and Tungsten.

Prices vary chiefly according to size and terms of orders.

Missouri Ore Market.

JOPLIN, March 4.

The highest price reported paid for zinc ore was \$54.50 per ton, with the assay basis opening the week at \$52, and closing at \$48 to \$51 per ton of 60% zinc. Lead brought \$57 per ton all week. Both ores were in good demand, and perfect weather for mining operations permitted an increased shipment of both minerals. Zinc buyers who have been out of the market for several weeks were among the purchasers this week for a small quantity, while some of the larger smelters took all the ore they could get at the lower figure. The buyer for the LaHarpe Spelter Co., who has been absent in Mexico looking for zinc, was back in the market. He reports having purchased 8,000 tons of calamine while absent, shipments to begin soon. A. O. Ihseng, of New York, who is in the district, asserts that the ore shipments from Mexico and British Columbia are being made without paying duty, and that all grades of ore are being shipped in as calamine, because under that name there is no duty named. The St. Louis Smelting & Refining Co. was not in the market for lead, and the local smelters took all this ore outputted at a shade lower prices.

Following are the shipments of zinc and lead from the various camps of the district for the week:

Table showing shipments of Zinc lb., Lead lb., and Value for various locations including Joplin, Carterville & Webb City, Galena-Empire, Duenweg, Badger, Alba, Oronogo, Aurora, Prosperity, Neck City, Sherwood, Granby, Carthage, Baxter, Zincite, Spurgeon, and Beef Branch.

Totals... 10,672,980 Zinc lb., 1,297,590 Lead lb., \$299,490 Value. This week, zinc value, \$262,690; nine weeks, \$1,802,420. This week, lead value, \$36,800; nine weeks, \$2,032,190.

Monthly Average Prices of Metals.

Table showing Monthly Average Prices of Silver in New York and London from January to December 1904 and 1905.

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

COPPER IN NEW YORK.

Table showing Monthly Average Prices of Copper in New York (Electrolytic and Lake) from January to December 1904 and 1905.

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

COPPER IN LONDON.

Table showing Monthly Average Prices of Copper in London from January to June 1904 and 1905.

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

TIN IN NEW YORK.

Table showing Monthly Average Prices of Tin in New York from January to June 1904 and 1905.

LEAD IN NEW YORK.

Table showing Monthly Average Prices of Lead in New York from January to June 1904 and 1905.

SPELTER.

Table showing Monthly Average Prices of Spelter in New York and St. Louis from January to December 1904 and 1905.

Dividends.

Table listing Dividends for various companies including Ala. Con. C. & I., Alaska-Mexican, Alaska Treadwell, Amalgamated Copper, American Coal, Bunker Hill & Sullivan, Calumet & Hecla, Calumet & Arizona, Carmen, Mex., Central Eureka, Central Lead, Claremont Oil, Dos Estrellas, Federal Mg. & Sm., Federal, General Chemical, Greene Con. Gold, Imperial Oil, Iron Silver, Kern River Oil, La Victoria y An., National Lead, Oil City Petroleum, Pacific Coast Borax, Parrot, Peerless Oil, Phila. Gas, Providencia, Quincy, San Francisco Mill, Santa Maria de la Paz, Soledad, Sorpresa, Silver King, Standard Oil, Stratton's Independence, Thirty-three Oil, U. S. Steel, Union Oil, United Petroleum, and United States.

\*Monthly. †Quarterly. ‡Semi-Annual.

Assessments.

Table listing Assessments for various companies including Alta-Sierra, Austrian Syndicate, Beaver Harrison, Belcher, Blue Eagle, Black Rock Copper, Brunswick, Burlington, Caledonia, Con. St. Gothard, Dagmar, Emerald, Exchequer, Gould & Curry, Great Eastern, Hale & Norcross, Halifax-Tonopah, Horn, Idaho Development, Idaho, Jackson Butte, Joe Bowers, Julia Con., Juno, Little Chief, Manhattan, Mayflower, Petro, Potosi, Reamer Con., Santa Rita, Scottish Chief, Sheba, Sonora Quartz, Spanish Ridge, Star, Union Con., West Century, and Yuba Con.

Colorado Springs (By Telegraph).

Table showing Colorado Springs prices by telegraph for March 6 and March 7, listing companies like Anaconda, C. K. & N., Cripple Ck. Con., Doctor Jack Pot, Elkton Con., El Paso, Isabella, Moon Anchor, Old Gold, Portland, and Vindicator Con.

STOCK QUOTATIONS.

Salt Lake City. March 3

Table with columns: Company, Par Val., High., Low., Shares. Lists various mining companies like Ajax, Columbus Consolidated, Carisa, etc.

Total sales 110,615 shares.

St. Louis, Mo.\* March 4.

Table with columns: Company, Par Val., Bid., Ask. Lists companies like Am. Nettie, Colo., Center Creek, etc.

\*By our Special Correspondent.

Montreal.\* March 4.

Table with columns: Company, Par Val., High., Low., Sales. Lists companies like Dominion Coal, Dom. I. & St., etc.

\*Montreal Stock Exchange.

Total sales, 2,818 shares.

San Francisco.\* March 2.

Table with columns: Company, Location, Opening, Closing, Sales. Lists companies like MacNamara, Mont. Tonopah, etc.

\*San Francisco & Tonopah Exchange.

Total sales, 88,200 shares.

San Francisco (By Telegraph).

Table with columns: Company, March 6, 7. Lists companies like Belcher, Best & Belcher, Caledonia, etc.

New York.

Large table with columns: Company, Par Val., Mar. 1-7 (High/Low), Sales. Lists numerous companies like Amalgamated, Anaconda, Best & Belcher, etc.

Total sales, 388,578 shares. \*Ex-dividend.

Boston.

Table with columns: Company, Par Val., Mar. 1-7 (High/Low), Sales. Lists companies like Adventure Con, Allouez, Amalgamated, etc.

Total sales, 145,477 shares. †Ex-dividend. ‡Assessment Paid.

STOCK QUOTATIONS.

London (By Cable).*							
Company.	Mar. 7			Company	Mar. 7		
	£	s.	d.		£	s.	d.
Camp Bird	1	13	9	Esperanza	10	11	3
Con. Gold Fields	18	0	0	Modderfontein	10	17	6
De Beers	1	9	0	Rand Mines	65	10	0
Dolores	8	10	7 1/2	Rio Tinto	2	2	6
East Rand	1	3	9	Simmer & Jack	1	7	6
El Oro				Tomboy			

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

Coal, Iron and Industrial Shares.														
Company.	Par Val.	Mar. 1		Mar. 2		Mar. 3		Mar. 4		Mar. 6		Mar. 7		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allis-Chalmers	\$100	17 1/2	17 1/2	17 1/2	17 1/2	17 1/2	17 1/2	17 1/2	17 1/2	18	17 1/2	17 1/2	17 1/2	2,100
Preferred	100													200
Am. Agri. Chem.	100													
Preferred	100													
Am. Sm. & Ref.	100	90 1/2	89 1/2	90 1/2	90	92 1/2	90 1/2	91 1/2	91 1/2	92 1/2	91 1/2	93	91 1/2	109,675
Preferred	100	118 1/2	118	118		118 1/2	118 1/2			118 1/2	118 1/2	120	118 1/2	5,030
Cambria Iron	50					49 1/2				49 1/2		49 1/2		190
Cambria Steel	50	27 1/2	27	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2	3,980
Col. Fuel & Iron	100	51 1/2	50 1/2	52 1/2	51 1/2	52 1/2	50 1/2	51 1/2	50 1/2	52 1/2	51 1/2	51 1/2	50 1/2	39,988
Preferred	100													200
Col. & H. C. & I.	100	16 1/2	16 1/2	17		16 1/2								600
General Chem.	100													100
Preferred	100													
Lehigh Nav.	50	108		108		107 1/2	107 1/2	107 1/2	107 1/2	107 1/2		107 1/2		643
Mong. R. Coal	100													100
Preferred	100													280
National Lead	100	34 1/2	33 1/2	35 1/2	35	34 1/2	34 1/2	34 1/2	34 1/2	35 1/2	34 1/2	34 1/2	34 1/2	23,194
Preferred	100	103	102 1/2	104 1/2	103 1/2	105	103	104 1/2	104 1/2	105 1/2	104 1/2	105 1/2	104 1/2	1,494
Phila. Nat. Gas	50	44	43 1/2	44 1/2	44	44 1/2	43 1/2	44 1/2	44 1/2	44	44	44	43 1/2	6,091
Preferred	50					47 1/2	47 1/2	47 1/2	47 1/2	48	48	48	48	449
Pittsburg Coal	100			20 1/2	20 1/2	20 1/2	20 1/2	20 1/2	20 1/2	21	20 1/2	20 1/2	20 1/2	562
Preferred	100	80	79 1/2	80 1/2	80	80 1/2	80	80 1/2	80 1/2	80 1/2	80 1/2	80	80	1,907
Republic I. & S.	100	20 1/2	19 1/2	20 1/2	20 1/2	19 1/2	19 1/2	18	19 1/2	18 1/2	19 1/2	18 1/2	18 1/2	18,150
Preferred	100	78 1/2	76 1/2	79 1/2	78 1/2	77 1/2	76 1/2	77 1/2	76 1/2	76 1/2	76 1/2	76 1/2	76 1/2	9,600
Sloss Shef. S. & I.	100	105		108	106 1/2	99	86	89	86	91 1/2	83 1/2	86		3,880
Preferred	100													
Standard Oil	100	615	612	620	618	620	616 1/2	619	617	615	618 1/2	615		353
Tenn. C. I. & R. R.	100	93 1/2	91 1/2	94 1/2	93 1/2	94	87 1/2	89	87 1/2	89 1/2	87 1/2	87 1/2		114,850
U. S. Steel Corp.	100	35 1/2	34 1/2	36 1/2	35 1/2	36 1/2	35 1/2	36 1/2	35 1/2	36 1/2	36 1/2	35 1/2		460,269
Preferred	100	95 1/2	94 1/2	96 1/2	95 1/2	96 1/2	95 1/2	96 1/2	95 1/2	96 1/2	96 1/2	94 1/2		159,036
Va. Car. Chem.	100	35	34	37 1/2	35	37 1/2	36 1/2	36	37	36	36 1/2	36 1/2		14,530
Preferred	100	106 1/2	105 1/2	108	107 1/2									14,530

Mexico.							
Company.	Shares Issued.	Prices, Mex.		Company.	Shares Issued.	Prices, Mex.	
		Bid.	Ask.			Bid.	Ask.
DURANGO:				San Rafael y An.	1,200	\$740	\$750
Penoles	2,500	\$2,600	\$3,000	aviada	670	1,160	1,163
San Andrea de la Sierra	200	10,000		Soledad, aviada	960	305	315
GUANAJUATO:				Sorpresa, aviada			
Cinco Senores y An.	2,000	15	20	MEXICO:			
aviadoras				Aldebarren	2,000	14	18
Cinco Senores y An.	400	32	40	Buen Despacho	3,000	40	48
aviada				Dos Estrellas	3,000	3,500	3,550
Providencia, San Juan	6,000	155	165	La Esperanza (El Oro)	3,000	1,500	1,500
de la Luz				Santa Ana, Esperanza	2,400	15	30
GUERRERO:				NUEVO LEON:			
Garduno y Anexas	7,200	31	35	La Fraternal	1,000	580	620
HIDALGO:				Norias de Bajan	1,000	700	750
Amistad y Con	9,600	68	70	SAN LUIS POTOSI:			
Carmen, aviada	1,100	240	245	Concepcion y An.	3,000	20	30
Guadalupe Fresnillo	1,000	170	200	El Barreno, aviadora	2,000	95	100
Mill	1,400	70	80	Sta. Maria de la Paz	9,600	256	259
Guadalupe Fresnillo	1,680	90	110	ZACATECAS:			
Mine	1,000	130	180	Asturiana y An	2,500	8	12
Maravillas y An., aviador	12,800	5	7	Candelaria y Pinos	2,500	45	60
Maravillas el Lobo	9,600	7	10	San Carlos y Anexas	2,500	15	20
Refugio, aviada	28,800	45	60	Sta. Maria de Gaud.	2,500	80	85
Sta. Gertrudis y An.				MISCELLANEOUS:			
aviadas				Bartolome de Medina	2,000	82	87
Sta. Gertrudis y An.				Naica (Chihuahua)	100	11,000	13,000
aviadoras				Natividad (Oxaca)	1,800	650	750
San Rafael y An.	1,200	2,130	2,180	aviadora	6,000	86	90
Trompillo				San Francisco Hac.	3,000	320	340
				Union Hacienda			

Paris.					
Company.	Location.	Par value.	Latest dividend.	Prices.	
				Opening.	Closing.
Acieries de Creusot	France	2,000	Fr. 75.00	Fr. 1,875.00	1,880.00
Anzin, Coal	France		290.00	5,790.00	5,710.00
Biache-St. Vaast	France	1,000	160.00	3,605.00	3,605.00
Boleo, c.	Lower California	500	104.17	2,650.00	2,750.00
Brunay, Coal	France	400	27.50	735.00	713.00
Courrieres, Coal	France	500	110.00	2,910.00	2,899.00
Ecombrera-Bleyberg, z.l.	France	350	35.00	702.00	714.00
Huanchaca, s.	Bolivia	125	2.50	88.25	93.75
Laurium, z. l.	Greece	500	25.00	338.00	332.00
Malfidano, z.	Italy	500	50.00	640.00	644.00
Metaux, Cie. Fran. de.	France	500	22.50	525.00	537.00
Mokta-el-Hadid, i. l.	Algeria	500	40.00	1,045.00	1,040.00
Nickel, n.	N. Caledonia	250	22.50	665.00	669.00
Penarroya, Coal	Spain	500	45.00	1,165.00	1,190.00
Vielle Montagne, z.	Belgium	30	30.00	841.00	845.00

London.									
Company.	Par Val.	Latest dividend.			Quotations.				
		Amt.	Date.	Buyers.	Sellers.				
American:									
Alaska-Treadwell	£ 5 0 6	s. d.	Feb., 1905	£ 5 15 0	£ 6 0 0				
Anaconda	5 0 2	0 0	Nov., 1904	5 11 3	5 13 9				
Camp Bird	1 0 5	9 0	Feb., 1905	1 13 9	1 16 3				
Copiapo	2 0 5	0 0	Oct., 1904	1 8 9	1 11 3				
De Lamar	1 0 2	0 0	Nov., 1904	1 16 3	1 18 9				
El Oro	1 0 0	9 0	July, 1904	1 1 3	1 3 9				
Frontino & Bolivia	1 0 0	rts.	Mar., 1904	1 15 0	1 16 0				
Le Roi	5 0 5	0 0	Nov., 1899	13 9	16 3				
Le Roi No. 2	5 0 2	0 0	Jan., 1903	16 3	18 9				
Mesquital	1 0 0	3 0	Feb., 1903	2 3	2 9				
Montana	1 0 0	6 0	Apr., 1899	6 8	1 0				
Palmaresjo & Mex.	1 0 0	3 0	Nov., 1904	13 6	14 6				
Stratton's Indep'd.	1 0 0	6 0	Feb., 1905	8 0	8 6				
St. John del Rey	1 0 0	0 0	Dec., 1904	1 5 0	1 10 0				
Tyee	1 0 2	0 0	Dec., 1904	2 2 6	2 5 0				
Utah, Con.	1 0 6	0 0	Jan., 1905	8 7 6	8 12 6				
Ymir	1 0 1	0 0	Mar., 1902	2 6	5 0				
European:									
Libiola	5 0 1	6 0	May, 1904	1 12 6	1 15 0				
Linara	3 0 5	0 0	Sept., 1904	4 0 0	4 10 0				
Mason & Barry	1 0 7	0 0	May, 1904	2 18 9	3 2 6				
Rio Tinto	5 0 32	6 0	Nov., 1904	65 0	65 0				
Rio Tinto, pf	5 0 2	6 0	Nov., 1904	6 2 6	6 7 6				
Tharsis	2 0 7	0 0	May, 1904	5 18 9	6 1 3				
West Australian:									
Associated	1 0 2	6 0	July, 1904	1 17 6	1 18 9				
Cosmopolitan	1 0 1	0 0	Apr., 1904	5 0	5 6				
Golden Horseshoe	5 0 6	0 0	Nov., 1904	6 13 9	6 16 3				
Great Boulder	1 0 2	9 0	Mar., 1905	1 1 6	1 2 0				
Gt. Boulder Perse	1 0 1	0 0	Sept., 1904	11 9	12 3				
Great Fingall	1 0 7	6 0	Jan., 1905	8 0 0	8 1 3				
Ivanhoe	5 0 5	0 0	Jan., 1905	7 18 9	8 1 3				
Kalgurli	1 0 2	6 0	Jan., 1905	7 1 3	7 6 3				
Lake View	1 0 1	6 0	Oct., 1904	1 5 0	1 6 3				
Oroya-Brownhill	1 0 4	0 0	Mar., 1905	3 9 11	3 11 1				
Miscellaneous:									
*Brilliant Central	1 0 0	6 0	Mar., 1905	17 6	1 0 0				
*Brilliant & St. Geo.	1 0 0	6 0	Feb., 1905	1 1 0	1 2 0				
Briseis Tin	1 0 0			10 0	11 0				
*Broken Hill	1 0 8	1 6	Feb., 1905	2 2 6	2 3 6				
Mt. Lyell	3 0 1	3 0	Dec., 1904	2 15 0	16 0				
Mt. Morgan	1 0 3	3 0	Feb., 1905	2 15 0	2 17 6				
Waihi	1 0 2	6 0	Mar., 1905	6 12 6	6 15 0				
Indian:									



### 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.

**Dolomite.**—As a subscriber I would like to ask if there are any known processes of separating carbonate of lime from carbonate of magnesia on a commercial scale, and if so the owners or patentees. I have a large deposit of mineral which shows on analysis, almost half-and-half carbonates of lime and magnesia with less than 0.5% of impurities, such as silica, oxide of iron, and alumina.—K. W. H.

**Answer.**—Your mineral is dolomite, which, calcined and slaked, makes a good cement that will resist the action of water, and is also used as a lining for bessemer converters. Treated with sulphuric acid dolomite yields calcium and magnesium sulphates, which are marketable products. At Port Kennedy, Pa., the Asbestos Manufacturing Company, of Philadelphia, utilizes dolomite, mined locally, for the preparation of magnesium carbonate. Ordinarily magnesium carbonate is made from carnallite or magnesite electrolytically. We advise writing to the General Chemical Company, 25 Broad street, New York, and to the Roessler & Hasslacher Chemical Company, 100 William street, New York.

**Copper Ore Treatment.**—What successful plants are in operation treating copper ores by wet methods? What, briefly, are the best known methods employed? Are there any books on this subject?—M. W.

**Answer.**—This subject has interested many inventors in recent years, but the *modus operandi* of the wet processes patented varies little, and usually the dissolved metal is precipitated electrolytically. The Henderson-Claudet process is largely used in Great Britain for handling Rio Tinto ore and cinder, and the Hunt-Douglas method is employed at a plant in the United States for extracting copper from silver-lead mattes. Both processes are described in 'The Mineral Industry,' Vol. II, and in subsequent volumes further interesting data may be found. We would also suggest that you read Eissler's 'Hydro-Metallurgy of Copper,' Philips' 'Elements of Metallurgy,' and the various monographs and transactions of societies at which the late T. Sterry Hunt and other eminent experts imparted valuable knowledge on this important subject. The files of the JOURNAL are also invaluable records of the progress made in the leaching of copper ores, as, for instance, the issue of April 21, 1904, in which the method employed at the Rio Tinto mine was described in detail by Mr. C. H. Jones.

**Tantalite.**—Could you kindly give me a few points about this mineral, and if possible let me know of any direct source of supply? I know a party who would buy large quantities at a reasonable price.—P. T.

**Answer.**—Attention is being called to tantalum by the experiments of Siemens & Halske, who have decided to use this metal for the filament of an incandescent lamp. Otherwise the demand for this rare element is infinitesimal, and is quoted in Germany at \$3.57 per gram. Tantalite is a tantalate of iron and manganese, frequently accompanied by a small percentage of cupric oxide and lime. Nearly all of the mineral, from which tantalum is manufactured, is obtained from Sweden and France, and, although there have been discoveries in Alabama, North Carolina, South Dakota, Connecticut, Massachusetts, and at other places, no effort has been made in the United States to create a demand. Other sources, promising a regular supply of tantalum pentoxide, should the native mineral not satisfy the consumption, are accessories to pitchblende and wolframite. By writing to the geological surveys at Stockholm, Sweden and Paris, France, you may be able to learn the names of those who are producing tantalite in those countries. In a later issue of the JOURNAL will appear a detailed description relative to the occurrence, chemistry, use and value of tantalum.

**Petroleum Lands.**—Can you tell me in what way concessions for petroleum deposits in the United States are made in the following points: 1. What space is reserved for concessions in an oilfield?

2. What is the maximum and minimum area conceded in exploiting an oilfield?

3. What area is allowed for works of prospecting, and for other auxiliary works?

4. What tax or royalty does the State levy on operators for petroleum?

5. What rent or royalty is paid by explorers or operators to the owners of the land, from which petroleum is taken, when the land does not belong to the State? P.

**Answer.**—1. Under the United States mining law petroleum is considered a mineral, and lands containing oil may be set aside and surveyed as mineral lands, the same as in the case of lands containing deposits of gold, silver, copper, iron or other ores.

2. The law provides that oil lands can be located under the provisions applied to placers or alluvial mines. The location can be made by the discoverer, and must, where lands have been surveyed, conform to the lines as laid out on the surveyor's map. A single prospector can locate an area of 20 acres, and an association or company can locate as much as 160 acres,

which is the maximum allowed. There is no provision, however, to prevent the locators of different tracts from consolidating after their claims are patented. The discoverer can hold his claim or location, and can patent it when the proper surveys are made, by showing that \$500 worth of work has been done on the claim; and on paying his fee of \$5 per acre, he then secures absolute title.

3. No provision is made for any extra grant for surface works.

4. The State does not impose any royalty or tax upon the product when the wells yield oil or are worked.

5. With regard to petroleum on lands owned by private parties, there is no general rule. In many cases the land is purchased outright, in fee; in others the rental or royalty is a matter of agreement with the proprietor of the land, and varies widely in different districts and in different cases.

### Recent Legal Decisions.

SPECIALLY REPORTED.

**DUTY ON SHEET STEEL IN STRIPS.**—Cold-rolled steel in coils varying from 50 ft. to 200 ft. in length, and from 0.5 in. to 6 in. in width, 0.025 in. thick or thinner, is dutiable under the provision in paragraph 124, act of August 28, 1894, and in paragraph 137, act of July 24, 1897, for flat steel wire or sheet steel in strips.

The term "sheet steel in strips," on and prior to August 28, 1894, was a commercial designation interchangeably used with the term "flat wire," to describe cold-rolled steel strips in long lengths. It did not include or apply to strips of steel cut or slit from hot-rolled sheets of steel, which were not and are not commercial entities.—Appeal of Boker & Co. from Collector of Customs at New York; Board of General Appraisers.

**DUTY ON STEEL WOOL.**—"Steel wool," so called—known also as "steel fiber" or "steel shavings"—which is made from steel wire through the use of machinery by passing toothed knives over the wire, is dutiable under paragraph 135, tariff act of 1897, according to its value per pound, as "steel in all forms and shapes not specially provided for."

The doctrine of *noscitur a sociis* does not, in general, apply to the so-called "catch-all" clauses of the tariff acts, which are intended to embrace articles described chiefly by their component materials without regard to denomination.—Appeal of Buehne Steel Wool Company from Collector of Customs at New York; Board of General Appraisers.

The cost of maintaining each arc lamp in the city of New York has been figured to be \$168.94; of each incandescent lamp, \$29 per year.

**Abstracts of Official Reports.***Osceola Consolidated Mining Company.*

The report of this Keweenaw copper company covers the calendar year 1904. Development has been carried along vigorously, by deepening of shafts and extension of new levels, the work accomplished during the year amounting to 1,748 ft. of the former and 24,638 ft. of drifts.

Improvements of the mill equipment are under way. These comprise the replacement of the present simple steam stamps by those of the 'steeple compound' type; the installation of a crushing roll in connection with each head of stamps, to obviate the return of oversize to the mortars; the addition of jigs and an improved type of classifiers to distribute the jig feed; the enlargement of the water pumping plant.

Milling returns for the past two years are shown below:

	1903.	1904.
Tons rock stamped.....	924,400	1,095,520
Pounds refined copper per ton of rock.....	17.4	18.7
Per cent. copper in concentrate.....	73.32	74.56
Product copper, tons.....	8,029.8	10,236.2
Mining cost per lb. of refined copper.....	9.04c.	8.69c.
Total cost per lb.....	10.29c.	9.96c.
Cost of mining per ton of ore.....	\$1.26	\$1.32
Cost of stamping per ton.....	17.4c.	18.1c.

The company is capitalized at \$2,500,000, of which \$2,403,750 has been issued. The net income for the year, after deducting construction expenses, was \$662,820, from which \$288,450 has been distributed, at the rate of 12%. During its 26 years the company has paid \$4,631,900 in dividends.

*Arizona Copper Company, Ltd.*

This company, whose headquarters are at Edinburgh, Scotland, owns a large group of mines in the vicinity of Clifton, Ariz., together with concentrating mills, a smelter, a sulphuric acid plant and an equipment for treating tailing by leaching. Its own railroad, 70 miles long, connects Clifton with the Southern Pacific at Lordsburg, N. M., and a leased line extends its connection 39 miles to the El Paso & Southern at Hachita. The financial statements cover the year ending Sept. 30, 1904, but the reports on operations include only the latter six months of that period.

A great amount of development has been done, particularly in long transportation tunnels and working levels, and one new and highly promising orebody has been tapped. Ore reserves have kept about their same lead over extraction.

Of the 230,478 tons of ore treated in the concentrators, two-thirds came from the Humboldt tunnel workings, one-fifth from the Metcalf, and the rest from the Coronado workings. The yield of concentrate, 35,814 tons, showed a ratio of 6.4 to 1. After an exhaustive trial, a new Australian jig is being installed in all five mills. This jig has a capacity of 650 tons per day. Tailing to the amount of 36,070 tons was leached, the copper recovered amounting to 609 tons, a decrease

of 135 tons as compared with the previous six months.

The smelter treated 53,220 tons of ore and concentrate and 639 tons of precipitate, yielding 6,949 tons of copper during the half year. The tonnage of first-grade ore, smelted without concentration, has increased slightly, owing to its decreasing tenor of metal; it constituted only 6.7% of the ore mined.

The railroad is in excellent condition. Three bridges have been filled in with permanent embankments, and two more will be filled shortly.

A combined statement of the profit and loss accounts of the several departments follows:

Sales of copper and sulphate.....	£725,191
Railway earnings.....	127,457
Miscellaneous.....	166
Total receipts.....	£852,814
Mining and smelting.....	£479,133
General charges.....	22,798
Railway operating expenses.....	140,891
Total expenses.....	£542,822
Net earnings for the year.....	£309,992
Balance brought forward.....	14,863
Balance on hand.....	£324,855

Of this balance, interest absorbed £9,162, income tax, £13,440, and £40,000 was reserved for the redemption fund. Dividends on two classes of stock have been paid to the amount of £24,531, leaving a balance of £238,272 to carry forward. The issued capitalization amounts to £703,984; an authorized issue of £40,000 of A preferred shares has not yet been called.

*Mount Morgan Gold Mining Company.*

The works of this Queensland company, whose report covers the half year ending Nov. 30, 1904, are situated a few miles inland from Rockhampton, and include means for treatment of its ores by smelting, bessemerizing and leaching. The ore in the lower levels is an auriferous, copper-bearing pyrite, but in the upper levels is oxidized, and is attacked by steam shovels working in open cuts.

Development is being actively pushed, particularly to discover the mineralogical character of the ore reserves, as affecting some contemplated additions to the smelting plant. Work of this nature during the six months comprised 3,277 ft. drifts, 559 ft. winzes and raises, and 7,610 ft. of diamond-drill holes. In the open cut 273,529 tons of overburden and waste were removed.

Ore sent to the works amounted to 125,412 tons, of which 67,193 tons came from open-cut, and 58,219 tons from underground operations. The amount of waste, mined with the ore but afterward discarded, is increasing rapidly, especially in the open-cut work. These surface operations have the advantage of being able to reach outlying edges of the orebody, which could not be safely attacked from below; they also supply filling for abandoned stopes, part of the overburden being dropped into the mine through chutes.

Construction on a new smelter, comprising three large blast-furnaces and two converter stands, is under way. The power plant is to be enlarged, and the metallurgical works are to be operated by electricity. During the half year the 119,673 tons of fresh ore showed an average content of 0.469 oz. per ton. The distribution of material and the yields from the three departments of the treatment plant were as follows:

	Tonnage treated.	Yield, fine oz.
Sulphuret ore.....	52,480	33,115
Oxidized ore.....	67,193	23,120
Tailing.....	20,775	2,336
Totals.....	140,448	58,571

Receipts from all sources totaled £295,814; operating expenses were £185,972; transportation, £7,605; office charges, taxes, royalties, etc., £9,099, leaving a profit on the year's operations of £93,138. Of this, £75,000 has been divided among the holders of the £1,000,000 capital stock, and the balance of £18,138 has been carried forward.

**Pig Iron Consumption.**

The approximate consumption of pig iron in the United States is estimated by Mr. James M. Swank, general manager of the American Iron & Steel Association, as follows for the year 1904, the figures being in long tons, and the second column showing the changes as compared with the previous year:

	1904.	Changes.
Production for the year.....	16,497,033	D. 1,512,219
Imports.....	79,500	D. 520,074
Stocks unsold, Jan. 1.....	598,489	I. 548,538
Total supply.....	17,175,022	D. 1,483,755
Exports.....	49,025	I. 28,646
Stocks, Dec. 31.....	446,442	D. 152,047
Total deductions.....	495,467	D. 123,401
Approximate consumption.....	16,679,555	D. 1,360,354

The decrease in production was 8.4%; that in consumption was 7.5%. The approximate consumption, ascertained in the same way, was as follows for nine years past:

1896.....	8,275,774	1901.....	16,232,446
1897.....	9,381,914	1902.....	18,436,870
1898.....	12,005,674	1903.....	18,039,909
1899.....	13,779,442	1904.....	16,679,555
1900.....	13,177,409		

In preparing these figures, the comparatively small quantity of foreign pig iron held in bonded warehouses at the end of each year has not been considered. All stocks in the yards of the American Pig Iron Storage Warrant Company are included in the unsold stocks for each year.

Although last year covered a period of depression, and the consumption was less than in 1903 or 1904, it was a little more than double that of 1896, showing an extraordinary gain in the nine years.

One objection to wireless telegraphy on a commercial scale is that a severe storm would certainly blow down the vertical wires used at the stations, thus crippling the service.

**Pig Iron Production of Canada.**

The American Iron & Steel Association has received, direct from the manufacturers, the statistics of the production of all kinds of pig iron in Canada in the calendar year 1904. They show an increase of 5,524 gross tons, or a little over 2%, as compared with 1903, but a decrease of 48,615 tons as compared with 1902.

The total production in 1904 amounted to 270,942 gross tons, against 265,418 tons in 1903. In the first half of 1904 the production was 120,643 tons, and in the second half it was 150,299 tons, an increase of 29,656 tons. Of the total production in 1904, 251,671 tons were made with coke and 19,271 tons with charcoal. About one-fourth of the total production was basic pig iron, namely, 70,133 tons. The production of bessemer pig iron, all made in the last half of the year, was 26,016 tons. Spiegeleisen and ferromanganese have not been made since 1899.

The following table gives the total production of all kinds of pig iron (including spiegeleisen and ferromanganese) in Canada from 1894 to 1904. Prior to 1894 the statistics of pig iron production in Canada were not collected by this Association:

1894	44,791	1900	86,090
1895	37,829	1901	244,976
1896	60,030	1902	319,957
1897	53,796	1903	265,418
1898	68,755	1904	270,942
1899	94,077		

The unsold stocks of pig iron in Canada at the close of 1904 amounted to 35,119 tons.

On Dec. 31, 1904, Canada had 15 completed blast furnaces, of which eight were in blast and seven were idle. Of this total, 10 were equipped to use coke for fuel and five to use charcoal. In addition, three coke furnaces were partly erected on Dec. 31, but work on the furnaces had been suspended some time ago.

**The Latest Dynamos.**

The continuous-current dynamo of today is really an alternator fitted with a commutator. It is proposed to go back to the earliest type, the Faraday disk, which is an acyclic dynamo. This will employ a high peripheral speed—12,000 ft. to 20,000 ft. per min.; and, in one type—the Noeggerath—will employ a number of conductors connected in series by slip-rings. Some of the advantages are: (1) The avoiding of lamination either of the stationary or rotating parts, as there is but little hysteresis-loss from eddy-currents; (2) uniform voltage, as there is no irregularity from commutation, though there may be slight inequalities in mechanical motion; (3) by shifting the collecting brushes, the dynamo can compound itself, even becoming self-exciting; (4) the regulation is good, as the tendency is to lengthen the magnetic path, since the action is not de-magnetizing but cross-magnetizing; (5) in construction, half the copper used in the ordinary direct-

current dynamo will be saved, and the absence of lamination will reduce the cost of the iron part; (6) the high efficiency in small floor-space; (7) the high speed required will be furnished by the steam-turbine, an advantage which the direct-current dynamo can now share with the alternating machine. The efficiency of one of the first machines constructed was remarkable, being 91%. Comment is superfluous and premature, but the innovation seems to hold the attention of electrical engineers generally.

**Zinc Made in the Electric Furnace.**

The spelter made by the De Laval electric furnace, sold in Europe under the brand "G. D. L.," is guaranteed not to contain more than 0.1% of impurities. Analyses show only 0.03 to 0.06% lead, 0.01% iron, and no arsenic or cadmium. These show it to compare very favorably with the brand "Extra pur A" of the Société de la Vieille Montagne and with the various brands of American high-grade spelter. At present the "G. D. L." spelter is sold at a slight discount from the other high-grade splelters, although it is well within the requirements for that class of metal.

These extra pure grades of spelter are required for the manufacture of special kinds of brass; for example, the brass that is to be rolled into sheet for the manufacture of cartridge shells. According to the specifications of most European governments, this brass must not contain more than 0.2% lead, must be free from arsenic and sulphur, and must conform to certain mechanical tests. In general, brass that is to be spun must be made of high-grade spelter.

In certain kinds of brass, especially brass which is to be machined, a small percentage of lead is no objection, indeed, is advantageous, and for the preparation of such metal an inferior grade of spelter can be used.

Iron is one of the great pigments of nature. In the ferrous state, it colors rocks and soils various shades of green or blue. In the ferric state, it colors rocks and soils red. Thus blue slate is shaded by ferrous silicates; red sandstone is colored by ferric hydroxides. Epidote, a common green mineral, is an exception to the general rule, most of its iron being in the ferric state.

With reference to the interruption of telegraphic communication by storms, and the consequent desirability of putting all wires underground, it has been estimated that the expense of laying a 50-cable conduit between New York and Philadelphia would be about \$6,000 per mile, or \$600,000 in all. As there are now in use between these cities about 300 wires, it can be readily seen that 50 wires would do but a fraction of the necessary business.

**Spanish Mineral Exports.**

Exports of metals from Spain for the 11 months ending Nov. 30 included 44,345 metric tons of pig iron, against 55,574 tons in 1903; 30,457 tons of copper, against 30,441 tons; 1,877 tons of spelter, against 2,227 tons; 176,178 tons of lead, against 163,534 tons in the preceding year.

Exports of minerals for the 11 months are reported by the *Revista Minera* as below, in metric tons:

	1903.	1904.	Changes.
Iron ore	7,692,114	7,291,932	D. 400,182
Copper ore	1,039,793	1,012,861	D. 26,932
Zinc ore	122,021	136,479	I. 14,458
Lead ore	2,553	4,996	I. 2,443
Pyrites	560,409	567,550	I. 7,141
Salt	291,421	350,005	I. 58,584

Imports of fuel for the 11 months were 2,129,893 tons, an increase of 44,464 tons, and 177,181 tons of coke, a decrease of 3,356 tons.

**Patents Relating to Mining and Metallurgy.**

**UNITED STATES.**

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

Week Ending February 21, 1905.

782,864. EXCAVATING, HOISTING, AND CONVEYING BUCKET.—Joseph Marousch, Cleveland, Ohio. In a bucket comprising two trays arranged to swing from and toward each other according as the bucket is opened or closed, the combination with the said trays of relatively stationary framework, of bell-crank levers fulcrumed to the framework and operatively connected with the trays at the rear ends of the trays; links pivotally attached at one end to the bell-crank levers and at the other end to the said lugs; means for elevating the slide; means for detachably connecting the slide to the slide-elevating means, and means for limiting the descent of the slide, the arrangement of the parts being such that the trays are swung outwardly or inwardly according as the slide moves into its lower or upper position.

782,875. FORGE.—Henry Price, Buffalo, N. Y., assignor to Chilion M. Farrar and George M. Trefts, Buffalo, N. Y. In a forge, the combination with a series of spaced permanent grate-bars flush with the cover of the grate, of a series of rotatable auxiliary grate-bars operating between the permanent grate-bars to vary the intensity and area of the blast.

782,893. METHOD OF TREATING ALKALI-METAL AMALGAM.—Charles E. Baker and Arthur W. Burwell, Cleveland, Ohio. A method of treating alkali-metal amalgam, which consists in converting the alkali metal into hydride and distilling mercury therefrom.

782,894. ELECTROLYTIC PROCESS OF REDUCING METALLIC SULPHIDES. Charles E. Baker and Arthur W. Burwell, Cleveland, Ohio. A process of treating metallic sulphides, which consists in placing the sulphides in an electrolyte of a molten chloride and in proximity to an anode, passing an electric current from said anode through the electrolyte, and causing the electrolytic chlorine to react on the sulphide and displace the sulphur.

782,916. COMPOSITION FOR BRICK, TILE ETC. William Maguire, Toronto, Canada.

composition for a tile, brick or the like, composed of 25 to 40% of magnesium chloride, 10 to 25% of calcined magnesite, about 25% of powdered glass and about 25% of sand or clay; all of said ingredients being mixed together in a liquid or semiliquid state and permitted to set or harden.

782,917. **ELECTRIC FURNACE.**—John M. Morehead, Chicago, Ill., assignor to Union Carbide Company, Chicago, Ill. An electric furnace, comprising a working chamber, a hood depending into said chamber, electrodes within said hood, and means for introducing the charge into the hood.

782,922. **PROCESS OF SMELTING REFRACTORY ORES.**—Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. The process of producing calcium carbide, which consists in interposing a charge of a calcium compound and carbon as a resistance-conductor between electrodes, one of said electrodes being of metal and comprising a liquid portion and a solid portion, electrically heating said charge to the temperature requisite for reduction, and cooling the solid portion of said metal electrode.

782,927. **DUMP-CAR.**—Erich Saling, Bruckhausen-on-the-Rhine, Germany. A dump-car provided with discharge-openings, a pair of chutes beneath the same, doors for closing the openings, a transversely movable slide, and lids hinged to the slide and projecting into the chutes.

782,933. **QUICK-RELEASE DEVICE FOR ATTRITION OR OTHER MILLS.**—John Waldron, Muncy, Pa., assignor to Sprout, Waldron & Company, Muncy, Pa. A quick-release device for grinding-mills comprising, in combination with a fixture and movable bearing for the shaft of one of the grinding-disks, a dead-point elbow-lever having its shorter arm pivoted to said fixture, and a bowed link curved over the pivot of said lever and pivotally connecting the elbow of said lever with said movable bearing.

782,940. **CLAM-SHELL BUCKET.**—Gurdon H. Williams, Cleveland, Ohio. In a clam-shell bucket, the combination of a supporting-frame, two scoop members each having two axes of oscillation fixed relatively to said frame, a power-wheel mounted in the latter, and means including chains or cables connecting such power-wheel with said members.

782,989. **ELECTROLYTIC PRODUCTION OF SUPEROXIDES IN ALKALINE SOLUTIONS.**—Hugh Rodman, Philadelphia, Pa., assignor to The Electric Storage Battery Company, Philadelphia, Pa. A method of electrolytically producing a superoxide direct from metals which consists in constituting them the anode in an attenuated alkaline solution.

782,991. **FUEL.**—Samuel P. Sadtler, Philadelphia, Pa., assignor to Cal-Car-Co Company, Camden, N. J. A fuel product comprising particles of carbonaceous matter and a binding agent therefor consisting essentially of a product of the residual liquor of the wood-sulphite process and aluminum sulphate.

783,016. **MACHINE FOR FORMING BUILDING BLOCKS FROM PLASTIC MATERIAL.**—Hiram J. Buchanan, Auburn, Ind. A suitable supporting-frame; a bed-plate having a central opening or openings; side and end walls removably mounted on said bed-plate; vertically movable cores and means to elevate and lower the same as desired, and an adjustable extension for said side walls adapted to form a building-block with an extension disposed at any desired angle.

783,022. **ATTRITION-MILL.**—Levi D. Colley, Muncy, Pa., assignor to Sprout, Waldron & Company, Muncy, Pa. In a vertical-disk grinding-mill, the combination with a casing having a feed-opening and a runner-head having an eye through which the stock is received, of an inwardly projecting sealing-ring around said feed-opening having a flange at its outer end fitted in a rabbet therefor in the outer side of the casing, a feed-

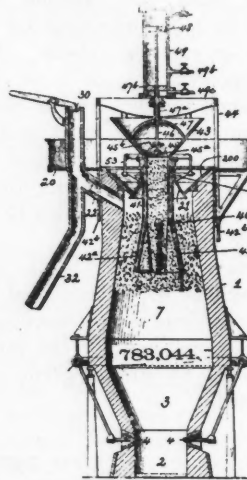
spout or hopper secured to said casing over said flange and thereby holding said ring in place, and a sealing-ring secured around the eye of the runner-head and rotatable therewith, one of said rings fitting within the other.

783,024. **VALVE FOR COMPRESSED GASES.**—Abraham B. Cox, Jr., New York, N. Y. A valve comprising an exteriorly threaded shouldered casing adapted to project into a receptacle when attached thereto with the shoulder abutting with the receptacle, the said casing having an orifice at its extreme inner end, a removable cap secured to the casing, provided with an outlet which forms a continuation of the casing-chamber, and a needle-valve held in the cap and casing and adapted to close the inner orifice of the casing.

783,032. **ROCK-DRILL.**—Charles G. Foote, Denver, Colo. In a rock-drill, the combination with a guide-shell and a casing slidable thereon, of a hollow cylinder mounted to rotate in the casing, a power-spring located in the cylinder, the latter being provided with a cam, and a hollow drill-holder entering the cylinder and having a projection engaging the cam of the rotary cylinder, whereby, as the latter is rotated, the drill-holder is moved rearwardly against the power-spring and released.

783,025. **CONVEYER-TRUNK.**—John M. Culver, Chicago, Ill. A conveyer conduit or trunk formed of a relatively stationary member and a non-telescopic movable member connected longitudinally therewith.

783,044. **PROCESS OF SMELTING ORES IN BLAST-FURNACES.**—Joseph E. Johnson, Jr., Longdale, Va. A process of smelting ores in a blast-furnace, which consists in feeding separate bodies of ore and fuel into the furnace, smelting the charge and increasing the amount of heat available for smelting, and especially for those



reactions which require a high temperature, by supplying a blast containing an excess of oxygen, and utilizing the heat in the fuel by passing the gases escaping from the furnace through the incoming body of ore and maintaining them out of contact with the incoming fuel, the waste gases thus being high in carbon dioxide and low in carbon monoxide and nitrogen.

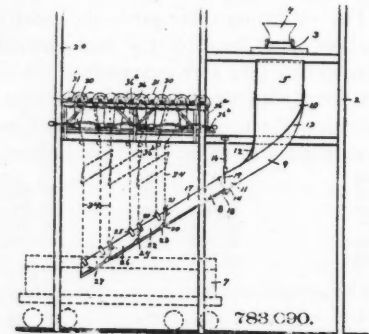
783,045. **OXYGEN-SEPARATING PROCESS.**—Joseph E. Johnson, Jr., Longdale, Va. A process of separating substances having different boiling-points from a liquid, which consists in heating a body of the liquid to the boiling-point of the more volatile substance, withdrawing the gaseous product, and simultaneously rotating the body at a sufficient speed to centrifugally separate the body into an inner evaporating portion and an outer portion of the residual liquid.

783,049. **CUPOLA-CHARGING DEVICE.**—Charles R. Knapp, Pittsburg, and Vergil Mulholland, Allegheny, Pa., assignors to Heyl and Patterson, Pittsburg, Pa. In a cupola-charging device, the combination of a cupola having an

opening in the walls thereof, a horizontal swinging frame adapted to support the material and to enter said opening in said cupola, and means for discharging said material from said support.

783,062. **CYLINDER FOR TREATING HEATED METAL.**—James W. Moshier, Bristol, Conn. A cylinder for treating heated metal consisting of a main cylinder of cast metal having an annular heat-insulator cast therein, with a thick heavy body of metal surrounding the said insulator and a thin body of metal inside of the said insulator, connected by a solid wall at one end of the cylinder with the said thick heavy body, the opposite end of the cylinder being recessed, an annular plate or bushing within the said recess, an inner cylinder extended through the said annular plate at one end and against the solid wall of metal at the other end, and an annular heat-insulator filling the space between the said outer and inner walls of the said main and inner cylinders.

783,090. **CHUTE.**—Alfred M. Acklin, Pittsburg, Pa., assignor to Heyl & Patterson, Pittsburg, Pa. The combination, with a suitable frame, of a chute having an upper section, a movable section normally in proper relation to the discharge end of said upper section and coupled thereto by a



part on the former section overlapping a part on the latter, mechanism for elevating said movable section, and connections from said movable section to said mechanism, whereby said movable section may be lifted bodily to a point above the discharge end of said upper section.

783,100. **SLATE-WORKING TOOL.**—William W. Burk and Edward Burk, Forest, Ohio. In a slate-working tool, a member comprising a blade, a hammer disposed below said blade, a supplemental arm disposed above said blade and a female punching member projecting laterally from said arm, a second member pivoted to the first-mentioned member and including a pair of parallel arms spaced to receive the blade between them and for cooperation with the latter, and a male punching member carried by the said second member for cooperation with said female punching member.

783,129. **SAND-HANDLING APPARATUS.**—William J. Patterson, Pittsburg, Pa., assignor to Heyl & Patterson, Inc., Pittsburg, Pa. In a sand-handling device for foundry purposes, the combination with a series of sand-receiving devices arranged in substantially parallel rows upon the foundry-floor with an intervening space between said rows, of an overhead traveling bridge, a carriage on said bridge adapted to travel transversely thereof, an elevator on said carriage extending down into said space and means for turning said elevator to discharge the sand into either row of sand-receiving devices.

783,140. **MACHINE FOR MAKING TUBES.**—Theodore Scherf, Elizabeth, N. J. In a machine for making tubes, the combination with tube-forming means, comprising a revolving mandrel and a head or casing surrounding same and having a plurality of spring-pressed follower-blades distributed about the mandrel and arranged to press against the material wound thereon, of means for supplying material cut into prede-

terminated lengths to said tube-forming means, and means for applying adhesive material to the said material of which the tube is to be formed.

783,146. ASPHALT MACHINERY.—Frank B. Smith, Omaha, Neb., and Henry R. Kasson, Chicago, Ill. An apparatus comprising a single railway-car, an asphalt-melting tank at one end of the car a horizontally arranged sand-drier at the other end of the car, a mixing device supported centrally of the car between said tank and drier, and mechanisms for directing melted asphalt and sand from said tank and drier, respectively, to the mixing device, said asphalt and sand-directing mechanisms, when in their operative positions, being located with their highest parts not substantially higher than said tank and drier.

783,196. SEPARATOR FOR SEPARATING WATER FROM CEMENT, ETC. Ludwig Hatshek, Vocklabruck, Austria-Hungary. In combination with a machine of the paper-making type for making plates of hydraulic cement and fibrous materials, apparatus for separating water from cement and fibrous materials, comprising a tank having a contracted bottom, an inlet to said bottom for the materials to be separated, a pipe open adjacent to the bottom, and leaving said tank at a distance below its water-overflow line, and means for collecting the outflow from said pipe.

783,200. FOUNDRY OR CASTING PLANT.—Joseph W. Henderson, Baltimore, Md. In a foundry or plant for the manufacture of castings the combination of the cupolas at one end of the foundry-building; a plurality of parallel floor-tracks extending in a direction toward said cupolas; a transfer-track which extends crosswise of the cupola ends of said parallel tracks, then back to and crosswise of the opposite ends of said tracks; cranes at said opposite ends of said parallel tracks; tracks connecting the ends of the parallel tracks with said transfer-track; overhead tracks in alinement with said connecting-tracks, and having travelers which move toward and away from said parallel tracks, and flasks mounted on rollers.

783,209. COAL MEASURING AND CHARGING DEVICE.—James B. Ladd, Wayne, Pa., assignor to The Smet-Salvay Company. In combination with a charging-hopper having a movable side, a supporting-block for said side adapted to permit a pivotal movement of the side with respect thereto, stationary means for the slidable support of the block and means for moving said block thereon.

783,221. CONCENTRATING APPARATUS.—Oscar B. Perry, San Francisco, Cal. In a concentrating apparatus, the combination of a screen, a series of collecting-tables located below and arranged successively lengthwise the screen, a distributor comprising a series of independent pan-sections successively arranged and located between the screen and tables, and a plurality of independent troughs extending from the receiving end of the screen lengthwise along the series of pans and tables all of said troughs leading from a common receiving-point and delivering separated portions of the material to separate pans at different distances from said point.

783,227. WELL-DRILLING MACHINE.—Leonard D. Shryock, Marietta, Ohio. A drilling-machine comprising a frame, an arm mounted to oscillate in the frame and adapted to operatively engage and deflect the drilling-cable, a shaft having a crank, a sheave intersecting the plane of rotation of the crank and arranged at an angle thereto, and a spudding-line passing over the sheave and connected at one end to the crank and at its opposite end to said arm.

783,234. HOT-BLAST STOVE.—Frank L. White, Pittsburg, Pa., assignor of one-half to John Kernan, Pittsburg, Pa. A hot-blast stove comprising a plurality of parallel arches presenting inclined upper faces, a plurality of brick girders, disposed transversely of said arches projecting thereabove, said girders having inclined faces resting upon said arches and substantially verti-

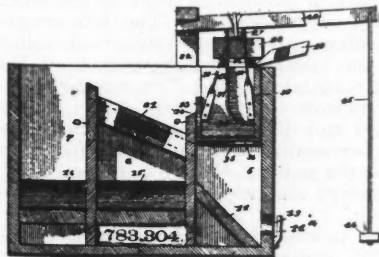
cal end faces abutting against each other, the upper edges of said girders alining to form continuous flat faces, and layers of brick laid upon said last flat faces and presenting regenerative passages.

783,249 and 749,250. AUTOMATIC VALVE FOR COAL-WASHERS.—William M. Duncan, Alton, Ill. The combination, with a vertically reciprocating coal-washer jig having an impurities-outlet, of a valve reciprocating with the jig and controlling said outlet, a stationary coal-delivery chute, and a swinging member reciprocating with the jig and connected with the valve, said swinging member having its path of reciprocation intersecting the path of delivery of the coal passing through said chute.

783,282. AUTOMATIC MINE-GATE.—James A. Joyce, Cleveland, Ohio, assignor to the American Mine Door Company, Cleveland, Ohio. A flexible mine-gate, suspended from a frame, slidably pivoted arms extending beneath the gate for folding it upward and supporting the folds, and actuating mechanism.

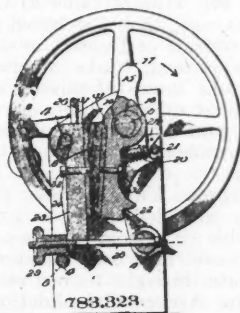
783,288. COMPOSITION OF MATTER FOR FILLING THE GROOVES OF METALLIC PLATES, ETC.—William S. Lamson, Lowell, Mass. A composition of matter containing carbundum, magnesium chloride and magnesium carbonate.

783,304. ORE CONCENTRATOR.—Michael E. Parks, Torreon, Mexico. An ore-concentrator, comprising an outer structure, transverse forward and rearward vertical partitions dividing the interior thereof into a concentrator-box, a tailings-box, and a slimes-box, and a vertically reciprocatory jigger in the concentrator-box



combined with means for operating the same, said rearward partition being less in height than the walls of the structure, and said forward partition less in height than the rearward partition, the inner side of the jigger being also less in height than the outer side thereof.

783,323. ORE-CRUSHER.—Frank P. Snow, Los Angeles, Cal., assignor to Frederick W. Braun, Los Angeles, Cal. In a rock-crusher having a suitable hopper or receptacle for the rock, a vertically removable stationary jaw, adjustably secured to its lower end within the frame; a vibrative jaw mounted at its upper end upon an

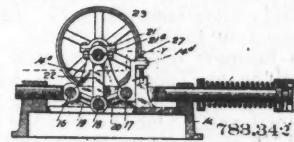


eccentric driving-shaft; an independent vibrative toggle pivoted in a plane below the free end of the vibrative jaw and having its outer end located within the lower end of said jaw; and a spring connected with the vibrative jaw and with the frame; whereby a circular or gyrotory movement is imparted to the upper end of the vibrative jaw and the lower end of the same is

caused to describe an arc of small amplitude, thus imparting an oscillatory and vibrative movement to the lower end.

783,332. PROCESS OF SOLDERING ALUMINUM.—Massimo Tomellini, Genoa, Italy. A process of soldering parts of aluminum which consists in cleaning the parts to form the joint and fitting them nicely together, then heating them at the joint to almost the fusing temperature of aluminum, then applying at the joint a rod of a metal having a higher fusing-point than the aluminum, and heating the same to a temperature higher than the fusing of aluminum, so that the aluminum at the joint and the aluminum oxid formed by the heating process may be fused and may alloy with the surface parts of the soldering-rod, and thereby flow more easily.

783,342. ACTUATING MECHANISM FOR CONCENTRATORS.—Arthur R. Wilfley, Denver, Colo. The combination, with an open-centered spring, actuated yoke having guide projections



adapted to slide in bearings, of a drive-shaft, and toggle mechanism located within the yoke and connected with the drive-shaft for actuating the yoke.

783,360. DEVICE FOR USE IN DRILLING OR CLEANING OUT WELLS.—Nolan H. Bowlby, Findlay, Ohio. A device for purposes described, comprising two tube-sections, a standing-valve casing removably uniting the same, a valve at the upper end of said casing, a working valve in the upper tube-section and a valve-stem for said working valve.

GREAT BRITAIN.

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

Week Ending January 28, 1905.

28,491 of 1903. UTILIZING HEAT IN OPEN-HEARTH FURNACES.—Cammell, Fletcher & Hamilton, Sheffield. In the manufacture of steel, using the waste heat from the converter for preliminarily melting the iron in an open-hearth furnace before it is charged into the converter.

3,998 of 1904. SEPARATING ALUMINA.—General Electric Company, Schenectady, New York, U. S. A. Separating alumina from clay by heating it in an electric furnace, with coke, so producing carbides of aluminum and silicon, and afterward dissolving the carbide of aluminum by means of a solution of caustic soda, leaving the carbide of silicon intact.

4,557 of 1904. UTILIZING SLAG.—T. Twynam, Leeds. Improved method of utilizing iron slags for making artificial stone etc.

8,559 of 1904. CUTTING COAL.—J. Kirschnick, Zabrze, Germany. Cutting grooves in coal by means of rows of fine jets of water coming out at very high pressure.

Week Ending February 4, 1905.

26,314 of 1903. FERRIC SULPHATE MAKING.—W. Garroway, Glasgow. Manufacture of basic ferric sulphate by passing a current of electricity through a solution of ferrous sulphate.

24,136. TREATING SULPHIDE ORES.—H. R. Angel, London. Modifications in the inventor's process for recovering metals from sulphide ores by heating with sulphate of soda and carbonaceous material.

## Special Correspondence.

San Francisco. March 2.

W. R. Rust, general manager of the Tacoma Smelting Co., denies that the plant has been sold to the American Smelting & Refining Co., and says there are no negotiations pending toward that end. He says, however, that both the Tacoma and Everett smelters will come shortly under control of the Tacoma Smelting Co., with no affiliation with the smelter trust. B. M. Baruch, of New York, who has no connection whatever with the American Smelting & Refining Co., is now at San Francisco, negotiating for both the purchase of the Tacoma and Everett smelters, the latter plant being owned by the American Smelting & Refining Co. The Everett smelter has for the past eight months been run on a very small scale by the American Smelting & Refining Co., but has a complete arsenic plant, and manufactures 90% of the arsenic used in the United States. The principal business done by the new company will be at Tacoma, which will be maintained as the principal smelting point in the Northwest. One-third of the present stock of the Tacoma Smelting Co. is controlled by the Bunker Hill & Sullivan Mining & Concentrating Co. of Idaho; another third by the Alaska Treadwell Gold Mining Co. and associated mines on Douglas Island, and the remaining third by D. O. Mills, F. W. Bradley, W. R. Rust and associates. Negotiations are now pending to buy the stock of the mining companies and part of the individual holdings, and to make contracts with the mining companies for terms of 25 years. In addition to the smelter at Tacoma there was opened on March 1 an electrolytic copper refinery, the only one in operation west of New York except the one in Great Falls, Mont. In due time works for manufacturing copper wire and sheet copper will be erected. Mr. Rust expects to retain his interests and continue as general manager of the new company, which will be distinctly a Pacific coast industry. The business will be greatly extended.

In 1880 a law was enacted by the California Legislature debarring directors of mining companies from buying, selling or leasing property unless with the ratification of two-thirds of the stockholders. The reason for the enactment of this law was that the directors of some of the Comstock, Nev., mining companies, organized under California laws, had made leases to themselves, or sold property to themselves, or made purchases from themselves, and the stockholders knew nothing of the transaction until the annual meeting, when the directors doing these things were out of office. Before the law was passed many questionable transactions of this character occurred, to the great disadvantage of the stockholders. Now, however, the present Legislature has repealed the law, and through the influence of mining men, be it said, on the plea that legitimate mining companies were hampered by the necessity of securing a two-thirds vote, and the provision did not protect stockholders from wild-cat schemes. The fact is, however, that it did protect stockholders from scheming or dishonest directors.

Two vessels arrived at this port from New York a few days since which are to be used by the Standard Oil Co. in carrying oil on the coast. The steamer Atlas brought 15,000 bbl. of fuel oil in her hold, 10,000 bbl. of which were burned in the trip. The other vessel, barge No. 93,

brought 21,000 bbl. of naphtha and 1,000 bbl. of fuel oil for operating steering gear. The steamer towed the barge the entire distance of 13,090 miles, and during the long voyage the steel towing hawser was only broken once, and that in the North Atlantic. The vessels came through the Straits of Magellan. This tow is about the longest on record. The barge is 280 ft. long, 45 ft. beam and 30 ft. deep, built to carry 28,000 bbl. of oil in a 20-ft. draft.

The old Norambagua mine, in Grass Valley district, has been sold by the estate of the late William Campbell to Eastern men, and will be reopened. This mine was at one time a large producer, but has been idle for some years. New machinery has been ordered and buildings for the men are being put up.

The De La Mar, Copper City & Kennett Road Co. has been organized in Shasta county, to build a 12-mile wagon road from De La Mar and Copper City to Kennett, where the new Mammoth smelter will, when completed, take custom ores, which the De La Mar smelter does not. The road will afford a means of transportation for the ore of many small mines in the districts referred to. Kennett is the nearest railroad point to De La Mar.

Denver. March 3.

The provisions of a bill introduced in the general assembly to regulate the conduct of mining companies and to prevent the sale of worthless stock, are such that on account of very strong opposition on the part of promoters there is not much chance of its passing. The bill creates the offices of State inspector of mines and an assistant, and Section 6 of the same reads as follows: "In case any company violates the provisions of this act, the officers and directors shall be individually and personally liable for said fraud or deceit the same as if they were personally acquainted therewith and had participated therein."

The production of the Cripple Creek district showed a falling off last month, and amounted to about 50,000 tons, valued at \$1,693,000. The past month was a short one, and considerable sickness prevailed among the miners, a large number of them being unable to work for a while. The present month will undoubtedly show a large increase, as the Stratton's Cripple Creek Mining & Development Co. has begun to grant leases on its Bull Hill properties, on which several hundred men will be employed at once.

The suit of J. B. Hindry against the Globe Smelting & Refining Co. is being tried here, and is drawing a great deal of attention. Mr. Hindry came to Colorado many years ago, and purchased a large ranch just outside of Denver, in the vicinity of the present Globe smelter. He claims that the fumes of this have ruined vegetation and killed a large part of his stock, and asks \$100,000 damages. It is a similar problem as exists in the Salt Lake valley.

A. B. Capron, United States Commissioner, has awarded \$266,000 to N. A. Munn, of this city, from the Ibex Mining Co. This suit has been pending since 1891, and was brought to recover an interest in the Archer Consolidation property, which was absorbed by the Ibex company. About \$4,000,000 worth of ore had been produced by the Ibex mine since the suit was commenced.

In the general deficiency bill, reported in Congress a few days ago, provision is made for an appropriation of \$30,000 for the completion of the equipment of the

Denver mint, where coinage is expected to commence in a few months, the bullion being retained here at present for that purpose.

The St. Louis, Rocky Mountain & Pacific Railroad Co. has been incorporated in Santa Fe. It proposes to build a railroad from Raton, N. M., just across the Colorado line, and a division point on the Atchison, Topeka & Santa Fe Railroad, to Elizabethtown, in Colfax County, a distance of 75 miles. It is the intention to continue it across the Taos range and make connection with the Denver & Rio Grande system.

The Nevada Power, Mining & Milling Co., nearly all of whose directors are from this city, has let about \$100,000 worth of contracts for electrical machinery for the construction of their 6,000 h.p. plant, whence the power will be carried nearly 80 miles to Tonopah and Goldfield, Nev. This enterprise will be a great help towards the development of that promising district, which is drawing so much attention at present.

Houghton. March 3.

Greater activity in the exploration of the southern extension of the Kearsarge amygdaloid bed will be manifested during the coming summer, judging from all indications. This formation is already supplying upwards of 45,000,000 lb. of refined copper per annum, and is rapidly increasing in importance as a producing factor. It is developed for a stretch of several miles, extending from the Calumet & Hecla, on the south to the Miskwabik, in Keweenaw county, on the north, but has never been fully tested to the south of the Calumet & Hecla, although it may contain good values in that direction.

Throughout the major portion of the winter the Laurium Mining Co. has had a diamond drill operating on its lands, searching for the Kearsarge lode. These probings have determined its dip and strike across the property, and indicate its possible value. It is expected that the data secured will be used as a guide to a shaft which will be opened this year.

No. 21 shaft of the Calumet & Hecla, which is situated on the southeastern corner of the main body of mineral land, is the southernmost point at which the Kearsarge as been exposed in a shaft. There it is split up and broken, the copper being scattered; but it may improve with depth, such being the characteristic of the bed. No. 20 and No. 19 shafts, which were opened first, and are located on the north-eastern corner of the property, expose fairly good values, particularly No. 20, which is shipping a few cars of rock each week.

Talk that the Tecumseh will explore its land for the Kearsarge lode has been of frequent recurrence during the past few months, and such action is likely to be taken in the spring as soon as the snow shall have left the ground. The Tecumseh lies next south of the old Osceola branch of the Osceola Consolidated Company's holdings, and has not been active for two years. That it carries the Kearsarge amygdaloid is entirely probable, but its extent and value have never been determined.

If the Rhode Island, Franklin and Arcadian companies undertake to explore for the Kearsarge amygdaloid on their lands south of the Tecumseh during the coming summer, as is planned, a great deal of information should be added to the fund of exact knowledge of the geological formation of the district. There are excellent prospects of the Kearsarge lode tra-

versing all of these properties, but whether it carries paying copper values so far south is another question, and one that can be settled only by actual work.

#### Scranton. March 6.

Notwithstanding the decrease in the number of tons of coal mined last year, the reports of the coal inspectors show that the number of fatal accidents per ton is rapidly increasing. The majority of the accidents arise from roof falls. The increase in the number of accidents cannot, however, be attributed specifically to any one cause more than another, according to an analysis of the figures supplied by the mining inspectors.

H. McDonald, inspector of the fourth Luzerne district, says that there were 4,867,715 tons of coal mined in his district. There were 45 fatal accidents, and 68 non-fatal accidents. Mr. McDonald says that the mines in his district have been ventilated better than they were ever before.

Work at the National colliery at Duryea suspended operations on March 4 for repairs that will require a month or more to complete. The chief alteration will be the rebuilding of the shoots that will enable loaders to fill the large steel cars as well as ordinary wooden gondolas that can only be filled there at present. The breaker is an old one, and it has been found necessary to remodel it considerably to meet changed conditions.

The Pine Brook colliery, which is in the heart of Scranton, was opened Wednesday, March 1, with a force of 700 men and boys. The fire that destroyed the old breaker occurred just a year ago, on April 29, 1904. The new breaker is a magnificent structure, supplied with the finest machinery procurable. The colliery started with nearly all the men previously employed, but during the busiest season it can find room for many more.

An amicable arrangement has been arrived at between the men employed at the Kingston colliery, who were employed in robbing pillars, and the owners of the mine. The men said they were entitled to more wages for this kind of work, and asked for an increase which the company refused. After a conference the company offered a sum which the men have accepted.

James Martin, inspector of the seventh district, has made elaborate recommendations to prevent a re-occurrence of the disaster at the Auchincloss mine, in which 10 men were killed. He advocates that where two engineers are employed in constant duty during 24 hours that three be employed, making a nine-hour shift among them. Mr. Martin advocates that the day-shift engineer begin at 6 A. M., and work to 1 P. M., or seven hours; and that the second engineer begin work at 12 A. M., and work until 7 P. M., or seven hours, and the third engineer to commence at 6 P. M. and work to 7 A. M. next morning. By the arrangement he asserts that there would be two competent engineers in the engine house together from 6 A. M. to 7 A. M.; from 12 A. M. to 1 P. M., and from 6 P. M. to 7 P. M. He says that these three hours are very important, being the periods in which the men are lowered to their work and brought to the surface.

The mammoth Truesdale breaker of the Lackawanna company, at Nanticoke, is completed. The structure is such a huge one that the ordinary breaker seems dwarfed by comparison. It will be the largest in size and capacity in the anthracite region. The machinery is now being

installed, and it is expected that in less than three months it will be in operation. It will be equipped throughout with automatic machinery. No steam power will be used, as all the equipments are to be driven by electricity. The capacity of the breaker will be 4,000 tons daily.

The cost of mining in the anthracite coal regions has materially increased during the year, and is evidenced by the various reports of the operating corporations. This is not all attributable to the increase of wages paid to miners. A considerable proportion of the increase covers charges for improvements and other incidental expenses. According to the report of the Lehigh Coal and Navigation Company the cost of mining was six cents higher in 1904 than it was in 1903. The actual cost of mining was \$1.73, which, owing to extraneous charges, amounted to \$2.02.

The Lehigh Valley Coal Co. has purchased the property of the Wyoming Coal & Land Co. They cooperated a colliery which was known as the Griffith mine. Under the new ownership it will be known as the Westmoreland colliery. The company owned about 300 acres of coal land, and the colliery, which is situated near the Maltby colliery, of the Lehigh Coal Co., has a capacity of 600 tons per day.

Announcement is made of the important changes in the districting of the Lehigh Valley Coal Company's collieries. The Heidelberg No. 1 and 2 collieries at Avoca and Dupont, which have heretofore been in charge of W. D. Owens, of West Pittston, will be transferred to Thomas Thomas' district, and Mr. Thomas will now have in charge the Seneca, William A., Lawrence and Heidelberg collieries. Mr. Owens will continue in charge of the big Exeter colliery at West Pittston, and will have in addition the new Westmoreland colliery and the Maltby colliery. The latter has heretofore been supervised from General Superintendent Zerby's office in Wilkes-Barre.

#### Duluth. March 5.

The United States Steel Corporation has increased its ore holdings on the Mesabi range by the addition of the lands of the Canisteo Mining Co., of Duluth, a concern whose chief stockholders were C. A. Congdon and G. G. Hartley, of that city. The price paid is not announced, nor are the royalties agreed upon nor the annual minimums to be mined; but it is known that these latter are large, and that on the western Mesabi will soon be an important addition to the tonnage of the range. These tracts lie in the central and western parts of T. 56 R. 24, and cover more than 1,000 acres of selected and explored lands. The Steel Corporation already had the Arcturus and Diamond mines in the same township, and now has an enormous tonnage there, most of it an ore that will require concentration. The ores of the Canisteo and their peculiarities were fully described in THE ENGINEERING AND MINING JOURNAL last summer in an article treating of the tonnage and treatment of these ores. In that article it was stated that there were 120,000,000 tons of ore on Canisteo lands, but this was probably considerably too high. These ores require that nearly two tons be mined to secure one ton of marketable product. They will probably be under such surface as to require underground operation; they are quite wet, and considerable pumping will be necessary. No railroad comes within six or seven miles of the nearest of these

ores, and the nearest one is the Great Northern. Considering the tonnage to be mined, it is natural to suppose that the Steel Corporation's Duluth, Missabe & Northern will get in there after a while, and to do so it will be forced to build 25 to 30 miles along the iron ore formation. These ores run quite close to the Mississippi river, and are all in Itasca county, where no mining has yet been done other than at the Nashwauk locations, where the International Harvester Co. and Jos. Sellwood are at work. No decision has yet been reached as to the manner of eliminating sand from these ores, but experiments have shown it to be no serious problem, and during the coming season these experiments will be continued on a large scale. In the two townships directly east and west of 56-24 no very large orebodies have been found, though some explorations have been carried on there in years past. It is quite likely that work will be directed now to developing the possibilities of these towns, and to further explorations in 56-24 as well. By this deal and the purchase of Arcturus and Diamond, the last of which was taken by the Carnegie company some years ago, the Steel Corporation increases its ore reserves by a tonnage up to its requirements for several years.

The work of the Bessemer Iron Co., which has been exploring at L'Anse, near the old Taylor mine, for a year past, has ceased and the field has been abandoned.

Several large steel shaft houses, of the type adopted by the Oliver Iron Mining Co., are going in at its large Gogebic mines. In addition to those heretofore mentioned, one will go in at No. 3, East Norrie, and one at No. 4, Pabst. These shafts, as well as A and 7, Norrie, are timbered with steel sets, and in order to complete the fireproof character of the workings incombustible frames were required. This type of shaft and shafthouse will be the accepted one for all permanent workings at large properties.

With present improvements completed, the Duluth, Missabe & Northern railroad will have 22 miles of double track on the main line, as well as many long passing tracks. This is in addition to all double trackage on the north and south ends of the road. This company's additions to equipment for the present spring will include 1,300 steel cars and 12 locomotives of the consolidation type, weighing 165,000 lb. on the drivers. The Duluth & Iron Range road is adding to its double-track lines, and in a few weeks will have the entire line from its docks to the Fayal terminals double-tracked, aside from three or four miles where it has not been necessary. This company's equipment order includes 500 ore cars and nine consolidation type locomotives, weighing 170,000 lb. on the drivers.

#### Salt Lake City. March 2.

There have been no new developments in the smelter smoke controversy during the past week. The county board of health has done all it can do, which was to order the smelters to "abate" the smoke nuisance. This they are making every effort to do; but the ruralists are impatient, and it is on the programme to ask the courts to grant them immediate relief in the shape of a permanent injunction, which, if granted, would mean the closing of all the plants in the Salt Lake valley. That the situation is grave, and the smeltermen so consider it, there is not the slightest doubt. C. W. Whitley, manager of the local plants of the American Smelting & Refining Co.,

has addressed a letter to clients in this State, asking for data in regard to comparative costs if their ores should be shipped out of the State for treatment. He says:

"The question of smoke nuisance that has been agitated here in this valley is fast assuming most serious proportions, and an attempt is being made by the farming community to get a permanent injunction granted as against the operation of the smelters in this valley."

The smelting companies are inclined to believe there is a concerted plan to drive them from the State, and, with "rural" juries to contend with, some of the managers do not look altogether hopefully upon the situation. In the meantime the Utah Consolidated and the American companies are going ahead with the installation of devices for the control of the smoke as recommended by Dr. Franz Meyer, who was employed to look into the local situation and devise a remedy. The United States and Bingham Consolidated companies are also about to follow suit.

The finishing touches will soon be put on the Continental Alta's five-mile aerial tramway, when the movement of ores from the mine at Alta to the mill will begin. Henry M. Crowther, the manager, of Salt Lake, expects that both tramway and mill will be in operation not later than March 10.

It looks as though the property of the Ohio Copper Co. would be sold. An option has been held on the mine, which is located in Bingham, for some time by parties said to represent the Guggenheim Exploration Co. Henry Catrow, the manager, has been called East to confer with parties holding the option.

The litigation which has been pending in the courts between the Mammoth and Grand Central Mining companies in Tintic for the past five years is now up before the Supreme Court for final action. The attorneys made their arguments during the week, and the court has taken the matter under advisement.

Mining men here anticipate a general revival in the old camp of Pioche during the present year. Several large deals are pending, which are likely to be consummated. A Boston syndicate has already made some extensive purchases, and has organized the Pioche Exploration Co. Only a half dozen are interested, and a fund of \$200,000 has been raised for the development and purchase of ground, equipment, etc. Representatives of this company are to confer with officials of the Nevada-Utah corporation, at the head of which is Col. John Weir, of New York, with the view of taking up the matter of building a railroad into the camp from Caliente. The San Pedro, Los Angeles & Salt Lake Co. will construct the line if the money covering the cost is advanced, the same to be returned in the shape of credits on outgoing freight. The Nevada-Utah holds options on the old Pioche Consolidated, Manhattan, and, it is said, on the Raymond and Ely, which contain thousands of tons of ore that could be profitably handled if there were railroad and smelting facilities on the ground.

The Columbus Consolidated mill at Alta, started up about a week ago, is reported to be giving good results. It is operated with only one shift at present, but others are to be put on at once. With the plant running at full blast, the company expects to produce about \$25,000 monthly.

Two enterprises are being pushed forward for the navigation of the Green river, in eastern Utah. E. T. Wolverton, manager of the manganese mines of the Colorado Fuel & Iron Co. in

this State, is at the head of one of them. The other is headed by J. J. Lumsden, of Grand Junction, Colo. Boats carrying both freight and passengers will be put on, which will promote, it is believed, interest in the mineral districts of that remote section of the State. Boats will ply from Green River south.

The concentrating mill of the Stockton Gold Mining & Milling Co. at Stockton is operating on 30 tons of ore daily, working with one shift, which is to be increased in about 10 days. In the mine the sinking of the shaft continues; the present depth is 750 ft., and will be continued to the 1,000-ft. point.

#### Deadwood. March 3.

The Imperial company this week made final payment to the Costello heirs for its interest in the McGovern ground at Portland. This completes 85% of the purchase of the property; the balance of the payments are small, and the money is in hand to meet them when due. The Imperial company secured this ground a little over a year ago, at a price of a little over \$100,000. It consists of 80 acres in the rich mineral section of Bald mountain. Only one claim, or 20 acres, has been explored to any extent, but in it the company has a three years' ore supply blocked out. The company's mill is at Deadwood, and is being increased to 150 tons daily capacity. The Power & Mining Machinery Co. is furnishing two steel leaching vats to add to the four already in use, and Frank Howard, of this city, has been awarded the contract to erect the building and install the machinery. For the past year the company has been treating 3,500 tons per month. The ore averages \$6 to \$8 a ton.

The Clover Leaf company has suspended operations in all departments excepting pumping, as the water is to be kept out of the mine while it is shut down. A special meeting of stockholders has been called for April 10, it being the intention to increase the capital stock to \$2,500,000; it is now \$1,200,000. About \$500,000 worth of the increase has been subscribed for at par, and will be realized on to retire an equal amount of first mortgage bonds. Several hundred thousand dollars' worth of additional stock will be placed in the treasury and sold for the purpose of doubling the mill capacity, sinking the shaft to 1,000 ft. and making other needed improvements. The mine is in fine condition. There are immense quantities of ore blocked out. The material is low grade, hence the desire to increase the mill to 120 stamps.

The Hidden Treasury company will resume sinking in a few days. The shaft is now 170 ft. deep, and lateral work at the bottom displays a good body of phonolitic ore.

The Rex company has decided to sink its shaft another 100 ft., making a total of 250 ft. Five hundred feet of work on the 150-ft. level discloses a large body of free-milling ore. At a meeting recently held J. A. Steele, of Minneapolis, was re-elected president. John Gilroy, of Lead City, is general manager.

The Gilt Edge-Maid company is installing at its property near Galena the first electric hoist to be used in the Black Hills. It was manufactured by the Hendrie & Bolthoff company. It will be used to hoist ore from the lower to the upper tunnel, a distance of 100 ft. The upper tunnel is level with the crusher room, and the ore will be trammed direct from the station.

The Eleventh Hour company has purchased a sawmill from John Wolzmut, of Spearfish, and will move it to the mine

immediately, to be used in the manufacture of lumber and timbers for the cyanide mill the company will build this summer.

The Hidden Fortune company is drifting from the 175-ft. level of the Bingham shaft in the direction of the ore shoot in the Bingham vein. This shoot where opened in the upper workings has proven to be of excellent grade, and is being successfully handled in the company's mill.

#### Butte. March 1.

After an idleness of about a month the Rarus mine, an asset of United Copper, is again in operation, having been placed in commission Saturday. The suspension was caused by the breaking of a pump and consequent flooding of the lower levels. During the shut-down 15 men were kept at work on the water. The crew now numbers about 150.

The Reins Copper has succeeded in draining the lower workings of its property, and is connecting up its large pump on the 800-ft. station. It expects to resume the extraction of ore next week. Last week it shipped 140 tons of copper-silver ore that had been taken from the 800 level just prior to the flooding of the workings. Thomas Bryant, who has been in charge of W. A. Clark's Original mine several years, entered the employ of the Reins to-day, taking the position of consulting engineer. He will also hold his position with Mr. Clark.

The large electric pumps ordered by the Pittsburg & Montana company last fall for use on the 1,200 and 700-ft. stations of shaft No. 2 have arrived, and are being installed. The addition of them will greatly facilitate the handling of the water in the lower workings of the property. Ralph Baggaley, manager, returned to-day from California, where he has spent nearly two months resting.

Butte & Boston commenced work in its Berkley mine to-day, and will continue until the property is thoroughly developed. It is not the intention to extract any ore at present. The mine is one of the good copper-silver producers of the company, but litigation has interfered with its operation during the last few years. It adjoins the Michael Devitt, another great mine belonging to the company.

H. L. Frank, of Butte, is interesting himself in the Pony district of Madison County, in which there is a large quantity of low-grade gold ore and some high grade. It is claimed that the ore will cyanide. Mr. Frank purposes to erect a plant and give it a thorough test. He owns valuable mine interests in Butte, and has taken the preliminary steps towards the erection of a custom mill in the Goldfield district of Nevada.

The Montana Zinc Co. is experimenting with a new device for separating and saving the metals in the zinciferous ores of the Alice. It is not yet operating its mill full blast, delays incident to the proper adjustment of new machinery being responsible for the delay. Superintendent Humphrey says his work during the last few days has been exceedingly satisfactory, and he is now confident of a successful termination of it. Manager Buzzo of the Alice has the Alice mine in shape for supplying any quantity of this class of ore on short notice, the vein being opened in three places below the 300 and the cross-cuts and levels newly timbered.

A new pump has been installed on the 1,800-ft. level of the Original, a Clark mine, and is draining the seepage of that mine and the West Steward, also a Clark property. These mines are connected on several levels, and are high-class producers



of copper-silver ore. The Original company has commenced work on its 300-ft. stack, designed for carrying away the fumes of its smelter and saving the copper-laden flue dust. The stack and its connection with the furnaces will cost about \$150,000. The foundation is about complete.

#### Leadville. March 4.

With the steadily increasing output from this city, there is a much stronger tone among business men. Business of the merchants largely dependent upon the mining condition and prospect has been increasing since the first of the year. That confidence in the future of the mining industry here is felt is indicated by the establishment here this week of warehouses by the large Eastern packing houses. Two more commission houses are shortly to open up, and two other business houses. There is not a vacant business house on Harrison avenue, for the first time in many years. The banks report an increase in deposits, and there is a general feeling of prosperity.

The outlook for the spring promises much. The principal development work will be done on Rock hill, where a great many properties are either to be revived or opened up. The English Syndicate, the Rock Hill Mines Co., The United Mines & Development Co. of New York, the Rock Hill Consolidated Co. and many individual mining men contemplate active development on the hill.

The Sugar Loaf district is also looking forward to much activity. Within two months this section will be busy with the usual spring "scratching," and some heavier work will also be undertaken. Iowa gulch, too, is planning for an awakening, and old properties there are to be revived. The number of lessees on the Jonny is to be increased, and tunnels which are being driven in several parts of the district will be completed this spring, and will mean the opening up of many properties.

Careful study of the situation of the land in Iowa gulch in the vicinity of Breece hill gives rise to the belief that an opinion expressed years ago by James W. Goff, an old-time prospector, will now prove true. Mr. Goff declared that the fissure veins revealed on the south side of Iowa, in the granite formation, are continuous to the northward into the porphyries and other formations of Breece hill. He claimed that the fissure vein in the Fortuna mine on the south side of Iowa gulch and the vein known to exist in the Sunday mine were the same. The character of the ore which for two years has been taken out of the Sunday is gradually resembling that in the Fortuna, and this has started the work of tracing the six well-defined fissures on the south side of the gulch eastward of the Fortuna and northward into Breece hill and Ball mountain. The principal work of searching for these veins is being prosecuted on the Mountain Lion claims, and is of a character that can scarcely fail to find them if they exist. The work is being accomplished through a tunnel, for which the section is an ideal one.

Owing to the steep descent of Breece hill to Iowa gulch, tunnels in this section can be easily prosecuted. Several parties are figuring on tunnels to start well down towards Iowa, with plans for cross-cutting after a sufficient depth has been obtained, and when the heads of these tunnels have penetrated into the porphyritic mass of Breece hill proper. These will undoubtedly mean much to the Breece Hill district.

A wonderful record has been established by P. J. McNulty, who is in charge of the sinking of a shaft for the United Mines and Development Company of New York, on the Mike claim on Rock hill. The shaft,  $4\frac{1}{4}$  by  $9\frac{1}{2}$ , was started on the morning of Feb. 6, and just 15 days later 150 ft. had been sunk. While the easiest part of the land was penetrated first, this makes an average of 10 ft. a day, and excels the best previous record on the Wilgus of about 500 ft. at a rate of 8 ft. a day. Mr. McNulty is working three shifts a day, and expects to sink the shaft to a depth of about 750 to 800 ft. before commencing drifting for the ore. Some little water was struck at a depth of 140 ft. between the wash and the lake bedding, but this has been penetrated, and the sinking is rapidly continuing.

#### Toronto. March 3.

The first output of the stamp mill of the Shakespeare gold mine in the Algoma district of the value of between \$3,000 and \$4,000 was shipped from Webbwood Cut on Feb. 27.

James Harvey, of Vancouver, B. C., is in Winnipeg in the interests of the Western Oil and Coal Co., of Vancouver, which is engaged in the development of a large oil area in Alberta, some seven miles north of the international boundary, where it has nine square miles of oil lands near the Waterton lakes. The company has two oil rigs in operation, and one well has been sunk to a depth of 779 ft. The Western Oil & Coal Co. is capitalized at \$1,000,000, and is putting its stock on the Winnipeg market.

The London (Ont.) and Middlesex Historical Society has received from Dr. Bell, of the Dominion Geological Survey, specimens of the minerals produced in every part of Canada.

J. H. Conrad, a prominent Yukon miner, who has extensive interests at White Horse and at Caribou Crossing, has gone on a trip to New York.

The annual meeting of the National Portland Cement Co., Ltd., was held here on Feb. 28, about 200 shareholders being present. A statement by W. F. Cowan, of Jackson, Mich., president and managing director, placed the profits of operations for the past year at over \$50,000. Mr. Cowan tendered his resignation as a member of the Board. The following officers were elected: S. G. McKay, Woodstock, president; Joseph Cobbledick, Exeter, first vice-president; J. W. Scott, Listowel, second vice-president; Gilbert McKechnie, Durham, treasurer.

The annual report of the War Eagle Consolidated Mining & Development Co., in which Toronto capital is largely interested, shows 61,064 tons of ore produced, of which 56,760 tons had been smelted. The assay value was \$691,287, total smelting charge \$400,368, and smelter's net value \$290,919. During the entire operation of the mine there have been produced a total of 297,225 tons, of a smelters' net value of \$2,802,877. The reserves of smelting ore are estimated at about 24,000, averaging \$8.50 smelter's gross value. The mining operations showed a balance of \$88,153, of which \$27,797 was applied to interest on debts, and \$19,903 written off for depreciation. The cost of ore production was brought down to \$2.24, and the cost of mining and development work to \$3 per ton. There was nothing in the report to indicate what measure of success has attended the new process adopted last year for the treatment of low-grade ores.

The Dominion Coal Co. will, during the coming season, employ the largest coal-carrying fleet yet engaged in the traffic between Sydney, N. S., and the St. Lawrence river. It will ship by 10 chartered steamers, in addition to five boats owned by the company. A new steamer, the *James Ross*, is in course of construction at Middlesboro, England, especially for this trade, with a carrying capacity of 7,000 tons, and will be built in time for the season's trade. Every effort will be made to largely increase the shipments up the St. Lawrence.

The Canadian American Oil Co., with a capital of \$1,000,000, has been organized to develop the Egg Lake Oil field near Edmonton, N. W. T. The directorate is R. Secord, T. A. Stephens, J. I. Mills, K. A. McLeod and O. M. Biggar. The leases, recently secured by H. A. Williams and G. W. McIntosh, covering 4,480 acres, and carrying with them options of purchase, will be transferred to the company.

#### Monterey. Feb. 28.

The cyanide plant of the Pozos mines at Ahualulco is temporarily closed down while some additional and larger tanks are being put in, which will materially improve the mill. Ferdinand Sustersic, manager for the Amparo Mining Co., has denounced for the company all the ground to which it has not already mining title, on the Embocada ranch, a few miles southwest of Ahualulco, of which it now owns the surface right, making a little over 4,000 pertinencias, or about 100,000 acres. This action was necessary to keep others out, as surface title does not carry the mineral rights with it in Mexico. H. L. Smith, of Boston, has been making examinations of the Myers' properties, between Ahualulco and Etzatlan, for New York people. Carlos Romero, of Etzatlan, is endeavoring to interest capital in the Monoloo at Hostotapaquilla. The Magistral copper mine, at Ameca, has been sold to satisfy a judgment of \$2,000, and, though it has been idle for some years, and is full of water, it is believed by many to be a good property. F. C. Helm and C. Shapley, who were leaders in the recently postponed deal on La Luz properties of Guanajuato, have gone with George I. Troop, their engineer from New York, to examine some mines in the interior of Jalisco. The smelter of José I. Diaz, in Guadalajara, is believed to be running in a small way. The recent visit of M. D. Watson and J. B. Birkendike to the Rosa Amarilla mines has resulted in the determination of that company to build a railroad to the Pacific coast, and surveys are being made.

Chihuahua has been stirred up again on the smelter question by the presence there about 10 days ago of many of the leading men of the operating force of the Southern department of the American Smelting & Refining Company. T. S. Austin, general superintendent; W. S. Morse, general manager; G. C. Kauffman, general manager of the mines, and H. J. Douglas, traveling auditor, were there at the same time. Considerable talk has also been occasioned by the rumor of a consolidation of all the mines of the Santa Eulalia district. This is probably a myth. The Mines Corporation, Ltd., is doing extensive development work on the Señorita, in the Victorino camp, 25 miles north of Chihuahua, under the management of G. H. Arlett. F. H. Oxnham is making an excellent showing on the properties of the Palmarejo & Mexico Mining Co., of London, which had long been operated at a loss until he took hold of them. Messrs.

Traux, Campbell and Patterson are working on the vein of the Señorita, in the Victorino camp.

In Guerrero Messrs. Chippendale, Miller and Wallace have accompanied William Niven on a trip down the Balsas river to explore the placers along its banks. The Reforma Mining & Smelting Co. has started operations at Campo Morado, under the superintendence of Harry Simon.

Two new companies are reported formed in London to do a general mining business in Mexico—the Consolidated Mexico Syndicate, Ltd., with a capital of £20,000, and the African & Mexico Mines Development Co., Ltd., with a capital of £25,000.

**London.** Feb. 25.

About eighteen months ago I gave some particulars in this column of the flotation of the Tasmania Gold Mining Co. by John Taylor & Sons. The properties acquired were a well-known group of gold mines that had been for many years successfully worked by a local company until the water difficulty had overcome them. Though profits had been made, there was no reserve fund out of which to pay for new pumping plant, so money was found in London by John Taylor & Sons, in order to put the mines in good order, and provide the necessary plant. The water difficulty was a prodigious one, for the drainage of a large area of country passed through the levels. In fact the amount of water to be dealt with was not far from being a record. The plant is now in place. It is capable of pumping 8,000,000 gal. per 24 hours from a depth of 2,000 ft. It is of the Hathorn-Davey design and manufacture, being divided into three independent units, each driven by a compound engine with cylinders 50 in. and 108 in. in diameter. A similar plant is in work in Japanese collieries, and also in Staffordshire, England, and it would be difficult to say off-hand which of the three installations is the largest. As far as I know, there is no pumping plant in America—the country of large things—as extensive and complete as any of these three.

The Etruscan Copper Estates has long since ceased to interest mining men, but the directors appear to be as optimistic as ever. At the meeting of shareholders, held this week, Mr. Earle, the chairman, announced that at the recent reconstruction practically all holders had taken up the new shares and paid their assessment. He announced that Mr. Govett has retired from the general management, but did not give any reason. Seeing that it was Mr. Govett's opinion which was all these years backed by the board against the opinion of Messrs. Moreing, R. J. Frécheville, Alexander Hill and Edgar Rathbone, it seems strange that he should be allowed to retire, or be shoved aside, at this juncture, without any word of explanation. Another announcement made was, that the directors had decided to suspend smelting operations, owing to lack of ore, and to concentrate their energies on exploration and development. Thus is a naïve confession that Mr. J. H. Fawcett was right when he resigned a year ago. At that time the directors were publicly announcing that there was plenty of ore to keep the smelters occupied, but Mr. Fawcett privately expostulated with the directors, and as a consequence had to resign. At the time, I said in this column that the opinion of Mr. Fawcett was the most valuable, from all points of view, and it savors of the comical to find the directors now adopting his view, as if it was a wonderful discovery made by their own perspicacity.

### Personal.

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

Mr. Jas. D. Hague is in London.

Mr. Poppe Yeatman has returned from China.

Mr. F. A. Swan is in Chihuahua, Mexico.

Mr. Richard A. Parker, of Denver, is in Mexico.

Mr. A. A. Blow has taken up residence at Washington.

Mr. Percy Williams was married at El Paso on Feb 18.

Mr. F. C. Rutan, of Chicago, has been at Salt Lake City.

Mr. Olof Wenstrom has returned to Boston, from Mexico.

Mr. J. B. Nau has returned from a professional trip in Europe.

Mr. John Birkinbine, of Philadelphia, was in New York last week.

Mr. John B. Farish is on his way to San Francisco, by way of Denver.

Mr. C. W. Kempton is in Arizona. He will return to New York March 18.

Mr. F. A. Slocum, of Concord, North Carolina, is on his way to Parral, Mexico.

Mr. N. P. Withington, of St. Louis, is examining coal and iron fields in Mexico.

Mr. G. F. Steel, of London, is in Mexico examining oil fields in which he is interested.

Mr. René Proust is engineer to the Malaysean Co. at Raub Pahang, in the Malay States.

Mr. Edmund B. Kirby is on his way to Denver and will proceed shortly to Goldfield, Nevada.

Mr. J. B. Tyrrell, of Dawson, Yukon territory, has been in New York, and is now at Ottawa.

Dr. R. W. Raymond, and Mrs. Raymond, are visiting Mr. Arthur S. Dwight at Cananea, Mexico.

Mr. Julian Kennedy has been elected to the board of trustees of the Carnegie Institute at Pittsburgh.

Mr. G. F. Milliken, chief engineer for the Nevada-Utah Mines & Smelters Corporation, is at Salt Lake.

Mr. W. E. Thorne has been appointed manager for the Snow Storm Hydraulic Mining Co., of Colorado.

Mr. Luther Wagoner, of San Francisco, is visiting mines near Austin, Nevada, in which he is interested.

Mr. A. F. Holden, managing director of the United States Mining Co., is inspecting the properties of that corporation.

Mr. Hugh Rose, lately at Rossland, B. C., is superintendent at the Tecoletes mine, in the Santa Barbara district, Mexico.

Mr. Edward L. Dufourcq, of New York, has returned from the examination of mines in Durango and Sonora, Mexico.

Mr. Victor C. Alderson, president of the Colorado School of Mines, is spending a few days in the Cripple Creek district.

Mr. F. N. Flynn, formerly at the smelter at Torreon, Mexico, is now the chemist at the Yampa smelter, Bingham, Utah.

Mr. H. J. Belmer is superintending the erection of a 60-stamp mill for the Amalgamated Gold Co., of Quartzville, Arizona.

Mr. Robert B. Brinsmade is now superintendent of the mines of the Roscoe Iron Ore Co., in St. Lawrence county, New York.

Messrs. Geo. R. Riese, of Chicago, and G. W. Dithridge, of New York, are inspecting the Vencedora mines at Parral, Mexico.

Mr. Henry R. Buckley has resigned as acting manager for the Ophir Consolidated Mines Co., in San Miguel county, Colorado.

Mr. F. H. Minard has returned to Denver from a professional trip to the Black Hills of South Dakota, and is at present at Leadville, Colorado.

Mr. C. H. Doolittle has been appointed manager of the Bingham New Haven mine in addition to his charge of the Utah & Eastern Copper Company.

Mr. O. O. McReynolds has charge of the construction of a concentrating plant for the Dives-Pelican & Seven Thirty Mining Co., at Silver Plume, Colorado.

Mr. George H. Bradley, of the Bradley Mining Machinery Co., of Spokane, has been made manager of the Salt Lake branch of the Allis-Chalmers company.

Mr. Joseph C. Erman has resigned as engineer of the Starlight mines, at San Carlos, Ariz., to become manager of the Keystone copper mines at Globe, Arizona.

Mr. R. A. F. Penrose has returned to Philadelphia, after a journey around the world, including the mining regions of New Zealand, Australia and South Africa.

Mr. Wilson Irwin, manager of the Manitoba Peat Co., is in Toronto, purchasing the machinery necessary to operate the company's peat deposits near Fort Frances, Ontario.

Mr. Geo. P. Hyde, formerly at the smelter at El Paso, Texas, and at Cerillos, N. M., has become superintendent for the Sonora Mining & Development Co., at Toledo, Sonora, Mexico.

Mr. Samuel James has resigned as superintendent of the Ohio and Colorado Independent Smelter at Salida, Colorado, and has accepted the management of the Almaloya smelter at Toluca, Mexico.

Mr. B. A. Schroeder, who was attached to the St. Louis office of the Crocker-Wheeler Co., has been placed in charge of the New Orleans office of the company. Mr. Schroeder succeeds Mr. H. P. Field, who has been transferred to the Boston office.

Mr. H. A. Barker, formerly receiver for the Free Gold Mining Co., has now handed over the property and an accumulated balance of \$12,194, and obtained his discharge from the superior court. He intends shortly to take a vacation in Europe.

Major A. V. Bohn, of Leadville, Colo., has returned from New York and the East, where he has been in the interest of the Valley Mining Co., of Leadville, now reorganized into the Battleboro Mining Co., and of which he has taken the management.

Mr. Charles T. Arkins, of Denver, is in New York. He was employed last year as metallurgist under Superintendent Shipman of the Golden Horseshoe Mining Estates Co., of Boulder, Western Australia; and more recently he served as expert for the Broken Hill Proprietary Co., of London.

Mr. N. Cleveland has been appointed general superintendent of the Yuba River Tract Company's dredge mining business in Yuba County, California. He was formerly superintendent of Boston & Oroville Dredging Company at Oroville, California, and also of the Bear river dredge enterprise.

**Obituary.**

Eugene F. Phillips, general manager and founder of the American Electrical Works at Providence, R. I., died on Feb. 22.

Michael Kelly, one of the best known coal operators in this country, died at Danville, Ill., Feb. 27, aged about 70 years. Mr. Kelly came to America from Ireland at the age of 20 years. He worked first as a laborer in a brickyard at Danville, but soon saw an opportunity, neglected by others, for mining coal. With a few dollars which he had saved he purchased 10 acres of land near Danville, and by determined and steady labor made of it a successful mine. He added to his holdings until he became one of the largest operators in Illinois. Mr. Kelly was a man of rugged mold, sterling in his honesty, and distinguished for eccentricities of manner and speech. His great wealth was won entirely by his shrewdness and industry, and was not achieved by speculation of any sort. He was widely known and respected.

Roland C. Luther, second vice-president of the Philadelphia & Reading Coal & Iron Co., died March 6 at Pottsville, Pa., aged 59 years, from apoplexy. Mr. Luther was one of the best known mining engineers in the country, and ranked high among the experts in that profession. He held many positions under the Philadelphia & Reading Coal & Iron Co., and in 1875 went to Nevada, where he did engineering work in silver mines until 1882. Returning to the East, Mr. Luther was made mining engineer for the Reading company, and in 1888 he was promoted to the position of general superintendent. For his services and management of the Reading's collieries during the strikes of 1900 and 1902 he was elected second vice-president of the company. The anthracite coal companies selected Mr. Luther as one of the three members representing the operators on the Anthracite Board of Conciliation, which was created to settle disputes arising out of the award of the Anthracite Coal Strike Commission.

**Societies and Technical Schools.**

*American Chemical Society.*—The sixth regular meeting of the New York section of this society will be held on March 10 in the American Museum of Natural History. The programme is as follows: Morris Loeb and F. S. M. Pederson, 'The Vapor Friction of Isomeric Ethers'; A. C. Langmuir, 'The Iodine Absorption of Rosin and Shellac'; William Melville and Alfred H. White, 'Decomposition of Ammonia at High Temperatures'; A. A. Breneman, 'Mineral Waters at the St. Louis Exposition'; George F. Kunz, 'The Radium Exhibits at the St. Louis Exposition.'

*Western Association of Technical Chemists and Metallurgists.*—This association will soon publish the first number of its proceedings. Among the papers will be the following: 'The Determination of Uranium and Vanadium,' by J. H. Haynes; 'A Method for Iron,' by J. C. Bailar; 'The Alkali Lakes of the San Luis Valley,' by H. Fleck; 'The Estimation of Arsenic in Sulphuric and Hydrochloric Acids,' by R. S. Beall; 'The Determination of Arsenic and Antimony in Lead Bullion,' by H. C. Parmelee; 'The Influence of Fine Grinding on the Metallurgy of the Precious Metals,' by A. W. Warwick; 'The Separation of Minerals by Static Electricity,' by W. G. Swart.

**Trade Catalogues.**

The Aetna Foundry & Machine Co., of Springfield, Ill., is sending out a convenient card calendar, suitable for desk use.

The National Electric Co., of Milwaukee, Wis., is issuing two cards, illustrating, respectively, the Christensen air-brake equipments, and Lundell Universal motors.

'As the Photographer Saw Us' is the title of a tasteful little book, issued by the Guarantee Electric Co., of Chicago, Ill. It contains photographic reproductions of the plant of the company.

The Fisher air compressor is described in catalogue "A," sent out by Christopher Murphy & Co., of Chicago, Ill. It contains detailed descriptions of this air compressor, with illustrations, testimonials and price-lists.

The Fischer Foundry & Machine Co., of Pittsburgh, Pa., has issued a handsome catalogue of its products, which include rolling mills, steel works, tube mills, boiler shops and bridge works. The book contains many excellent illustrations.

From the C. W. Hunt Co., of West New Brighton, N. Y., we have received pamphlets No. 051 and 052. The first contains descriptions, with illustrations, of the Hunt railway, and the second is an introduction to the general line of machinery, manufactured by this company. This also is illustrated.

Circulars No. 1,097 and 1,099, issued by the Westinghouse Electric & Manufacturing Co., of Pittsburgh, Pa., describe, respectively, the Westinghouse type K motors, direct-current series wound for crane, hoisting and similar service, and the Westinghouse bi-polar motors, type R, for direct-current circuits. Both circulars are provided with illustrations.

**Industrial.**

The firm of Bonnevie & Lee has been dissolved and N. C. Bonnevie is now conducting the business. The Denver Ore Testing & Sampling Co., will be conducted as heretofore and N. C. Bonnevie has been elected president and general manager.

The Mines & Metallurgical Co., of No. 11 Broadway, New York, has been appointed the exclusive agent in the United States, Canada and Mexico for the apparatus for concentrating sulphuric acid and evaporating corrosive liquors, patented by Dr. Adolf Zanner, of Belgium, which is already in extensive and successful use abroad.

Homer C. Bosworth, for several years manager of the Denver Fire Clay Co., of Denver, Colorado, is now an active partner in the firm of Hoffman & Pinther, of Mexico City. It will hereafter be known as Hoffman-Pinther & Bosworth. Beginning with March 1, this firm will be in a position to carefully and promptly attend to all of the wants of the assay and chemical laboratory trade.

The Colorado Iron Works Co., of Denver, Colo., reports the following orders and shipments. Complete sampling and smelting plant, with steel building, for the Mowry Mines Co., in Arizona; hot blast, copper matteing, smelting plant for the Lost-Packer Mining Co., in Idaho; a shipment of six carloads of material for the 200-ton smelting plant of the National Metallurgical Co., in Mexico; and concentrating machinery, consisting of impact

screens and supplies, for the Kootenay Ore Co. and the Jackson Mines Co., both in the Kootenay district, British Columbia.

The Westinghouse Electric & Manufacturing Co. has just sold to the La Belle Iron Works at Steubenville, Ohio, a direct-current engine-type generator, to be rated at 1,000 kw., the voltage to be 250. The contract includes also a switchboard of blue Vermont marble. The Westinghouse apparatus already installed in this plant includes alternating and direct current generators with a total rated capacity of 1,250 kw., a 300-kw. rotary converter, and over 200 motors, not including those used on the cranes, ranging in size from 1 to 200 h.p. About two-thirds of these are Westinghouse type C alternating-current motors.

The largest high head centrifugal pump ever made in one unit was built by the Byron Jackson Machine Works of San Francisco for a large mining company in Oregon. This was shipped recently, and represents one of the biggest pieces of modern pumping machinery ever turned out. The pump is of the series five step type and built to withstand a pressure of 250 lb. per square inch, or a total lift of 580 ft., and is to supply 9,000 gal. of water per minute. Pump is driven by four 400-h.p. turbine water-wheels, direct connected, and is made for the purpose of delivering the necessary water to a battery of giants that will operate on gravel deposits.

Some interesting facts regarding the endurance of a centrifugal fan blower were brought out in the discussion at the meeting of the Pittsburgh Foundrymen's Association, regarding the relative merits of the positive blower and the fan. It was stated by a representative of the Westinghouse Air Brake Co. that they installed six positive blowers in their foundry, and after six months replaced them with fans. At this plant the iron is melted continuously, and the blowers were compelled to operate 23 hours daily. The blowers were operated at a pressure of 16 ounces, and at the beginning of a heat would run up to 20 ounces. Regarding the life of fans, he said that they have used a No. 9 fan for 15 years, and during that period it was operated 23 hours every day except Sunday, and required no repairs whatever.

Among the recent shipments made by the American Concentrator Co., of Joplin, Mo., are the following: A complete equipment for a 300-ton copper concentrator for the Union Copper Mining Co., Copperopolis, California, consisting of New Century Blake crushers and rolls, New Century ore feeder, the entire transmission machinery, all necessary trommels, etc., and fifty-one compartments of the New Century differential motion jig. They are also furnishing this company with a large bull jig, having a compartment four feet wide and five feet long. The plant was designed throughout and working drawings furnished by this company. A three-compartment coal-washing jig for the Rocky Mountain Coal & Iron Co., Tercio, Colorado. Six-compartment New Century coal-washing jigs for the Raton Coal & Coke Co., Raton, New Mexico. One two-compartment and two single compartment anthracite coal-washing machines to the Scranton Coal Co., Scranton, Pa. Three single-compartment and two double-compartment anthracite coal-washing machines to the Delaware & Hudson Co., Scranton, Pa. One three-compartment jig of their bituminous coal type, and one New Century disintegrating screen, through Allis-Chalmers Co., to the Guanajuato River Mining Co., Marfil, Mexico.

## General Mining News.

ARIZONA.  
GILA COUNTY.

*Keytone.*—These copper mines, eight miles from Globe, have been sold by Joseph C. Erman, for Messrs. Finletter and Harvey, to St. Louis capitalists, headed by G. C. Campbell, for \$300,000. This property has been shipping ore for eight years and has netted the owners about \$100,000 in that time. The high-grade ore is about exhausted now, however, and the new owners have taken it over to work the medium and low grade ores, of which there are now immense bodies opened up. In order to handle these ores economically, it is proposed to install immediately a leaching plant, the ores being ideal for this process, containing as they do nothing but silica and copper carbonates.

## GRAHAM COUNTY.

*Shannon Copper Co.*—The production of this company at Clifton, for February, was 344 tons of copper. As February had but 28 days, and as the smelter and mill were shut down about eight days on account of washouts on the Coronado railway, the production averaged about 17 tons of fine copper per day, actual running time. This was practically from the company's own ores, as it received but one carload of ore from the Standard during the month, containing only about three tons of copper.

## YAVAPAI.

*American Copper Mining Co.*—This company, operating at Blanchard, has gone into bankruptcy, and a receiver has been appointed. This was caused, it is said, by incurring a debt of about \$125,000 at the mine. A new company will be organized to take over the property. Over \$400,000 has been invested in this property by New York people in the last four years. The mines are well equipped and developed.

## CALIFORNIA.

## AMADOR COUNTY.

*Argonaut Mining Co.*—In this mine at Jackson, J. B. Francis, superintendent, over 100 men are now employed. The first month's mill run has proven satisfactory.

*Doyle.*—This mine on Hunt's gulch, near the Amador Queen, is being inspected with a view of bonding. The mine is equipped with hoisting works and machinery.

*Kennedy Mill & Mining Co.*—This company at Jackson, Webb Smith, superintendent, now that it has all its stamps dropping, is making very satisfactory bulion returns monthly.

## CALAVERAS COUNTY.

*Donovan & Preston.*—This gravel mine on the South fork of the Calaveritas, has been bonded to Thos. Bradley, representing Oakland men.

*Gwin Mine Development Co.*—At the 2,100-ft. level of this mine at Gwin, D. McClure, superintendent, F. F. Thomas, manager, a good seven-foot orebody has been found,—the best found for a long time.

*Hagerman.*—This property near San Andreas is being opened by D. P. Gray.

*Jackson.*—D. Fricot is about to open this property, which he recently purchased, on an extensive scale, and men are now at work on buildings and machinery. The Calaveras Mining & Water Co. formerly owned this property, which consists of ditches and water rights, the Johnson gravel mine, and the Little Rock,

Seven-Up, Aloha, Yaqui, Mammoth, and Klondike quartz claims.

*Marshall.*—At this mine near San Andreas, Messrs. Hunter and Fish have nearly completed the mill.

*Nuner.*—In running the bedrock tunnel at this mine to tap the gravel channel, a promising quartz lead has been cut.

*O'Connell Blue Gravel Co.*—Preliminary arrangements have been made for starting up this property near San Andreas, and a steam power plant is to be put in.

*San Andreas Blue Gravel Mining Co.*—The steam hoist and buildings on this property at San Andreas have been completed, and the work of taking out the water and enlarging the shaft will shortly commence.

## EL DORADO COUNTY.

*Bacon.*—Work has commenced on this mine near Placerville. A 200-ft. shaft will be sunk, after which drifting will commence.

It is reported that the Union mine will soon pass into the hands of Eastern men, and that the Vandalia is also to be sold.

## FRESNO COUNTY.

*Copper.*—A Scotch syndicate is about to prospect a copper deposit on the Shird Blair ranch, south of the Fresno copper mine. Albert Rhodes is in charge of operations.

## NEVADA COUNTY.

*Morning Star.*—This property near Cherokee has been taken under bond by Philip Deidesheimer, who has engaged machinery to start more active work. John Curnow has been prospecting the claim for some time, and has run across some exceptionally rich ore.

## PLACER COUNTY.

*Big Boulder.*—W. H. Wales, N. J. Pearson and N. T. Collins have recently made a satisfactory strike in this mine at Secret Ravine, near Colfax.

*Dardanelles Drift Mining Co.*—This tunnel proposition, on the Forest Hill Divide, J. H. Meyers, manager, was formerly a hydraulic mine, but of late years has been drifted. The old 2,400-ft. tunnel is being continued 800 ft. to tap the "white lead."

## PLACER COUNTY.

*Bay State.*—This drift mine at Last Chance has entered the gravel channel with its tunnel. J. H. Meyers is manager.

*Buckeye.*—This drift mine north of Forest hill has installed a gravel mill.

*El Dorado Mining Co.*—This property at Last Chance, D. M. Ray, manager, is still yielding very rich gravel.

*Paragon.*—This old drift mine (formerly the Breece & Wheeler) at Bath, is again turning out a high-grade gravel.

## SAN DIEGO COUNTY.

*Iron Springs.*—In this district, north of Warner's Ranch, a number of prospectors are developing their claims. There is a small mill at the camp.

## SHASTA COUNTY.

*American Mining Co.*—J. H. Lenehan and other leasers on this mine at French gulch obtained \$3,420 out of 44 tons they extracted. Exploration work is being carried on by the company owning the property. A 1,200-ft. drift is being driven under contract to intersect the main ledge.

*Hazel Gold Mining Co.*—The strike of a 12-foot ledge of \$40 ore is reported on the Gladstone mine at French gulch, operated by this company, J. C. Jilson, manager.

*Navajo Gold Mining & Development Co.*—This company at Lower Springs district, four miles from Redding, has made a strike of rich gold ore in its White Oak claim. The company only commenced active operations in December last.

*Washington.*—Chas. Webb, holding the lease on this property in French gulch, reports a rich streak of ore as having been discovered. A five-stamp mill is kept busy on ore.

## COLORADO.

## BOULDER COUNTY.

Fairbanks, Morse & Company, of Denver, have contracted with Boulder parties for the erection of a 100-ton sampling works to be erected in Boulder.

*Crystal Gold Mining & Milling Co.*—This company owns a group of claims on Sherwood flats near Nederland, is interested in a large placer proposition of 1,000 acres on Clear creek in Jefferson county, and is securing a lease on property in the Cripple Creek district. Besides a plant on its Cripple Creek lease which is planned for, the company will erect a 100-ton mill in Denver to do custom work and for testing ores. C. L. Tripp is president and general manager.

*Livingstone.*—At this property in Sugar Loaf district, a new plant of machinery is to be installed for hoisting purposes. It will be capable of going down a depth of 1,000 ft. Power drills are also to be installed, and the company is figuring on the erection of a 50-ton mill. During the past 28 months the property has produced net and over smelting charges nearly \$65,000, with a previous record of \$300,000, it being one of the richest mines in the county, sylvanite being found on the property. William R. Doty, Sugar Loaf, is manager.

*Marquette Gold Mining & Milling Company.*—A strike has been reported from the 120-ft. level of their Baltimore shaft in Sunshine district, an eight-inch streak carrying values of nearly \$100 per ton in gold and silver, alongside of which there is a good-sized orebody carrying values of between \$12 and \$15 per ton. Shipments are being made to Golden smelter.

## CLEAR CREEK COUNTY.

*Dives Pelican & Seven Thirty Mining Co.*—This company at Silver Plume is building a 100-ton section of a concentrating plant, which will have an ultimate capacity of 300 tons per day. The company is also installing a 250-h. p. Babcock & Wilcox water-tube boiler, and a Rand cross-compound, Corliss-valve air compressor. O. O. McReynolds is consulting engineer for the company.

*Lebanon.*—Maxton Bros., of Idaho Springs, have enlisted the assistance of Eastern parties in the re-opening of this property at Silver Plume, and developments along liberal lines are to be carried on, it being claimed that there is considerable low-grade ores in the property, which can be handled with the present low cost of mining and treatment.

*Little Richard Mining Co.*—This company, in which Milwaukee parties are largely interested, has taken an 18 months' lease and bond on the Lexington group of six patented claims in Gold Dirt district, adjoining its own Little Richard group, the price named being \$50,000. Numerous applications have been received for leases since the company took hold, and the Lexington property is credited with a production of over \$200,000 from surface workings, but has been tied up in litigation for some time.

**Lake.**—This property in Virginia cañon, under lease to Messrs. Puttner & Knappes, of Denver, is maintaining a daily production of about 100 tons, daily, of iron, lead and zinc ores of a very fair grade, all of a smelting proposition. In the tunnel level the ore is from two to five feet wide, while in the first level it averages six feet in width.

**Mendota.**—The Stevens lease employs about 25 men, and the Mendota mill at Silver Plume is running on a very fair grade of ore, turning out a zinc product which sells for between \$22 and \$24 per ton, the smelting ores averaging \$45 in gold, silver and lead. L. Stevens, Silver Plume, is manager.

**Remington.**—John Hawkins, of Idaho Springs, has leased this property in Virginia cañon, and is making test shipments from the tunnel level workings.

**Sunburst.**—Lessees working on the Hancock level of this property near Georgetown have opened up from two to three feet of ore carrying silver values of from 300 to 400 ounces per ton, besides a little lead and gold.

## GILPIN COUNTY.

**February Shipments.**—For the past month the shipments of smelting and crude ore, tailing and concentrate from the Black Hawk depot to Denver and Golden smelters were 290 cars, or 6,000 tons, being in excess of corresponding month for last year of 1,960 tons, or nearly 50 per cent of increase, and being larger than any month in 1904, except December.

**Japanese Mining Co.**—This company has been incorporated with a capital stock of \$100,000 to operate under lease and bond the Rough and Ready mine, three miles north of Black Hawk. With the exception of Ivy Elmer Rogers, of Denver, all interested parties are Japanese, and every employee is to be a stockholder, those interested at present being wealthy Japanese contractors. The property has been idle for over 25 years, owing to litigation.

**Prompt Pay Mining Co.**—Articles of incorporation have been filed with a capital stock of \$100,000, incorporators being E. W. Williams, Frank J. Alexander, E. O. Williams, S. L. Morris, and S. G. Hamlin, offices in Denver, to operate the Prompt Pay property in Russell district.

**Newfoundland.**—Lessees working in the 900 east level shipped ores this week which brought them returns of 7.70 oz. gold, 6.30 oz. silver, or net value of \$146 per ton. Omaha, Nebraska, Detroit and Michigan parties are interested in lease and bond, with G. W. Mabee, Jr., Central City, as manager.

**Spur Daisy.**—Local parties who are leasing this property have received returns of 72 oz. gold for a shipment of five cords from surface ores from this property in Eureka district. Cleveland, O., parties are owners.

**Alice E. Mining Co.**—Articles of incorporation have been filed, capital stock being \$250,000, incorporators being E. H. Cambell, D. D. Johnson, and Arthur Ponsford, to operate in the Phoenix district. Company has taken a lease and bond on a group of claims in that district.

**Kemp-Calhoun.**—Grenfell & Company, of Bald Mountain, are taking out ores ranging from \$200 to \$250 per ton for first class, their second-class ores running over \$100 per ton, and their last mill ores gave values of nearly four ounces gold per cord.

**Alps.**—A shipment from a recent find

in the 1,300-ft. workings brought returns of over \$200 per ton at sampling works. Regular mill dirt shipments are being made, with fair-grade ores, and the property is in shape to produce on an increased scale. Local lessees are working under lease, with James Williams, Bald Mountain, Colo., as manager, Hal Sayr, of Denver, being the owner.

## LAKE COUNTY—LEADVILLE.

The mines of the Leadville district produced in the month of February about 75,000 tons of all classes of ore. Nearly 60,000 tons were handled by the American Smelting & Refining Co. Considerable iron is being shipped by this company to the Salt Lake smelters. The Empire Zinc company is shipping about 8,000 tons per month of zinc ore to its plant in Cañon City. Much of the ore comes from the Iron Silver mine.

**Murphy.**—This strike in the property of the Gnu Mining Co. is turning out very satisfactorily. Stations have been cut at three points, and ore is found in all of them. It is a high-grade silver running well in lead.

**United Mining and Development Co.**—The new shaft of this company on West Rock hill has reached a depth of nearly 200 ft., and is in the lake beds below the wash. Another shaft will be started in the near future.

**New Monarch.**—This company is shipping about 175 tons of sulphide from the Winnie shaft. This goes to the company's smelter at Salida. Sinking operations have temporarily ceased at the Penrose shaft of the Midas Mining company on account of a heavy flow of water.

**Randall & Trezise.**—This lease on the Favorite in Iowa gulch is shipping a good grade of ore from the new strike recently made there only 40 ft. from the surface. Sub-lessees are driving a tunnel on another portion of the property, and have encountered mineral. One of the largest tunnel enterprises in the district is now well under way. This tunnel starts on the west slope of Sugar Loaf mountain, and will be driven through the mountain to cut all the veins of that section. Its immediate objective is the Fanchon shaft, 2,600 ft. into the mountain. It will eventually cut the famous Dinerovei, one of the richest fissures in Lake county. The company is known as the Biord Mining and Tunnel company.

**Amity.**—This mine on St. Kevin hill, under lease to Hambleton and Cassily, is producing about 10 tons per day of high-grade ore.

**Ollie Reed.**—This mine is now on the steady producing list. The company has just started a drill hole in another shaft.

## SAN MIGUEL COUNTY.

**Alta Mines Leasing Co.**—The mines and mill of this company, in Gold King basin, have for several months past been making the best record in their history. The 20 stamps and Huntington comprised in the mill are pounding and grinding steadily, treating nearly 100 tons of mineral and turning out about 20 tons of concentrate in 24 hours. The mine is reported to be in excellent condition, with a very promising future. The vein carries from one to six feet of heavy silver and lead ore, which also carries some gold. The greater portion of it is milling ore, but a carload of high grade is shipped in its crude state to smelters at regular intervals. There are between 70 and 80 men employed in the mines and mill. J. L. Brown, of Telluride,

is at the head of the leasing company. The property is owned by the Alta Mines Co., composed largely of Milwaukee capitalists, of which A. C. Koch, of Telluride, is resident manager.

**Black Bear Mining Co.**—This company's group of mines, in Ingram basin, is undergoing systematic development. Drifts are being run in both directions on the vein from the bottom of a 150-ft. shaft sunk from the lower level of the upper workings, and the south drift of the main level is being pushed ahead and will soon intersect the Golden Crown, a cross lead. In the three places where development is in progress the vein is the full width of the drift, and only one wall is exposed. The vein is from 8 to 16 ft. in width, and composed for the most part of milling ore, which runs medium values in gold, silver and zinc, but chiefly gold. The property has been subjected to constant exploitation for the past two or three years, and is now in condition to produce an output sufficiently large to supply a 30 or 40 stamp mill. It is the intention to construct a mill this summer for the treatment of the product. Leonard Kaanta, of Telluride, is president and general manager of the company.

**Copper Glance Mining Co.**—This company is operating La Salle copper mines in the western part of San Miguel county, near the Utah line. Exploration work is being steadily prosecuted in the mines, and there are thousands of tons of ore in sight and in the ore bins. It is estimated there is \$2,000,000 worth of ore available in the property. The stockholders are considering the advisability of this spring and summer constructing a matte smelter in the vicinity of the mines for the treatment of the product. The mines are about 70 miles from Placerville, a station on the Rio Grande Southern railway, 20 miles below Telluride, and the large expense of hauling the product that long distance for shipment has prevented the operation of the mines extensively for the past year or two, only a few shipments having been made, though development has been going steadily ahead. The construction of a smelter will permit of more extensive operations. Some of the stockholders also contemplate building an electric railway from Placerville to the mines. Such a road would pass through Norwood, Naturita, Bed Rock and other small towns in one of the finest agricultural sections in southwestern Colorado. James N. McBride, of Cashin, Colo., is resident manager of the company.

**Japan Mines Co.**—As many men as can be worked to advantage are employed on development in this company's group of mines, near the Tomboy, in Savage basin. An upraise is being made to connect the lower workings with the upper, a distance of 680 ft. The raise is up about 160 ft., and will connect with the bottom of a shaft 175 ft. in depth, sunk from the lower level of the upper workings. When this piece of development is completed, the property will be in shape to repeat its heavy and valuable output of a few years ago, and resume its old position in the front ranks of San Miguel county's most substantial producers.

**Ophir-Consolidated Mines Co.**—Contractors are pushing development in three places on the mines of this company, located at Ophir Loop, 14 miles from Telluride. For the past three or four months the 50-stamp mill and the mines, with the exception of development, have been closed down, but the contractors will soon have a large body of tungsten ore blocked out, when it is the purpose to put a portion of

the mill in operation treating this product. It is said to be the largest body of the highest grade tungsten ore ever opened in the United States. It is probable that the extraction of ore from veins carrying ore running in gold, silver and lead will also then be resumed, and the entire capacity of the milling plant put in operation. Henry R. Buckley, who for several years was assistant manager and more recently acting manager, has severed his connection with the company, which is temporarily without a Western manager, though it is understood the appointment of one will soon be made.

**Smuggler-Union Mining Co.**—The properties of this company, in Marshall basin, continue to be worked exclusively by several distinct sets of leasers, who are taking out upwards of 300 tons of mineral daily, which is transported over the company's tramway to the two Smuggler-Union mills, at Pandora, two miles above Telluride, for treatment. All told, there are about 300 men employed on the property. Buckley Wells, of Telluride, is general manager.

**Tomboy Gold Mines Co.**—This company's mines in Savage basin are producing an average of 300 tons of ore daily, and it has about 250 men on its pay roll. The Cincinnati shaft, which in the future will be the principal opening through which the Argentine and Cincinnati vein will be worked, has attained a depth of 300 ft. and going deeper. It has three compartments, each 4 by 5.5 ft., providing for a cage, skip and manway, and is being very substantially constructed. The official report of operations for the month of December, recently made public by the company's London office, shows that during that month the mill treated 9,400 tons of mineral, yielding a bullion value of \$38,000; 324 tons of concentrate which returned \$23,500; the net profit for the month, over and above operating expenses and \$2,400 expended on improvements, being \$15,000.

#### SUMMIT COUNTY.

**Abundance Mining Co.**—This company, organized with a capital stock of \$100,000, has acquired the Colorado group on Mineral hill, near Breckenridge, and its plan is to develop the group through tunnel to the old workings. The values of the group consist of lead, zinc and silver. John G. Goodier interested the parties in the above company.

#### TELLER COUNTY—CRIPPLE CREEK.

Mining in general in the district is looking well. New leases are being continually let, some on the levels of developed property, and also a number on undeveloped property. Probably more men are working at present than at any time in its history. While the large companies are not doing as much on company account as at times in the past, still there are a great many more leases than ever before operating in this district. A number of the large companies are operating their properties to a great extent by lessees; among these are the Gold Coin, Stratton's Independence, Ltd.; La\* Dollar, Anaconda, and a number of others. The Gold Coin, however, has recently increased the amount of work done on company account. The mining stock market is more active than for several years, and on the whole the mining outlook in the district is very good indeed.

**Stratton Estate.**—A number of leases have been let during the past week on the Bull Hill portion of this property. It is understood that a good portion of the Bull Hill property has been leased to one party,

and that a large amount of work will be commenced immediately.

**Copper Mountain.**—A find of good ore has been reported from the Bill Nye property on Copper Mountain, and it is understood that a shipment is being prepared. No good ore has been shipped from this hill of late, though about seven years ago a considerable quantity was shipped from the Fluorine mine, which adjoins the Bill Nye on the west. The return of this hill to the shipping list is hailed with delight throughout the district.

**W. P. H.**—A large amount of ore is still being shipped from the Harrison & Seaver lease on this property. A number of leases are also being worked in the vicinity. The Forest Queen has a number of men employed. Gardner and associates are sinking a shaft on the Home property, which lies a little to the northeast of the W. P. H. Work was also commenced this week on the Norfolk property, which is under lease to Diemer and associates.

#### INDIANA.

The miners employed at the Twin mines, Green county, owned by the Coal Bluff Coal Co., J. Smith Talley, president, are on a strike owing to a difference as to the number of miners the machine operator should cut coal for. The agreement between the miners and operators of the 11th district stipulates that the machine operator should not cut coal for more than 12 men.

The annual meeting of the 11th district (Indiana) operators, and also of the miners' association, will be held separately with joint conferences at Terre Haute next week. The attendance promises to be the largest in the history of the organizations. It is stated that the operators have declared that the miners will be working under a lower wage scale next year, and that they are counseling as to the advisability of storing a large amount of coal away in anticipation of labor troubles. It is understood plans are made to stock the markets and store a large amount of coal this year.

#### MICHIGAN.

##### HOUGHTON COUNTY—COPPER.

**Calumet & Hecla.**—Thomas L. Livermore, vice-president of the company, of Boston, is at the mine inspecting the property. Construction work on the new electric power plant at Lake Linden is progressing favorably, the Wisconsin Bridge & Iron Co., of Milwaukee, Wis., having the iron work nearly finished.

**Centennial.**—This mine is now operating one stamp at its mill at Grosse Pointe during the day shift only, treating 275 tons of rock daily.

**Elm River.**—Work at this mine is confined to the cross-cut going west on the 500-ft. level and a drift north on the lode which was encountered in that cross-cut 600 ft. from the shaft. Two drills are in commission, and a small force employed. The cross-cut is being driven to cut some lodes known to exist to the westward of its face.

**Erie-Ontario.**—Eight men are engaged in stripping the overburden covering what is believed to be the Isle Royale amygdaloid bed on this property, equi-distant between the Champion and Winona mines. Owing to the contour and nature of the ground, the management is giving this lode attention now, as conditions for its exploration later will be unfavorable. It lies near the base of a hill, and will be sub-

jected to much surface water in the summer. The Baltic lode is located 2,000 ft. to the eastward and in high ground. A camp has been built for the men, and a small outfit installed. Occasional blasts are being put in the lode, revealing an encouraging amount of copper.

**Copper Range Consolidated.**—William A. Paine, of Boston, president of the company, has completed a careful examination of the properties controlled by this company and departed for the East. He will present the result of his inspection to the directors, who will take action on the initial dividend soon.

**Osceola Consolidated.**—Work at the old Osceola branch is suspended owing to the strike of 150 trammers, 700 men being idle. The men demand a 10% raise in wages and a shorter working day. Pending the settlement of the difficulty, work in the shops on surface has been discontinued.

**Quincy.**—Operations at the smelter on the shore of Portage lake have been resumed, the strike of the 78 employees having been amicably settled. The plant was idle only three working days, and the mineral which accumulated was soon smelted and shipped to the Eastern seaboard.

**Trimountain.**—No. 1 shaft has reached the 11th level. The lode is rich in copper at that point, comparing favorably with the values above.

##### KEWEENAW COUNTY—COPPER.

**Allouez.**—Copper is showing at all three points where the Kearsarge lode was cut at this property. No. 1 cross-cut, which is opened at a depth of 1,260 ft., reveals the richest ground. The cross-cut has penetrated the lode from foot to hanging walls, and copper is evenly distributed throughout its entire width, 21.5 ft., measured at right angles to its plane. No. 2 cross-cut, which is 88 ft. below No. 1 cross-cut, is half way through the lode, revealing values the average of the Kearsarge bed. In the bottom of the shaft an excellent showing of cupriferous ground is in evidence. At the juncture of the lode and shaft the latter is being turned from an angle of 80 degrees from the horizontal, at which it was sunk from surface, to 41.70 degrees, conforming to the plane of the lode. Certain mechanical provisions for carrying the skip over this curve are being provided, which take time and care.

**Miskwabik.**—Sinking in the shaft has been resumed after a year's suspension. It has been decided that the present depth, 70 ft., is not sufficient to permit a fair test of the Kearsarge lode. Sinking will be carried on until such time as the formation offers better values, and conditions are good for drifting. Previous to discontinuing lateral expansions a drift was driven northward at 70 ft. for 175 ft., and in the breast of this drift a cross-cut was opened from foot to hanging walls. The lode measured 12 ft. at that point, and had a healthy appearance.

##### ONTONAGON COUNTY—COPPER.

**Mass Consolidated.**—Thirty-three drills are in service, 20 stopping, 10 drifting, 1 cross-cutting, and 2 sinking. It is planned to increase the number of drills engaged in opening work as soon as necessary arrangements shall have been made. Sinking in "C" shaft on the Butler lode is approaching the fifth level. Recent openings disclose rich ground. Some fine stopping territory is in evidence on the Knowlton lode where it is reached by a cross-cut at the third level. Drifting both east and west is under way, the former being in

200 ft., and the latter 315 ft. Two stopes are opening, and the lode yields an excellent grade of stamp rock, besides considerable mass and barrel work. Drifting west is carried forward with a view to testing the values in the territory toward "D" shaft, and in the event of the good showing continuing, it is likely to result in the opening of the "D" shaft on the Knowlton lode.

OREGON.

BAKER COUNTY.

*Daines.*—These properties, including the Belcher and Golden Lion, show a large amount of development work and ore of high values. A 10-stamp mill is on the ground and will be installed as soon as the weather will permit.

*Highland.*—This mine, in the Rock Creek district, is now a steady shipper to the Sumpter smelter, and has its new 60-ton mill, which was installed a short time ago, in full operation.

*University.*—Alliene Case and Nic Williams, the owners of this group, in the Cornucopia district, east of and parallel with the big Searles property, have opened on the surface two veins of ore, one eight feet wide and the other three and one-half, assays from which run as high as \$266 to the ton, samples taken across the face of the vein. They are preparing to develop on a large scale.

PENNSYLVANIA.

ANTHRACITE COAL.

In the test case brought by the Delaware & Hudson Co. against John Shaleen, for working without a certificate, the district court has rendered an important decision. The suit was brought to test the law requiring certificates from all miners. The case was originally tried, and the law directed a verdict of guilty on the facts. The appeal was taken in order to test the question whether the act was constitutional or not. The defence raised the question that the act called for two years' experience as a miner, and did not say in what kind of mines the experience should be had. The district court now holds that a strict construction of the act would lead to unjust results. The main point raised in the defence after all was that the act was invalid, under the Fourteenth Amendment to the Constitution, which provides that no State shall make or force any law that will abridge the privileges of citizens of the United States, the claim being that the law prevented citizens of other States from working in Pennsylvania mines, no matter what experience they had had in other States. The present decision, however, holds that the act is fully within the power of the legislature, and is a valid exercise of the police power of the State, and that it does not discriminate against citizens of other States.

If this is supported by the supreme court, to which the appeal will doubtless be taken, it will greatly strengthen the position of the miners' union, as no man can obtain a certificate authorizing him to work in the anthracite mines, unless he has had two years' experience in the mines of Pennsylvania. This will make it impossible to bring any men from other States in case of a strike.

TEXAS.

HARRIS COUNTY.

*Humble.*—Several new gushers have been brought in—Beatty No. 4 and the Wood & Tondren well. The former is flowing 1,500 bbl. daily, but the latter has

not been connected up, and its capacity is unknown. The Guffey Petroleum Co. well had a blow-out, and is gushing mud and water. The daily output has increased to between 25,000 and 28,000 bbl., and 50,000 bbl. have been bought by the Texas company for 15c. per bbl. This shows an advance of 2½c.

HARDIN COUNTY.

*Batson.*—The production here shows an increase, and prospects seem better. The Guffey Petroleum Co.'s Wing No. 35 and Wing No. 36, and the Horkins & Solinsky well, drilled at the west of the old field, all came in flowing wells. The daily output is 10,000 bbl., and six wells are drilling.

*Saratoga.*—The International Oil Co.'s well No. 5 is in, and flowing 800 bbl. daily. Santa Fe No. 4, just in, is one of the best gushers ever brought in in this field. It came in Feb. 15, and is producing 7,000 bbl. daily. The Producers' Oil Co. No. 2 and Guffey Petroleum Co. No. 3 are in; both are flowing wells. Guffey No. 2 is still good for 1,000 bbl. daily. Rio Bravo Oil Co. (S. P.) are pumping 19 wells and drilling 2. The salt water is bad in parts of the field, and many operators are discouraged. The Union Petroleum Co. No. 1 is down 1,900 ft., and shows nothing but water so far, while No. 1 and 3 of the Moonshine Oil Co. have been abandoned. The O. K. Oil Co., after drilling 600 ft., has pulled its pipe and moved to Humble. The daily output has fallen to 10,000 bbl., and will likely decline still more.

JEFFERSON COUNTY.

*Beaumont.*—The oil market is very quiet, and prices are practically unchanged. Operators are waiting to see what legislation regarding pipe lines will be passed at Austin. There is no decidedly hostile feeling against Standard Oil in Texas among the oil producers, and the present low prices are not attributed to any manipulation by them. The Standard company has been a large buyer and shipper of crude, but it paid the market price, in competition with the local refineries, and most of its purchases went East by water and relieved the Texas markets. It has not been shown that the company controls any of the Texas pipe lines, but even if they do shippers have had a great many more complaints against their treatment by the railways than they have had against the various pipe-line owners. The production at Humble has increased to about 28,000 bbl. daily, and as Sour Lake output has fallen to 9,000 bbl., Saratoga to 10,000 bbl., Matagordo to 400 bbl., while Batson has increased to 10,000 bbl., the Humble production is about half the total for Texas. Jennings gushers are on the wane, and 30,000 bbl. daily is a liberal estimate. Crude prices seem to depend on Humble. If that field increases its output, oil will remain near present figures. If salt water seriously affects that field, and the output falls off, crude will sell at a much higher figure.

UTAH.

BEAVER COUNTY.

*Newhouse Mines and Smelters.*—The new equipment installed during the past year is now in commission. The power plant, mill, tramway and everything connected with it are working with eminent satisfaction. Recent assays of ore taken from some of the large stopes, he states, show even greater values than he expected or anticipated. The initial shipment of concentrate has been made to the Bingham Consolidated smelter for treatment.

*Majestic Copper Mining & Smelting Co.*—A thorough sampling and testing of the ores of the mines of this company are being made by members of the Newhouse staff. When matters of a metallurgical nature are settled Mr. Newhouse, the managing director, will make definite announcement of his future plans.

JUAB COUNTY.

*Centennial-Eureka.*—Preparations are being made to sink the main working shaft deeper. The present depth is 2,100 feet.

*May Day.*—The management of this company has succeeded in getting the American Smelting & Refining Co. to consent to a modification of the unexpired contract, which had about a year more to run. The conditions named in the contract held formerly were decidedly against the company, and, without sorting, it was found the ore could not be marketed at a profit. The smelting company granted a reduction of about \$4 per ton in working charges, besides removing penalties which now makes it profitable to market ore running as low as \$10 per ton. This will mean that the company can market from five to six carloads of ore weekly. The ore is of a class very much desired by the smelters at the present time.

*Uncle Sam Consolidated.*—Physical conditions at this property show improvement. The company is developing an extensive body of milling ore near the May Day side lines.

PIUTE COUNTY.

*Annie Laurie Extension.*—Developments being made at this property are said to be very encouraging.

SALT LAKE COUNTY.

*Bingham Consolidated.*—In the Dalton & Lark mines of this company in Bingham an upraise has been started in the main tunnel at a distance of 7,800 ft. in for the purpose of cutting the main orebody which has flattened out from an angle of 40 degrees to an angle of 23 degrees below the 1,100 level.

*Continental Alta.*—The late storms have delayed the completion of the five-mile aerial tramway being installed by this company between its mine and mill, over a distance of five miles.

*Columbus Consolidated.*—The warm weather of this week has increased the water supply, and the mill has been started again. It is expected the plant will keep going steadily from this time on.

*New England Gold & Copper.*—Machine drills are working in this property, and Henry M. Adkinson, manager, of Salt Lake and Bingham, says splendid results are being obtained in the campaign of development. The 50-ton mill will be started about a month later.

*South Columbus.*—This property at Alta is being vigorously developed. The tunnel being run is completed to about 1,000 ft., and indications are that it is about to cut another ledge crossing the property. The next one encountered, it is expected, will show a face of good shipping ore.

*Yampa Smelter.*—The new reverberatory and Edwards' roasting furnace were placed in commission this week, and are reported to be working nicely. The plant will soon handle 700 tons of ore daily.

SUMMIT COUNTY.

*California.*—Arrangements are being made to increase the working force at this property and the mill will probably be started again early in the spring.

*Daly.*—Work has been resumed again in the Federal tunnel.

*Ferry-Hancock.*—Development work is progressing very satisfactorily at this property.

*New York Bonanza.*—Sinking is going on below the 700 ft. level, and developments being made on the 600 and 640 levels show encouraging results.

*Silver Bell.*—Rich galena and carbonate ore has been encountered in this property. The ore was encountered in a small fissure, and is believed to indicate the near approach to a large ledge.

## TOOELE COUNTY.

*Manning Mill.*—This property, together with an old tailing dump containing upwards of 50,000 tons, has been leased by the Consolidated Mercur Gold Mines Co., the owner, to parties formerly connected with the company. The tailing contains about \$2 in gold to the ton.

*Sharp.*—This property is being developed vigorously. The management has let another contract for 200 ft. of drifting.

## WASHINGTON.

## FERRY COUNTY.

*Copper Key.*—On the upper tunnel level a drift is being pushed northward from the top of the winze, along which an excavation has been made on oxidized iron ore 60 ft. long, 40 ft. wide and 30 ft. high, taking in everything between the walls. From this shipments are being made to the smelters of 30 tons a day, which may be increased to 50 tons. The vein dips with the hill. The lower tunnel is in 275 ft., and being driven ahead 10 ft. a day. Bunches of iron oxide and sulphide ore are coming in.

*Lucile Dreyfus.*—The Miller-Fisher Leasing Co. keeps a 4-horse team hauling continuously to the railroad for shipment to the Northport smelter.

*Minnehaha Copper Gold Mining Co.*—The development of ore in the Minnehaha mine continues. The ore is being piled on the dump, and is of good quality.

*U. S. Le Roi.*—Work has been resumed after a long idleness, and the mine is reported to be looking well.

*Transvaal.*—A fine vein of gold-copper-iron ore is reported at this mine. The Lucile Dreyfus, Minnehaha, U. S. Le Roi and this mine are all situated in the Curlew mining district.

*Mountain Lion.*—Work has been resumed with 12 men on stoping ore for shipment. Pending arrangements for transportation, reliable particulars are not to be had. Heretofore the Republic & Kettle River Railway hauled nearly all the ore that was shipped, and it was delivered through the tunnel to the railway cars. An ore bin and trestle are now being constructed, the latter to run about 100 ft. from the shaft, alongside of the Washington & Great Northern Railway spur to the mine, for the purpose of loading ore on Great Northern cars, for transportation to the Northport and, possibly, other smelters.

## OKANOGAN COUNTY.

*Ruby Mining Co.*—The property of this company is on Mt. Chapaca, near the Similkameen river, and consists of a group of claims spread along the north-east slope of this mountain. At the original point of the discovery of the strong ledge extensive developments have been made. The values of the ore are chiefly in silver. Many sacks of high-grade ore have been shipped to smelters for treatment, but the heavy expense necessary to make delivery to the smelters connect this plan to be abandoned and while waiting

for means of cheaper transportation the company is now running a main tunnel to tap the ledge at a depth of about 450 ft. This tunnel has now been run 400 ft. and has about an equal distance farther to reach the objective ledge. Three shifts of men are at work, and when the Similkameen power plant is ready for business, the application of this power and the installation of machines, the work will be expedited and the tunnel soon completed.

*The Mineral Hill Mining Co.*—This company's mine is near Conconully. At present a force of miners is at work drifting from main tunnel and blocking out ore for shipment in the spring. Work has been suspended on the main tunnel, but will be resumed in April with machine drills until the principal ledge is encountered which will require some 600 ft. of work. The company will erect the present summer an electric plant on Salmon creek from which 4,000 or 5,000 h.p. can be developed. This plant will furnish power for operating the mine and for an electric railway to be built from Conconully to connect with the boats on the Okanogan river at Alma. The power will also be utilized to furnish light for the town.

## WEST VIRGINIA.

## BARBOUR COUNTY.

*Davis Coal & Coke Co.*—This company is reported to have purchased all the West Virginia holdings of the Manufacturers' Fuel Co., of Chicago. The fuel company owned five operating mines and a large number of coke ovens, situated at Belington. The Belington & Beaver Creek railway, 28 miles in length, connecting the different mines, was included in the purchase. This road is well equipped with coal cars to handle the output of the mines. The purchase price is more than \$3,000,000. The coal contained in these mines is of fine quality.

## PHILIPPINE ISLANDS.

*Philippine Mining Co.*—George E. Chamberlain, of Boston, has left for the Philippine Islands in the interest of this company, which is assembling dredges on its placer property on the Island of Masbate. The dredge is expected to be finished and in operation within six weeks. An exhaustive examination of the property by several mining engineers is said to have given a general average of 40% per cubic yard, after deducting all bonanza streaks, some of which ran into dollars. The issue of stock necessary to put the company on a paying basis has been over-subscribed. The books of the company were closed Feb. 6.

## Foreign Mining News.

## CANADA.

## BRITISH COLUMBIA—BOUNDARY DISTRICT.

*Boundary Ore Shipments.*—Shipments for the week ending Feb. 25 were as follows, in tons: Granby, 9,750; Mother Lode, 2,874; Brooklyn, 2,996; Rawhide, 2,091; Sunset, 30; Mountain Rose, 132; Emma, 363; Oro Denoro, 66; Senator, 264; Providence, 60; Last Chance, 55; E. P. U., 20; total for week, 19,511; total for year, 129,040 tons.

## MEXICO.

## ZACATECAS.

*San Rafael El Grande Mining Co.*—This company, at Zacatecas, now owned by A.

E. Stilwell and his American and English associates, is about to unwater its silver mines. New machinery, including a new 50-h.p. hoist for the San Luis shaft (now called the San Rafael), is being installed, and will soon be ready for work. The machinery and head frame at this shaft have been repaired, and is ready to start with the exception of the boiler tubes, which are not of standard size, owing to the boiler being of German manufacture. The tubes and a new flat rope are expected to arrive very shortly, and bailing will then be started. The San Rafael is a silver property, and consists of a tract of about 500 acres in the heart of the Zacatecas district. The mines have been under water for 15 years, and have produced up to date about \$80,000,000. The actual unwatering, which will be carried out by means of special double discharge automatic bailers of large capacity, is expected to begin on or about April 1. Bailing will be done at both the Lete and San Rafael shafts. As soon as the water has been taken out active exploration will be begun in practically virgin ground, where it is hoped to find the continuation in depth of the ore shoots which were so profitably worked in the upper levels. These upper levels have been gutted in the usual Mexican way. The work is under the direction of James W. Malcolmson, the manager of the company, and the engineer in charge of the work at the mines is Harold Rickard.

*Mala Noche.*—These famous silver mines near Zacatecas are said to be about to be taken over by the Guggenheim Exploration Co. These mines have produced enormous quantities of high-grade ore, and contain three principal veins, besides many others of less importance. The main veins are the Mala Noche, San Clemente and Loreto. All are well defined deposits, and maintain their uniformity in depth. As is the universal experience in Zacatecas, a barren zone was found not very far from the surface, but on sinking through this region a new productive area was found in all cases, and the future of the mines in depth is assured. There is very little water to be contended with, and prospects for successful work are excellent.

*Zaragoza Mining Co.*—This company has just finished the installation of its new concentration mill for a daily capacity of 30 tons, and the results so far obtained have been very satisfactory. The development of the mine is being actively pushed, and the production will soon be greatly increased. The ore carries copper pyrites and some galena, which the concentrators used (New Standard) successfully separate as two valuable products.

## SOUTH AFRICA.

## LOURENÇO MARQUES.

The American consul at Lourenço Marques announces that there has been an inquiry there from the Transvaal for American cement. At present the cement trade is chiefly in the hands of the British and the Germans. Thousands of tons of German cement have been landed at Lourenço Marques for both local and Transvaal consumption.

## SOUTH AMERICA.

## CHILE.

*Tekenika Coal Mining Co.*—This company has been formed at Punta Arenas, Chile, for the purpose of working the mines at Tekenika, probably the furthest south of any coal mine in the world, lying as it does in the Straits of Magellan.





**Cyanogen.**

This substance is the first 'compound radical' to be honored with the title in the history of chemistry. Yet when Gay-Lussac, in 1811, showed that the 'blue-maker' was the nucleus of an extended series of compounds, he only laid the foundation for theory which recognizes many compound radicals. Indeed, wherever two or more atoms associate in a series of compounds so that, together, they enter, reside in, or leave, any one of these compounds, the association constitutes a compound radical. Thus the 'NO<sub>2</sub>' group in nitric acid and the nitrates, 'NH<sub>2</sub>' in ammonia derivatives, and 'NH<sub>4</sub>' in ammonium derivatives, 'SO<sub>3</sub>' in the sulphites, 'SO<sub>4</sub>' in the sulphates, 'CO<sub>3</sub>' in the carbonates, 'C<sub>2</sub>H<sub>5</sub>' in alcohol compounds, etc.—each in its way and station is a radical or residue, compounded of two or more atoms.

But there is another characteristic of compound radicals, that is, the simulation of the chemical characteristics of simple, active and typical atoms. Thus the group 'NH<sub>4</sub>', ammonium, closely imitates the chemical, and even physical, properties of an alkali metal like sodium or potassium. Similarly, cyanogen imitates the characteristics of a halogen like chlorine; in this case cyanogen is a weak halogenoid, but it makes up for it by a multifarious adaptation to many compounds. To be specific, a halogen like chlorine leads the following reaction:  $Cl_2 + 2KOH = H_2O + 2KCl + 2KOC$ . The chloride and the self-oxidized hypochlorite result, in cold and dilute solution of KOH. Similarly cyanogen follows suit in the analogous reaction:  $(CN)_2 + 2KOH = H_2O + 2KCN + 2KOCN$ . There result a cyanide and a cyanate (the latter would be called a 'hypo-cyanite' if cyanogen could fill out analogously the series of the four oxygen-acids of chlorine). The metallurgist of gold in cyanidation would much prefer to deal only with hydrocyanic acid, HCN, ignoring cyanic acid, HOCN, but unfortunately he cannot. Potassium and sodium cyanides are unsaturated as regards oxygen; and by oxidation they pass to the corresponding cyanates; hence the would-be inorganic metallurgist must divest himself of all prejudice and prepare to follow out cyanogen in its vagaries. Now, this compound-radical, cyanogen, is made up of carbon and nitrogen, and neither of these atoms ever forgets its nature and right. Hence, at the very start, both carbon chemistry and nitrogen chemistry are alternately thrust forward into prominence; indeed, so strong and varied is this tendency that there are two series of the cyanides and the cyanates, the 'normal' and the 'iso,' according as

carbon or nitrogen succeeds for the time in usurping the central authority of the molecule. If the carbon rôle is dominant, cyanogen follows that tendency. Thus, if hydrocyanic acid be hydrolized by appropriate catalytics, the following equation, with production of ammonium formate, results:  $HCN + 2H_2O = NH_4CO_2H$ ; while cyanic acid, similarly, gives ammonium carbonate, thus  $HOCN + 2H_2O = NH_4CO_3$ . This is one reason why the test for cyanic acid always implies production of a carbonate. Indeed, there is no simple, clear, direct test for cyanic acid or cyanates other than this; though the writer discovered several years ago that a concentrated solution of cobalt cyanate gives characteristic blue absorption-bands. It should also be noted that we speak of the ammonium formate and cyanate as though the respective acids had been formed; the significance of this will be discussed in later papers.

**Iron and Steel Statistics.**

We are indebted to Mr. James M. Swank, general manager of the American Iron & Steel Association, for the following table, which includes all the statistics collected up to the present date. The figures are in long tons, except for coke, which is in short tons, and for imports and exports, of which the total values are given:

Products.	1903.	1904.
Shipments Lake Superior iron ore	24,289,878	21,822,839
Shipments Connellsville coke	13,345,230	12,427,468
Production of pig iron	18,009,252	16,497,033
Unsold pig iron stocks, Dec. 31	598,489	446,442
Production of bessemer steel	8,592,829	7,859,140
Production of all kinds of rails	2,992,477	2,284,761
Production of open-hearth steel	5,829,911	5,907,666
Imports of iron ore	980,440	487,613
Imports of iron and steel	\$41,255,864	\$21,621,970
Exports of iron and steel	\$99,035,865	\$128,553,613

With the exception of open-hearth steel the table shows a reduction in all lines of shipments and production in 1904 as compared with 1903; a shrinkage of over 47% in iron and steel imports, and of more than 50% in imports of iron ore. It is only by the presentation of this comparative table that we are able to appreciate fully the great reaction that occurred in the iron and steel industries in 1904.

**Russian Quicksilver Production.**

By the kindness of Mr. Vincenzo Spirek, we are able to state that the production of quicksilver in Russia during 1904 was 392.5 metric tons, as compared with 362 tons in the previous year. Applying this corrected item to the total published in our issue of February 16, makes the total output of the world in 1904 amount to 4,010.5 metric tons, or 118,711 flasks.

In the reduction of zinc blende, ZnS, it is desirable to avoid the formation of zinc sulphate, as this requires a very high heat to drive off its sulphuric anhydride.

**Open-hearth Steel Production.**

The American Iron & Steel Association has received complete statistics of the production of open-hearth steel in the United States in 1904. The production was larger than in 1903 or in any preceding year.

The total production of open-hearth steel ingots and castings in the United States in 1904 was 5,907,666 gross tons, against 5,829,911 tons in 1903, an increase of 77,755 tons, or 1.3 per cent. The following table gives the production of open-hearth ingots and castings by States in long tons:

States.	1903.	1904.
New England	169,209	195,901
N. Y. and N. J.	104,598	165,986
Pennsylvania	4,442,730	4,306,498
Ohio	369,349	480,406
Illinois	422,919	358,215
Other States	321,106	400,660
Totals	5,829,911	5,907,666

In 1902 the total production was 5,687,729 tons; in 1901 it was 4,656,309 tons.

The open-hearth steel made in 1904 was produced by 115 works in 16 States—Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Alabama, Ohio, Indiana, Illinois, Wisconsin, Missouri, Colorado and California. In 1903 there were 111 works in 17 States which made open-hearth steel.

The production of open-hearth steel ingots in 1904, excluding castings, amounted to 5,605,332 gross tons, against 5,429,563 tons in 1903, an increase of 175,769 tons.

In 1903 4,734,913 tons of open-hearth steel were made by the basic process and 1,094,998 tons were made by the acid process, while in 1904 the production by the basic process amounted to 5,106,367 tons and by the acid process to 801,299 tons. In the following table the production by States of both acid and basic open-hearth ingots and castings in 1904 is given in long tons:

States.	Basic.	Acid.	Total.
New England	147,890	48,511	195,901
N. Y. and N. J.	139,791	26,195	165,986
Pennsylvania	3,667,673	638,825	4,306,498
Ohio	427,948	52,458	480,406
Illinois	341,073	17,142	358,215
Other States	382,492	18,168	400,660
Total	5,106,367	801,299	5,907,666

There was a decrease in the production of acid steel in 1904, as compared with 1903, of 293,699 tons, or over 26.8%, but an increase in the production of basic steel of 371,454 tons, or over 7.8 per cent.

The total production of open-hearth steel castings in 1904, included above, amounted to 302,334 gross tons, of which 98,919 tons were made by the basic process and 203,415 tons were made by the acid process. In 1903 the production of open-hearth steel castings amounted to 400,348 tons, of which 134,879 tons were made by the basic process and 265,469 tons by the acid process. The decrease in direct castings in 1904 as compared with 1903 amounted to 98,014 tons.

Lepidolite, according to recent investigation, possesses monoclinic symmetry.

## Traveling in Alaska.

By J. P. HUTCHINS.

This paper is inspired by similar descriptions recently published in this JOURNAL, notably the accounts of northern Mexico, by A. R. Townsend;<sup>1</sup> of British South Africa, by F. C. Roberts,<sup>2</sup> and of the Sudan and Abyssinia, by A. H. Ackerman.<sup>3</sup> It is submitted with the hope that

zone, because of similarity of environment, and the small number of these descriptions, have resulted in our thinking of the land of the midnight sun as a wintry region, where one must 'mush' through perpetual snow, 'after dog teams,' 'among stunted trees,' 'crackling with frost,' and



MAIL STAGE TO DAWSON.

it may prove of some value to mining men who have occasion to visit the districts of Alaska and the Yukon.

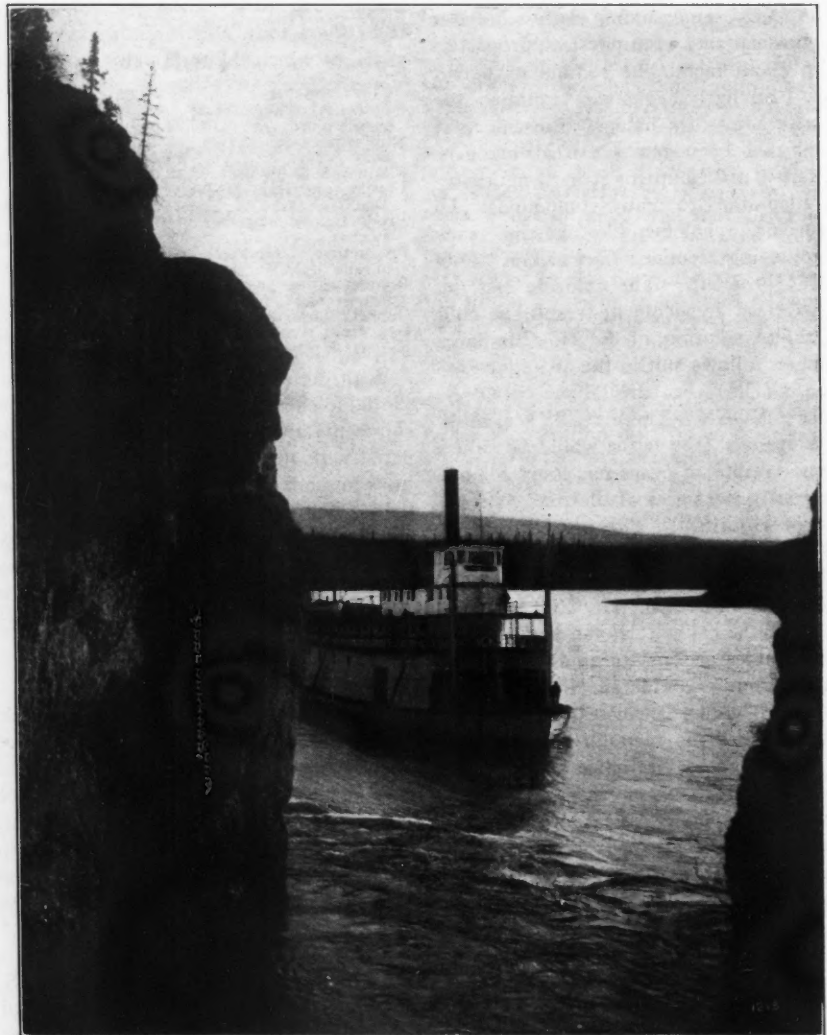
These territories comprise together about 1,000 by 650 miles, extending from the extreme southern to the extreme northern part of Alaska, between the 55th and 70th parallels, and between the 130th and 165th meridians. Future development may prove that some of Yukon territory east of that included between the meridians mentioned is a valuable mining country; but, for this article, consideration will be limited to the territory delimited. This is a large region, and the climatic conditions of the several parts show marked difference. It will be convenient to consider all of the area north of the St. Elias range and east of the Coast range, extending to the Arctic ocean on the north and to the Behring sea on the west, as one meteorological unit, there being, however, differences between conditions on the coast and in the interior. That region in Alaska south of the St. Elias range and west of the Coast range has a much milder climate; any suggestions as to outfitting for this part of Alaska must be different from those for the zone north of the St. Elias range and east of the Coast range, which, for convenience, will be called the 'interior,' though including the west and north coasts.

There has been a surprising misconception of the summer climatic conditions of the far north, due, perhaps, to veracious descriptions, but almost exclusively of winter scenes, in the interesting novels of Jack London. He has written in a way to give the impression of a region perpetually bleak and barren. To be sure, he has also depicted summer conditions; but the lack of effect on the inhabitant of the temperate

the glass showing 60° below.' All of this is strictly true of the winter, and accuracy has not been sacrificed to the picturesque in

the absorbing stories of this writer. But one is apt to be surprised, on visiting the interior during the latter part of May, all of June, July and August and the early part of September, to find a climate almost ideal. The days are warm and beautiful, the nights only a few hours long. There are occasional showers which keep vegetation green and fresh until nipped by the first frosts, late in August. The summers are truly short and sweet; so nature has provided a number of quick-growing plants. More than forty varieties of wild flowers were shown at the annual horticultural exhibition at Dawson last summer, together with a surprising number of rapidly maturing vegetables that grow in temperate zones. Several varieties of wild berries grow abundantly. The summer climate is similar to that of mountainous districts in the temperate zone at altitudes of 4,000 to 5,000 ft. A temperature of about 90° F. at midday, with but slight humidity, is sometimes noted. Nights are invariably cool.

The outfit and clothing for summer journeying in the interior should be identical with that used in mountainous districts of temperate zones at 4,000 to 5,000 ft. above sea-level, with a few additions.



STEAMER PASSING FIVE-FINGERS RAPIDS ON THE YUKON.

<sup>1</sup> This JOURNAL, Feb. 25, 1904, p. 315.

<sup>2</sup> The same, July 14, 1904, p. 57.

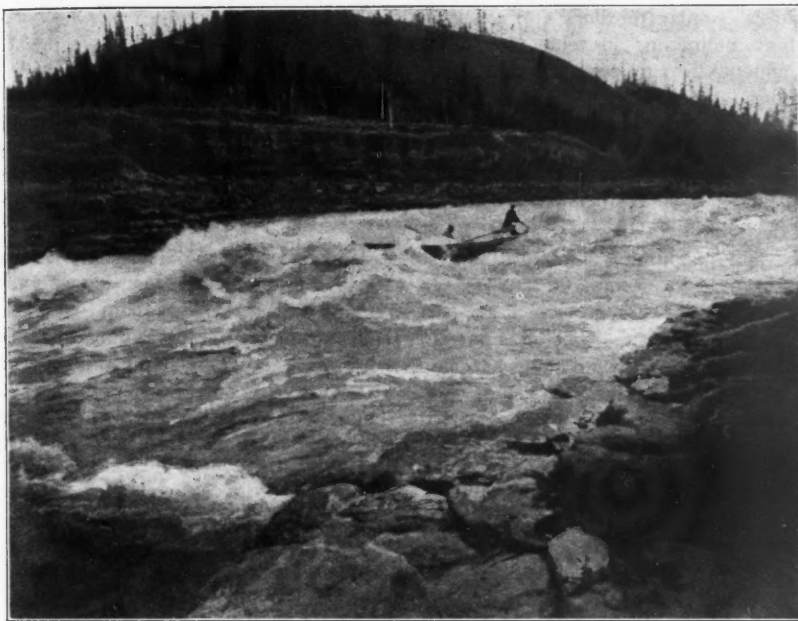
<sup>3</sup> The same, Sept. 8, 1904, p. 388.

Traveling off well-beaten roads or trails is likely to be over marshy ground or through wet moss; these are kept saturated by gradual thawing of the frozen ground, and by frequent showers. Therefore it is

tory. Where the rivers are shallow, boats are used which are poled and pulled upstream, or allowed to drift downstream. Scows serve to transport men and freight downstream. Good roads are maintained

ranges, respectively, it is necessary to provide only such an outfit as that mentioned above; but additional provision must be made for heavier and more frequent rainfall. This region is more mountainous, and it is therefore more difficult to cover. However, at no point is it far from the coast, which has numerous fiords, making it simple to maintain a floating base of supplies comparatively near any temporary headquarters.

Winter lasts from September to May, and is severe in the interior, though travel does not cease. Drift mining is carried on throughout the winter, some claims being mined by preference after the ground freezes, as little or no pumping is then necessary. A journey of 400 miles or more, with the thermometer on 'mild' days at 20° F. below zero, and on 'cold' days 50° F. below zero, is not considered a hardship. Stage sleighs, drawn by horses, are used on the well-traveled trails. Dog-teams are generally used on other trails. Road houses are maintained 25 miles apart on the stage roads, and it is possible to stop while relaying horses. Stages do not run at night, but about 75 miles are covered per day. Charges are at the rate of about \$.25 per mile; 25 lb. of baggage is allowed each passenger, excess baggage being charged at the rate of about 10c. per lb. per 100 miles. The clothing necessary in traveling by stage includes warm underwear. Leather shoes with overshoes,



SHOOTING WHITE HORSE RAPIDS.

well to provide 'packs,' a blucher-bootee of rubber covering the foot, but having leather for the flaps (which lace), and for all the upper part; these may be had of two patterns, one slightly higher than the ordinary shoe and without heels, the other reaching midway up the calf and having heels. The second type with a leather tap under the ball of the foot, which may be attached by any shoemaker, is comparatively comfortable; it is water-tight to the top, and is cooler and lighter than any other form of rubber shoe or boot. A good leather hunting-boot is preferred by many; it is usually sufficient, though it is more likely to leak than 'packs,' when used on marshy areas. Rubber blankets should be provided; they have numerous uses. Netting against mosquitoes and gnats is necessary in many districts. A mackintosh, which can be used as a rain coat during showers and as an overcoat during the evenings, which are often chilly, will be found useful.

Arrangements for packing should be those generally employed in mountainous districts. Because of marshy ground, pack animals cannot be heavily burdened in most parts of the interior. The distance between settlements is great, and good time must be made. The climate is healthful, and a few simple remedies suffice; fever of any kind is rare, except in and about mining camps, where typhoid sometimes occurs. There are no reptiles nor poisonous plants. Traveling through the populated parts is easy. On the Yukon and its affluents, light-draught steamers are used when navigation is open, and the accommodations and service are satisfac-

between mining camps in the Yukon territory, and comfortable stages are operated on wheel. Some idea of the character of the roads of the Klondike district can be



TRAVELING BY DOG-TEAM AND SAIL.

had from the fact that 20 cwt. per animal is frequently hauled. The roads in Alaska are not as good.

For traveling during the summer, May 15 to September 15, in the district south and west of the St. Elias and Coast

packs, or felt shoes, a fur overcoat with high collar, fur cap with flaps that cover back of neck, ears, most of cheeks and chin, are necessary. Mustaches and beards are more of a nuisance than a protection; the moisture from the breath condenses

and freezes so as to cause discomfort; therefore, it is well to be clean-shaven. Fur or heavy woolen mittens, with extensions to protect the wrists, are sufficient to keep the hands warm; gloves do not allow the doubling up of the fingers (as do mittens) into the palms of the hands, and should not be worn. Stages are usually well supplied with fur robes to keep the lower limbs and feet warm, so the fur coat reaching just below the knee is of ample length and is less costly and clumsy. One should be able to remove the over-garments quickly and easily, as on entering the road houses, which have double windows nailed down and caulked, a roaring fire, and often a temperature of 80° F., one changes from, say, 40° below to 80° above rather suddenly. Usually it is possible to alight at a road house every few hours. The character of a well-traveled trail is indicated by the fact that a number of men ride between White Horse and Dawson on bicycles during the winter. Unseasoned wheelmen cover the distance, about 350 miles, in six or seven days; conditioned riders in about five days, which is better than stage time.

In 'mushing' (probably a corruption of the French word *marcher*, 'to walk') after a dog-team, as those who have read the noted epic of the dog will remember, it is necessary for all hands to travel, either breaking trail for the dogs, or guiding the 'gee-pole,' an extension on the rear end used to keep the sled to the trail. Mushing is hard work; and it is remarkable how little clothing one need wear while on the trail. A fur cap is essential, and woolen mittens suffice. For the feet the best of care is necessary; packs, described above, are the most satisfactory footwear; they should be one or two sizes larger than the leather shoe usually worn, and enough warm woolen stockings, or German socks, should be provided. Extra footwear is indispensable, for there is always the possibility of getting the feet wet by breaking through thin ice on numerous so-called 'glaciers.' These are the accumulations of ice which are found where springs run during the winter. Felt shoes are not as satisfactory as packs, easily becoming wet through; moccasins, though warm and comfortable, are objectionable for the same reason, except where there is no danger of getting the feet wet; then they make a light and comfortable covering. Fur coats are not generally worn while 'mushing,' being too heavy; but it is well to be provided with a 'parka,' a large blouse-like garment of denim or skin, provided with a fur-trimmed hood and sleeves, and reaching to the knees. This is an over-garment, literally, for it covers even the cap. Gathering-strings are provided at throat and wrists to exclude cold air; skin is better than denim, as it affords complete protection against wind, which seems to penetrate any woven material. Fortunately, during periods of excessive

cold, there is no wind, otherwise traveling would be more hazardous. A tent for camping out is useful, though not essential, except when crossing exposed tracts. An ample supply of warm blankets, or, better, of fur robes, is necessary. Food supplies should be similar to those for a trip in the high mountains in temperate zones. The appetite is surprisingly active while 'mushing,' and proper recognition of this fact should be made.

Good dog-teams, sleds and drivers can be secured throughout the north; whites are better drivers than Indians, and are more desirable in other ways. Indian dogs, 'husky' and 'malamute,' are no better than others brought in by the gold-hunters. In the early days native dogs (which are part wolf) were preferred, it being supposed that they ate less and could stand hardship better. Dogs must have the best of care, and any interference by a tender-hearted person (who may not approve of their being fed but once a day, or of other seeming cruelties) may result disastrously. The 'cheechako' (Indian for 'greenhorn' or 'newcomer') had best devote himself to the many 'chores' incidental to camping out. He should do his best to keep up a light heart and jollity, no matter how difficult after a day's struggle with "the cussedness of inanimate objects." Ample supplies of 'dog bacon' and other canine delicacies must be provided, if good time is to be made. Dog teams, well kept and not overloaded, seem to like their work, and will go running where the trail is good, with yelps of enjoyment.

Policing of the far North, particularly Canada, where it is done by the Northwest Mounted Police, is good, and there is no need of firearms except for hunting. There are no dangerous wild animals; moose, caribou, brown and black bear, lynx, marten, rabbits, ptarmigan and grouse are among the more common fauna. Alcoholic beverages should be used, while traveling in the far North in the winter, as almost everywhere else, with much discretion; the warming effect is but temporary and delusive, and is followed by a reactionary chill.

In outfitting, nearly all necessities can be purchased to advantage in the coast towns of Alaska, and the likelihood of taking mere impedimenta is thus largely avoided. An intelligent, reliable and resourceful class of men whom the inhospitable North has developed is encountered throughout Alaska and the Yukon. Custom officials, of both the United States and Canadian service, are exceptionally courteous and just. A duty of approximately 33 1-3% is levied by the Canadian Government on new materials, such as are comprised in a traveling outfit. Engineering instruments, when owned more than one year by the engineer entering Canada, are admitted duty free; otherwise 33 1-3% of their value is collected. Government regulations, such as those of Canada, re-

garding the carrying of gold out of the country, should be carefully regarded. An excellent set of rules for the Northern districts has been evolved; though seemingly irksome to the 'cheechako,' they are what experience has proven suitable, and should in every case be rigidly observed.

Any one about to undertake winter traveling in the far North will do well to get the 'Call of the Wild' and the 'Son of the Wolf,' both by Jack London; they make good reading for the steamer trip from Seattle, and there is much in them that will be in the nature of valuable suggestion. 'Three Years in the Klondike,' by Jeremiah Lynch, will serve in a similar way. Although the Northern country is young, it has been pregnant with action, and reading matter pertaining to it teems with interest. These suggestions are made after two years spent in the North; I hope they may prove of assistance to those who are planning to travel in the Alaska and Yukon territories.

#### Tin in Bolivia.

In the JOURNAL for Feb. 16 last, we published a statement of the receipts of Bolivian tin in Great Britain, with an estimate of the arrivals on the Continent. Messrs. H. A. Watson & Company, of Liverpool, who furnished the figures, now inform us that the actual receipts on the Continent in 1904 included *barilla*, or concentrate, and bars, equivalent to 2,912 long tons of metallic tin. The total exports of tin and tin material from Bolivia for the year, reduced to metallic tin, were as follows, in long tons:

To Great Britain . . . . .	9,867
To European Continent . . . . .	2,912
↳ Total . . . . .	12,779

As practically all the tin mined is exported, this figure represents the tin production of Bolivia for the year. It is the largest output ever reported. Nearly all the tin sent to the Continent goes to Germany.

#### German Iron Production.

The output of the German blast furnaces in the month of January is reported by the German Iron and Steel Union as below, in metric tons:

	1904.	1905.	Changes.
Foundry iron . . . . .	159,155	147,878	D. 11,277
Forge iron . . . . .	63,173	60,602	D. 2,571
Steel pig . . . . .	52,862	51,303	D. 1,559
Bessemer pig . . . . .	41,916	31,805	D. 10,111
Thomas pig . . . . .	513,947	474,621	D. 39,326
Total . . . . .	831,053	766,209	D. 64,844

The total decrease was 7.8%; all kinds of iron show lighter output this year. The decrease was most marked in bessemer and in Thomas, or basic, pig. Steel pig, in the German classification, includes spiegeleisen, ferro-manganese, ferro-silicon, and all similar alloys. Some of the decrease was probably due to the coal strike and consequent short supplies of fuel for the blast furnaces.

### Coal-Mine Explosions in Kansas.

We noted recently the appointment of a commission by the State to investigate the causes of recent explosions in the coal mines of southeastern Kansas, and to suggest some means of preventing the recurrence of such disasters. This commission consisted of three members, Archie Fulton, of Lansing; James A. Orr, of Weir City, and Edward Bartow, of Lawrence. The commission went promptly to work, and has already presented its report to the Governor. After describing visits made to a number of mines, and investigations into the causes of accident there, the report sums up the reasons for these explosions under five heads, as follows:

1. Heat and flame. Under this comes several sub-heads: Well-prepared shot; poorly prepared shot; shots on the solid or through a rib; windy or blown-out shots; inferior powder; mixing dynamite with powder; excessive use of powder; insufficient tamping.

2. Inflammable gases, under which are two sub-heads: Fire-damp and powder smoke.

3. Coal dust, having three sub-heads: Dust in rooms and entries; drill dust; holes tamped with drillings.

4. Suitable amount of pure air.

5. Weather conditions.

1. It is possible that a well-prepared normal shot may through-fire, and, under certain conditions, originate an explosion. It is much more probable that explosions are initiated by poorly prepared shots. By this are meant shots on the solid, or nearly through a rib, which on account of the solidity of the coal vein in the one case and the weakness in the other are projected with their power undiminished into an adjoining room, causing a so-called windy, or blown-out, shot. Similar conditions may be obtained by the use of inferior powder, in which the combustion may be incomplete; by mixing dynamite with powder, in which case the explosion of the dynamite may project the powder in an unconsumed state into the room; or by excessive use of powder, the effect in this case being a shattering of the coal and the projection of flame into the room; and, finally, insufficient tamping, in which case the shot is projected from the room as from a gun barrel.

2. These gases may come from two sources, first, gases exuding from coal or surrounding strata, and, second, combustible gases caused by the explosion of powder. Evidence is strong that there is no great amount of gas in the mines of this district. A little has been found when a horse-back has been cut. This gas by itself, under the systems of ventilation which are found throughout the district, can hardly cause an explosion.

The British Royal Commission, in its experiments in 1891 to 1894, concludes that marsh gas present in insufficient quantity to cause an explosion may assist in the propagation of an explosion in the presence of coal dust. This the commission thinks should be investigated more fully.

It is possible that powder smoke may be a contributory cause in cases where shots are fired in succession and rapidly. Under such conditions, the unconsumed gases, which may be present to as high as 49% of the gases formed by the ignition of powder, may collect and mix with air to such an extent that a following shot throwing fire may cause the mixture to ignite.

3. In all but one of the explosions the mines were wholly or partially dry and contained dust. It seems to the commission that dust is the most important factor in these explosions. The exact cause of a dust explosion is in doubt. The following condition is, however, necessary: It must be dry. Explosions take place in cold weather and on the first of the air. Explosions are usually caused by later shots.

Explosions in wet mines are rare, only one having been reported, in the Fleming mine, and that occurred in the month of April, all the other explosions occurring in November, December, January, February, or March. Evidence was also obtained of several windy shots which were stopped by wet places in the mines.

It is noticeable that all the explosions since 1903 have occurred in the months of January, February, and April. The one in the latter month happened in the only wet mine under discussion. Five of the major explosions and three minor explosions occurred between January 18, 1905, and February 9, 1905, during one of the coldest periods in the history of this coalfield. It is the belief of the commission that cold weather may affect the dust in two ways: first, by lowering the temperature to such an extent that the very fine particles of dust, which during warmer weather would be readily oxidized and destroyed, remain undestroyed and accumulate, and will thus be in condition to be readily ignited when a shot throws fire; second, in the summer the warm air is more moist than the air in the cooler parts of the mine and gives up its moisture; while in the winter the cold, dry air from outside contains less moisture than the warmer air of the mine and absorbs the moisture from the mine, leaving it dry and tending to increase the amount of dust. The source of dust may be from the breaking down of the coal by excessive shots, from the dust made by the drill, and by the blowing out of shots tamped with drillings.

4. Many contend that an extra large amount of pure air has great effect in causing explosions; that the air is more

dense in winter; that it is more dense and under pressure where a downcast fan is used.

5. The effect of weather on dry, dusty mines has been discussed. Where explosions occur from other causes than dust, cold air is claimed to be more dense and to contain more oxygen to the cubic foot. It has been noted that pressure exerts considerable effect on the explosive power of various gases.

The report sums up, in conclusion, the conditions that tend to decrease the number of explosions and their destructive power.

1. Every precaution should be taken to reduce the heat and the flame. Every miner should remember that the life of a fellow-workman may depend on the placing of his shot. It is very difficult to lay down a rule for the placing of shots in all parts of the coalfield, since conditions vary throughout the field. The miners and the operators at each mine should examine the conditions in that mine and make rules to govern the placing of shots. In this respect the amount of mining to be done and the extent of the cutting should be regulated. These rules should be subject to approval of the State mine inspector, and should be posted in the blacksmith-shop or engine-room, where they can be seen and read by all miners. In mines where more than 10 miners are employed who are of nationality speaking a language other than English, a copy of the rules in that language should be posted. The following suggestions in regard to these rules are, that the shot must not be drilled on the solid, nor shall gripping shots be taken; dynamite shall not be used in coal shots, and excessive amount of powder should be avoided. The shots should be thoroughly tamped with non-combustible material and should be tamped to the mouth of the hole, whether squib or fuse be used. It is the belief of the commission that the squibs should be adopted in this field, because it gives the shot-firer a better chance to judge the shot, allowing him to ascertain the direction and the depth of the hole.

2. Inflammable Gases.—No shot should be fired in any room known to generate gas in any quantity, without first brushing it out. Marsh gas, though not present in a sufficient amount to explode, or even to be detected by the Davy lamp, may become an aid in propagating an explosion.

The danger from powder will be reduced by slower firing. Time should be allowed for the gases from one shot to cool down before other shots are fired. This can be accomplished by using the squib, where the time of firing the shot can be better regulated than when the fuse is used. The best method of firing would be from the outside of the mine. Electricity, the commission believes, could be used for this purpose. By this means

the shot-firers would be taken out of danger. While it might tend to make the miners more careless in placing their shots, an inspection of the shots by a competent person would tend to eliminate this trouble.

3. The places should be kept cleaned up by the miners, and the roads and entries cleared by the operators. Drill dust should not be allowed to remain near the hole, and the entries and places should be thoroughly wet. The method of wetting is immaterial, provided it be thoroughly done. In the mines visited the most satisfactory method was the laying of pipes in the entries, with connections for hose at such convenient intervals that water could be thrown into the farthest end of the room.

4. Slowing down of the fan seems to be of advantage, and an exhaust fan is better than a blowing fan. The warming of the incoming air in cold weather would be useful, as the air would be more moist, and oxidation of the very finely divided dust would continue, as in the summer season. That this is possible has been shown at the Devlin & Miller mine.

The object of this commission was primarily to suggest means of saving the lives of the shot-firers, and to prevent the loss of property which accompanies such explosions as have recently occurred in southeastern Kansas. The commission has lacked time to consider this matter in as thorough a manner as it should be considered. It is of great importance, as is shown by the fact that there was an average of 10,365 men employed in and about the coal mines of the State during the past year, and that the value of the property involved is upwards of \$30,000,000. In the history of other coalfields it has been noted that explosions become more frequent and more severe as the mines become deeper and are further away from the outcrop. This is probably because of the greater depth of the overlying strata and the smaller chance which water has to enter the mine. We cannot, therefore, expect the natural conditions to improve, and unless precaution be taken more explosions will occur. This commission recommends that a second commission be appointed with more time to make investigations and experiments; that the legislature make provision for the appointment and expenses of said commission. It is further recommended that said commission consist of five members, one miner, one operator, one chemist, one mining engineer, who is neither engaged in operating or mining, and one other person; that sixty days be allowed the commission for the investigation, except that the chemist and mining engineer be allowed not to exceed sixty additional days for making experiments.

The new commission should show a preliminary report April 1, 1906, and a final

report Jan. 1, 1907, allowing a year and a half in which to make the examinations and experiments and prepare a report for the next legislature. The period of these examinations and experiments should extend throughout a winter season, and the commission should be instructed to make investigations in regard to mine temperatures at the air intake and in different parts of the mine. The commission should be instructed to secure records of reports and experiments in other coalfields, and to make use of these reports wherever similar conditions exist.

The commission also should be instructed to secure records and reports of mines bored by electricity, wherever that may have been done, and the possibility of using electricity in this field should be thoroughly investigated. Tests of the amount of marsh gas should be made, and such other chemical tests—as the quality of the powder, the amount of volatile matter in the coals at different parts of the field—as may be deemed advisable.

Pending this report this commission recommends that the mine inspector be given power to enforce the recommendations of the commission until the next meeting of the legislature, as follows:

(1) That operators of dry mines should keep them thoroughly wet. (2) That great care should be used in the placing of shots. (3) That no combustible matter be allowed in the tamping of shots. (4) That squibs should be used instead of fuse in firing shots. (5) That in the future the fan should be at least 15 ft. from the mouth of the shaft.

#### Pig Iron Production by Grades.

For two or three years past the American Iron & Steel Association has collected figures showing very closely the various grades of pig iron produced. We have now received the association's full statement of these grades. The figures for two years past are as follows, in long tons:

Grades.	1903.	1904.
Bessemer and low-phosphorus	9,989,908	9,098,659
Basic pig made with mineral fuel.	2,040,726	2,483,104
Forge pig.	783,016	550,836
Foundry and high silicon.	4,409,023	3,827,229
Malleable bessemer.	473,781	263,529
White, mottled, and misc.	120,137	53,284
Spiegeleisen.	156,700	162,370
Ferro-manganese	35,961	58,022
Total	18,009,252	16,497,033

The bessemer figures include low-phosphorus pig iron, that is, iron running below 0.04% in phosphorus. Pig iron containing from 0.04 to 0.10% of phosphorus is classified as bessemer. The basic figures are confined strictly to pig iron made with mineral fuel. A few thousand tons of castings direct from the furnace are included in the totals for white, mottled and miscellaneous grades of pig iron for 1903 and 1904. Ferro-silicon and high-silicon pig iron are included in the foundry figures.

Of the total production of pig iron in 1904 over 55.1% was bessemer and low-phosphorus, as compared with over 55.4% in 1903; nearly 23.2% was foundry, against 24.4% in 1903; 15% was basic, against over 11.3% in 1903; 3.3% was forge, against 4.3% in 1903; 1.3% was spiegeleisen and ferro-manganese, against 1.06% in 1903; and nearly 1.6% was malleable bessemer, against 2.6% in 1903. The production of white and mottled and miscellaneous grades of pig iron, and of castings made direct from the furnace, amounted in both years to less than 1% of the whole output.

In 1904 the production of low-phosphorus pig iron amounted to 190,946 tons, against 200,422 tons in 1903. In 1904 low-phosphorus pig iron was made in New York, Pennsylvania, and Tennessee.

The chief makers of bessemer and low-phosphorus pig in 1904 were: Pennsylvania, 4,511,999 tons; Ohio, 2,138,442; Illinois, 1,424,030; Maryland, 292,642 tons. The larger makers of basic pig were: Pennsylvania, 1,805,747 tons; Alabama, 273,587; Ohio, 179,560; New Jersey, 112,455 tons. Of foundry iron, the leading producers were: Alabama, 1,085,935 tons; Pennsylvania, 840,407; Ohio, 459,354; New York, 281,419 tons. A small quantity of basic pig made with charcoal is not included in the figures.

Included in the 3,827,229 tons of foundry pig iron made in 1904 are 69,730 tons of ferro-silicon, produced in Pennsylvania, Virginia, West Virginia, Kentucky, and Ohio, a small part of which was made with electricity. In 1903 there were 51,516 tons of ferro-silicon made. Pig iron containing 7% of silicon and over is classified as ferro-silicon. Virtually all the charcoal pig iron made is classified as foundry pig iron. Alabama is now the leading producer of foundry pig iron and Pennsylvania of forge.

The production of malleable bessemer pig iron in 1904 amounted to 263,529 tons, against 473,781 tons in 1903. In 1904 the production of white and mottled and other miscellaneous grades of pig iron and direct castings amounted to 53,284 tons, against 120,137 tons in 1903.

Of the spiegeleisen made in 1904, Pennsylvania supplied 103,773 tons; Illinois, 39,779; New Jersey, 11,242; Colorado, 7,556 tons. Pennsylvania made nearly all the ferro-manganese, 57,076 tons, Tennessee furnishing 946 tons. The New Jersey spiegeleisen is made from one of the products obtained from the concentration and separation of the complex zinc ores from the mine at Franklin Furnace.

The figures given for ferro-manganese for 1904 include a small quantity of ferro-phosphorus made in Tennessee. Ferro-phosphorus was not reported for 1903, but a small quantity was reported by Alabama in 1902. Spiegeleisen usually contains from 9 to 22% of manganese, and ferro-manganese from 45 to 82 per cent.

**Tube-mill Notes.\***

BY ALFRED JAMES.

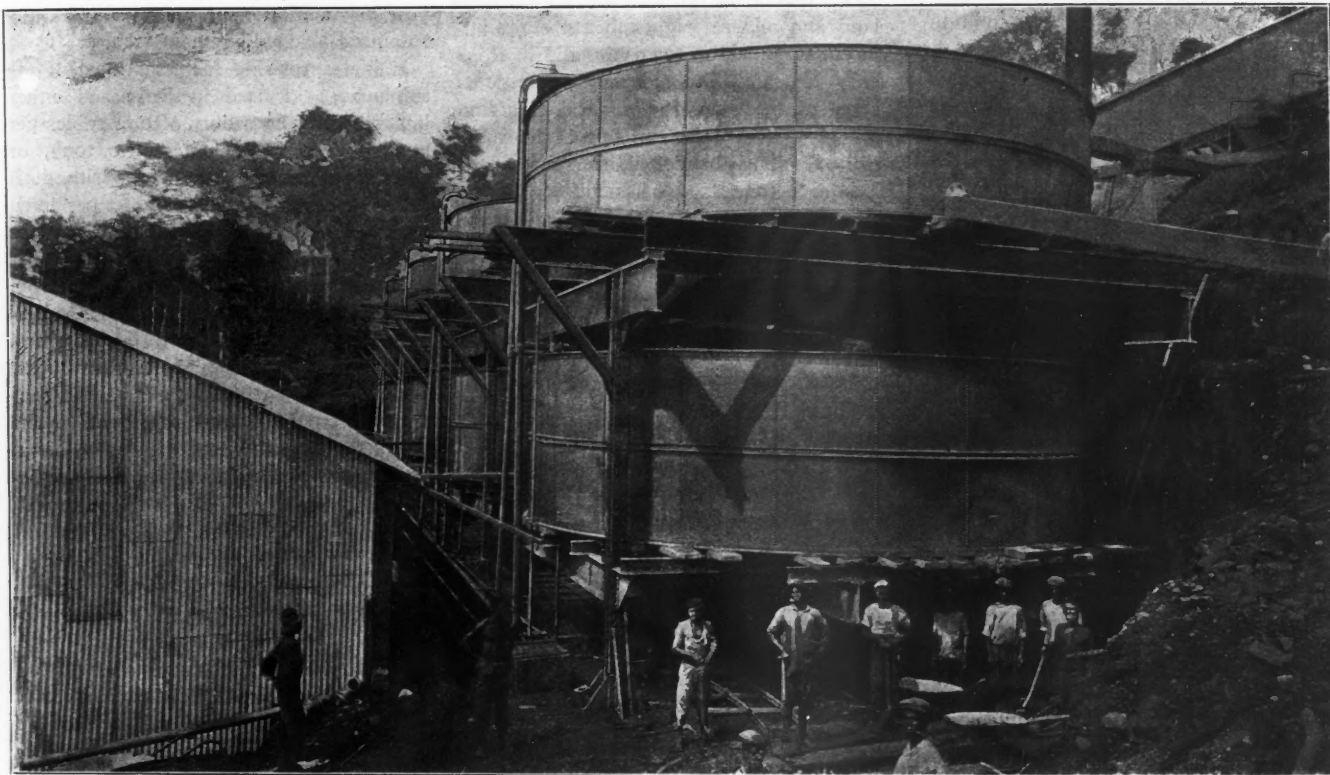
One-stage wet tube-mill work, that is, without return, obtains not only at El Oro, but in Korea, in Germany, and even at Kalgoorlie itself, the Ivanhoe having adopted this method in preference to the return system. The Ivanhoe figures are actually only half those of the other mines, which show their cost per ton milled instead of per ton of sand absolutely slimed. On the other hand, the Ivanhoe has recently thrown out its tube-mill, evidently owing to Mr. Nicholson's preference for pans, and it is possible, therefore, that the cheap tube-mill work accomplished at the Ivanhoe may not compare satisfactorily with the more expensive work accom-

esting to note that the costs given by Mr. Grüssner, as well as by Mr. Broadbridge, require to be multiplied by 2 in order to obtain the actual cost per ton of sand slimed in the tube-mill. Mr. Broadbridge's figures refer to the total sand treated in the agitation plant, but of this over 50% has been first separated by a spitz and passes to the plant without re-grinding, as would be obvious on examination of the grinding analysis.

The three division plates introduced into one of the flint-mills at Kalgoorlie proved absolutely unsuccessful in practice. Manufacturers formerly made a blunder in providing divisions in the tube, as it is found that the little flints work their way up the tube through the holes in the dividing plates and refuse to return; they become

pulp even thicker (60%) than this is in successful use, so that there are questions of dilution, before the spitz and amalgamation plates, which have not yet been fully considered. In the experimental work on the Rand the mill men naturally rush their feed through; that is where their experimental work necessarily differs from their practice. The rate of revolution most satisfactory in practice is found to be  $200 \div \sqrt{D}$ , where D equals diam. in inches. Thus a 4 ft. 1 in. mill should revolve at  $200 \div 7 (\sqrt{49} = 7) = 29$ , the correct number of revolutions per minute. This simple formula was first suggested by Mr. Davidsen.

The correct charge of flints for a mill is found to be  $W = 44 \times N$ , where W equals the weight of flints required and N the



OBUASSI CYANIDE PLANT, ASHANTI GOLDFIELDS CORPORATION

plished at the Hannan's Star or the Oroya Brownhill. In the latter case the results are complicated by the fact that pans are used.

At first sight, the spitz separation of the coarse particles seems undoubtedly the proper method to pursue, but when it comes to passing 268 tons of sand *per diem* through the Hannan's Star mill in order to slime the total sand output of 38 tons only, it looks as if steps should be taken to render unnecessary such an enormous amount of return, especially as it is quite possible to slime the material, in one operation only, to a fineness equal to that of the Hannan's Star finished product—less than 5% retained on a 150-mesh sieve. In this connection it is inter-

trapped, and are actually forced out at the feed end of the mill. Now, each mill is but one long tube, and the flints bed themselves perfectly even. There is no overlapping at any particular spot, and no segregation of sizes whatever.

As for the great wear and tear of lining, reported from the Rand, this is due to the deliberate experimenting with coarse feed and increasing output; in regular tube-mill practice there will be only the usual consumption of lining. By "regular tube-mill practice" is meant the proportion of water in feed, rate of revolution, weight and size of flints, and size of machine, for given output. As no one has given figures, with the exception of Mr. Robinson, who gave a maximum figure, it may be added that in grinding sand a pulp of 50% thickness has been found to give good results, but

number of cu. ft. contained in the cylinder of the tube mill, but West Australian wet-grinding practice takes nearly 50% more flints than these figures. As for the size of flints, for wet-crushing, large pebbles are found to be best, say those of from 3 to 4 in. diam. For dry-crushing, smaller pebbles give a finer product.

In first starting tube-mills there is a tendency to load up with flints. Since experimenting on a large scale is necessarily slow—as can be seen by the time which elapsed at the Hannan's Star before the present high efficiency was obtained—it is desirable not to increase the load of flints beyond that given by makers without careful investigation. It is a curious fact, which has been noticed all over the world, that it takes much less horse-power to run a tube-mill crushing wet than crushing dry.

\*Abstracted from contribution to discussion, Institution of Mining and Metallurgy, Jan. 19, 1905.

One point, which in practice has proved most important, is the need of elasticity in the capacity of tube-mills. In West Australia mills have been put down with the idea of obtaining a unit of an exact size to work with uniform conditions; but as soon as the stamp capacity becomes increased the mills have not the elasticity to cope with the new conditions, and the question arises, in designing new installations, what size of tube-mill would be most satisfactory. It is difficult to lay down a general rule, but there are two guiding principles. The first is that a tube-mill working at its full or normal capacity is doing work under the most even conditions, and, second, that it is practically impossible to increase the output of a tube-mill beyond its normal capacity. In installations where an increased output is being worked it is desirable to put in a tube-mill of greater capacity than at first required, and to revolve this more slowly than the normal rate, or with a less than normal charge of flints. In this way the fineness or coarseness of feed can be regulated to a nicety, whereas the usual recipe of makers for the regulation of the size of the finished product is impracticable with a stamp battery which has only a certain definite output, and through which, therefore, one cannot rush a greater amount of material in order to render the finished product coarser, and containing a minimum proportion of slime. The better method of accomplishing this is that stated above, to diminish the flint charge or rate of revolution.

#### Palladium.

This is one of the noble metals, being the last of the so-called first platinoid group, which includes ruthenium, rhodium and palladium. It was formerly gathered from platinum residue, but is now found in considerable quantity in the nickeliferous pyrrhotite of Sudbury, Canada. Platinum occurs there as the mineral sperrylite, the di-arsenide analogous to pyrite, and it is plausible to suppose that palladium occurs in a similar form. It is said that the Orford Copper Company, which handles Canadian nickel ore, obtains yearly residue containing 3,000 oz. of palladium. Most of us recall the metal as being the classical example of hydrogen absorption, for which it is used in gas analysis; one part absorbs from 600 to 982 volumes of the gas. The question of the formation of a compound (that used to be rated as two atoms of palladium and one of hydrogen) is still a mooted one; for alloys with gaseous metals (other than with hydrogen) are not available for comparison. Palladium has a limited field of use, being employed to a slight extent in dentistry, in chronometers, in surgical and optical instruments. Platinum has a specific gravity of about 18; but palladium of only 12. It is singular that no insistent demand should have yet been found for the metal.

Probably this will be discovered as the supply becomes more abundant.

#### Valuing Mineral Lands for Taxation.

SPECIAL CORRESPONDENCE.

The New Jersey State Board of Taxation has rendered decisions in the cases of the Crane Iron Works against Jefferson township and Roxbury township, in Morris county, in each case reducing the assessment on the company's mining property from \$1,500 to \$1,000. While the decisions favor the Crane Iron Works, in that the concern will pay taxes on a lower valuation, the State Board sustains the township assessors in taxing mineral rights, which was the point of contention. The Crane Iron Works owns 2.8 acres of land and mineral rights in 410 acres adjacent to Jefferson township, and in Roxbury township the company owns 11.52 acres of land and the mineral rights in 207 acres adjacent. Each property is the site of a long-abandoned iron mine.

In each case the assessment was \$1,500. The Crane Iron Works appealed to the State Board for a reduction to \$100 in the assessment of Jefferson, and a reduction to \$200 in the assessment of Roxbury.

The company contended that the land was worth not more than \$10 per acre and that the mineral rights were worth nothing at all, and that, therefore, an assessment of \$100 in the one case and \$200 in the other would be taxing more than full value.

The argument of the township assessors was that the Crane Iron Works would not sell the land without retaining the mineral rights and, furthermore, would not release the mineral rights in lands sold in former years, even though the witnesses for the Crane Iron Works showed that the mineral rights were not carried as assets on the company's books. The State Board ruled that mineral rights reserved were assets and thus assessable, and that the only problem was to fix their value.

The decision of the State Board, while reducing the assessment, sustains the township assessors.

In Europe most of the sulphur gas from the roasting of zinc ore is saved for acid making. In this country it largely escapes.

Dumortierite is a boro-silicate of alumina; it seems to be both acid and basic at the same time, being in this respect comparable with the well-known ketone-acids of organic chemistry. It will be difficult to locate the position of the acidiphanous hydrogen, and of the ketone oxygen; but the provisional formula places the hydrogen with silico and the oxygen with alumino groups.

#### Sulphuric Acid in Russia.

This is one of the most remunerative industries in Russia, by reason of the enormous consumption of sulphuric acid for refining petroleum. Additional profit is made by converting the sludge acid into ferrous sulphate, or by utilizing it for the manufacture of Leblanc soda and other purposes. But competition among the sellers of sulphuric acid has been keen, suggesting the recent compact signed by manufacturers in St. Petersburg, Moscow, and Warsaw. By dividing the consuming territory, and regulating production, it has been possible to advance the price of acid in the Volga district over \$4.50 per ton. In the Riga district there also exists a similar agreement, and henceforth, or, rather, until consumers oppose the affiliation of manufacturers, the sulphuric acid will remain stable.

It is a surprising fact that most of the sulphuric acid used in Russia is either imported, paying a duty of 0.22 rubles per pood (about \$6.89 per metric ton), or made from Scandinavian iron pyrite, dutiable at 1 copek per pood (30.5c. per ton), or from Sicilian sulphur, dutiable at 0.02 to 0.05 rubles per pood (61c. @ \$1.57 per ton). In 1904 the imports of sulphur from Sicily amounted to 15,141 long tons, which compares with 15,068 tons in 1903, and 17,295 tons in 1902. The Russian output of sulphur is small, less than 2,000 tons per annum, while the quantity of pyrite mined amounted in recent years to about 25,000 tons. The imports of pyrite are between 45,000 and 50,000 tons, although for years they have been about half as large. Assuming that the average consumption of pyrite is 70,000 tons per annum, equivalent to, say, 31,500 tons sulphur, and, adding the brimstone used, we have a total of 50,795 tons of sulphur consumed per annum. Theoretically, this is equivalent to about 152,385 tons of sulphuric acid of 66° Baumé. In addition, a small quantity of acid is recovered as a by-product in the roasting of zinc ores in Poland.

The vapor tension of water at ordinary temperatures is about 17 mm. This means that if dry mercury were standing under a long dry vacuum column, and a drop of water was introduced into the eudiometer, the mercury would fall 17 mm. The vapor tension of boiling water at the mean sea-level pressure of 760 mm. is itself 760 mm., which is one way of defining the boiling point as that temperature at which the vapor tension of a liquid equals the superincumbent atmospheric pressure. This vapor tension of a liquid, as water, is restrained and lowered by a dissolved substance. The degree of this lowering is directly in proportion to the number of ions or electrolytic molecules present. This can be measured by the lowering of the freezing point, or the raising of the boiling point.



## A New Mining District in Quebec.\*

By J. OBALSKI.

Until 1900, the northern boundary of the Province of Quebec was the Height of Land, and the formation was usually considered as Laurentian. In 1900 this boundary was extended to the East Main river, and the work of the Geological Survey has shown that a considerable part of that territory is covered by the Huronian formation. The different geological explorers, such as Dr. Bell, Richardson, Low and others, without going to the detail of prospecting, had called attention to the probable value of that northern section from a mineral point of view, but the first real prospect was undertaken by Peter McKenzie, who boldly started upon such general indications to explore the region north of Lake Chibogomo, where Richardson had first pointed out the existence of serpentine, copper pyrite and magnetic iron. Thus, in 1903, Mr. McKenzie made two explorations there, starting from Lake St. John, and brought back specimens of asbestos, copper ore, magnetic iron, with information of such nature that I decided to visit this district with him, in the fall of 1904.

I reached the Chibogomo by way of Lake St. John, the River Chamouchouan, and a succession of large lakes called Chigoubiche, Chamouchouan, Nikaubau and Obatogoman, the same route having been followed by previous explorers. After passing the Laurentian gneiss, the first Huronian rock was encountered, in the form of diorite, at the end of Lake Obatogoman, and followed to the north end of Chibogomo. The formation then consists mostly of diorite rock, but is sometimes chlorite schist, intrusive granite, conglomerate, talc schist and serpentine.

On a large island between the two discharges of Lake Chibogomo I found the following minerals:

1. An extensive outcrop of quartz showing a distinct vein of the same, running about EW for 2,000 ft., with a vertical dip. The south wall was well exposed, and I measured 30 ft. across without finding the other wall, the quartz being then covered by earth and trees. This quartz shows visible gold in small particles in several places, as well as in the loose boulders; it also contains bunches of copper and iron pyrites in which analyses have shown gold in commercial quantities. By panning out in the vicinity of the vein, and even at some distance from it, fine colors of gold were found in nearly every pan. Several hand pieces of quartz were tested, giving from traces to \$10 per ton, two specimens of pyrite giving respectively \$9 and \$64 to the ton. About 8 oz. of concentrate, resulting from the rough hammer-crushing followed by panning of about 100 lb. of quartz from that vein, gave 9 oz. of gold to the

ton, numerous colors of gold being visible in that concentrate.

2. An outcrop of chalcopyrite yielding 23% of copper, with some gold and silver, to the amount of \$2 to the ton. The ore is contained in what is apparently a vein running NS from the shore of the lake, of about 2 ft. of mixed ore and quartz, some bornite being also met in the vein. In the surrounding diorite rock small pockets of ore are also in sight for a distance of more than 50 ft. along the shore. By panning out in the crevices of that vein, which is about one-fourth of a mile from the auriferous quartz vein, I found colors of gold.

3. A belt of the diorite contains a large amount of magnetic iron disseminated through the rock for about 50 ft. in width and a distance of one-fourth of a mile towards a hill called Paint mountain, about 300 ft. high.

4. On this Paint mountain there is a good deal of rusty rock, and at one point I found colors of gold. In several places are small quartz veins, some of them with a little copper pyrites, and at a few points, red oxide of iron or ochre, being undoubtedly due to the decomposition of iron pyrites. By digging out at one place a kind of porous quartz was encountered, and a few feet deep it became impregnated with iron pyrites to the extent of 50% in the quartz, such pyrites containing 44% of sulphur, but no copper nor precious metals. I consider that deposit to be a large one.

About five miles in a northerly direction, after passing through some narrows where diorite and conglomerate are visible on both shores, a large exposure of serpentine rock is met with. That serpentine was mentioned by Richardson on a small hill which we called Magnetic cone, but the exploration of the shore and of the Rapids river shows that this formation extends in an easterly direction for more than 8 miles, and, in fact, I did not see the end of it.

On a large island close to the shore Mr. McKenzie discovered asbestos on his first trip, and in the following ones he made some prospects which disclosed fibers of good length, and, in my opinion, in commercial quantities. The quality is comparable with that of our Eastern Townships, the serpentine resembling also that of the same region. I saw fibers of 2.5 in., and at one place there was an agglomeration of veins forming a total width of about 6 in. The rock presents itself in various forms, being sometimes compact, broken or shaly. When in the compact serpentine, the fiber is very abundant, but the veins do not extend far; in the shaly rock a variety of apparently fibrous hornblende, resembling Italian asbestos, is quite abundant. The prospects show the existence of asbestos for a distance of about 800 ft. Magnetic iron appears to be widely distributed throughout this section. On

the Magnetic cone, and in its vicinity, the needle shows a remarkable variation, which, in a certain zone, is really 180 degrees, turning completely from north to south.

There is a vein of magnesite containing 7.5% of iron which is magnetic, and the surrounding serpentine is strongly magnetic and contains visible grains of magnetite. On the Asbestos island there is a black serpentine with a semi-metallic streak, due to magnetic iron in an earthy form. In all that district north of Lake Chibogomo, the dip-needle is strongly affected over an extent of several miles, the needle remaining vertical in many places. The facts are remarkable, and justify the expectation of finding this magnetic iron somewhere in a more condensed form.

I recall the fact that the report for 1872-73 of the Geological Survey mentions a variety of strongly magnetic serpentine found on an island in Lake Abitibi, by W. McOuatt, which would seem to resemble that found at Chibogomo.

Besides the above indications, magnetic iron in massive form was found by P. McKenzie south of the Sorcerer's mountain in veinlets of about 1 in., specimens of which possess the property of loadstone.

On looking over the geological map of the basin of the Nottaway river, by Dr. R. Bell, we see a considerable development of Huronian rocks, having, in the western part of Northern Quebec, a width of about 140 miles from north to south, and I am of opinion, with the members of the Geological Survey who have explored it, that there are great possibilities of finding commercial minerals there. That belt will be crossed by the proposed transcontinental railway, and I think that a large field will then be offered to prospectors.

That district is well wooded with good, but small-sized, timber, offers numerous water powers and fairly extensive tracts of cultivable land, the climate being that of our northern countries. The country is undulated, with here and there low hills, and the average altitude is from 1,000 to 2,000 ft. above sea-level.

Jigs are used for tin dressing only in Australia; in Cornwall, and elsewhere, the Frue vanner and other forms of the shaking-table have replaced the jig. The reason is mainly in the scarcity nowadays of tin-stone coarse enough to warrant the older method of treatment.

The cassiterite of Mount Bischoff (Tasmania) is associated with topaz, both crystalline and amorphous, in large dikes of an acidic porphyritic rock penetrating slate and sandstone. The topaz has replaced feldspar, the rock containing no alkali, and consisting practically of quartz and topaz. It is comparable to the Saxon *sneckenstein*, a topaz quartz-porphry.

\*Paper read before the Canadian Mining Institute, March, 1905. By J. Obalski, Inspector of Mines of the Province of Quebec

**Timbering at the Chillagoe Mines.**

By T. J. GREENWAY.

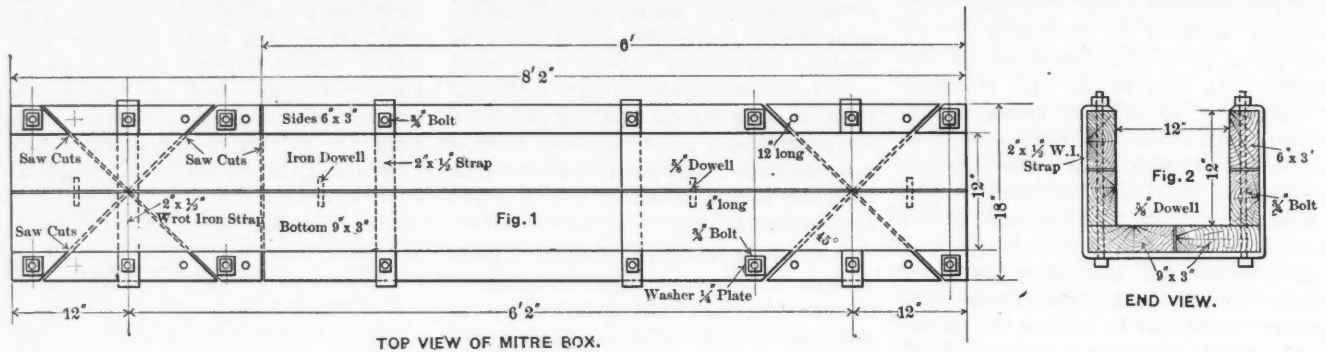
In working the Chillagoe mines, in northern Queensland, the conditions are such as render necessary the adoption of some method of square-set timbering

the angle and square templates shown in Figs. 1, 2, 8 and 9.

A post is made by fixing a selected log in the miter-box (by means of wooden wedges) with one rough end projecting out of the squared end of the miter-box. This rough end is then cut off flush with

by means of the square template with its accompanying spirit level.

A cap or stretcher is made by fixing a log in the miter-box, and cutting it to the length and shape determined by the miter cuts. It is then removed to a sawing frame, and the beveled ends are



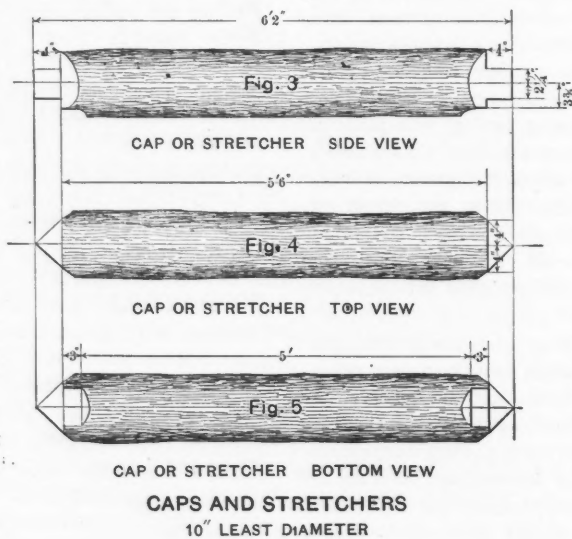
which will permit of the use of the stunted and twisted local timber without the aid of a saw-mill. After experiment-

the end of the miter-box, and the other rough end is cut off to a length determined by the transverse gauge cut in the

shaped into miter tenons by sawing and adzing them to the required dimensions, which are determined by means of the angle template.

The manner of framing the posts, caps and stretchers together underground is clearly shown in Figs. 10 and 11, page 515.

With this method of cutting and framing, the use of rough log timber for square-set timbering presents no difficulties. As need scarcely be said, such timber is, weight for weight, much cheaper and stronger than sawn timber, and it can be used in remote districts where sawn timber is practically unobtainable. In the Chillagoe district the logs are delivered at the mines at a cost of from 6c. to 8c. per running foot, and the cost of converting them into posts, caps or stretchers is 4c. per running foot.

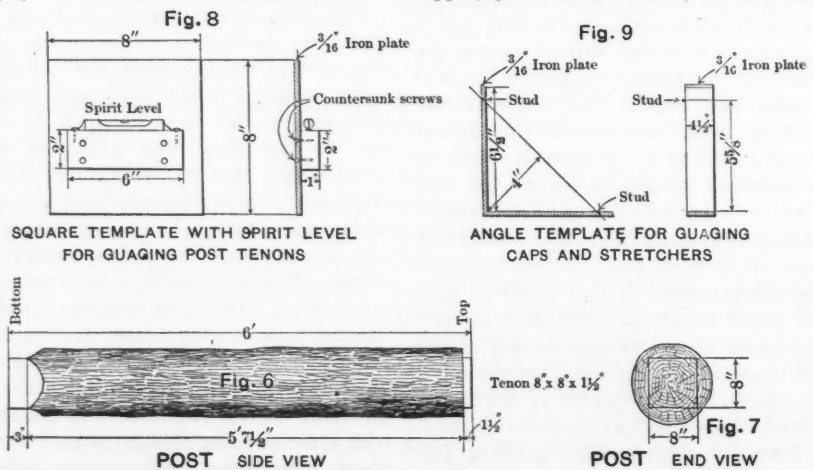


ing with various methods of cutting and framing round timber, the writer devised and adopted the method described hereafter, which has now been in successful use for two years.

The square sets are made up of the usual members, namely, posts, caps and stretchers. The shape of the posts is shown in Figs. 6 and 7, and the shape of the caps and stretchers, which are alike in every respect, is shown in Figs. 3, 4 and 5. All are cut from rough-hewn logs which are delivered at the various mines by timber-getters in accordance with a specification requiring that the logs shall have a clear minimum length of 6 ft. 6 in., and a minimum diameter of 10 in. The heavier logs are selected for making the posts, and the lighter ones are used for making the caps and stretchers.

The various set members are cut to the required shapes and dimensions by a simple method of sawing and adzing the logs, accurate measuring, centering, etc., being attained by using the miter-box and

miter-box. The post, after having been thus cut square and true to the required length, is taken out of the miter-box and



firmly fixed in a suitable saw and frame, and the ends are then shaped into square tenons by sawing and adzing them to dimensions which are gauged and squared

to 14% tin. It is not possible, when smelting for copper in the ordinary way, to put the tin into the copper. It passes into the slags and is wasted.

**Cyanidation of Silver in Mexico.**

(By HUGH G. ELWES.)

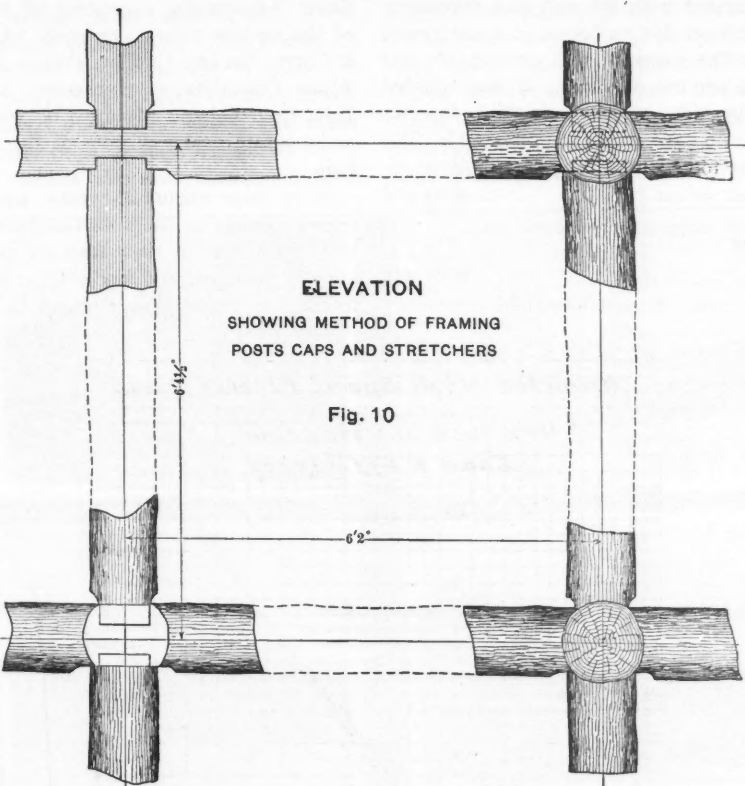
In districts remote from a smelter or railway, or from both, the profitable treatment of low-grade silver and gold ores is a difficult problem. The cyanide process,

process; but now that the very rich ore, usually found as pockets in well-defined veins, has been exhausted, low-grade mineral forms the larger part of the production. The smelter at Aguascalientes is distant 75 miles by rail; notwithstanding the fact that the mines are often near the

disposition can be found for them. This applies not only to the town of Zacatecas, but also to Sombrerete, Pinos, and other parts of the State, and, indeed, to many other districts of Mexico. There is a common impression that cyanidation is not generally applicable to silver ores; but I hope to show that a profit can be made in cases where no other available process can give satisfaction. I do not pretend that the extraction is as high as is the case with gold; but, since the cost of treatment is low, the net result is satisfactory.

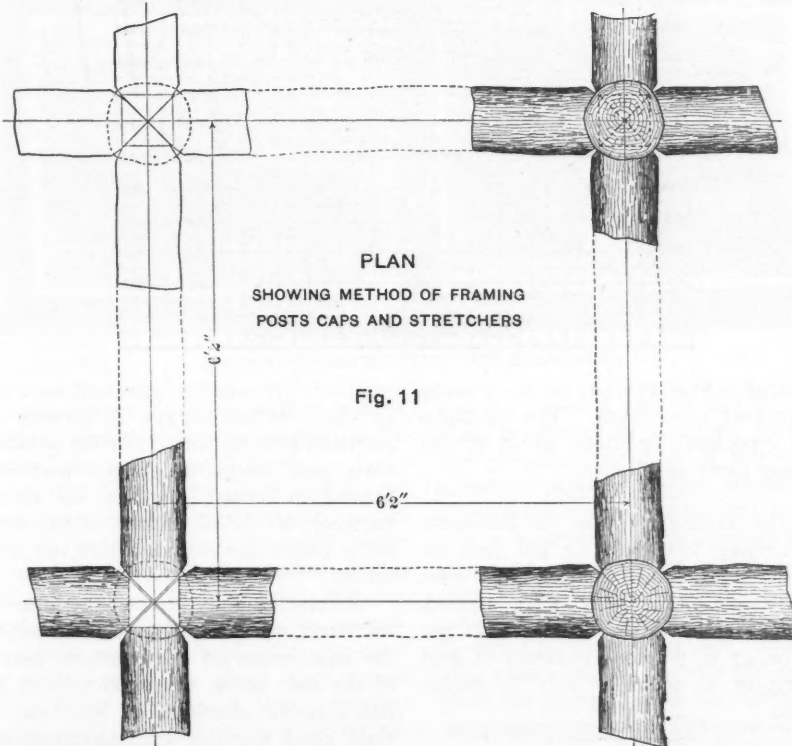
My first experiments on a large scale were made on tailing from the *patio*; but later I successfully treated the pulp direct from a stamp-mill. The tailing tested represents material which had been repeatedly condemned as too rebellious to yield a profit by cyanidation; it was found in an old *hacienda de beneficio*, or Mexican metallurgical works, and still contained a small amount of copper sulphate, derived from the treatment it had received. The analysis of the tailing was roughly as follows: Silica, 77%; lime, 7%; sulphur, 5%; iron, 4%; zinc, 3%; copper, 1%; silver, 16 oz., and gold, 0.1 oz. per ton of 2,000 lb. The method followed was: First, two water-washes were run into ordinary leaching tanks, containing 25 tons each of tailing. The first wash was run in from below, and the second from above. A little lime, amounting to 0.2% of the tailing, was sprinkled over the surface after the first wash had run through. A cyanide solution, containing 0.5% KCy, was introduced from below until the surface of the tailing was covered to a depth of 4 inches. The vat was left to soak for 12 hours; the solution was then drained off and run through zinc boxes. An hour after the solution had disappeared below the surface of the tailing, another solution containing 0.25% KCy was added, to a depth of 4 inches. The amount of solution in the first wash was 10 tons, and the second was the same, for each vat. One hour after the solution had disappeared below the surface, three more washes of cyanide solution, each of 10 tons, were run through, with the same interval; the cyanide for the first two being 0.25%, and for the last 0.12%; then followed a single water-wash of 10 tons, and the tailing was discharged from the vats. The assay of the material, after the treatment described, showed silver, 4 oz. per ton, and gold, a trace. Thus the extraction was 75% of the silver and practically all of the gold. The cost was:

Cyanide, 2 lb.....	\$0.40	gold
Other chemicals.....	0.10	"
Zinc.....	0.03	"
Filling and discharging vats.....	0.20	"
Filters.....	0.02	"
Assaying and sampling.....	0.05	"
Superintendence.....	0.07	"
Pumping.....	0.03	"
<b>Total cost per ton.....</b>	<b>\$0.90</b>	
Value of silver extracted (\$0.50 per oz.)	\$6.00	
Value of gold extracted (\$20 per oz.)	2.00	
<b>Total value extracted per ton.....</b>	<b>\$8.00</b>	
<b>Profit per ton.....</b>	<b>\$7.10</b>	



ELEVATION  
SHOWING METHOD OF FRAMING  
POSTS CAPS AND STRETCHERS

Fig. 10



PLAN  
SHOWING METHOD OF FRAMING  
POSTS CAPS AND STRETCHERS

Fig. 11

suitably modified, affords an almost ideal means of extracting value from ores which can be handled profitably in no other way. Zacatecas, for example, is a district which has produced vast amounts of silver and some gold from ores treated by the *patio*

railway, the cost of freight and treatment is so high as to be prohibitive. An exodus of miners has left Zacatecas at a low ebb. There is no question that low-grade silver and gold ores can be opened up to an enormous amount whenever a profitable

The tailing treated in the above experiment had been ground to 30-mesh, and passed through a 1/2-in. screen before being loaded into the vats. Some soluble bromides and bromates of sodium were put into the preliminary washes. A test (of the tailing as it came from the corral), made by washing with concentrated ammonia, showed that none of the silver was present as chloride or bromide. Under local conditions it is safe to estimate that an ore such as the above can be milled at a cost not exceeding \$2 gold per ton; and assuming \$1 as the cost of cyanidation in round figures, the total cost of milling and cyaniding may be taken at \$3 gold per ton. Ore of this kind cannot be shipped from Zacatecas. Mining should not cost more than \$3 gold per ton for ore put on the crushing-floor of a mill near the mine. Thus there is a profit in mining and milling cyanide ore containing only 16 oz. of silver and 0.1 oz. of gold per ton. This class of ore represents the lowest grade which is worth considering. There are mines in Zacatecas which can produce large quantities of such material.

I will now give the results obtained, with the raw product of a stamp mill, 100 miles from a railway. The mill consists of 20 stamps, crushing to 16-mesh, and two Huntington mills to reduce the pulp to 30-mesh. The battery pulp is run direct, without classification, to two Frue vanners; the vanner tailing is run into settling pits for subsequent amalgamation in pans, with salt, sulphate of copper and mercury. My experiments, made both with the concentrate and also with the tailing from the Frue vanners, showed a greater extraction and economy by cyanidation than by pan amalgamation. The cost per ton of milling and pan amalgamation was obtained by taking the average of a 60-days' run under ordinary conditions. It resulted as follows:

Labor.....	\$1.15 gold
Fuel (wood).....	2.00 "
Water (pumped).....	0.22 "
Chemicals.....	1.38 "
Materials.....	0.15 "
Total.....	\$4.90 gold

The cost of mining is \$2.75, consisting of \$2 for labor and \$0.75 for light and supplies, both in gold. The extraction obtained by concentration and pan amalgamation is 60% only, the ore being considered rebellious. By cyanidation, an extraction of over 80% was obtained at a cost of only \$0.75 for chemicals and handling. The cost of milling—that is, crushing and concentrating only—was found to be \$1.42, including the water which is pumped from the mine. Thus, comparing the total mining and milling costs, the results per ton are as follows:

Mining, milling concentration and pan amalgamation.....	\$7.65 gold
Mining, milling, concentration and cyanidation.....	3.50 "

In addition to the saving thus shown, there must be taken into consideration the increased extraction obtained by the use of cyanide. Since the average assay of

the ore was 40 oz. of silver per ton, this additional saving, namely, 20%, represents 8 oz. of silver, or \$4. As a result of the experiments, a cyanide plant is being erected, one of the first instances of such an accessory for a Mexican silver mine.

The concentrate from the Frue vanners was roasted with 8% salt in a reverberatory furnace for 10 hours, at a cherry-red heat. The assay of this concentrate was 200 oz. per ton of silver. It was agitated with cyanide solution (1.5%) for six hours, and gave an extraction of 90%. The cost per ton of roasting was as follows:

Salt at \$8 per ton.....	\$0.64 gold
Fuel.....	0.25 "
Labor for charging, rabbling and discharge.....	0.15 "
Total.....	\$1.04 gold

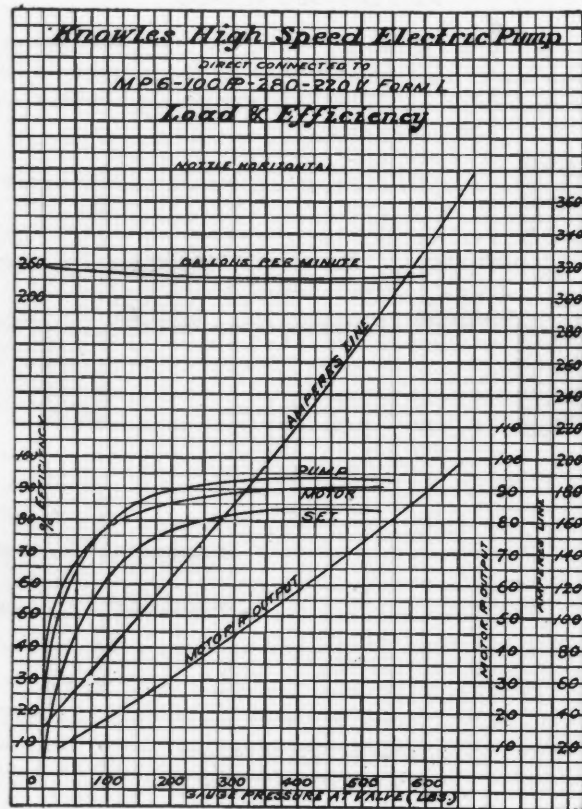
The cost of agitation and chemicals

### Pumping on the Comstock.

By CARL GEORGE P. DE LAVAL.

For years numerous efforts have been made to unwater and explore the entire Comstock lode. The latest move in this direction has just been made by the Ward Shaft Association, consisting of a group of the middle mines, composed of Gould & Curry, Savage, Chollar, Potosi, Bullion, Alpha Consolidated, Exchequer, and the Julia Consolidated Mining Co., who own and operate nearly a mile of the middle lode.

It is now about 26 years since the largest pumps of the steam-actuated type were installed, but since then the development of pumping appliances has advanced to such an extent that it would be an in-



amounted to \$1.45 gold per ton for treating the roasted concentrate. The examples given represent conditions which prevail in many parts of Mexico.

At the Anchor tin mine, in Tasmania, ore carrying less than 0.3 per cent tin is rendered profitable. During two weeks, for example, 5,142 tons were treated, yielding 11 tons of tin, equal to 0.21 per cent, or 4.7 lb. per ton; in terms of gold this return is equal to only 20 grains per ton.

In tin dressing, the presence of the sulphide (stannine) interferes with the separation of the oxide (cassiterite). At the Conrad mine, in New South Wales, the stannine in a silver-lead lode cannot be extracted profitably.

justice to criticise the types that were then in use. Suffice to say, it is with admiration that we look upon the great efforts and successful designs that were applied in former years by the veteran engineer, Mr. W. R. Eckart, of San Francisco, before the completion of the Sutro tunnel.

The responsibility of demonstrating that the latest types of pumps will accomplish the exploration of the southern portion of the lode below the 2,500-ft. level has fallen on the shoulders of Mr. Leon M. Hall, chief engineer and superintendent. The northern half has already reached a depth of 3,000 ft., with good returns from the deepest parts, and there are known to be large mineralized bodies below the 2,500-ft. level in the middle and southern parts, where the inrush of water about

twenty years ago flooded the mines up to the 1,600-ft., or Sutro tunnel, level.

No known mining district in the world has encountered greater difficulties than the Comstock. The water that was encountered twenty years ago at the 2,900-ft. level of Exchequer mine had a temperature of 170° F., that of the stations and workings being about 110°. After vain efforts to overcome this inrush of water it was finally decided to allow the mines to fill to the Sutro tunnel. About ten years ago another effort was made to unwater them through the Crown Point incline, which also was abandoned after

plant of the most modern type, consisting of three Reidler electric pumping engines driven by 200-h.p. induction motors. These pumps take the water at the 2,150 ft. level and, together, discharge 4,500 gal. per min. into the Sutro tunnel under a 430-ft. head. The hydraulic pumping engine serves as a sinking-pump, discharging into a tank at the Reidler pump.

The power is generated on the Truckee river, about two miles east of Floriston, where McCormick turbines are directly connected to Westinghouse three-phase generators of the revolving armature type. Each pair of wheels will develop about

prising the Comstock Pumping Association, which calls for the delivery of electric power for draining the Comstock mines, lighting, hoisting, etc., the maximum amount being 5,000 h.p. In order to fill these contracts for additional power the Truckee River Co. has now prepared plans for a second generating station and a new pole line. Water will be diverted from the river and conducted to the extreme eastern end of the company's hydraulic system, where it will be utilized by water-wheels under a head of 141 ft. For the maximum of 5,000 h.p. the rate will be \$4.50 per h.p. per month, with proportional rates for lesser amounts. This is based upon motor readings, and will save the mining companies a considerable amount of money as compared with the existing contract. All motors of 50 h.p. and over are operated directly on 2,240 volts, all smaller motors on 440 volts, and the lighting circuit is 220 volts, three-wire system, except in the Gould & Curry mine, where it is 110 volts.

The reason for installing the Reidler pumps at the C. & C. shaft in 1902 was the inability to go deeper than 450 ft. below the Sutro tunnel, with the power from the hydraulic water supply for the hydraulic elevators, which proved to be excellent sinking-pumps. Although the efficiency is only 25 per cent, the cost of repairs is small, and this type of sinking-pump is fully as reliable as any other appliance for this purpose. The pumping plant handles not only the mine water, but also the pressure water when the hydraulic elevators are used for sinking. However, when the shaft is free from water another pumping plant is to be placed at the 2,550-ft. level, abandoning entirely the use of the elevators.

The Reidler pumps are of the mechanically operated valve type, and run at 110 rev. per min. This gear accomplished its object for high speed when first introduced, but, of those pumps that have been fitted with it, in many instances the positive valve-gear has been removed, and the pumps have been operated with equally as good success without it. This is exemplified by a pumping engine designed by myself, having positively closed valves and running at a speed of 600 ft. per min., and from which the gear was removed for an experiment, to determine the capability of the engine running at the same rate of speed without the positive valve-gear. Since the removal of the valve-gear the pump has been running three years with a slight alteration in the arrangement of the valves themselves. The result has proved that high-speed pumps do not require positively closed valves and that such valves cannot be operated at more than 130 to 150 rev., while properly constructed poppet valves are operating at as high as 300 rev. without showing the defects natural to poppet valves. Various engines have been designed by me and are now running at 600 to 800 ft. without



PUMPING STATIONS ON THE COMSTOCK.

an expenditure of about half a million dollars; operations became confined to the ground above the 1,500 ft. level.

At this time hydraulic pumping engines were installed, together with various Cornish engines, able to keep the water at the 3,300-ft. level in the northern mines, but the expense was so great that the mines were allowed to fill to the 1,600-ft. level, and work was confined to the more accessible orebodies above the tunnel. About four years ago a large hydraulic lift was installed at the Consolidated California shaft, and with this appliance the water at the north end has been kept at about 2,150 ft., and ore having a value of over \$1,000,000 has been extracted. Having reached this level, another effort was made to go lower, by the aid of a

1,400 h.p. under a head of 84.5 ft. Regulation is effected by Lombard governors. The generator potential of 500 volts is raised to 24,000 volts by Westinghouse oil-insulated transformers, and the current is transmitted about 35 miles to Virginia City, over a double circuit of copper wire. The mining companies purchase power from the Truckee River General Electric Co., the amount used being based upon a peak load of two minutes' duration when the electric hoists are operated directly upon the lines. The price is \$7 per h.p. per month. There is about 2,000 h.p. of apparatus installed on the Comstock, which will soon be increased to about 5,000 h.p., a contract having been closed between the Truckee River General Electric Co. and the 32 mining companies com-

a positive mechanism, showing that water-hammer from backward flow at the end of the stroke, which causes valves to seat hard, can be removed without the application of mechanically-moved valves, if the pump is properly proportioned in relation to water spaces, air-chambers and passages. Some designers advocate mechanically closing both inlet and outlet valves, while others favor mechanical opening; again, some constructors mechanically operate but one set of valves. Such mechanisms are useless and lead only to trouble and expense. Simplicity is a desirable feature in all constructions.

In determining the type and design for the Ward shaft, the association was able to select the plant from the best types of pumping machinery in the world, and to consider the electric motor and pumping engine as a whole unit. It is a well-known fact that motors designed for such slow speeds as 100 rev. will give a very low power factor, and that one of the same capacity running at 200 rev. would give about 15 to 20 per cent better results as regards the amount of power saved at the generating station and the reduced cost for operating, and on this basis high-speed 200-rev. pumps without mechanically-operated valves were selected and ordered from the International Steam Pump Co. The contract calls for two first-motion electrically driven pumps, each of the units to have capacity for lifting 1,600 gal. per min. against a pressure equivalent to a height of 1,500 ft., or from the 3,000-ft. level up to the level of the south lateral branch of the Sutro tunnel. Each pump is to be driven by an 800-h.p. slow-speed induction motor.

It is intended to install a temporary drainage plant at the Ward shaft, first using an air-lift to lower the water to the 1,800-ft. level, and thence down to the 1,800-ft. level without other pumps. The present bottom of the shaft is at 2,500 ft., and when that point is reached the shaft will be sunk through the solid rock to the 3,000-ft. level, where the permanent pumps will be placed. The weight of both pumps for the Ward shaft and their motors is about 600,000 lb., which may be interesting for comparison with the older pumps at the Comstock.

The Ward shaft electric pumps will have a capacity of 3,200 gal. against 1,500-ft. head, and will cost \$80,000. The Mexican Union pumping engine is of the Cornish type, compound, condensing, fly-wheel, Leavitt arrangement of cylinders, with a fly-wheel 36 ft. dia., which, with its shaft alone, weighs 208,700 lb. The high-pressure cylinder is 64 in. dia. by 6 ft. 9 in. stroke, and the low-pressure cylinder, 100 in. dia. by 8 ft. 6 in. stroke. The nominal stroke of the pump is 10 ft. This engine was constructed in 1880, with a double line of 14-in. plunger pumps, discharging into the Sutro tunnel. Later the 14-in. pumps were replaced by 17-in., and

additional 18-in. pump rods were added about 1,000 ft. long. The pump rods, from the top bob to the 2,700-ft. level, were 2,618 ft. long. The total weight of moving parts was 1,620,500 lb. The total lift of water was 1,180 ft. to Sutro tunnel from the 2,700-ft. station. Due to the great length of pump rods, the effective stroke of the plunger was reduced from the surface stroke of 10 ft. to an actual stroke of 9.7 feet.

The Chollar, Norcross, Savage, Belcher and Overman pumping engines were all of the compound vertical condensing, Davey type. The high-pressure cylinders were 32 in. dia., the stroke 10 ft. 9 in., and the low-pressure cylinders 65 in. dia. and 8 ft. stroke. No fly-wheels are used on this type, and the strokes are variable as in any direct-acting pumping engine. These pumps force water from the 3,180-ft. level to the Sutro tunnel 1,570 ft. The total weight of the moving parts is 1,437,900 pounds.

In the Yellow Jacket shaft a pump was installed in 1880, which at that time was considered the best of any. The type of engine was a horizontal compound fly-wheel design, the high-pressure cylinder being 31 in. dia.; the low-pressure cylinder, 62 in. dia.; and the stroke, 10 ft. The balance bob was so constructed that the pump cylinders would receive a 10-ft. stroke. This pumping engine took water from the 3,000-ft. level, pumping it direct to the surface, having a total length of pump rods of 3,055 ft. The weight of the moving parts was 1,510,400 lb., and the engine made  $5\frac{1}{2}$  rev. when pumping 432 gal. An accident occurred to this engine, causing it to be closed down until the Sutro tunnel was completed, when it was replaced by a double line of pumps raising the water 1,516 ft. to the Sutro tunnel and pumping 700 gal. per min. About a month later a heavy flow of water from the 2,700-ft. level of the Exchequer mine was encountered, flooding all low levels. The pump was speeded up to its utmost capacity, 750 gal. per min., but the water still gained and the pump was not able to hold it, nor could any other means at hand control the water. It was then stopped entirely and for good.

In the Ophir mine the horizontal geared type of engine was used, the steam cylinder being 24 in. dia., with 5 ft. stroke, and the pump being fitted with two fly-wheels. The pump stroke was at the surface 8 ft. and 7.7 ft. below. The total length of the pump rods (partly on the incline) was 3,273 ft., the weight of moving parts, 1,067,500 lb., and the water was pumped 900 ft. to the Sutro tunnel, discharging 280 gal. per minute.

At the Consolidated California shaft the engine was of the Davey differential type, the high-pressure cylinder being 24 in. dia., the low-pressure cylinder, 40 in. dia., with an 8-ft. stroke and 7-ft. stroke for the pumps. The pumps could furnish 500

gal. per min., and the weight of the moving parts was 860,000 lb., with 2,150 ft. of pump rods. These pumping engines cost, without foundations and installation, \$1,300,000, giving maximum capacity for all of 5,400 gal. to an average height of 1,152 ft. The average cost for operating was about \$34 per i.h.p. per month. The total amount of water pumped was 5,040 gal. to an average head of 1,074 ft., with a total i.h.p. of 1,703. The total cost per month was \$58,120, or \$697,440 per year, not including repairs, like a broken bob, wheels, plates, rods, plungers, etc. The hydraulic pumps handled 2,128 gal. per min., and the Cornish 2,912 gal., requiring about 2.7 miles of rods, which, together with all other moving parts, came to the grand total of 6,496,400 lb. of reciprocating details requiring to be started and stopped nine times every minute. It therefore required 2,230 lb. of moving parts for every gallon pumped.

These figures are given for comparison with modern high-speed engines with small parts of light weight, as there are no heavy moving parts in directly connected pumping engines, which give at once the most flexible system, accommodating themselves to any size of installation. Great weights in motion limit speed, and the strength of materials is soon exceeded, causing break-downs and repairs. The old Comstock pumps could not be increased in capacity, as extra weight brought reduction of speed, as was shown at the Mexican Union, where the speed had to be reduced to about four revolutions per minute, on account of overstraining the rods, which were of 18 in. by 18 in. Oregon pine, and 2,618 ft. long. Owing to the extreme hot water ( $170^{\circ}$ ) and the saturated atmosphere of the shafts, the machinery and parts had to be constantly lubricated to an excessive extent, requiring careful watching for rotting of pump rods, rusting of wrought parts and destruction. The cost of maintenance and power was enormous, and could not continue with the advent of new methods and devices and the demands of shareholders for more dividends. When the C. & C. electric pumps were started a new era dawned upon the Comstock lode, which will be followed up by the installation of the permanent Knowles electric express pumping engines, just contracted for, draining the group of the middle mines to a depth of 3,000 ft. through the Ward shaft.

Chromic anhydride is known; also chromates and di-chromates, but not chromic acid proper, though di-chromic acid seems to be formed on dissolving chromic anhydride in water. The absorption spectrum of potassium di-chromate is the same as that of what is usually called chromic acid, which indicates that the di-chromic ion is the chemical individual of both.

**Books Reviewed.**

*Suction Gas.* By Oswald H. Haenssger. Cincinnati, Ohio; The Gas Engine Publishing Company. Pages, 88. Price \$1.

This is a contribution to the general problem of better economy and efficiency in the use of fuel, and fuel as gas in particular. The need of special technique on new mechanical devices is well illustrated in this little book, which considers the thermo-chemistry, the design, the cost of operation, and the possible utility of the suction gas-producer. The treatise, which emphasizes the virtue of one make of producer, is valuable in showing the general principles of several.

*The State of Idaho.* 1905. Boise, Idaho; Prepared and published by the Bureau of Immigration, Labor and Statistics. Pages, 200; illustrated.

This is an official publication containing information concerning the institutions, industries and resources of the State. It is prepared by the Commissioner of Immigration, Labor and Statistics. The book includes, besides an historical survey and interesting and valuable matter of a general nature, many data concerning mines and mining in the State. Each county is taken separately, and its resources and possibilities are set forth in a detailed and careful manner. There are many excellent illustrations showing town-views, scenery, mining operations, etc. The work in its inception and execution is to be commended except in one important detail. There is no index; and in a publication of this nature an index is its most important part.

*Jahrbuch der Chemie for 1903.* Edited by Richard Meyer. Braunschweig, Germany; Friedrich Vieweg & Sohn. Pages, 555; with index.

This is the 13th summary of the annual progress of chemistry. The volume is produced under the co-operation of more than a dozen of the active middle-aged specialists, working under the direction of the Brunswick veteran. The chapters include: (1) Physical Chemistry, by Bodländer, 55 pages; (2) Inorganic, by A. Werner and P. Pfeiffer, 74 pages; (3) Organic, by C. A. Bischoff, 98 pages; (4) Physiological, by Wm. Küster, 21 pages; (5) Pharmaceutical, by Heinr. Beckurts, 16 pages; (6) Foods, by the same, 9 pages; (7) Agricultural, by A. Morgan and W. Zielstorff, 19 pages; (8) Metallurgical, by Th. Fischer, of Berlin, 52 pages; (9) Fuels and Explosives, by C. Haussermann, of Stuttgart, 25 pages; (10) Industrial Inorganic, by F. Quincke, of Leverkusen, 19 pages; (11) Industrial Carbohydrates, by A. Herzfeld and O. Schreffeld, 14 pages; (12) Fermentation, by M. Delbrück and O. Mohr, 21 pages; (13) Fats and Mineral Oils, by J. Lewkowsch,

17 pages; (14) Coal Tar and Dyes, I, by P. Friedlaender, 61 pages; (15) ditto, II, by the same, 32 pages; (16) Textile Fabrics, by the same, 17 pages; (17) Photography, by J. M. Eder and E. Valenta, 25 pages.

The enumeration is interesting for the estimation of the relative importance of the respective divisions, which recognize neither electro-chemistry nor electro-metallurgy as separate headings, though separate annual volumes are now devoted to these subjects. But we are specially interested in the contents of chapters 8, 9 and 10, comprising together 86 pages, or 15.5% of the whole. Here we find some reasonable attention to the pyrometer, the construction and practice of the stack furnace, oil furnaces, together with special consideration of iron, aluminum, antimony, arsenic, lead, gold, cadmium, copper, nickel, platinum and the platinumoids, mercury, silver, zinc, and tin. Under fuel, we note pyrometry, hard and soft coal, turf, wood, liquid fuel, and gas fuel. Under explosives, nitro-cellulose (and by the way, nearly all of the so-called 'nitro' compounds are really nitrates proper, nitro-glycerine for instance), nitro-mannite and dulcite, nitro-glycerine, projectible powder, excavation powder, fuse, celluloid, etc. Under industrial inorganic, there are given sulphuric acid, soda (how the old substantialists do hold their places!), alkali industry, potash, sulphate, hydrochloric acid and chlorine, nitrogen compounds, fertilizers, glass, ceramics, cement, and minor products. The volume is worth its price for these chapters, 8, 9, and 10.

It would be ungracious, in this age and civilization, to pass unnoticed the other rich material assembled on subjects that are more closely related to the 'organic' world, carbon, and the like; but a word must suffice. Comment on the book as a whole is uncalled for, and flattery is out of place. The wonder is that a fair condensation, of such a many-fingered and many-eyed science as chemistry, should be attempted—not to say fairly accomplished—in the space of one volume, and with almost audacious promptness. The busy metallurgist can add no better volume to his library than this, which must represent the substance of at least twenty more technical journals, weekly, fortnightly and monthly, pure and practical.

**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.

*L'Iglesiente Propriamente Detto e la Sua Costituzione Geologica.* By Giovanni Merlo. Turin, Italy; G. U. Cassone. Pages, 36; illustrated.

*Preliminary Report of the Ohio Co-operative Topographic Survey.* C. E. Sher-

man, Inspector. Columbus, Ohio; State Printers. Pages, 228; with maps.

*New Mexico Mines and Minerals. World's Fair Edition.* 1904. By Fayette A. Jones. Santa Fé, New Mexico; The New Mexican Printing Company. Pages, 360; illustrated.

*The Art of Generating Gear-Teeth.* By Howard A. Coombs. Reprinted from the *American Machinist*. New York; The D. Van Nostrand Company. Pages, 132; illustrated. Price, 50 cents.

*Geological Survey of Michigan. Volume IX, Part I. The Delta of the St. Clair River.* By Leon J. Cole. Lansing, Mich.; State Printers. Pages, 248; with maps, plates and illustrations in text.

*The Laboratory for the Testing of Road Materials at Columbia University; with Observations on Current Practice.* By A. Black. New York; Reprinted from the *School of Mines Quarterly*. Pages, 28; illustrated.

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*Department of Commerce and Labor. Bureau of the Census. Special Reports on Mines and Quarries.* 1902. Prepared under the supervision of Wm. M. Steuart, Chief Statistician. Washington, 1905; Government Printing Office. Pages, 1,124.

*Steam Turbines, with an Appendix on Gas Turbines and the Future of Heat Engines.* By A. Stodola. Translated from the German by Louis C. Lowenstein. New York; The D. Van Nostrand Company. London; Archibald Constable & Co., Ltd. Pages, 444; illustrated. Price, \$4.50, net.

## 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 Smelting & Refining Company of Australia.*

Sir—I have just seen the JOURNAL of February 2 and the reference to the Smelting and Refining Company of Australia. Will you permit me to state that I resigned my seat on the board of this company over two years ago, and that the property was a going concern when I originally became associated with it, and not, as you say, "lying idle."

REGINALD WARD.

London, Feb. 27, 1905.

*The Metric System in Mexico.*

Sir—I am afraid that those who take such an optimistic view of the metric system fail to realize that men do not, will not and cannot change easily from one standard to another. For instance, why is there any other bolt thread than the United States Standard used?

I have just returned from a two years' engagement as master mechanic in Mexico, and in all that time I saw no metric units used in mechanics. Railroads, mines, buildings, power-plants, lumber mills, rolling-mills, and, in fact, everything mechanical uses feet and inches. While iron is purchased by the pound, if it is imported from the United States it must be invoiced in kilograms to conform to custom-house requirements. A mining company's store clerk checks out such things by the pound. Even in the regular city stores one buys meters of cloth that is one yard wide, kilos of 3-in. nails, 1-in. iron, or 12-lb. rails. After a thousand years of that sort of use of the metric system the change back to the English system could be made in a day, as easily as was the change to the metric. The ordinary two-foot rule can be purchased in Mexico with metric graduations on one side, but I found not the slightest use for these graduations. Firewood is purchased by the cord and *carga*, and ore by the *carga*. I wonder if the metric system is used in other so-called metric countries as it is in Mexico?

I would beg all who are interested in this subject to read 'The Metric Fallacy,' by Halsey and Dale. It would seem impossible for any one to advocate the metric system after reading this compilation. The book was published in 1904, when the metric bill was before the House of Representatives. It would be useless for me to go into the merits of the case when Halsey and Dale have given us the result of so much investigation and thought.

I know the extent of the Mexican use

of the metric system, and would like to hear from those who know the actual conditions in other metric countries. Land surveys are metric in Mexico, but, compared to the work which has been done in land surveying in the United States, the amount of surveying which has been done in Mexico before the change to metric was *nil*. Besides—and this is a joke, though true—the United States Geological Survey believes that the metric system should be adopted in all departments but its own.

MARK R. LAMB.

San Francisco, March 5, 1905.

*The Metric System.*

Sir—The contribution by "Decimal" in your issue of February 23 brings forward again a subject of paramount importance. Your columns have hitherto frequently contained valuable lines upon the adoption of the metric system for universal use in the technical practice of our profession. I cannot but be convinced that the facilities thereby accruing must, more than once, have strongly appealed to those engineers who have had the opportunity of making calculations both in the English and the metric systems:

Having had occasion of late to make some plans of a permanent value to those interested, I was very loath to use the system in vogue, but I had to resort to it, nevertheless, simply for the sake of correlation with previous work; perhaps, unfortunately, as well for the sake of correlations immediately to come.

We in this country have certainly this advantage, that we are not possessed of the prejudices which are at times, perhaps, apt to slightly shadow the proceedings of a few of our cousins across the Atlantic; and, furthermore, that spirit of enterprise which is characteristic of American undertakings, and whereby we find ourselves ever ready to take up and uphold any feature of work tending to facilitate execution, ought, I believe, to pave the way for the adoption of a system of calculation the merits of which it were superfluous to enter into at this date.

Those who have delved in the fascinating study of the properties of numbers will readily perceive how the decimal system is itself inferior in value for practical purposes to a system of which the number twelve is the base. This in view of the greater number of factors divisible into the duodecimal base. But then 24 would still be preferable, and so on *ad infinitum*. And as perfection cannot dwindle to our limited potentialities, we might as well plead for the decimal system and abstain from asking for too much.

Your contributor, "Decimal" (whose name, by the way, I would gladly learn), persistently points to the ready acceptance of the metric system in Germany. A remarkable fact, indeed, when we bethink ourselves of the deep hold constituted

usages will retain among the masses. This, to my mind, is only suggestive of the increased facility which the change would obtain in the United States. We must remember that a large percentage of the immigrants, during the past twenty-five years and more, consist of individuals who were already accustomed, in their native country, to count by tens, hundreds and further on in the progression. Statistics will show how large a percentage of the population they make up. To confront them with the multiplicity of our *non-interdivisible* systems constitutes somewhat of a retrograding step.

As suggested by "Decimal," the change must come from above. A strong impetus that might be given toward the adoption of the metric system within the land would consist in its usage by all the government departments. The national industries would follow close. Why should not all the standard products of our iron, steel and other industries be gauged by multiples of decimal units? Would that constitute such a sweeping change? Assuredly not, in view of the nation's sound common-sense, which would immediately grasp the advantages to be gained thereby.

Again, if the educational institutions would take the matter up and train those under their care to calculate in the decimal system, a still further advance might be recorded. But even more would be accomplished were engineers, who constitute the vast army of calculators, to tacitly adopt the metric system in the course of their technical practice. I cannot conceive of any wider-reaching means. Thus would the decimal system gradually find its way in our technical literature; in the course of a few years, thanks to the wide diffusion obtained by means of publications of the same rank as THE ENGINEERING AND MINING JOURNAL, the antiquated systems yet in vogue would be effectively weeded out.

Not the least among the changes brought about by the French Revolution can we reckon the adoption of the metric system by that body of scientific men, among whom such names as Laplace, Monge and Legendre are found. It would be to the pride of American engineering to bring about the same change among the English-speaking nations, composing a far larger aggregate of individuals than the French can boast.

LEON DOMINIAN.

Delagua, Colo., Feb. 28, 1905.

Silicon fluorofom has been recently prepared, analogous to ordinary carbon-chloroform. It is a combustible gas, liquifying under ordinary pressure at  $-90^{\circ}$  C., and being decomposed with water, or alkaline solution, without change of volume. This completes the series of the silicon analogues of chloroform, namely: silico-fluorofom, silico-chloroform, silico-bromoform, and silico-iodoform.