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Copper Coinage in China.*

Special Agent Burrill has made to the Department of Commerce and Labor the following report on the increase in importation of copper into China and its use by the mints in conversion into 1-cent pieces and "cash:—"

The enormous increase in the importation of copper into China recently is due to its unrestricted coinage into 1-cent pieces and cash, which operation is virtually under the absolute control of the provincial authorities. While the multiplicity of mints threatens the debasement of the currency of the Empire, the Central Government leaves the question of production entirely to the viceroys of the provinces. As these officials realize a comfortable margin of profit on the coinage, business men here assume that there is no likelihood of its early cessation, and that the extensive copper importation will continue. The Shanghai Chamber of Commerce has investigated this question and has informed the diplomatic corps at Peking that representations looking to the regulation of currency should be made to the Government. The chamber pointed out that as the Chinese provincial governments imagine they have a perennial source of income from the profit of the mints, they may fail to grasp the dangers of depreciation because of overissue. It was further suggested that if restrictions be not established, foreign trade in China must inevitably suffer.

In the report on the trade of China and abstract of statistics it is estimated that the output for 1904 approximated 1,745,000,000 of copper pieces, and the chamber of commerce declares that by 1906, when all the mints, new and old, are in operation, the output will reach in round numbers 16,413,000,000 pieces. There are

*Daily Consular and Trade Reports, No. 2446. Dec. 26, 1905.

18 or 19 mints now in operation in China, but although bankers and merchants have given the subject close study, they find it extremely difficult to obtain through unofficial channels absolutely accurate information as to the present producing power of the various mints established. These conditions indicate a growing demand in China, and it is estimated that the United States now exports to this country practically one-half of all the copper that is used. The American electrolytic copper is popular here because it can be worked to advantage in the mints. Australian copper, sold through British and German syndicates and metal exchanges, is also largely represented on this market. The "Walleroo," mined in Australia, is regarded as one of the best produced in the world because of its purity, but for the purposes of the Chinese the best American electrolytic copper is fully as desirable.

The importation of copper disks or blanks, the same size as the coins themselves, has been prohibited by the Chinese Government for the reason that individuals brought them in and, by using a home-made stamp, more or less crude, but nevertheless effective, established a lucrative industry. These coins circulated freely in the interior, and the authorities found it essential to suppress the competition. The customs authorities will, however, admit copper disks through the custom-house for delivery to Government mints on an order from Peking. Such disks are now made in England, Germany, and Japan, and are said to be more profitable for export than ingots. There is also a demand for copper strips 2½ to 3 in. wide, of the same thickness as the coin. These strips are stamped at the mints and placed in circulation, saving time and decreasing somewhat the expense of coinage.

The United States and other copper exporting nations have adopted the custom of shipping the long ingots, which is regarded as far more satisfactory, as it prevents pilfering en route and also guards against short weight. This change in the method of shipment was brought about by the trouble experienced in importing the short ingots in such condition that they would arrive at their destination without loss to either the exporter or the importer. The customs duty on copper is 1.175 Haikwan taels per pikul, or approximately 88c. in American money figured at \$1 gold as the equivalent of 1.34 Haikwan taels, the rate for November Duty on copper is rarely paid in China, however, as it is used for Government purposes and may be imported free on the pass of the taotai of Shanghai, whose

position is similar to that of the mayor of an American city. For the purposes of such free importation authority has been delegated to this official by the Peking Government. Copper is bought in this market on a c. i. f. basis; this is, its price laid down in Shanghai must include cost, freight, insurance, and commission.

The Welsh Colliery Situation.

Consul Daniel W. Williams, of Cardiff, reports that there will be no general lock-out or strike in the Welsh coal fields in January, the conciliation board, which represents masters and miners, having formulated a new agreement, which will continue until Dec. 31, 1909. The terms of the agreement are practically the same as those which have been in operation for the past three years.

It was realized by all parties that any further reduction of wages would have precipitated a strike involving about 163,000 miners. Any stoppage of the mines at the present time would have resulted in serious losses to the masters as well as to the miners, for the reason that much of the present depression is caused by the competition of cheaper German and Belgian coals in the European markets, and any shortage of Welsh coal would give foreign coals further opportunities to gain new markets. On the other hand, certain contingencies may restore a measure of prosperity. A strong effort will be made the coming year to remove the Government tax of one shilling a ton.

Tin and Gold in the Malay States.

The report of the British Resident-General for 1904 shows that there was a further increase that year in the output of tin in the Malay States. The figures for the past three years are as follows:

	1902.	1903.	1904.
Pikuls	780,871	841,993	856,238
Equal to tons	46,480	50,054	50,960

Of the output for 1904, 553,193 pikuls were sent out of the country in the form of tin ore, and the balance in the shape of block tin. The price of tin did not fluctuate so widely as in the previous year; and the local sterling rates give an average of £121 18s. a ton for 1904, and for 1903 an average of £122 19s.

The results of gold mining in the States during 1904 do not appear to have been brilliant. The quantity obtained from actual crushings was 12,625 oz. from 54,961 tons in Pahang, and 2,189 oz. from 3,438 tons in Negri Sembilan. In addition, 146 oz. were obtained from alluvial washings, and 2,115 oz. from 11,350 tons of tailings by means of the cyanide process.

Gold Dredging in 1905.

BY J. P. HUTCHINS.*

During the past year this flourishing business has had considerably more than a proportionate share of success in the world of metallurgical operation; and it is now in a healthy and progressive condition. A growing realization of its unique advantages, and a general conception of its unusual possibilities, have contributed largely to this result. Dredging for gold is less in the sphere of hazardous chance, and more within the realm of commercial certainty, than is any other form of precious-metal mining. Placer mining in general, and particularly those operations which include the exploitation of shallow alluvion, have the advantage of being almost, if not quite, on the plane of commercial enterprise. The risk of failure is slight, if the preliminary exploration is directed by skilled engineers and the subsequent exploitation is directed by careful managers; but an unusually high grade of engineering skill, experience and judgment are necessary. The seeming simplicity of the examination of alluvion and of the operation of dredging machinery, has often resulted in the employment of amateurs and usually with disastrous result. Comparatively shallow placers are essential for success in dredging. The ease, cheapness, quickness and great reliability of the prospecting methods, applicable to such deposits, have called the attention of capital to dredging. The determination of ore-reserve (so vitally important in all mining operations) may be accomplished in its entirety, beforehand and exactly. Such knowledge, when combined with a true appreciation of the characteristics of alluvion, lead to results which can be predicted with certainty.

Results of Prosperity.—The world's production of gold by the dredging method during 1905 is probably less than 5%, and possibly less than 3%, of the total. The reasons for its seeming undue prominence are several. The most potent is the comparative lack of hazard; the success of dredging is its own recommendation. As a result, conditions are assuming a phase which though not necessarily bad, are at least conducive to that bad condition which makes "booms" possible. Australia is now recovering from the reaction following such a boom in dredging years ago. The volatile inhabitants of Argentine Republic have recently suffered from an excitement imported and industriously stimulated by New Zealanders. Harm has been done although they had sincere intentions; and there is a danger of similar disaster as in Australia, where enthusiasm, insufficient prospecting, with faulty design and weak construction, caused many failures. The possibility of more booms is not remote; the investing public cannot

* Mining Engineer, New York.

be too carefully warned against them. In the United States there has been comparatively little illegitimate promotion. Prospecting methods do not readily lend themselves to the unscrupulous. This is due to a uniform and standard procedure, with generally accepted conceptions of prospecting, in which the employment of skilled engineers has assisted. The honesty and integrity of those engaged in all phases of dredging has had its effect on the general prosperity of the business. As a general statement it can be said that where dredging has been unsuccessful during the past year, there has been a woeful lack of careful prospecting and good management.

Failures and the Causes.—There have been failures, but in every case the causes are easy to determine. Thus unalloyed prosperity has not attended some companies in Australia. Elsewhere the use of "standard" dredges, in areas requiring unusual design and construction, has resulted badly. These dredges are "standard" only because they have been evolved with great success in peculiarly favorable and easy environments. Until it is more clearly understood that, for instance, the Oroville dredge (probably the most successful type) is not a mechanism universally adapted to the successful working of all auriferous alluvions, disaster is bound to occur. Examinations by amateurs, and purchases of "stock" dredges from manufacturers who are frequently unwilling to modify the design and construction to suit particular conditions are responsible for other failures. Nepotism in dredging companies as in insurance corporations has been an expensive luxury.

Modification of Prospecting.—During the past year attention has been directed to the necessity for conducting examinations so as to rectify the incongruity between prospecting and dredging. Shaft sinking, where not impossible nor of prohibitive cost, has been more generally preferred in determining value and in investigating other characteristics of alluvion. The unquestioned advantage of this method (over that of making test-pits of small diameter with drilling machines), has been more generally recognized; it can be predicted that in the future there will not be such a wide difference between prospecting and dredging values. The added advantages of easy and thorough inspection of the various characteristics of the gravel section and bottom (so important in the investigation), are such as to justify the extra expense. In the examination of subfluvial, sublacustrine and submarine alluvion, drilling machines are absolutely necessary; in the preliminary investigation of areas unsuited to shaft sinking they are useful. However, they have not occupied their former exclusive position as being indispensable to all prospecting of dredging ground.

It is seldom that prospecting is done

too thoroughly; but in several instances, during the past year, examinations have been so conducted and at such cost that they can only be called extravagant affectations of accuracy. In this, as in other procedure, splitting hairs is of no use. In the examination of lode mines there is frequently ample justification for large expenditure in sinking and driving. The expenditure in prospecting dredging ground is lower than is permissible in lode mining. Overstepping this limit is bad practice. Thus the cost for a superfluous number of test-pits can much better be applied to the installation of dredging machinery and to a working test. In some cases unnecessary disbursements of such magnitude have been made which would instal a complete dredge of large capacity and high efficiency. Such practice is pernicious affectation.

Prospecting cost per ft. of depth has not varied materially during 1905. Shaft sinking, in a majority of cases, has proven more costly than drilling. It has varied from \$1 to \$8 per ft., the smaller figure is in shallow ground requiring no timbering or pumping. According to recent figures, prospecting in California by drilling machine varies from \$1 to \$2.50 per foot.¹

Expansion of Dredging.—During the past year the number of gold dredges operating in the world has increased to nearly 500. Investigation brought new cases within the horizon of dredging possibilities; operations are being conducted from Tierra del Fuego (where large volumes of 16c. dirt have been found), to the Arctic circle (where a tenor of more than \$1 per cu. yd. has been saved). Large districts in the temperate and tropical zones of South America (Bolivia, Brazil, the Guianas, and Colombia) have been included. They seem to possess the basis for future operations of considerable magnitude. In Alaska and Klondike, the experience of 1905 indicates a more hopeful future. Until recently, because of unfavorable conditions, due particularly to a hostile climate, these districts were supposed to be unsuitable for dredging. Similarly, several years ago frozen gravel was thought to be unworkable by the hydraulic method. In dredging ground where any considerable extent of frozen material is encountered the high cost requires that there be high value in the ground. Investigation and exploitation have proven the existence of large areas which are but little or not at all frozen. Thus in one case in the Klondike valley, a dredge with 7-ft. continuous buckets, working alluvion 25 to 30 ft. deep, encountered no frost. This augurs well; the installation of other modern and well designed plants has a similar significance. Frozen condition of alluvion added about 40c. per cu. yd. to the working cost, for thawing.

¹ "Gold Dredging in California," *Bulletin* No. 36, California State Mining Bureau.

Provincialism in Dredging Practice and Dredge Design.—This unfortunate condition has been more noticeable than is warranted in these days of progress; thus design of close-connected buckets has delayed progress. The devotees of the headline in their blind adoration, refuse to see the advantage of the spud.

Several years ago when "paddock," or inland, dredging (with its accompanying difficulties of disposal of fine) was in its inception in the Oroville field, I visited Bannack, Montana. The particular problem there had been the evolving of an efficient dredging pump; elsewhere they called it miraculous and impossible, and went on trying to solve the problem in their own ways. They ignored to their disadvantage, the long experience at Bannack. This spirit is manifest in numerous other ways; it may be fostered by manufacturers who are often unwilling to modify design and construction to suit particular conditions; this may be aggravated when dredge operators become partisan.

Variation in Practice and Design.—During 1905 practice has apparently continued to vary more widely than ever. In the design of gold-saving areas, and with this object in view, we have made strenuous efforts and we are justified by seemingly good results. In this respect of gold-saving arrangements, the Australians and New Zealanders, have gone through the list of gold-saving devices; recent practice contemplates either a table-area of about one-sixth that of our dredge, or no tables at all, using the sluice-box alone. It is difficult to reconcile such contrary opinions. Gold, both here and in the Antipodes, has the same aspect when seen from the viewpoints of saving, specific gravity, fineness and amalgamability (the potent factors in extraction); hence gold-saving methods are practically coincident here and in Australia. Does it seem possible then that such different conclusions can be the result of correct deductions from careful practice? The dredge with large table areas (either on the main hull in co-ordination with screens having perforations of about 0.5 in. in diameter, or on an auxiliary scow in conjunction with a grizzly as the hydraulic mining undercurrent is used) is considered the perfect gold-saver, on the Western Continent.

The experience of the United States with the device which is now preferred in New Zealand and Australia (the sluice box alone) has created doubt as to its efficiency. To cite one instance, material which had been originally passed through 120 ft. of sluice, on redigging and passing through 30 ft. of sluice of the same type, yielded about as much gold as at first. This is not entirely determinative, as the possible presence of material which disintegrates with time and exposure would vitiate any positive conclusion. Australians and New Zealanders (by the side of whom, American dredgemen are as in-

fants) seem to have quite different characteristics, in that they have tried more varied gold-saving devices than we have, and through a much longer time. Amalgamation as an aid in saving gold is in disfavor among them. At first, some are tempted to conclude, as experience is the best teacher, that their own practice is best. However, when one reads that only one-half as much gold is recovered by the floating dredges as is saved in other placer operations, in areas of the same characteristics in Australia, all is in doubt again. Here again confusing factors make conclusion hang. It can be said, as a general statement, that even though conditions in Australia, New Zealand and America are somewhat dissimilar, yet such contradictory conclusions can be the result only of hap-hazard and crude manipulation.

Sampling of Tailing.—The chaotic conflict of practice (more obvious than ever in 1905) is almost entirely due, to the ignorance of the approximate extraction accomplished by the gold-saving apparatus. Prospect values and gold extraction per cu. yd. have been considered in detail. The cost of handling material per cu. yd. has been minutely tabulated in cost sheets with numerous items; extraction, repairs, lost time, etc., have been examined microscopically. Deductions as to extraction have been made simply by comparing results of clean-ups, with results of prospecting; this procedure has shown that the relation of extraction to prospecting varies from 40 to 250%, and *vice versa!* This is analagous to ascertaining the extraction in vein mining, by comparing clean-up with assay value, without any sampling of tailings. Such bad practice is unquestionably responsible for the present condition; until it is known what proportion of the gold tenor is lost in tailing, numerous different gold-saving devices will be used (locally, for no other reason than custom); gold-saving practice will vary with the personal factor.

Modifications of Design and Construction.—No striking novelties of design or construction have been introduced during 1905. Excavating, screening and tailing apparatus have approached similarity in design and construction in all parts of the world; however, this convergence is taking place slowly. In sluicing and gold-saving, the tendency has been to diverge. Amateurs conducting placer mining with crude incompleteness, have always been responsible for seemingly contradictory results, which are likely to stagger an enquirer for exact information. Dredging is handicapped by this unfortunate condition. In a period when all metallurgical operations have been striving for refined methods, such uncouthness is unpardonable.

To be sure, there has been an improvement, and dredges have excavated larger volume and at less cost than ever before.

High saving has been accomplished principally because of the new design of dredges which includes the better co-ordination of the various phases. Early designs were notoriously deficient in this respect; and a constant overloading of gold-saving devices, due to insufficient capacity, resulted in loss. Dredges are now being constructed to dig 60 ft. below the surface; this means that it is possible to handle alluvion more than 75 ft. deep (by having a bank more than 15 ft. above water level).

The centrifugal tailing-elevator has proved its worth in New Zealand and Australia during the past year. Its adoption in America is yet to be chronicled. The first steam-turbine for gold dredging was installed during 1905, its use will be of material assistance in many instances. It was adopted in the Klondike, to economize the expensive fuel, and to allow larger deck room on the dredge. A short description of this new plant is of interest. The dredge has 7-ft. close-connected buckets, with a record of 3,200 cu. yd. per day. Its rated motor capacity is 290 h. p., of which less than one-half is normally used². The power plant includes boilers of combined capacity of 450 h. p.; a 600-h. p. steam turbine (this size was installed as it was intended to operate several dredges) and surface condensers. Electricity at 2300 volts, was generated and transmitted to the dredge where transformers reduced it to 440 volts. The entire installation was completed and in operation in 43 days; it ran satisfactorily, even at a temperature of 2° below zero, until continued cold weather caused a shut-down. This is unusually good work, and is highly commendable.

A marked progress is manifest in the disposition of operators (with wide experience) to prefer trommels to shaking-screens. The superiority of the revolving-screen is shown in economy of power and maintenance cost, due to its mechanical features, and to its better work as a screening device; this latter advantage is due to its disintegrating effect.

The general tendency during 1905 was to build dredges larger, with greater proportionate strength of parts and increased capacity. That larger buckets can excavate to better advantage in alluvion containing boulders, clay or cement, has been more generally acknowledged. Various bad mechanical arrangements (like that by which stacker belts were driven from the lower end) have been eliminated in the newer designs. A general improvement is noticeable.

Some of the recent years were periods of retrogression by reason of the general bad design and bad construction of dredging machinery. The ability of the dredging industry to prosper despite such handicaps

² "A New Centrifugal Elevator," by W. Peck. This JOURNAL, Aug. 5, 1905, p. 199.

indicates its flourishing condition. There have been several installations of freak types, but they have accomplished no general good.

Modifications in Manipulation.—There has been a refinement of method, particularly in the prevention of wasting adjacent virgin ground. More care in gold-saving has been noticeable, and considerable progress has been made. A great divergence of manipulation still occurs in methods of holding dredges; however, the respective merits of spuds and head-lines have been better demonstrated than ever before.

Adverse Legislation.—The dredging industry has assumed such a magnitude as to threaten, in a slight degree, contiguous and adjacent interests; but no hostile associations and legislation (such as that which resulted from hydraulic mining in California) have developed. In Australia, however, dredging operations have been regulated (but not materially obstructed) by legislative enactment. In California, ill-advised agitation by hysterical devotees of aestheticism, and action by sycophantic black-mailers, have caused some annoyance; but no harm has or can result to any industry doing such inestimable good with such slight accompanying damage.

Merger of Dredging Corporations.—The first important instance of what undoubtedly will be a series of mergers has been consummated in 1905. More than most metallurgical operations, dredging invites consolidation; the results of this have been good. The time when each dredge was an independent individual in a dredging community, with its own manager, city officer, superintendent, foreman, machine- and blacksmith-shop, is passing. Cost is more likely to be materially reduced by pooling, than by improvement in design, construction or method.

During the past year there has been a slight reduction of costs; due particularly to the incorporation of several companies under one management; and in a lesser degree to the building of larger dredges with increased capacities. Cost varies greatly; from 3c. per cu. yd.; to more than 50c. per cu. yd. in Klondike and Alaska. Cheap work can be done only in temperate zones. The obstacles, individual to tropical or frigid climates, and which only hinder other mining operations, are serious when they concern this industry. Dredging cost is very sensitive to environment.

Salt in small proportions does not injure cement. It should not be used, however, for stucco work, as it causes an efflorescence on the surface. Neither should it be used for any work coming into contact with ammonia, as for stables or chemical works.

Neat cement reaches a greater strength at short periods than sand mixtures. Long time tests prove, however, that sand mixtures ultimately attain greater strength than neat cement.

Coal Industry of West Virginia in 1905.

BY J. W. PAUL.*

Nothing of particular novelty characterized the coal industry of the State; there was the usual increase in tonnage, and also the clamor of the operators for railroad cars in which to ship the product. The trade, viewed from the operators' side, was productive of much profit, by reason of the low price for coal during the greater part of the year. Much complaint was heard, during the latter half of the year, of the scarcity of cars; but this condition seems to have been the result of a general demand upon the railroads for cars for all purposes. Again, the increase in the production of coal in the fields now developed was quite large, and the growth was in excess of the ability of the railroads to move the tonnage offered.

Based upon the production for the fiscal year, ending June 30, 1905, the production of coal for the calendar year 1905 reached 35,000,000 net tons; and of coke, about 2,800,000 tons. That the railroads took care of an increased tonnage, a table given herewith attests; the figures are in tons:

	1900.	1903.	1904.	1905.
B. & O. R. R. Co.....	4,832,853	5,749,829	7,988,955	7,864,308
C. & O. Ry. Co.....	4,116,970	3,609,467	5,976,644	7,700,811
N. & W. Ry. Co.....	4,181,400	6,075,934	6,749,131	8,227,419
K. & M. Ry. Co.....	713,811	*1,161,457	1,508,861	1,865,130
W. Va. C. & P. Ry. Co.....	1,729,568	1,586,158	1,809,833	1,821,690
Totals.....	15,574,602	18,182,845	24,033,424	27,479,358
*Estimated.				

During the past two years, improvements were in progress which placed the railroads in a position to accommodate the growing traffic; but the lack of motive power and coal cars was keenly felt. The trade names of West Virginia coals are becoming so firmly fixed, and so widely known in the general markets that an ever increasing demand is made upon the producers.

In the past, the most enthusiastic predictions of future production were surpassed; and, on account of the numerous opportunities offered by the State, it becomes mere guesswork to hazard a prediction upon the future tonnage.

The year closed marked an important era in railroad construction within the State; notably, the completion of the Coal and Coke Railway, connecting Charleston with Elkins; the grading of many miles of the Deepwater Railway; the opening of the Kanawha and West Virginia Railroad Company's line along Blue Creek; the extension of the Coal River and Western Railroad; and the grading of the extension of the Morgantown and Kingwood Railroad.

Since 1896 this State has been third in rank among the coal-producing States, a

*Chief Mine Inspector, Charleston, W. Va.

position it now holds, being surpassed only by Pennsylvania and Illinois.

The consolidations of consequence during the year consisted of the absorption by the Fairmont Coal Company, of the Pittsburg & Fairmont Fuel Company and the Southern Coal & Transportation Company; by the Sunday Creek Company, of the Kanawha & Hocking Coal & Coke Company; and by interests allied with the Berwind-White Coal Mining Company, of the W. P. Rend Mines.

During the last part of the year an effort was made to consolidate, under one ownership, about 28 mining companies on Cabin Creek in Kanawha county; also a similar effort was made to consolidate, under another ownership, all the mines on Paint Creek, Kanawha county; but at the close of the year, neither effort had been consummated, though the indications are favorable to an early consolidation of these fields.

During the calendar year there were no strikes of any consequence in any part of the State, aside from local troubles of short duration, in which the mines in Mason county were the most affected.

The year closed with a good demand for coal and coke, with prices ranging up to \$1.40 for coal; and \$2.75 to \$3.00 for coke.

Cadmium in Spelter.

The effect of a small cadmium content in spelter has been discussed in this JOURNAL (April 13, 1905, p. 697). A further contribution on this subject has been made by F. Novak, in a paper entitled "Physical-Chemical Studies respecting Cadmium in Lead-containing Zinc (*Zeit. f. Anorg. Chem.*, 1905, XLVII, 421). The most important results of his investigations are that an increase in the cadmium content of spelter rolled at 120°C. effects a reduction of the reaction-velocity in the solution of the spelter in dilute chlorhydric acid; but an increase, in the case of dilute nitric acid. The addition of 0.25% of cadmium to spelter gives the latter, after rolling and recrystallization by strongly heating, a finer grained structure than the cadmium-free zinc. The addition of 0.25% of cadmium to zinc increases its hardness and tenacity; and diminishes its brittleness. A higher content of cadmium (over 0.5%) makes the spelter softer, more brittle, and weaker than pure zinc; and consequently has an unfavorable effect on the quality of the metal.

Metallic palladium may be deposited from a solution of cyanide of palladium.

A Bucket Elevator for a Mine Shaft.

A continuous bucket elevator has recently been installed by the Underwriters' Land Company to raise zinc ore from its 45° shaft at Carthage, Mo. The general

ward in case the power is shut off. It operates on the large spur wheel on the driving shaft, and is designed to allow free rotation forward, but to grip the spur wheel and hold it fast upon its making any backward movement.

permit a wide range of feeding capacity.

The elevator was built by the C. O. Bartlett & Snow Company, Cleveland, Ohio, and cost \$3,700 f. o. b. Carthage, erection not being included. The cost of elevating ore by this method, as given by the operating company, is 0.37c. per ton.



FIG. 1. BUCKET ELEVATOR.

arrangement of the plant is described in *Engineering News* (Dec. 7, 1905, p. 598), from which we take the illustration Fig. 2. The driving head is 42 ft. 6 in. above ground in the top of the head frame, and the tail sheaves are carried on a concrete foundation set in an enlargement of the drift leading off from the shaft bottom. The floor of this drift is 155 ft. 3 in. below ground, and this is, therefore, the vertical depth of the shaft. Measured on the incline, the shaft is 219 ft. 6 in. long. The conveyor is 300 ft. long between centers. In operation the ore is discharged from cars into hopper near the bottom of the elevator; from the hopper the ore is fed automatically into the buckets, which discharge automatically into the crusher bins in the head frame. Fig. 1 is a view of the head frame showing the shaft opening and the chain of buckets rising from it.

In the shaft the rail stands are supported on concrete piers, and above ground they are carried by a timber trestle. The buckets are of the overlapping type, of malleable iron and are 24 inches long. They are carried by two strands of drop-forged steel chain, with 1½-in. steel axles to which are fastened track wheels 6 in. diam. The track consists of heavy T-rails and the chain travels 50 ft. per min. A ball-brake, or friction ratchet, is designed to prevent the elevator from running back-

The feeding hopper at the foot of the shaft is somewhat similar to the "recipro-

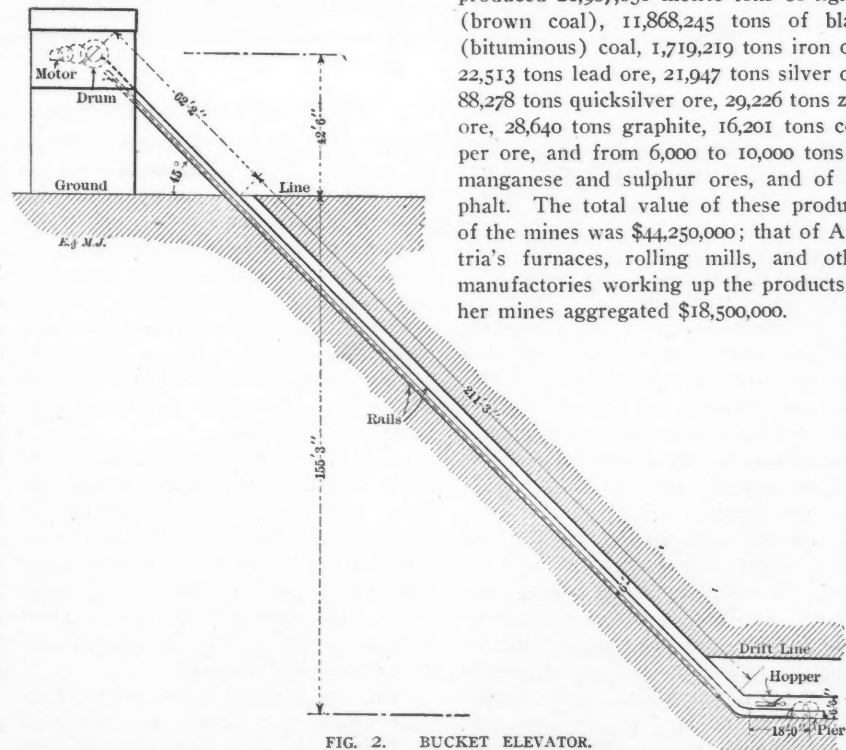


FIG. 2. BUCKET ELEVATOR.

cating feeder" used for coal conveyors. Adjustments are provided, however, to

Stoppage of Leaks by Liquid Cement.*

BY AUGUST WOLFSHOLZ.

It is often necessary to render underground walls sound and watertight. This may readily be done by drilling a series of holes through the walls and injecting liquid cement by means of air pressure. A simple hand force-pump with an india rubber pipe to connect it with a vessel containing the cement, furnished with a delivery pipe and jet, is all that is necessary. A damp tunnel was made watertight by means of numerous holes drilled through the crown, into which the cement was sprayed. Where the flow of water is considerable it may be advisable to render the cement quick-setting by adding to it a solution of soda, which causes it to set in a few minutes. This method is recommended for keeping back damp and wet in all kinds of underground buildings, it being very easy to produce a layer of cement at the back of the work, where it is safe from injury and abrasion.

Austria's Mining Industry.

According to Consul-General Guenther, of Frankfort, the mines of Austria in 1904 produced 21,987,651 metric tons of lignite (brown coal), 11,868,245 tons of black (bituminous) coal, 1,719,219 tons iron ore, 22,513 tons lead ore, 21,947 tons silver ore, 88,278 tons quicksilver ore, 29,226 tons zinc ore, 28,640 tons graphite, 16,201 tons copper ore, and from 6,000 to 10,000 tons of manganese and sulphur ores, and of asphalt. The total value of these products of the mines was \$44,250,000; that of Austria's furnaces, rolling mills, and other manufactories working up the products of her mines aggregated \$18,500,000.

*Note from an article in *Gesundheits-Ingenieur*, 1905, p. 234-36.

Blast-Furnace Charging.

BY IRVIN JOHN.

Some time ago the writer was asked to devise some scheme for feeding the furnaces of the Cia. Metalurgica de Torreon, Torreon, Mexico, to dispense with hand feeding. Fig. 1 will show in a general way the apparatus in use at the time.

There were four furnaces with brick hoods and steel downtakes; as shown, the usual feed doors were at the sides, with large sliding doors at one end to admit a car which had side-hinged shutters.

The suspended buckets were carried up the incline on a bulb iron rail overhanging the ends of the trestle bents, and stopped opposite each furnace; the ore dropped into the car which was pushed into the

fed by hand temporarily. No. 1 furnace was then rebuilt and fed by the new car. No. 2, 3 and 4 were rebuilt in order, including No. 5; they were fed by the new car.

There was this objection to a vertical elevator. It could not be arranged to run the same car, from the pit, clear over the furnace top during reconstruction. Dropping the load from the incline car to the car over the furnace is equivalent to two cars going the whole length of the furnace room; the hopper offers facility for any separation that might be wished for in the charge.

The incline car is as long as the furnace inside (12 ft.); it is run by a $\frac{3}{4}$ -in. cable over a 4-ft. drum, with a friction band listed by the makers to lift 10,000 lb. over the drum. The weight of the car is about four tons; with five tons of charge it was

dividends. The combination seems to be performing its mission, and better results are still possible.

Mining in the Black Hills in 1905.

BY F. W. BOWER.

The dividends paid by the Black Hills companies during the year of 1905 amounted to about \$1,500,000. The Homestake company paid \$1,200,000. The Golden Reward paid about \$200,000, being 20% on the market value of the stock. The company's smelter was not in operation during the year, and the returns came entirely from a 200-ton cyanide plant in Deadwood. There were three companies in Pennington county which paid small dividends, namely, the Cochran and Gol-

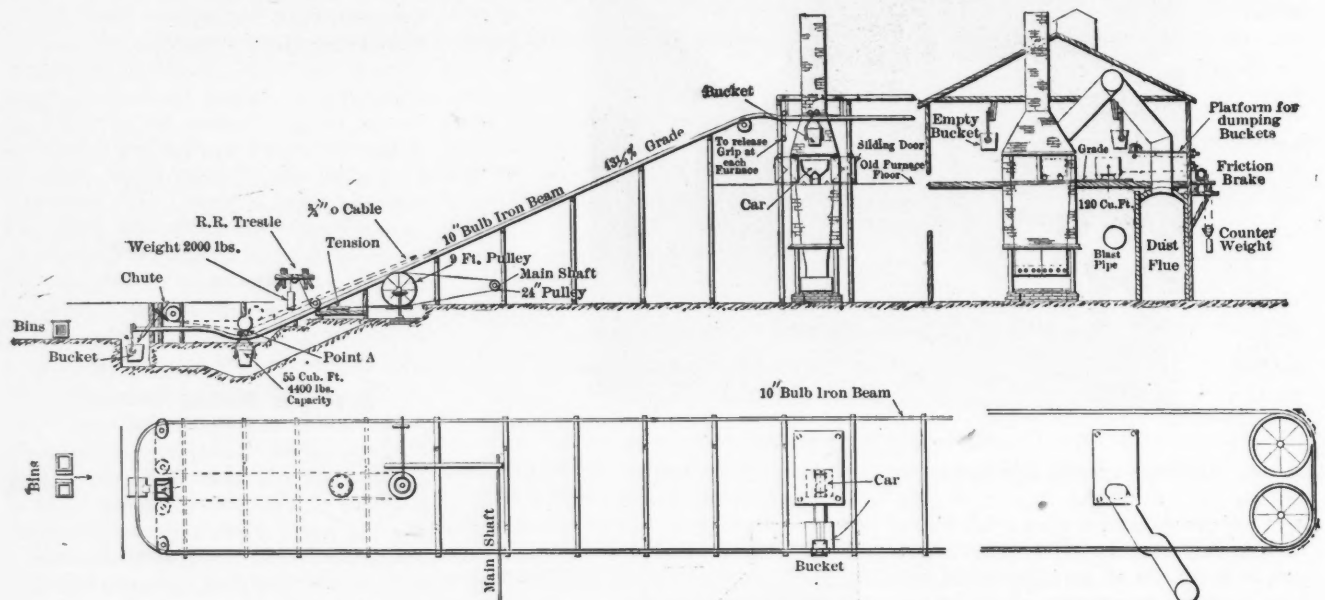


FIG. 1. BLAST FURNACE CHARGING.

furnace. The car was 6 ft. long; counterweights were provided to draw the empty car out; they did not do it. A winch was then made for this purpose; but it proved unsatisfactory. The car was finally abandoned and a large hopper was put in place for the buckets to empty into. This hopper was partitioned so as to quarter the load into four barrows; the load was rolled to the furnace door, dumped on the floor and shoveled in; but the buckets would get loose and drop to the ground, or go down to the charge pit. There were 60 men on the feed floor, and a squad for repairs; 900 ft. of new cable was required each month, and accidents were frequent. No suggestions were offered; the only requirement was to keep four furnaces running during any change.

Fig. 2 shows the plan adopted for the immediate trouble, as well as to provide for increase of the plant. No. 5 furnace was built at the far end, prepared with deck plates and downtake below the floor; the top of the furnace was 6 ft. above the old floor. This furnace was blown in and

carried from the pit and dropped through the hopper. The car returned to the pit for loading in two minutes; allowing about 3 minutes for loading, this would be one ton per minute continuously.

The upper car is worked by a small friction drum and a tail rope over the furnace tops; it would discharge into any furnace and return to the incline car (in advance of its arrival) loaded from the charge pit. Three men do all the work on the furnace floor.

There were some discouraging results at the starting in getting the charges uniform, and consequently in getting the spreaders adjusted; but it was finally accomplished after the reckless work in the charging pit was remedied. Still better results were shown after the new furnaces were added with interior lines better suited to mechanical feeding.

Over six furnaces were not contemplated when this device was designed; eight furnaces have been running; the device has been in continual operation over two years with satisfactory annual

den West mines west of Rochford in the Hornblend district, and the Clara Bell mine near Hill City. Other dividend payers in Lawrence county were the Wasp No. 2, Maitland, Spearfish, Lundburg-Dorr; several other companies made good profits which were applied to further development.

More substantial development work was done during 1905 than in any previous year. This is especially true along the strike of the Homestake vein, where a dozen companies made heavy investments in development. Plans were drawn during the year for three large mills on this belt; by the Safe Investment and Lucky Strike companies, on the south; and by the Homestake Extension, on the east. The Globe company, on the west, has a mill building finished ready for machinery; the Puritan company, south of the Homestake company four miles, has a 100-ton cyanide mill ready to start. The Columbus Consolidated company made the statement that a 1000-ton mill will be built early in the spring, on the large property

that is situated north of Lead.

In the Garden City district, the Maitland mine has been a great producer. Development has opened high-grade ore on quartzite, and also the Homestake veins that underlie the quartzite, and which carry good values. Much ore was opened in that same district by the Minnesota Mines Company, and by the Goldstake company.

There were six steady producers, in the Bald Mountain district, which turned out an average of 600 tons of ore daily; this was sent to the mills in Deadwood, and to the Lundberg-Dorr mill at Terry. The Imperial company opened up a body of ore, 1,400 ft. wide and 20 ft. thick, on the old McGovern ground. The Golden Reward company did excellent development work on a vertical vein, 75 ft. in width, which comes up through the slate to the

commence the first of April. This company has a million tons of ore blocked out ready for treatment. The Dakota company, which has property adjoining the Reliance, will sink a shaft to quartzite, which will develop the entire Portland district on that level.

The Southern Hills district saw more substantial work done than ever before. This is true especially of the camps around Rochford, Hill City and Keystone. At Rochford, the Montezuma mining company was organized to open up the big vein which cuts through that section of the country from the north to the south. Money was subscribed for a 100-stamp mill, and contracts have already been let for machinery. West of Rochford the Cochran mine and the Golden West produced considerable bullion, and in each mine the main bodies of ore were opened

mill were built at the Clara Bell mine, which recently went into the hands of Ohio people.

At Keystone, ground was broken for a 200-ton mill at the Bullion mine. The excavation has been finished and the mill is to be completed by early spring. The Eagle Rock Mining Company purchased the Wealthy mine and has machinery on the ground for a new mill and hoist. Work has been advancing at the Bismark mine, which has paid a good profit. The Keystone-Holy Terror company has money raised for the building of a cyanide annex, and for the equipping of these old properties. Some substantial work was done in that camp.

Considerable amounts of mica and tripoli were shipped from Custer county during the year. Two mills were in operation a part of the time, the Tycoon and

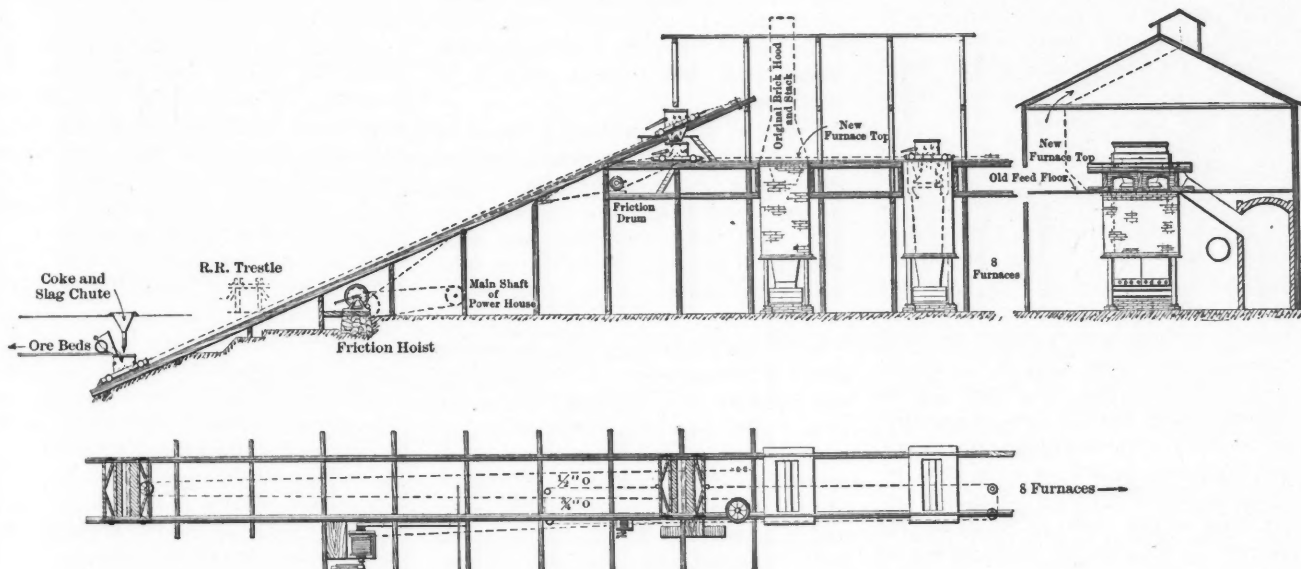


FIG. 2. BLAST FURNACE CHARGING.

base of the quartzite. This vein is to be thoroughly developed this year, and will eventually be a producer. Early in 1905 the Horseshoe company lost its big mill at Terry by fire, but 30 tons of high-grade ore were shipped daily to outside smelters. This company has been thoroughly re-organized and will rebuild its plant at Pluma.

There were 21 mills in operation in Lawrence county during 1905, including six stamp-mills, and two cyanide plants of the Homestake company. Half a dozen or more mills are now in course of construction in the county. On the west slope of Ragged Top, the Victoria and Eleventh Hour companies are each building a 200-ton cyanide mill; these will be in commission by February first. The Branch Mint company is building a large cyanide mill on the old Union Hill properties at Galena.

The Reliance company, in the Bald Mountain district, has plans drawn for a 150-ton cyanide mill, work on which will

up. A new strike has just been made by James Cochran (owner of the Cochran mine), which will assay \$100 a ton. This is supposed to be the mother vein. The control of the Golden West mine is in the hands of the McCormicks of Chicago. This mine has the record of cheap mining and milling for the year, the actual cost being less than 50c per ton. Around Hill City a number of the mines reached a producing basis during the year. A ten-stamp mill was completed last month by the Gopher mining company; the Canton Mining Company also completed a mill and has made its first run. E. C. Johnson, who spent a long time getting the Gerty tin mine in shape, built a small experimental mill which worked through some tin ore from this old property. He has raised capital sufficient to build a larger mill. The American Tungsten Company has recently been organized to develop a property containing wolframite; a hoist and buildings have already been erected. A new hoisting-plant and stamp-

Extreme. Some nickel ore was discovered (down the creek, a little way from Custer) which attracted the attention of Omaha capitalists.

A careful estimate placed the output of gold from the Black Hills for the year at \$8,000,000. This smaller output was due to several things: the failure to start up the Golden Reward smelter, and the burning of the Horseshoe mill early in the year lost over \$1,000,000 in the year's output. Great advancement was made in the treatment of ore by cyanidation, especially in the handling of slime by the filter-process. The Homestake company commenced the erection of a large plant in Deadwood, with a capacity of 2,700 tons per day.

It is believed that it will be possible in the coming year, to increase the extraction by cyaniding to 80%. Some mills in the Hills have been doing as well already, but the general average for the past year has not exceeded 72 per cent.

Pennsylvania Oil Fields.

BY HAROLD C. GEORGE.*

The production of petroleum in western Pennsylvania reached its maximum in 1891, when the prolific McDonald field turned out such remarkable gushers. Since then, with but few exceptions, there has been a continuous decline in the production of all fields of the State; and it is only the continual drilling of new wells and the cleaning out of old ones that prevent this decline from being more rapid.

The oil fields of the State are naturally divided into three groups, as follows:

First, the northern district, which includes the Bradford field (of McKean Co.), the Warren, Clarendon and Cherry Grove fields of Warren county, and the fields of Elk and Forest counties.

Second, the central district, which includes the field of Venango, Clarion, Armstrong and Butler county fields.

Third, the southwestern district, which includes the fields of Allegheny, Washington and Green counties.

In the fields of Bradford and Warren counties little drilling is being done, and the production is gradually decreasing. At the present time the average production of these fields is about $\frac{1}{4}$ bbl. per day for each well. Most of the wells have been drilled from 15 to 30 years; and, as the sand is compact and uniform, the wells have enjoyed a long life.

In the fields of Elk and Forest counties drilling for oil has not been as extensive as formerly, but operations for natural gas are being carried on with good results. In these fields the production is better than in the fields of Bradford and Warren counties, as the wells are not so old and they are worked more systematically.

The field of Venango and Clarion counties is in much the same condition as the northern fields. Little drilling has been done this year, and the production is declining gradually.

In the Butler county fields drilling has been carried on more extensively; and, although the "territory" has been drilled over many times, there are still some pools left to be found by some fortunate prospectors. The "territory" is far from being uniform, and the wells are not long lived. Many of the oldest men in the business have been deceived by the wells of this region. The recently drilled "Spoty McBride" well might be mentioned in this connection as the most deceptive of them all: This well was drilled during the summer, near Butler, and at first was a gusher; but to-day, of the 30 wells drilled in this pool since the striking of the original gusher, less than one-third are now producing, and with an aggre-

gate of only about 50 barrels per day; of this amount the original well is said to produce 15 barrels.

The Armstrong county field shows a revival of operations, but the southwestern fields have the most marked gains.

Some good wells have recently been drilled in Allegheny county, and present operations promise good results.

The operators in the older fields have generally applied themselves to the more economical production of petroleum from the old wells, rather than to the drilling of new ones.

The cheap source of power offered by the natural gas engine has aided much in operating, and in prolonging the life of, the wells. It is almost universally used in all the fields of the State and by its great economy and its capacity to run without a constant attendant, it has become profitable to pump small wells where a number of them can be operated from a centrally located "power." Under other conditions, such wells would have to be abandoned.

The great trouble with so many of the old wells is due to the wearing out of their tubing, lead lines and rods. It does not pay to purchase a new equipment for such wells, and hence they are either abandoned, or else a boring rig or some other cheap method of operating is installed.

On the 1st of January, 1905, the market price of Pennsylvania crude petroleum was \$1.50 per bbl.; but it did not remain long at that point and continued to decline until it reached \$1.27 where it remained until the middle of September, when it began to advance rapidly until 34c. had been added. This advance has had a marked effect on the industry. There is renewed activity in all the older sections of the Pennsylvania fields. There seems to be no territory too small to invite the attention of the producer, providing there is a reasonable expectation of finding oil. Wells that a few years ago would have been abandoned without any attempt to convert them into valuable producers are now in urgent demand; and the output, however small, is carefully looked after. It is evident, however, that no material increase in the supply of high-grade petroleum can be expected from these sources. There is no doubt that the recent increase in the market price of oil has stimulated field developments; but it is purely problematical whether this stimulus will be sufficient to increase the production so as to meet the demand.

The old fields have been very closely drilled, and the old wells have practically drained adjacent territory which itself might formerly have been advantageously drilled. The most noticeable effect of the advance in the market is seen in the old fields and in shallow territory. Wells which were neglected during the depres-

sion are being put into better shape so as to increase their yield. Yet all the renewed production of the old wells, and all the drilling in the State during 1905 have failed to sustain the production; and the prospect for discovering new producing pools is far from encouraging.

The gradual decline of the Pennsylvania fields, and the more rapid failure of the gusher territory of West Virginia (which for years has been the principal factor in the yield of high-grade oil) have decreased the supply just when the demand is greatest.

The increasing use of gasoline and of the lighter products of petroleum has brought about a heavier demand upon the fields producing high-grade oils. The manufacture of these products is naturally limited, and it is impossible to augment the yield from the heavy asphalt oils produced abundantly in Texas and Louisiana.

Although the "wild cattle" have been industriously seeking after new pools and extending the limits of the old ones, the large list of "dry holes" for the year bears witness to the fact that there is no longer anything of value in reserve for the drill. In the older fields the activity is confined to locations that would be passed by if there were anything better in view.

An oil well begins to die the day it is born; so that it is only a question of days, of months or of years until the end comes. This might be said of the Pennsylvania oil fields in general. Their decline has been going on for several years, and one of two things is destined to happen in the near future: Either there will be a marked advance in the price of high-grade petroleum, or else the production of the State will practically cease.

Peat and Coal Mixed as Fuel.

Consul Diederich, of Bremen, reports that a number of experiments have been made recently in using compressed peat and coal mixed for fuel in a brickyard, and the result has been so favorable that it will no doubt open a new field for the use of peat as fuel in the manufacture of bricks. In the neighborhood of Jever, Oldenburg, an excellent, heavy, blue clay is found which was considered suitable for the manufacture of hard clay paving bricks. All efforts to manufacture such bricks from this clay proved unsuccessful until a mixture of one part of peat and 10 parts of coal was tried as fuel. The result was that instead of the light-red brick, which had been produced formerly, a hard and brown brick was obtained. The experiments were repeated and the fuel was mixed in various proportions until, at last, with a mixture of equal parts of peat and coal, a first-class brick was produced.

*Instructor in mining and mineralogy, School of Mines and Mining, Western University of Pennsylvania, Allegheny, Pa.

The South Kalgurli Company's System of Ore Treatment.*

BY ARTHUR C. CLAUDET.†

The new plant (actual practice) treats 230 short tons per day by dry crushing, roasting, grinding and amalgamating, agitating with cyanide and filter-pressing.

in the rough ore bin above the mills. This bin has a capacity of 300 tons. From the bottom of this bin the ore is fed by automatic feeders to three Krupp ball-mills. A Sturtevant fan exhausts the dust from the ball-mills, and deposits it in the dust-house, in which it is collected and returned to the plant for treatment.

The fine-crushed ore as discharged from

the double push conveyor in any quantity as required by the furnaces. The double push conveyor is so arranged that any surplus not required by the furnaces is above the eight Merton furnaces, which are fed by eight automatic variable screw feeds.

The waste gases from the furnaces are drawn through a long masonry flue having special arrangements for settling and collecting the dust. The flue terminates at the base of a smoke stack 110 ft. high. The dust as collected in the flue is returned by automatic conveyors, and is delivered into the fines ore bin. Hot ore push-conveyors working in cooling troughs carry the roasted products from the furnaces to a chain and bucket elevator discharging into two mixer pans.

These pans each have a water service connected to overhead supply tanks; and are arranged to run separately and to receive the whole of the roasted ore, or the pans may run together, so that there will be no need of stoppages to clean up. These pans, in addition to intimately mixing the ore with water, to some extent grind and amalgamate. Before being elevated to these pans the hot ore passes over a pit into which a bad roast may be dropped by means of a slide in the bottom of the conveyor trough, and picked up by the automatic conveyors and returned through the furnaces. This pit may also serve the purpose of a receiver for the roasted ore, so that should it be necessary at any time to stop the grinding and amalgamating plants the furnaces may still be kept going.

Re-grinding.—The product from the mixing pans is laundered to five large amalgamating and grinding pans, the ground product being subsequently run into a nest of six sand separators. The overflow, as slime, passes over settling boxes, and the underflow, containing all that has escaped being ground to slime in the five large pans, is passed again through two additional re-grinding pans.

The clear water overflow from the settlers is returned by means of a centrifugal pump to the overhead tanks which supply the mixer pans. The overflow from the settlers, now a thickened pulp, is laundered direct to five agitators.

The product from the two additional re-grinding pans also joins this overflow, and the whole product now slimed is treated by cyanide and agitation. The receiver tanks used in connection with the circulation of the water are in duplicate, and are connected by sludge cocks to the agitators, so that they may periodically be sluiced clear of collected sludge.

Filter-Press Plant.—The filter-press plant consists of nine presses, seven for slimes and two for clarifying the solutions before precipitating. The presses are filled and washed by means of belt-driven pumps, and a pair of montejus are also connected ready for immediate use as

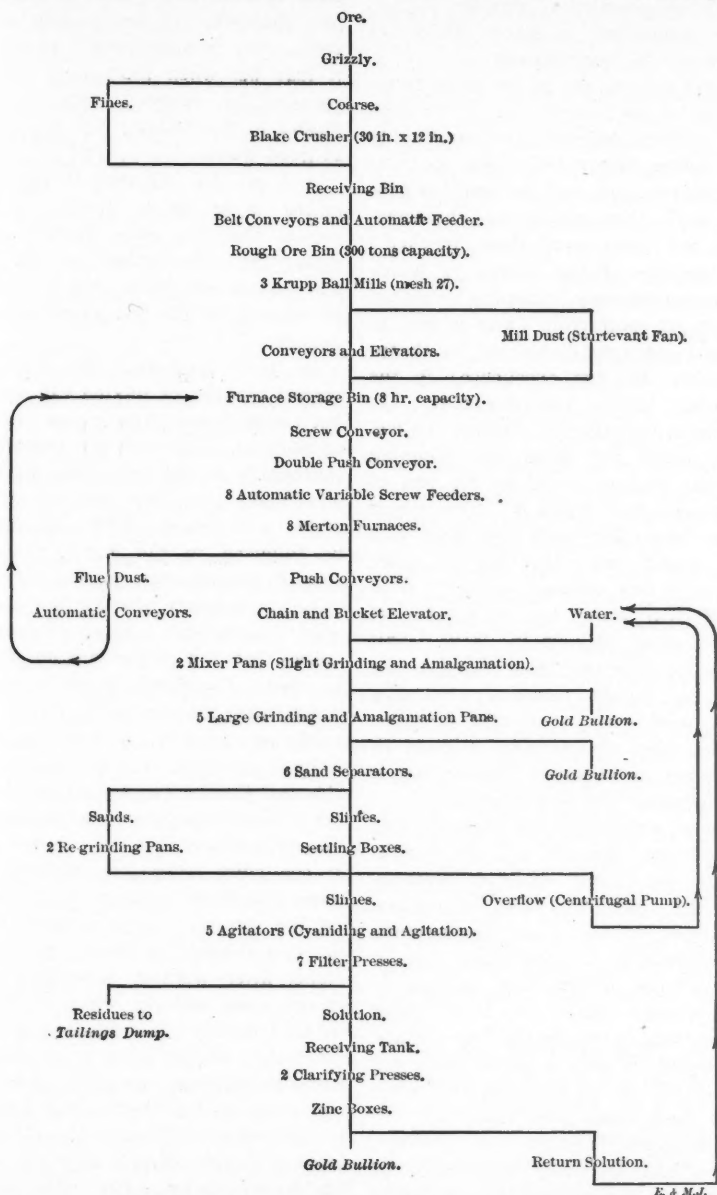


DIAGRAM OF ORE TREATMENT AT SOUTH KALGURLI.

Ore Breaking.—The ore is delivered at the brace in self-dumping skips, each having a capacity of 30 cwt., and dumped upon a grizzly. All stone under gauge passes through the grizzly into a receiving bin. The remainder is crushed to gauge by a 30 in. by 12 in. Blake crusher.

Fine Crushing.—The whole of the ore is fed from a receiving bin to a belt-conveyor by an automatic feeder. The belt-conveyor rises on an incline and deposits the ore on a cross belt-conveyor, which distributes it by means of trips and chutes

the grinding mills is automatically delivered (by a system of conveyors and elevators) into a storage bin conveniently situated for supplying the furnaces. The bin has a capacity equal to eight hours run of the mills, so that a casual interruption to the operation of either the roasting or crushing plant does not necessitate closing down the other.

Roasting Plant.—The milled ore is roasted or desulphurized in eight Merton furnaces fitted with draught indicators and mercury pyrometers. The ore is automatically fed by a screw conveyor from the bottom of the fines ore bin into

*From Bulletin No. 15, Institution of Mining and Metallurgy, Dec. 14, 1905.
†Consulting Engineer, London, England.

standbys. The presses are emptied on to a belt-conveyor which carries the residues out of the mill and on to the dump, delivering at an elevation of 50 ft. above the ground. It will thus be seen that the ore once in trucks underground is never again handled by manual labor, passing through the various stages of treatment and being finally discharged on the tailing dump by purely mechanical means.

The Clean-up Room.—The solutions from the filter-presses are run to a large receiving tank, and are then pumped through clarifiers from which the clear gold solution gravitates to zinc-boxes. The spent solution from the zinc-boxes flows to a large dump from which it is raised by a belt-driven pump to the mixer supply tanks. In connection with the water supply there are head tanks of a capacity of 60,000 gal.—a sufficient reserve for two days' treatment. The clean-up room is fitted with a tilting furnace, zinc slimes and amalgam retorts, gold refining furnaces and all necessary apparatus.

Motive Power.—The whole of the plant is run by electric motors with power supplied by the Kalgoorlie Electric Power and Lighting Company. The power required has been divided into fourteen units, so grouped that the stoppage of one unit, with its apportionment of the plant, will in no way affect the continuous running of the other units. In addition, an auxiliary steam-drive is arranged in connection with the re-grinding and agitating plants, so that, should the electric power be cut off, these plants may still be kept running. A 20-drill air-compressor has been installed with necessary boiler power and electrically-driven centrifugal circulating pump and air pumps.

Railway Siding.—A new siding connecting with the Government railway has been built on to the lease, with switches leading to central points for unloading firewood and supplies. Firewood is taken to the Merton furnaces by means of an inclined tram with two parallel truck lines arranged so that the full truck going down draws the empty one up.

Pans.—Separators have been put in, and they are now sending the sand only through the pans, and slimes over sand traps.

Sand Traps.—Water jets have been fitted to the bottoms.

Compensating weights have been put in use in the re-grinding pans. Two small classifiers have been installed, and settlers for re-grinding have been attached to two pans.

Analysis of an Average Sample of Ore:
Silicious rock, 60.10%; iron, 7.7%; copper, 0.12%; lime, 8.93%; magnesia, 4.45%; carbonic acid, 12.45%; alumina, 1.66%; sulphur, 3.45%; arsenic, trace; antimony, trace; tellurium, nil; combined water, 0.96%; oxygen and loss, 0.23%; Total, 100%. Gold (per ton of 2240 lb.), 14 dwt.; silver, 6 dwt., 12 gr.

Mixing Concrete.

BY J. H. ROBINSON.

Concrete mixing in batch-machines is sometimes condemned. Continuous mixing is also sometimes condemned by engineers who have obtained better results by the batch method. Yet, each of these methods of mechanical mixing has its use, or application, in places where the other might be inappropriate.

In hand mixing one of the great temptations is to use concrete that is too wet; such a mixture depends upon the fluidity of its matrix, rather than upon its thorough incorporation, and the result is generally work that cannot be characterized by any other word than "botched."

An example of the extent to which too wet concrete may be used is furnished by a firm of contractors (who wished to produce a job remarkable for its cheapness rather than its excellence) in the instructions to the superintendent. He was ordered to make the concrete "so wet that it would not stand any ramming other than that produced by the feet of the men who were laying it." This meant that the men must work *knee-deep* in a mushy, muddy mass that had so much water in it that *without ramming*, 6 or 8 in. of clear water rose to the top of footing courses only 30 in. thick. This is radically different from flushing the surface by proper ramming; ramming gives a solid mass, compacted by pressure; the other method gives a loose, almost spongy, sedimentary deposit that is neither compact nor workmanlike.

The ease with which wet concrete may be placed and "flowed" into the various parts of the forms, without ramming, tempts the contractor, and, sometimes, the engineer, to use a too wet mixture. Wet concrete is a good thing, but it should not be wetter than enough to make the mass quake like liver under hard ramming, which flushes the surface. Dry concrete is also a good thing, but it should not be so dry that the water will not flush under hard ramming.

Machine-mixed concrete is, perhaps, better for wet mixtures, when made by a continuous mixer; and for dry mixtures, when made by a batch mixer.

The uniformity of the product depends more upon the care with which the measuring is done, rather than upon the type of mixer; though this last has also a noteworthy effect.

One reason for the preference shown for very wet concrete by some contractors is the fact that, with mixtures of this character, it is easy to conceal botchy work. A common practice in such cases, is the use of a flattened shovel, which is shoved up and down along the inside edge of the forms as the concrete is placed. This is, often, all the ramming that such concrete gets; it is too wet; and

the very fact that a shovel may be introduced and kept in motion to the extent it is done, is proof of a too wet or too thin mixture. The appearance of the resulting structure is good; the finished surface of the concrete is smooth, and the corners are sharp. But the interior! Let the engineer break into and examine *one* mass of concrete that has been laid in this manner. He will be apt, thereafter to insist upon *dry* concrete; for, however much more trouble it may be, when thoroughly mixed dry concrete is rammed until the water flushes to the surface, it is proof positive of good work.

And yet dry concrete, if not properly mixed, is as apt to produce a botched job as the wet, *only*, the dry concrete shows the imperfections on the surface, and one is not lulled into a false sense of security by the fine appearance of the outside.

In batch-machines, the theoretically correct manner of mixing can be carried out rather better than in any other form of machine. The sand and cement can be thoroughly mixed dry; then mixed wet; and finally may have the wet aggregate added and mixed. This procedure may be followed to the extent that, under careful management, results may be obtained in ordinary practice that are otherwise unattainable. This, of course requires that the proper amount of water be used. Too much water is as bad as, if not worse than, too little.

Mixing concrete by hand is economically done, when sufficient room is available and the nature of the work will permit, by arranging a long mixing board in such position that the one end may be at the point where the material is delivered, and the other at the point nearest the structure to be erected. The cement and sand are mixed dry and, the stone, after wetting, shovelled into the mixed mass and the whole then sprinkled and turned. It is in turning that the utility of this form of mixing board becomes apparent; the mass is turned to the sides, in fan-like manner; and then to the center; following always the general direction toward the place where the concrete is to be laid. This procedure will save largely in the amount of handling required; as the more times (within reasonable limits) the concrete is turned the better the mixture, a more truly homogenous mass is obtained; as well as dispensing largely with shovelling into barrows and wheeling.

This method, of course, may be applied where the sequence of mixing the various ingredients is not that given; it is the principle of doing away with extra handling, and not its method, that it is desired to point out. The particular method given is especially useful in foundations, or other work on one level, but it may be applied in many other ways.

Chinese Coolies in the Transvaal.

Although the importation of Chinese coolies for work in the Transvaal has recently been discontinued by the order of the new ministry of the British Empire, it is interesting to learn as to the conditions under which these laborers were dispatched from China to the Transvaal. This is described by Consul General Ragsdale, of Tientsin, in a recent letter to the Department of Commerce and Labor, published in Daily Consular and Trade Report, No. 2452, January 3, 1906. The following is an abstract of his communication:

The cost to the South African mining companies of the Chinese coolie is much greater than the cost of the Kaffir, and the profit, if any, will consist in the greater capacity of work in the individual and the increased security of the mine owners against unexpected shortage. This experiment with indentured Chinese labor is the result of a thorough investigation of the labor question by the Transvaal Chamber of Mines and the carrying on of the work in China is in the hands of a labor importation agency appointed by this chamber of mines. This work was sanctioned by the British Government by the passing of the Transvaal labor importation ordinance. The commissioners of the Transvaal Chamber of Mines arrived in China during the winter of 1903 and at once commenced negotiations with the Chinese Government in Peking for permission to export coolies. After completing the necessary arrangements the actual work of collecting the coolies was entrusted to two British firms in Tientsin—William R. Forbes & Co. and the Chinese Engineering and Mining Company. For each coolie delivered at the port of embarkation and passed by the medical examiners a fixed sum is paid these contractors. The contractors pay all cost of collecting the coolies and supplying them with food and transportation to the point of delivery. Any coolies failing to pass the physical examination are a loss to the contractors. The contractors at once through their agents established collecting stations in various parts of the provinces of Chihli and Shantung. The first shipments were collected from Tientsin and Tongshan, as the coolies were numerous and near. Later, as the coast supply decreased, the agents pushed inland.

The inland collecting stations were usually at some town having a resident foreign missionary doctor, who made a preliminary examination of the coolies before they were sent to the coast. This examination was at the expense of the contractors. The accepted coolies were marched to the nearest railway station and forwarded to the shipping point. In a short time Chinwangto was made the main shipping point and a depot was established there. Near the beach a large compound,

surrounded by a high brick wall, was built, to accommodate incoming coolies.

The coolies arrive in lots of from two to three hundred and are placed in a small detention compound. Each one is stripped and examined by the doctors. This physical examination is thorough, including tests for eyesight and hearing. Those accepted are scrubbed with soap, vaccinated, photographed and their identification cards written up. A number is hung about their necks and they are ushered into the large compound, where they remain until the next transport sails. In the meantime they are furnished with a copy of the contract they are to sign both in Chinese and English. At all hours of the day special Chinese clerks take them individually and explain each clause on the contract in the simplest manner possible and in every detail, until each coolie understands where he is going, for what purpose, and under what conditions, and in what manner he will be repatriated.

These Chinese instructors are under the control of the Chinese protector, a British Government official in no way connected with the Transvaal mines. His duties are to see that until the coolie leaves China the white man adheres, both in letter and spirit, to his part of the contract; that each coolie understands what engagement he is entering into, and that he enters into this engagement of his own free will and not because of outside pressure. While waiting for the transport the coolie, for the first time in his life, does no work, and has not a care, is clean, and has all the food and tea he wishes. He has no opium and no Chinese spirits. The change in the coolie is marvelous; he straightens and squares his shoulders, the wrinkles of worry disappear, and he simply exudes contentment. The shipping of the coolie is a slow process, as each must be re-examined by the doctors on the day of embarkation, and about 400 per day is the limit.

The day before shipping, the coolies are taken in lots of ten to the office of the Chinese protector for a final examination in the catechism of what they are about to contract for. The questions asked are many and cover every possible point on which could hang a misunderstanding. Following are some of the questions: Where are you going? How long will you be at sea? What will happen when you arrive in the Transvaal? At what will you work? Can you work as carpenters, machinists, etc.? At what wages? Can you leave money in China for your family? How much? How many hours will you work a day? How many days per week, etc? Do you go of your own free will? These questions are propounded until all understand, when the coolies are thus addressed: "If there is any coolie here who regrets having come and does not wish to go to South Africa let him come forward. Any of you is at

perfect liberty to go home now if you so choose. There is no punishment and no money for you to pay if you have changed your minds. You have only to tell me and you may walk out of the compound and go home. The only requirement is that you leave Chinwangto within twenty-four hours." Only about one in two hundred leaves at this point, and any excuse he may give is accepted by the Chinese protector.

The next day is the final medical examination and shipment. In a large hall stand or squat some 200 coolies in rows along the wall. Their only clothing is a piece of string and a paper tag. In the next room are the doctors and the Chinese clerks. The coolies come in one by one. They are compared with their identification card. If passed, they cross the room to a Chinese clerk who checks their name on the roll. They are then passed into the next room and into the tank, through which warm water constantly flows. Here they leave behind all remnants of Chinese dust, and passing into the dressing room, put on new clean clothes, shoes, belts, socks, straw hats, etc., and reappear in dark-blue uniforms, no longer mere Chinese, but wearing on the front of the coat in Chinese characters the legend, "Nan Fei Li Kung."

In the next room are three desks with Chinese clerks and a foreign supervisor. At the first the paper tag is changed for a lead disk with a number on it. This is fastened about his neck, and he is sent to the desk at which he arranges for a portion of his wages to be paid in China each month, to his wife, father, or other person designated by him. This is done by means of a coupon pass book. Next he goes to the paymaster. Here he receives \$38 (Mexican), two months' pay, and \$8 bonus. The money is laid out and counted in front of him. It is then pushed into a small tin pan, which will later serve him as a rice bowl, and he is passed to the next room, where he signs his contract, before which, however, he has one more chance to retreat if he so wishes. No one has ever retreated at this point.

The next room is a long hall, divided lengthwise by an iron grating. On the one side the hall opens into the outside world; on the other into the compound. It is here that the South African laborer bids farewell to his family and creditors. It is not a pathetic sight. If his creditors leave him any of his newly acquired wealth his relatives argue with him for it, and fortunate the coolie who escapes to the next room with any money. Here he receives his kit bag containing a full winter outfit of clothes, blankets, a tin cup and everything he can possibly need on the trip, including a small bamboo pillow with folding legs to serve as a seat by day. They walk out with their bags on their backs, enter the train, and are taken at once to the dock, where they

are changed to a waiting lighter and towed to the transport. Everything is clean and comfortable for them. Rules prescribe the number allowed on each transport, and they sail away with no work to do for a month and all they can eat. They are a cheerful crew.

The first shipment of coolies was made from South China in May, 1904. The total number of shipments from all ports to date is 29. The total number of coolies shipped from all parts of China is approximately 49,000. Of these, 28,000 have been exported from Chinwangtao and 5,500 from Cheefoo. The number of deaths during the voyage have been only three or four per trip. From statements published in Johannesburg the health of the coolies has been eminently satisfactory, with the exception of those exported from the southern provinces. This difference was so marked that all exportation from the south was soon stopped and only the strong rugged northerner is now taken. Of the 33,500 taken from the north less than 300 have died from sickness. The total deaths have been 15.5 per thousand, of which 2.4 per thousand were due to accident. The number repatriated at the expense of the mines has been about 1,000, of which 204 were from the north. Less than 50 have returned to China at their own expense. Of the total number of coolies sent to Chinwangtao those rejected by the doctors after examination have amounted to about 50 per cent., thus showing great care used in final selection and to some extent the lack of care in the first collecting.

There is one important omission in the Transvaal labor ordinance. It allows only the importation of unskilled labor for manual work in the mines. There is no provision for importation of the necessary Chinese clerks, secretaries and interpreters. It is impossible to obtain sufficient Chinese-speaking Englishmen to perform the necessary work in Chinese involved in the importation of a large number of coolies into an English-speaking country. The few who speak Chinese fluently and are suitable for the work receive good pay in China, and the lower class of Chinese-speaking whites are in no way suitable for the work, as they are usually unreliable and the creators of everything but harmony. English-speaking Chinese are in every way preferable, as they thoroughly understand their own people, and with the exercise of ordinary care in the selection, they are reliable, trustworthy, and non-disturbing workers.

Freezing of the cooling water for internal-combustion engines may be largely prevented by mixing with the water from 20 to 25% of glycerine.

Plaster of paris, mixed thick with a little thin glue, makes an excellent material to plug holes too large for putty, in wood-work which is to be painted.

Shaft Sinking in Quicksand.

BY GEO. C. MCFARLANE.*

The recently completed No. 4 shaft of the Handy Bros. Mining Co. (near Auburn, Michigan), is a fine example of the successful application of a steel shoe in sinking a rectangular shaft through a heavy bed of quicksand.

Before reaching the coal-seam, the shaft passed through the following strata; 80 ft. hard surface-clay, 35 ft. of mixed quicksand and gravel with a sprinkling of large stones; and 40 ft. of rock consisting of slate and sandstone.

The shaft is 8 ft. by 16 ft. 4 in. in the clear; it is divided by 8 in. by 10 in. buntons into two cage-ways, each 5 ft. 2 in. by 8 ft.; and a pump-way 4 ft. 8 in. by 8 ft. Through the clay, the shaft sets are 10 in. by 10 in. Norway pine, spaced 40 in. apart centres, and lagged with 2-in. plank. Back props of 10 in. by 10 in. timber were put in at 20-ft. intervals to

encountered underneath. The excavation was dressed with mattocks $\frac{1}{4}$ in. larger than the completed set.

After each set was hung, the corner lagging was slipped in and the set aligned with oak wedges. The buntons on one side were put in with the set; on the other side long-jacks (made of 3 in. pipe with a flange for a base, and the screw of a common 2 in. jack-screw) were used for temporary buntons. The temporary buntons were used for a space of 10 or 12 ft. above the bottom set, and were removed when the long timbers of the set were being lowered into place. Before the quicksand was tapped the shaft was enlarged, and three special sets were put in to permit of the steel shoe being set up and bolted together.

On Sept. 21, before this work was quite completed, sand and water broke through the shaft bottom and the water rose 40 ft. into the shaft before the pumps could be connected up. One No. 10 and two No. 9 pumps were installed in the pump compartment and soon got the water under control; but in the meantime the sand had heaved up several feet into the shaft. A sump was formed by driving a 3 ft. by 3 ft. coffer-dam of oak plank; the sand was bailed out, and the shaft-bottom was breast-boarded. The shoe was made in four pieces, constructed of $\frac{1}{2}$ in. steel plates, 6 ft. high, 9 ft. $8\frac{1}{2}$ in. wide, by 18 ft. $\frac{1}{2}$ in. long; these were reinforced by a belt of two $\frac{1}{2}$ in. by $5\frac{1}{2}$ in. by $3\frac{1}{2}$ in. angles, and by a belt of one $\frac{5}{8}$ in. by 7 in. by 7 in. shelf-angles, underneath which were bolted white-oak timbers of wedge-shaped section. The shoe was braced with two 8 in. by 10 in. oak buntons, and by two tie-bars 1 in. wide and 7 in. deep. All rivets on the outside of the shoe were counter-sunk, and driven flush with the plate.

In erecting, the ends were bolted to the corner angles of the sides with tap bolts, except the upper two feet of the shoe, where countersunk patch-bolts with slotted heads were used. On Oct. 3, sinking was renewed by jacking the shoe ahead into the quicksand, using from 32 to 46 jack-screws (2 in. by 14 in.); for several days progress of 12 in. to 14 in. per 24 hours was made, from 30 to 40 buckets of inflowing sand being excavated per eight-hour shift. The sand usually welled up about 18 in. above the cutting edge of the shoe. At times, however, in the space of a minute, the bottom would heave up four or five feet, often completely burying the jacks. After the first two weeks these inrushes became infrequent, and the volume of inflowing water decreased to 200 gal. per minute.

Through the sand the shaft was timbered with 10 in. by 10 in. white-oak, spaced 4 in. apart, the space being left for the heads and nuts of the hanger bolts. When the set was in place, this space was filled with 2 in. by 8 in. plank,

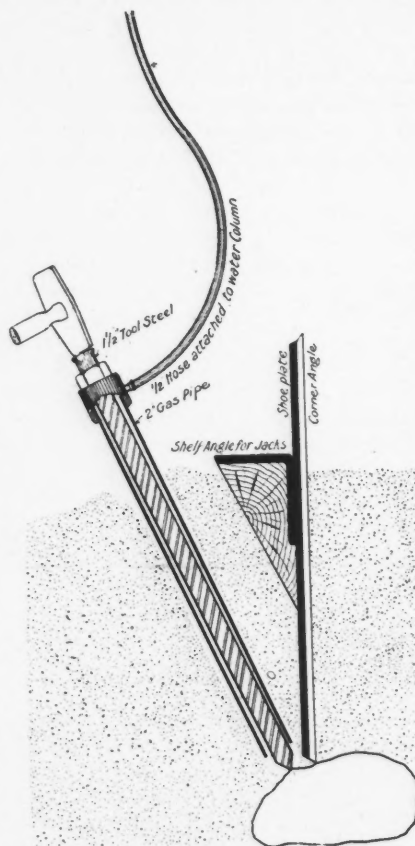


FIG. 1.

support the shaft-lining; between back props, the sets were suspended with $1\frac{1}{4}$ in. rods.

Sinking was begun Sep. 5, 1905, and carried on continuously with eight-hour shifts. Through the clay the shaft was excavated by hand; experience in this region shows that blasting in the clay develops fine hair-line cracks which cause the clay to slough off in big slabs when running sand and gravel are

*Mining engineer, Bay City, Mich.

except at the bolt heads, where the space was covered by spiking a piece of plank over it. Loosely twisted strands of marsh hay were packed in the space between the set and the shoe-plates. Before the shoe had advanced far into the sand, the sinkers noticed that a cavity was

(mixed quite wet, in the proportion of 300 lb. Portland to the yard of concrete gravel) was slushed in, flakes of hay being shoved down alongside of the shaft timbers as filling proceeded. The concrete was allowed to set for 24 hours. It was hoped that this filling would stop

follow down, and keep pace with, the shoe. As the mass of concrete settled, the space left between it and the clay was filled by slushing in more concrete. When the shoe had been advanced 18 ft. into the sand, about 100 yd. of concrete filling had been used behind the timbers. At

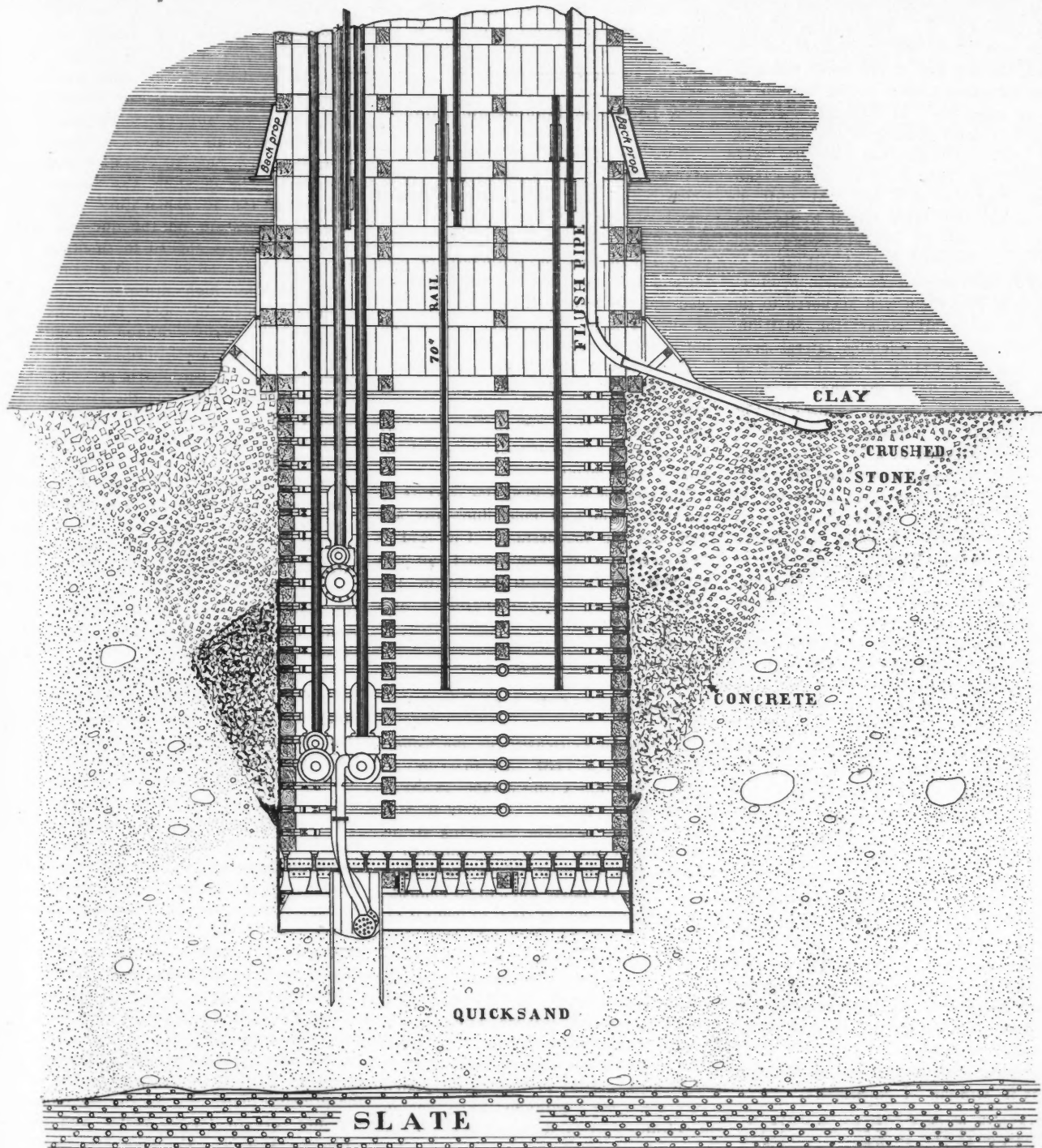


FIG. 2. SHAFT SINKING IN QUICKSAND.

forming behind the timbers. Some of the lagging was removed from the set over the sand disclosing an irregular cavity all around the shaft and extending back three to five feet. Sinking was discontinued, and it was decided to fill with concrete.

Marsh hay was spread around the sides and bottom of the cave, and concrete

the caving; but when the shoe was jacked ahead the sand was washed out from under the concrete, leaving it suspended on the shaft timbers. The concrete was loosened from the timbers by chisel bars (driven through the spaces left in the lining at the bolt heads), and finally the mass was loosened sufficiently for it to

this point it was decided to use broken stone for filling in place of concrete; and this filling was flushed in behind the timbers; an 8 in. column pipe with a couple of short lengths of 6 in. pipe connected to it with flexible connections being used.

The settling of the top filling was not gradual but periodic; at times no motion

would be apparent for 24 hours; then in the space of ten minutes, the filling would settle 4 or 5 inches. During one of these settlings, the lower sets of timbers on one side of the shaft began to draw on the bolts. Before this movement had proceeded far, several 30 ft. lengths of 70-lb. rail were fitted with lugs at each end (see Fig. 2.) The strings of rails were run from top to bottom of the shaft, the top lug of the lower rail gripping the same timber as the bottom lug of the upper rail. A sole-plate was used to give a solid bearing to the upper lug, and thin wrought-iron wedges were driven from both sides to bring a uniform strain on each rail. At 10-ft intervals the rails were spiked to the timbers. Six strings of rails were used, and they prevented further settling.

By using heavy rail for tension members, and by having them well anchored to the crib at the shaft collar, the shaft-lining will stand considerable lateral pressure before deflecting from the vertical.

At different times the shoe encountered large stones; a tool (shown in Fig. 1.) was used in locating and dislodging them. It consisted of a bar of tool-steel, about four ft. long, surrounded by a 2-in. pipe. A 1/2-in. hose was connected to the pipe and to a nipple in the water column; a stream of water was forced through the pipe permitting the tool to be easily shoved into the sand. It some times required several hours to break up and dislodge one of these stones.

When the shoe finally encountered bed rock, it was found that the rock was inclined a few inches from the horizontal in the breadth of the shaft. The effect of jacking one side of the shoe into the rock, was to rack the shaft-lining toward the high side. This deflection amounted to 2-3/4-in. before the shoe got down to bedrock all around. When the sand was finally shut off on Nov. 20, no attempt was made to remove the shoe; the cutting edges were bent and buckled, and it would probably have been hazardous to remove it in any event. After the ground had been securely timbered, and a set of dead logs put in on the rock, the upper filling was completed by pouring in several buckets of cement grout to fill any small crevice that the crushed stone had failed to reach.

Following is the cost of sinking through this 35-ft. stratum of quicksand:

1 blacksmith, 58 days @ \$3 per day.	\$174.00
2 pumpmen, 59 days @ \$2.65 "	312.70
1 carpenter, 56 days @ \$2.80 "	156.80
3 top men, 58 days @ \$1.75 "	304.50
3 engineers, 59 days @ \$2.50 "	442.50
15 sinkers, 55 shifts @ \$2.55 "	2,103.50
Steel shoe.....	450.00
Pump fittings and liners.....	390.00
Packing and oil.....	180.00
Hangers and bolts.....	110.00
Oak timber.....	576.00
Concrete.....	240.00
Crushed stone.....	364.00
Oil suits for sinkers.....	96.00
Boiler coal.....	260.00
Miscellaneous supplies.....	212.00
Superintendence.....	550.00
	<hr/>
	\$6,922.25

This is at the rate of \$197.80 per foot.

As a comparison I would state that a few months previous to this, Mr. Williams (with practically the same crew of men) sunk an 8-ft. by 16-ft. shaft to a depth of 206 ft. (through 90 ft. of clay and hardpan and 116 ft. of sandstone and slate), in 38 days, at an actual cost for all labor of \$2,285; or a trifle over \$11 per ft., as against \$115 per ft., for the labor item alone through the 35 ft. of sand in the Handy shaft.

A Lead and Magnesium Alloy.

An alloy of lead and magnesium has been patented by W. F. Moffett, of Bloomfield, N. J., for use as an anti-friction metal; its melting point is much higher than that of the usual anti-friction metals, composed of lead and antimony, or lead, tin and antimony. At the same time, the lead-and-magnesium alloy does not melt at such a high temperature that it cannot be melted in an iron ladle.

The inventor prefers an alloy consisting of 98.75% of lead and 1.25% of magnesium. With 4% of magnesium the alloy is brittle. With 2% the alloy is hard and suited for journal bearings which require a hard metal.

The method of making the mixture is, first to melt the lead under fluor-spar, and then add the magnesium. The lead is then raised to a temperature that will melt the magnesium, and thus prevent the oxidation of the latter. The mixture is then poured into ingots. It may be melted in an iron ladle in the usual manner, and is quite tough and strong.

Separation of Zinc from Iron.

W. Funk, in *Zeitschrift für angewandte Chemie*, 1905, p. 1,687, says that, for accurate separation a considerable excess of ammonia is requisite. His method is as follows: The solution, containing all the iron as ferric salt, should be contained in a basin, and not more dilute than necessary. To it is added ammonium chloride, then 10% ammonia solution to neutral reaction, followed by an excess equivalent to 20-30 times the amount necessary to precipitate the iron. The covered basin is heated to 70°-80°C., the liquid filtered, and the precipitate washed with hot 5% ammonium chloride solution. The precipitate is dissolved in warm dilute hydrochloric acid, and the precipitation repeated under the same conditions. The zinc in the filtrates may be determined in any of the usual ways. If the iron is to be determined, the ammonium chloride must be first washed out of the precipitate, and after ignition any silica present must be determined. The acetate method of separation is preferable.

In specific gravity, palladium is very close to silver and lead. The specific gravity of silver is 10.5, that of lead 11.3, while palladium has 11.5.

The Effect of Altitude upon Combustion.

BY CHAS. M. PALMER.*

A discussion recently came up in which a manufacturer of cement plaster, plaster of Paris, etc., claimed that more fuel is required to calcine this material at high than at low altitudes. His claim was opposed by the contention, that, inasmuch as water boiled at a lower temperature the higher the altitude, it requires less fuel to evaporate a given quantity of water at, say, 7500 ft. elevation than at sea level. The question was referred to the writer for an explanation. I found that the literature on the question was scanty, except as applied to smelting; in that case, it is well-known that more fuel is required for high altitudes. This has been the subject of more or less discussion, but the reasons offered in explanation of this fact are inadequate. That a large variation in barometric pressure exerts a marked effect upon the evaporative efficiency of a boiler, is shown by the summary of eight boiler tests conducted here (Butte, Mont.), the elevation being from 5500 to 6000 ft. The maximum and minimum of these trials were 8.94 and 6.32 lb. of water evaporated (reduced to 212° F.) per lb. of coal (of a fair grade bituminous, with 8 or 9% ash); the mean was 7.77, which is very low; considering the high-class of the installations, 10 lb. would not be an unreasonable expectation at sea level.

The only attempt of this kind which I have found occurs in Hofman (*Metalurgy of Lead*, p. 304), where it states that Headden, at a meeting of the Colorado Scientific Society gave the following: "A cubic foot of air entering the blast furnace under a certain pressure will expand more at a high altitude where the air is rarified, than at sea level; consequently more heat will be consumed and this has to be made up by an extra amount of fuel. In the same way more power and consequently more fuel is required at a high elevation to obtain this cubic foot of compressed air."

From the wording of this quotation, it is assumed that the absolute pressure of the blast would be the same for different altitudes; that assumption is not permissible. Blast pressure gauges measure the pressure above that of the surrounding air; this, of course, varies with the altitude. A simple calculation (by means of the well-known gas equation) will show 1 lb. of air at 60° F. and 16.7 lb. per sq. in. pressure (this being 2 lb. more than ordinary sea level pressure) occupies a volume of 11.54 cu. ft.; in expanding isothermally to 14.7 lb. pressure it will become 13.11. At 13 lb. pressure (7500 ft. elevation and 2 lb. blast) the volume is 14.80, which in expanding to 11 lb.

*Chemical engineer, Butte, Montana.

becomes 17.5 cu. ft. The lowering of temperature for adiabatic expansion for these two cases is 26° and 34° F., respectively; it appears to me that the actual loss of heat is the difference between these two values, which is 8°, for every pound of air; this is equivalent to about 2 B. t. u. (8 multiplied by 0.24, the last number being the sp. heat of air). The theoretical amount of air for the complete combustion of 1 lb. of coke (or a heating power of, say, 12500 B.t.u.) is 10 lb.; if three times the theoretical amount be used, then, at the higher elevation mentioned, an amount of coke is required to make up for this heat lost by expansion. This is less than 0.5%. Thus it is seen that while an effect in the direction indicated is undoubtedly produced, it is not nearly so large as the quoted statement implies, in fact, it is quite insignificant.

However, there appeared to be other considerations which would have a very material effect upon combustion at high altitude; these considerations are applicable alike to natural or forced draft.

It is assumed that the evaporation of water, and calcination of cement plaster (which consists in removing a portion of the water of crystallization of gypsum by heat in open vessels), are identical operations; this is not true. But admitting this, it can be shown that to evaporate 1 lb. of water from 60° F. into steam at 212° F. (boiling point at sea level) and that for 1 lb. of water from 60° into steam at 198° F. (boiling point at 7500 ft. elevation), requires 1,118.6 and 1,114.3 B.t.u., respectively; a difference of 4.3 B.t.u., or less than 0.4%—a negligible quantity in practice.

The points to which I would especially direct attention are: the dependence of the relative intensity of the heat produced, and the perfection of combustion by using oxygen in a concentrated state (as compared with the more diluted or attenuated oxygen occurring at high altitudes).

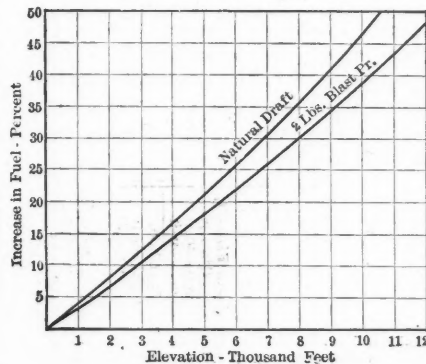
Combustion in the ordinary sense may be defined as a rapid chemical action between fuel and the oxygen of the air. Heat of combustion is the amount of heat evolved per unit weight of combustible; this depends upon the nature of the substance, and not upon the rapidity of the action. This should not be confused with the "temperature of combustion," which varies both with the nature of the combustible and with the rapidity of action. The rapidity of combustion, and hence the temperature, depends upon the nature of the combustible and the supply of oxygen.

The law of "mass action" in chemistry states that: "The amount of substance transformed or decomposed (or the effect produced) in unit time, is proportional to the amount present during that time."

The "amount present" means concentration; in ordinary chemical work with solutions it means the number of gram-molecules per liter (a gram-molecule is the molecular weight expressed in grams), but for the present purpose it may be taken to mean percentage concentration.

Regarding the various applications of the law of mass action, where the concentration of the reacting substances is constant, other things equal, so is the velocity of reaction; it can be shown, in any poly-molecular reaction, that "the total amount of change at any moment is proportional to the product of the active masses of all the substances taking part in the reaction." If the active masses are constant this product is a constant. In applying this principle to the case of a furnace, the amount of change in unit time (and hence the temperature) is proportional to the product of the concentration of the oxygen in the air, (a), and the concentration of the fuel in the charge, (f). If both are considered as unity, then:

$$af=1 \dots \dots \dots (1)$$



At sea level, where the atmospheric pressure is 76 cm. of mercury, 3.57 cu. meter of air contain 1 kg. of oxygen (2.2 lb.), at ordinary temperature. If y equals the weight of oxygen in unit volume of air, and yx is the pressure in cm. of mercury, then:

$$y=0.01315x \dots \dots \dots (2)$$

From this equation (by assigning any desired value to x) the corresponding amount of oxygen in the air at that pressure is obtained, as compared with unit weight in unit volume at sea level.

According to equation (1), any variation in a will produce a proportional variation in the product which represents the amount of change or effect. This is expressed by substituting any value of y found by equation (2), for a in equation (1).

Now, the object of using fuel in a blast furnace or any furnace, in fact, is to maintain a given temperature or produce a constant effect throughout a given mass of matter. Assume two furnaces working at different altitudes, say, sea level and 7500 ft. elevation; other conditions

being the same throughout, with respect to charge, percentage of coke, blast pressure, etc., the latter being, say, 10 cm. of mercury (=2 lb., approximately) which of course, means 10 cm. above atmospheric pressure at the place under discussion. The first furnace is using air at 86 cm. absolute pressure; which is equivalent to 1.13 kilo of oxygen per 3.57 cu. meter of air. Fuel being considered unity,

$$1.13 \text{ times } 1=1.13.$$

This numerically expresses the effect produced under the conditions. The other furnace is using air at 67 cm. absolute pressure; this contains 0.88 kilo of oxygen per 3.57 cu. meter; then:

$$0.88 \text{ times } 1=0.88.$$

The diminished concentration of the oxygen has decreased the effect from 1.13 to 0.88. To bring the latter up to its value in the first case the fuel must be increased to:

$$\frac{1.13}{0.88} = 1.284$$

or over 28%.

There is obviously a limit to the decrease in the amount of oxygen, where combustion is no longer supported, or the rate of combustion is too slow to maintain the fuel at the ignition temperature, regardless of the amount of the latter present. Another cause which would render equation (1) insufficient to represent the whole truth, as the limit mentioned is approached, is the incompleteness of combustion. The equation assumes, for simplicity, a bi-molecular reaction or a reaction of the second order between oxygen and carbon under ideal conditions. As the oxygen is diminished, this assumed simple reaction becomes complicated by the introduction of the side reactions, in which appear compounds having a lower heat of formation. In practice, carbon is less perfectly oxidized and more carbon monoxide is formed (instead of carbon dioxide as it should be); hydrocarbons are volatilized unburned or incompletely so. However, the actual effect is even less than is indicated by equation (1).

Again, if at the altitude mentioned, 28% more fuel was used than at sea level, where unit concentration of both fuel and oxygen is employed (it must be remembered that the above equation considers the concentration of the oxygen in the air or the amount of oxygen per unit volume, and not the absolute amount), then the absolute amount of air must be increased correspondingly; the energy lost in heating this extra quantity of matter is another factor which still further diminishes the effect sought. The increase in fuel required is greater than is indicated by the equation given above. The two curves accompanying represent the increase of fuel required for natural draft and for a 2-lb. blast-pressure, at various altitudes.

West Australian Gold Mining in 1905.

BY H. C. HOOVER.*

The gold production for the year 1905, and previous years, in fine ounces, was as follows:

	1902.	1903.	1904.	1905.
Jan.....	144,496	178,360	176,653	165,452
Feb.....	131,206	163,058	162,402	154,033
Mar.....	152,527	165,031	136,835	160,918
April.....	157,705	176,814	180,999	172,136
May.....	141,117	175,859	160,280	157,685
June.....	102,938	176,333	167,446	155,149
July.....	158,304	180,097	160,719	166,006
Aug.....	161,521	175,110	168,432	174,681
Sept.....	161,689	170,693	165,852	163,297
Oct.....	167,034	161,692	174,607	160,622
Nov.....	169,448	170,479	163,933	160,000*
Dec.....	163,053	171,257	165,072	160,000*
Totals, 1,871,038	2,064,801	1,983,230	1,949,975	

*Estimated.

The year's production was again marked by a steady decrease; in total about 34,000 oz. less than for 1904, and about 115,000 oz. less than 1903. There is every reason to anticipate a further decline in future; debarring, of course, the discovery of new districts. The decline is due, in part, to the following causes: Decrease in value with depth in the leading mines; lower working costs, and therefore lower-grade ore included in mine products; exhaustion of surface alluvial; and failure in the discovery of important new mines.

The first and last of these causes are the most serious. The decrease in value with depth cannot be helped; but the failure to develop new mines of consequence during the past seven or eight years is due to a large decrease in prospecting. The conditions of the Australian Mining Title by which a leasehold is granted subject to maintenance, the constant employment of one man for every six acres, rendered it practically impossible for the prospector to hold his ground; and, although personal concessions are constantly given by officials, the fear of inability to hold ground has driven the prospector largely from the field and throttled the growth of the industry. Politically the Colony has freed itself from a labor government, and more can now be hoped toward the development of the State's resources.

The dividends for the year I estimate at £2,150,000. Several companies have strengthened their reserve funds to provide for the finding of other mines to take the place of present properties when these shall be exhausted. Several are looking beyond the State of their birth for such opportunities. The nominal capital of all important West Australian companies quoted on various markets (practically all dividend-paying concerns) is at present about £9,500,000. The value of these companies on the market is £29,500,000; showing that the average return for the year was roughly 40.41% on

*Consulting Mining Engineer, with Bewick, Moreing and Co., London, England.

the nominal capital, and 13.72% on the market value of the shares.

The depth now reached by the leading mines varies from 1,000 to 2,000 ft. There has been an undoubted decrease in value with depth; and Kalgoorlie especially appears to be a good field for the confirmation of theories as to secondary enrichment of the sulphide zone. However, the decrease in average of output per ton has not been due to this cause alone, for the great decrease in working cost, with improved extraction, has permitted the treatment of much ore hitherto unprofitable.

The total ore reserves in the leading mines which furnished fully 70% of the State's output are about 5,000,000 tons. The annual extraction is now at the rate of about 2,000,000 tons; so that somewhat over a two-years' supply is visible in average. Individual mines vary from a few months ahead of the mill, to as much as five years.

Working costs showed a further improvement during the year. The wide variation of size of ore bodies, degree of refractory character, distance from rail, size of equipment, etc., prevent any generalization. The average costs for all charges, except development, on several typical mines are furnished in a table given herewith. This includes administration, repair, renewal, etc. The cost of development varies on these mines from 30c to \$1 per ton.

	Great Fingall, 100 Stamps, 18,000 tons per month.	Ivanhoe, 100 Stamps 17,000 tons per month.	South Kalgurli, Dry Crushing, 7,000 tons per month
Mining, per ton.....	\$1.68	\$2.04	\$1.62
Treatment, per ton.....	1.94	2.14	2.78
Realization, ".....	0.08	0.10	0.04
Gen. Expense, ".....	0.08	0.12	0.28
	3.78	4.40	4.72

No startling metallurgical advance has been made during the year, although all departments show steady improvement. The average of Kalgoorlie extraction on well-managed mines is probably over 90% on telluride ores; one mine, the South Kalgurli, is averaging over 94%. The most important advance has been made in the elaboration of regrinding as an adjunct to the increase of stamp duty. The question of regrinding was first undertaken on Kalgoorlie mines; fine division (amounting to absolute slime in most instances) is a necessity in securing efficient extraction. Various machines were introduced for this purpose; all forms, such as Huntington mills, etc., being discarded in favor of an adaptation of the old Wheeler pan, and the tube-or flint-mill. Which of these latter machines will ultimately prevail is still disputed, but sufficient experience has been gained to settle some features of practice.

The pan is the best machine yet found

for grinding sand from one degree of fineness to another; where regrinding is installed as simply an adjunct to increased mill-duty (in crushing sand from, say, 10 or 12-mesh mill-screen, to about 30 mesh for percolation-cyanide treatment), it is superior to any invention yet brought forward. To Mr. W. J. Loring belongs most of the credit for advancement along this line. The Sons of Gwalia, Great Fingall, and Oroya mines, under his general charge, received most of the investigation. The Sons of Gwalia 50-stamp mill is now crushing 11,000 tons per month; further installation now in progress will increase it to 12,000 tons. The Great Fingall mill, of 100 stamps and on hard quartz, is doing more than 18,000 tons per month, and will probably reach 20,000 tons. On these mines, sliming is undesirable; the increase of slime over a similar degree of fineness from mill-screen is not over 7 per cent.

Where sliming is necessary to increase extraction, the relative merits of the tube-mill and pan are still unsettled, both having staunch advocates. The Ivanhoe mine, under Mr. R. B. Nicolson, has done the most efficient work; this is the leading exponent of the pan, as the Oroya-Brownhill is the leading exponent of the combined pan and tube-mill. At the Oroya, 10,000 tons per month are crushed by 50 stamps, and at Ivanhoe 17,000 tons with 100 stamps. At the latter mine, tube-mills have been discarded, but the mines are not quite on a parallel basis; a portion of the product of the Ivanhoe mill is treated by percolation; it is difficult to compare with the Oroya, where all the ore must be reduced to a slime. In the latter case, pans are used for intermediate crushings between the stamps and the tube-mills.

In general, it is certainly settled that the tube mill is a sliming machine; but where an increase in slime is undesirable, it has no place at all. Equally well is it settled, that the pan is the superior machine for crushing sand to an intermediate stage. It is still to be determined, which machine will prevail for sliming.

Carborundum.

The production of carborundum in the United States in 1905 was 5,596,280 lb., instead of 3,940,000 lb., as stated in our issue of January 6th. The latter figure was given through a clerical error, which omitted to include the production of one plant for the first six months of the year. The production of carborundum in 1904 was 7,060,380 lb.

The existence of platinum in Brazil has been recognized in the Lages stream in the Serro district; in alluvial deposits at Itabira de Campa; in the Ouro Preto district, and in the River Abaete—all in the State of Minas Geraes.

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*Illustrated.

The Western Coal Situation.

The convention of the western bituminous coal miners, which met at Indianapolis this week, will formulate the demands of the miners, for the new arrangement to take effect on April 1. If they follow the instruction of the district conventions, an increase of 10 per cent. in the coal mining rate will be asked for; but it must be remembered that more is usually demanded than is really expected, to give a basis for negotiation.

The joint meeting of the miners and operators will be held about Jan. 25, when the real struggle will begin. The operators, however, are not united as the miners are, and there are serious differences between Pennsylvania and Ohio on the one hand and Illinois on the other; with non-unionized West Virginia always in the background as a competitor.

Manhattan.

Manhattan, the newest gold camp in Nevada, has been the occasion of an exciting rush during the last fortnight, a large number of men from Tonopah and the other older camps having stampeded into the new district. The moving cause was the shipment of some rich ore from several claims, which were located less than a year ago. Of course, there is not yet sufficient evidence to decide whether this new camp may turn out to be another Tonopah, or whether it will simply prove to be one of the mistakes, of which history records so many in these mad "rushes." Anyway, allowance must be made for the natural exuberance of the prospector, especially at the present time, when mining excitement runs so high.

New Copper Companies.

The high price which prevailed for copper during 1905, and especially in the last quarter of the year, failed to stimulate, to any great extent, the bringing out of new companies for the public to invest in. Such new enterprises as were launched upon the market were developed chiefly by interests which sought new supplies of the metal for their industrial requirements in one way or another.

There are now beginning to be signs of the organization of new companies and offering of their shares for purely speculative purposes, of which there were numerous examples in the boom of 1899.

The extraordinary success of the North Butte company, which was one of the spectacular features of 1905, for instance, is leading to the organization of other companies, taking advantage of the fashionable name. We have already an East Butte company, and there is talk of a South Butte. Later on there may be a West Butte, a Northeast Butte, and so on. Unfortunately, the cardinal points of the compass are limited. "Verde" was once a similarly fashionable name in connection with Arizona companies.

Coal Storage for Steam Plants.

In coal handling for steam generation the storage methods adopted are almost as diversified as the characteristics of the several kinds of coal that may be used from time to time. The most economical, as far as utilization of space, and freedom from danger of spontaneous combustion, are concerned, is the gantry crane or bridge, having two motions at right angles to each other. This method is also, usually the highest in first cost. The economy of handling in well designed plants is, however, great enough to overbalance the higher fixed charges in most cases. where real estate is of great value, this method is applied with excellent results.

Coal storage in pockets over the boilers to be fed is one of the systems most economical of labor in power-house work. Notwithstanding the high fixed charges resulting from this method of storing (the construction cost may run from \$2 to \$4 per ton for timber, and up to as high as \$7 per ton for steel or reinforced concrete pockets) the added convenience and the ease of weighing and feeding fuel to the furnaces are often of sufficient importance to justify the expense incurred. This is especially the case in city power-houses where the ground space is so expensive that this method is often cheaper than the additional real estate required to provide sufficient storage capacity.

Arizona.

Political considerations may seem to make it expedient to unite Arizona and New Mexico as one State to enter the Union, but the mining industry deplors this attempt to dispose of the future of Arizona against what appears to be clearly the desire of the majority of its people,

at least those who have done most to develop its resources and have its welfare most at heart. Arizona is not, and never will be, a rotten borough. It now ranks second among the states and territories of the United States as a producer of copper, and its mining industry is in no way of an ephemeral character. It has been going on for many years at an increasing ratio, and there is but little doubt that before many years Arizona will even surpass Montana as the premier copper producing region of the United States.

Arizona is frequently spoken of as if its copper mines occurred in a single district, whereas in fact they occur in a considerable number of districts, which are rather widely scattered. In this respect, Arizona differs materially from either Montana or Michigan. The wide-spread occurrence of important copper deposits which is thus manifested, has an important bearing upon the future of the Territory. For one thing, it presents the chance that some of these important districts may attain a magnitude analogous to that of Butte, Mont.; and for another, it holds out the promise that the full extent of the copper resources of the Territory has not yet been discovered, and that other important districts (perhaps as important as those which are now being exploited) will be developed in the future. It is only a very few years since such districts were developed just over the line in the State of Sonora, Mexico.

The future of Arizona is therefore bright. Its people have the utmost confidence in it, and naturally desire to work out their own welfare. This is a desire which ought not to be ignored. At the present time, Arizona is not asking for admission as a separate State; it is simply begging to be let alone until such time as Congress shall be glad to accept voluntarily the overwhelming evidence that it will furnish in support of the claim it may make for recognition. It will surely be only a few years before the time will come.

The St. Joseph Lead Co.

The special meeting of the stockholders of this company, which has been called for Jan. 31, to vote on an increase in the capitalization of the company from \$6,000,000 to \$20,000,000, has attracted considerable attention as indicating possibly a further plan for consolidation in the lead producing business of the United States.

This company is one of the historic mining companies of America. Among the lead mining companies it is indeed the senior. It was the first to discover the disseminated deposits of lead in Southeastern Missouri, this having been done in 1869, and ever since that time it has been the most important factor in that very important district, which ranks second to the Cœur d'Alene as the largest source of lead in the United States. The major part of the increase in the production of lead in 1905 was directly due to this district. The output of the St. Joseph Lead Co. alone constitutes a very respectable percentage of the total output of the country.

Many attempts have been made to affiliate this company with the trust, but its owners have been unwilling, and their position in the business is too strong to admit of any constraint. The company is entirely independent, owning its own mines, mills, railway, and smelter, and producing a special brand of lead, which is a standard in the market and does not go begging for customers. The position of the company is therefore practically impregnable. Moreover, its stock is very closely held.

Financially, the company has been very successful. It has been a regular dividend payer for a long series of years. Its dividends, however, have been at a low rate on a low capitalization, the policy of the company having been to reinvest a large portion of its earnings in the development of the district, wherein it is by far the largest owner of mineral land. A few years ago the capital stock was increased from \$3,000,000 to \$6,000,000 to represent more nearly the value of the company's holdings. A further increase, as now projected, is likely to be on the same lines. It would be regrettable to see this famous company lose its independence.

Chinese Labor in the Transvaal.

Elsewhere in this issue we publish an interesting article describing the conditions under which 45,000 Chinese coolies have been collected in China and dispatched to South Africa to serve as workmen in the mines of the Transvaal. It is evident from this authoritative statement that the emigration under contract has been effected in a thoroughly honest man-

ner, and the statements of Mr. W. Fischer Wilkinson, whose article on mining conditions in the Transvaal was published in our last issue, show clearly that the employment of these coolies in the mines has not been accompanied by any outrage upon the principles of modern civilization. On the contrary, the evidence is clearly that this contract-transmigration of the coolies has been to the advantage of all parties concerned, including the coolies.

The action of the new liberal ministry of Great Britain in interrupting the importation of these coolies, to which we have previously referred, was obviously for political effect. As our London correspondent has recently pointed out, the Chinese labor question forms one of the counters in the political game in England, and calm, unimpassioned opinions on the subject are scarce. It is not to be wondered at therefore that organs of the Conservative party should declare that this policy of the Liberal party is only a prelude to the disruption of the British Empire, and that the Liberals should declaim against what they call the new slavery. The Liberal leaders were bound to make some pronouncement before the general election in order to satisfy a large section of their followers who are red-hot on the subject of this "slavery." Nevertheless, their action required a boldness, which we have been free to admire.

While the "philanthropists" are satisfied at the new move, the mine owners in the Transvaal are not much worried. They have already a large number of coolies, who have immensely ameliorated the distress of labor shortage and enabled the mines to increase largely their output, the "best on record" in gold production being surpassed month after month in 1905, December finally capping the climax with a turn out of 431,594 fine ounces, which was a gain of 6,837 ounces over November. Moreover the mine owners welcome the promise that the future policy with regard to the Chinese labor question shall be decided by a legislature which is representative of the opinions of the inhabitants of the Colony. There is but little doubt that the preponderance of opinion among both English and Dutch in the Transvaal is in favor of continuing Chinese labor, inasmuch as almost everybody recognizes that the gold mining industry is the main source of wealth to the country.

California Gold Production in 1905.

In the preliminary estimates made by the Director of the Mint for 1905, the gold yield of California is placed at \$17,502,600, and the silver yield at 879,411 fine ounces. This shows a decided falling off in the gold production of the State as compared with the previous year, when the output was reported as \$19,100,000. Such a decrease was, however, to be expected; in fact it was thought by some good judges that there would be even more loss than is shown. The severe and protracted drought during the last three months of the year, a time of the year when rains are normally expected, was undoubtedly the principal cause.

For one thing, the hydraulic miners were unable to start piping at the usual time owing to lack of water, and indeed many of them remain idle yet, though under ordinary circumstances they should have had two months' water by this time. For another thing, and this is the main cause of the deficit, the quartz mines and mills were obliged to close down for lack of water for power. For nearly three months in Tuolumne county the mills were idle and for a shorter time also in Amador and Calaveras counties, while for several weeks the great mines at Grass Valley and Nevada City had to stop their mills. Not only all along the Mother Lode counties has this closing down been the rule, but in most of the other countries as well.

The main source of the gold in California is the quartz mines, and when they have to shut down and cease crushing ore, the bullion output is directly affected. California has not seen such a scarcity of water in the streams as occurred last year, for more than a decade. Not only were the miners unable to secure the usual water for power, but also the electric power plants were compelled to shut down for weeks. Considerable snow has already fallen this winter in the mountains and foothills, but the cold weather has kept it frozen, so that so far but little water is coming from it, though an abundant supply is certain when the warm rains begin.

There was some increase of gold output in 1905 from the dredges, which were not affected by the drought, but this was much more than offset by the loss from the quartz mines, which are generally much heavier producers than the dredges.

The knowledge of this state of affairs makes clear of course the reason for California's poor showing in 1905, and will prevent any misconception as to its being possibly due to any failure of the resources of the mines.

Competition in Custom Smelting.

Since 1899 the American Smelting and Refining Company has practically had the monopoly of the custom-smelting business in gold and silver ores in the United States. Its only serious competitors have been the silver-lead smelters of the Pacific Coast, and the Balbach company of Newark, N. J., whose radius of action has been very small, especially in the case of the Balbach company, the latter's business being chiefly the refining of base bullion; and one independent company in Colorado. During 1905 the independent smelters of the Pacific Coast were eliminated from the competition through their acquisition by the American Smelters' Securities Company, a subsidiary organization of the American Smelting and Refining Co.

Outside of the concerns above mentioned, the only competitors of the trust have been a few smelters of gold and silver ore, employing copper as the collecting agent. These concerns have been, however, insignificant competitors, except at Salt Lake City, where their inroads have been of a more serious character, although not very damaging, because of the abundant ore supply tributary to that great smelting center. Smelting with copper as the collecting agent being considerably cheaper than smelting with lead, the concerns employing the former process have naturally had the advantage on certain classes of ore. In this connection it is interesting to remark that the American Smelting and Refining Company is now going extensively into the copper smelting business at Salt Lake City, on its own account.

Competition with the American Smelting and Refining Company in a general way has been frequently threatened, but plans toward that end have never gone much further than profitless discussion. It appears now, however, that a real competitor, developed from what is actually a going concern, is soon to enter the field. This is the United States Mining, Smelting and Refining Company, which has been recently organized in Boston, to take over the United States Mining Company

and its subsidiary enterprises, the latter including the Mammoth Mining Company of California, the Richmond-Eureka Mining Company of Nevada, and an interest in the De Lamar Copper Refining Company of New Jersey. The new company will therefore begin business with a copper refinery near New York, a copper and lead smeltery in Utah, and a copper smeltery in California. It is planned, however, to erect plants at other points. The success of the new enterprise will depend largely upon the wise location of the new plants. In this connection it may be mentioned that the De Lamar Copper Refining Company is already engaged in the construction of a lead refinery of 24,000 tons capacity per annum at East Chicago, Ind.

It may be remarked that the new company starts with at least two elements of success, namely, strong financial resources, and the possession of important ore supplies. The latter condition is fundamental to the success of a custom smelting business under present conditions. It has been thoroughly recognized by the managers of the American Smelting and Refining Company, who in spite of all their efforts to keep control of the business by the consolidation of plants, and the consummation of community of interest in the lead manufacturing branches, have been obliged, or at least have seen fit, to embark extensively in the mining business. It is now seen more and more clearly that the possession of the raw material in the form of profitable mineral is the true basis of an industrial metal enterprise, as was perceived years ago by some clever intellects, and for this reason the value of such resources is steadily increasing.

Looking at the prospect more narrowly, it is quite certain that a general competition in the ore-smelting business will reduce the profits per ton of ore treated, wherefore calculations must make an allowance for discount from the conditions of the last two or three years. Competition, however, will be welcomed by the outside mining companies, which have to sell their ore without any community of interest. On their behalf it is to be hoped that competition will develop surely, swiftly, and soundly. We believe, however, that it is not the intention of the new company to court competition at the outset, but rather to pursue a conservative policy.

Metallics.

The hotter melted metal is, the more gas it will absorb.

Palladium dissolves in nitric acid, but the best solvent is aqua regia.

Palladium has the lowest melting point of any of the platinum group of metals.

On account of its extremely fine grinding puzzolan mortar often gives nearly as much tensile strength in 3:1 mixtures as when tested neat.

Careful foundrymen do not allow metal to reach a higher temperature than is needed for pouring the castings. This is on account of the absorption of gas at higher temperatures.

Great care should be used to prevent iron chips, borings or other hard and gritty substances from getting in a valve; they cut and scratch the discs and seats, and make a leaky valve out of a tight one.

In the gas-engine too much compression causes the mixture to fire itself at the wrong time, and causes the engine to knock or stop. Too little compression causes loss of expansive force and power.

Where a flanged pipe joint has to be broken often, the application of pulverized soapstone, chalk or plumbago will prevent sticking. This will allow the packing to be removed without injury, and used repeatedly.

Assays for copper in yellow brass chips usually show very nearly the amount of copper contained in the original brass rod. Chips which show a much lower copper content usually contain considerable oil and dirt.

The majority of the pin-holes which are found in castings are probably caused by melting a finely divided material, such as chips. Nearly every foundry melts them in the same manner and all have the same pin-holes in their castings.

The productive area of natural gas in southeastern Kansas and northern Indian and Oklahoma Territories is located in the westerly dipping sandstones of the lower Coal Measures, immediately above the Mississippian limestone or Mountain limestone.

Gray-iron castings sometimes come from the foundry so hard that the tools in use, even if of self-hardening steel, make a poor showing. Only a few pieces can be finished without re-grinding and re-setting the tool. The same thing sometimes happens in finishing steel rods and similar parts.

Puzzolan permanently assimilates but little water compared with Portland cement, its lime being already hydrated. It should be used in comparatively dry mixtures, well rammed; but while requiring little water for chemical reactions, it requires for permanency constant or continuous moisture in the air.

M. Moissan announces that copper may be readily distilled in the electric furnace. When the fumes are condensed on a cold substance, a filiform felting of copper is obtained which has all the properties of ordinary copper. At boiling point copper dissolves graphite, and releases it in a more or less crystallized form in cooling.

Holland is a stearin candle manufacturing country. Three factories make, beside pure stearin candles, composition candles of paraffin and stearin. Candles are molded by machinery. The machines contain, according to size, 100 to 200 molds, depending on size of candles. Candles are pressed out to the number of 100 to 200 by rods (pistons) with continuous wicks inside.

The essential constituent parts of a concrete pavement are a concrete body finished with a wearing surface or top coat. The thickness depends on the purpose for which the pavement is to be used and the size of the slabs into which it is divided. For slabs 4 or 5 ft. square a total thickness of about 4 in. is usually sufficient; for slabs 6 ft. square the thickness should be about 5 in.

In the Appalachian field the main supply of natural gas comes from the Devonian to the upper Coal Measures, a distance in the vertical scale of nearly 6,000 feet. In northwestern Ohio and central Indiana the main source of supply has previously been the Trenton limestone, now largely depleted, and in central eastern Ohio more recently a large supply has been found in the Clinton limestone of the Silurian period on the eastern flank of the Cincinnati uplift.

The temperature of combustion of practically pure methane and oxygen when in the proportion of one volume of the former to two volumes of the latter lies between 514 degrees and 546 degrees C. This is to say, methane will not burn until that temperature is attained. The addition of hydrogen even in large quantities does not cause the methane to burn at a lower temperature. Natural gas consists usually of upward of 90 per cent. of methane, besides more or less hydrogen.

Star bits for rock-drills have the advantage over chisel bits, that in hard ground, the wear on the cutting edge is halved for the same distance driven, while the four shoulders which take up the wear make it possible to drive a longer distance on a smaller difference of gauge between drills following each other. In difficult ground it is possible to put down a hole with a star bit where a chisel bit would certainly stick. The star bits are relatively heavier and oppose more resistance to turning. In some ground they will not bore so quickly as a chisel bit.

The Yukon basin has been prospected since 1878, the first gold being obtained from the bars on the Lewis and Stewart rivers. In 1886 coarse gold was discovered on Fortymile river, about 60 miles from the present site of Dawson. A camp was established at the confluence of the Yukon and Fortymile rivers, and about 250 miners worked with varying success on the tributaries of Fortymile river up to 1896. The yearly output of gold was about \$150,000. In 1896 George Cormack, prospecting in the Klondike region, made his famous discovery on Bonanza creek, but the outside world did not hear of this until 1897.

With skilled labor at \$3.50 and common labor at \$2 per day of nine hours, the cost of erecting the frame work of small steel mill buildings is about \$10 per ton, if the trusses are riveted and all other connections are bolted. The cost of heavy machine shops, all material riveted, is about \$8.50 to \$9 per ton. Small buildings in which all connections are bolted may be erected for \$5 to \$6 per ton. The cost of erecting a coal tippie was \$8.80 per ton. The erection of the buildings of the Basin & Bay State Smelter cost \$8.20 per ton. Six gallows frames in Montana cost from \$11.20 to \$15.20 per ton for erection, all connections being riveted.

The cost of manufacturing lime is from \$1.20 to \$2.90 per 2,000 lb. of product. This corresponds to 4.2 to 10.15c. per bushel of 70 lb. The cost per 2,000 lb. is divided as follows: Interest on cost of plant and quarry, 5 to 20c.; taxes, minor supplies, etc., 10 to 25c.; cost of quarrying two tons of limestone, 50 to 90c.; cost of fuel for burning, 30 to 75c.; cost of labor (exclusive of quarrymen), 25 to 80c. The minimum estimate represents what might be attained by a good modern plant, run steadily, and under exceptionally favorable conditions as regards quarrying, fuel and labor. The maximum estimate could easily be exceeded in a small or unsteadily operated plant.

Heycock and Neville have plotted cooling curves showing the successive phases for copper-tin alloys containing about 90% copper and 10% tin, this corresponding to the so-called gun-metal, formerly used for artillery. M. Guillet shows, further, that for alloys containing more than 92% copper the resistance to rupture is slightly increased by tempering at a low temperature, from 400 to 600° C., a corresponding variation appearing in the elongation. The maximum resistance is attained by tempering at 600° C. The maximum elongation, however, varies with the composition of the alloy. Thus, for a bronze containing copper 91, tin 9, the greatest elongation appears when tempered at 800°, while the alloy copper 79, tin 21, when tempered at 600° C. is most ductile.

Colliery Notes.

Most deep English collieries employ four-deck steel cages for hoisting. Two mine cars are carried on each deck, eight cars making a load.

The Illinois State mining law requires that a miner who is about to explode a blast with a manufactured squib should not shorten the match, saturate it with mineral oil nor ignite it except at the extreme end; he should see that all persons are out of danger from the probable effects of such a shot, and take measures to prevent any one approaching by shouting "fire!" immediately before lighting the fuse.

The pneumatic system of sinking colliery shafts frequently has advantages over the freezing process. It is cheaper and requires a less expensive plant to operate it. The maximum working pressure within the caisson is rarely above 26 lb. per sq. in. When the air is kept fresh, men in good physical condition are able to work four-hour shifts with a fair amount of comfort. Owing to their temperament, Italian laborers have been found best suited to this class of work.

Maps of underground workings should show all shafts, slopes, tunnels or other openings to the surface or to the workings of contiguous mines; all excavations, entries, rooms and cross-cuts; the location of the ventilating machinery and the direction of the air currents; the location of pumps, hoists and all permanent machinery; hoistings, abandoned workings and water levels or standing water (with its depth when practicable); and the boundaries of all surface outcrops.

Incandescent lamps are dangerous in colliery workings where there is much dust, owing to the inflammability of coal-dust, particularly that which collects in the upper parts of roadways, which is generally of the finest. There is another danger due to their exposure to large currents of air containing oxygen. It has been proposed to enclose all incandescent lamps employed in coal mines within dust-tight globes to minimize danger from fire and explosions, as was done when electric lighting was first introduced into mines.

Electricity is rapidly displacing gas as an illuminant throughout Europe, but the demand for coal is not consequently diminished; on the contrary, it is stimulated. In addition to the coal required for generating electricity, the demand for coal gas for power purposes increases faster than illuminating gas is displaced by electricity. A decrease in the purity of the coal gas supplied to consumers is becoming noticeable in many cities. This is due to the use of inferior kinds of coal in gas making. The highest grade of coal is chiefly employed for naval purposes.

In some of the larger English collieries, drop cages are employed for simultaneously decking cars. There are two drop cages, one of which is heavy enough to overbalance the weight of the other; these are connected together by an overhead rope, and form the means of communication from the higher level to the lower. The mine cars are loaded on the upper landing. The drop cages hold four cars and are equal in height to the distance between the two floors, so that the top of the cage bridges over the space when the drop cage is resting on the lower floor. When the cages are loaded from the right-hand side, and the drop cage on that side is the lighter one, four full cars are run upon it and carry it down to supply the bottom decks of the main shaft cage, while four full mine cars are run straight out to load the top main shaft cage. The drop cage when unloaded is restored for re-loading by the overbalance.

The pneumatic process is sometimes employed in sinking colliery-shafts through running sand formations. The cutting tool is termed a caisson. It is shaped like an inverted bell or drinking glass. It is charged with air above the normal pressure, and weighted. The weight of the caisson, including the superstructure, and added weights, forces the rim into the stratum, and as the earth inside is removed through doors on top, the caisson sinks and forms the wall of the new shaft. Where the stratum consists of soft material and the digging inside the caisson is evenly done, the caisson can easily be kept in a vertical position; but when boulders or other obstructions deflect it, side-weighting has to be resorted to in order to straighten it up. The air pressure within the caisson tends to retard settling; for this reason the pressure is reduced frequently during the absence of the men to enable the structure to sink as far as possible.

The danger in coal mines arising from incandescent electric lamps and combustible materials being in contact with each other is not generally recognized. A serious fire was recently started in a colliery by an incandescent lamp that became covered with coal dust. An experiment with a 12-c. p. lamp at 110 volts, showed that when it was placed in a can of water at 60° F. and allowed to remain a little over two hours the temperature of the water was raised to 180° F. The lamp was then placed on the top of a heap of small coal and smoke began to rise from the coal in 5 min. In 35 min. the temperature of the coal was 330° F, and in 1½ hours the coal took fire. The same lamp was covered with a layer of coal-dust. In less than 5 min. the temperature was raised so high that the lamp exploded, and shortly afterward the dust took fire. These experiments show the need of keeping underground lamps clean and well insulated.

Correspondence and Discussion.

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.

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 this JOURNAL.

Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

Standardization of Ferrocyanide Solutions.

Sir—In a recent number of this JOURNAL (Oct. 28 1905, p. 780) appears an article by E. M. Johnson, entitled "Standardization of ferrocyanide solutions with respect to zinc," which is stated to be an abstract from the *Western Chemist and Metallurgist*. Among other things, Mr. Johnson says that some chemists disregard the amount necessary to affect the indicator, and others disregard the blank in standardizing, but allow for it in the determination. Either procedure is of course incorrect, but errors are involved hardly worth commenting on in the discussion of any method, because it ignores the very fundamentals of accurate volumetric analysis.

The use of a table of variable standards, as published by Mr. Johnson, while undoubtedly correct, is not at all necessary. In this connection he says: "In fact, I do not see how a direct-reading solution can be adopted for all amounts of zinc." On the contrary, a direct-reading solution can be adopted, having all the accuracy of his table. If the amount of volumetric solution necessary to affect the indicator is subtracted, both in standardizing and from the determination, we obtain a standard applicable to all amounts of zinc. I shall base my demonstration of the correctness of this proposition upon Mr. Johnson's own figures.

There are two methods of determining the amount of volumetric solution necessary to affect an outside indicator: One is by direct experiment; the other by calculation. In the former case, the blank should of course contain the same volume of solution and free acid as the sample in determination. In the latter case, we proceed as follows:

Make a series of two or more titrations with different quantities of zinc in each. Subtract any lower one of these figures from a higher and calculate the standard from the remainder. This will give the true standard of the solution, exclusive of the indicator. The indicator can now be readily calculated. Let us illustrate this by an actual example taken from Mr. Johnson's figures:

Zinc gm.	Johnson's constant.	C. C.
.250	.0100	25.0
.050	.0093	5.4
Difference, .200		19.6

Now $.200 \div 19.6$ gives the true standard of Mr. Johnson's solution as .0102 gm. zinc per c.c. The indicator is obtained as follows: .250 gm. zinc divided by the true

standard .0102 gives 24.5 c.c. The amount of ferrocyanide used in excess of this is due to the indicator. 25 c.c. are actually used; consequently the indicator is affected by 0.5 c.c.

Another example from Mr. Johnson's figures:

Zinc gm.	Johnson's constant.	C. C.
.250	.0100	25.0
.150	.0098	15.3
Difference, 100		9.7

Now $100 \div 9.7$ gives, by the same arithmetical procedure, the true standard of .0102 gm. zinc per c.c.; the indicator being affected by 0.5 to 0.6 c.c. The amount necessary to affect the indicator as calculated, will generally correspond to the figure obtained by direct experiment. The fact that some of Mr. Johnson's other figures give by calculation a standard slightly different from .0102, is due to inaccuracies inherent in the method or in the manipulation. Naturally, the calculated standards cannot be more accurate than the errors of experiment. Mr. Johnson's figures corroborate this. With .010 gm. zinc, his constant varies from .0077 to .0096.

It is generally conceded by experienced chemists that the ferrocyanide method does not give very concordant results on small quantities of zinc. H. Van F. Furman, for instance, places the minimum at about 4% zinc, using one gram of the material. Nor is it surprising that small quantities of zinc should give the least concordant standards. The source of the error lies mainly in the uncertain indicator. Thus, taking Mr. Johnson's figures, with .010 gm. zinc, the indicator represents about 35% and the zinc about 65% of the total amount of ferrocyanide used; whereas, with .250 gm. zinc, the indicator represents only 2% and the zinc 98% of the total volume of ferrocyanide consumed. In the latter case, any inaccuracies are in a measure minimized by being distributed over a large quantity of zinc.

Regarding the estimation of very small quantities of zinc, it may not be out of place to call attention to the excellent and authoritative paper of W. Geo. Waring in the *Journal of the American Chemical Society*, January, 1904. For low-grade material, Mr. Waring recommends the precipitation of the zinc as sulphide and its ignition in a scorifier to zinc oxide.

CHAS. E. RUEGER.

Great Falls, Mont., Dec. 11, 1905.

The Cost of Dredging.

Sir—In the *JOURNAL*, (Dec. 23, 1905, p. 1169) reference was made to the low cost of dredging at Oroville, California; it was said that this "as far as we are aware, surpasses the best on record in straight hydraulic mining." I write to draw your attention to some figures which show that the hydraulic mining of auriferous alluvion is the cheaper. In

looking up results, I have been handicapped by the variety which obscures the determination of cost. For purposes of comparison, accurate figures deduced in similar ways are needed. However, there is no material uncertainty in my general conclusion.

The figures 2.36c. per cu. yd. (Report State Mining Bureau of California, *Gold Dredging*, Bull. No. 36, p. 52) might lead to misapprehension. Such low cost was possible only when operating a dredge of large capacity; and when new, and therefore not subject to much delay for repair and renewal. Thus a set of unusually favorable circumstances assisted in the general work. An examination of the table, which gives 2.36c. per cu. yd., shows that it was a record for only 31 days; and an item called "other expenses" (amounting to 40% of the operating cost during the next 30 days) is omitted. For the second month 3.35c. per cu. yd. is given. Thus it will be seen that 2.36c. per cu. yd. is not an "average cost." Further examination shows that, during the two months, 212,260 cu. yd. (bank measurement) was dredged. Now any "average" cost for dredging, to be reliable, should include exploitation during a longer period than one or two months. An average cost of nine other dredging operations, at Oroville, extending through periods sufficiently great to make conclusions reliable, is 6.22c. per cu. yd. Mr. C. W. Purington (*Methods and Cost of Placer Mining in Alaska*, Bull. No. 263, U. S. Geological Survey, p. 168) says: "Eight cents per cubic yard is believed to be a safe estimate for the total cost of gold dredging at Oroville." This includes depreciation of plant, and amortization; it is the total cost of dredging. The observations which led to this conclusion were made at various times, the last during the summer of 1904. No great reduction of cost has been effected since that time, though improvements in dredging apparatus, the merging of numerous dredging companies, and the use of larger dredges, have reduced operating expense.

While not intending to go at length into the means by which costs are found in dredging or hydraulicking, yet I note some points. Yardage affects totals largely; in general it is true that the calculations by which volumes are estimated are more likely to contain errors when concerned with dredging operations. Depths to the bottom of ponds or rivers, as they appear in calculations, are frequently inaccurate (often hardly better than guesses), and they are likely to be exaggerated. An increased attention to the accuracy of measurements for the calculation of yardage will unquestionably result in higher cost allowance for many dredging operations.

The following figures for operation in northern California are taken from "Notes on Hydraulic Mining in Low Grade Gravel," by William Radford

(*Trans. Am. Inst. Min. Eng.*, XXXI, 617). 1,251,399 cu. yd. was hydraulicked on a grade of about 4.8% (a moderate inclination for sluices, recent practice approving 8% or more) in 270 days, the working season. The total cost for this work is given as 2.19c. per cu. yd.

At No. 8 Claim, North Bloomfield, 1,858,000 cu. yd. was washed on a grade of about 4.5%, in 295 days, at a total cost of 2.86c. per cu. yd. Later 2,919,700 cu. yd. was washed (on the same claim and under similar conditions) in 342 days, at a total cost of 3.25c. per cu. yd. Increased expenses, for labor and explosives (due particularly to more heavy boulders), made the difference. (*A Practical Treatise on Hydraulic Mining in California*, A. J. Bowie, p. 278).

At Flint Creek, Montana, (Fred D. Smith, this *JOURNAL*, Nov. 11, 1899, p. 573) gravel containing 1.5c. per cu. yd. has been washed, in large volumes, at a profit, on grades varying from about 4.16 to 12.5%. Conditions were favorable for cheap work. Operation has been carried on for a number of years.

As an operation parallel with that giving 2.36c. per cu. yd. for dredging, I cite one over which I had charge, in Calaveras county, Cal. Although the working cost for the year was about 6c. per cu. yd., yet the hydraulicking at first was carried on for less than 2.5c. per cu. yd. Expenses, which increased as the work progressed, were responsible for the higher average figure.

Economy in management by mergers (in operating expenses); by improvements in design; by increase of capacity; and by reduction in power cost (merged interests obtaining lower rates) will show lower cost for the year by dredging. But hydraulic mining is still the cheapest metallurgical operation for the recovery of gold from auriferous alluvion.

J. P. HUTCHINS.

New York, Dec. 28, 1905.

The Card System of Accounting.

Sir—The recent paper in this *JOURNAL* (Oct. 28, 1905, p. 790) on "The Card System for Mine Supplies," by W. M. Jeffrey, is both interesting and instructive. The danger to which a mining company is exposed—a danger frequently overlooked where accounts are systematized by auditors—is that the mine is run to suit red-tape, whereas, undoubtedly the chief desiderata are simplicity and reliability.

The writer has in mind an instance where materials were required from a warehouse by an engineer sent specially to instal a new plant. This man had been given no authority to sign requisitions on the warehouse. The work was in suspense, several men remaining idle until the materials arrived. The storekeeper (who was a stickler for system) declined to deliver the articles without the author-

ity of the manager, who was absent. The consequence was, the articles were taken by force from the warehouse by the engineer, which action was thoroughly ap-

proved by the manager upon his return. In another case an inventory of store supplies was taken at a place which had been in existence about three years, resulting in a discrepancy of several thousand dollars. Here it was not lack of honesty, but lack of any system whatever. All the values, without doubt, had gone into the mill and mine; it was simply a question of a rough-and-ready manner of handling the materials, the men in

in Mexico, for instance, there are other conditions and requirements to be considered, such as import duties, a long haul by wagon or pack animals, the isola-

WAREHOUSE BOOK.

Voucher No.	Date Rec'd.	Invoice No.	Date Inv.	Shipper.	Article.	Weight.	Amount.	Duties.	Wagon.	Total.	Cost per Unit.
.....

FIG. 1. MATERIAL ACCOUNT.

Article.	Value on Hand.	Received.	Used in Mines.			Total.
			S. Mateo.	S. Marcos.	S. Lucas.	
Lumber.....
Candles.....
Explosives.....
Stable supplies.....
Sacks.....
.....
.....
.....
.....

FIG. 2.

tion from railroads during the rainy season, etc. Reverting to the text, the samples of account cards given herewith represent an efficient and simple method of handling material. There are many articles, which need not enter into the material account at all, which are purchased at regular intervals, such as illuminating and lubricating oils,

proved by the manager upon his return. In another case an inventory of store supplies was taken at a place which had been in existence about three years, resulting in a discrepancy of several thousand dollars. Here it was not lack of honesty, but lack of any system whatever. All the values, without doubt, had gone into the mill and mine; it was simply a question of a rough-and-ready manner of handling the materials, the men in

DISTRIBUTION OF MATERIALS.

	San Mateo	San Marcos	San Lucas	San Juan	San Pedro	Total
Developing.....
Timbering.....
Tramming.....
Hoisting.....
Sampling.....
Loading.....
Salaries.....
Marketing.....
Laboratory.....
General Expense.....

FIG. 3.

charge helping themselves to whatever they happened to need. These are extreme cases, but they go to show that no hard-and-fast rule should be imposed arbitrarily by an office man, who, perhaps, is entirely ignorant of the local conditions obtaining at outlying mining camps. It frequently happens that the man who handles the accounts is accountant, cashier, paymaster and storekeeper all in one; and this, too, where the supplies and operations of four or five mines have to be entered up. Thus

cotton waste, tools, etc., which are used indiscriminately at all the mines. These can be taken up in a "General expense account," and at the end of the month may be proportioned out to each mine according to the tonnage produced. Of course, where articles are ordered for any particular mine, charge them direct to the respective mine.

WALTER DAVIS.

Sierra Mojada, Coah., Mexico, Dec. 4, 1905.

The Ownership of Experience.

Sir—I venture to call attention to an interesting controversy:

"This material has cost us considerable money; it represents capital invested and is not for distribution."

This quotation was taken from a notice, posted in the office of a firm of engineering contractors; it relates to the notes made by its employees in the course of construction, or to notes brought by the employees themselves, when accepting positions with the firm. The policy of the firm is to consider all knowledge that its employees may have at their command as its personal property; irrespective of whether or not such knowledge may be of use in its business, and whether or not it may be gained while an employee.

The Pennsylvania courts have held that processes developed by men engaged in the laboratories of manufacturing plants are the property of the manufacturers and not of the discoverer; and they have required the surrender to the manufacturer of notes made by chemists under these circumstances. But I do not believe that data accumulated during the course of an extensive engineering practice could be or would be so considered, in the event of a suit to decide such ownership.

The engineer, whether his contract be written or verbal, in accepting a certain work which he may undertake to perform, agrees to furnish the "reasonable degree of skill" required, and the knowledge and ability requisite to carry out the work to the best of his judgment. His knowledge, and his skill, his professional data and notes, as such, remain, or should remain, his own property. The client or the employer pays him a rental, a fixed or indeterminate sum for the use of his knowledge. I do not know of a single case where the courts have held to the contrary; and decisions made as recently as the past month seem to hold to the principle outlined herein.

An instance of this (though one that does not specifically concern mining or metallurgical interests) is the case of a salesman employed by a hardware firm with which he had been connected for some time, and in whose employ he had learned the business. He left its employ and sought and obtained employment with a competing firm, whereupon the first firm promptly brought suit to force him to give up selling the competing line. This suit was decided last month—it seems almost unnecessary to add—in favor of the defendant. It is mentioned here solely as an instance of the point to which some firms will go in the endeavor to secure, or to hold after obtaining in questionable or other ways, advantages to which they are not entitled. They try to coerce, through fear of possible expense, a compliance with their demands.

NIMMO BUSH.

New York, Dec. 31, 1905.

Surveying Secondary Mine Openings.

Sir—The article by Mr. Burr in this JOURNAL (Nov. 11, 1905) is of considerable interest to the mine surveyor and of value in demonstrating the possibility of making rough surveys without the use of instruments. Surveys of this character do not, and in the nature of their execution cannot, compare with even the roughest kind of instrumental work. As a matter of fact, they are apt to take more time than the difficult set-ups that have to be made in cramped positions. The writer has made surveys, using the ordinary transit on short tripod or on a base-board only (where there was only sufficient room for the instrument), in positions where the string method could not be used.

The accuracy of the "string method" cannot but be problematical, it is extremely difficult to find cord that has uniform elasticity, and unless it is stretched tightly, it is useless. The difficulty of measuring to the intersection of two strings placed at an angle of 160° , is not to be lost sight of, nor is the fact that the three sides of the triangle cannot always be measured. In my own practice I have found that work laid out on the surface with cords, could not be depended upon, even for approximate work, unless the shortest side of the triangle was at least 5 ft. in length. This length is very hard to obtain if crooked and tortuous workings are being surveyed; and this is about the only place where the string method would effect any great saving.

The writer does not agree with Mr. Burr regarding the accuracy of this class of work; in fact, a second measurement is never made in carrying it on; and if it were, no two readings will give the same figure. An error of only one degree is, perhaps, sometimes attainable when the angle is nearly 90° . This, the writer is frank to admit, he has never been able to do with the short legs a triangle must necessarily have in order to be of use in cramped positions.

The accuracy of this method is commensurate with that of the so-called "metallic" tape, which in my experience has been found to stretch 4 in. in a length of 100 ft. Perhaps if a tape of this character were used for the measurements, the uneven stretch of the cord might be to a certain extent compensated by the correspondingly uneven stretch of the tape. For short drifts that do not go anywhere, and for outlines of stopes, the method suggested by Mr. Burr is valuable; it is used in the Pennsylvania anthracite fields, and in many metal mines; but it cannot be used for work that requires even an approximation to accuracy. The use of triangles whose altitudes have the common difference 2 and whose hypotenuse and base have the difference 1, is sometimes useful.

NIMMO BOUSH.

New York, Dec. 31, 1905.

New Publications.

Architects Directory and Specification Index. Pages, 176; 7 by 10 in.; cloth; \$2. New York, 1905. Wm. T. Comstock.

The Mineral Production of Western Australia. Bulletin No. 16. By A. Gibb Maitland and C. F. V. Jackson. Pages, 105; $5\frac{1}{2}$ by $8\frac{1}{2}$ in.; paper. Perth, 1904: Western Australia Geological Survey.

Geology and Auriferous Deposits of Southern Cross. Bulletin No. 17. By Charles A. Gibson. Pages, 47; illustrated; $5\frac{1}{2}$ by $8\frac{1}{2}$ in.; paper. Perth, 1904: Western Australia Geological Survey.

Geological Features and Auriferous Deposits of Mount Morgan; also, Notes on the Geology and Ore Deposits of Mulgabbie. Bulletin No. 18. By C. F. V. Jackson. Pages, 36; illustrated; $5\frac{1}{2}$ by $8\frac{1}{2}$ in.; paper. Perth, 1905: Western Australia Geological Survey.

Geological Features and Mineral Resources of the Pilbara Goldfield. Bulletin No. 20. By A. Gibb Maitland. Pages, 127; illustrated; $5\frac{1}{2}$ by $8\frac{1}{2}$ in.; paper. Perth, 1905: Western Australia Geological Survey.

Coolgardie Water-Supply. By Charles S. R. Palmer. Pages, 164; illustrated; $5\frac{1}{2}$ by $8\frac{1}{2}$ in.; paper. London, 1905: The Institution of Civil Engineers.

Revista del Servizio Minerario d'Italia, ncl 1904. El Corpo Reale delle Miniere. Pages 680, 8x10 in.; paper; price, 5 lire. Rome, 1905: G. Bertero.

Report of the Mining Industry of Natal for the year 1904. By C. J. Gray, Commissioner of Mines. Pages, 95; illustrated; 9 by 12 in.; paper. Pietermaritzburg, 1905.

On the Oxidation of Nitrogen in the High Tension Arc. By Johannes Brode. Pages, 63; cuts, 19; 6 by 9 in.; paper. Price, 2.50 marks. Halle, 1905. Wilhelm Knapp.

Revised Nomenclature of the Ohio Geological Formations. By Charles S. Prosser. Pages, 36; 6 by 9 in.; paper. Columbus, Ohio, 1905. Geological Survey of Ohio, Edward Orton, Jr., State Geologist.

The Cobalt-Nickel Arsenides and Silver Deposits of Timiskaming. Part II of the 1905 report. By Willet G. Miller. 66 pp.; illustrated; 6 by 9 in.; paper. Toronto, Ontario, 1905: Bureau of Mines.

Records of the Geological Survey of India. Vol. XXXII, part 3; pp. 42; illustrated; $7\frac{1}{2}$ by 10 in.; paper. Calcutta, 1905: The Geological Survey; London: Kegan Paul, Trench, Trübner & Co.

The Broken Hill Mines. Pp. 51; illustrated; $7\frac{1}{2}$ by $8\frac{1}{2}$ in.; paper; one shilling. London, 1905: Effingham Wilson.

Report of the Department of Mines of Pennsylvania. Part I, Anthracite. Pp. 573; illustrated; 6 by 9 in.; cloth. Harrisburg, Pa., 1905: Department of Mines.

The Mineral Industry During 1904. Volume XIII. Prepared by the Editorial Staff of THE ENGINEERING AND MINING JOURNAL, Pages 576; illustrated. Size 7 by 9 in. Cloth. New York and London; 1905. THE ENGINEERING AND MINING JOURNAL.

Traité de Métallurgie Générale. Vol. II. By L. Babu. Pages, 705; illustrated; $6\frac{1}{2}$ x $9\frac{1}{2}$ in.; cloth. Paris, 1906: Beranger.

Contents: Fuels. Charcoal. Coke. Gas. Methods of firing. Classification and description of furnaces. Furnace construction. Blowers. Hot blast apparatus. Accessory apparatus of furnaces. Collection of dust and fume.

The author of this work is an ingénieur en chef des mines, and a professor in the Ecole Nationale Supérieure des Mines. This is the second volume of the series, the first of which treats of ores and general metallurgical principles.

Handbook of Cost Data. By Halbert P. Gillette. Pages, 610; illustrated; 4 x $6\frac{3}{4}$ in.; leather; \$4. New York, 1906: C. Clark Publishing Co.

Contents: Cost keeping, preparing estimates, organization of forces, etc. Cost of earth excavation. Cost of rock excavation, quarrying and crushing. Cost of roads, pavements, walks, etc. Cost of stone masonry. Cost of concrete construction of all kinds. Cost of waterworks. Cost of sewers, vitrified conduits, and tile drains. Cost of piling, trestling and timber work. Cost of erecting buildings. Cost of steam and electric railways. Cost of bridge erection and painting. Cost of miscellaneous structures.

This is a very satisfactory book. The author states in his preface that it is the first book on engineering cost data ever published. We do not think it is correct to disregard Trautwine and some others in that manner, but in so far as the subjects of which it treats is concerned, there is certainly no other book which is so complete, analytical and generally useful as this. It is a book in which the costs of engineering construction are analyzed and discussed, and that is what has long been needed. The manner in which the author has performed his task makes us long for a similar book on mining costs. We hope that our readers will purchase and study this book, and will be inspired by it to contribute to our columns the material of similar character,

which will some day form the basis of a mining cost book.

The author has the right ideas and a thorough grasp of the subject. The keynote to the latter is given in a lecture which he delivered to students of Columbia not long ago. He urged them not to wait until in responsible charge of work before beginning the collection of cost statistics. The inspector of engineering work is in a better position to acquire the most valuable kind of data than is the chief engineer himself. The latter may learn in a general way what each of the classes of work costs, but the former will learn in detail what certain parts cost. This kind of knowledge enables the cost of future work to be estimated, where some of the details differ. It is just this kind of detailed information that the chief engineer very likely will not get, so that in fact with all his seeming advantage he may not be able to predict the cost of similar work, where conditions vary, with the accuracy that detailed data would furnish.

Mr. Gillette's book is especially useful to the civil engineer, but both the mining and metallurgical engineers will find it of great value, and will, we are sure, rate it as a very profitable pocket-book, not only for the concise and specific information which it contains, but also for many suggestive ideas and hints as to the performance of engineering work which it gives.

The Economics of Mining. Edited by T. A. Rickard, pages, 421; 6 x 9 in.; cloth; \$2. New York and London, 1905: THE ENGINEERING AND MINING JOURNAL.

Contents: Causes of failure in mining. The valuation of mines. Ore sorting. Sorting at Johannesburg. Cost of shaft sinking by hand. Gold mining as an investment. Mining risks. Mining methods at Johannesburg. Notes on zinc mining. Gold mine accounts. The payment of extensions of mining plant out of revenue. Ore treatment at Kalgoolie. Gold mining accounts. Mine valuation by government. Cost per ton as a basis of mine valuation. Mine accounts. Ore-breaking and sorting on the Rand. Mining investment. Investment in mines. A card system for mine accounts. Gold mine accounts. Card systems for mine accounts. Appraising futures. Appraising the value of a mine. Mining costs at Cripple Creek. Some aspects of mining finance (Parts 1, 2, 3, 4 and 5). Mining finance. Resuing in underground work. Gold mining in Rhodesia. Mine labor and costs on the Witwatersrand. Mining costs at Cripple Creek. Mining and milling in the Mojave desert. Cost of mining zinc ore in the Joplin district. Mining in Rhodesia. The economic ratio of treatment capacity to ore-reserves. Equipment and ore-reserves, (Parts 1, 2 and 3). Mine equipment and ore-reserves. Another aspect of mining finance. The economic ratio of treatment capacity to ore-reserves. Mining in

Rhodesia. Secret reserves. The valuation of gold mines. Treatment capacity and ore-reserves. Amortization. Valuation of gold mines. Mine equipment and ore-reserves. The economic ratio of treatment capacity to ore-reserves. Equipment and ore-reserves (parts 4 and 5). Ore-reserves in gold mines. The personal equation. Ore-reserves. No-liability companies. Engineers' estimates of costs. Gold dredging in California. Mining in Missouri. Secret reserves. Mine equipment and ore-reserves. Gold dredging at Oroville. The basis of value. Leasing at Cripple Creek. Secrecy in mining. Mine valuation. Gravel-mining costs in Alaska and northwest Canada. The cost of mining. Mine reserves. The cost of mining. Cost of chlorinating Cripple Creek ores. Cost of mining and milling. Dredging at Oroville. Some pumping data. Deep mining. Notes on mine reports. Mine reports. The interval between levels.

This book is a reprint of various articles, bearing upon the cost of mining, which appeared in the JOURNAL between January, 1903, and June, 1905. As affecting the economic aspect of the problem, certain articles dealing with ethical and financial consideration were included.

The collection of articles is noteworthy and reflects credit upon the accomplished editor of the book. All of them were interesting when they appeared in the columns of the JOURNAL. It speaks well of their character when they are found to be even more interesting upon republication. They have lost nothing through the lapse of time and have gained much by the close assembly with other articles pertaining to the subject. Some of these articles are especially remarkable contributions. There is not one of them which does not have a permanent value. It has been useful work, therefore, to republish them in this convenient form. The table of contents shows thoroughly the scope and character of the book. It will be found not only a book that will be read with interest, but also one that will claim a place on the library-shelves as a work of reference.

Professional Papers.

In this department are entered references to the important papers connected with or germane to the mining, metallurgical and chemical industries which are published in the current engineering and technical periodicals, and because of their length or other reasons cannot be referred to in fuller abstracts in the JOURNAL. Whenever abstracts are to be published, however, references are not made in this department, the object of which is to supplement the remainder of our pages, so that the JOURNAL will constitute a full record of the progress in the art.

Electrolytic Production of Copper Sulfate. By Gustav Kroupa. *Oest. Zeit.* Nov. 25, 1905, pp. 611-613 (continued).

Liquifaction of Air and the Industrial Manufacture of Pure Oxygen and Nitrogen. By George Claude. Lecture before the Société des Ingenieurs Civils

de France, Dec. 1, 1905. Reprinted in *Le Génie Civil*, Dec. 9, 1905, pp. 96-99, illustrated.

Compensation of Instrumental Errors in Topographical Work. By H. Maudin. *La Revue Technique*, Nov. 25, 1905, pp. 871-877.

The Cost of Gold Extraction at Certain West Australian Mines. By C. Göpner. *Métallurgie*, Dec. 8, 1905; pp. 549-556, and to be continued. The cost sheets of a number of large mines and mills are analyzed and compared.

A New Form of Procedure for Earthwork Computations and a Slide Rule Therefor. By C. W. Crockett. *Eng. News*, Dec. 21, 1905; pp. 654-655.

Experiments with the Pitot Tube in Measuring the Velocities of Gases in Pipes. By R. Burnham. *Eng. News*, Dec. 21, 1905; pp. 660-662.

Magnesite Kilns and the Manufacture of Magnesite Brick. By C. Schimm. *Tonin-Zeit.*, 1905, Dec. 16; p. 1,968—Dec. 19, p. 1,983.

The Metallurgy of Cripple Creek, Colorado, Ores. By Godfrey D. Doveton. *Min. Jour.*, Dec. 23, 1905, p. 702. Description of the process at the Homestake, Gold Coin, Dorcas and other mills.

Abstracts of Official Reports.

Old Colony Copper Company.

The report of this Michigan mine covers the year ending September 30, 1905. It is shown that mining operations comprised 110 ft. of shaft, 303 ft. of drifts, and 334 ft. of crosscuts. Good indications have occasionally been seen, and some copper has been found in the vein rock, but not in sufficient quantities to give it a commercial value.

No. 1 shaft is to be sunk 100 or 200 ft. deeper to investigate the value of the lode. A complete diamond-drill, cross-section two miles in length, and the above openings, failed to locate copper in commercial quantity. It does not seem probable that this exists at this present depth.

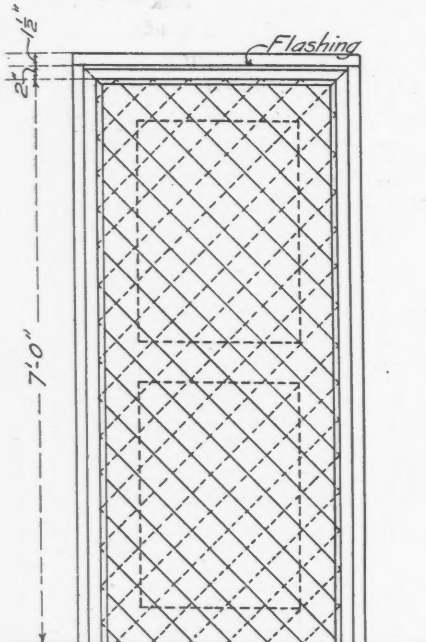
The company is capitalized at \$2,500,000, of which \$1,100,000 has been paid in. Receipts for the year, from interest and rents, were \$3,149, and working and other expenses were \$26,061, a deficit of \$22,912. A balance of \$44,520 was brought forward and \$11,573 was secured by installments of capital, making a balance on hand of \$33,181. Of the last installment ordered, \$15,320 still remains unpaid.

Slag cement is the term applied to cement made by intimately mixing and grinding together, granulated blast-furnace slag of definite characteristics and slaked lime; calcining is not used in this process. This is the puzzolan cement now used in American practice; it is often sold as Portland.

Doors for Mill Buildings.

A strong, cheaply made door for mill buildings, and one that is light enough to be easily set, is shown in the accompanying illustration. The door is composed of an interior frame, indicated by the dotted lines, and of two outer platings of $\frac{7}{8}$ in. matched flooring; these are cut to lay diagonally and spiked to the frame. The diagonals run in opposite directions on the opposite sides, for the sake of rigidity.

The door frame required is of the simplest description, and the whole



WORKING DRAWING OF CHEAP DOOR.

arrangement has been used successfully for a number of years; it is as strong and durable as it is cheap.

The Saniter Desulphurizing Process.

BY HENRY M. HOWE.

In my biographical notice¹ of Sir Lowthian Bell, I said that the Clarence Works "used among the very first the Saniter desulphurizing process, though later developing another way of desulphurizing better suited to their conditions." This "other way" was to use calcium fluoride instead of calcium or ferrous chloride, the substances with which the Saniter process is generally associated. But as the use of calcium fluoride also is covered by the Saniter patents, the second of the clauses which I have just quoted is misleading.

¹Transactions of the American Institute of Mining Engineers, Vol. XXXVI, to appear.

What the Clarence Works really did was to turn from the regular and typical Saniter process and develop a special variety of it.

My informant no doubt had the usual form of the process in mind, and I find that Sir Hugh Bell had when, in kindly examining my manuscript, he passed by without comment the words which I have here quoted.

It is in justice to Mr. Saniter, who calls my attention to the matter, that this note is written.

Composition of Natural Gas.

The following table gives the average composition of natural gas produced in Pennsylvania, northwestern Ohio and Indiana, and Kansas. The weight of 1,000 cu. ft., the specific gravity, and the heating value are also given for each.

Constituent	Average Pa. and W. Va.	Average Ohio & Ind.	Average Kan.
Marsh gas, CH ₄	80.85	93.60	93.65
Other hydrocarbons.....	14.00	.30	.25
Nitrogen.....	4.50	3.60	4.80
Carbonic acid, CO ₂.....	.05	.20	.30
Carbonic oxide, CO.....	.40	.50	1.00
Hydrogen.....	.10	1.50	.00
Hydrogen sulphide.....	.00	.15	.00
Oxygen.....	Trace.	.15	.00
Total.....	100.00	100.00	100.000
Pounds in 1000 cu. ft. a...	47.50	48.50	49.00
Spec. gravity, air being 1	0.624	0.637	0.645
B. t. u. per 1000 cu. ft. b	1,145,000	1,095,000	1,100,000

a, 1,000 cu. ft. of air at an atmospheric pressure of 14.7 lb. and at a temperature of 62° F., weighs 76.1 lb. and is a mechanical mixture of 23 parts of oxygen and 77 parts of nitrogen, by weight.

b, B. t. u.—British thermal unit, which indicates the heat necessary to raise one pound of pure water at 39° F. one degree.

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 Ended Jan. 9, 1906.

- 809,278. PROCESS OF PRODUCING SOLUTIONS CONTAINING PURE SILVER SALT.—Walther Bolsterli, Winterthur, Switzerland. Filed July 6, 1905.
- 809,285. SAFETY DEVICE FOR ELEVATORS.—John R. Conley, Oakland, Kan. Filed Mar. 21, 1905.
- 809,291. ART OF MANUFACTURING IRON OR STEEL.—Emil Fieischer, Dresden-Strehlen, Germany, assignor to Jacob Eduard Goldsmith, Frankfort-on-the-Main, Germany. Filed July 26, 1904.
- 809,295. GAS-PRODUCER.—Jerome R. George, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a Corporation of Massachusetts. Filed July 10, 1903.
- 809,309. ELECTROPLATING APPARATUS.—Arthur W. L'Hommedieu, Chicago, Ill., assignor to Charles F. L'Hommedieu, Chicago, Ill. Filed Apr. 22, 1903.
- 809,316. CONVEYER.—John W. Mackin, Chicago, Ill., assignor to Chester T. Drake, Chicago, Ill. Filed Jan. 24, 1903.
- 809,320. SAFETY DEVICE FOR ELEVATORS.—Fred S. Payne, Boston, Mass. Filed Apr. 20, 1905.
- 809,322. APPARATUS FOR THE COMPLETE COMBUSTION OF SOLID FUEL.—Adam Pfeifer, Frankfort-on-the-Main, Germany. Filed Mar. 17, 1904.
- 809,344. COKE-OVEN COVER.—Andrew H. Walstrom, Birmingham, Ala. Filed Dec. 12, 1904.
- 809,354. METHOD OF DENSIFYING AND ELIMINATING AIR AND GAS FROM MASSES OF PULVERULENT METALLIC SALTS AND OXIDES.—Eayre O. Bartlett and William F. Gordon, Joplin, Mo. Filed Apr. 29, 1903.
- 809,361. WATER ELEVATING AND STORAGE APPARATUS.—William W. Douglass, Kansas City, Mo. Filed June 9, 1904.
- 809,385. APPARATUS FOR DISCHARGING LIQUIDS IN VACUO.—Jarard W. Lytton, Portsmouth, Va. Filed Oct. 28, 1904.
- 809,387. CABLEWAY.—Thomas S. Miller, South Orange, N. J. Filed Dec. 15, 1902.
- 809,405. METHOD OF SKIMMING SLAG FROM MOLTEN METAL.—Maximilian M. Suppes, Elyria, Ohio. Filed July 1, 1903.
- 809,436. DIPPER FOR DREDGES, EXCAVATORS, AND THE LIKE.—Walter Ferris, South Milwaukee, Wis., assignor to The Bucyrus Company, South Milwaukee, Wis., a Corporation of Wisconsin. Filed Apr. 14, 1905.
- 809,438. MECHANISM FOR AUTOMATICALLY DISTRIBUTING LIQUID FUEL.—Henri Galopin, Melbourne, Victoria, Australia. Filed May 19, 1905.
- 809,450. PROCESS OF MAKING SULPHURIC ANHYDRIDE.—Rudolf Knetsch, Ludwigshafen-on-the-Rhine, Germany, assignor, by mesne assignments, to General Chemical Company, a Corporation of New York. Filed Sept. 24, 1901.
- 809,472. COMPOSITION OF MATTER.—Benjamin C. Senton, Rutland, Vt., assignor to Senton and Evans, New York, N. Y., a Co-partnership. Filed Apr. 6, 1904.
- 809,492. PROCESS FOR ELECTROLYTIC PRODUCTION OF LUSTROUS METALLIC COATINGS UPON METALS.—Alexander Classen, Aachen, Germany. Filed Sept. 28, 1905.
- 809,550. PROCESS OF MAKING BORIC ACID. &c.—Henry Blumenberg, Jr., Daggett, Cal., assignor to American Borax Company, Pittsburg, Pa., a Corporation of California. Filed March 24, 1905.
- 809,586. GOLD-SEPARATOR.—Ezra J. Sterling, Brooklyn, N. Y. Filed Feb. 1, 1905.
- 809,593. DEVICE FOR REMOVING MINING AND OTHER DEBRIS.—Simon W. Wible, Bakersfield, Cal. Filed Feb. 6, 1905.
- 809,633. SUBMARINE MINING.—Edgar F. Scheibe, New York, N. Y., assignor, by direct and mesne assignments, to Submarine Gold Mining Company, a Corporation of New York. Filed Mar. 1, 1905.
- 809,648. FRUE CONCENTRATOR.—Louis R. Tulloch, Angels Camp, Cal. Filed Feb. 5, 1904.
- 809,653. APPARATUS FOR VENTILATING MINES.—Michael J. Ward, Minersville, Pa. Filed Apr. 11, 1904.
- 809,659. PURIFIER FOR GAS.—Elmer C. Woodworth, Deer Isle, Me. Filed June 16, 1905.
- 809,689. EXCAVATING-MACHINE.—Alfred F. Huber, Chicago, Ill. Filed July 3, 1905.
- 809,754. CHARGING APPARATUS FOR BLAST-FURNACES.—Gibbon C. Shackelford, Allegheny, Pa. Filed Aug. 26, 1903.
- 809,765. ORE-CONCENTRATOR.—George M. Whitney, Lawson, Colo. Filed May 20, 1905.
- 809,770. ASYMMETRIC CELL.—Max Buttner, Wilmersdorf-Berlin, Germany. Filed Aug. 4, 1904.
- 809,790. FEED FOR COAL-CUTTING MACHINES.—Frank Eckersley, Crofton, near Wakefield, England. Filed Feb. 27, 1905.
- 809,805. SYSTEM FOR PUMPING OIL WELLS.—Ross J. Hoffman, Bradford, Pa., assignor to Hoffman Manufacturing Company, Bradford, Pa. Filed Apr. 17, 1905.
- 809,806. METHOD OF PRODUCING OIL FROM OIL-WELLS.—Ross J. Hoffman, Bradford, Pa., assignor to Hoffman Manufacturing Company, Bradford, Pa. Filed April 17, 1905.
- 809,827. CONVEYER.—George Lucas, Passaic, N. J. Filed Dec. 7, 1904.
- 809,842. APPARATUS FOR THE PRODUCTION OF CALCIUM CARBIDE.—Edgar F. Price, George E. Cox, and James G. Marshall, Niagara Falls, N. Y., assignors to Union Carbide Company, Niagara Falls, N. Y., a Corporation of Virginia. Filed Oct. 19, 1904.

Personal.

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

Mr. Winthrop W. Fisk, of Boston, is now at Fuerte, Sinaloa, Mexico.

Mr. R. B. Atwater, of Helena, has been visiting at Duluth, Minn. for some days.

Mr. Harry Huntington Miller, of New York, has gone to Mexico on professional business.

Mr. Frank M. Estes, Jr., is now chief engineer of Camp Bird, Ltd., at Ouray, Colorado.

Mr. Hiram W. Hixon, of Victoria Mines, Ont., has gone South for a vacation of a month.

Mr. George Heffner, late of Pittsburg, is now superintendent of Genesee furnace at Charlotte, N. Y.

Mr. C. W. Purington has returned to Denver, after examining mining property at Cook's Inlet, Alaska.

Mr. Edward J. Collins, superintendent of the Wolverine & Arizona mine, of Bisbee, has been in Duluth.

Mr. Byron W. Pattison, superintendent of the Shattuck and Denn mines at Bisbee, has been in Duluth.

Mr. A. H. Wethey, of Butte, Mont., has been a recent visitor in New York. He has now returned to Butte.

Mr. P. O. Wels has resigned from the Lake Superior Smelting Co., to go to the International Ore Treating Co.

Mr. W. E. Defty, of Phoenix, Arizona, is in Sonora, Mexico, where he expects to remain until the end of January.

Mr. Quincy A. Shaw, of Boston, a director of the Calumet & Hecla Mining Co., is visiting the mine in Michigan.

Mr. William Worthington, formerly of Butte, Mont., is chief chemist of the Calumet & Arizona smelter at Bisbee, Arizona.

Mr. W. H. Harris, principal mine foreman of the Calumet & Arizona mines, has just returned to Bisbee from Los Angeles, Cal.

Mr. G. B. Scammel, formerly of Mayer, Arizona, and now of Los Angeles, Cal., left Douglas, Ariz., last week for Los Angeles.

Mr. F. L. Harrington, manager of the Saginaw Development Co., of Bisbee, Arizona, was in Duluth and Saginaw recently.

Mr. J. B. Tyrrell, mining engineer, has changed his office for the winter from Dawson, Yukon Territory, to Ottawa, Canada.

Mr. W. Spencer Hutchinson, of Boston, Mass., has gone to California on profes-

sional business. He will return early in February.

Mr. James Ross, president of the Dominion Coal Co., sailed last week from New York for Naples accompanied by Mrs. Ross.

Mr. George H. Duggan, of Montreal has been appointed second vice-president of the Dominion Coal Co., of Sydney, Cape Breton.

Mr. Patrick Clark, of Spokane, was in Butte, Mont., Jan. 8. on mining business. He is interested in several claims in the Butte district.

Mr. L. J. Shepard has arrived at Bisbee, Ariz., from Chicago, and is now the purchasing agent for all the Calumet & Arizona properties.

Mr. Harry Meyers, who retires as general manager of the Brookwood Coal Co., was presented with a gold watch and chain by the employees.

Dr. Henry B. Macaulay, who has been for two years past at the Rosario mine, San Jose de Gracias, Sinaloa, Mexico, has returned to New York.

Mr. Frederick Grundy has returned to Los Angeles, Cal., after three months spent in extensive examinations in Chihuahua in southern Mexico.

Mr. James W. Neill, of San Francisco, is in Butte, Mont., on business connected with the East Butte Copper and Pittsburg Copper companies.

Mr. Bertram Hunt has just returned from Costa Rica, and has opened an office in the Schmeidell Bldg., San Francisco, as consulting metallurgist.

Mr. B. Stanley Revett, of Breckenridge, Colo., has gone to Colombia on professional business in connection with gold-mining interests in that country.

Mr. Henry J. Wolf, formerly with the San Miguel Consolidated Gold Mining Co., is now engineer for the Telluride Power Co., at Telluride, Colorado.

Mr. C. A. Wright, Jr., of Hancock, Mich., recently elected secretary of the Keweenaw Copper Co., has removed to New York to take up his new duties.

Mr. Edward Collins, superintendent of the Wolverine & Arizona mine at Bisbee, Ariz., has been visiting in Duluth, Minn., and Calumet, Mich., the last two weeks.

Mr. W. F. Staunton, general manager of the Development Co. of America, has been in Arizona on business in connection with properties owned by the company.

Mr. Ralph Baggalay who has had the management of the Pittsburg & Montana Copper Co., Butte, Mont., since the inception of the company, will shortly retire.

Mr. Edward Kneeland, formerly connected with the smelter at Torreón, Mexico, has been visiting in Los Angeles, Cal

and is returning home via Douglas, Arizona.

Mr. Arthur C. Lamonte, chief engineer of the coal department of the Lackawanna railroad, has appointed M. C. Chamberlain and William Sebol district superintendents.

Mr. O. Wiser, for five years superintendent of the Annie Laurie mill at Kimberly, Utah, has resigned. He has been succeeded by A. C. Riser, who has been his assistant.

Mr. F. W. Denton, general manager of the Copper Range Consolidated Co.'s mines in the Michigan copper district, recently returned from a visit at Palm Beach, Florida.

Mr. Henry B. Paull, chief clerk for the Calumet & Arizona Mining Co. some years, has resigned and will devote himself to his private interests in southern Arizona and elsewhere.

Dr. L. L. Hubbard, of Houghton, Mich., superintendent of the St. Mary's Mineral Land Co.'s exploratory operations and former State geologist, has been in Boston the last few days.

Mr. Humphrey M. Morgans, of London, has gone to India, where he will make inspection of the Singareni collieries; also of the Hutti and Tupodoldi mines, all in Hyderabad, Deccan.

Mr. Charles H. Palmer of the American Copper (new Coram Co.), who has been in Butte, Mont., on business connected with the company during the last two months, is now in Boston.

Mr. Alfred J. G. Swinney, of London, has left for the Dutch East Indies, where he will visit Sumatra and Borneo to investigate certain gold and tin properties for a Dutch mining company.

Mr. A. H. Bromly has been in San Francisco. He is on his way to inspect some mineral properties in the State of Michoacan, Mexico. He will be in the City of Mexico early in March.

Mr. Oscar Rohn, formerly of Michigan, has succeeded Mr. Ralph Baggaley as manager of the property of the Pittsburg & Montana Copper in Butte, Mont. Mr. Rohn took charge of the mines and plant Jan. 8.

Mr. John T. Keith, formerly superintendent of the Wyoming division of the Lehigh Valley railroad, has been appointed general manager of the Markle coal properties in Hazleton, and will reside in Jeddo, Pa.

Mr. William Kirkpatrick, secretary of the Pittsburg & Montana Copper Co., has sent in his resignation. He expects to go from Butte, Mont., to California for his health as soon as released from active duty.

Mr. William G. Mather, president of the Cleveland-Cliffs Iron Co. and general manager of the concern's extensive interests in the upper peninsula of Michigan, expects to leave Jan. 20 for an extended European trip.

H. L. Shock, late vice-president and general manager of the Empire Portland Cement Co., Warners, N. Y., has been appointed manager of the cement department of the Struthers Furnace Co., Cleveland, with plant at Struthers, Ohio.

Mr. George R. Connor, foreman of the Nottingham colliery, who has been in the employ of the Lehigh & Wilkes-Barre Coal Co. for half a century, sustained an attack of paralysis last week. He was one of the best known foremen in the region.

Mr. Norman W. Parlee has left the employ of the Timiskaming & Northern Ontario Railway Commission, for whom he prospected the town-site of Cobalt, and is now engineer for the Nova Scotia Steel & Coal Co., Ltd., at its iron mines at Wabana, Bell Island, Newfoundland.

Mr. James B. Tonking, for many years superintendent of the mines of the New Jersey Zinc Co. at Franklin Furnace, N. J., has resigned and moved to New York. He will open an office as consulting engineer in New York. He is succeeded by Mr. F. Rubidepe, recently assistant superintendent.

Professor Henry M. Howe, of Columbia University, has been elected foreign member of the Swedish Royal Academy of Sciences. The other Americans holding this honor are Professors Simon Newcomb, Samuel Pierpont Langley and Charles R. Van Hise, and Messrs. Alexander Agassiz and Thomas A. Edison.

The Pennsylvania Steel Co. announces the following changes, taking effect Jan. 8: Mr. H. H. Campbell has been appointed to the office of metallurgical engineer. He will occupy a similar position with the Maryland Steel Co. and the Spanish-American Iron Co. Mr. J. V. W. Reynolds has been elected vice-president and will have full charge of all the company's affairs at Steelton. Mr. John W. Dougherty has been appointed general superintendent of the Steelton works. Mr. F. D. Carney has been appointed assistant general superintendent of the Steelton works. Mr. Thomas Earle has been appointed superintendent of the Bridge and Construction Department.

Obituary.

Fred W. Reeder, Sr., one of the oldest blast furnace workers in the Mahoning valley, died at his home in Youngstown, O., last week, age 81 years. He had been retired for the past 14 years.

Dr. W. R. Harper, President of the University of Colorado, died of cancer on Jan. 10, 1906. He had been an invalid since an operation a year ago, and his

death has been a matter of melancholy certainty. Dr. Harper's work as an educator covers too wide a field to discuss in detail; but this JOURNAL takes occasion to emphasize the common loss suffered by the removal of this original and energetic organizer of college and university work. It is a commentary on the versatility of the man that his scholastic specialty was Hebrew.

William J. Lewis, of the firm of Lewis, Oliver & Phillips, from which sprang the large interests controlled by the Oliver Iron & Steel Co., died at his home at Hazelwood near Pittsburg, Jan. 3. Death was the result of a general breakdown brought on by advanced age. His condition took a decided turn for the worse about six weeks ago, and pneumonia, the direct cause of his death, developed last week. Mr. Lewis was born in England in 1822. In his career as a manufacturer he originated and perfected many patent devices and pieces of machinery, and it was his inventive genius which contributed most largely to his success and that of the interests with which he was connected.

Mr. C. Reginald Enock writes us from Lima: "On Nov. 22 in Lima, Peru, the well-known engineer and mining man Thomas A. Bennett died suddenly of heart failure and pneumonia. Mr. Bennett was an Englishman, and his work had covered a large field, including the United States, New Zealand, Mexico and Peru. He was much esteemed in Lima for his upright character and disposition, and his death is a loss to the country, for which he always predicted a great development. The writer knew him for some years, and had been his companion in various expeditions into the mining regions of the Peruvian Cordillera, for, notwithstanding his advanced age, Mr. Bennett was an indefatigable traveller. He represented important interests, both at home and abroad, and as a result of his work several large mining enterprises were under way in Peru, including the famous Cerro de Pasco copper mines, which were first taken up on his initiative. It is for the writer a melancholy pleasure to pay this small tribute to the memory of a fellow engineer and countryman; one who was always generous as an associate in business matters, and loyal as a friend. He died at the age of 62 and was buried in the Bellavista Cemetery near Callao, in the presence of many of his numerous friends."

Societies and Technical Schools.

University of Pennsylvania.—The Wharton School of Finance and Commerce now offers a course in manufacturing. It includes the following subjects: American Industry, Industrial Management, Marketing of Products, Labor Legislation, Business Law, Accounting, Advanced Accounting, Transportation, Bank-

ing, Corporation Finance, Insurance, Economics.

Engineers' Society of Western Pennsylvania.—At the 29th annual meeting in Pittsburg, the following officers were elected: President, Julian Kennedy; vice president, J. K. Lyons; directors, E. K. Morse and A. R. Raymer; secretary, F. V. McMullin; treasurer, A. E. Frost. The treasurer's report showed a balance of \$1,322 and an invested surplus of \$7,200. The secretary's report showed a total list of 950 members.

B. & M. Chemical Club.—This club, organized in September, 1904, is a society composed of the chemists and assayers employed at the Great Falls (Montana) smelter of the Boston & Montana Consolidated Copper & Silver Mining Co. This society holds meetings each month for presenting papers and articles on chemical and kindred subjects. The present officers are: F. H. Keller, president; H. L. Eaton, vice-president; H. M. Kimball, secretary-treasurer.

United Engineering Society.—At a recent meeting of the board of directors of the American Institute of Electrical Engineers Mr. John W. Leib, Jr., was appointed trustee to represent the Institute for a term of three years upon the board of trustees of the United Engineering Society, invested with the care and administration of the new United Engineering building. Mr. Lieb at the same time was made a representative of the Institute on the building committee. He succeeds Dr. Schuyler Skaats Wheeler, who by reason of his recent election to the presidency of the Institute resigns from these other bodies.

Canadian Mining Institute.—In accordance with the by-laws of the Institute, the nominating committee appointed by the council, have submitted to the secretary the following list of nominations to all offices falling vacant at the next annual meeting: President, George R. Smith, Thetford mines, Que.; vice-president (for one year), F. D. Adams, Montreal, and R. G. Leckie, Temagami, Ont.; (for two years) Frederick Keffer, Greenwood, B. C., and G. Herrick Duggan, Sydney, N. S.; treasurer, J. Stevenson Brown, Montreal; secretary, H. Mortimer Lamb, Montreal. The councillors nominated are: For one year—John Blue, C. J. Coll, Thos. Cantley, Frank B. Smith, J. C. Gwillim, Jas McEvoy, W. G. Miller and Harry Williams; for two years—W. H. Aldridge, B. A. C. Craig, A. M. Hay, R. T. Hopper, Thos. Kiddie, A. E. Barlow, John B. Porter, and W. D. Robb.

Independent nominations can be filed with the secretary up to Jan. 25. Each must be signed by five members.

American Foundryman's Association.—The following circular from the secretary has been issued: "We beg to announce the taking over by the Government of our

standardizing bureau and that hereafter the standardized drillings of cast iron prepared and sold by our Association are to be obtained from the Bureau of Standards of the Department of Commerce and Labor. The American Foundrymen's Association has been highly honored by this recognition of its work, and the undoubted broadening out of the preparation of standard drillings now to be expected, will greatly enhance the value of standards for check determinations in the iron and steel industry. Director Stratton, of the Government Bureau of Standards, informs us that all orders for the drilling should be sent to the Bureau of Standards, Washington, D. C. To avoid delay, the remittance at the rate of \$2 per sample of 150 grams, or three samples of 150 grams each for \$5, should accompany the order and this may be in form of a check or post-office order made payable to the Bureau of Standards."

Trade Catalogues.

The Peerless boiler and engine are described in the catalogue of Baker & Hamilton, San Francisco, Cal.

The Abercrombie & Fitch Co., 314 Broadway, New York, issues a reprint of its catalogue "Camp Outfits."

A new catalogue of portable buildings and miners' sluice-boxes is issued by the American Portable House Co., Seattle, Wash.

The Dake air and steam motors, chain hoists and contractor's supplies are described and illustrated in bulletin No. 16 of the Dake Engine Co., Grand Haven, Mich.

Catalogue No. 25 of the Turner Brass Works, Franklin, Franklin and Michigan streets, Chicago, Ill., describes and illustrates gasoline, kerosene, and alcohol appliances made by it.

"Railroads Old and New" is a descriptive pamphlet nicely bound and well illustrated and published by the Verona Tool Works, Pittsburg, Pa. The last few pages are used as a catalogue of track tools.

The Link Belt Engineering Co., Philadelphia, Pa., issues two catalogues on the Trump measuring and mixing machine; one describing the machine itself, and the other its application to mixing concrete.

A catalogue that has sufficient tables and other data to merit preservation is No. 30 of the S. Freeman & Sons Manufacturing Co., Racine, Wis. It describes the boilers and plate work issued by this company.

Industrial.

Genesee furnace, at Charlotte, N. Y., has gone into blast, after receiving extensive repairs. It is owned by Corrigan, McKinney & Co., of Cleveland, Ohio.

M. E. Ashcraft, George H. Brobst, C. D. Fleming, F. M. Wilson and C. L. Merrifield have incorporated the Fairmont Mining Co. with \$100,000 capital stock, to manufacture mining machinery, mine cars, tipples, etc., at Fairmont, West Virginia.

The Robins Conveying Belt Co., has recently opened an office at 749 Railway Exchange Building, Chicago. C. Kemble Baldwin, the chief engineer of the company, is in charge of this office and will handle all inquiries from parties located in the middle West.

The Mexico Mine & Smelter Supply Co. has enlarged its stores in Mexico City, Mexico, and will in future carry full supplies of heavy chemicals in addition to mining machinery and supplies. The company expects to shortly carry \$500,000 worth of stock in Mexico City.

The Hewitt-Carstarphen Co., McPhee Building, Denver, Colo., announces that it is established and equipped to manage all classes of engineering. The company is prepared to specialize in metallurgical and mill constructions, mine management and surveillance, civil and hydraulic engineering, and electrical installations as applied to mine equipment and development.

The Colorado Iron Works Company reports the sale of three large sets of Humphrey Rolls to the American Smelter Securities Co. for its Garfield plant. The same company is building for the Hall Mining & Smelting Co., Nelson, B. C., the equipment for a complete crushing and sampling plant in which six impact screens will be used, an automatic bedding system consisting of conveyors with reversing trippers, an automatic mixing and distributing system for crushed material for the lead converting plant and a car haul system, including 17 cars and 24 turn tables.

The Green Fuel Economizer Co., Matewan, N. Y., reports the following sales: A duplicate economizer for the Western Electric Co., New York; an economizer for the Central Pennsylvania Traction Co., Harrisburg, Pa., economizers for the N. J. Worsted Spinning Co., Garfield, N. J.; a "Junior" economizer for the Muskegon Post Office, Muskegon, Mich.; an economizer for the State School of Mines, Denver, Col.; an economizer for the Frost Paper Co., Norwood, N. Y.; an economizer for Knowlton Bros., Watertown, N. Y.; seven economizers for the Union Station, Pennsylvania Railroad, Washington, D. C.; an economizer for the Jackson Street Railroad Light & Power Co., Jackson, Miss.; an economizer for the Gravesend Pumping Station, Brooklyn, N. Y.

The Canadian Westinghouse Co. has obtained from the Vancouver Power Co., of Vancouver, B. C., an order for a 1500-h. p., 2,200-volt revolving field engine-type generator, which will be direct connected to a Pelton water-wheel. This is a duplicate of the generators now in operation in the power plant of this company and will operate in multiple therewith. The order includes switchboards, air-blast transformers of 550-kw. capacity. There is also included in the order a 1,000-kw. 50-cycle rotary converter to operate 550 volts. This converter will furnish power for railroad work and will be controlled direct from the switchboard.

Construction News.

Georgetown, Colorado.—The Georgetown Loop Mining Co. proposes to put in machinery for driving a tunnel on its claims.

Central City, Colorado.—Hoisting machinery is to be put on the National mine. John B. McKay, of Central City, is in charge.

Alice, Colorado.—A power plant is to be erected at the Bonny Briar mine in the Fall River district. H. F. Nemmo, of Alice, is manager.

Istachatta, Florida.—The Istachatta Phosphate Co. is in the market for 3½ miles of track; 40-lb rails will be used. A 1-¾-yd. dipper dredge is also required.

Little Rockies, Chouteau County, Montana.—The Papoose Mining Co. intends to put in a cyanide plant in the spring. C. H. Boynton, Helena, Montana, has charge of the property.

Telluride, Colorado.—This company is considering the building of a mill, and of a tramway to carry ore from the mine. Willis Connable, of Coudersport, Pa., is president of the company.

Territory of Yuruari, Venezuela.—The Yuruari Mining Co. is to build a cyanide plant in the gold district near Nueva Providence. T. M. Keyser, 1135 Broadway, New York, is general manager.

Atlanta, Georgia.—The Cherokee Chemical Co. wants machinery for separating amorphous graphite by air process. Deposit carries 13 to 14% graphite, also about 2% iron and a small amount of silica. S. E. Smith, Atlanta, is secretary.

City of Mexico.—The Compañía Minera de Mexico will erect a mill to cost about \$250,000, to handle ore from the Restauradora group of mines in the district of Guanacevi, State of Durango. Address R. H. Hulton, Central Mercantile Building, Mexico City.

Baltimore, Maryland.—The Southern Fuller's Earth Co., 763 Calvert Bldg., Baltimore, is in the market for a new or second-hand steam shovel; for 2 miles of track, dump cars, small locomotive and general contractor's supplies. The company also require conveying machinery.

Special Correspondence.**San Francisco.** Jan. 10.

The drought in California still continues and in the mountain and foothill counties large numbers of quartz and hydraulic mines remain idle for lack of water supply, for power or washing. There have been heavy falls of snow in the higher ranges, but cold weather has ensued instead of the expected warm rains, so that no water has come down. As a result, the storage reservoirs are still empty and the streams low or dry, greatly to the detriment of the mining industry throughout the State.

The South Yuba Mining & Milling Co., of Nevada county, has decided to erect a smelting plant on its copper properties on the south fork of Yuba. The company has done a great amount of prospecting for months past on its property and has developed the ground to such an extent that it no longer regards the mine as a prospect, but a proved property, with good values in sight. The company has bonded a number of properties south of the river, having traced the great copper ledge to a point a few miles west of Grass Valley.

In Calaveras county the Union Copper Co. has completed and started up its new smelter at Copperopolis. This mine was for a long time a producer, but little has been done upon it for some years until lately. Now, however, development work is actively carried on and there is plenty of ore ready for the smelters.

The Saline Valley Chemical Works, of which R. B. Evans, of Los Angeles, is president, have secured ground at Wiseburn Station, 12 miles from Los Angeles, on which it is proposed to place a large plant for the manufacture of soda compounds. The company has secured control of several miles of sodium sulphate deposits, in the desert region, heretofore of no value for lack of transportation. The building of the new Salt Lake & Los Angeles railroad has enabled them to obtain the raw material from Soda lake, which, prior to the opening up of the road, was 40 miles from transportation and the Arizona & California road from Wittenburg Junction on the Santa Fe, now in course of construction, will also give access to Danby lake. It is expected that the soda deposits will shortly be developed by the company named.

The four claims of patented land and one unpatented claim owned by Thomas Keating, of Coffee Creek, Trinity county, have been sold to A. B. Downe, of Los Angeles, who will open up the property on an extensive scale. The mines are on Hardscrabble creek, a tributary of Coffee creek. This county is just now the scene of several rich strikes. The old Van Ness mine in Trinity mountain, across the divide from French Gulch, is turning out large quantities of gold and the Bonanza-

King, some 20 miles distant, is making heavy yields. The Tip Top mine on Cañon creek, bonded to Harvey, Clark & Gove, has shown quartz yielding up into the thousands. The Enterprise and Yellowstone mines on east fork of Trinity river, are both making steady bullion shipments. While this is generally known as a gravel county, the quartz mines are now yielding the largest proportion of gold.

Heretofore what turquoise has been produced in California has come mainly from Tulare county, but recently claims have been taken up in Silver mountain district, San Bernardino county, which promise well. They were located by a lady—Mrs. T. N. Bartelle—and have been sold for \$24,000 to C. W. Baldwin, of New York, who will develop them.

It is probable that Willits, in Mendocino county, will shortly be lighted by natural gas, though this is a county where no hydrocarbons or gases have heretofore been considered and there never have been and discoveries of oil. Recent experiments with the gas, at the Norton Spring on the east side of the valley, have shown it to be of good quality and under great pressure. G. W. Richardson has taken hold of the project and will pipe it to Willits. Gas escapes from several places in the spring under strong pressure and a mammoth hood will be constructed to catch the gas and convey it to a large reservoir, where it will be stored.

There are persistent rumors that the famous Yellow Aster mine at Radsburg, Kern county, the largest gold producer in the State south of the San Joaquin Valley, is to be sold, the prospective purchasers being English capitalists. The option as has been held by W. F. Botsford, who is reported to have closed the deal with the Englishmen.

The compressor plant of the Gaston mine, Nevada county, has been installed, and work on the new 3,500 ft. tunnel will soon commence. The tunnel will crosscut the Gaston ledge at a depth of about 3,000 ft. on the pitch of the vein.

Butte. Jan. 9.

All of the large copper mines of the district are being operated as usual, but nearly all of the smaller ones are closed down on account of a strike of teamsters engaged in hauling ore. Companies have received a large quantity of ore from this source. Mines connected with railroad service are not affected. The Chambers and Gallatin, owned by the Amalgamated, the former having an output of 130 tons a day and the latter 125 tons, have been closed since the strike began, nine days ago. The ore of these and other small mines has been hauled by contract. The teamsters demanded an increase of 50c. a day and the contractors refused to grant it. There is no prospect of a settlement of the difficulty.

The Nordberg Manufacturing Co., of Milwaukee, has notified the Boston & Montana and North Butte that the new hoisting engines ordered by these companies several months ago will be shipped the latter part of this month. North Butte will get the first. The buildings are ready to receive them. The one intended for the Boston & Montana will be placed on the Leonard. At the J. I. C., of the Amalgamated Co., the engine and compressors are in working order.

Reins Copper has cut a station at a depth of 1,000 ft. and installed a pump in it. The company will resume sinking at once and continue the work to the 1,200. It will then crosscut its ground.

Raven Copper is preparing to cut its veins, three in number, at 1,500 ft. It has been drifting east and west on the middle vein and has opened up a large quantity of commercial ore. The lower opening will be made from the 1,500 of the Buffalo, an Amalgamated mine. The company has two claims in the heart of the copper zone.

Fire broke out in the workings of the East Colusa mine Jan. 8, the result of using hot ashes for filling between timbers, but it is now under control. So far no serious damage has been done. The mine is east of the Leonard, of the Boston & Montana.

The interests of the Morris estate and those of A. C. Burrage of Boston, located near Pony, Madison county, are to be consolidated if both sides can agree. Harry Poland, representing Mr. Burrage, will accompany the Morris' to the property. The claims are gold bearing, those comprising the Burrage interests including the Boss Tweed and Clipper groups, which were bought from the Morris and Elling estate, five years ago. The proposed consolidation is for the purpose of attempting the operation of the property on a large scale.

United Copper and the W. A. Clark properties are maintaining their output of copper, no diminution or increase over December being noticeable. The former has not yet undertaken the unwatering of its Lexington mine and is not securing much ore outside of its established producers, Rarus, Cora and Minnie Healey. Lexington is giving it better returns than Belmont. This is possible by reason of the temporary suspension of operations by the Montana Zinc Co. because of the ore haulers' strike. The zinc company secured its entire supply from the Lexington.

Salt Lake City. Jan 15.

The Little Chief Mining Co. has closed a deal for the purchase of two adjoining mining claims which are considered to be valuable.

A new mining district has been discovered in the extreme southeastern portion of the State of Nevada, 15 miles south-

east of St. Thomas and about the same distance from the Grand Cañon of the Colorado. Salt Lake and Los Angeles people have gone in to develop the region. The ledges are strong and well defined and the values run principally in gold. Some sensationally rich ore has been brought in from there. The new camp has been named Gold Butte.

The California lode mining claim at Ophir has been purchased by the Buckhorn Ore Co. for \$15,000. The ground adjoins the Ophir Hill mine, owned by Senator W. A. Clark, of Montana.

The Blackbird Copper & Gold Mining Co., which owns property in Beaver county, adjoining the Cactus mines, has undertaken to sell \$156,000 worth of bonds, the proceeds from which are to be applied towards the liquidation of some existing obligations, and to shape the property for operation again.

The Pittsburg Consolidated Mining Co., operating near Alta, has undertaken to place \$50,000 in first-mortgage bonds, the proceeds to be used to develop the mine by driving a tunnel from the Alta side of the mountain.

The stockholders of the Petro Mining Co. have ratified the option on the Bingham property of that corporation, given by the directors some time ago.

The work of cleaning the debris from the Ontario drain tunnel which caved in nearly a year ago, is going ahead steadily. It will be several months yet before the Ontario mine will be in condition for operation again.

Denver. Jan. 12.

It is generally thought here that the Colorado Fuel & Iron Co. stock is at present not controlled by the Gould interests, and that these will not be able to name the entire board of directors at the next annual meeting.

A couple of days ago the Crested Butte Coal Co. was organized here with a capitalization of \$500,000. This company intends to develop coal lands in the vicinity of Crested Butte, where some new anthracite deposits have lately been found.

In consequence of the Lake Superior iron mines, from which the Colorado Fuel & Iron Co. has lately been partly supplying its Minnequa plant at Pueblo, having shut down for the winter, the plant is at present confined to the use of ores from the company's properties. The company has lately made a contract with the lessees of one of their properties in Saguache county, to furnish them 200,000 tons within the next two years.

After two years' work and the expenditure of about a million dollars, the Animas Power & Water Co. has turned the water of Cascade creek into the 9 ft. turbines in the power plant situated about 12 miles above Durango, and is ready to distribute power to the surrounding country.

An attempt was made a few days ago to destroy by fire the large plant of the Empire Zinc Co., near Cañon City, where a couple of men, who were shot at by the watchman, but who escaped, carried a quantity of straw under one of the buildings, after saturating the same with oil, and then set fire to it. Before any serious damage could result, the blaze was extinguished.

Representatives of the Westinghouse Co. have been here lately with a view of building an electric line between Denver and Leadville, in conjunction with a plan of that company to build a system of lines for the transportation of ores to the smelters.

Leadville. Jan. 13.

Arrangements have been made for the shipping of 60,000 tons of manganese ore during the year to the Illinois Steel works at Chicago. Col. George W. Cook, who represents the company, was in the camp during the week and completed the arrangements. The ore that is needed will carry on an average 25% manganese, low silver, low iron and an excess in silica. The bulk of the ore will come from the Grey Eagle, and preparations are now being made to start shipping. Some of the ore will also come from the Cloud City, which has a large body of this class of ore. Apart from the Illinois Steel Co. numerous inquiries have been received by mine managers for manganese ore from other steel works in the East, notably the Carnegie Steel Co., but it is doubtful if Leadville will be able to supply this market on account of the high railroad rates to the Atlantic coast; should the railroads see fit to make a special rate the ore will be sent to Pittsburg. In this event the shipments for the year will be in the neighborhood of 100,000 tons.

Good progress is being made in drifting from the Penrose northward toward the Coronado, and now it has reached under the Sixth Street shaft; this is a little better than half way. Already the effect of draining is being felt in the Coronado as the blocks of ore are becoming drier daily. The extra amount of water diverted to the Penrose does not make any difference to the pumps as they are handling the flow easily. It is now felt by everybody that the water problem in the down town section is solved. When the drift reaches the Coronado it will be 100 ft. below the shaft and upraising will be done to make the connection. When the drift is completed upraising its whole length will be started to the ore-shoots; at present the drift is in lime.

The Damascus Mining Co. has control of 65 acres of ground in Park county, on Loveland mountain, and is driving a tunnel to open the different claims; the vein which is about 4 ft. wide, carrying values in gold, silver, copper, lead and zinc. The tunnel will be driven in the

neighborhood of 4,000 ft. and already 1,000 ft. have been cut. The ore in the tunnel is low grade and to treat it successfully the company is erecting a mill in Leadville; it will be an electric separator and the Blake-Morscher process will be installed. When the mill is completed it will be a custom one; the company has made arrangements with the A. Y. & Minnie people to treat the tailings from their mill.

The Mammoth shaft, Big Evans gulch, has completed installing pumps at the 550-ft. level and sinking has again been resumed. The diamond drill went through a body of sulphide ore at the 600-ft. point, and the ground in the shaft at present is heavily mineralized.

The Nevada, in South Evans gulch, has been working on a small streak of ore carrying good values in gold; recently the vein widened out to 10 in. and the a little bit further up the gulch, is shipping steadily 30 tons daily of a first-class values have increased. The Favorite, grade of sulphide, and from the Little Ellen about 25 tons daily are going to the smelter.

The Home Extension, which belongs to the Cloud City Mining Co., has opened a good body of manganese ore in one of the lower levels, and with the work done it is 15 ft. wide. At two other points in the company's ground bodies of manganese ore have been opened, so that the mine is in a position to ship 50 tons daily.

Calumet. Jan. 12.

Lake Superior copper production showed a decrease of about 400,000 lb. last month. The December product was 19,050,000 lb. of refined metal. December was shortened by holidays and storms, the latter crippling the railways and retarding the transportation of rock from the mines to the stamp mills. The present average monthly output of the Lake mines is 19,250,000 lb., which indicates a yearly product of 231,000,000 lb. There will be increases from various sources during the current year, however, and it is more likely that the 1906 production of Michigan will be between 235,000,000 and 240,000,000 pounds.

Results at the Mass Consolidated mine last month were highly creditable. Official returns give the production as 185 tons of mineral. This is the largest month's yield ever secured at the property. The Mass secured nearly half of its product in the form of mass and barrel copper, 81 tons of the December yield being in that form. It is the plan of the management of the mine to place the property in shape to supply 1,000 tons of rock daily just as soon as it can possibly be done. The mine is shipping 550 tons of rock daily from the three active now. Shaft C, the newest opening, is shipping 150 tons daily, the remainder coming from A and B shafts.

Sinking is under way in all three openings and the drifts are being pushed forward as rapidly as possible in order to provide new stoping territory. The upper portion of the shaft-house at shaft A was destroyed by fire a few days ago, but the loss is slight, and no serious inconvenience will result.

At the Ahmeek development work is being pushed. The output last month was the largest yet secured. Ahmeek should produce at least 3,000,000 lb. The introduction of the steeple compound stamps in the Tamarack mills will provide sufficient capacity to handle all the rock the Ahmeek is likely to ship for some time.

Osceola's production suffered mainly from an accident at No. 5 shaft of the old Osceola branch of the property, which prevented hoisting at that point for more than a week. The South Kearsarge branch continues to yield the best results. While the rock shipments from the North Kearsarge are large, the mineral returns are not as good as from the adjacent mines.

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Duluth. Jan. 12.

The total shipments of ore by Pickands, Mather & Co. in 1905 were 2,020,672 tons, an increase of 703,409 tons. The company has mines on the Menominee, the Gogebic and the Mesabi ranges. Pickands, Mather & Co. are preparing for a larger output the present year. They are sinking new shafts and dropping old ones, stripping at some points and adding new levels at others; exploring on the Menominee range at four promising points and on the Gogebic at one, and negotiating for additional tonnage in explored properties on the Mesabi.

Pickands, Mather & Co. show a very great increase from mines they have been developing on the Gogebic, notably the Odanah and Mikado, which have jumped from 55,000 tons in 1904 to 284,000 last year. Albany will make a large product this year, so will Cypress; Sparta has been abandoned and its lease surrendered, after a gross production of about 1,300,000 tons; Troy can increase some; Utica is stripping some lean ore that lies in a shallow deposit on its west 40, and was not considered of value till recently; Elba has sunk a new shaft in rock, freeing a large tonnage that was around the old working and timber shafts, and under the stockpile grounds and railway tracks; Syracuse is sinking a shaft and should make a good product this season; Bangor is to sink but can do little or nothing this year; Mohawk has begun hoisting in a new mine and is well equipped for at least 100,000 tons this year; Corsica has been unwatered and will resume shipments, after an idleness of two years; Minorca and Malta have been sinking new shafts but will not increase materially; Albany shaft has been sunk a new lift and another level has been opened for milling. On the

Menominee, Caspian will mine little until the overlying sandrock has been drained; Vivian has sunk a new lift. In the Felch mountain the company has taken the Calumet, an old property carrying lean silicious bessemers, and will make a product this year. At Deerwood, Minn., they are exploring by shaft and rifts, but are not discouraged, they state, with the outlook and have nothing yet that is good enough to mine and sell.

Cole & McDonald, of Duluth, are drilling south of the generally accepted formation on the eastern Mesabi, in sections 19, 29 and 30, T 58 R 14, and if they find ore there the whole district between this location and the village of Aurora will doubtless be explored thoroughly.

Contractors are grading for tracks from the new Mayas mine, 8,000 ft. east of the main line of the Duluth & Iron Range road, in 59-14, and the property can make a considerable shipment next year. They are stripping it. There is a small but excellent orebody exposed which is all to be taken out in a couple of years.

Negotiations are under way for the sale of a 40-acre tract in section 30 T 59 R 14, on which about 2,000,000 tons of excellent ore was discovered several years ago. The proposed buyer is a well known consuming interest, together with a Cleveland shipper.

The Richmond mine, Cascade range, has made a larger shipment this year than in the past, about 86,000 tons in all. A good deal of it was sent to Michigan furnaces. It will produce heavily the coming season.

The Peteler Co., of Minneapolis, will build for the Oliver Iron Milling Co. a large number of standard-gauge stripping cars. An order for 550 has already been placed, and the company is now working a large force in the shops.

A 25-kw. generator has been ordered by the Sibley mine, Oliver Iron Mining Co., for underground haulage at its Vermilion property. The General Electric Co. is to furnish the machines.

Antoine Ore Co. is to add a large Gate centrifugal crusher for the coming season, and will largely increase its capacity. It will be in shape to crush about 300,000 tons in the season, and a more powerful hoisting plant will also be installed.

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Platteville, Jan. 5.

One of the largest deals ever consummated in the Platteville district is reported as having been closed by Chicago, Milwaukee and local capitalists, who have purchased the Kneevs property near Shullsburg, about 1,900 acres, consideration being \$150,000. Mr. Fred Krog, manager of the Empire, is one of the chief local parties interested. It is the intention of the purchasers to develop a portion of the property, leasing the balance. The Kneevs property at one time was one of the heaviest producers of lead in the district. It lies about 2-1/2 miles west and a

little south of the Shullsburg camp. There are great quantities of zinc ore in the mine needing only roasting and magnetic separation to put it on the market.

The new concentrating plant recently erected by the Galena Iron Works Co. for the Baxter Mining Co., in the Meekers Grove camp, has just completed its initial 11 days run, and has demonstrated that the style of plant is particularly adapted to the ore in that locality. It is turning out two tons of high-grade ore per hour entirely free of sulphur. The mine is owned and controlled by G. S. Parker, J. M. Bostwick, W. F. Palmer and S. P. Lewis, all of Janesville, Wis. The property has been thoroughly prospected. The owners are preparing to open up another shaft; as soon as this is done it is their intention to erect another concentrating plant.

Among the new prospectors who have come into the Cuba City camp recently, are E. E. Voss and associates of Milwaukee, and Tom Cleary of Platteville. They have leased the Banfield and Chris Brun property, consisting of 320 acres. In their first drill hole, at a depth of 172 ft., very good ore was struck, which continued to 180 ft. The range on this property has been located, and it is the intention of the above named gentlemen to fully prospect same. Preparations have been made to carry on the work during the winter.

A party of Milwaukee and Madison capitalists, accompanied by Mr. Dow, who promoted the Black Jack deal, were in the district last week. All the preliminary surveys and maps are completed and the new company is in position now to do the work intelligently.

The following mining companies have filed articles of incorporation with the Secretary of the State, the declared purpose of organization being that of mining zinc and lead.

The O. P. David Mining Co. of Montfort, Iowa County, Wis. capital stock being \$120,000. The directors are L. H. Stephens, Lou Fisher and J. H. Fosbinder. The David property has been worked quite thoroughly during the last summer and it has been demonstrated that there is a large range running the entire length of the property. Share of this property have jumped from \$50 up to \$1,200 in a little less than 30 days.

The Raisbeck Co. of New Diggings, La Fayette county, Wis., capital stock being \$20,000. The directors are J. K. Carey, John Dawson and A. B. Dawson.

The Security Mining Co. of Highland, Iowa County, Wis., capital stock being \$125,000. Directors are Richard M. Kennedy, M. Lynch, J. H. Wall and Platt Whitman.

The Benton Land and Mining Co., of Janesville, Wis., capitalized at \$45,000. Incorporators being Geo. G. Southerland, A. M. Vanentine and M. J. Jeffries.

In addition to the above there are some 12 new prospect pools forming, many of which will probably incorporate later, as soon as it has been demonstrated thoroughly that the different properties justify further work.

The supply of prospect drills does not equal the demand. Five carloads of prospect drills have been shipped into the Platteville camp during the last 30 days. In spite of the cold weather prospecting goes on apace, as, the majority of the drillers have built portable sheds, thus enabling them to work in the severest weather.

The Square Deal and Murphy Mining companies of Hazel Green camp are both installing large Ingersoll Rand compressors, with which to carry on their development work.

Another big strike below the glass rock was made at the Ollie Bell mine, which lies to the southwest of the Benton camp, proving beyond a doubt that larger bodies of ore exist below that which is now being worked.

The drillers have started to work on the Freeport Mining Co's. land, in the Leadmine Camp, near Benton. It is in this immediate neighborhood that the deep drilling has been carried on with such unexpected and satisfactory results, below the glass rock.

A large number of Rockford and Freeport capitalists have recently become interested in the Galena Camp.

Wm. Hardy, W. H. Strasser and E. Stadel have organized a prospecting company for the purpose of developing the mines in the neighborhood of the Hazel Green camp. There are 60 shares, all taken.

The Skene management at Elizabeth camp imported 40 miners from the Joplin district. They are now in a position to operate their mines day and night.

Scranton. Jan. 16.

It is generally believed in the anthracite region that the Broad Mountain coal lands were purchased for the Schuylkill Coal & Iron Co., which has been so active recently. The purchase is the largest for many years in the history of the industry. It is still the belief of some that the company is acting in the interests of the Delaware & Hudson Co. The company now owns an immense area of coal land. Notwithstanding the low price paid for the Broad Mountain lands, experts who have made searching tests declare that there is a great supply of coal deposits, but that the working of the veins will be difficult owing to the fault which exists.

The operators have tentatively agreed to a conference with the miners and there is no doubt but that it will be held in ample time before April 1.

Chief Mine Inspector Roderick will not agree to the plan advocated by the mine workers that any mine foreman shall be

eligible for mine inspector without passing a further examination. Discussing the suggestion he said: "The mine workers first advocated the election of mine inspectors and a law was passed granting their wishes. Now they want the law changed again, but I cannot agree with them in their proposition. A mine inspector must have better qualifications than the ordinary mine foreman and for that reason a special examination is necessary. If the mine workers want a change let them ask for the adoption of the system in vogue in the bituminous coalfield, where the governor appoints four examiners who hold examinations for mine inspectors in every district. The candidates making the highest averages are selected for the places to be filled and those following in the order of their efficiency are held on the reserve list for four years, to be selected by the governor in case of death or resignation of a regular inspector. A board like this could be composed in the anthracite region of one examiner from each of the hard coal counties. The miners would have representation on such a board."

Splendid progress is being made on the new twin breakers of the Lehigh Valley Co., at the Sayre shaft at Mt. Carmel. A steam shovel is already at work covering the strippings which will supply coal for the breakers. A 40-ft. vein will be stripped.

Operations will be resumed at the old Tomhicken breaker of the Lehigh Valley Co. on April 1. The water is now being pumped out of the shaft.

Charles L. Shaw, of West Pittston, formerly chief coal inspector for the Lehigh Valley Co., has been appointed general shipping coal agent at Buffalo. He is succeeded by Alfred Sword, of Parsons.

John Flaherty, of Wilkes-Barre, has been appointed superintendent of the Nottingham colliery of the Lehigh & Wilkes-Barre Coal Co., the largest operation of the company.

There were 610 fatal accidents in the anthracite mines last year. There were about 1,500 non-fatal accidents. The death rate was largely increased owing to the number of accidents in connection with cages, which was unusually high. The falling of top-rock or coal was the most prolific cause of the fatal accidents, there being more than 200 deaths from this cause alone. On the other hand the work was very steady during the year, increasing the ordinary risks.

A meeting of the Independent Coal Operators' Association will be held on Monday in Wilkes-Barre in connection with the renewal of the trade agreement with the miners on April 1 next. H. H. Ashley is the president.

For the first time the *United Mine Workers Journal* makes public some of the financial figures in connection with the strike of 1902. It says: "The total

amount contributed to support the anthracite strikers was \$2,645,325. Of this vast total the public contributed \$60,000. The membership of the United Mine Workers contributed \$2,225,370. The other trade unions contributed \$359,000. So that the public contributed 2% of the support given the anthracite strikers."

In the Hazleton colliery last week, two men were fatally burned and six were seriously injured. A gang of men had just received their powder supplies and were on their way to their chambers. In his hurry one of the men crossed a trip of cars and came in contact with the live trolley wire, causing a short-circuit. The sparks from the wire fell into the powder keg carried by another man, immediately behind him, exploding the powder. That any of the men escaped is regarded as a miracle.

After negotiations extending over many years a deal has been closed between the Pottsville hospital and the Lehigh Valley Company for the coal and minerals under the William Coleman tract of 438 acres in Branch township, Schuylkill county. The Lehigh Co. already owns the adjoining tracts which are in the same territory as those acquired recently by the Schuylkill Coal & Iron Co. About 10 years ago the surface of the water shed was conveyed to the Pottsville Water Co. and some complicated questions arose as to alleged interference with the adjoining tracts of the Lehigh Co. These will now be finally settled.

Dover, N. J. Jan. 14.

The Baker mine, 1½ miles north of Dover, in Morris county, New Jersey, owned by William H. Andrew and Thomas Baker, of Dover, and leased and operated by the Warwick Iron Ore Co., of New York, caved in on Monday morning, Jan. 8, causing the operators a loss of upward of \$10,000. The Baker mine had been reopened by the Warwick Co. last summer after an idleness of 29 years. The cave-in happened at a peculiarly fortunate time for the men employed. The night-shift had come up and only one pump-runner was in the mine. He heard the rumbling noises foretelling a fall of ground and hastened out, reaching safe ground only a few minutes before the shaft caved in.

All the machinery in the mine was lost and the ore-docks, containing several hundred tons of ore, also went down. The entire roadway leading to the Richard mine, the property of the Thomas Iron Co., caved in.

It is not likely that the operators will attempt to reopen the mine. The Baker mine was developed by the old Allentown Iron Co., which failed about 1876. The Allentown Co. took out about 150,000 tons of ore under its lease, paying a royalty of 80c. a ton. They got over the line on to the property of the Thomas Iron Co. own-

ers of the Richard mine. A law suit resulted and the Allentown Co. failing, the owners of the mine entered into an agreement with the Thomas Iron Co., by which the Baker mine should not be operated for a period of 21 years, the Thomas Iron Co. to have the use of the Baker mine shaft to work a large breast of ore on the Richard mine property, which the Allentown people had uncovered.

The Thomas Iron Co. never did use the Baker shaft, however, and the mine remained idle for 29 years until last summer, when it was leased to the Warwick Co. The cave-in of last week may be the cause of a suit for damages brought by the owners, for it is said that it was the result of the eagerness of the operators to make a showing for the lessees, to do which they took ore wherever found even, it is alleged, to robbing the pillars, which was contrary to the provisions of the lease.

Less than 1,000 tons of ore had been raised, although the engineer in charge said that there were over 20,000 tons in sight.

Less than a quarter of a mile from this cave-in, is a large hole over 100 ft. in diameter and nearly as deep, where a few months ago over 400,000 tons of earth and rock dropped through a narrow fissure into an old working of the Richard mine. No damage was done except that it was necessary to shift the tracks of the Mt. Hope Mineral Railroad.

Victoria, B. C. Jan. 8.

From recently published statistics of mineral production, etc., in British Columbia during the year 1905 the following have been taken. Where figures appear in parentheses they show for purposes of comparison, the production in 1904.

East Kootenay.—The St. Eugene mine's production of silver-lead ore and concentrates was, in round numbers, as follows: Ore milled, 130,000 tons (73,000 tons); concentrates shipped, 30,000 tons (15,000 tons); lead produced, 40,000,000 lb. (21,000,000 lb.); silver, 1,000,000 oz. (541,500 oz.) Of the ore and concentrates produced, 11,708 tons were shipped to Europe and the remainder to the lead smelters at Nelson and Trail, in British Columbia. Development work consisted of 2,029 lin. ft. of sinking and raising and 5,744 lin. ft. of cross-cutting and drifting, making a total of 7,773 lin. ft. and bringing the aggregate footage of development in the mine up to about 42,000 ft., or 8 miles. The net earnings for the year were about \$500,000. Four quarterly dividends, each of 2%, were paid, making 16% in all to date, and representing a total on the issued stock (\$3,202,000) of \$512,320 of distributed profits.

The Crow's Nest Pass Coal Co.'s three collieries produced 835,623 tons of coal (742,210 tons) gross. Of this quantity some 450,000 tons were made into coke,

producing 261,933 tons of the latter (245,118 tons). The coal exported almost altogether to the northwestern United States amounted to 246,267 tons (132,364 tons) and the coke 115,289 tons (109,411 tons.) The greater part of the remaining 139,000 tons was consumed in Canada. The standard number of employees at the company's three collieries was: At Coal Creek, 900 (897); Michel, 600 (618); Carbonado, 245 (223); total, 1,745 (1,738). The payrolls for the year totalled \$1,511,430 (\$1,419,795). The foregoing figures for 1905 include a close estimate for December and may be slightly varied when the exact returns shall be received. Among the improvements made during 1905 was a modern steel trestle and tippie 832 ft. long, having a capacity of 4,000 tons per day and costing, with machinery, and coal-handling appliances, more than \$200,000.

Rosslund.—Rosslund mines together produced 314,048 tons of ore in 1905, in the following proportions: Le Roi, 113,694 tons; Centre Star, 94,550 tons; War Eagle, 61,117 tons; Le Roi No. 2, 22,035 tons; Jumbo, 10,729 tons; Spitzee, 4,809 tons; White Bear, 4,329 tons; Velvet-Portland, 1,955 tons; several small mines, 820 tons; total, 314,048 tons. The Rosslund *Miner* places an average value of \$12 per ton on a production of 315,000 tons, giving a total of \$3,780,000. While this valuation may be a fair statement of the value of the metal contents of the ores of some of the mines, it will probably be found too high as an average of all the ore produced. There appears to have been a falling off in the output of the camp, for the tonnage shown in the *Annual Report* of the Minister of Mines for 1904 was 312,991 long tons, or about 350,600 short tons. This would make it appear that the output was 35,000 tons less in 1905 than in 1904, but the difference is probably accounted for in the much smaller tonnage of low-grade ore sent to concentrators in 1905 than in 1904.

Boundary.—The ore output of Boundary mines in 1905 has been variously stated. The tonnage obtained by the writer when in the district about the middle of December, with the output of that month estimated was as follows: Granby Co.'s mines, 654,000 tons; British Columbia Copper Co.'s mines, 189,000 tons; Mother Lode, 180,000 tons and Emma, 9,000 tons; Dominion Copper Co.'s mines, 88,000 tons; Oro Denoro, 3,000 tons; sundry small mines, 5,000 tons; total, 939,000 tons. A general average value of the ores of the mines that shipped the great bulk of the tonnage is 1.3% copper and \$1.50 to \$2 gold and silver combined, so that a total value of more than \$5,000,000 may be placed upon the output of the Boundary for 1905. It may be, though, that this exceeds the recoverable value of the ores smelted. The 1904 tonnage and value, as given in the *Annual Report* of the Minister of Mines, was 801,925 long tons valued at \$4,110,366, but this included the output of

the Nickel Plate mine in the Similkameen—about 10,000 tons at from \$12 to \$15 per ton—which mine is not in what is usually regarded as the Boundary district, so its 1905 output has not been taken into account in the foregoing figures for that year.

Vancouver Island.—Late information indicates that the output of the collieries of Vancouver Island was about 770,000 long tons of coal, less some 20,000 tons made into coke, leaving a net production of about 750,000 tons of commercial coal. The gross output was considerably larger but, after making allowance for losses in coal-washing, etc., that result is arrived at and it will probably be found to represent about the total tonnage of marketable coal.

In metal mines the only production of which information was made public was that of the Tye mine, at Mount Sicker, which produced about 32,000 tons of ore that brought in after payment of freight and refining costs of matte, about \$97,000.

London. Jan. 6.

Mr. A. J. McMillan has won the day in connection with the proposed LeRoi amalgamation, and has defeated the directors who were in favor of this new move. Your readers will remember that for many months the directors of the LeRoi Mining Co. wished to amalgamate with the War Eagle, the Centre Star and the Trail Smelter according to the plan formulated by Messrs. Bradley & McKenzie. As Mr. McMillan would not agree to these proposals, the other directors took the unusual course of removing him from the board, being enabled to do so by one of their articles of association. At the time when I recorded this action, I mentioned that Mr. McMillan would find it next to impossible to regain his directorate by appealing to shareholders, for the holdings of Mr. Waterlow, Sir Henry Tyler, and their friends appeared to preponderate. At the general meeting of shareholders held a month ago, those present were almost all in favor of Mr. McMillan and against the amalgamation proposals. The directors demanded a poll and gave instructions that the poll should be conducted by post and not by the legal proxy method. Mr. McMillan promptly obtained an injunction from the High Court declaring that such a poll was illegal, and could not be acted upon. However, when the directors came to figure out the result of this poll they found themselves in a minority, and taking it as a sufficient, if not strictly legal, intimation of the wishes of the shareholders, accepted the inevitable and resigned. Mr. McMillan and three new directors in harmony with him have been elected in their place. To an independent observer the rights and wrongs of the proposals of the two parties have never been quite clear, and in spite of lengthy reports and

other literature, it is impossible, with the information published, to form any opinion as to the relative advantages of isolation or amalgamation. Nor have the shareholders decided the question on its abstract merits, for they have been swayed entirely by personal considerations. In the first place, the voting of Mr. McMillan off the board in the way adopted was regarded as unsportsmanlike, and won Mr. McMillan a certain amount of sympathy. Then again, some of the shareholders, resenting the attacks made on Mr. McMillan during the last year or two, entered on a campaign of counter-attacks on Messrs. Bradley and McKenzie and against American methods of managing companies. It will be seen therefore that the fight has been conducted chiefly on personal questions, and not on the calm consideration of the economics of mining.

You mentioned in your columns a week or two ago that the people who have recently formed the Zinc Corporation in Australia had taken the Smelting & Refining Co. of Australia in hand and intended to remodel it and employ the works for treating lead, copper and other ores. Particulars of the new company formed, the Australian Smelting Corporation, are now to hand. The company has been registered under the laws of New South Wales. The capital is £350,000, of which £300,000 is now being offered for public subscription, the remainder to be used as part purchase price on certain options not yet completed. Debentures to the amount of £100,000 to be issued to the holders of a like amount of debentures of the Smelting & Refining Co. of Australia, and further payments are to be made on completion of the purchase of the smelters and other assets of the latter company, the exact amount not having yet been decided on. The property of the Smelting & Refining Co. is in the hands of the debenture holders and so the holders of ordinary and preference shares will get no benefit from this reorganization. The Corporation has made contracts, acting in unison with the Zinc Corporation, for the lead concentrates produced by Blocks 10 and 14, Broken Hill South, and British Broken Hill, the zinc concentrates being, of course, dealt with by the Zinc Corporation. The Corporation has also obtained options on the copper properties belonging formerly to the Caledonia Copper Co. and the Caledonia Mining Co., both situated in the island of New Caledonia. Negotiations are also being conducted for the treatment of other copper and gold ores and concentrates in Cobar and other parts of Australia and New Zealand. There is a prospect that the Carmichael-Bradford process will be used for the manufacture of sulphuric acid, and that the manufacture of fertilizers out of the phosphate rocks found on the Solomon islands will be started shortly. It is possible that the smelter

and works will be removed from Dapto to some deep-water site, but details on this point are not yet settled.

The total amount of new capital issues offered in London in 1905 was £167,187,400, an increase of £44,167,700, or 35.9% over 1904. Mining capital issues were as follows:

	1904.	1905.	Changes.
Australia	£ 368,800	£ 235,300	D. £ 133,500
South Africa.....	1,996,800	4,271,800	I. 2,275,000
Other Countries	929,500	4,926,100	I. 3,996,600
Total issues.....	£3,295,100	£9,436,200	I. £4,138,100
Exploration.....	3,673,300	2,438,400	D. 1,234,900
Coal and Iron...	2,196,200	3,249,900	I. 1,053,700

The capital applications for metal-mining companies and for coal and iron companies show large increases.

Johannesburg. Dec. 5.

The municipal elections along the Rand caused very little enthusiasm. The miners appeared to be apathetic, and many of them refused to vote at all. It is satisfactory to note the high character of the men selected.

The bold policy being pursued by Messrs. G. A. & H. S. Denny of the General Mining & Finance Corporation is much discussed. On the new Goch Gold Mines Ltd. and the Meyer & Charlton, these engineers have introduced some metallurgical innovations, which if successful might have far reaching effect on the practice of the Rand. Messrs. Denny believe the stamp has seen its day, and have declared the employment of roller mills and grinding pans a preferable scheme of crushing.

Stage crushing is being used at the Meyer & Charlton, the second roller-jaw crusher delivering a satisfactory small product to the mill bins. A mesh of 400 screening is used in the mill, and the stamp duty is now about 5.6 tons per day. Cyanide solution is fed into the boxes and the battery tailings carried down to the cyanide works by a lengthy flume, in which the solution and stamped product are well agitated. Instead of employing a tailing wheel for elevating the pulp—an almost universal custom on the Rand—a powerful pump has been installed to elevate the product to the spitzluten. This pump using 21½ h. p. raises 46,000 gal. per hour to a height of 75 ft. The pulp then passes over the spitzluten, which catch the concentrates and coarse sands (say 35% of the ore) for transmission to the two tube mills. Subsequently the spitzkasten separates the sand and slime, the sands being treated in the usual way, while the slime is passed on to the large conical separation vat. Into this also passes the slimed portion of the tuck-mill product, which is all run across shaking amalgamation tables, while the sands are returned to the mill-tailings launder for automatic redistribution.

New York. Jan. 17.

The opening of the new year sees mining generally active everywhere, with the promise of a good year throughout 1906.

The new desert gold mines of Nevada continue to show remarkable developments and several companies there are already paying steady dividends. In the adjoining sections of southern California prospecting has been greatly encouraged, and it looks as if several mining districts of permanent value would be established. In the central section of California mining has been hindered to some extent by short supplies of water. In Colorado the Cripple Creek district is doing very well; while Leadville has just closed one of the best years in its long and varied history. There is also much activity in other Colorado districts, as in Telluride and the San Juan. In the Black Hills in South Dakota much preparation is going on for next season's work, while the Homestake and other old mines continue to do well.

The market conditions remain most favorable for copper mining, and new developments are reported everywhere. Arizona, especially is making great advances, and the mines of the Bisbee district are becoming important producers. In Montana important discoveries in depth are reported in some of the old Butte mines, the extent of which will not be fully known for some time. In the Lake Superior country more new work and prospecting is going on than has been the case for many years.

Three important companies have been organized during the past month. The Lewisohn Mining & Exploration Co., with \$50,000,000 capital, is to take over several copper properties and to develop others, working as one exploration and holding company. The American Consolidated Copper Co., with \$150,000,000 capital stock, proposes to operate in Montana, in California and elsewhere. It is promoted by J. A. Coram and others of Boston. The United States Mining & Smelting Co. is a reorganization of the United States Mining Co., and will operate chiefly in Utah, adding smelting to mining.

Zinc mining continues active, especially in the Joplin district and in the Wisconsin district. The Colorado zinc ores are also receiving much attention.

The Lake Superior iron mines have closed the most active year on record, with an output of 34,000,000 tons. In the South also the local iron mines have been active, and in New York and elsewhere, old mines are being reopened and worked.

In coal the chief interest at present attaches to the negotiations for new mining agreements. Nothing has been made public about the anthracite coal contracts, but it is understood that arrangements are being made quietly for a conference between miners and operators. At present the indications are that amicable settlements will be made in both cases.

General Mining News.

Chattanooga Coal & Iron Co.—This company has been organized, with \$500,000 capital stock. C. E. Buek of Birmingham, Ala., is president; J. D. Lacey of Chicago, J. M. Wynkoop of New York and A. D. DeCamp of Chicago are among the directors. The new company has purchased coal lands near Dunlap, Tenn., and iron-ore property in north Georgia, which will be fully developed, active work to be begun soon. It will also acquire the Chattanooga Blast Furnace Co.'s furnace of 200 tons daily capacity, under construction for some months past and now nearing completion.

United States Smelting, Refining & Mining Co.—This company has been organized under the laws of Maine, as successor to the United States Mining Co. The new company will have \$75,000,000 capital, consisting of 750,000 shares of 7% cumulative preferred and 750,000 shares of common stock, the par of each being \$50. The preferred stock is entitled to receive cumulative quarterly dividends at the rate of, but never exceeding, 7% per annum before any dividend can be paid on the common stock. In the case of liquidation or dissolution of the company the preferred stock will also have preference in the distribution of assets to the extent of its par value and accrued dividends. The shares of preferred and common stock have equal voting powers, except that common stock alone can vote on the increase of the amount of authorized common stock. The directors are divided into four classes, to serve at the outset one, two, three and four years respectively, and each class of directors coming up for election thereafter will be chosen for the term of four years.

The company now offers United States Mining Co. shareholders stock in exchange on this basis: Three-fourths share preferred, \$37.50, and one-fourth share common, \$12.50, and \$1 cash; in all, \$51 for each \$25 par share of United States Mining stock, and shareholders who deposit stock for exchange before Jan. 23 may subscribe for new common stock at par, \$50, in the proportion of one share for five.

This will dispose of 111,914 shares common stock of a block of 120,000 shares underwritten at par for \$4 per share by a syndicate headed by Lee, Higginson & Co., which syndicate will receive \$480,000 for its services. The new company will have out, when exchanges are made, \$20,983,950 preferred and \$12,994,650 common stock, leaving a balance of stock in the treasury for future distribution. Exchange of shares must be made prior to April 2.

At a meeting held in Boston, Jan. 11, R. D. Evans was chosen chairman of the board of directors; A. F. Holden, general manager; William H. Coolidge, vice-president and F. W. Batchelder, secretary and treasurer. The following executive com-

mittee was appointed: R. D. Evans, William H. Coolidge, A. F. Holden, N. W. Rice, James J. Storrow and Sidney W. Winslow. The directors of the new company are to serve as follows: For four years, R. D. Evans, A. F. Holden, James J. Storrow and Sidney W. Winslow; for three years, Frederick Ayer, William Barbour, William H. Coolidge and N. W. Rice; for two years, Charles F. Brooker, E. N. Foss, E. C. Ramsdell and H. H. Wehrhane; for one year, C. A. Hight, Galen L. Stone and E. C. Swift.

Lake Superior Iron Ore Movement.—The dock statistics of the Lake Erie ports, as compiled by the Cleveland *Marine Review*, show that the receipts of Lake Superior iron ore at those ports for the season were 29,018,282 long tons; while the stocks remaining on the docks on Dec. 1 were 6,758,511 tons. The movement of ore to furnaces for the season is shown in the following table:

	1904.	1905.
Ore on docks, May 1.....	4,489,891	2,271,631
Receipts for season.....	17,932,814	29,018,282
Total.....	22,422,205	31,289,913
Ore on docks, Dec. 1.....	5,763,399	6,758,511
Shipped to furnaces,	16,658,806	24,531,402

The increase in shipments to furnaces this year was 7,872,596 tons, or 47.3%. In addition, there was an increase of 995,112 tons in the stock on docks on Dec. 1. This was partly due to the large receipts, which overtaxed the facilities of the railroads. The stock of ore on docks May 1, 1905, was low, and it seems probable that this will also be the case in the present year.

As the total shipments of ore from the upper ports—not including ore from the Michipicoten range in Canada—by water were 33,473,788 tons, there were 4,455,506 tons which did not reach Lake Erie ports. Nearly all of this went to South Chicago and Milwaukee.

American Consolidated Copper Co.—This company has filed articles of incorporation in Maine, with an authorized capital of \$150,000,000. The incorporating officers were Larkin T. Trull of Lowell, Mass., president; Timothy E. Hopkins of Danielson, Conn., treasurer, and David W. Snow, of Portland, clerk. Hiram M. Burton, of Winchester, Mass., and the president and treasurer are named as directors. Except 50 shares held by each director, the stock, all of which is common with a par value of \$100, remains in the treasury. It is understood that this is the holding company promoted by J. A. Coram and others, of Boston, which is to control properties in Montana, California and elsewhere.

American Smelting & Refining Co.—Mr. Edward Brush, secretary of this company, has tendered his resignation and has been succeeded by W. E. Merriss, who has been assistant secretary for four years. Mr. Brush has been acting also in the capacity of vice-president, and assistant to the president, and he found the duties so engrossing as to make it necessary for

him to retire from the position of secretary. G. M. Borden was elected assistant secretary, succeeding Mr. Merriss.

Changes will also take place in the organization of the American Smelters Securities Co. by the election of G. M. Borden as secretary and W. E. Merriss assistant secretary.

ARIZONA.

COCHISE COUNTY.

Tombstone Consolidated Mines Co.—Mr. E. W. Walker, superintendent, states that the company is installing at its mines, near Tombstone, a 40-stamp mill and 8 Wilfley tables. The work will be completed in February. The tailings will be cyanided. The company is now shipping two or three carloads of ore to El Paso daily. A standard-gauge railroad about 4,000 ft. long, has been built between mine and mill. The main pump-shaft is now down 886 ft., and the Prescott pumps installed are raising about 5,000,000 gal. water per day.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—This company reports the production of its mine at Clifton in December at 1,107 short tons of fine copper. The works were stopped four days by floods.

YAVAPAI COUNTY.

The Golden Key Mining Co., Hillside, is installing a power plant to operate its mining machinery. A contract has been closed for two Hornsby-Akroyd oil engines, 16 h. p. each, built by the De La Vergne Machine Co. of New York.

CALIFORNIA.

AMADOR COUNTY.

Defender.—J. H. Wolf has been operating this property at Defender on a lease, but has now suspended work until Spring, owing to difficulties caused by cold weather and bad roads.

Keystone Mining Co.—In this old property at Amador City an extensive cave has occurred from the 450 level to the surface near the north shaft, where there are no hoisting works. The cave will not interfere with the operation of the mine beyond reducing the available ore supply for the present. The orebody in that section of the mine is pretty nearly worked out, it is reported. The break in the ground had been anticipated and no one was hurt.

EL DORADO COUNTY.

Stillwagon.—This mine near Grizzly Flat, now owned by Fred Davis is to be rehabilitated and worked.

Wagner.—This mine at Lotus, owned by J. B. Wagner is now being opened. The shaft will be continued to 175 ft., where it is expected the ledge will be struck and the mill is then to be started.

MARIPOSA COUNTY.

Whiterock Copper Mining Co.—A. C. Hagerthy, J. T. Giles and Chas. C. Burrell has filed suit against this company for \$21,175, the action being upon a judgment

for this amount obtained last April in Maine. If these plaintiffs become absolute owners, it is their intention to commence work on an extensive scale and develop this copper property.

NEVADA COUNTY.

Gaston Mining Co.—A contract is to be awarded for a 3,500 ft. tunnel on this claim to be driven in from Poorman's Creek to tap the vein at a depth of 3,000 ft. An additional compressor plant has been installed.

North Star Mines Co.—This company will install a new motor to run the 80-stamp mill at the North Star which has heretofore been run by water power. The experience of this winter has caused the company to make a change.

SHASTA COUNTY.

Bully Hill Mining Co.—It is reported that an unexpectedly large and high-grade body of copper ore has been opened up on the 800 level of the main Bully Hill mine.

Afterthought.—At this mine Superintendent Bretherton has encountered near the surface a fine body of copper ore carrying gold and silver.

Chinese Claims.—S. W. Cheney of San Francisco has purchased the gravel claims of the Ah Fon Mining Co. at Igo.

SAN DIEGO COUNTY.

Discovery.—John Noble has found at Pine Valley, northeast of the Eureka mine, a 10-ft. ledge of free milling gold ore.

Hawks.—Frost & Bryan of San Diego have let a contract for a tunnel on this old mine at Deer Park.

SISKIYOU COUNTY.

Drummer Boy.—On this group, Cherry Creek, McAdams district, E. W. Emmons, manager, extensive improvements are being made. A 10-stamp mill is being put up with bunk and cook houses, offices, etc., and an electric light system is being put in. Many thousand tons of good milling ore have been blocked out.

McKinly.—At this mine (formerly the Mormon & Lash), 10 miles from Yreka, the owners, L. B. Jamison and Wm. Jolly, have made a rich strike. A ledge of good size and high value has been found in a gulch where water had washed down to bedrock during hydraulic mining operations.

Old Diggins Mining Co.—This company, owning a mile of mining ground along Little Humbug creek, are about to hydraulic the gravel with water thrown against the banks with a pump. A great deal of gold has been taken from this claim by ground sluicing, as it has been worked in a small way for some 40 years.

Blue Gravel.—H. C. Corlin of Grants Pass, Oregon, has taken a 90-day bond on this mine, near Yreka, and will reopen it. The mine has been worked at intervals for some 15 years. The bedrock gravel

is rich, but has to be hoisted 110 ft. to be washed.

YUBA COUNTY.

Dredge Mining.—W. P. Hammon and associates are about re-commencing operations on the Bear river, near Wheatland. They suspended operations at this place a year ago, the four boats then in use not handling the material properly. All the boats but one have since been removed to Oroville. Modern buckets are being put in the remaining boat, and the pit for it is being sunk.

COLORADO.

GILPIN COUNTY.

The shipment of smelting and crude ores, concentrates and tailings to the Denver smelters and outside points for the past twelve months show an increase of nearly 25% over 1904; the smelting ores have carried higher values than for several years past; seven new mills have been built or are in course of completion this year and others are projected for 1906; a large amount of machinery and new buildings have been put up on properties which have been rehabilitated, and several properties are to resume operations during the next 30 days. Sales of properties amounted to over \$500,000, mostly Eastern capital becoming interested and several deals of larger than usual proportion are now under way. Several properties have paid good dividends, notably the Running Lode, nearly \$100,000, the Old Town, \$60,000; together with East Notaway, Pittsburg, Alps and a number of smaller properties which have been successfully operated on the leasing system. The outlook as seen through conservative eyes is much brighter for 1906 than for several years past.

Pewabic Consolidated Gold Mines Co.—New shaft buildings have been erected on the Iron shaft; new machinery has been installed and the company will install an air compressor plant. J. C. Fleschutz, Central City, is manager and heavy shipments are promised.

Old Town Consolidated Mining Co.—Shipments have been cut down from 150 tons to 75 tons per day on account of the breaking of the transformer plant, a new one having been ordered from Pittsburg. About 150 men are working, of whom 100 are on leasing account.

Mackay-Alps.—A home pool is developing this property on Quartz hill, and they are preparing to install new machinery. A. Christopher, Central City, is superintendent.

Apex Gold Mining & Milling Co.—This company, operating in the Pine Creek district, is figuring on the erection of a large mill for the treatment of its own ores, C. E. Barrick, Bank block, Denver, is manager.

Reward Gold Mining & Reduction Co.—This company, operating in Enterprise district near Black Hawk, will arrange for

building an aerial tramway from its tunnel to a proposed new mill on North Clear Creek. A. W. Stone, Erie Bank Building, Buffalo, N. Y., is manager.

Cliff Groups.—Eastern and Colorado people have become interested in this group in Boulder Park district, and they are organizing a company and intend to install machinery, M. H. French, Tolland, Colorado, is manager.

Rocky Mountain Terror.—This property, in Russell district, has been purchased from Denver owners for a small sum by G. K. Kimball, Jr., of Idaho Springs, and new machinery is to be installed and property actively operated.

Pozo.—Marion, Ohio, and Denver people are interested, and they purpose installing a plant of machinery and erecting larger buildings. This is the only strict zinc producer in the county, and has shipped about 20 car loads during the fall months, the ores netting about \$40 per ton. A. M. Rucker, Bald Mountain, Colorado, is manager.

Mascot Co.—A new plant of machinery is to be installed on the Estelle shaft. Wilkes-Barre, Pa., people are interested with J. F. Harrington, Central City, as manager.

CLEAR CREEK COUNTY.

Germanica.—Frank White of Georgetown, has been appointed manager; a company has been organized with strong backing and a power plant is to be installed for driving the tunnel.

East Griffiths.—Extensive tests are being made to determine the process of treating the ores of this property, which has recently been sold to Eastern capitalists, a new mill having been practically decided on. Property is located at Georgetown, Colorado, and a mill is to be built at the mouth of Doric tunnel.

Ireland Lambs.—It is reported that an examination has been made of this property in the interests of intending purchasers and steps are being taken for the installation of machinery. Property is situated on Santa Fe mountain, near Idaho Springs.

GARFIELD COUNTY.

About 80,000 lb. of equipment for the drilling of oil wells in the Raven Park field near Rifle has been delivered to the Missouri-Colorado Co., an Eastern corporation. One well is down 2,475 ft. and three other wells are to be drilled. George Eldred, Rifle, is in charge of work for the company.

SAN MIGUEL COUNTY.

Gold Run Placers.—This property has been leased by Jacob Fillius, of Denver, and E. C. Howe, of Telluride, trustees in control, to Lee Fillius and J. E. Wrightman, of Denver, who will, as soon as possible, begin the construction of a large plant thereon for the treatment of the quantities of mill tailings which have been deposited over the surface from a depth of a few inches to as much as 40 and 50 ft.

The placer is $1\frac{1}{2}$ miles in length by from $\frac{1}{4}$ to $\frac{3}{4}$ of a mile in width, lying in the valley on both sides of the San Miguel river between the eastern limits of Telluride and western line of the village of Pandora, 2 miles above and embraces about 100 acres. During the past 25 years, tailings from various mills, among them the Tomboy, Smuggler-Union, Japan, Cimarron, Valley View, Liberty Bell and Taylor, located at a higher elevation, have been coming down the creeks and on reaching the head of the valley spreading out over the placer, the sand and the heavier substance settling on the surface. In the early history of milling in this district, even down to a few years ago, when cyanide and rag and canvas plants were first introduced for the treatment of mill tailings, it is known that mineral values escaped with the tailings and were lost, the greater portion of which are carried in the vast accumulation of sand on the Gold Run placer. The Peck cyanide plant was treating this sand and tailings to good advantage, demonstrating that they carried values in paying quantities, until about three years ago, when the placer changed hands. At that time the Keystone Hydraulic Mining Co., owner and operator of the Keystone placer on the San Miguel river, 5 miles below Telluride, threatened the mining companies operating the quartz mills with injunctions and suits for damages unless the tailings were impounded and prevented from washing down the river, the sand and other materials in the water cutting out the pipe-lines very rapidly, necessitating their replacement at great expense at frequent intervals. The Tomboy, Smuggler-Union and Liberty Bell companies combined and purchased the property, and the Peck plant was closed down. Messrs. Fillius and Howe were appointed trustees, and a long dam was constructed across the river and valley just above the corporation limits of Telluride, behind which the waters of the river were impounded and the sand, etc. given an opportunity to settle.

SUMMIT COUNTY.

The year 1905 was a good one for Summit county. The production of silver, lead and zinc showed a large increase over preceding years, and although the gold output fell off, the total was higher than it has been for many years. Shipments of smelting ore and concentrates remain very steady in spite of the holiday season intervening.

The Old Union Co. continues its regular shipments of concentrates and during the last week nine car loads have been sent away through the local sampler.

The Germania mine, on Little Mountain, is shipping high-grade silver-lead ore from that portion of the property leased by Messrs. Engle & Kaiser.

The Sallie Barber, on Nigger Hill, is making large shipments of lead and zinc ores. The Little Sallie Barber, developed

by County Commissioner Phillips, has shipped two carloads of high-grade zinc ore. The Chester property, operated by Mr. C. C. Acton in Summit gulch, has a ledge opened up by shaft, showing 5 ft. wide and high on gold.

The Jesse mine is temporarily closed down, awaiting renewal of lease, which has just expired, or the granting of a new lease. The last clean-up was highly satisfactory. The output in the form of shipping ore, free gold and concentrates shows a good profit over working expenses. The Lucky mine on Mineral Hill will have its main shaft deepened 100 ft. and new levels opened up on the shipping lead ores. The French Creek tunnel into the foot of Mt. Baldy is now in 1,850 ft. and a new zinc ledge has been cut through.

INDIANA.

SULLIVAN COUNTY.

Paragon Coal Mining Co.—This company has been organized, with office at Terre Haute, Wis., capitalized at \$5,000,000. The organization has acquired 10,000 acres of coal land between Shelby and Farmersburg. It is asserted that this new company has no connection with other Indiana mining corporations. The more prominent men connected with and interested in the new company are: C. W. Hotchkiss, of Chicago; W. R. Kopf, of Chicago; George F. McCulloch, of Muncie, and Paul H. White, of Indianapolis.

Colora Mining Co.—William W. Hubbard and C. H. Jones, of Indianapolis, have purchased the coal mine of this company near Jasonville at a consideration of \$125,000. It is said to be one of the best equipped mines in the State. The purchase includes 700 acres of coal land near the mine. These properties were owned by Messrs. Metzger and Jones of Toledo. Mr. Hubbard says a company to be known as the Central Coal & Mining Co will be organized in a few days with headquarters in Indianapolis, to operate the mine.

PIKE COUNTY.

Land owners in the vicinity of Petersburg, are enjoying quite a boom. A new railroad is building through the coal region and the diamond core drill now at work is making discoveries of seams of coal. The promoters of the new railroad have secured options on 25,000 acres of coal land and are still working to secure more. Land has advanced from 10 to 20% in value.

INDIAN TERRITORY.

On Jan. 5th a meeting of the Indian Territory coal operators was held at South McAlester, to consider the proposed sale by the Government for the Indians of the segregated coal lands next March. At this meeting there was represented about 75% of the holders of

leased coal lands, and they appointed the following committee to go to Washington, D. C., next week to confer with the Secretary of the Interior with a view to getting the best possible terms of sale and payment on the leased coal lands: Franklin Bache, of Ft. Smith, Ark., president of the Kali-Inla Coal Co., holding 2 leases; W. C. Perry, Kansas City, Mo., president of the Southwestern Interstate Coal Operators' Association, and of the Central Coal & Coke Co., representing 4 leases; S. J. Tonkin, Coalgate, I. T., general superintendent of the Southwestern Development Co., representing 6 leases; Carl Scholz, Chicago, Ill., vice-president of the Southwestern Interstate Coal Operators' Association, and president of the Rock Island Coal Co., representing 24 leases; James Elliot, Haileyville, I. T., general manager of the Hailey-Ola Coal Co., representing 4 leases; B. T. Bush, of St. Louis, Mo., general manager of the Western Coal & Mining Co., representing 11 leases; James Degnan of Wilburton, I. T., president of the Degnan & McConnell Coal & Coke Co., representing 4 leases; H. Dow, president of the Milby & Dow Coal & Mining Co., of Dow, I. T., representing 4 leases; and William Busby, of South McAlester, I. T., president of the Great Western Coal & Coke Co., the Osage Coal & Mining Co., and Samples Coal & Mining Co., representing 8 leases.

There will be a meeting of the Southwestern Interstate Coal Operators' Association at Kansas City, Mo., on Jan. 22 to prepare for the joint convention with the United Mine Workers of America, at Indianapolis, Jan. 25 next.

CHOCTAW NATION.

Bokoshe Smokeless Coal Co.—This company has been organized to develop coal property at Bokoshe. The capital stock is \$100,000. The principal incorporators are J. W. Maney, Oklahoma City, Okla.; Anton Huber, O. B. Kee, Weatherford, Texas.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—The Jennings Oil Co., which is owned and controlled by the Heywood Bros., has declared a dividend of 25%, notwithstanding the low price of crude.

Shipments from here in November averaged 23,000 lbs daily.

MARYLAND.

FREDERICK COUNTY.

Blue Mountain Iron Co.—This company's property, better known as Catocin furnace, will be sold at public auction by the trustees in bankruptcy on Feb. 19. The property is in the Catocin Valley, 12 miles north of Frederick, and includes a charcoal furnace and 10,667 acres of land containing hematite and magnetite deposits of known value. The furnace has been operated for many years.

NEVADA.

LANDER COUNTY.

About a half mile from the Gold Quartz Mining Co.'s property, near Beowawe, a remarkable strike was made a few days ago on the property of William Attenburg. In a hole some 3 ft. deep by 6 ft. wide and 15 ft. long there is exposed an iron quartz containing coarse gold and gold in wire form 1/2 in. or more in length. The rock around the pit is covered with soil and snow, so that it is impossible to determine the extent of the ledge at present. The deposit is near the contact of a much metamorphosed quartzite and altered porphyry. Considerable work has been done on this property in other places showing ore of medium grade, but nothing before has been found in the Bullion district showing such phenomenal values.

Kattenhorn.—Mr. Tyree, of Salt Lake, representing the Reliance Mining Co. of the same place recently purchased the Kattenhorn claims in Bullion district Lander county and has set a force of men to work drifting and crosscutting in the main tunnel on the Little Gem claim. This company has been working these claims under lease and bond for a number of months past.

STOREY COUNTY—COMSTOCK LODGE.

Hale & Norcross Mining Co.—At the annual meeting last week M. W. Fox was elected president, James H. Swift vice-president, Frank Higgins superintendent and M. W. Fox, James H. Swift, Geo. P. Thurston, W. J. Dale, Frank Mahon, Henry Oterson and Geo. C. Sneider directors. R. U. Collins was re-elected secretary.

OREGON.

BAKER COUNTY.

Mattoon.—Manager Butler reports that he is now working in a drift from the second tunnel and is in a 30-ft. vein, which will average \$12.50 to the ton. It is free milling and shipping ore.

Burnt River District.—The county recorder has received for record deeds transferring from C. G. Green, of Durkee, to C. W. Thompson, of Portland, Oregon, and F. T. Sutherland of New York, for \$20,000, the Blue Bucket, Marcus Daly, and Golden Gate quartz claims and the Golden Gate placer, with water rights, in the Burnt River camp, 26 miles southeast of Baker City.

Iron Dike.—Advices have just been received that all matters in litigation concerning the title to the mine at Homestead, have practically been settled, and that the owners of the property, Contad, Curtze and others, of Erie, Pa., will build the railroad from Homestead up Snake river, to Huntington, where connection will be made with the Oregon Railroad & Navigation line. This is regardless of other railroad schemes in contemplation, the leading one being for the building of a line direct from Baker to Homestead

down Powder river. The Iron Dike mine has much ore on the dumps and blocked out ready for smelting when the proper arrangements can be made.

Morning Mine.—At this mine, in Greenhorn camp, 55 miles west of Baker City, the lower tunnel has opened a body of ore. The mill is running steadily with sufficient ore in sight to insure a long run. The tunnel cuts the ledge at a depth of nearly 300 ft. and the pay streak is 8 ft. wide.

Belcher.—Superintendent Brady of this mine, which is the property of the Daines Mining & Milling Co., in the Greenhorn camp, has orders to resume work on the property, and will put 15 men in at once.

Thornburg Placer.—Manager W. L. Vinson of the placer in the Granite district, 40 miles west of Baker City, reports the transfer of that company to a syndicate of Corning, N. Y., capitalists. Work has been done in cutting ditches and putting in machinery.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Paris Gold Mining & Milling Co.—This company has just disposed of a large block of its stock, \$40,000 in price, and will proceed at once to put this money into developing its ground. The ground lies near to that of the famous Penobscot mine owned by Governor Maitland.

Columbus.—The manager of this company states that work will be resumed at an early date. The company is now awaiting the arrival of Mr. Sauntry, one of the chief owners. Although the mine has been shut down for some time, the water has been kept out and work can be resumed at short notice.

Phoenix.—At the annual meeting of this company it was decided to build a new mill very soon. There is on the property at present a small plant, but as the ore is low grade a larger mill is necessary in order to handle it properly.

UTAH

BEAVER COUNTY.

Federal Mining Co.—Plans have been laid to spend \$15,000 in the development and equipment of this property.

JUAB COUNTY.

Beck Tunnel Consolidated.—The new orebody recently developed in this Tintic property is said to have a width of from 50 to 60 ft., about one-half of which will pay to ship without mill treatment.

Scranton.—This property, located near Eureka, is shipping zinc ore to the Iola, Kansas, smelters.

SALT LAKE COUNTY.

Shawmut Consolidated.—This company has bought the Mirror lode mining claim.

South Columbus.—This Alta property will be active again in February.

Boston Consolidated.—The experimental mill, built on the Bingham property of this corporation, is in commission.

SUMMIT COUNTY.

Odin.—A shipment from this new Park City producer netted \$44 to the ton.

West Quincy.—The management is endeavoring to make arrangements to work this property through the Daly-Judge mine.

Little Bell.—The new ore-bins at this property will be completed in about 10 days, when ore shipments will be begun.

VIRGINIA.

ALBERMARLE COUNTY.

Naylor-Bruce Graphite Co.—This company has been organized with a capital of \$100,000 for the purpose of developing graphite-bearing lands near Free Union. The company contemplates the erection of a plant for the concentration and manufacture of the product. Officers and incorporators are Mason G. Worth, New York, president; Robert D. Crawford of Greene county, Virginia, vice-president; F. Eugene Ames of Boston, secretary, and Harry Barnett of Boston, treasurer.

WEST VIRGINIA.

KANAWHA COUNTY.

Keystone Land & Coal Co.—This company has been incorporated to mine coal and make coke at Paint Creek. The capital stock is \$1,000,000. The incorporators are E. B. Mucklow, J. H. Huling, C. W. Morton, M. T. Roach, A. W. McDonald and V. L. Black.

Foreign Mining News.

CANADA.

ONTARIO.

The following is the first exact statement ever made of the shipments of iron ore from the Helen mine on the Michipicoten range. The following are the shipments by years, in long tons:

1900.....	53,470	1903.....	208,413
1901.....	232,505	1904.....	118,355
1902.....	298,430	1905.....	169,527

This makes a total of 1,075,700 tons to the end of 1905. The year 1902 showed the heaviest shipments.

ASIA.

CHINA.

Viceroy Chou Fu, of Nanking, has published an exhaustive report on the mineral resources of the Liangkiang Viceroyalty (Kiangsu, Kiangsi, and Anhui provinces) and has issued instructions to the viceroys and governors of other provinces ordering them to follow his example, and also to establish in each province a department of mines, which shall without delay make a careful and detailed survey of the mineral deposits of each province, mark out their respective boundaries, and earmark all places in which there may be the least indication of mineral deposits or any earthy thing having commercial value. After this has been done permits must be obtained from the department of mines

before any person or persons shall be allowed to develop such deposits. These departments, on the other hand, will be required to send periodical reports to the Shangpu (mining recorder) for record, with maps and general remarks on each newly-opened mine or mines that shall come under the department's notice. In this manner it is thought that the Imperial Government will be enabled to keep in touch with all the mineral industries in China.

The French consul in Kueilin has asked permission from the mining department, Peking, on behalf of a joint French and Chinese syndicate, to recommence work on a black-lead mine at Mawailing (Horsetail Pass) in the sub-prefecture of Shangszechou, which was stopped on account of the insurrection in Kuangsi during the past two years.

AUSTRALIA.

WESTERN AUSTRALIA.

The Mines Department puts the total output in December at 162,091 oz. fine gold. For the year 1905, the total was 1,955,316 oz. fine gold; a decrease of 28,137 oz., or 1.4%, as compared with the previous year.

Late News.

BY TELEGRAPH.

CALUMET, Mich., Jan. 17.

Little change can be reported today at the Tamarack mine, where fire broke out last Thursday. The fire started in an abandoned stope on the 22d level in No. 2 shaft, about noon. The mine officials believe that the flames have now died out, but the quantity of gas in the workings prevents any adequate investigation at present. Yesterday lanterns were lowered as far as the 18th level in No. 2 shaft, before the light was extinguished. Capt. Thomas Maslin, who went down No. 5 shaft with a party of men to search for those men known to be imprisoned in No. 7 shaft, was overcome by gas; two men with him were also overcome and taken to the mine hospital. All three are now recovering.

As the fire started in an abandoned portion of the mine, and cannot very well spread, it is believed that the actual damage will be slight, the loss being limited largely to stoppage of production. The loss of life, of course, is to be regretted. Work in the surface plants continues. Some of the heads in the stamp-mill on Torch Lake have been stopped, but Nos. 3 and 4 shafts, which are isolated from the rest of the mine, continue to supply 1,250 tons of rock daily. Nos. 1, 2 and 5 shafts are not working, but the mine officials expect to resume operations fully, as soon as the noxious gases can be expelled from the workings.

Coal Trade Review.

NEW YORK, JAN. 17.

ANTHRACITE.

The hard-coal market, as is to be expected from the unseasonably warm weather, is sluggish, and without important change from last week. It is, however, a fact that there has been less movement in seasons which have been colder, notably in the winter following the great strike. Shipments being made regularly, the ability of retailers to make prompt deliveries prevents stagnation to any marked degree. It is fair to assume that with a touch of real winter weather trade would resume its normal proportions for the winter months. There seems to be a growing conviction, especially among New England dealers, that there is less likelihood of a strike than seemed probable several weeks ago.

Prices on domestic and small sizes remain firm at the following quotations: \$4.75 for broken and \$5 for domestic sizes. Steam sizes: \$3 for pea; \$2.25@ \$2.50 for buckwheat; \$1.45@\$1.50 for rice and \$1.30@\$1.35 for barley f. o. b. New York harbor shipping points.

BITUMINOUS.

The seaboard bituminous trade continues strong and active, showing very little change from the conditions reported last week. The demand is shown by the fact that holders of contracts are already beginning to ask for additional coal; that is to extend their contracts to larger quantities than were originally specified. Prices remain steady, in spite of the continued mild weather.

Consumption in the far East evidently continues very large, and that territory is calling for heavy shipments still. More complaint is heard about delays in unloading at Eastern ports. The Sound is still calling for large quantities of coal.

In the New York harbor trade demand continues very good. The little spurt in prices which was caused by the snow-storm last week has not been fully maintained, but quotations remain higher than they were before the storm, prices ranging from \$2.80 to \$2.90 for good ordinary grades of Clearfield. There is no inferior coal at present to disturb the market.

All-rail trade continues very good. The demand for bituminous is less directly affected by the weather than that for anthracite, as the sales are largely to manufacturing establishments. Transportation is good, as the snow was not heavy enough to affect the railroads to any extent. Car supply is fair, and few complaints are heard.

Vessels in the coastwise trade are in fair supply and freights are unchanged. Current rates from Philadelphia are: to Boston, Salem and Portland, 80@85c.; to Lynn and Newburyport, \$1.05@\$1.10; to Portsmouth, 85@90c.; to the Sound 70@75 cents.

COAL TRAFFIC NOTES.

The Boston Chamber of Commerce reports receipts of coal at that city in 1905 as follows: Anthracite, 1,977,398 tons; bituminous, 2,798,290; foreign, 608,471; total, 5,384,159 tons. The foreign coal is chiefly from Nova Scotia, though a small quantity comes from Great Britain. The total shows an increase of 315,507 tons, or 6.2%, over 1904.

The Dominion Coal Co. produced from its mines in Cape Breton in 1905 a total of 3,176,908 long tons of coal; an increase of 120,716 tons, or 3.9%, over 1904.

The total coal and coke traffic originating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the full year was as follows, in short tons:

	1904.	1905.	Changes.
Anthracite.....	4,514,073	4,615,888	I. 101,815
Bituminous.....	27,046,243	30,386,521	I. 3,340,278
Coke.....	8,685,619	11,327,153	I. 2,641,534
Total.....	40,245,935	46,329,562	I. 6,083,627

The increase in anthracite was 2.3%; in bituminous, 12.4%; in coke, 30.4%. The total gain over 1904 was 15.1% last year.

The coal tonnage of the Chesapeake & Ohio Railroad for the five months of its fiscal year from July 1 to Nov. 30 is reported as follows, in short tons:

	1904.	1905.	Changes.
New River.....	2,148,972	2,186,858	I. 37,883
Kanawha.....	925,897	1,099,811	I. 173,914
Kentucky.....	42,558	37,767	D. 4,791
Conn. lines.....	59,771	167,362	I. 107,591
Total.....	3,177,198	3,491,795	I. 314,597

Of the 3,324,433 tons originating on the line this year, 1,408,795 tons were carried westward; 513,548 tons to points east; 1,402,090 tons to tidewater.

The coke traffic for the five months was as follows, in short tons:

	1904.	1905.	Changes.
New River.....	83,050	130,533	I. 47,483
Kanawha.....	13,064	46,707	I. 33,643
Conn. lines.....	585	6,923	I. 6,338
Total.....	96,699	184,163	I. 87,464

Of the 177,240 tons originating on the line this year, 95,871 tons were carried westward, and 81,369 tons to points east.

Birmingham. Jan. 15,

The coal production in Alabama right now is greater than it has been in more than fourteen months. There is a good demand for the product and the prices are firm. The commercial coal companies are having a happy output while the convict mines and the old non-union mines are not lagging. At the mines of the iron companies where the union men are still out on strike the production is showing a little improvement.

Coke is still in strong demand and is not as easy to secure as the furnace companies would like to see it.

The Semet-Solvay Co., at Ensley, Ala., has recently added a large refinery department to the by-product coke-oven plant.

Chicago. Jan. 15.

The weather continues to be responsible for depression of the Chicago coal market, in almost every line. With small demands by users of steam and domestic coals and favorable transportation conditions prices are sagging and shipments accumulate on track, forcing sales to escape demurrage charges. The old complaint is also heard, that too much coal is being mined in Illinois and Indiana, and that shipments from eastern mines are too great.

Western bituminous, the great source of supply for most coal users in Chicago territory is very ragged. Domestic sizes especially have a hard time finding sales at \$2@2.40 for lump and egg. Run-of-mine ranges \$1.40@\$2 and screenings bring \$1.15@\$1.55. Run-of-mine coal is in best demand.

Hocking has been depressed owing to large shipments that have caused forced sales, bringing the price down as low as \$3, against \$3.25@\$3.50 normally. Youghiogeny has also been caught in the demurrage press and its price has gone a little under \$3 on some sales, against a normal quotation of \$3.15. Smokeless is weak, though shipments apparently are being curtailed, and brings \$3.30@\$3.40.

Anthracite is in very light demand and most of the business is being done at cut rates, by independent dealers. There is no scarcity of any grade, chestnut being now in fair supply.

Cleveland. Jan. 16.

The Cleveland market has been flooded with coal for a week and prices are likely to show a sharp recession. The railroads have completely recovered from their recent car shortage and are offering so much equipment at the mines that over-production of fuel is the striking influence on current prices. It has been apparent for some weeks that if the railroads ever got to a position where they could serve the productive capacity the market would be overwhelmed. This time has come. Consumers in this territory have their yards filled and still coal is standing on the sidings consigned to them. One of the big railroads has placed an embargo on Cleveland for the time being. In Cleveland car service charges are being assessed against the consumers of coal or against the shippers, and both have worked together to throw over their coal to any possible market. The result is that run-of-mine steam coal is now selling at \$1. It is a strange feature of the trade that slack is now selling above run-of-mine. Ohio slack is selling at \$1 to \$1.10 at the mines and Pennsylvania at \$1. The relief from car shortage also resulted in a better tone to the coke market. The prices have eased materially and now the best grades of 72-hour foundry coke are selling at \$3.50 at the oven and the best grades of furnace coke are selling at \$2.60 to \$2.75 at the oven.

Pittsburg. Jan. 16.

Coal.—The market is in good shape, and most of the mines in the district are running full with a good supply of railroad cars. Prices remain about the same, on a basis of \$1.20@\$1.30 a ton for run-of-mine at the mine. The annual convention of the United Mine Workers opened this morning at Indianapolis and is the largest delegate meeting of miners ever held. The joint conference with the operators to consider the mining rate for the year beginning April 1 has been arranged for Jan. 25 and the outlook for a settlement does not seem favorable. The operators in this district say positively that they will not consent to an advance and many are opposed to granting a continuation of the present rate. At the annual district convention held here last week the 140 delegates from the Pittsburg districts were instructed to demand an advance of 10c. a ton for pick mining and a general increase of about 12% for machine cutting and loading and for inside and outside day labor. It is understood the Ohio districts will make a similar demand.

Connellsville Coke.—There was a heavy increase in both production and shipment. The price of furnace coke is a trifle weaker for prompt delivery, quotations being \$2.65@2.75. Foundry coke is held at \$3.40@\$3.50 a ton. The shipments for the week amounted to 283,291 tons, an increase of 30,923 tons over the previous week (five days). The shipments for the week aggregated 12,112 cars, distributed as follows: To Pittsburg and river points, 4,384 cars; to points west of Pittsburg, 6,462 cars; to points east of Everson,, 1,266 cars. This was a gain of 2,203 cars over the previous week. The combined shipments from the Connellsville and Mason-town fields amounted to 355,286 tons.

Foreign Coal Trade.

Jan. 17.

Imports of fuel into Germany for the 11 months ending Nov. 30 were, in metric tons:

	1904.	1905.	Changes.
Coal.....	6,644,708	8,614,287	I. 1,969,576
Brown Coal.....	6,963,522	7,176,868	I. 213,348
Coke.....	482,857	655,435	I. 172,579
Total.....	14,091,087	16,446,590	I. 2,355,503

The chief imports of coal were from Great Britain, while the brown coal, or lignite, was all from Austria.

Exports of fuel from Germany for the 11 months ending Nov. 30 were, in metric tons:

	1904.	1905.	Changes.
Coal.....	16,233,062	16,446,517	I. 213,455
Brown Coal.....	20,818	18,423	D. 2,395
Coke.....	2,491,319	2,509,209	I. 17,890
Total.....	18,745,199	18,974,149	I. 228,950

The chief exports of coal were to Austria, Holland, Belgium and France. In 1905 there were 19,631 tons of coke sent to the United States.

The coal production of Germany for

the 11 months ending Nov. 30 is reported as below, in metric tons:

	1904.	1905.	Changes.
Coal.....	109,633,117	110,672,797	I. 1,039,680
Brown Coal.....	44,233,083	47,426,651	I. 3,193,568
Total mined	153,866,200	158,099,448	I. 4,233,248
Coke made.....	11,244,023	13,878,482	I. 2,634,459
Briquets made...	10,422,835	11,748,721	I. 1,325,886

The larger part of the briquets made are from the brown coal, or lignite.

Iron Trade Review.

NEW YORK. Jan. 17.

The main point of interest this week is found in the buying of outside pig iron by the United States Steel Corporation. The details are given in our Pittsburg letter below. The object of the large orders placed is understood to be the steadying of the market, but the effect is still rather doubtful. Inquiries now coming in seem to show that many consumers have underestimated their requirements, at least for the first half of the year.

An extraordinary demand for structural material continues to be manifest. In addition to the work already in hand, new bridge orders are coming in, and the building operations planned for the coming season are continually increasing in number.

The number of furnaces in blast in January shows a slight decline from the December report. This is due chiefly to the enforced blowing out of several furnaces for necessary repairs.

According to the London papers, a recent conference held in Paris was attended by representatives of the United States Steel Products Export Co., the German Steel Syndicate, and of the Belgian and French works. The conference discussed the question of the establishment of an international wire nail syndicate. It was eventually agreed to advance prices for the Orient by 12s. per ton, but for Egypt and Bulgaria the increase was fixed at 8s. The representatives of the Belgian Wire Nail Syndicate proposed that all export orders in the markets of the world should be apportioned among the individual groups on the basis of the average deliveries for the export trade in the past three years. It is understood that the suggestion was adopted in principle, although the difficulty of carrying it into practice was not lost sight of by those present.

Birmingham. Jan. 16

A steady inquiry for pig iron in the Birmingham district assures the manufacturers that conditions are going to hold for some time to come. The advance in freight rates on March 1, of 25c. per ton to eastern, northern and western points, will be offset by an advance in the iron quotations. There is a steady delivery of iron, the railroads in this section doing better this winter in the way of transportation than for some years. A meeting of the Southern Iron Committee was held in Birmingham during the past week,

and arrangements were made for the adoption of the advanced rate on pig iron of 25c. per ton, effective March 1.

Following iron quotations still prevail in this district: No. 1 foundry, \$15; No. 2 foundry, \$14.50; No. 3 foundry, \$14; No. 4 foundry, \$13.50; gray forge, \$12.50 to \$13; No. 1 soft, \$15; No. 2 soft \$14.50.

Steel, finished iron and steel, cast-iron pipe and foundries and machine shops all report a satisfactory business in this district.

One furnace is due to go into blast this week in the Birmingham district, Alice furnace in the city, belonging to the Tennessee Coal, Iron & Railroad Co. Two others are nearly ready.

Chicago. Jan. 15.

Quietness, but continued firmness marks the market for iron and steel. Sales of pig iron are by no means heavy yet, but seem to be fully as great as the trade expected. Buying is still chiefly in small quantities, with here and there a lot of fair size. Inquiries, however, are increasing, and everything points to a large spring business. Some orders are running into the third quarter now, but they are few. The mild weather has been in favor of quick deliveries. On general orders Southern brings \$14.50@15 Birmingham, or \$18.15@18.65 Chicago, and Northern \$19@19.50 for No. 2. Quick deliveries command 25c.@75c. premium.

Coke is somewhat firmer, the supply having been somewhat lessened by restriction of shipments. Connellsville 72-hour is quoted at \$5.90, or \$3.25 at the ovens.

Cleveland. Jan. 16.

Iron Ore.—A little more ore has been bought by the furnace interests during the past week from the amounts stored on the Lake Erie docks. The purchases have not been large, the amount available for sale not permitting it. It is now reported that many of the vessel interests have decided to hold their tonnage for wild charters, rather than to tie up on more contracts, expecting a good year in the lake marine trade. The furnace interests are understood to be in the market for more ore for 1906 delivery, but purchases may be withheld until it is known how the market is going to develop after that time. Prices still hold at \$4.25 for Bessemer Old Range, base quality f. o. b. Lake Erie reports; \$4 for bessemer Mesabi; \$3.70 for non-bessemer Old Range and \$3.40 for non-bessemer Mesabi.

Pig-Iron.—The Steel Corporation during the week took over 20,000 tons of bessemer iron at \$17.50 in the Valley for first half delivery. The demand for basic is strong enough to support the market on the old price of \$17.50 in the Valleys. Foundry has eased on second quarter buying. Spot iron is scarce and the price holds steady at \$18 in the Valleys for No.

2. The southern furnaces are holding for \$14.50 Birmingham.

Finished Material.—The demand for sheets is the strongest part of the market. Plates are strong and structural is active. Bars are especially strong, with bar iron in exceptional demand.

New York. Jan. 17.

Business continues active and the demand for structural material and plates is heavy: The quantity of construction work in hand and projected is enormous.

Pig Iron.—Though it was believed that users were supplied for a time, there is still a good deal of buying. Pipe-foundry grades and basic pig are most in demand.

Prices for Northern iron ore are firmer. For large lots we quote; No. 1X, \$19@19.50; No. 2X, \$18.50@18.75; No. 2 plain, \$17.75@18.25; gray forge, \$17@17.25. Virginia foundry is held at \$18.60@19.10 for No. 1, and \$18.10@18.60 for No. 2. Basic is \$18.75 for Alabama, and 25c. less for Northern. For Southern iron, on dock, quotations are: No. 1, foundry, \$18.75; No. 2 \$18.25; No. 3, \$17.50; No. 4, \$17; No. 1 soft, \$18.75; No. 2, soft, \$18.25; gray forge, \$16.50. Southern prices are firm; a little extra is asked for special deliveries, especially on No. 2 soft.

Business in warrants is very light, and prices nominal.

Cast-Iron Pipe.—Prices are steady on a basis of \$28.75 per net ton for 6-in. pipe, carload lots at tidewater points. The pipe foundries all report plenty of work.

Bars.—Business is good and prices are higher. Mills are asking 1.895@1.945 for common bars and 1.95@2c. for refined bars in large lots at tidewater. Steel bars are 1.745@1.795c., same delivery. Store trade is good, at 2.25@2.50c., delivered.

Plates.—Steel plates are still in demand. Tank plates are nominally 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745 @ 1.845c., according to width. These are the pool prices. Most new orders are placed on a premium basis, and jobbers ask heavy advances on small lots.

Structural Material.—Orders continue to come forward for bridge and building work. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in. 1.895c.; angles and channels, 1.845c., tidewater delivery. These are the pool prices, but buyers have to pay all sorts of premiums to secure material when they want it.

Steel Rails.—No change in standard sections. Light rails are in steady demand, prices ranging from \$26 for 35 lb., up to \$33 for 12 lb. rails. Girder rails are beginning to be inquired for for next season, when a good deal of new trolley work is projected.

Philadelphia. Jan. 16.

Pig Iron.—Phenomenal activity continues in the eastern basic market. Some of the heaviest contracts for the year have recently been placed. The selling price of basic iron in this market is \$17.50 and eastern plants are by no means yet supplied. The inquiries for other kinds of iron still continue, but there is an absence of that anxiety to close contracts which has characterized this market for some time. The pig iron market is very strong in every branch and even the latest sales of forge have been made at exceptionally high figures. The foundry buyers are watching the course of the market, but have not recently bought heavily. Malleable iron has been called for.

Quotations may be given at \$19.50 for No. 1X foundry; \$18.50@19 for No. 2X; \$18@18.50 for No. 2 plain; \$19 for best No. 2 Southern; \$17.50 for best gray forge; \$18 for basic and \$24@25 for low phosphorus.

Steel Billets.—The most of the business in billets during the past few days has been for special makes, with prices ranging from \$34 to \$38. Ordinary billets \$30.

Merchant Bar.—The demand for merchant bar has relaxed temporarily and this week's meeting of the Bar Iron Association will probably take some action on the situation. Quotations for car lots are 1.83½ in large lots, but smaller buyers are paying considerably more and the bulk of business is now in small lots.

Sheets.—The advance of \$2 per ton is followed by an active demand for small lots of both heavy and light sheets.

Pittsburg. Jan. 16.

The negotiations of the United States Steel Corporation for a large block of bessemer pig iron were not concluded until Friday, when it bought all the available iron for first-quarter delivery and part of its requirements for the second quarter. The deal for 90,000 tons that was pending a week ago did not go through, owing to failure to agree on a price. The Bessemer Pig Iron Association insisted on a rate of \$17.50 for first quarter and a higher price for the second quarter. W. P. Snyder & Co. entered into a contract for 60,000 tons for first quarter at \$17.25. Valley furnaces, and the association finally consented to deliver 35,000 tons at that price, leaving 25,000 tons of the contract for the Snyder interest to fill. The Corporation wanted more iron at that price, and the association accepted an additional order of 25,000 tons, making a total of 85,000 tons bought by the Corporation for delivery in the first quarter at \$17.25. Valley furnaces. Earlier in the month the Corporation bought 7,000 tons at \$17.50, Valley, and with sales aggregating 7,500 tons made to other interests during the week at that

price there is but little iron available for shipment in the first quarter. After the deal for 85,000 tons was closed, the Corporation entered into negotiations with W. P. Snyder & Co. for second-quarter iron and bought 30,000 tons at \$17.75, Valley furnaces, which practically establishes that as the minimum price for the first half. It is given out that the main purpose of the Corporation in inducing producers to shade the price for first quarter was to prevent a runaway market and to keep the price below \$18. The fact that it paid \$17.75 for future iron, however, will undoubtedly establish a minimum rate of at least \$18.25 to buyers of small lots. There is not much demand for foundry iron, but some important inquiries for gray forge have been received during the week. The Massillon cast-iron pipe interest has bought 22,000 tons of foundry but most of it is Southern iron which was bought at a shade under the price now quoted at Birmingham, \$14.50, and a few thousand tons was obtained from Cleveland furnaces at about \$16.50 at furnace.

The cold wave of last week was of short duration and did not interfere with shipments as was expected. The tonnage sent out from mills in the Pittsburg district in the first two weeks of the year is reported to be greater than any corresponding period last year. While there has not been much new business in finished steel products, specifications on old contracts have been heavy and strong efforts are being made to catch up and be able to take care of new orders. The Carnegie Steel Co. was crippled somewhat in its steel hoop branch by a serious fire at its plant at Greenville. The building was burned, but the machinery was not destroyed, and plans were promptly prepared for re-building the works on a larger scale. There will be no delay and it is expected to have the plant running again in a few months. Work on the new structural and plate mills at Homestead will be rushed as a record-breaking demand in these lines is in sight. Labor troubles may affect the situation somewhat, as the International Association of Bridge & Structural Iron Workers seems determined to win the strike against the American Bridge Co. regardless of the cost. The executive board is now in session at headquarters in Cleveland, considering a proposition to declare a strike on all material handled by the American Company. This will seriously affect independent erecting concerns that have contracts for material with the American. It is announced today that hasty action will not be taken, and before the proposed strike is declared the matter will be submitted to the membership of the organization for a vote. New business in merchant pipe is being booked and an advance of about \$2 a ton is expected to be ordered by the leading interest before the end of the week. The rail mills of the country, according to the

latest figures given, opened the year with orders for fully 2,100,000 tons on the books and very little of this business was carried over from last year.

Low-price bar-iron contracts are rapidly being filled, which is indicated by the bi-monthly examination of the sales sheets of the Republic Iron & Steel Co., made on Thursday under the agreement with the Amalgamated Association. The examination showed that the average sales for November and December were between 1.5c. and 1.6c. The average at the previous settlement was 1.4c. Under this settlement the pay of the puddlers is advanced from \$5.50 to \$5.75 a ton and the wages of the finishers are increased 2%. The Republic is still quoting 2c., Youngstown for common iron bars, but outside interests are reported to be selling at 1.90c.

Steel.—The market is quiet, no sales of billets of any consequence having been recorded. Bessemer and open-hearth billets are quoted nominally at \$26 and sheet-bars at \$27. Merchant steel bars remain at 1.50c. and plates at 1.60c.

Sheets.—There is a good demand and all the mills are busy except where it is impossible to obtain steel. Black sheets are quoted at 2.40c. and galvanized at 3.45c. for No. 28 gauge.

Ferro-Manganese.—There is still a scarcity for prompt shipment and a few small lots sold at \$135. On contract for delivery beginning next June foreign 80% is offered at \$85 per ton.

Heavy Chemicals and Minerals.

NEW YORK. Jan. 17.

The general market for heavy chemicals in the new year has not moved much from what it was in the closing days of the last calendar year; but enough strength is shown to indicate both the vigor of the trade for the new year and also somewhat of its tendency.

Sulphur.—The market is steady. We give herewith the prices for the Louisiana crude, guaranteed 99%, in carload lots. Sicilian is quoted the same for Atlantic ports as the American product.

One of the prominent Sicilian exporting houses has sent out word that low-grade Sicilian sulphur is being exported to America under a classification different from that to which it is entitled. It will therefore be well for consumers of Sicilian brimstone to watch the foreign sulphur arriving in this country and have it analyzed for its sulphur contents.

The monthly report from Emil Fog & Sons from Messina, notes that the exports to the United States and to France, for November, 1905, showed a decrease as compared with the same month in 1904. The anxiety in Sicily regarding the influence of the American product still continues, as well as apprehension concerning the inroad made by pyrite.

Pyrite.—This continues unchanged and in steady demand, the production being

constantly absorbed, with a possibility of upward tendency in prices.

Nitrate of Soda.—This opens the new year with a market which is firmer both on the West coast, and also in New York, but with prices unchanged. Contracts for the first half of the year are reported at \$2.20, and for the whole year at \$2.18@2.20. Quotations are for 96%; 95% are quoted 2½ to 5c. per 100 lb. lower. Deliveries in New York for December, 1905, were 11,800 tons, as compared with 19,870 tons for December, 1904. Visible stocks on January 1, 1906, were about 8,000 tons.

Salt Cake.—This is quoted at 65c. per lb. on contracts for carload lots. The heavy alkalis (carbonates and caustic) show a sustained demand.

Sulphate of Copper.—This reports the same advanced figure recently quoted, probably in sympathy with the sustained strength of the metal. The price is given herewith.

Tin Crystals.—These are quoted at 21½@23c. Tin bichloride is reported at 10½@11c. The slight advances quoted for these are evidently sustained both by the demand of the consumers of the salts and by the advanced price of the metal.

Phosphates.—The dealers report the same situation as noted hitherto and recently. Prices are the same and the market is firm. The exports for the twelve months ending July 31, 1905, were 543,319 tons, an increase of about 8% over the previous year. This was absorbed mostly by Germany, Italy, Great Britain, France, Holland and Belgium, and in the order noted. The imports of crude phosphate in the same period were 48,511 tons.

PRICES.

Acids.		
Boric, crystals.....	per lb.	.10
powdered.....		.10½
Carbonic, liquid gas.....		.12½
Hydrofluoric, 30%.....		.03
48%.....		.05
60%.....		.11
Nitric acid, 36%, 100 lb.....		\$1.75
38%, 100 lb.....		5.25
40%, 100 lb.....		5.75
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.....		1.00
60%, bulk, ton.....		18.00@20.00
66%, 100 lb. in carboys.....		1.25
66%, bulk, ton.....		21.00@23.02
Blue Stone (Copper Sulphate), carload lots, per 100 lb.....		\$5.90
Nitrate of Soda, 100 lb.....		2.20
Sulphate of Ammonia, per 100 lb.....		3.10@ 3.15
Sulphur.		
Louisiana, New York, Boston or Philadelphia or Baltimore.....	ton	\$22.12½
Philadelphia or Baltimore.....		22.62½
Pyrite.		
Domestic, furnace size.....	Unit	11c.
Fines.....		10c.
Imported, lump, At. ports.....		10@11c.
fines " ".....		9½@10c.
furnace size.....		11½@12c.
Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.		
Phosphates.	F. o. b.	C. I. F.
		Gt. Britain or Europe
*Fla., hard rock.....	\$7.75@8.00	\$10.90@12.10
land pebble.....	4.00@4.25	7.95@8.65
†Tenn., 78%.....	4.60@4.65	
75%.....	4.00@4.25	
75%.....	3.65@3.75	
68@72%.....	3.25@3.50	
‡So. Car. land rock.....	4.00@4.25	
river rock.....	3.75@4.00	
*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.		

Metal Market.

New York, Jan. 17.

Gold and Silver Exports and Imports.
At all United States Ports in Dec. and Year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Dec. 1905 ..	\$2,668,532	\$3,982,040	Imp. \$1,313,508
" 1904 ..	13,502,827	3,336,184	Exp. 10,166,643
Year 1905 ..	46,794,467	50,246,564	Imp. 3,452,097
" 1904 ..	121,211,827	84,803,234	Exp. 36,408,593
Silver:			
Dec. 1905 ..	8,196,149	4,646,789	Exp. 3,549,360
" 1904 ..	4,114,661	2,252,955	" 1,861,706
Year 1905 ..	57,513,102	35,892,196	" 21,620,906
" 1904 ..	50,135,245	26,087,042	" 24,048,203

These statements cover the total movement of gold and silver to and from the United States. 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 January 13, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	\$ 16,000	\$34,292	\$ 904,915	\$18,863
1906	534,000	60,568	4,878,053	61,810
1905	5,074,500	58,926	1,465,238	36,745
1904	179,891	933,055	2,062,510	42,465

Exports of gold for the week were to the West Indies; of silver to London. Imports were from the West Indies and Mexico.

The foreign trade of the United States for the full year is reported by the Bureau of Statistics of the Department of Commerce and Labor as below:

	1904.	1905.
Exports	\$1,451,318,740	\$1,626,962,343
Imports	1,035,909,190	1,179,358,846
Excess exports, \$	415,409,550	447,603,497
Add ex. of silv.		21,620,906
Total		\$ 469,224,403
Ded't ex. of im. gold		3,452,097
Net export bal		\$ 465,772,306

The movement of gold and silver in detail is given in the table at the head of this column.

The statement of the New York banks—including all the banks represented in the clearing house for the week ending Jan. 13, gives the following totals, comparison being made with the corresponding week of 1904.

	1905.	1906.
Loans and discounts ..	\$1,064,336,800	\$1,005,041,600
Deposits	1,119,160,100	997,206,208
Circulation	43,020,100	52,990,800
Specie	215,591,400	178,329,500
Legal tenders	88,657,900	83,780,700
Total Reserve	\$304,249,300	\$262,110,200
Legal requirements	279,790,625	249,301,550
Surplus	\$24,459,275	\$ 12,808,650

Changes for the week this year were increases of \$383,300 in loans, \$10,993,500 in specie, \$4,610,000 in legal tenders, \$13,463,400 in deposits, \$77,900 in circulation and \$12,257,650 in surplus reserve.

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

	Gold.	Silver.
New York Associated	\$178,329,500	
England	148,989,290	
France	573,701,135	\$212,915,610
Germany	160,130,000	53,375,000
Spain	75,155,000	114,225,000
Netherlands	33,007,500	30,491,500
Belgium	16,156,665	8,078,335
Italy	139,290,000	17,662,500
Russia	518,050,000	18,145,000
Austria	224,375,000	60,400,000

The returns of the Associated Banks of New York are of date Jan. 13, and the others Jan. 12. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

The coinage of the Mints of the United States for 1905 was as follows:

	Pieces.	Value.
Gold	3,878,332	\$49,638,441.00
Silver	35,511,526	6,332,180.90
Nickel and Copper	110,546,439	2,298,555.43
Total U. S.	149,936,297	\$58,269,177.33

The silver was all subsidiary: no silver dollars were coined. In addition to the United States coins, there were 17,331,313 coins executed for the Philippine Islands; 2,724,862 for Panama; and 900,000 for Costa Rica.

The Treasury Department's estimate of the money in the United States on Jan. 1, 1906, is as follows:

	In Treasury.	In Circulation.
Gold Coin (in bul. in Treas.) ..	\$238,281,230	\$ 654,168,025
Gold Certificates	46,554,850	480,939,019
Silver Dollars	588,638	83,736,227
Silver Certificates	11,613,515	463,960,485
Subsid. Silver	6,961,490	110,029,365
Treas. Notes of 1890	55,116	8,274,884
U. S. Notes	3,418,925	343,262,091
Nat. Bank Notes	13,740,872	527,173,475
Total	\$321,214,636	\$2,671,543,571

Population of the United States Jan. 1, 1906, estimated at 83,960,000; circulation per capita, \$31.82. 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.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to Jan. 6: £256,200 in bar silver, and £60,000 in Mexican dollars; £316,200, all to India. Receipts for the week were: £3,000 from Australia; £3,000 from Chile; £259,000 bar silver and £72,000 in Mexican dollars from New York; £337,000 in all.

Our attention has been called to a misprint in the columns of the JOURNAL by which the price of silver on Dec. 14 last was given at 63½¢. It should have been 65½¢. and the figure last given was used in making up the monthly average.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	\$0.50	\$0.51½
Peruvian soles and Chilean	0.45	0.47
Victoria sovereigns	4.85½	4.87½
Twenty francs.	3.86	3.88
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Jan.	Sterling Exchange.	Silver.		Jan.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
11	4.86½	65½	30½	15	4.86½	65½	30½
12	4.86½	65½	30½	16	4.86½	65½	30½
13	4.86½	65½	30½	17	4.86½	65½	30½

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

Other Metals.

Daily Prices of Metals in New York.

January	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
11	18½ @18½	18½ @18½	79½	36½	5.60	@6.70	@6.50
12	18½ @18½	18½ @18½	79½	37	5.60	6.65	6.50
13	18½ @18½	18½ @18½	.....	37½	5.60	6.65	6.50
15	18½ @18½	18½ @18½	78½	37	5.60	@6.65	@6.50
16	18½ @18½	18½ @18½	79½	36½	5.60	@6.65	@6.50
17	18½ @18½	18½ @18½	78½	36½	5.60	@6.65	@6.50

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper.—The market, which last week closed entirely nominal, has since then not improved in tone. On the contrary, buyers have withdrawn almost entirely from the market both here and in Europe, and when at the beginning of this week, the London standard market displayed a great deal of weakness, it had a tendency to cause offerings more freely on the part of sellers, which so far, however, have not brought about business. The close is weak at 18¾@18½ for Lake; 18¼@18½ for electrolytic in cakes, wirebars or ingots and 17¾@18¼ for casting copper.

The London standard market is unsettled, and while the spot position, relatively speaking, has held its own fairly well, there is a great deal of pressure on the part of the bear contingent to sell the three months option. The close is easy at £78. 7s. 6d. for spot and £76 15s. for three months. Refined and manufactured sorts we quote: English tough, £84@£85; best selected, £85@£86; strong sheets £92.

Statistics for the first half of January show a decrease of 1,800 tons in the visible supplies.

Exports of copper from New York for the week were 2,485 tons. Our special

correspondent reports the exports from Baltimore for the week at 614 long tons.

Tin.—In spite of the declining prices, business has been very active from day to day, as a number of consumers have been compelled to cover their immediate requirements. The market closes steady at 36¼c.

The London market, after opening very firm, touched £167 12s. 6d. for spot and £168 for three months, but in sympathy with other metals there has been a severe decline during the week, and the close is weak at £163 15s. for spot and £164 5s. for three months.

Lead.—Business in this metal is very quiet and supplies are more plentiful than they have been for some time past, so that the premium which has been ruling for spot deliveries is gradually disappearing. Sales of spot lead have been made at 5.70, New York.

The London market has shown great weakness and at the close there is a downward tendency, the quotation being £16 15s. for Spanish and £16 16s. 3d. for English lead.

The movement of foreign lead in the United States for the 11 months ending Nov. 30, is reported by the Bureau of Statistics as follows: the figures being in short tons:

In bond, Jan. 1.....	11,481
Imports in all forms.....	89,925
Total supplies.....	101,306
Re-exports of foreign.....	56,022
In bond Nov. 30.....	5,445
Total deductions.....	61,467
Balance, retained in U. S.....	39,839

This indicates a consumption of nearly 40,000 tons of foreign lead.

St. Louis Lead Market.—The John Wahl Commission Co. reports on Jan. 13, as follows: Receipts amounted to 45,755 pigs this week, against 24,160 pigs last week; Shipments 28,280 pigs this week, against 32,240 pigs last week. Late last week about 100 tons of a special brand brought \$6 but this figure could not be realized since; though producers were very firm in their views. On Wednesday, \$5.85 was the best obtainable figure, and, on Thursday, ordinary metal was offered at \$5.85; special brands still being held higher. To-day bids ranged \$5.85 to \$5.90, but no sales reported.

The company telegraphs us on Jan. 17, as follows: Lead is easier. Missouri brands are obtainable at 5.85c., but not salable above 5.80c.

Spelter.—The demand has subsided, and owing to conditions in the ore market favorable to the smelters, fairly heavy quantities have been pressed for sale, and the market closes easier at 6.55@6.65 New York and 6.40@6.50c. St. Louis.

There has been a surprising drop in the London market, which suddenly gave way to the extent of £1 and has since then declined further, closing easy at £27 15s. for good ordinaries and £28 for specials.

There has been no explanation for this sudden change of front, but mail advices may furnish more details.

St. Louis Spelter Market.—The John Wahl Commission Co. on Jan. 13, reports as follows: Receipts compare 61,225 slabs this week, with 66,580 slabs last week; Shipments 60,200 slabs this, against 71,730 slabs last week. Market better. Quotable during week at from \$6.50 early to \$6.55 later. Demand good, but few sales are reported. Price firm at \$6.55.

The company telegraphs us on Jan. 19, as follows: Spelter is quiet but firm, at 6.50c., East St. Louis.

Zinc Sheets.—The price of zinc sheet is to \$8 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 and 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, \$7.25; January 7, 1905, \$7.50; May 12, \$7.25; June 1, \$7; July 29, \$7.25; August 10, \$7.50; December 1, \$7.75; January 6, 1906, \$8.

Antimony.—There has been no change in the market or prices.

Nickel.—Quotations for large lots, New York, or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

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

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

Quicksilver.—Prices in New York continue steady at \$40 per flask for large orders—over 100 flasks—and \$40.50 for jobbers' lots, down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to \$41.75@42.25 per flask. San Francisco prices are steady at \$39 for domestic orders, and \$37.50 for export. The London price is £7 5s., but second hands ask only £7 2s. 6d. per flask.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 50 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn.....	275
No. 2, 28% Mn.....	180
No. 3, 20 to 25%, with 2 to 4% iron.....	165
Manganese tin, No. 1, 55% Mn., no iron.....	480
No. 2, 56% Mn., some iron.....	280
Manganese nickel, No. 1, free from iron.....	450
No. 2, traces of iron.....	270

Manganese metal is quoted as 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen. These alloys are made by the Isabellenhütte, in Bonn, Germany, which is represented by Mr. Speier in Breslau as selling agent.

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

	Per lb.
Aluminum.....	33@37c.
No. 1, 90% ingots.....	31@34c.
No. 2, 99% ingots.....	4c. up.
Rolled sheets.....	20@28c.
Aluminum-bronze.....	33@39c.
Nickel-alum.....	\$2.10
Bismuth.....	77c.
Cadmium, f. o. b. Hamburg.....	80c.
Chromium, pure (N. Y.).....	50c.
Copper, red oxide.....	95c.
Ferro-Molybdenum (50%).....	75c.
Ferro-Titanium (20@25% N. Y.).....	12½c.
Ferro-Chrom. (75%).....	29c.
Ferro-Tungsten (37%).....	\$1.60
Magnesium, pure (N. Y.).....	75c.
Manganese (98@98% N. Y.).....	40c.
Manganese Cu. (30@70% N. Y.).....	\$1.75
Molybdenum (98@99% N. Y.).....	40c.
Tantalum acid (N. Y.) (oz.).....	45c.
Phosphorus, foreign.....	70c.
Phosphorus, American.....	90c.
Tungsten (best), pound lots.....	

Variations in price are chiefly due to size and conditions of order and deliveries.

Missouri Ore Market.

JOPLIN, Jan. 13.

The highest price reported paid for zinc ore was \$54 per ton, the assay basis price ranging from \$50 to \$45 per ton of 60% zinc. Average price \$47.30.

The highest price paid for lead ore was \$81 per ton, with 80% grades selling at \$80 per ton. Average price, \$79.72.

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

	Zinc, lb.	Lead, lb.	Value.
Joplin.....	2,992,260	219,570	\$82,090
Cartersville-Webb City..	2,541,290	557,130	79,460
Galena-Empire.....	1,283,840	88,660	32,430
Duenweg.....	1,198,740	86,890	30,435
Badger.....	1,243,030	.....	29,210
Aurora.....	948,350	.....	20,920
Alba.....	759,610	.....	18,990
Neck City.....	645,570	.....	16,130
Baxter Springs.....	266,880	.....	6,000
Granby.....	197,000	22,000	5,550
Spurgeon.....	261,420	26,200	5,350
Wentworth.....	264,590	.....	5,015
Prosperity.....	91,460	54,720	4,240
Oronogo.....	101,070	8,320	2,760
Carthage.....	110,040	.....	2,750
Beef Branch.....	106,590	16,290	1,990
Central City.....	61,280	.....	1,380
Stott City.....	47,390	.....	1,130
Totals.....	13,220,410	1,079,820	\$345,830
Two weeks.....	21,091,540	3,309,840	572,055

Zinc value, the week, \$302,780; 2 weeks, \$479,475.
Lead value, the week, 43,050; 2 weeks, 92,580.

The Lanyon Zinc Co. re-entered the market early in the week, with offerings of an advance of \$1 per ton and succeeded in securing some 1,500 tons purchased on a basis of \$50 per ton of 60% zinc. Only ores assaying 60% or better were sought, and as several large bins of this grade of ore were being held for an advance, the purchasing agent succeeded in buying largely before other companies knew the turn was being taken. This action caused prices to advance on all 60% grades sold, but with a light demand for lower grades no change was made in the purchase price.

In point of values the past week is the

greatest ever recorded, being \$6,790 greater than the last year's largest week and gives to the first half of January over half a million dollars valuation, an increase of over \$200,000 over the first half of January, 1905.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
January...	33.33	52.00	January...	55.55	61.50
February...	33.63	52.77	February...	56.37	57.62
March...	35.40	47.40	March...	57.20	57.50
April...	35.75	42.88	April...	58.00	58.00
May...	34.87	43.31	May...	57.77	58.27
June...	31.93	40.75	June...	56.60	57.80
July...	33.37	43.00	July...	53.00	58.00
August...	37.55	48.83	August...	53.00	58.00
September...	40.18	46.75	September...	53.50	63.50
October...	43.65	47.60	October...	53.50	63.86
November...	43.95	49.55	November...	54.70	68.67
December...	46.38	49.00	December...	55.55	76.25

The total shipments, or sales, of ore from the Joplin District for the full year were as follows, the figures given being in short tons, of 2,000 lb.:

	1904.	1905.	Changes
Zinc ore.....	267,239	252,435 D.	14,804
Lead ore.....	34,367	31,679 D.	2,688
Total values....	\$11,487,355	\$13,302,800 I.	\$1,815,445

The total amount received for lead ore in 1905 was \$1,986,480; for zinc ore, \$11,334,320. The highest price paid for lead was \$80 per ton and the highest weekly average \$77.60. The lowest price was \$57 in February, March and June. The average price for 1905 was \$62.12 and in 1904 it was \$54.80 per ton. The highest price for zinc for the year was \$60 per ton in January and February; the lowest point was a basis price of \$38 to \$41, with the highest at \$43 per ton the second week in June. The average price for 1905 was \$44.88; in 1904 it was \$32.92 per ton.

Wisconsin Ore Market.

PLATTEVILLE, Jan. 13.

There was a little better price paid for the higher grades; 60% zinc ore brought \$50, with the usual penalty for iron. Some of the fancy grades brought as high as \$54.50. The Empire ore was sold at a high price, several bins carrying a considerable amount of iron brought as high as \$42.

Lead continues scarce, and only one car was reported sold. This brought top price, \$35 per thousand.

The camps in the Platteville district report ore loaded as follows:

	Zinc, Lbs.	Lead, Lbs.	Sulphur, Lbs.
Platteville.....	408,890	.....	.....
Livingston.....	440,000	.....	.....
Buncombe-Hazel Green..	252,800	.....	.....
Cuba City.....	187,000	.....	.....
Harker.....	135,530	.....	.....
Linden.....	121,270	.....	.....
Highland.....	120,000	.....	.....
Rewey.....	108,000	.....	.....
Bentley.....	61,000	.....	.....
Mineral Point.....	50,400	.....	.....
Shullsburg.....	.....	30,000	.....
Montfort.....	.....	.....	113,600
Total.....	1,884,890	30,000	113,600

Zinc ore shipments show a large increase, but lead ore sales were light.

Mining Stocks.

New York. Jan. 17.

The stock market has been strong again, and an important point is that outsiders are more in evidence in the buying. Undoubtedly the public is being drawn into the Exchange, but it is still largely professional trading which sets the pace. Money is easier and the shipment of \$1,000,000 gold to Mexico today had very little effect.

The copper stocks are the main attraction. Amalgamated has gone to \$113¼, closing at that figure, while Anaconda sold at \$64 per share. On the outside market, United Copper closed at \$64½ for the common and \$91 for the preferred. Utah Copper closed at \$38; Boston Consolidated \$32; Nevada Consolidated, \$11¾; Granby, \$10. Greene Consolidated touched its high point at \$30¼.

The industrials were generally strong. United States Steel sold up to \$44¾ for the common and \$109½ for the preferred. American Smelting & Refining sold at \$128 for the preferred and \$168 for the common. Tennessee Coal, Iron & Railroad closed at \$161, while \$94 was paid for Sloss-Sheffield.

Homestake, of South Dakota, was dealt in at \$81¾. On the Consolidated Exchange, Elkton sold at 46@47c.; Work at 8½c.; Jim Butler at 92c.; Sandstorm at \$1.30. Little was done in the Comstocks.

A special meeting of Tennessee Coal & Iron stockholders has been called for Jan. 31 to vote on the proposition of increasing the common stock of the company \$7,000,000, making the total authorized issue \$30,000,000. The proceeds from the new issue will be used for the purpose of making improvements and additions to the properties and developing the iron-ore resources.

Boston. Jan. 16.

The market was quieter to-day than it has been for some time. A good business was done in stocks, but there was a perceptible lull in the boom, as if copper shares were taking a rest.

The organizations of the new United States Co. and of the much heralded Coram company are noted elsewhere.

Copper Range sold up to \$84 to-day, holding it to the close. Quincy sold at \$111; Mohawk at \$60; Centennial at \$30½; Old Dominion, \$40. Osceola stood at \$105, on light trading. There were some dealings in Trinity around \$10½. North Butte closed at \$89½, after going a fraction over \$90.

United States Mining was up \$2¾ to \$52 to-day. On the curb the common stock of the new United States Mining & Smelting sold at \$60¼, holding around that figure to the close.

There were some sales of Dominion Steel around \$27½; Dominion Coal brought \$76½ for a small lot.

Some of the larger holders of Montana Coal & Coke are pooling their stock in anticipation of the transfer to the new American Consolidated Copper Co. The terms of the transfer are one share of the new company, par \$100, for eight shares of Montana, par \$10 each.

Rumors are current of large sales of Bingham Consolidated, which may involve a change in control. There are reports that the new Coram Consolidation has offered to buy Bingham on a basis of \$20 per share in cash and \$35 in stock of the new company.

Colorado Springs. Jan. 12.

The market has been considerably more active during the past week than for some time, and several stocks have scored advances. The production of the Cripple Creek district for 1905 totals \$22,307,952, bringing up the total production for the past 15 years to \$203,000,000.

Findley advanced from about 84 to 91c., but shaded off today to 88 and recovered to 90c. Vindicator sold on Saturday last at 80, being a 5c. advance over the last previous sale, and has advanced to \$1 during the week. Elkton has also made slight gains, and sold on today's market for 49c. El Paso has a little more than held its own, and sold today for 68c. Dante shows an increase of about 1c. and closed today at 7¾c. Isabella is selling for 24½, Portland for \$2. Independence for 18c. per share.

San Francisco. Jan. 11.

Trading in the Comstocks was light and prices rather weak. On the other hand the Tonopahs were active, a strong buying demand being manifest. There was some excitement, and prices were generally good. Oil stocks have been dull.

At the annual meeting of the San Francisco Stock Exchange Board the old officers were unanimously re-elected, with A. B. Ruggles as president, William Edwards vice-president, Joseph L. King, chairman, F. W. Hadley, secretary, and Charles D. Laing, treasurer.

The sworn returns of the mining companies, as filed in their offices this week, show cash on hand Jan. 1 as follows, with all expenses paid, unless otherwise noted: Alpha Consolidated, \$49; Alta, \$402, with liabilities of \$4,478; Andes, \$1,644; Belcher, \$145, with December expenses partly unpaid; Best & Belcher, \$327, with \$3,000 liabilities; Bullion, \$114; Caledonia, \$2,688, with December expenses unpaid; Confidence, \$3,578, with December expenses unpaid; Challenge Consolidated, \$3,399; Consolidated Imperial, \$1,222; Crown Point, \$6,010; Chollar, \$5,966; Exchequer, \$581; Gould & Curry, \$5,942; Hale & Norcross, \$537; Julia Consolidated, \$162;

Justice, \$635; Mexican, \$2,706; Consolidated New York, \$606, with liabilities of \$396; Overman, \$1,878, with December expenses unpaid; Ophir, \$39,716, besides concentrates in transit; Savage, \$3,646; Silver Hill, \$16,948; Sierra Nevada, \$271, with liabilities of \$1,500; Scorpion, \$665; Standard Consolidated \$35,044, with December expenses and clean-up to be accounted for; Segregated Belcher, \$1,699; Syndicate, \$61; Union Consolidated, \$453, with liabilities of \$1,500.

The following companies report no cash on hand, with indebtedness as given: Consolidated California & Virginia, \$7,373; Potosi, \$1,274; Utah Consolidated, \$3,143 and December expenses.

Dividends.

Company.	Payable.	Rate.	Amt.
Am. Smelting & Ref.	Jan. 15	\$1.75	\$875,000
Beck Tunnel & Mfg.	Jan. 15	0.01 1/2	15,000
B. & H. Mining	Dec. 30	0.01	4,000
Granby Con.	Jan. 15	0.30	399,991
Homestake	Jan. 25	0.50	109,200
Int. Steam Pump, pfd.	Feb. 1	1.50	132,750
International Nickel, pfd.	Feb. 1	1.50	133,689
Jamison	Jan. 18	0.03	11,700
Nat. Steel & Wire	Jan. 31	1.75	52,390
Osceola Copper	Jan. 31	4.00	400,000
Quincy Copper	Feb. 26	5.00	500,000
Rob Roy	Jan. 10	0.03	4,575
Tamarack Copper	Jan. 25	3.00	300,000
Tonopah of Nev.	Jan. 22	0.25	250,000
Tenn. Coal, Iron & R. R.	Feb. 1	1.00	225,531
Tenn. Coal, Iron & R. R., pfd.	Feb. 1	2.00	4,966
Utah Con., Utah	Jan. 15	2.50	750,000
Virginia-Car. Chem., pfd.	Jan. 15	2.00	360,000
Vulcan Detinning, pfd.	Jan. 20	2.25	33,750

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

Assessments.

Company.	Delinq.	Sale.	Amt.
Alta Sierra	Jan. 31	Jan. 21	\$0.20
Alpha Con.	Jan. 31	Feb. 21	0.05
Best & Belcher	Feb. 9	Feb. 28	0.10
Brunswick-Chollar	Dec. 30	Jan. 22	0.03
Brunswick Con. Va.	Dec. 28	Jan. 18	0.05
Brunswick-G. & Curry	Jan. 13	Jan. 31	0.03
Bullion	Jan. 11	Feb. 1	0.05
Con. Cal. & Virginia			0.25
Fair View, Cal.	Feb. 12		0.10
Lady Washington	Jan. 2)	Feb. 10	0.05
Last Chance, Cal.	Jan. 27	Jan. 27	0.005
Julia Con.	Jan. 6	Jan. 29	0.03
Little Chief, Utah			0.01
Mexican	Feb. 7	Feb. 28	0.15
Potosi	Feb. 5	Feb. 27	0.10
Overman	Jan. 3	Jan. 22	0.10
San Juan Grande	Feb. 5		0.45
Sierra Nevada	Jan. 22	Feb. 12	0.10
Sonora Quartz Div	Feb. 2		0.02
Union Con.	Jan. 25	Feb. 15	0.10
Utah Con., Nev.	Jan. 13	Feb. 6	0.05
Silver Shield, Utah	Jan. 13	Jan. 29	0.03

St. Louis.

	High.	Low.
Adams	\$.40	\$.25
American Nettle	.17	.15
Center Creek	3.00	2.25
Central Coal & Coke	61.00	60.00
" " pfd	81.00	80.00
Central Oil	60.00	55.00
Columbia	1.80	1.00
Con. Coal	33.00	30.00
Doe Run	200.00	180.00
Granite Bimetallic	.21	.15
St. Joe	23.00	31.25

LONDON. (By Cable.)*

	£	s.	d.
Camp Bird	1	12	3
Consolidated Gold Fields	6	0	7 1/2
De Beers	18	10	0
Dolores	2	1	3
East Rand	6	16	6
El Oro	1	8	3
Esperanza	5	6	0
Modderfontein	8	5	6
Rand Mines	7	18	9
Rio Tinto	66	5	0
Simmer and Jack	1	11	9
Stratton's Independence	0	8	0
Tomboy	1	7	6

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

STOCK QUOTATIONS.

NEW YORK. Week Jan. 17

Name of Company.	High	Low	Clg	Sales
Anacostia	115 1/2	109 3/4	113 3/4	1,038,215
British Col. Copper	268 3/4	252	257 1/2	237,450
Federal	145	141	145	18,730
Federal, Pf.	167	105	106 3/4	3,600
Greene Copper	89 1/2	29 3/4	29 3/4	20,880
Greene Gold	8 3/4	3 3/4	3 3/4	2,725
Homestake	82	81 3/4	81 3/4	350
Mitchell	14 1/2	10 3/4	14 3/4	24,105
Ontario	4	3 3/4	3 3/4	750
Tennessee Copper	52	49	49 3/4	9,850
Union Copper	2 1/2	1 3/4	2 1/2	6,010
United Copper	65 1/2	63 3/4	64 1/2	86,100
United Copper, Pref.	91	88	90 3/4	1,585
Utah Apex	8 3/4	8 3/4	8 3/4	5,400
Utah Copper	38 1/2	37 1/4	38 1/4	5,400

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	169 3/4	162 3/4	168 3/4	148,600
Am. Smelting & Ref., Pf.	130	126 1/2	128	10,700
Col. Fuel & Iron	69 3/4	57 1/2	69 3/4	147,840
National Lead	89 1/2	84	85 1/2	33,800
Pittsburg Coal	15 3/4	14 3/4	14 3/4	2,000
Pittsburg Coal, pf.	60 3/4	59 3/4	59 3/4	500
Republic I. & S., Pf.	109 1/2	107 1/4	108 1/4	367,805
Tenn. C. & I.	165	146 1/2	161	34,026
U. S. Red. & Ref.	165	146 1/2	161	29,100
U. S. Red. & Ref., Pf.	31 3/4	30 3/4	30 3/4	994
U. S. Steel	69	68 3/4	68 3/4	10
U. S. Steel, Pf.	45 1/2	43 3/4	44 1/2	389,300
Standard Oil	109 1/2	106 3/4	109 1/2	193,550
Bethlehem Steel	69 1/2	68 1/2	68 1/2	172
	32	31	31	3,400

BOSTON.

Altoona	45 1/2	43 1/2	43 3/4	5,148
Amalgamated	115 3/4	109 1/4	113 3/4	66,559
Atlantic	27 1/2	25 1/2	25 1/2	3,824
Bingham	36 1/2	34 1/2	35	7,929
Boston Consolidated	38 3/4	30 3/4	31 1/2	9,070
*Calumet & Hecla	71 1/2	70 1/2	71 1/2	1,75
†Centennial	32	30 3/4	31	5,010
Mercur	.66	.61	.66	3,270
*Copper Range	85 1/2	82	84	27,607
Daly-West	17 1/2	16 3/4	17 1/2	2,216
Franklin	19	17 3/4	17 3/4	5,424
Granby	10	9 3/4	9 3/4	230
Green Con. Copper	30 3/4	29 3/4	29 3/4	13,938
Isle Royale	27 3/4	26 3/4	26 3/4	4,185
†Mass.	12	11 1/2	11 1/2	10,713
Michigan	17	16 3/4	16 3/4	2,110
Mohawk	61	59 1/2	59 1/2	1,904
*Forth Butte	92 1/2	85	89 1/2	42,502
*Old Dominion	42	39 1/2	40	13,678
Osceola	106	104 1/2	105	1,579
*Parrot	42 1/2	39	40	7,441
Quincy	114	110	112	1,561
Rhode Island	8	6 3/4	7 1/2	3,097
Shannon	6 1/2	6 1/2	6 1/2	6,838
Tamarack	115	107	112	1,253
Tecumseh	15	14	14	2,346
United Copper, com	65 1/2	63 1/2	64 1/2	20,905
U. S. Mining	52 1/2	48	52 1/2	37,779
Utah	69 3/4	62 3/4	67 1/2	68,871
Wolverine	134 1/2	131	134 1/2	284

PHILADELPHIA.

Cambria Steel	35 3/4	34	34 1/2	149,707
Philadelphia Co.	53 1/2	51 1/2	53 1/2	21,802
Tonopah	20 3/4	17 1/2	19 1/2	10,910

PITTSBURG.

Crucible Steel	15	14	14 1/2	7,974
Crucible Steel, Pref.	79 1/2	76 3/4	78 1/2	3,837
Tonopah Ext.	8.40	7.50	7.90	9,982

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	47 1/2	48	47 1/2	48
El Paso	66 1/2	66 1/2	56 1/2	59 1/2
Isabella	23	23 1/2	23	23 1/2
Portland	200	200	200	200
Vindicator	70	80 1/2	70	80

SAN FRANCISCO.

Best & Belcher	1.10	1.15	1.10	1.10
Bullion	.26	.26	.26	.26
Caledonia	.50	.50	.45	.45
Confidence	.85	.85	.80	.80
Con. Cal. & Va.	1.15	1.15	1.15	1.15
Gould & Curry	.20	.20	.16	.17
Halo & Norcross	1.00	1.00	.90	.90
Mexican	1.10	1.13	1.05	1.10
Occidental Con.	.92	.92	.92	.92
Ophir	5.62 1/2	5.75	5.50	5.75
Savage	.45	.48	.41	.41

*Ex-dividend. †Assessment Paid.

†1st Installment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.691	26.423	27.900
February	57.592	61.023	26.665	28.047
March	56.741	58.044	26.164	26.714
April	54.202	56.600	24.974	26.118
May	55.430	57.832	25.678	26.614
June	55.673	58.422	25.644	26.910
July	58.095	58.911	26.760	27.163
August	57.806	60.259	26.591	27.812
September	57.120	61.698	26.349	28.518
October	57.923	62.034	26.760	28.617
November	58.453	63.849	27.952	29.453
December	60.563	64.850	27.930	29.977
Year	57.221	60.352	26.399	27.839

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

COPPER.

Month.	NEW YORK.				LONDON.	
	Electrolytic.		Lake.		1904.	1905.
	1904.	1905.	1904.	1905.		
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.969
March	12.299	15.125	12.551	15.260	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.975	12.620	15.978	57.645	69.667
Oct.	12.998	16.279	13.118	16.332	60.012	71.406
Nov.	14.284	16.599	14.456	16.758	65.065	74.727
Dec.	14.661	18.328	14.849	18.398	66.384	78.993
Year	12.823	15.590	12.990	15.699	58.587	69.465

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, g. per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		CRYOLITE— lb. .06½	POTASSIUM—
Bort as to size..... carat.	\$10.00@18.00	EXPLOSIVES—	Bicarbonate crystal..... lb. \$0.08½
Carborundum, f.o.b. Niagara Falls, powd..... lb.	.08	Blasting powder, A..... 25-lb. keg .65	Powdered or granulated.. " .14
Grains..... " .10		" Blasting powder, B..... " 1.40	Bichromate, Am..... " .08½@.084
Corundum, N. C..... " .07@.10		" "Rackarock" A..... lb. .25	Scotch..... " .08½@.081
Chester, Mass..... " .04½@.05		" "Rackarock" B..... " .18	Bromide..... " .15
Craigmont, Ont..... " .05½@.06½		Judson R.R. powder..... " .10	Carbonate (80@85%)..... " 3.50@4.00
Mont. f.o.b. Chicago..... " .07@.07½		Dynamite (20% nitro-glycerine)..... " .13	Caustic, ordinary..... " .04½
Crushed Steel, f.o.b. Pittsburgh..... " .05½		(30% nitro-glycerine)..... " .14	Elect. (90%)..... " .06½
Emery, in kegs: Turkish flour..... " .03½		(40% nitro-glycerine)..... " .15	Chlorate, powdered..... " .08½
Grains..... " .05@.05½		(50% nitro-glycerine)..... " .16½	Crystals..... " .18@.19
Naxos flour..... " .03½		(60% nitro-glycerine)..... " .18	Kalnit (bulk)..... lg. ton. 8.50
Grains..... " .05@.05½		(75% nitro-glycerine)..... " .21	Manure salt 20%..... " 14.75@15.50
Chester flour..... " .03½		Glycerine for nitro..... " .11@.11½	Double Manure Salt, 48@53%..... 100 lb. 1.16½@1.19½
Grains..... " .05@.05½		FELDSPAR— Ground..... sh. ton. 9.75@10.00	Muriate..... " " 1.95
Peekskill, f.o.b. Easton, Pa., flour..... " .01½		FIRE BRICK.	Permanganate..... lb. .09½@.10
Grains, in kegs..... " .02½		American..... per M. 20.00@30.00	Prussiate, yellow..... " .13½@.13
Garnet, per quality..... sh. ton. 25.00@35.00		Imported..... " 30.00@45.00	Red..... " .35
Pumice Stone, Am. Powd. lb. .01 3-5@.02		St. Louis No. 1..... " 16.00	Sulphate..... 100 lb. 2.18½@2.21½
Italian, powdered..... " .01½@.01		" No. 2..... " 14.00	SALT— N. Y. com. fine 280 lb. bbl. .72@1.18
Lump, per quality..... " .04		Extra..... " 20.00@23.00	N. Y. agricultural..... sh. ton. 4.40
Rotenstone, ground..... " .02½@.04½		FIRE CLAY.	SALTPETER— Crude..... 100 lb. 4.00@4.25
Lump, per quality..... " .06@.20		St. Louis mill,..... per ton. 2.50	Refined..... " 4.50@5.50
Rouge, per quality..... " .10@.30		FLUORSPAR—	SILICA—
Steel Emery, f.o.b. Pittsburgh..... " .07		Domestic f.o.b. shipping port:	Ground quartz, ord'ry..... sh. ton. 9.00@10.00
ALCOHOL— Grain..... gal. 2.38		Lump..... sh. ton. 8.00@10.00	Best..... " 12.00@13.00
Refined wood, 95@97%..... " .70@.75		Ground..... " 11.50@13.50	Lump Quartz..... " 2.50@4.00
Purified..... " 1.25@1.30		Gravel..... " 4.25@4.50	Glass sand..... " 2.75
ALUM— Lump..... 100 lb. 1.75		FULLER'S EARTH— Lump.. 100 lb. .80	Infusorial earth, crude..... 25.00
Ground..... " 1.85		Powdered..... " .85	Calcined and floated..... 32.00
Chrome Alum..... lb. 0.05		GRAPHITE—	SILVER— Nitrate, crystals..... oz. .36½
ALUMINUM— Sulphate, com'l. 75@1.25		American ore, common..... lb. .01@.10	SODIUM—
AMMONIUM—		Artificial..... " .06	Acetate..... lb. 0.04½
Bromide..... lb. .22		Ceylon, common pulv..... " .02½@.03½	Bicarb. ord., bulk, f.o.b. works..... 100 lb. 3.50
Carbonate..... " .08		Best, pulverized..... " .04@.08	Extra domes, f.o.b. works " .06½
Muriate grain..... " .06@.06½		German, com. pulv..... " .01½@.01½	Bichromate..... lb. .07
Lump..... " .09½		Best, pulverized..... " .01½@.02	Bromide..... " .42
Sulphocyanide com..... " .25		Italian, pulverized..... " .01@.02	Carbonated ash, high test, in bags, f.o.b. works..... 100 lb. .75@.77½
chem. pure..... " .35		GYPSSUM— Ground..... sh. ton. 8.00@8.50	Foreign, f.o.b. N. Y..... " .85@.87½
ARSENIC— White..... " .06@.06½		Fertilizer..... " 7.00	Caustic, 60@78%, f.o.b., works..... " 1.75@1.85
Red..... " .06½@.07		Rock..... lg. ton. 4.00	Foreign, f.o.b. N. Y..... " 1.90@1.95
ASPHALTUM—		English and French..... " 14.00@16.00	Chlorate, com'l..... " .08½
Barbadoes..... " .02½@.03		INFUSORIAL EARTH—	Cyanide, ("100% KCN")..... " 1.8@.19
Cuban..... " .01½@.03½		Ground Am. best..... " 20.00	Hyposulphite, Am..... " 1.60@1.60
Egyptian, crude..... " .06@.07		French..... " 37.50	German..... " 1.75@2.00
Gilsonite, Utah ordinary..... " .03@.03½		German..... " 40.00	Phosphate..... lb. .02½@.02½
Trinidad..... " 35.00		LEAD— Acetate, white (sugar of) lb. .07½	Prussiate..... " .09½@.09½
BARIUM—		Brown..... " .07@.07½	Sal soda, f.o.b. works..... 100 lb. .80
Carb. Lump, 80@90%..... sh. ton. 25.00@27.00		Nitrate, com'l..... " .07½	Foreign, f.o.b. N. Y..... " .85
92@98%..... " 28.00@29.00		" granular..... " .08½	Silicate, concentrated..... lb. .05
Powdered 80@90%..... lb. .01½@.02		MAGNESITE— Greece.	Com'l..... " .01
Chloride com'l..... ton. 32.00@34.00		Crude (95%)..... lg. ton. 6.50@7.00	Sulphate, com'l..... 100 lb. .40
Chem. pure cryst..... lb. .05		Calcined..... sh. ton. 16.50@17.00	STRONTIUM— Nitrate..... lb. .09
Nitrate, powdered, in casks..... " .06		Bricks, domes, per qual. f.o.b. Pittsburgh..... M. 160@200	SULPHUR— Best seconds, per ton. 21.00
Sulphate (Blanc Fixe)..... " .02		MAGNESIUM—	Roll..... 100 lb. 1.85
BARYTES—		Chloride, com'l..... lb. .01½	Flour..... " 1.90
Am. Crude No. 1..... sh. ton. 9.75		Sulphate (Glaubers salt) 100 lb. .40@.50	Flowers, sublimed..... " 2.20
Crude No. 2..... " 8.00		MANGANESE—	TERRA ALBA— 100 lb. .70@.80
Crude No. 3..... " 7.00		Crude powdered:	TALC— North Carolina..... sh. ton. 15.50@23.50
Floated..... " 18.00@19.00		70@75% binoxide..... lb. .01½@.01½	N. Y. Fibrous best..... " 10.25
Foreign floated..... " 20.00		75@85% binoxide..... " .01½@.02½	French, best..... " 20.00
Snow-white..... " 17.25@18.75		85@90% binoxide..... " .02½@.03½	Italian, best..... " 30.00
BAUXITE— Ga. or Ala. Mines:		90@95% binoxide..... " .03½@.05½	TAR— Oil bbl. (50 gal.)..... bbl. 5.40
First grade..... lg. ton. 5.25@5.50		Ore..... unit. .18@.20	TIN— Bi-chloride, 45%..... lb. .09½
Second grade..... " 4.50@4.75		MARBLE— Flour..... sh. ton. 6.00@7.00	Crystals..... " .22
Arkansas, first grade..... lg. 5.00@5.50		MINERAL WOOL—	URANIUM— Oxide..... " 2.25@3.00
Second grade..... " 4.50@4.75		Slag, ordinary..... " 19.00	ZINC— Metallic ch. pure..... " .07@.09½
Washed ore..... " 6.00@7.00		Selected..... " 25.00	Chloride solution, com'l..... " .04½@.04½
BISMUTH— Sub-nitrate..... lb. 1.50		Rock, ordinary..... " 32.00	Dust..... " .05½@.05½
BLEACHING POWDER— 35%, 100 lb. \$1.25@1.30		Selected..... " 40.00	Sulphate..... " .02@.02½
BONE ASH. lb. .02½@.02½		MONAZITE SAND—	THE RARE EARTHS.
BORAX " .07½@.07½		Guar. 97%, with 5% Thorium oxide..... lb. .10	BORON— Nitrate..... lb. \$1.50
CALCIUM— Acetate, gray..... " 2.35		NICKEL—	CERIUM— Oxalate..... oz. .85
Acetate, brown..... " 1.60@1.65		Oxide, crude, 100 lb. (at 55 for fine metal contained)..... .35@.40	LITHIUM— Carbonate..... " 1.50
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J..... sh. ton. 65.00		Sulphate, single..... 100 lb. .22@.25	LITHIUM— Nitrate..... oz. .60
Chloride, f.o.b. works..... " 9.00@10.00		" double..... " .13@.15	TANTALUM— Acid..... oz. .40
CEMENT—		OZOKERITE lb. 11½	Ore, 20% acid..... lb. .20
Portland, Am. 500 lb..... bbl. 1.55@1.60		PAINTS AND COLORS—	" 70% "..... " 3.50
Foreign..... " 1.25@1.75		Litharge, Am. powdered..... " .05½@.06½	THORIUM— Nit. 49@50%..... " 8.00@10.00
" Rosendal' 300 lb..... " .85		English glassmakers..... " .08½@.08½	URANIUM— Nitrate..... lb. .25
(in sacks)..... " .65		Lithophone..... " .03½@.06½	ZIRCONIUM— Nitrate..... oz. 10.00
Slag cement..... " .75@1.25		Metallic, brown..... sh. ton. 19.00	
CHLORINE— Liquid..... .30		Red..... lb. 16.00	
Water..... .10		Ocher, Am. common..... " 8.50@9.00	
CHROME ORE—		Best..... " 16.00	
(50% ex-ship N. Y.)..... lg. ton. 18.50@19.00		Dutch, washed..... lb. .01½@.01½	
Bricks, f.o.b. Pittsburgh, M..... 175.00		French, washed..... " .02	
CLAY, CHINA— Am. common ex-dock, N. Y..... " 7.75@8.00		Paris green, pure, bulk..... " (12) nominal	
Am. best ex-dock, N. Y..... " 8.00		Red lead, American..... " .06½@.06½	
English, common..... " 12.00		Foreign..... " .07@.08½	
COBALT— Oxide..... lb. 2.60		Turpentine, spirits..... gal. .64	
COPPERAS— Bulk..... 100 lb. \$0.47½		White lead, Am., dry..... lb. .05½@.05½	
In bbls..... .57½		American, in oil..... " .06@.06½	
In bags..... .67½		Foreign, in oil..... " .09@.09	
		Zinc white, Am. extra dry..... " .04½@.04½	
		Foreign, red seal, dry..... " .06@.08	
		Green seal, dry..... " .06½@.09	

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.