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Exports of coal from the United States in May were 640,343 tons, whereof 158,350 tons were anthracite and 481,993 tons bituminous. The total shows an increase of 185,573 tons, or 40.8 per cent. over last year. Of this gain 120,292 was in exports to Canada, and 29,225 tons in those to Mexico. The shipments to European ports, though still small, showed a large relative gain; they were 25,882 tons this year, against 3,638 tons in 1899. It is evident that we have, as yet, made only a small beginning at coal trade with Europe.

For the eleven months of the current fiscal year, ending May 31st, the value of the exports of the United States was the greatest on record—\$1,264,269,007. The value of the exports of manufactures was also the greatest on record, reaching a total of \$393,089,579, or 31.1 per cent. of the total. Last year the exports of manufactures were valued at \$306,854,428, or 27.7 per cent. of the total. The present fiscal year shows, therefore, a gain of \$86,235,151 in value, and of 3.4 per cent. in proportion. Of the exports of manufactures iron and steel furnished a value of \$110,066,849, or 28 per cent. of the whole.

With the recurrence of a falling market in almost all the metals, and especially in the iron trade, we seem to be entering on the period of labor troubles which usually accompanies such conditions. Already we begin to hear of reductions in wages, which will be generally resisted, while on the other hand there are demands for higher scales, which employers are not willing to grant under present circumstances. One trouble is that most of these demands for increases come too late; but it is also a fact that manufacturers are sometimes too ready to reduce wages, and thus create a suspicion as to the justice of their action, which is apt to have bad results.

The present condition of affairs in China shows how little value is to be attached to mining concessions in that country which are not backed up by actual force exerted by a foreign nation. If the trouble there is as widespread as the current news indicates, there will be very little left of the property in mines and railroads which has been created by foreign capital. It should be noted also that the Government officials are generally acting with the so-called rebels, whose destruction of foreign property meets their approval.

We may add also that there is unfortunately much uncertainty as to the present position and possible fate of several American engineers who have been engaged in mining work in the interior. Among them are two—Mr. H. C. Hoover and Mr. C. D. Jameson—who are known to readers of the "Engineering and Mining Journal" through their contributions to its columns.

The opening sessions of the International Congress of Mining and Metallurgy, held in connection with the Exposition at Paris, seem from our reports to have been successful, both in regard to attendance and to the character and importance of the papers presented. Such abstracts of a number of these papers will be presented in our columns, as their importance and interest may require. It is evident that a great deal will be said at the Congress about American practice in both mining and metallurgy; and it will be of interest to see the views taken of our methods by foreign experts. At present the tendency abroad is to regard these methods with much favor, in view of the results which have been secured through them in this country and elsewhere.

It is to be noted that British mining engineers and metallurgists are not taking an active part in the proceedings of the Congress, though the reports mention a number as present. This is in keeping with the general lack of interest in the Exposition which has been shown in England almost from the time when the first preparations for its work were begun.

The labor troubles in Alabama, which have temporarily stopped coal production and will, unless soon settled, seriously interfere with the iron production in the State, appear to be based on somewhat unreasonable demands. The Alabama coal mines are largely owned by the iron-making companies, and a very large proportion of the coal produced is used in the iron manufacture. It is, therefore, quite natural that the wage scale should be based on the selling price of pig iron, and this has been the arrangement in force for several years. It has worked, on the whole, very satisfactorily, and there have been few complaints. For the past six months the miners have been earning the highest wages they have ever received, which have been paid by the operators without demur. The yearly agreement expired July 1st, and the present difficulty has arisen over the new contract, the men asking for an increase of pay at the time iron prices are falling everywhere. The operators are willing to renew the old scale, but claim that they cannot grant any increase under present conditions; and their argument seems a just one.

The Alabama miners—who are chiefly negroes—have been organized by delegates from the North and West during the past year, and the present difficulty seems to be chiefly due to these delegates, who control the organizations.

Just at present the German iron trade is suffering from an active attack of apprehension lest the markets should be flooded with "cheap American iron." The German ironmakers reason that demand in the United States is lessening and prices falling, while production continues very large; consequently this fall there will be a great surplus of iron and steel to be disposed of, and this is likely to be offered in European markets at lower prices than German makers can afford to meet. In Germany, as in this country, there has been a great expansion during the past two years of prosperous trade. Many new companies have been formed, old companies have increased their capital, and the speculation in industrial stocks has been very active. During the last two months the boom has been subsiding and the fall in prices of industrials—especially iron and steel stocks—has been very heavy, almost reaching the proportions of a crisis. This has been helped by the cry of "American competition," which has been raised in certain quarters. These apprehensions have been carefully promoted by the advocates of high protection and by a powerful group of operators in Berlin who have speculated heavily for the fall. While there is no doubt that the German ironmakers, especially those who export largely, will have to meet American competition in the future, the present forecast seems unreasonable, and it is not at all likely that the markets will be flooded as some Germans seem to anticipate. While our export trade is expanding the surplus for sale abroad is not going to be excessive, nor will our makers be satisfied to sell at a loss, even for the purpose of clearing off their stocks and establishing trade. The British iron trade papers take a much more reasonable view of the situation, and while they anticipate some American competition they are not inclined to be alarmists as to the extent or possible effect on prices.

THE TASMANIAN COPPER COMPANY AND THE PHOENIX SYNDICATE.

A noteworthy example of ignorance of mining as a commercial undertaking (we have no ground for saying duplicity) is afforded by the history of the Tasmanian Copper Company, which was organized in London, in March, 1897, with a capital of £325,000 to acquire the Rosebery Mine, on Mount Black, in the North Dundas Mining District of Tasmania. The vendor was the Gold Estates of Australia, Limited. According to the prospectus it was to receive 225,000 shares in part payment of the purchase price; of the remainder of the capital stock the vendor was to receive the proceeds of 25,000 shares and 75,000 shares were to provide working capital. The property was offered as a copper mine and capital was invited to it on the strength of the success of the Mount Lyell Mine, from which the Rosebery is distant 18 miles.

The Rosebery Mine was reported on by Mr. B. Pherson Ekberg, mining engineer to the Gold Estates of Australia, Limited, who estimated the quantity of ore in sight to be over 1,700,000 tons, and represented its character by the following analysis: Copper, 3.5 per cent.; iron, 33; lead, 0.3; zinc, 2.7; arsenic, 0.9; antimony, 0.3; sulphur, 40.5; silica, 14; lime, 3.1; alumina, 1.5; gold, 3 pennyweights 12 grains per ton; silver, 9 ounces per ton. If the ore had been of that character and the Tasmanian Copper Company had employed competent engineers to mine and smelt it, there would probably have been little trouble. Unfortunately, after it had taken over the mine and opened it to some extent, it turned out to be not a copper mine but a deposit of mixed sulphide ore of low grade and great complexity. According to the report of Mr. Harold Wilson, general manager of the company, for the year ended December 31st, 1897, the quantity of ore actually blocked out at that time was 400,000 tons, the average grade of which he determined by 25 samples of 25 to 50 pounds each (except a few that were 200 pounds) to be 0.77 per cent. copper, 21.07 zinc, 4.73 lead, 8.625 ounces silver per ton and 0.155 ounce gold per ton. This result was obtained as the arithmetical average of the 25 assays, without taking into account the quantity of ore represented by each, or apparently without taking the samples in a systematic manner. We refer particularly to this point because, according to Mr. E. A. Ashcroft, one of the reasons for the failure of his process at Cockle Creek was that the ore turned out to be of lower grade than had been represented. In view of the relations that have lately been formed between that gentleman and the Tasmanian Copper Company it may be remarked that the data presented in the official publications of the company do not afford any reliable guide as to what the Rosebery ore, as it will be mined, actually contains. However, the data before us is amply sufficient to discredit Mr. Ekberg and show that the ore will be found low in gold, silver, lead and copper and high in zinc. For upward of two years the Tasmanian Copper Company has

been trying to find a way of working it, to which end Mr. Harold Wilson has been in England investigating various processes that have been proposed for the treatment of such ores. As a result of his study the Tasmanian Copper Company has lately become interested in the Phoenix Syndicate, which has been organized by Messrs. James Swinburne and E. A. Ashcroft to exploit a process invented by the former.

According to the report of the directors of the Tasmanian Copper Company for the two years ended December 31st, 1899, presented at the stockholders' meeting April 5th, 1900, the Phoenix Syndicate is raising £10,000 for experimental purposes, of which the Tasmanian Copper Company has subscribed £1,000, obtaining in consideration therefor the "right to use this process on a moderate royalty." So far the Phoenix process "has been tested in the laboratory stage, and also in the stage beyond, in 20 to 30 pound charges, and in both has proved successful. . . . It is claimed that by this process a profit of from £3 to £4 per ton can be made on average Rosebery ore." It should be noted that it is now considered that the ore will average 25 per cent. zinc, the tenor in gold, silver, copper, and lead remaining as previously recorded.

The Swinburne process is covered by British patent No. 10,829A, of 1897. The essential feature of the process is the direct decomposition of zinc sulphide in an electrolyte of fused zinc chloride, sulphur vapor coming off at the anode and metallic zinc at the cathode, lead sulphide being capable of decomposition in similar manner. In the treatment of lead-zinc sulphide ores as described in the patent specification it is proposed to mix the pulverized ore with molten zinc chloride in a pot and electrolyze first for the deposition of lead and then in a separate pot for the deposition of zinc. Theoretically the process is feasible, but practically there must be many difficulties, partly in effecting a separation of the impurities which are generally present in a mixed sulphide ore and partly in handling an electrolyte of the peculiar properties of molten zinc chloride. Not having any details as to the manner in which it is proposed to overcome those difficulties, we shall defer to a subsequent issue a discussion of the Swinburne process from a metallurgical and economical point of view.

In the meanwhile we advise the Tasmanian Copper Company to be circumspect in its dealings with the Phoenix Syndicate, Limited. We appreciate that it is a wonderfully seductive promise to make to the stockholders that a process has been discovered whereby all the metals, except iron, contained in their highly complex ore can be recovered, together with the sulphur, by one chain of apparently simple operations; but we fear that those operations may not be so simple as they look, or so profitable as is claimed. Assuming that the Rosebery ore will assay 0.155 ounce gold per ton, 8.625 ounces silver, 0.77 per cent. copper, 4.73 per cent. lead, and 25 per cent. zinc, as supposed by the Tasmanian Copper Company, and 35.60 per cent. sulphur (as we have reckoned from the corresponding assays in the first annual report) the total value of the metals contained in one ton (2,240 pounds) of ore in their refined condition, at the present high level of the market, in London would be as follows, the figures being given in decimals of a pound sterling:

0.0077 ton of copper @ £74.25	£0.57
0.0473 ton of lead @ £16.75	0.79
0.2500 ton of zinc @ £21	5.25
0.155 oz. gold @ 84s.	0.64
8.625 oz. silver @ 2s. 6d.	1.08
0.3560 ton of brimstone @ £4	1.42
0.6610 ton of marketable products	£9.75

If 90 per cent. of the above products were recovered, which so far as copper, lead, zinc and silver are concerned would be very good practice by existing metallurgical methods (unusually good in the case of zinc), the value of the refined products in the ore would be $0.90 \times £9.75 = £8.775$. The cost of mining a ton of ore is estimated by Mr. Wilson at 12s. = £0.6. It would hardly be contemplated to smelt the ore at the mine, because coal (Australian) would cost there about £1 per ton, and wood 6s. per cord; and since it would undoubtedly require considerably upward of one ton of coal to smelt a ton of ore, it would be cheaper to carry the ore to the coal than the coal to the ore. Furthermore, since $0.9 \times 0.661 \text{ ton} = 0.594 \text{ ton}$ of the ore would be (we assume) converted into products which would find their market chiefly in Great Britain, it would probably be the policy to carry the ore there and smelt it with better and cheaper coal. Even if the water power near the mines were utilized it would be doubtful whether it would not be cheaper to carry the ore to Swansea and smelt it with coal at 7s. 6d. per ton, since water power costs usually a large percentage of the cost of steam power with coal so cheap as 7s. 6d., and the freight on 0.594 ton of finished products would probably be more than that on 1 ton of crude ore.

If, then, the crude ore were carried to Great Britain we may fairly estimate (1) carting and loading on board cars, 2s. per ton; (2) freight to Burnie, 72 miles, not less than 4s.; (3) port charges, at least 2s.; (4) freight to Great Britain, about 20s., making a total of 28s. to be added to the 12s. cost of mining, or 40s. = £2 in all, besides which there would be the cost of unloading the ore in England, carriage to smelter's works, commissions, insurance, etc. Assuming, however, that the gross value of

the ore be £8.775 and the cost at the smelter's works be £2 (of which the former figure is doubtless too high and the latter too low) the difference is £6.775, out of which the Tasmanian Copper Company tells its stockholders it may get a profit of £4 per ton. In order to do this the Swinburne process must be performed at a cost of £2.775 = \$13.50 per ton, including taxes, insurance and general expense, sale of products, discount on products corresponding to cost of delivery to the market of which the quotations have been reckoned, repairs and renewals of works, and amortization of cost of works and "moderate royalty." Although we are aware that the decomposition electrolytically of molten zinc chloride does not require so much power as the decomposition of ZnCl₂ in aqueous solution, or of ZnSO₄, and have refrained from thermal calculations, because of the lack of data, we do not believe that Messrs. Swinburne and Ashcroft are going to treat the Rosebery ore at a profit of £4 per ton, and in making such a statement the Tasmanian Copper Company is undoubtedly misleading its stockholders. It is also misleading its stockholders by reckoning a value of £3 5s. 6d. for 21.07 per cent. zinc in the ore, as it did in the first annual report, where the gross value of the ore at prices at that time was set down at £5 14s. 9d. per ton. The Rosebery ore has no value at the present time beyond what can be realized by sorting out the pyrites and smelting it with such zinc as can be worked off economically in the slag; or what the Smelting Corporation, Limited, which has works near Manchester, England, will give for it. It may acquire a larger value by the application of a suitable metallurgical process of treating it, but in the discovery of such a process the Tasmanian Copper Company needs the best kind of disinterested metallurgical advice and runs a great risk in relying on the experiments of Messrs. Swinburne and Ashcroft, of whom the latter already holds the record for one of the most colossal failures in metallurgical history.

NEW PUBLICATIONS.

"Talc and Pyrophyllite Deposits of North Carolina." Being Economic Paper No. 3 of the North Carolina Geological Survey. By Joseph Hyde Pratt. Raleigh, N. C., State Printer. Pages 28; with maps.

This paper is a timely one, as the talc deposits of North Carolina are now attracting much attention, and a great deal of prospecting and development work has been done on them. This is partly due to the greater demand for talc, and partly to the opening up of the country by railroads, which has made great progress during recent years. The paper is a practical one, and after a brief general introduction on talc, goes carefully into all the known resources of the State in this mineral. It also describes what has been done in the way of developing the deposits and the present situation of the industry. It will be of much service to those who are interested in or who are users of talc.

"Transactions of the Association of Engineers of Cornell University," Volume VIII. Ithaca, N. Y.: Published by the Association. Pages 132, illustrated.

As usual, the proceedings of this Association contain some papers of interest and value. The present volume covers the University year 1899-1900, and the articles are both by students and graduates. The list includes papers on the Snoqualmie Falls Power Transmission, by C. H. Baker; Tests of Brick Masonry Piers, by E. J. McCausland; Wind-mill Power, by E. C. Murphy; Distribution of Pressure on the Base of Dams, by F. F. Hall; Intersection of the Cataract Construction Company's Tunnels at Niagara Falls, N. Y., by G. F. Simpson; Pneumatic Transmission in Underground Tubes, by H. Stidham; Street Paving, by S. Whinery; Holding Power of Screws in Wood, by W. J. Graves; Flow of Water over Weirs, by G. S. Williams. The range of subjects is considerable, and the papers show generally careful study.

"Geological Survey of Alabama. Report on the Warrior Coal Basin." By Henry McCalley. University, Ala.: Published for the Survey. Pages 328; with maps and illustrations.

This is the first complete report on this important coal basin, and is the result of years of work spent in its survey. Mr. McCalley was the first to attempt a study of the coal seams and a correlation of the outcrops in various parts of the field, but soon found that these attempts could not be relied on, owing to the great variations and disturbances in the strata. This added very much to the difficulty of the work.

The author has so well explained the nature of his valuable report in his letter of transmission that we cannot do better than to use his words: "The report and map are, strictly speaking, economic reports, as they are filled up with economic descriptions, particular stress being laid upon those things that were considered of most economic value. They treat of a region that is rich in coal, building and paving stones, clays, timber, water-power, etc. Coal, however, is the principal wealth of this region and as the report and map deal with it almost exclusively, they are, strictly speaking, coal reports."

The report consists of first generalized and then detailed descriptions. The general descriptions (Chapter I.) speak of the Warrior Coal Basin as a whole. They have a general section (Plate 1) of the strata of the basin so far as they usually carry workable coals (above the Black Creek Coal Seam), which shows the name, thickness and relations to each other of all the coal seams and how they occur in groups. The detailed descriptions consist of six chapters and an appendix, a chapter to each of the groups of coals. The report contains 7 plates (separate) and 50 figures (printed in the text). It also has detailed sections of nearly all the test pits made in the examination and tracing out of the coal seams, some of the sections of the thinner coals not being given. The map shows the lines of outcrops of all the principal coal seams and

the country underlain by them, and the location of all the test pits with the thickness of their coals. It also shows how the Coal Measures become covered up on the west and southwest by the Cretaceous and Tertiary strata and how they are bounded on the southeast by faults and the older formations. It has three general sections of the strata, one respectively along the southeast edge, central portion and western visible edge of the basin, and some partial vertical sections to show the increased thickness of some of the coal seams between the portions of the field represented by the three general sections."

"Topographic Surveying: Including Geographic, Exploratory and Military Mapping." By Herbert M. Wilson. New York: John Wiley & Sons. Pages 930; illustrated. Price, \$3.50.

This book, the author says, has been prepared with a view of bringing together in one volume the data essential to a comprehensive knowledge of topographic surveying. It has been his aim to cover the varied phases of all classes of surveys which are made with a view to representing on maps information relative to the features of the earth's surface. The methods elaborated are chiefly those which have been developed in recent years; but he has endeavored to go beyond these, and, guided by experience, to adapt them to the most detailed topographic as well as to the crudest exploratory surveys. The hope is entertained, therefore, that the engineer who may be called upon to conduct an exploratory survey in an unknown region, or to make a detailed topographic map as a preliminary to construction, will find herein descriptions and examples of the methods he should employ, the essential tables for the computation of his results, and hints which will guide in the equipment of his party.

The volume is devoted practically to higher surveying, and presupposes a knowledge of all the more elementary branches. At the same time, many of the subjects treated are essentially elementary, and these are briefly described, in order that all the facts which the topographer must know and all the formulas and tables which he must have at hand in the field may be brought together. An effort has been made to present the subject in the most practical form. To give more immediate aid to the working surveyor, examples of the various computations are presented, as are illustrations of the instruments, methods, and resulting maps from surveys actually executed.

Instead of describing the instruments or their uses independently, each is described in that position of the text in which its employment in field surveying is most prominently mentioned. The tables are not brought together at the end of the volume, but each is placed in that portion of the text which relates to its use. The object is to produce a handy reference-book for use in the field, as well as a text-book for guidance in college instruction. It is believed that, by this arrangement, if a topographer in the midst of his field-work desires information on a special point, it can be found, with accompanying examples and tables, gathered together in one chapter or clearly indicated by cross-references. The method of treatment usually followed in works of this class consists in, first, a description of the astronomic methods on which general map surveys must be based, and then a description of primary triangulations as a basis for the detailed topographic surveys which are finally described. This order is here abandoned for the more natural method of commencing with the simplest operations and advancing gradually toward the most complex and refined. Each subject is treated in the same manner. The work has thus been made especially useful to the inexperienced topographer and the student.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review on another page of the Journal.

"Preliminary Report on the Clays of Alabama." Bulletin No. 6, Geological Survey of Alabama. By Heinrich Ries. University, Ala.; published by the Survey. Pages, 220.

"Anuario de la Minería, Metalurgia y Electricidad de España: Año Septimo, 1900." Edited by Don Adriano Contreras. Madrid, Spain; published by the "Revista Minera." Pages 528. Price (in New York), \$3.50.

"The Use of Water in Irrigation in Wyoming, and Its Relation to the Ownership and Distribution of the Natural Supply." Bulletin No. 81, United States Department of Agriculture. Washington: Government Printing Office. Pages, 56; illustrated.

CORRESPONDENCE.

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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 will only be published when so requested.

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

Steam Shovel Work on the Mesabi Range.

Sir: We note an item in your issue of June 23d relative to the amount of iron ore handled by 3 steam shovels at the Mahoning Ore and Steel Company's mine on the Mesabi Range, and would state that while the amount handled is very large, it is not the record for steam shovel work by any means. Your article states that 3 steam shovels handled from the bank, which was blasted, on cars 13,000 gross tons in one day. As a matter of fact in June, 1897, a "Vulcan" 90-ton steam shovel, working in the Oliver Mine, at Mountain Iron, Minn., handled 170,000 gross tons in 26 days. This ore was also taken direct from the bank and was not blasted, but was loaded on cars.

You will readily see that if the 3 steam shovels mentioned handled 13,000 gross tons in one day, they would handle 338,000 gross tons in 26

days, or 112,666 gross tons for each steam shovel or 57,334 gross tons less than a "Vulcan" steam shovel handled in 26 days; in other words, one "Vulcan" steam shovel handled 6,540 gross tons (half the amount mentioned, 13,000 gross tons) in one day. As a matter of fact, we would say that there are now several 90-ton Vulcan steam shovels working in the Mesabi country and handling on an average such amounts as mentioned above every day.

The Vulcan Iron Works Co.,
Per S. S. Patterson.

Toledo, Ohio, June 26, 1900.

The Proposed Lead Combination.

Sir: Your remarks in your issue of June 23d on the proposal of the Utah smelters to form a trust or combine to artificially advance or keep up the price of lead, are timely and to the point. A greater mistake could not be made. The productive capacity of this country in the mining and smelting of lead, together with the improved methods and intelligent manipulation practiced by our skilled operatives, have at last enabled us to compete for the markets of the world, not only in this, but in other metals also. The protective duties originally enacted by our Congress to foster this industry have now ceased to be a necessary factor in assuring a reasonable profit to our producers. Copper once amply "protected" by a heavy duty, is now turned out of our mines and reduction works more cheaply than by any other country in the world; so also are spelter and lead, to say nothing of pig iron. But owing to the tariff on the latter metals, we see them shipped to foreign buyers very often at lower prices than the home consumer can purchase for. This is a manifest injustice to our domestic manufacturers. The time has come for the repeal of the tariff on all of these metals, as is the case with copper. The writer has always been a protectionist, and is one now, but the moment we attain the condition that enables us to produce an article, especially the raw material, as cheaply as the foreign article, that moment the duty upon it should be abolished. The fluctuations in prices independent of the existence of a tariff on an article that can be turned out of our mines, furnaces, or factories at cheaper rates than the foreign product, is a constant menace to the stability of business affairs.

Manufacturers and dealers cannot afford to take undue risks in the purchase of supplies, either under the stress of an unnecessary tariff or a "combine," to artificial'y maintain big profits; hence the hand-to-mouth policy is the inevitable result as soon as business begins to decline, and this policy itself contributes to the curtailment of the volume of trade. In this connection it would be well to bear in mind the disastrous outcome of the French syndicate attempt to corner the world's production of copper ten years ago.

Another important fact to be considered is that we are beginning to produce, in certain lines, more than we can consume. We must, therefore, seek an outlet in the foreign markets of the world, but to do this we must be assured of a reasonable stability in the cost of the raw material, since the foreign buyer of our manufactured products does not take kindly to an unstable price list.

The time was when many of our industries needed a fostering tariff, but the child has learned to walk, the youth to leap, into active business life, and now our country may be likened to a young giant who has reached maturity, and now stands forth ready and eager to do battle with the world's greatest industrial antagonists. "Protection" that does not protect but only serves as a pretext for extortionate profits, must be abolished, and in other case tariffs must be modified to meet the requirements of new conditions. Already, owing to abnormally high prices, we see ominous signs that the boom has passed flood tide. Foreign orders for our manufactures are beginning to drop off, to be cancelled or reduced. Domestic trade is slowly but surely settling down to a lower level of prices. Now a most important factor in the maintenance of a market for our manufactures in the foreign field, is that the raw material shall be supplied to our home trade at the lowest price consistent with a fair profit to the producer; and for the domestic trade the manufacturer must be assured of reasonable stability in the cost of his raw material and freedom from inflation before he is justified in accumulating goods in stock. The dealer in supplies cannot be expected to be a very liberal buyer when prices are abnormally high. Until prices reach a fairly steady and uninflated basis business is sure to drag. P.

Cincinnati, Ohio, June 27, 1900.

Soda Salts in Boiler Compounds.

Sir: There is much to be said relative to the action of soda ash or caustic soda in a steam boiler. Caustic soda, which is commonly known as concentrated lye (sodium hydrate); soda ash, which is carbonate of soda, and, when in crystal form, is known as sal soda or washing soda; bicarbonate of soda; sulphate of soda, commonly known as Glauber's salts; chloride of sodium, which is table salt; nitrate of soda; fluoride of soda; phosphate of soda, and so on, a soda base being combined with these acid radicals, forming the different salts of soda. All salts of soda are soluble in water; more so in hot solutions, and do not precipitate out of solution until the solution becomes saturated, when the salt of soda will then cake at the bottom or hottest parts of the vessel. Sodium salts are not volatile, so that soda found in the condensation, the engine cylinder and through the steam system is carried over mechanically and not chemically.

If steam is perfectly free from moisture when delivered from the boiler, it will not contain nor carry any soda, as it is the moisture which holds or contains the soda salt in solution.

In the soda salts mentioned the affinity between the soda and the acids is so great that it will not break up to go to another acid radical, consequently we cannot saponify the water and cause consequent foaming by the use of these salts nor by use of phosphate or sulphate. But a sulphate will give off to some extent, softening the water by breaking up into a hydrate when in a boiling solution. When you use caustic or soda ash, introducing same into the feed water, you saponify the water in your boilers, causing it to foam. The great velocity with which the steam is leaving the boiler carries this foam and moisture over

mechanically and takes over just so much soda. Any grease or dirt that may be in the boiler or water will form just so much more of this saponifiable condition, causing more violence or perceptible foaming.

Soda ash or caustic soda carried into the cylinder of the engine cuts the cylinder oil, forming soap with the animal or vegetable part of the cylinder oil and mechanically coagulating into a sticky, non-lubricating mass the mineral part of the cylinder oil, consequently your lubrication is destroyed. The same action takes place in a boiler where you have oil coming back in the returns. Soda carbonate and soda hydrate saponify the animal oil, forming soap, which gives you violent foaming. It cuts and coagulates the mineral oil into a mass.

A word on oils. Where you are constantly buckling the tubes in a water tube boiler, or bagging the sheets in a tubular boiler, or the back ends of the tubes of a tubular boiler are constantly leaking, it is due to oil coming into the boilers with the returns. The animal or vegetable oil, combining with the lime and magnesia as oleate of lime and magnesia, most of the lime and magnesia being in the form of a carbonate, the carbonic acid is readily displaced by the oleic acid. These oleates of lime and magnesia are insoluble, because the oleic acid has combined with an insoluble base. This oleate of lime is formed on top of the water in little globular masses. These little particles are very adhesive; they gather together, forming into a mass and then become of a gravity equal to the gravity of the water and are carried buoyantly with the circulation. They always adhere around the ends of the tubes or in the lower water tubes, because this substance adheres on a hot surface more rapidly. Being a non-conductor of heat, it concentrates and checks the heat in these parts, preventing the water from absorbing the heat units, consequently the metal is brought up to such a degree of heat that it melts; the pressure within forcing the metal out, buckling the tube or forming a bag. The mineral oil combines with the lime and magnesia as a mechanical mixture in a coagulated, sticky mass, incorporating with and forming a part of the general mass, all of which is insoluble and very adhesive.

Further, I will say that this mechanical mixture is also formed with common salt or the fluoride or the nitrate of soda. Any one of these three will form a more sticky, tenacious, adhesive, coagulated substance mechanically with the oil, both mineral and animal, and in a hot solution far worse than the combination with lime or magnesia. This is formed because the affinity between the fluorine, nitrogen and chlorine with soda is so great that it does not break up but enters into a mass with the oil; so, wherever you may be getting a little oil back in your returns, a fluoride or chloride of soda will cause your boiler to leak and bag more quickly and the action is more vicious than the action with lime.

Soda is so cheap that makers of boiler compounds can afford to sell any preparation of soda and make heavy profit.

If a boiler owner is going to use soda, he should buy his own. Phosphate of soda, whether it be tri-sodium phosphate or the other soda phosphates, is used with the same purpose in view; that is, of converting the lime carbonate and the lime sulphate into phosphate of lime, known or claimed to be tri-calcium phosphate. But the phosphate going to the lime, the soda must go to the carbonate, sulphate or hydrate and you get the same action; the results are always the same, the soda ash being left in solution.

The compound men will all explain to you the action on the lime, but they do not tell you what becomes of the soda. The man who is selling it does not know; the chemist who got it up does know, but he takes good care that the buyer does not know through any fault of his.

The only salt of soda that can be successfully used is the tannate of soda, and then only when used with four times its weight of tannin. Also with a large excess in weight of sugars, mixing the sugars to handle the sulphates and the tannins to handle the carbonates. These mixtures can be used without any foaming or deleterious action to the iron. It is a subject in organic chemistry by itself. You can buy these substances at the wholesale drug trade. The reason soda salts have been used so extensively throughout the country in the face of the fact that the joints are all leaking and you have the steam connections clamped up with these protectors, is the persuasive power of some salesman and the fact that engineers do not read chemistry or figure out the reactions.

Chicago, June 20, 1900.

William H. Edgar.

IRON ORE IN SOUTH RUSSIA.—At a recent meeting of the Mining Conference for South Russia it was stated that the iron ore deposits of Krivoi-Rog, the Donetz Basin and the Kertch Peninsula would be sufficient to supply the iron works of South Russia for many years, provided the Government would consent to the building of railroads to reach the mines, and would concede low rates for transportation.

GOLD IN THE DUTCH EAST INDIES.—According to a recent British consular report, in 1899 several new companies were started for the exploration of gold concessions in Celebes, Borneo, and Sumatra. Considerable difficulty is experienced in getting the mines already started into proper working order, but in more than one instance the quantity of gold and silver extracted from the quartz has proved highly satisfactory. There seems little doubt, says the report, that, provided sufficient capital is obtained and proper management secured, the future of several of the companies is assured.

MACHINERY AND TOOLS IN THE CAUCASUS.—United States Consul Schumann sends the following from Mainz, May 16th, 1900: "French and Belgian capital is largely interested in industrial undertakings in the Caucasus. In 1898, the export of manganese iron ore from the Caucasus amounted to 20,000,000 pounds (361,120 tons), and recently a number of new mining concessions have been granted. The most important of the new French companies, whose chief industry is the mining of manganese and copper ore, is the Societe Industrielle du Caucase, whose main offices are at Tiflis. The demand for mining machinery, tools, and instruments of all kinds is very great."

GEOLOGY AT THE MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Specially Reported for the Engineering and Mining Journal.

The forty-ninth meeting of the American Association for the Advancement of Science was held at Columbia University during the week beginning June 25th, and was fairly well attended in spite of the early date, which interfered with many college commencements, and the notable absence of excursions and receptions. About 450 persons were in actual attendance on the sessions, and 315 new names were added to the roll of members. Section E, that of Geology and Geography, was attended, however, by a much smaller number of members than usual, and the papers were likewise much fewer, both in the regular Section and at that of the Geological Society of America, to which one of the days of the meeting was given up, as usual. Some of the 29 papers which were presented to the two societies contained features which will be of interest to the readers of the "Engineering and Mining Journal," and only these will be touched upon in this report. The vice-presidential address of Prof. J. F. Kemp was upon the pre-Cambrian sediments of the Adirondack region and a full abstract of it appeared in the "Journal" of June 30th.

The twelfth summer meeting of the Geological Society of America was held on Tuesday, June 26th, and was presided over by the president, Dr. G. M. Dawson, director of the Geological Survey of Canada. The secretary announced the election of three new fellows of the society since its last meeting, L. C. Glenn, of South Carolina; T. L. Watson, of Georgia, and Stuart Weller, of Chicago University. The first paper on the society's programme was by H. W. Turner on "The Geology of the Silver Peak Mining District." The author said in substance: The Silver Peak District lies in Esmeralda County, Nevada, in the western edge of the Great Basin. The region is characterized by isolated ridges and wide valleys, the lowest portions of which are playas, or dry lake beds. These playas are often covered with incrustations of salts; thus, the Clayton Valley playa, just east of Silver Peak village, is coated with a dazzling white sodium chloride of sufficient purity to be used as it is for domestic purposes, while the Columbus playa and one in Fish Lake Valley are rich in borax and related salts. The oldest rocks, except some gneisses of doubtful age, are Lower Cambrian, the Middle Cambrian and Silurian being also represented. Volcanic activity began in Paleozoic times and, after a long interval, was renewed in the Tertiary, when a lake covered a large part of the district and deposited several thousand feet of sediments. The Silver Peak range was elevated after the lake period, as is evidenced by the lake deposits arching up over the range. The chief economic interest of the region lies in the gold and silver veins in Mineral Ridge, one of the eastern spurs of the Silver Peak range. These veins usually occur at the contact between the granites and gneisses and the overlying Cambrian rocks. They are of two kinds, quartz veins containing pyrite and free gold with a little silver, and quartz veins containing lead sulphides and silver with a comparatively small amount of gold. Along the latter veins, so far as observation goes, there are basic dioritic dikes, which do not usually, if at all, occur along the veins containing chiefly gold. When the investigations have been completed it may be possible to show, therefore, that these dikes have exerted a definite influence on the kind of ore deposited. It may be possible that the diorite magma is the source of the lead and silver. The abandoned Vanderbilt mines and the Homestake are examples of the lead-silver veins, and the Silver Peak Mine of the free-milling gold veins.

Native copper from Garfield County, Oklahoma, was the topic discussed by Erasmus Haworth, of the University of Kansas. Native copper has been found in the "Red Beds" of Cretaceous age in the northern part of Oklahoma Territory. It was found all through a 6-in. stratum of red, clayey shale, 32 ft. below the surface. The copper is in circular discs 1 in. or more in diameter and as thin as paper. These leaves lie at all angles with the stratification of the bed, though they approach parallelism with the bedding near the middle. The disks or leaves occur in the cracks which were produced in the beds by drying and are, therefore, later than the deposition of the sediments. The question of their origin is a very puzzling one. The Red Beds are entirely free from organic remains and there seems, therefore, to have been no organic matter decaying here to reduce the copper to a metallic state. The strata are perfectly unaltered by metamorphism and they are at least 100 miles from the nearest igneous rocks, considerations which seem to eliminate the action of heat from the problem. The author suggests that the presence of the metal is due to a complicated reaction between copper sulphate on the one hand and ferric oxide, calcium carbonate and traces of free sulphuric acid on the other.

Charles H. Hitchcock, of Dartmouth College, described the volcanic phenomena on the Island of Hawaii, as seen by him during the eruption of 1899. The lava rose into the summit crater and then, the hydrostatic pressure being too great for the strength of the cone, burst forth at a point about 3,000 ft. down the eastern side of the cone, near where several other eruptions have occurred, thus indicating the existence of a line of weakness along this part of the cone. The fountain of molten lava thus produced was said to be 500 ft. high at first, but the height gradually decreased to the end of the eruption, three weeks later. Later a second vent discharged a similar flood of lava, ½ mile from the first and 1,000 ft. lower down. The vents being above the upper limit of the trade winds, the steam from them ascended in a vertical column and then spread out laterally like the trunk and foliage of a large tree. So much dust was thrown out that the mingled steam and dust cloud obscured the sky for nearly 1,000 miles in every direction to such an extent that it was impossible for mariners to take the usual observations for latitude. At Honolulu, 150 miles distant from the eruption, the dust fell like rain and people could feel the impact of the particles upon their faces. Over a large part of southern Hawaii there are immense tracts covered by ancient discharges of volcanic ashes, easily separable into two beds, each of which is twelve feet or more in thickness. All the good soil of this section consists of this material after it has been decomposed.

The Hawaiian volcanoes have been active from Tertiary time to the present.

One of the most interesting papers, from an economic standpoint, given before Section E was that by F. H. Newell, upon the progress being made in the measurement of streams and determination of the water supply of the country. He showed that the water resources are being studied in a manner comparable with that in which the metals and ores are being examined, and official data collected concerning the occurrence and value of this important natural product. On important streams in various parts of the United States systematic measurements are being made showing the variations in discharge from day to day throughout several seasons and years; in this manner the quantity and time of occurrence of floods is made known and the duration of seasons of drought. By having this information engineers and others concerned in the development of water power can determine the degree of reliability of various streams, and ascertain the available power. Not only are the surface streams being measured, but examinations are being carried on of the occurrence of water underground, especially that reached by deep artesian wells. The importance to the public health of a water supply from these sources is well known. Applications are received from all parts of the United States for definite facts concerning the quantity and quality of water occurring in previous strata far underground. Throughout much of the United States the only mineral of economic value is water. This is particularly the case on the High Plains west of the Missouri River, where settlement is dependent wholly upon the ability to obtain water by the means of wells. The subject of water-storage is also being considered by the United States Geological Survey, and reservoir sites are being selected and surveyed in various parts of the West, particularly in the Rocky Mountain region, and in the High Sierras of California. Detailed surveys are made and estimates prepared of the cost of construction. In the State of New York about 20 rivers are being measured—these being mainly tributaries to the upper Hudson, Mohawk and Black rivers. Characteristic fluctuations of these streams were exhibited by means of diagrams. The catchment area tributary to various reservoir sites is being surveyed and shown upon the contoured maps prepared in cooperation with the State engineer and surveyor. The formation obtained concerning the flow of streams and the possibility of regulating the floods by means of storage reservoirs has peculiar importance in New York State, through the rapid development of electrical plants and the probable need of increased supply for the Erie Canal. The subject of the influence of forests upon the water supply can only be thoroughly understood when definite knowledge is had of the behavior of the streams. For this reason rivers issuing from the Adirondacks are being carefully studied, while the character of the timber on the watershed is being examined by foresters.

"The Genesis of the Pegmatite in North Carolina" was the subject of a paper by A. A. Julien of Columbia University. This is the rock which carries so many minerals of scientific interest as well as the ores of the rare earths which are now in so much demand for the manufacture of mantles for incandescent gas lamps. In the paper it was held that the origin of this rock yet calls for satisfactory explanation and that the difficulty may be in part due to variation of conditions in the genesis of the igneo-aqueous magma. Three hypotheses are current: Intrusion as dikes, infiltration as veins and segregation. When examined in view of the known characteristics of rock-masses produced in each of these ways, most of the pegmatites of North Carolina do not appear to conform to any one. In the author's opinion they should be considered as aggregates of the very schist material which incloses them, softened to a plastic condition by thermal or superheated waters and afterward consolidated with the concretionary structures which they now present. The author then discussed the phases of concentration of the more basic minerals, which are mica and feldspar, containing the rarer elements and the significance of their close association with smoky quartz. The pegmatites of this region seem to mark the initial metastatic changes which accompany the birth of granite, rather than, as in other regions, the phenomena which marked the exhaustion of the process.

THE SUMMER MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

The following notice has been issued from the Secretary's office in New York:

I. As already announced in Circular No. 2, the Council has accepted an invitation to hold the seventy-ninth meeting of the Institute in Canada, beginning in the latter part of August next, under the auspices of the Canadian Mining Institute. The sessions will be held at Sydney, Cape Breton, and Halifax, Nova Scotia; but for the convenience of members and guests from other quarters, the city of Quebec has been selected as a gathering point. Parties arriving and reporting themselves at the Hotel Frontenac, in Quebec, a day or two before the departure of the special train for Sydney, as stated below, will enjoy, through the courtesy of the Canadian Mining Institute, special facilities for inspecting the characteristic features of that quaint and fascinating town. Mr. James F. Lewis, an old and well-known member of the Institute and President of the Canadian Rand Drill Company, at Sherbrooke, about 150 miles from Quebec, on the road to New York and Boston, will cordially welcome any members who may stop at that point on Saturday, August 18th, on their way to Quebec. He promises them "the freedom of the city," and a pleasant experience. If the majority of those wishing to make this stop en route should prefer Friday, August 17th, so that they may spend Saturday in Quebec, this change of date could doubtless be made. Those who desire to visit Sherbrooke should give notice at once to Mr. Dwight, as stated below, indicating at the same time their preference for Friday or Saturday; and the final arrangements on this point will be specially communicated to them hereafter.

II. A special train, composed of Pullman sleepers, dining car, baggage car, etc., will leave Quebec on the evening of August 19th and proceed direct to Sydney, Cape Breton, Nova Scotia, arriving there Monday evening. The provisional programme, subject to minor changes, is as follows:

Tuesday, August 21st.—Visit to steel works, now under construction, of the Dominion Iron and Steel Company at Sydney, and the coal-handling plant at the International and other piers of the Dominion Coal Company.

Wednesday, August 22d.—Excursion over the Sydney & Louisburg Railway, visiting the Caledonia, Dominion No. 1, Hub, Reserve, International and other collieries of the Dominion Coal Company, and, time permitting, visiting the historic port of Louisburg. An alternate trip will be made to the old Sydney mines of the General Mining Association, worked as far back as 1785.

Thursday, August 23d.—Sail through the beautiful Bras d'Or Lakes to Port Mulgrave, where the special train will be rejoined.

Friday, August 24th.—Excursion to steel works and collieries at New Glasgow, Stellarton, Westville and other important districts.

Saturday, August 25th, to Tuesday, August 28th, will be spent at Halifax, where the members will be entertained officially and many side trips of a pleasant and interesting character will be provided by the Mining Society of Nova Scotia to the gold mines, the citadel, forts, etc., etc.

Wednesday, August 29th.—Arrival at Quebec of special train, returning from Halifax.

III. Arrangements can be made for a limited party to visit Newfoundland. They will take the steamer "Bruce" Thursday evening, August 23d, to Port-Aux-Basques, connecting there on the following morning with the Newfoundland Railway, the transportation being furnished by Mr. R. B. Reid, proprietor of the railway, and proceeding to the Wabana iron mines of the Dominion Iron Company; thence to St. Johns, Newfoundland, where several days will be spent, and the return trip will be made by steamer "Buena Vista" (kindly placed at our disposal by the Dominion Coal Company) direct to North Sydney.

The Wabana property is one of the most interesting iron deposits on this continent. The additional expense of this trip cannot be stated at this time, but as the Canadian Mining Institute will provide transportation back to Quebec, the expense will be largely for berths and meals.

IV. The special train will be sidetracked at Sydney and other points and members will live on the cars. Commodious cars will be selected, and a special baggage car provided, to which members of the party will have access at all hours of the day and evening. Mr. Theodore Dwight, Assistant Treasurer of the Institute, who conducted the recent enjoyable trip to California, will again have charge of the arrangements, and the members will have every possible comfort. During the stay at Sydney and Halifax, Nova Scotia, and St. Johns, Newfoundland, members who so desire will be able to secure accommodations at the hotels, but at their own expense.

The total cost for the round trip, from Quebec, comprising about 2,500 miles of travel, including all expenses for sleeping-car accommodations and meals, will amount to \$110. No rebate can be promised to those who do not make the whole trip or continuously occupy the train. Berths in this special train can be secured up to July 15th by members and associates and their families. A deposit of \$50 for each person will be required before July 15th, the balance to be paid previous to starting. Applications may also be made at the same time for other persons, and after July 15th such applications will be considered in order of priority, and places will be assigned to the extent of the available accommodation. It is possible, however, that room will be found for all, even to the extent of additional guests. The purpose of the above statement is to secure the accommodations of all members and associates who apply before July 15th. Although the time for such application is extended to July 15th, it should be borne in mind that within that period priority of application will govern in general the distribution of berths in accordance with individual preferences.

These applications and all correspondence on the subject of the special excursion train should be addressed to Mr. Theodore Dwight, Assistant Treasurer of the Institute, 99 John Street, New York, N. Y.

THE INTERNATIONAL CONGRESS OF MINING AND METALLURGY AT PARIS.

The International Congress of Mining and Metallurgy began its sessions in Paris, June 18th. The programme for the Congress and a list of the papers to be read was given in the "Engineering and Mining Journal," May 12th, 1900, page 555. The general opening meeting of the Congress was held in the Grand Hall of the Palais des Congrès at the Exposition. After the opening addresses the Congress divided into two sections, that on Mining, whose meetings were held in the rooms of the Societe d'Encouragement pour l'Industrie Nationale; and that on Metallurgy, which met in the hall of the Societe Geographique.

The proceedings also included collective group visits to the Exhibition, under suitable guides; and festivities and functions of a social character, including a banquet at the Hotel Continental, on Wednesday, to which all foreign members of the congress had complimentary invitations.

A number of American and English engineers and metallurgists attended the Congress. Some of the papers read were of much value and interest, and we hope to give full abstracts of a number of them at an early date.

On Tuesday, June 19th, the Metallurgical section was occupied by an elaborate report on the "Utilization of Blast Furnace Gases," by Mr. Hubert, of Liege, Belgium. His paper described very carefully the tests made of the engines at the John Cockerill Works at Seraing, Belgium, to which we have heretofore referred.

In the Mining Section the subject was "Ventilation and the Use of Explosives in Coal Mines." Among the papers read were those named below, of which brief summaries are given:

Safety Explosives in France.

By M. Delafond.

As far back as the year 1888 this subject occupied the attention of the French Government, and a commission, which included the savants MM. Mallard and Le Chatelier, exhaustively studied the question, and

reported in favor of the use of explosives other than gunpowder, recommending as preferable to ordinary dynamite a mixture of ammonium nitrate with nitro-naphthalene, nitro-benzene, nitro-cotton, etc. Accordingly, on August 1st, 1890, Government regulations were issued rendering the use of the explosives recommended in the report obligatory in mines in which firedamp or inflammable dust was prevalent. The chief safety explosives in use in France are "grisoutine" and "grisounite," both names being derived from "grisou," which signifies firedamp. There are two varieties of grisoutine, the composition of which is as follows: In one case: Ammonium nitrate, 88.00; nitro-glycerine, 11.76; nitro-cotton, 0.24. And in the other case: Ammonium nitrate, 87.00; nitro-glycerine, 12.00; nitro-cellulose, 1.00. The detonating temperatures are respectively 1,440° and 1,450°. Of grisounite that are also two kinds, one of which contains ammonium nitrate, 95.5; binitro-naphthalene, 4.5, and has a detonating temperature of 1,486°. The other kind contains ammonium nitrate 91.5; binitro-naphthalene, 8.5, and possesses a detonating temperature of 1,890°; the latter is used for blasting rocks. In the year 1897 (there are no later statistics) the consumption in France was: Grisoutine, 378 metric tons; grisounite, 108 metric tons.

It is calculated that down to the end of last year 16 million shots have been fired with the new explosives. The results have been eminently satisfactory, for only one single case of explosion of firedamp has been shown to be due to the new blasting agents.

Explosives Used in the Coal Mines of Belgium.

By Victor Watteyne and Lucien Densel.

In 1884 this subject attracted the attention of the Government, and regulations were published, specifying the conditions under which explosives might be employed in coal mines. These rules were supplemented by a fresh edict in 1895, in which the restrictions as to the use of low explosives are increased. The result of this control has been very satisfactory. The principal safety explosives employed in Belgium are the following, of which we subjoin the composition: Antigrisou Favier No. 2, ammonium nitrate 80.90, ammonium chloride 7.40, binitro-naphthalene, 11.70; grisoutite and forcite de Baelen No. 1, nitro-glycerine 44, sulphate of magnesia 44, cellulose 12; antigrisou of Arendinck nitro-glycerine 27, gun-cotton 1, ammonium-nitrate 12; forcite de Baelen No. 1, nitro-glycerine 29.40, gun-cotton 0.60, ammonium-nitrate 70. And a number of others all containing ammonium nitrate in greater or less quantities. Considerable attention has been directed to mechanical means of breaking down rock and coal, and thus obviating the use of explosives in coal mines. The only apparatus of which the use has become general are mining wedges acting on the plug and feathers principle, actuated by hydraulic pressure or mechanical percussion. The introduction of the portable hand drills has extended their employment to cuttings not large enough to accommodate a rock drill. The result is that explosives have been dispensed with in many cases where they were formerly deemed necessary. The drawback is that the cost of working is greater with the wedge than it is with explosives.

Report on Dynamite Magazines.

By H. Le Chatelier.

A number of experiments have been undertaken in France in recent years, with regard to the construction of dynamite magazines above and below ground. These trials were undertaken partly at the powder mills at Sevran, and partly at the collieries of Blanzay. If possible, it is desirable to be able to store a certain amount of dynamite in the pit. The question to be decided was, can this be effected with safety? As regards underground magazines—at the Blanzay mines—one was constructed by way of experiment, containing 500 kgs. of dynamite. The gallery of communication 1.70 m. in height and in width was twice bent like a hand-brace, and at the outlet ended in the safety automatic plugging device. This consists of a prolongation of the gallery through a mass of cement poured into an excavation made around it. In front of this channel, the plug, which is of cylindrical shape, 1.50 m. in height and width, is placed. Two-thirds of its length is made of cardboard, known as leather board, and the remainder of wood. The contents were fired by electricity; a dull, subdued report was heard, accompanied by a slight trembling of the earth. After a few seconds yellowish smoke was observed to be issuing from the orifice. The experiment was a success. The commission accordingly recommend the use of such a plug, closing instantaneously after an explosion. Other experiments were made and described, and a code of regulations for underground magazines was prepared.

Papers were also presented by MM. Petit and Kotzowski.

AMERICAN IRON FOR AUSTRIA.—The Danick Machine Construction Works of Prague, Bohemia, one of the largest concerns in Austria, has lately contracted for 4,000 tons of foundry iron from the United States. This iron is to be delivered in August and September.

PETROLEUM PRODUCTION IN RUSSIA.—The "Petroleum Review" reports the total production of the Apsheron Peninsula in May at 43,976,145 poods of crude petroleum, equivalent to 720,329 metric tons. Of this 5,214,303 poods, or 11.8 per cent. of the total, were used for fuel at the wells and pipe line stations.

IMPORTS OF PRECIOUS STONES.—The value of precious stones examined and passed at the Appraiser's Stores, New York, during the fiscal year ending June 30th, 1900, is as follows: Cut, \$10,927,073; uncut, \$4,057,037; total, \$14,984,110. During the fiscal year 1899 the amounts were as follows: Cut, \$11,996,310; uncut, \$6,039,491; total, \$18,035,801. This shows a falling off for the year just completed of about \$3,000,000, which may properly be attributed to the disturbance in the diamond industry as a result of the siege of Kimberley, no diamonds having been mined during a period of nearly four months. There is a scarcity of rough diamonds in the market at present, and such cut diamonds as are offered for sale are at prices above figures which our importers are willing to pay.

THE AMERICAN PHOSPHATE COMPANY'S PLANT, NEAR MOUNT PLEASANT, TENN.*

By George F. Blackie.

The American Phosphate Company, organized in July, 1899, has just finished a complete washing, drying, crushing and screening plant of 450 tons capacity on the line of the Mount Pleasant Southern Railway, 2 miles from its junction with the Nashville, Florence & Sheffield Railway. This company owns about 3,200 acres of land in the Mount Pleasant field and something like 600 acres near Godwin, on the main line of the Louisville & Nashville Railroad.

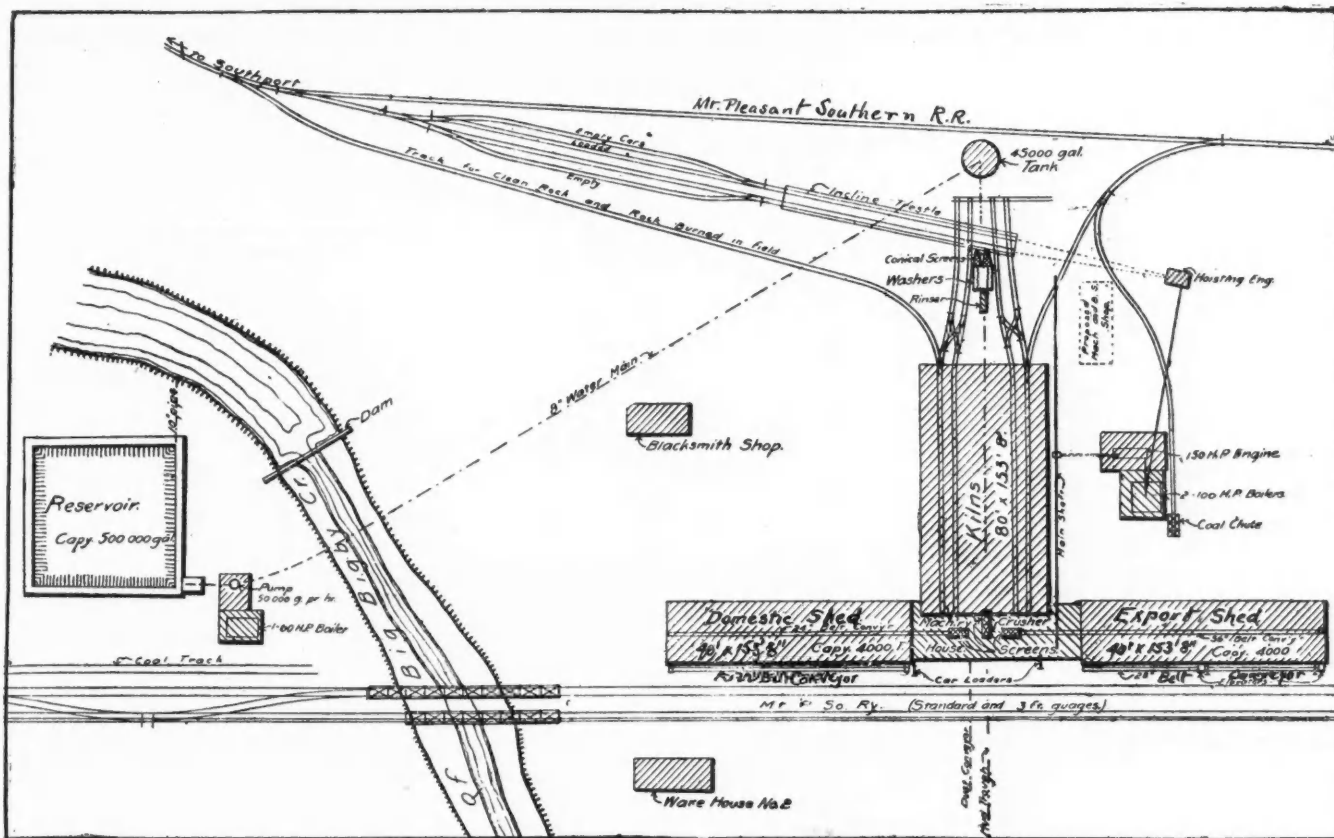
The general outline of the plant of this company is shown on the accompanying plat. The main buildings form a T, with the machinery building at the end of the kilns and between the export and domestic storage sheds. The main power plant is just back of the export shed and alongside of the kilns. It consists of a Hardie-Tynes Corliss engine 16 by 36 in., with 26 in. by 14 ft. wheel making 85 revolutions per minute, developing 150 H. P. This works on a 26 by 96 in. main driven pulley, and drives the entire plant, except the hoist. The boilers are two—100 H. P. each. They furnish steam for the Corliss and hoist. The boiler feed water is heated by exhaust steam through a Webster heater, and forced into the boilers by a No. 4 Garden duplex pump. An injector is also kept on in case of accident to pump or heater. The main line shaft runs the washer at one end, and the crusher, screens, main eleva-

than the creek and 500 ft. therefrom, and on a 60-ft. double-decked trestle.

The tank is for emergency use and for fire protection when the pump is not running. It will supply the washer for 1 1/4 hours in case of accident to the pump. The washing is done by direct pump pressure, leaving the tank full at all times. The 8-in. main is tapped at the bottom of the tank foundation for fire protection and boiler feed pipes. At the washer it is divided into three 4-in. streams, which are in turn divided into 1-in. and 2-in. streams leading to the various parts of the washer.

The rock, on being dumped into the chutes at the top of the incline, is forced by 5 streams in each chute into two conical screens of 1/4-in. steel, 4 ft. lesser diameter and 5 ft. major diameter, and 10 ft. in length, with 2-in. round perforations. These screens revolve 13 times per minute; four streams play against the rock in each screen from the large or lower end while passing through. The rock not rejected from these screens is then discharged into a 16-in. screw conveyor at the mouth of each screen. These conveyors are 10 ft. long, and the bottom lining is perforated by 1/2-in. holes. A 2-in. pipe with 1/4-in. perforations is placed over each conveyor and gives the rock a thorough rinsing in transit before it is discharged into chutes and trammed into the kilns.

The rejections from the two conical screens fall into a box, in which is a double-log washer 25 ft. long and revolving 18 times per minute. The paddles on the logs form a double screw, and draw the pieces of rock up an incline of 1 in. per foot through the mud and water, and discharge them into a rinsing screen 8 ft. long and 2 ft. in diameter, with



PLAN OF AMERICAN PHOSPHATE COMPANY'S PLANT.

tors and a rope drive at the other. This rope drive, extending the entire length of the domestic and export sheds and machinery house, drives all conveyor belts and loading elevators and car loaders, except one, which works directly off the line shaft.

So far the mining has been done here in about the same way as at other mines, and the phosphate is loaded on tram cars and hauled to the foot of the washer incline, which is double-tracked, loads going up while empties come down. Length of incline track, 134 ft. on a 22 per cent. grade, and 35 ft. at the top on a 2 per cent. grade. At the top loads are dumped to the center between tracks and fall into steel chutes leading into conical screens. The hoist is a double-cylinder, reversible 7 by 10 in. engine, and easily capable of raising 2 cars up the incline in 30 seconds. The washing system is the most complete and efficient. In connection with this, it will first be necessary to take up the water-power plant.

The creek passes the plant at a distance of about 500 ft. from the washer. This creek at its lowest stage will furnish 53,000 gallons of water per hour, which is much more than is required to run the washer. To enable works below to operate full at low water, a reservoir has been excavated one side of the creek, and the creek will be dammed to turn water into the reservoir. The reservoir is figured to hold sufficient water to run the plant for 12 hours, and will be filled at night and cut off in the day, so that the creek will flow free all day.

The pump is a Stilwell-Bierce & Smith-Vaile, compound, 10 and 16 by 12 and 12, 10-in. suction and 8-in. discharge, with capacity of over 50,000 gallons working under the required conditions. The 8-in. main leads to a 16 by 22-ft. tank (capacity 45,000 gallons), about 110 ft. higher

1/8-in. by 3/8-in. perforations; speed, 34 revolutions per minute. A spray of water plays through this screen.

The rock discharged would not soil a silk handkerchief, and we have analyses of 83 per cent. bone phosphate of lime and 3 per cent. iron and alumina from this product which would have been left in the mines, were it not for the log washer; for small rock presents so much surface for dirt in proportion to its weight that it is almost worthless unless thoroughly treated.

With this washer the cost of mining is reduced, for the miners need not be so careful to separate rock from the dirt. The proportion of cleaned rock to that put in the washer has so far been found to be about 66 per cent. The muddy water is carried off by a trough lined with No. 10 steel bent to a half circle 18 in. in diameter, and is on a grade of 4 ft. per 100. This passes over the valley between the kiln buildings and through the machinery building to a point about 400 ft. from it; but it may be moved or extended easily as mud accumulates. The rock from the washer is taken in to the kilns in cars and dumped on the wood. The kilns are in two buildings, 35 by 153 ft. 8 in. each, with 10 ft. space between, but all under one roof. A rock wall, 5 ft. high, is built around the posts on the outside, and No. 10 boiler iron bent to a diameter of 18 in. is placed around the inside posts, and then filled with sand. This is protection to the posts while the kilns are afire. The dried rock is taken to the shaking screen by end dump cars at present; but it will be handled with a flight conveyor, as it is almost impossible to feed the crusher to its capacity by cars.

The shaker is in the machinery house and at the end of the kiln tracks. It is a screen of 1/4-in. steel 3 by 10 ft., with 2-in. round perforations, and on a slant of 2 ft. in 10. The screen moves longitudinally, with a 3-in. throw, 325 times per minute. The rejections from this

*Abstract of paper read before the Engineering Association of the South, May 10th, 1900.

screen are hopped into a boot and raised 50 ft. by a chain-and-bucket elevator, and discharged into the domestic screen described later on. The rock which is not rejected from the shaker feeds on the crusher, which is a McLanahan & Stone roll, and capable of crushing 500 tons daily. When crushed, the rock is raised 50 ft. by a chain-and-bucket elevator, and discharged into the "export screen," which is a double rotary, and made of one 3 by 8-ft. screen, with 1/4-in. round perforations, inside of a 4 by 8-ft. screen, with 1/2-in. round perforations; speed of screen, 29 revolutions per minute. The rock retained in both the outer and inner screens can be either thrown on a conveyor belt and stored in the export shed, or it may be loaded direct into cars for shipment by a Praytor patent car loader, commonly called in this district a "scratch-back." The small rock which is rejected from the inner screen may be separated from the larger rock (and such is ordinarily the case) and taken with the dust down a chute into the elevator leading to the "domestic screen." This is also a double rotary screen, 10 ft. long; inner screen, 4 ft. in diameter, with 3/4-in. round perforations; the outer screen being No. 13 wire cloth, 3-mesh. The product of these screens is either loaded into cars or stored by conveyor belt in the domestic shed. We now have all the dust discharged at the same point, and it drops into a 9-in. screw conveyor and is carried entirely out of the machinery house and thrown into the yard. After enough of this waste has accumulated in the yard to make some necessary filling, an elevator will be placed to carry the dust into the mud trough from the washer, and it will be taken far away into the settling pond.

Running the entire length of each of the export and domestic sheds are rubber belts, on which is discharged rock from the respective screens. These are only used when rock is to be stored and during the intervals of changing cars and scratch-backs. The belt in the export shed is 36 in. wide and 183 1/2 ft. center to center of head shafts. The one in the domestic shed is 24 in. wide and 169 ft. 9 in. center to center of head shafts. These travel through 400 ft. a minute. The tripper travels on a T-rail and may be anchored at any point. They consist of a stand and two rolls, one roll about 2 ft. above the other. The belt passes over the upper one and under the one below. The speed of the belt throws the rock into sheet-iron chutes and distributes in either or both sides of the building.

As stated above, the rock may be loaded direct from the screens or may be stored. The stored rock is loaded as follows: Just outside the export and domestic sheds, and a little below the floor level, are conveyor belts traveling about 300 ft. per minute. In front of the domestic shed is one scratch-back, and in front of the export shed there are two. The belts carry the rock, which is dumped on them from the sheds, to elevators, and it is thrown into cars by the scratch-backs. There is also a scratch-back at the machinery building, which is used only to load direct from the export screen. The hoppers over the loading conveyors are arranged three to the door, and slanted so that the rock goes on the belt in the direction of travel and reduces the wear on the belt. The doors, 8 in number per building, are 8 ft. wide and composed of two parts. The bottom part is only 2 ft. high and is on a movable hinge, so that when raised it comes off the hinges and is placed on the opposite side of the belt and forms one side of the hopper. The rock then released at the bottom feeds on the belt till it gains its natural slope. The larger door is then raised and the rock left in the shed is cast on or taken to the belt in wheelbarrows.

Praytor car loaders are used, and they are certainly great labor savers in phosphate rock handling. This loader was patented in May, 1899, by Mr. William W. Paytor, who was at that time with the Tennessee Phosphate Company. It consists of a 3 7/16 in. shaft, 15 ft. 2 in. long, with a wheel similar to a turbine on the loading end. This wheel has from 7 to 12 paddles of 1/4-in. steel, 14 by 8 in.; 1 tight pulley and 3 loose ones are on the loader shaft and 4 tight pulleys on the counter. A direct and a cross-belt are used. The loading shaft has a throw of 4 ft. 3 in., and, when extended, the wheel goes into the car door and bears on an adjustable jack-box. The wheel reaches nearly to the center of the car. The rock drops on the revolving wheel from a movable chute and is distributed in the car. For domestic rock, these scratch-backs are speeded about 300 revolutions per minute; and for export rock, about 285 revolutions per minute, on account of the difference in size of the grades. When one end of the car is loaded, the cross belt is thrown on the tight pulley and the opposite end is loaded. Then the scratch-back is drawn out and the center of the car is loaded by the movable chute. The scratch-backs will be thrown in and out of cars by compressed air.

Special attention has been paid to the tracks about this plant, and as nearly as possible a complete gravity system is used, reducing the cost of switching to a minimum.

The water from phosphate rock washers makes the streams so muddy that it interferes with people and industries below, and other companies have had a great deal of trouble from damage suits; so this company has guarded against this trouble by building a settling pond. The creek channel has been changed for nearly 1/4 mile, and a levee was thrown up on the bank of the creek through the property, forming an area of about 30 acres. This includes the old creek bed, which is very crooked, and will require a long time to fill with waste. A sluice gate will be placed at the corner of the pond farthest from the washer, and the water will be drawn off clear before passing into the creek. This pond is not yet complete and only a few acres are used now for settlings, but the result is perfectly satisfactory. The water is flowing through a trough into the creek just as clear as the creek itself.

The tank is kept full at all times for fire protection, and 2-in. pipe and fire hose are in all parts of the buildings. Barrels of water and buckets are placed at frequent intervals on the joists in the buildings, and certain of the employees are commissioned on the fire brigade. The practice of fire drills will be carried on. The works are fully wired; electric call-bells are placed at all important points, and regular code of signals used.

FRENCH IRON ORE TRADE.—Imports of iron ore into France from Spain during the first four months of the current year were 150,150 tons, showing a decrease from last year of 17,080 tons.

ABSTRACTS OF OFFICIAL REPORTS.

Baltic Mining Company, Michigan.

This company is engaged in the development of a promising copper property in the Lake Superior regions. The report is for the year 1899. At the close of the year the company had five shafts down respectively, 69 ft., 219 ft., 292 ft., 285 ft. and 248 ft. The drifting done on different levels has been 3,058 ft. The average cost of shaft sinking has been \$24.74 and of drifting \$6.45 a foot. During the year 35,411 tons of the rock taken out were stamped, yielding 789,763 lbs. mineral, or 603,570 lbs. refined copper. The average yield of copper was 17 lbs. to the ton, or 0.85 per cent. No estimate of the cost of this copper can be given, as the mining work was development entirely.

The financial statement for the year shows receipts as follows: Assessments, \$230,554; sales of 621,336 lbs. copper at 16.93c., \$105,240; Atlantic Mining Company, \$2,656; total, \$338,450. The payments were: Expenditure at mine, \$195,417; smelting, freight and marketing copper, and general expenses, \$13,900; real estate bought, \$1,001; total, \$210,318. This left a balance of \$128,132, to which is to be added \$39,711 from previous year and \$72,751 due on assessments, making the available surplus brought forward, \$240,594.

The directors' report says: "Work has progressed as rapidly as could be expected considering the difficulty in procuring either labor, machinery or materials for construction under the conditions that have prevailed during the year. Regular production with one small head of stamps in the Atlantic Mill began with the month of July and has since been maintained. The rock stamped came mostly from the openings tributary to Nos. 1 and 3 shafts, supplemented latterly by a small quantity from stopes. The openings being carried on an arbitrary line, not always entirely in the lode, little chance is afforded for selection and it is believed that the average yield of the rock will improve when stoping is done on an extensive scale, and the ordinary selection of ground can be made. The developments made upon the lode during the year confirm the belief that there exists here a very large body of material containing sufficient copper to admit of a low cost of production, if worked upon an extensive scale. A large production cannot, however, be made without adequate development underground as well as surface equipment. An eligible site for a stamp mill on the shore of Lake Superior, near the Salmon Trout River, has been selected and the construction of a steel mill building to contain four heads of modern style stamps has been contracted for to be completed next summer, although it is not intended to erect more than two heads during the current year."

Montana Mining Company, Limited, Montana.

The report of this company for the second half of 1899 shows that work on the mine and mill was continued, and the treatment of the old tailings in the cyanide plant was also carried on. The result, as expressed in sterling from the London office was as follows: Receipts from produce, £71,386; rents, etc., £388; total, £71,774. Expenditures at mine were £58,382; on outside properties, £2,702; in London, £2,611; total, £63,695, leaving a balance of £8,079. This, with £24,687 brought forward from previous half-year, made a total of £32,766 on hand at the close of the year. The amount refunded to capital account was £1,888. The result of operations at the mine was, in American currency:

	—Mill Ore.—		—Tailings.—		Totals.
	Total.	Per ton.	Total.	Per ton.	
Tons worked	24,700	69,573	94,273
Receipts	\$156,598	\$6.34	\$188,081	\$2.71	\$344,679
Expenses	178,293	7.22	103,460	1.49	281,753
Profit or loss	L. \$21,695	L. \$0.88	P. \$84,621	P. \$1.22	P. \$62,926

The mill expenses in detail were: Working expenses, \$119,359 (\$4.83 per ton); prospecting, \$53,066 (\$2.15); insurance, taxes, etc., \$5,868 (\$0.24). The tailings expenses were made up as follows: Treatment and transport, \$79,109 (\$1.14 per ton); redemption charge for plant, \$24,351 (\$0.35). The quantity of the precious metals recovered was, in fine ounces:

	—Mill Ore.—			—Tailings.—		
	Quantity.	Proportions.	Value.	Quantity.	Proportions.	Value.
Gold	7,024	20.0	90.9	8,062	15.1	86.3
Silver	28,145	80.0	9.1	45,209	84.9	13.7
Totals	35,169	100.0	100.0	53,271	100.0	100.0

The recovery from mill ore was \$5.77 in gold and \$0.57 in silver; total, \$6.34. The saving from tailings was \$2.34 in gold and \$0.37 in silver; total, \$2.71 per ton.

The directors' report says: "No decision has yet been given in the case of the St. Louis Mining and Milling Company vs. the Montana Mining Company, which was argued before the District Court of Appeals on 9th February last. The developments in the mine during the past half-year consisted of shafts, drifts, cross-cuts, upraises and winzes, representing a total progress of 3,500 ft., at a cost of \$53,066, or an average of \$2.15 per ton of ore treated. This excessive average is due to the relatively small tonnage extracted during the half-year. During the half-year a number of properties were offered, but, with the exception of a promising group of undeveloped claims in the State of Nevada, none of them stood the test of examination. A long option has been secured on this group of claims on advantageous terms, and they are now in course of development. The financial position of the company is sound, but, with the uncertainty attending our operations at the mine at the present time, and in view of the possible expenditure on the property under option, the directors consider it advisable to conserve the funds in hand, and do not therefore recommend the payment of a dividend. Notwithstanding the searching nature of the exploratory work which was undertaken during the past half-year, it failed to discover ore bodies of any importance. As a consequence, the supply of ore met with was only sufficient for the requirements of one of our mills."

THE SANTO DOMINGO GOLD MINE IN PERU.*

Written for the Engineering and Mining Journal by F. C. Fuchs.

The Santo Domingo Mine is located in that zone of the great rivers known in Peru under the name of "Montana," and situated on the east of the great Andes Cordillera. The lack of rains and of great rivers in the western part of Peru can be readily explained. Crossing the Cordillera from west to east, the difference of the hydrographic conditions of its two slopes is very noticeable; on the east the enormous mass of evaporated water from the Atlantic is condensed, returning later to the ocean through the Amazon and other rivers. The topography of the Montana is very rough, and the continuous and heavy rains generate numerous torrential streams that give great intensity to the abrasion and transportation phenomena. An exuberant vegetation completely covers the mountains, making still more difficult the access to those regions.

The Province of Carabaya that forms part of the Department of Puno, seems to have been known since an early period previous to the dominion of the Incas. In 1553 the Spaniards began to explore and work the mines and placers of those regions, from which, according to ancient documents, they took out great quantities of gold.

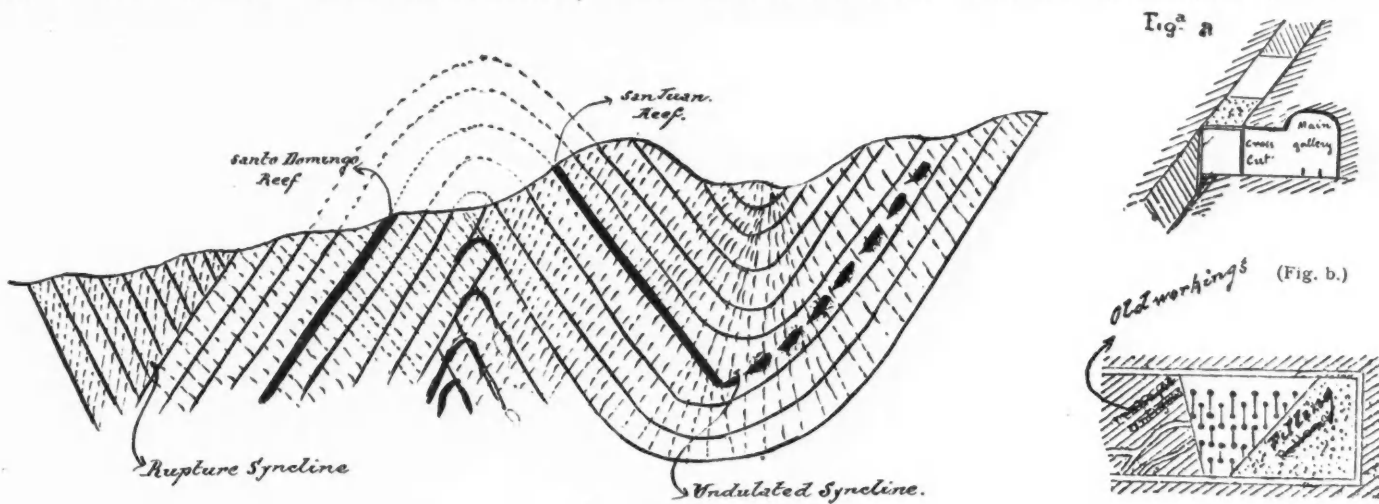
Much has been written about the history of the Carabaya gold-fields, but of what can be called the modern epoch very little is known. About the middle of 1892 a man called Estrada, who had coca plantations on the margin of the Inambari River, made an exploration along one of its tributaries, the Machotacuma torrent, and discovered what promised to be a very rich gold vein. Associated with Mr. Velazco, from Arequipa, they invested a small sum and worked the mine periodically for about three years, obtaining small profits. In 1898 they struck a rich zone,

zones already explored does not cut them, following, on the contrary, their irregularities and inflections. The vein has a width that varies from 3 to 15 ft.; when narrow the ore is composed of quartz, native gold, stibnite, pyrites, other sulphurets and tellurides; in the wide zones the content of the vein is almost all a black, very plastic clay, containing iron pyrites and accidentally small grains of native gold. The black clay, undoubtedly proceeding from the wall rock, is irregularly crossed by narrow veinlets and pockets of a white milky quartz, very friable, enclosing small needles of stibnite and pyritic crystals.

The bonanzas occur as shoots of ore, and are wonderfully rich, giving in average \$10,000 per ton of ore.

In the Sucho region the gold was found native in the shape of a massive veinlet, 1/4 in. thick. From all the other zones the ores obtained assay from \$4 to \$80 per ton. At a short distance from the Santo Domingo vein there is another one, the San Juan, also enclosed in the black slate as a bed vein, but instead of dipping as Santo Domingo to the southwest, it dips to the northeast, on the other side of an anticline, giving it the appearance of a broken saddle-reef. The San Juan vein has been carefully explored and no indications of rich zones have been found. The filling consists of the black plastic clay and milky quartz with pyrites very similar to those of Santo Domingo, but there is complete absence of the other sulphurets and tellurides that characterize this last vein.

Mr. T. A. Rickard, in his paper on the Bendigo Gold-fields* points out the fact that while the saddle-reefs are almost always rich, the inverted-saddles are not workable, and explains this fact based on the mechanical principle of the arch, but he does not try to explain the difference of richness between the two legs of a saddle-reef, this being generally rich along the anticlinal line and at one of the legs, and low grade at the other one. Could not this peculiarity be explained? Sup-



SANTO DOMINGO MINE, PERU.

a true bonanza, from the upper part of which 16,800 oz. of gold were obtained in the short period of five months.

During the bonanza, Mr. W. L. Hardison, from California, a well-known American, engaged in the oil industry, happened to pass Santo Domingo on his way to other mines further in the interior, and seeing the great output of the mine, he made a contract with the owners to buy it. Six months afterward the Inca Mining Company, a corporation organized under the laws of the State of West Virginia, with a capital of \$1,000,000, acquired the property and began workings on a larger scale. Nearly 18 months were devoted to the proper development of the mine, and in July, 1898, the old mill was completely modified and started continuous running, giving good profits and insuring the success of the enterprise. A 10-stamp battery and a chlorination plant have been erected, which in two months more will increase the production to 3,500 oz. of gold per month, or, say, \$70,000.

The predominant rock in the Santo Domingo Region is a black carbonaceous slate, containing a great quantity but not a great variety of fossils. These fossils, first discovered by me in February, 1897, were classified by Prof. J. Balta from the Lima School of Mines, who describes them thoroughly.†

Most of them belong to the graptolite family (hydrozoary class) and are: Diplograptus palmeus, diplograptus pristi and monograptus prionon. Two others were classified as Lingula Attenuata and Medusae. The presence of graptolites in the black slates permits this rock to be assigned to the Silurian formation.

Interspersed between the black slates are found strata of gray slate, more clayey than the other rocks. The black slate strata have a general strike from northwest to southeast, are very much disturbed, and form anticlinal and synclinal folds. The eruptive rock that has produced these disturbances does not appear on the surface nor at the level of the lowest works, but at this last point the slate shows many marks of metamorphism. The segregations of quartz so characteristic of the primary eruptive rocks, and the presence of porphyroid granite in Saco and Limbani (25 miles from Santo Domingo) as the only eruptive rock to be found in great masses in the whole region, confirm the supposition that to this rock is due the undulation and rupture of the slate strata.

The Santo Domingo vein is enclosed in the slate strata, and in the

posing that while one of the legs is in relation with a ruptured syncline by which the mineralizing agents from depth found an easy way the other leg forms part of an undulated syncline without free access to the deep region? If this hypothesis were true two periods must be considered for the filling of such a saddle-reef; one corresponding to the formation of the mineral elements common to both legs, and a second one that produced the enrichment of only one of them.

San Juan and Santo Domingo appear as the legs of a saddle-reef only in their central part, in the extremes forming a single bed-vein. In my opinion they belong to fissures formed by the emersion of the porphyroid granite with contemporary filling of both, with the black clay and pyritous milky quartz; and that for the Santo Domingo vein there has been a second period in the history of its formation, during which new mineralizing agents produced its enrichment.

It is more difficult to explain the distribution of the rich zones of the Santo Domingo reef, in the shape of columns or shoots of ore, because if in the veins that cross the different rocks, the enrichment of certain zones can be assigned to the variation of the enclosing rock, in the case of a bed-vein interstratified between two strata of the same formation, without "indicators" that theory cannot be applied.

The enclosing rock of the shoots of ore, does not differ from the general slate formation. Could this special shape and disposition of the bonanzas be assigned purely to physical and mechanical causes? Perhaps the microscopical study of the ore and enclosing rock of the bonanzas † will throw more light upon this interesting problem.

When the Inca Mining Company took possession of the property the works on the vein were almost all caved in, and those on the hanging wall stood only on account of the heavy timbering. The consumption of timbers was enormous and their supply required from 30 to 40 men working continually. The dampness of the climate very soon rots the wood, and from this cause and the pressure the sets only lasted from 2 to 3 months, a special gang being required for changing and repairs.

In all mine workings the first necessity is to have the main galleries perfectly secured, and as it was impossible to obtain this having them on the vein, I decided to carry the main galleries into the foot-wall, 3 ft. distant from the vein; the results obtained reduced 90 per cent. the consumption of timbers. With the galleries in the foot-wall making low floors, the total extraction of ore between two levels was very rapid. Timbers were only used as mud-sills supported against the foot wall by

* Abstract from a paper published (in Spanish) in the "Boletin de Minas" (Lima, Peru), Volume XIV, pages 6, 11, 21, 85, and Volume XV, pages 6, 12, 20, 25, 35, 42 and 49.
† "Boletin de Minas," Volume XIII., page 69, and Volume XIV., page 19.

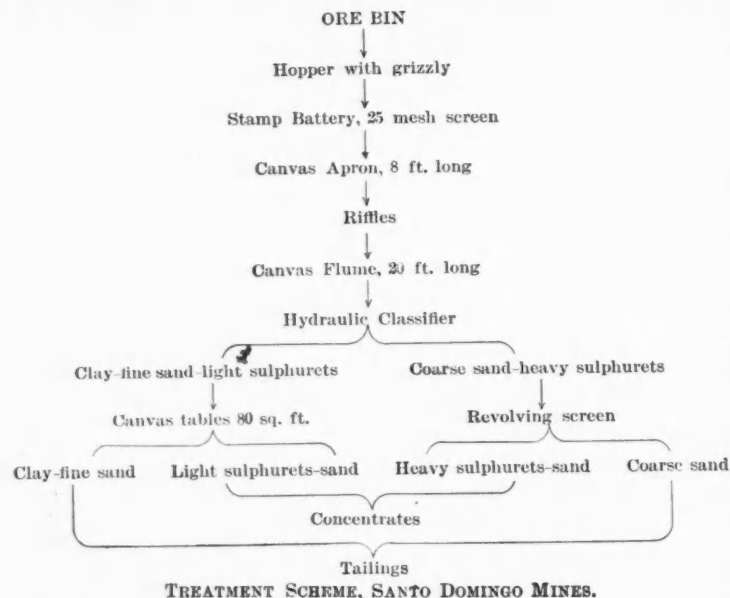
*"Transactions" American Institute of Mining Engineers, Volume XXII, page 316.
† Now being made at the Lima School of Mines.

means of buckstaves (Fig. A). The raises on the vein advanced with the stoping, and when this was finished between two levels the raises were filled, with waste rock. Between each two levels there were always permanent raises in the foot-wall.

In the region of the old workings, the method proposed was to make big faces, having the stoping face and the filling with natural slopes (Fig. B) so as to have the roof pressure strongly supported upon the solid foot-wall by means of timbers which in the advancing were changed from back to front.

From February, 1897, to May, 1898, the mine was developed in an extension of 3,200 ft., which gives an average of 200 ft. monthly; a small advance only due to the great difficulties arising through the want of food supply, which made it possible to retain only a small number of miners.

Messrs. Estrada and Velazco, previous owners of the property, erected in 1896 a small plant, composed of a vertical water wheel, a four-stamp battery (450 lbs. each head) and a sluice with transverse riffles. With this rudimentary plant they took out $10\frac{1}{2}$ quintals of gold, throwing into the Santo Domingo Ravine probably a double amount. With the only means at my disposal, the old mill was repaired and a special plant devised and erected. This plant can be understood from the accompany-



ing working scheme (A). The product obtained on the canvas apron, riffles and canvas sluice, was washed out, settled, calcined and amalgamated, keeping the tailings, that were always rich.

The plant described being erected with the only elements at hand in the Montana was unable to permit a thorough concentration, but it was better to obtain dirty concentrates than to lose so much gold in the tailings.

In 15 days' test running, during which time small repairs and modifications did not permit continuous running, 50 tons of ore were treated, with a total value of \$2,150, obtaining the following results:

Gold, 80 oz. at \$20 per ounce.....	\$1,600.00
Four tons concentrates, \$76 per ton.....	304.00
Six tons screen tailings, \$2.05 per ton.....	12.30
Forty tons canvas tables tailings, \$4.20 per ton.....	168.00
Loss	65.70
Total	\$2,150.00

From July, 1898, to date, the small mill has run continuously, producing about \$150,000 in gold, and some 3,000 tons of concentrates that will be treated by chlorination.

The Santo Domingo reef has proved to be very rich. With the new plant \$70,000 in gold bullion will be produced monthly, this sum representing for the company large dividends. It is just to state that this flourishing condition is mainly due to the good administration of its actual manager, Mr. Chester W. Brown.

Carabaya is still an unexplored country, and during my stay of two years there I have acquired the conviction that sooner or later enormous riches will be discovered.

EXPLOSIVES IN FRANCE.—According to an order recently issued, every package or cartridge of explosives sold for use in mining in France must carry on it a statement indication of the nature and proportion of the substances entering into the composition of the explosive, in order that its detonation temperature may be calculated.

MANGANESE ORE IN CHILE.—According to the "Revista de Minas," of Santiago, the exports of manganese ore from Chile in 1899 were 23,000 metric tons; nearly all of it going from Vallenar and Coquimbo. This compares with 20,581 in 1898; 23,528 tons in 1897, and 26,151 tons in 1896. The heaviest shipments on record are 51,686 tons in 1892; the total for the 10 years ending with 1898 was 344,087 tons.

DOLOMITE AS MONEY.—According to the "Bulletin" of the Field Columbian Museum, Chicago, pieces of dolomite are used as money by the Indians in Lake County, California. The stone tokens are shaped in cylindrical forms and burned, which brings out reddish streaks in the oxidation of the iron, and then polished and perforated. In this form they are highly valued by the natives.

RECENT DECISIONS AFFECTING THE MINING INDUSTRIES.

Specially Reported for the Engineering and Mining Journal.

ASSUMPTION OF RISK BY MINER.—At the time of injury, deceased, an employee, was filling cars in a mine with ore from a chute. The employer had erected a platform along the cars for the men to stand on while barring ore at the mouth of the chute, and ladders alongside the chute for them to climb up and pry the ore loose when the ore became clogged, but deceased instead of standing on the platform, climbed into the car, and commenced to bar in this situation. He had never been authorized to get into the car for that purpose, and no custom to do so was shown. He struck his head against an overhead trolley wire and was killed. It was held by the court that he had assumed such risk.—*Lepalla vs. Cleveland Iron Mining Company* (81 Northwestern Reporter, 553); Supreme Court of Michigan.

WHEN OPERATOR IS NOT LIABLE FOR INJURY.—A party was employed by a mine operator, at the time of his death, at the bottom of a shaft; his duty being to fill the ore bucket, which was hoisted by a horse led by a boy. The employee at the top of the shaft, whose duty is to dump the bucket and let it down to deceased, dropped it without looking to see whether the boy had hooked the rope to the horse, as was the custom, in order to let the bucket down steadily, which he had not done, and the bucket struck deceased and killed him. The court, on appeal held, that though it was shown that the boy was incompetent to manage the horse, such incompetency was not the cause of the accident, but that it was caused by the negligence of deceased's fellow servant at the top of the shaft, and hence the lower court did right to direct a verdict for the mine operator.—*Adams vs. Snow* (81 Northwestern Reporter, 983); Supreme Court of Wisconsin.

MINING PARTNERSHIPS IN WEST VIRGINIA.—Where tenants in common, or joint tenants, of an oil lease, or a mine, agree to develop their common property, each giving his skill, paying his share of the outlay, and getting his share of the product, they constitute a mining partnership. Such members have a lien on the property for advances or balances due them; but when the partnership agreement of an oil partnership is to deliver the oil to a pipe line which should give each member "division orders" for his share, the partnership has no lien on such division orders, as against a partner—it constituting such a division of the property as divests the lien. When members of a mining partnership cannot agree in management, those having a majority interest control its management in all things necessary and proper for its operation. A sale of his interest by a member of a mining partnership to another member, or to a stranger, does not dissolve the partnership, as in ordinary partnerships.—*Childers vs. Neely* (34 Southeastern Reporter, 828); Supreme Court of West Virginia.

SUFFICIENT EVIDENCE OF LIABILITY OF OPERATOR.—In an action for damages under the laws of Illinois (S. & C. Annual Statutes chapter 93, section 14) providing for a recovery for the death of a person killed in a mine by reason of the failure to inspect the mine before beginning work in the morning, deceased was a driver, and was supposed to have been killed by a collision between his cars, which he was driving in on the main line from a switch, and loaded cars standing on the main track. No one saw the accident. The driver's seat was on the front end of his car and was uninjured. When found his body was lying between the rail and a rib of coal 4 ft. distant, and in front of his trip. Witnesses testified that after the accident there was not space enough between the cars for a man to get through. Deceased might have been killed while on the seat, and the seat left uninjured, or he might have been between his cars and the cars on the main track, and been crushed on account of the latter being too close to the switch. The court on appeal held that the evidence was sufficient to sustain a verdict against the company.—*Jupiter Coal Mining Company vs. Mercer* (84 Illinois Appellate Court Reporter, 96); Appellate Court of Illinois.

THE COYNE GAS PRODUCER.

The accompanying illustration shows a new type of gas producer, devised and patented by Mr. John Coyne, of Pittsburg, for which certain advantages are claimed. What these are can best be shown by the drawing, which shows two half-sections on different lines, and by the description which makes clear the operation of the producer.

The apparatus consists of a duplicate-chambered retort, the base of which is immersed in a tank of water, thus forming a seal, the water being kept at the proper level by inlet and outlet pipes. The body of the retort consists of an outer metallic and inner refractory shell, with intervening air space, which prevents radiation of heat. Partially inserted in the base of each chamber is a spherical perforated fire grate, with conical projections on the exterior, and conical openings to the interior. Gas, air, steam and oil may be conveyed to the interior of this blast chamber grate through hollow journals. Its lower part is immersed in the water-seal or tank. These fire grates are surrounded by tuyere pipes in order to keep the base of the retort cool, and are supported by friction rollers, which relieve the weight on the hollow journals, on and by which they are intermittently rotated, thus agitating and keeping open the base of the fuel charge. In the bottom of the water-seal tank is an opening, through which the grates may be removed from the retort.

At the top of the retort are two bell-valved conduits, for receiving and delivering the solid fuels (coal and coke) to either combustion chamber. Properly arranged pipes, fitted with reversing valves, connect the chambers, and convey the gas and air blasts in either direction, provision being made for introducing a flue cleaner to remove carbon adhering to the gas pipes.

In beginning operation both chambers are charged with fuel, which is then fired, the three bell valves being left open, permitting the escape of the initial product. A moderate air-blast is then introduced through

the air pipes and hollow journals of the grates. When there is a proper depth of incandescent fuel in each chamber, a fresh charge of fuel is delivered to one side, termed the regenerating chamber, to which the air-blast is now directed—the bell valves being closed—the air entering in numerous radiating jets through the conical openings in the grate and, being forced up through the incandescent carbon, is at once decomposed.

The oxygen of the air unites with the carbon, producing carbonic acid gas, which, ascending through the incandescent and diminishingly heated carbon, becomes carbonic oxide. The hydrated bituminous vapor being distilled from the fresh charge on top mixes with the carbonic oxide, and is conveyed through the reversing valve, pipe and hollow journal into the opposite grate, where it mingles with a jet of steam (or steam and oil), and is forced through the upper perforations in grate, and the incandescent carbon in fixing chamber. The steam is decomposed, producing a large volume of carbonic oxide, while the

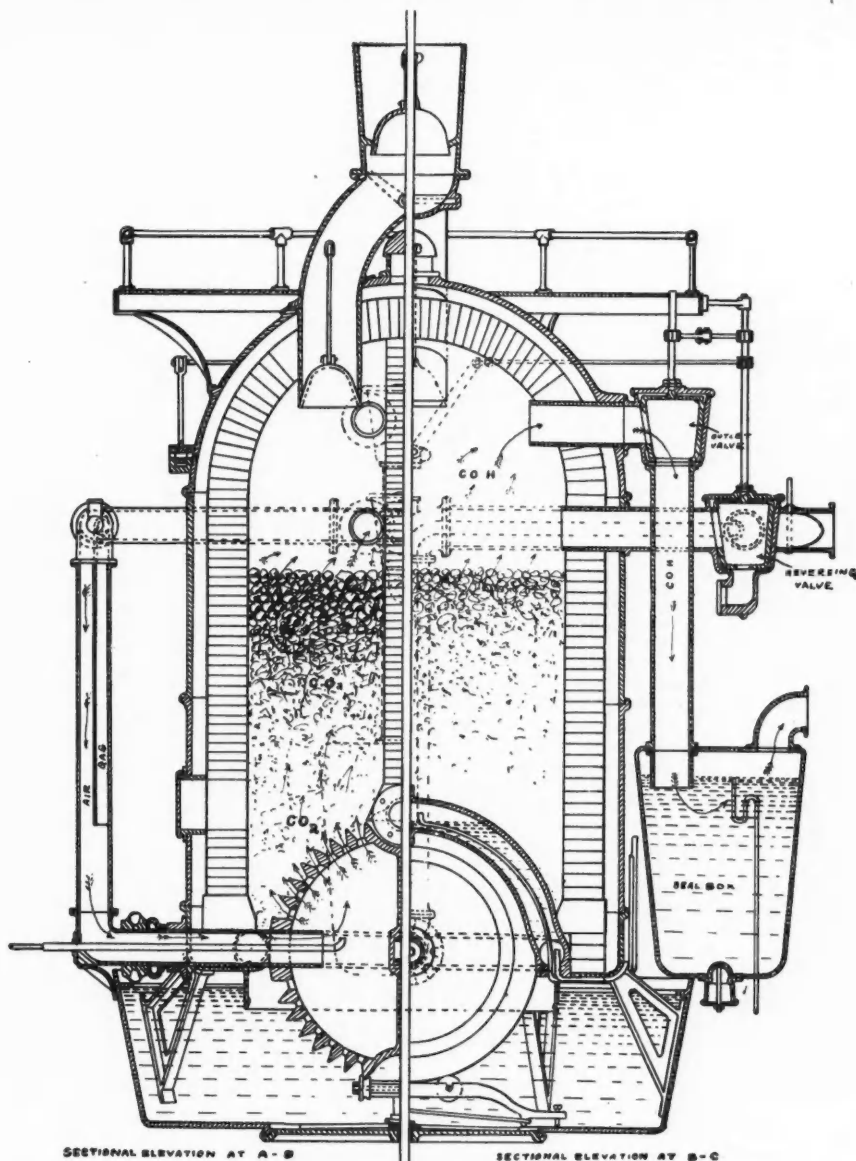
and as the volume of carbonic oxide produced in the fixing chamber is five times that brought over from the regenerating side, the amount of nitrogen in the resultant gas is inconsiderable.

The regeneration can only be efficiently effected by the oxygen of the air blast, which accomplishes a double purpose, in that it volatilizes the carbon as well as regenerating the charge to a state of decomposed steam.

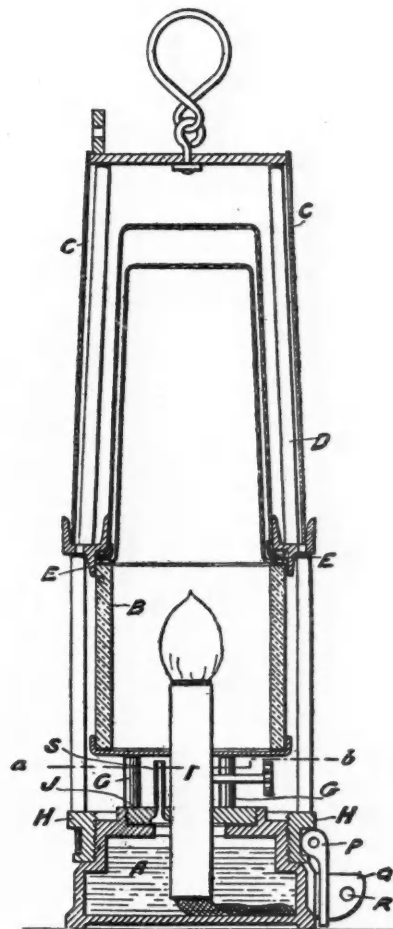
The conditions and results in this process are, it is claimed, strictly in accordance with natural laws, and to those skilled in the art of gas manufacture it will be evident that the process is entirely feasible.

THE HOWAT MINERS' LAMP.

The accompanying illustration shows a form of safety lamp recently patented in Great Britain by A. Howat of Didsbury, England. The purpose of this invention is to render the use of paraffin a practical possi-



THE COYNE GAS PRODUCER.



THE HOWAT SAFETY LAMP.

hydrogen is set free, both gases passing through the outlet valve to the hydraulic main, and thence to the purifiers and holder.

When the temperature in this fixing chamber is so reduced that it will no longer decompose the steam, the direction of the blast is reversed and a fresh charge of fuel delivered to this chamber, which now becomes the regenerating side of the retort, while the other becomes the fixing chamber, the fuel in which has by this time come to a high state of incandescence. The connections to each chamber being identical, the method above described, where the first is the regenerating and the second the fixing chamber, is exactly the same when, with the direction of the blast reversed, the fixing side becomes the regenerating and the other the fixing chamber.

The process is therefore continuous, and no waste occurs, except when first firing the retort in beginning operation, when the bell valves, as before explained, are all left open. All the carbonaceous material is gasified, the product being a permanent or fixed carburetted, or bi-carburetted hydrogen. The mineral residuum or slag passes through the perforations in grate, and between the tuyere pipe and grate to the water seal-tank, from which it is removed. Any partially decomposed carbon comes to the surface of the water, and is recovered, to be returned to the retort.

In this process the only nitrogen is that introduced in the air blast,

and ability in safety lamps. This gives, under favorable conditions, an exceedingly good light. The flame chamber, or that part immediately below the wick burner, is isolated from the oil minimum of heat-conducting area. The lower supporting ring of the lamp glass is closed in, or is made as a complete plate to enclose the flame chamber, and the opening in the oil reservoir is covered by another plate. The studs for supporting the flame chamber are connected to the plates and produce what may be termed a lantern-wheel structure. Through the plates the wick tube passes from the oil reservoir into the flame chamber, and the upper end of the wick tube acts as a burner around which is placed a sleeve capable of sliding up and down and of regulating the light. The adjustment of the sleeve from the exterior of the lamp is effected by a fine wire rod, passing through a close-fitting gas-tight tube in or on the ring plate, and above such tube is fitted with a small screw, which under the moving of the rod rotates, but does not travel endwise, and by engaging with a screwed eye on the sleeve travels the sleeve up and down. A small button or milled edged disc below the plate facilitates the turning of the rod and screw. To the plate which closes the oil reservoir is attached a small tube, which opens into the interior of the oil reservoir, and extends, by preference, into close proximity with the said upper ring plate, and being open to the atmosphere constitutes a vent for vaporized oil.

THE COAL BASIN OF MICHIGAN.

Written for the Engineering and Mining Journal by A. C. Lane.

(Concluded from Page 768, Volume LXIX.)

Saginaw County.—This is the county in which the best coal has been found, analyses Nos. 1, 2 and 3. From it the bulk of this year's increase comes. There are at least three different seams worked in this county. The upper two might be considered a double seam, and are worked by the

11. Verne Coal Company, which is down only about 58 ft. The coal is a sulphurous coking coal of the type of the Sebewaing. This and the abandoned Colcord on the south side of the same section were opened some time ago, but the mine has changed hands more than once and has not proved very profitable in spite of the fact that it is one of the few that keep a company store, as it is practically compelled to, not being near any town. The company store has cut no figure in Michigan. The same coal seams appear to be traceable to the west and north, toward St. Charles and Paines Junction. The first explorers around St. Charles appear to have reached this horizon, finding it about 2 ft. thick. They probably believed the general impression which has prevailed that there was but one coal seam of any account in Michigan and so failed to go deeper.

The main seam worked at St. Charles is, however, deeper—from 180 to 220 ft. down, according to the rolls in the bed, and chemically is very much like the principal seam of Saginaw, as may be seen from analyses Nos. 1 and 3; a non-coking coal, but low in ash and sulphur.

There are about 4 shafts producing at St. Charles from 700 to 1,000 tons a day each, and one or two others at least will be added.

12 and 13. The J. H. Somers Coal Company, F. G. Benham, manager, have two shafts.

14. The Northern Coal and Transportation Company, T. W. Davis, manager, have a shaft here and also one in James Township, half way to Saginaw. This company has done extensive exploration and leasing, and is said to represent the Ellsworth interests.

15. The Michigan Coal Company, C. R. Campbell, manager, is also a steady producer.

An almost continuous line of explorations enable one to connect this St. Charles coal with that at West Saginaw at about the same depth. To the west and north the body of coal is cut off by a preglacial drift filled channel 250 ft. deep, and the coal, though of course rolling a good deal, and thickest only in spots, rises and runs out to the southeast. In the immediate future undoubtedly a number of shafts will be added along this belt. Now in operation are:

16. The Saginaw Coal Company, in the south part of East Saginaw.

17 and 18. The Pere Marquette Coal Company. Shaft No. 1 close to the Saginaw Mine, about 140 ft. deep, and No. 2, west of Saginaw, about 190 ft. deep. These all have the same manager, Robert M. Randall, and are properties in which prominent officials of the Pere Marquette Railroad are interested.

An analysis of Shaft No. 1 is given above. The east side shaft is rather too near the rock surface.

Tests of the coal from the west side shaft for fuel gas have been very satisfactory, as would be expected from the low percentage of ash and S. characteristic, of this seam. And though the moisture is high, it is intimately combined with coal, and, I suspect, is partly converted into water gas at the expense of the fixed carbon.

19. The Standard Mining Company, T. B. Jones, manager, is a mine close to the Saginaw Mine, opened by some old Jackson miners, and has the reputation of being the most economically opened.

The Saginaw County field just described is the most important and promising recently opened. Several million tons available have already been proved by drilling.

The high quality of the coal is sufficiently indicated by the calorimeter tests. None of the coal from this seam is, so far as I know, coking.

Bay County.—The coal worked in this county, so far as I have seen analyses, resembles more that of the upper seams in Saginaw County, being sulphurous and coking. See analysis No. 7.

20. The Monitor Company, E. L. Malthis, manager, and

21. The Bay Coal Mining Company, A. Zagelmeier, manager, Bay City, Mich.

The above two mines are on adjacent sections, about 8 miles west of Bay City, and a new shaft is going down a mile south. They largely supply the North American Chemical Company, which will probably want about all they can turn out.

22. Michigan Coal and Mining Company, J. A. Etzold, manager.

23. Central Coal Mining Company, W. A. Knapp, manager.

These two mines are on adjacent properties, West Twenty-third Street, and an analysis of coal from the latter is given, which is perhaps a somewhat extreme type of the Bay County coals, though it resembles three or four other analyses in my possession. Recent investigation by C. W. Hilton shows that the Fe and S are always very nearly in the ratio to form the sulphide.

24. The Valley Coal Mining Company, J. H. Metcalf, manager, is located not far off.

25. Handy Bros. Mining Company, C. W. Handy, manager, West Bay City.

26. Wenona Mining Company, E. B. Foss, manager, Bay City.

These mines are north of Bay City, not far from the shore, and the coal here is quite thick. There are indications of more coal of valuable thickness in the same region. There is and has been more or less exploring for 20 miles north. The coal has not usually proved thick enough.

In the Saginaw-Bay County District, in spite of the fact that the most valuable bodies of coal have been found there, the farmers have frequently leased on the basis of a royalty of 6 to 8c. per ton of screened coal. In no other district have the royalties been so low, and I do not think that any operator coming in now from outside can count on such figures, but I do not think there would be any difficulty in getting land

to test at from 10 to 15c. per ton of coal hoisted. Usually 18 months are given for testing. The cost of churn-drill test holes is not far from 50c. per foot. Machines are just being introduced in mining.

The following statistics from the report of the labor commissioner may be of value:

From the Management.—Average number of employees for each mine (shaft), 56; hours worked per day (8.1 below), 7.8; days worked per month (22 below), 21.3; wages, per day (\$1.70 below), \$2.04; number kegs powder (25 lbs.), 12,913; number tons mined (six months ending November 30th, 1899), 283,898; average cost per ton, \$1.31.

From the Men.—Average age of employees, 32.6 years; number native labor (some negroes), 508; foreign (a good many Scotch), 507; average number years in this country, 17; average months' work per year, 9.3; average days per month, 22; average hours per day, 8.1; number who work by the day, 315; number who work by the ton, 700.

Average wages: Mine boss, \$2.75; weighman, \$2.25; engineer, \$1.83; fireman, \$1.67; machine miner, \$2.31; blacksmith, \$2.02; timberman, \$1.84; trackman, \$1.99; cager, \$1.74; miner, \$1.66; driver, \$1.76; laborer, \$1.63; general average, \$1.70.

Generally speaking, the miners are of a high grade, and, as appears from the number of years spent in this country, have thoroughly Americanized. They do not herd together. Quite a number spin off on their bicycles from the mines around Saginaw.

The following is an abstract of the wage scale agreed to by the miners and operators in the fall of '99. A new scale has just been introduced to agree with that in other regions. An 8 hour work-day; screens to be either diamond or flat bar at the option of the operators, all to have 7/8-in. spaces between bars, and not to exceed 14 in. in length with a superficial area of not to exceed 72 in., the operators to be granted 60 days in which to arrange their screens to conform to this regulation, price of mine run coal to be determined on the actual percentage of screened coal at the mines producing the same; the base in Saginaw County to be on 70c. per ton for mining coal 30 in. and upward; for 27 in. and less than 30 in., 75 c.; for 24 in. and less than 27 in., 80c.; the base in Bay County to be on 75c. per ton of 2,000 lbs., for mining coal 30 in. and upward; 27 in. and less than 30 in., 80c.; 24 in. and less than 27 in., 85c.

During the past year explorations have been undertaken all over the area indicated on our map and outside of it. They have not, I believe, materially altered the following figures, except that there is probably a good deal less coal over 4 ft. thick. A roof of black slate or low grade cannel is too often included.

Out of 110 holes put down in the coal basin, 43 have not any coal reported (39 per cent.), 7 have coal seams, but probably less than 1 ft. thick (6.3 per cent.), 11 between 1 and 2 ft. of coal (10 per cent.), 20 between 2 and 3 ft. (18 per cent.), 12 between 3 and 4 ft. (10.8 per cent.), 17 over 4 ft. (15.5 per cent.). From this we may provisionally infer that 61 per cent. of the basin is underlaid with coal. This coal will average 2.86 ft. thick or for the whole basin 1.75 ft. thick. But if we take into account only the coal 2 ft. thick or over, and allow but 1,000 tons to the acre to be yielded (and though modern practice can do much better, not much better is done in Michigan), and assume the area of the coal basin to be only 6,500 miles, we still have indicated 3,025,600,000 tons, nearly half in 4-ft. seams. The estimate of this last sentence should be cut down one-half probably.

The general conclusion is that the Michigan basin is destined to large development, but that it will not be very rapid, nor can coal ever be produced very cheaply. Thus, while it can supply that part of the Great Lake basin where it has a distinct advantage in freights, it will hardly go out of that watershed. At present, however, the Ohio and other well-established coals have special rates which are a formidable handicap to the newcomer. However, whenever the supply exceeds the local demand, water transportation is at hand. The coal basin is now mainly served by the Pere Marquette, the Michigan Central, and the Grand Trunk systems. It would not be difficult for the Pennsylvania, via the Grand Rapids & Indiana, and the Ann Arbor line, to work in.

LIQUID FUEL.—A consular report from Java states that a new source of fuel supply will shortly be made available, says the London "Colliery Guardian." This fuel is the residue left after refining the crude petroleum obtained from the oilfields in Koetei, on the east coast of Borneo. It is maintained that one ton of this liquid fuel is equivalent in steam-producing power to two tons of the best Japanese coal. The price is said to be very moderate, taking present values of coal into consideration.

SPANISH AND LAKE SUPERIOR ORE FREIGHTS.—A very interesting question was raised at the meeting of the British Iron Trade Association by Mr. McCosh, of the firm of William Baird & Company, of Glasgow, says the London "Iron and Coal Trade Review." Mr. McCosh pointed out that it was not high railway freights alone with which the freighters and traders of this country had to contend, but that they had also to meet much higher rates of sea freight than were paid by the traders on the American lakes. The cost of the carriage of iron ore from the head of Lake Superior to Cleveland, on Lake Erie, as he pointed out, was last year not much over 2s. per ton, and Mr. Colby, of the Colby Mines on Lake Superior, and of the Whaleback Steamship Company, by which much of this work was done, at the same meeting certified that this work was done at a profit at the price quoted. Now, the lowest freight of which we have heard as charged for the carriage of iron ore from Bilbao to Cardiff or Middlesbrough is 4s. 6d. per ton, which is fully 100 per cent. more than the American lake rate for 100 than that which usually obtains. The more normal Bilbao-Cardiff rate is nearer 6s. than 4s. 6d., and there is no doubt that the higher rate is much too high. What are the traders to do? Competition is supposed to rule the cost of freights as it rules the cost of most things. Will the traders aim at more competitive conditions. It is only fair to add that the rate of 2s. to 2s. 6d. quoted on the great lakes is an abnormally low one, but still it shows clearly enough what can be done, and here appears to be a case where British circumstances might be Americanized with advantage.

A NEW AUTOMATIC LUBRICATOR.

The lubricator here shown is to be attached to any reciprocating or oscillating parts of engines or machinery requiring constant and reliable lubrication, such as the cross-heads, connecting rods, eccentric straps, etc., of engines, pumps, air compressors, etc. As it feeds grease instead of oil, it may be attached in any position desired, feeding vertically upward or downward, horizontally or at any angle desired. It feeds only when the part to which it is attached is in motion, and no feeding or loss can occur after the motion ceases.

The base of the lubricator is screwed firmly into the part to be lubricated in the usual way. The body is attached to the base by the union nut or enlarged ring at the bottom. When this is unscrewed the upper part is all taken off together, the barrel is filled with a charge of grease and returned and securely clamped in the position again by the union nut. The feeding is accomplished by the pressure of the piston, and this pressure is applied by the vibrations of the pendulum seen in the front. By the adjustment of the stop-screws at the side, the pawl attached to the pendulum may be made to take from one to six or more teeth of the ratchet wheel for each vibration. On the ratchet-wheel shaft is a worm which meshes into the large worm wheel at the top. The central screw or spindle is splined and revolves with this wheel at the same time that it travels downward by the operation of its thread in the central nut which is screwed into the bracket or guide at the top. The feeding goes on if the vibrations continue, until the piston reaches the bottom and the grease is all expelled. To raise the piston for refilling the barrel, the central nut, which has a milled and notched head, is unscrewed from the bracket, the piston is pulled, the nut is whirled down the screw by hand and screwed tight in its place again. The ratchet



THE MERRILL LUBRICATOR.

wheel may be pulled around by hand, until the slack is taken up and feed is fully established, and if at any time it is desirable to feed in an extra quantity of grease, this also may be done by turning the ratchet wheel. The lubricator may be made of any size and for any rate of feed desired. The one here shown will hold about 14 cub. in., or somewhat less than half a pint of grease. The ratchet wheel has 100 teeth, the spindle wheel has 125 teeth, the central spindle is 24 threads to the inch and the travel of the piston is $3\frac{1}{2}$ in. If, then, the pendulum is set to take two teeth of the ratchet wheel for each stroke, the number of strokes required to empty the barrel will be 525,000, and at 200 strokes per minute this would last 2,625 minutes or say 45 hours. Any of the usual kinds of grease may be used in the lubricator and any percentage of pure graphite may be mixed with it. The worm is of steel, the pawls are of steel hardened and the wheels are of hard bronze. The lubricator was designed and patented by G. U. Merrill, of Paterson, N. J., and is made and sold by James L. Robertson & Sons, of New York.

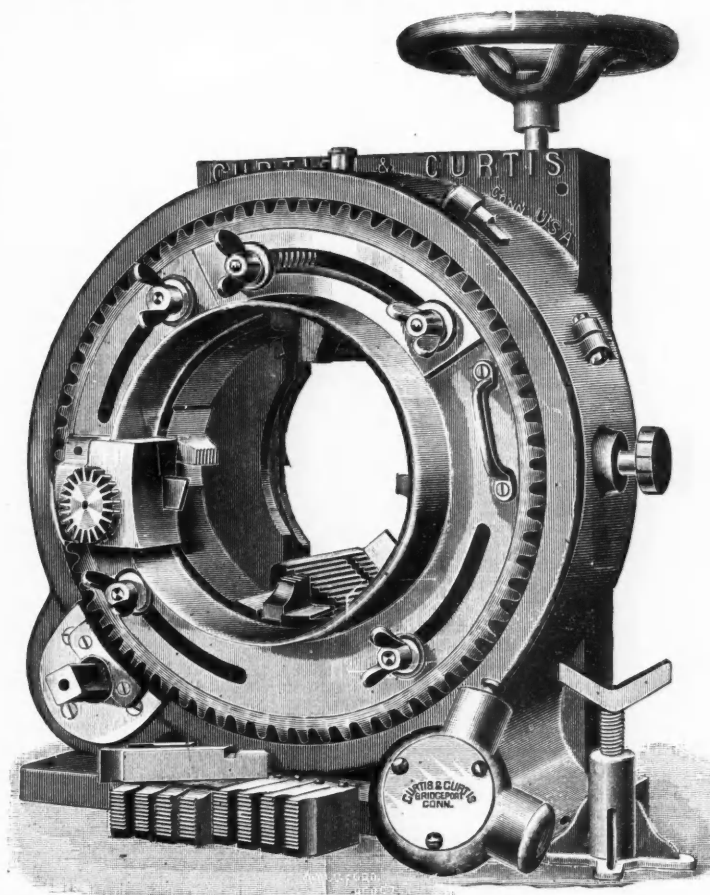
LATE IMPROVEMENTS IN THE FORBES PATENT DIE STOCK.

The accompanying illustration shows the latest form of the Forbes patent die-stock. The machine consists of a die-carrying ring, surrounded and supported by a shell, and having a pinion imbedded in its side, with a pipe-vise attached to the back of the machine. The pipe is inserted through the back of the machine, with the end to be threaded against the back of the dies. The gear is then revolved by means of the pinion which engages with it, and, as the dies revolve, they are caused to recede into the shell, by a lead-screw on the back of the gear, which brings the dies onto the pipe. The recent improvements are the adjustable shell, the new automatic cutting-off device, and the adjustable face-plate stop. One of the chief objections that has been made to this style of machine, of whatever make, is that the die-carrying ring is supported only on the ends of the teeth inside the casing, and, as this partial support is constantly full of oil and chips, sooner or later, the ends of the teeth are worn or ground off, which makes the gear a loose fit in the shell. As soon as this occurs, the gear will tip, when subjected to any strain, which, in turn, prevents the dies from tracking, with the result that a crooked or drunken thread, or no thread at all, is cut. The only remedy is a new gear, made especially to fit the enlarged casing or shell. All the Forbes die-stocks are now provided with an adjustable shell for the purpose of taking up this wear.

In the cut, on the top of the machine will be seen a slot, with a lug on either side of it connected by a screw. By simply tightening this screw there is enough spring in the casting to take up almost any amount of wear. By this means very loose gears can be made a very tight fit. This improvement prolongs the life of the machine many times. With this adjustment the gear can be kept a tight working-fit for a practically indefinite time.

In the old style the cutting-off device was simply a blade-cutter, forced forward by a wedge driven in behind it by a screw. In the new style a skew rack is cut on the cut-off tool, which engages with a worm-wheel. This worm-wheel in turn engages with a worm, which, by means of a star-wheel, is driven automatically by the machine. As the die-carrying gear is revolved, the cutter-blade is driven forward by an automatic feed, and cuts the pipe off, without leaving any burr, and perfectly true and straight. The feed is both forward and backward, and it can be used either automatically or by hand, as desired.

The new face-plate stop is designed so that after the dies are once set and opened again to take the pipe out after cutting the thread, they can



THE FORBES IMPROVED DIE STOCK.

be snapped back to the original position quickly and without the trouble of resetting them. Messrs. Curtis & Curtis, of Bridgeport, Conn., manufacture this machine.

MINERAL COLLECTORS' AND PROSPECTORS' COLUMN.

(We shall be pleased to receive specimens of ores and minerals, and to describe and classify them, as far as possible. We shall be pleased to receive descriptions of minerals and correspondence relating to them. Photographs of unusual specimens, crystals, nuggets and the like will be reproduced whenever possible. Specimens should be of moderate size and should be sent prepaid; we cannot undertake to return them. If analyses are wanted we will turn specimens over to a competent assayer, should our correspondent instruct us to do so and send the necessary money.—Editor E. & M. J.)

165.—J. J. D.—Hematite.—Ilmenite.—The shiny black mineral in a bunch of radiating crystals is hematite, a common ore of iron. Its mode of occurrence in the specimen you send is, however, decidedly uncommon. Specimen No. 2, the black mineral occurring in plates in a quartz gangue is probably not promising. No. 3 is quartz carrying galena, lead sulphide, and tetrahedrite, gray copper ore. The rock is very rich looking, and an assay will very likely show good values. A 2-ft. vein of such stuff is well worth prospecting carefully. No. 4 is a very pretty specimen. The white mineral is calcite, the black menite, a titanium-iron oxide. Neither specimen is tin ore.

166.—A. H.—Quartz.—Specimen No. 1 is a coarse granite containing large red crystals of orthoclase feldspar. No. 2 is vein quartz, carrying crystals of iron pyrite and possibly some copper pyrite. The specimen may carry gold, but it looks like argentite, silver sulphide, rich stuff.

167.—G. W. S.—Platinum Nuggets.—We do not know who has the largest nugget of platinum in existence, but in all probability the Russian Government has the finest collection of large nuggets. In this country there are some nice specimens in the mineralogical collection of

Harvard University, while Baker & Company, of Newark, N. J., the platinum refiners, have a very large nugget. There is also a large nugget in the Eggleston Museum of Columbia University, New York.

168.—Inesite.—The latest "Bulletin of the Field Columbian Museum Chicago, notes some specimens of this rare mineral from a mine near Villa Corona, in Durango, Mexico. It occurs in tufts of radiating crystals of flesh-red color. In composition it is chiefly silica and manganese oxide, with small quantities of lime, magnesia and iron oxide.

QUESTIONS AND ANSWERS.

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

Magnetic Separators.—Where can I find accounts of the Wetherill separator? Also of some other forms of magnetic separator in actual use?—T. E. E.

Answer.—The Wetherill separator was fully described in the "Engineering and Mining Journal," July 17th and 24th, 1897. Other forms of magnetic separators in use at iron mines in Sweden were described and illustrated in a paper by Mr. H. C. McNeill on "Recent Practice in Magnetic Separation in Sweden," which was published in the "Engineering and Mining Journal," November 18th and 25th, 1899.

Solvent for Precious Metals.—I have received proposals from a company having a secret solvent for gold, silver and copper ores, which, it is claimed, will take out all the values. Do you know anything about it?—N. J.

Answer.—We do not know the special process you mention. On general principles, however, it is best to distrust anyone who has a "secret" solvent or process for the extraction of metals. Such solvents usually act much more promptly and efficiently on the bank accounts of those who invest in them, than on the ores or metals.

Uranium Ore.—I have several uranium claims, and would like to know what the ore is worth; where it can be sold; and what are its uses.—L. F. S.

Answer.—The value of the ore depends on its nature and the proportion of metal contained. There are several buyers, one of the best known being located in Denver. Others may be found if you will consult the advertising columns of the "Engineering and Mining Journal." We suggest that your best way to find buyers is to advertise that you have ore for sale. The uses of uranium have been fully treated in previous numbers of the "Engineering and Mining Journal" and in the volumes of "The Mineral Industry."

Power Required to Run Jigs.—Can you tell me any way of estimating the power required to run several jigs?—N. McD.

Answer.—Prof. R. H. Richards ("The Mineral Industry," Volume VIII.) says: "The power required to drive a jig depends on the area of the sieve; the height of the tail-board; the specific gravity of the jiggling stuff; the length of stroke and the number of strokes per minute. The consumption of power varies between 0.5 and 2 H. P. as a rule. Fraser & Chalmers, in computing new work, allow 1.5 H. P. on a 1-sieve jig, 2 H. P. for a 2-sieve jig, 2.5 H. P. for a 3-sieve jig, and 3 H. P. for a 4-sieve jig. To this they add 15 per cent. for friction of shafting, slip of belts, and other mechanical losses of power."

Bromine Recovery.—Can you tell me what is the latest method for the recovery of bromine from waste liquors?—J. T. R.

Answer.—Dr. Borchers ("The Mineral Industry," Volume VIII.) says: "Electrolysis offers a most economical way for the recovery of bromine from the waste liquors of potassium chloride works. The lyes contain 40 per cent. magnesium chloride, small quantities of alkaline chloride, 2 to 4 per cent. magnesium sulphate and 0.2 to 0.3 per cent. bromine. These solutions were subjected to the following treatment. They form the electrolyte contained in wooden tanks, each about 6 ft. long, 2.5 ft. wide and 1.5 ft. deep. Carbon blocks were arranged as electrodes in series 0.5 in. apart, and an electromotive force between the two electrodes of from 3 to 3.5 volts was maintained, with a current density of about 35 amperes to 1 sq. ft. of surface. The bromine was subsequently recovered from the electrolyzed lye by distillation."

Utilizing Waste Heat from Roasting Furnaces.—Is there any way of utilizing the waste heat from a roasting furnace? There seems to be much heat lost in some forms of such furnaces?—J. T. R.

Answer.—Mr. H. W. Hixon—"Notes on Lead and Copper Smelting and Copper Converting," page 113—says: "I have made experiments in utilizing the heat of the waste gases of the Bruckner flue in making steam, and have succeeded in raising steam to 100 lbs. pressure in small quantity. The steam generator was made of 10 pipes, 3-in. diameter and 130 ft. long, suspended from the arch by hangers, all being connected at one end with a common feed-water main, and at the other to a steam drum. Ample return pipe was provided for the water which is blown into the steam drum to return along with the feed-water. It was found that the pipes were soon coated with flue-dust, and did not absorb the heat as rapidly as they did when clean. The steam generated fell off rapidly and, unless the pipes were cleaned the steam amounted to little. This device, however, acting as a feed-water heater attached to a boiler, effected considerable saving."

CEYLON GRAPHITE.—According to a paper read recently before the London Geological Society by Mr. A. K. Coomara Swami, the Island

of Ceylon is surrounded by raised beaches, and has been elevated in recent geological times; fluviatile deposits also occur; the gems for which Ceylon is famous are obtained from gravels in the Ratuapura district. With the exception of these recent deposits, the island probably consists entirely of ancient crystalline rocks. Graphite occurs chiefly in branching veins in igneous rocks, which at Ragedata are granulites and pyroxene granulites. The relations to the matrix are held to favor the idea of the deposition of the mineral as a sublimation product (Walther), or from the decomposition of liquid hydrocarbons.

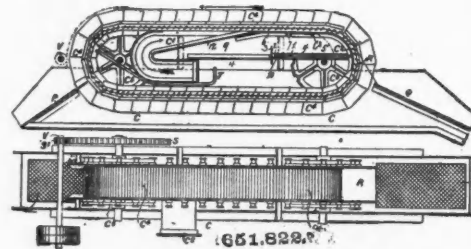
PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of the 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 Scientific Publishing Company upon receipt of 25 cents.

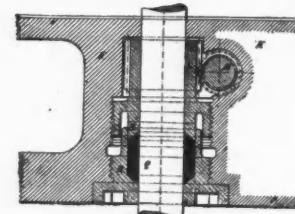
Week Ending June 19th, 1900.

651,822. **APPARATUS FOR CLEANING OR WASHING PYRITES OR OTHER MINERALS.** Cuthbert Burnett, The Grange, and Henry T. Newbegin, Newcastle-on-Tyne, England. An endless inclined metallic traveling belt, metallic prismatic grid-bars inclined downwardly in the direction of travel, a second series of grids on the



bases of said prismatic grids carrying the load, a screen between said series of grids, upstanding overlapping side plates at the ends of said grids to form a traveling trough and means for projecting water up through the belt contrary to the direction of travel.

651,837. **CONSTRUCTION OF DOUBLE-ACTING AIR-COMPRESSORS.** Edmond M. L. Duval, Paris, France, assignor to La Compagnie de Pives Lille, same place. Combination with high and low pressure cylinders arranged tandem wise, pistons therefor, and a piston-rod common to both pistons, of an intermediate part interposed between and closing the inner end of the cylinders and through which the piston-rod passes and has a bearing, an interiorly screw-threaded recess about the piston-rod extending part way through



651,837

the intermediate part, a movable compressing-sleeve about the piston-rod at the inner end of the recess formed at one end with gear-teeth and at the other end with exterior screw-threads in engagement with the interior threads of the recess, a fixed sleeve about the piston-rod screw-threaded into and closing the open end of the recess, packing interposed between the fixed and movable sleeves, a worm in engagement with the gear-teeth on the movable sleeve, and an operating-shaft for turning said worm, said worm and shaft being mounted entirely within the intermediate section.

651,849. **ELECTROLYTIC APPARATUS.** Max Haas, Aue, Germany. In an electrolytic apparatus for the manufacture of bleaching-lye from chloride, the combination of a tank having inlet and outlet openings at its opposite ends, with double-pole electrodes provided within said tank, ribs and serving as top and bottom supports for said electrodes, openings alternately arranged in the middle and at the sides of the electrodes, electric connections leading from the positive and negative end electrode.

651,900. **ROLLING-MILL GUIDE.** Owen F. Leibert, Bethlehem, Pa. The combination with the rolls of a rolling-mill, of a feed-table and cross-bars arranged at the delivery side of the rolls, side guards on the cross-bars, and a bridge between the cross-bars.

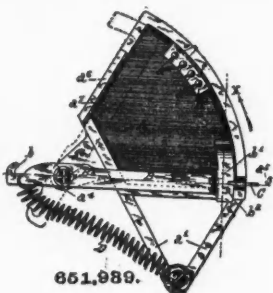
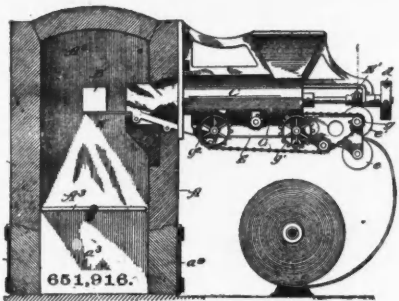
651,900. **BURNER FOR LIQUID FUEL.** Paul E. Thurow, Hamburg, Germany. A burner comprising an internally threaded cup-shaped base provided with an axial threaded bearing, and an external nozzle closed at its inner end and screwed to the base to form a chamber between the two, an internal open-ended nozzle screwed axially into the closed end of the external nozzle, means for supplying liquid fuel and a combustible vapor under pressure.

651,916. **FURNACE FOR PRODUCING CALCIUM CARBIDE.** John Zimmerman and Isidore S. Prenner, Chicago, Ill. The combination of a furnace-chamber, electrodes in the chamber having an arcing space between them, a flat strip of combustible flexible material projected horizontally into the furnace-chamber in line with the arcing space and having a forward feed, means for continuously introducing a supply of carbide-producing material thereon, and means for projecting and feeding the strip horizontally forward.

651,939. **FUSE-IGNITER.** Maurice O. Smith, Springfield, Ill., assignor of one-third to Charles Kritzberger, same place. The combination of a sweep having a serrated and upturned foot, a box above which said sweep is oscillative, a free-holder adapted to support fuses in position to be engaged by the serrations on foot of said sweep, and means for operating said sweep.

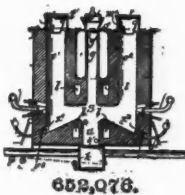
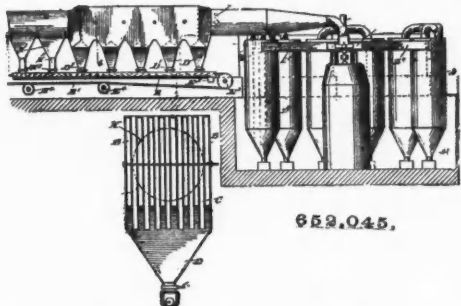
651,944. **DETACHABLE TOOTH FOR STEAM-SHOVEL BUCKETS.** Bartley Brown, St. Paul, Minn., assignor of one-third to Daniel J. Keefe, same place. In combination with the steam-shovel bucket, a tooth, carried by the bucket and projecting from its cutting edge, sockets for receiving the shank of the tooth and means for locking the tooth in the sockets.

651,959. **GAS-PURIFIER.** George P. Washburn, Chadron, Neb. The combination with a chamber constructed to contain a body of water and a gas-supply pipe, of a gas cooler and purifier, comprising a cylinder having a closed upper and an open lower end, a guide for the



supply-pipe extending up into the cylinder, separate connections between the guide and the cylinder.

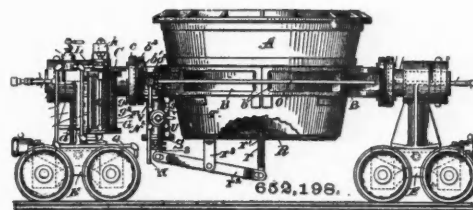
- 651,965. **PROCESS OF HARDENING AND TOUGHENING ARMOR-PLATES.** Emml Ehrensberger, Essen, Germany, assignor to Fried. Krupp, same place. The process consists in heating the side which is to be hardened to a temperature corresponding to the degree of hardness desired, heating the other side which is to become tough to a temperature lower than that necessary to produce hardening, and suddenly cooling the plate from the different temperatures.
- 651,972. **DERRICK APPARATUS.** Samuel Mation, New York, N. Y., assignor to the Lidgerwood Manufacturing Company, of New York. In a derrick, in combination, a mast, a hoisting and swinging boom, a boom-hoisting rope, a load-hoisting rope, a boom-hoisting rope, two frame members containing the bearings for rope-drum shafts, a load-hoisting rope drum and a boom-hoisting rope drum revolvably mounted between said frame members.
- 652,045. **METHOD OF CONDENSING FLUE-DUST.** Rudolf Ruetschi, Perth Amboy, N. J. The method for condensing flue-dust carried in fumes, consists in cooling the fumes under exclusion of air, by an external cooling medium, to precipitate a portion of the solid matter in the fumes, then compressing the fumes and mixing the same



with air, and then dividing and expanding the mixture and giving each divided current a whirling motion under exclusion of air, and at the same time cooling the mixture by an external cooling medium, to precipitate the remaining solid matter.

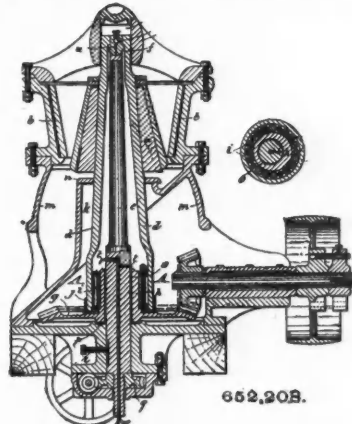
- 652,053. **NOZZLE.** Victor C. Swanson, Salem, S. D. The combination of a nozzle, means on which the nozzle is mounted, a spring attached to the body and extending longitudinally of the nozzle and engaged therewith to hold the nozzle in one position, and means attached to the nozzle for moving it against the tendency of the spring.
- 652,058. **LIQUEFIER FOR ATMOSPHERIC AIR.** Charles E. Tripler, New York, N. Y. A liquefier for atmospheric air comprising an exterior or main casing the interior of which is divided into channels or chambers for outgoing expanded air and which communicate alternately at top and bottom the exterior one of which is open at the outside of the said casing, a coil of pipe in said channels or chambers to which coil compressed air is supplied, an expander located in said casing and having one or more orifices through which the compressed air is expanded and in which expander the said coil of pipe terminates, and a trap connected in said coil or pipe, the said trap being located in one of said channels or chambers, and having a discharge-opening reaching to the outside of the apparatus.
- 652,065. **ROOFING COMPOUND.** Karl Wessel, Chicago, Ill., assignor, by direct and mesne assignments, to Herman Rendtorff, same place. A roofing compound consisting of coal-tar and dried and pulverized slaked lime mixed in proportion of about two parts coal-tar to one part slaked lime.
- 652,072. **TREATMENT OF ORE.** Guy de Bechi, Paris, France. The method of treating complex ores for the recovery therefrom of copper, zinc and lead, consisting in subjecting the said ore to a chloridizing roasting, treating the roasted ore with a solution of calcium chloride to remove soluble sulphates, lixiviating the ore to remove zinc and copper, and fractionally precipitating the zinc and copper from the solution, as hydrated oxides.
- 652,076. **HIGH-TEMPERATURE SMELTING-FURNACE.** Wilhelm Borchers, Aix-la-Chapelle, Germany. A high-temperature smelting-furnace having two opposite fuel-shafts, alternately serving as combustion and heat-accumulator chambers, a horizontal passage connecting the lower end portions of the fuel-shafts, a smelting chamber or shaft, arranged centrally between the fuel-shafts and opening at its lower end into said horizontal passage, means for feeding fuel to and for closing the upper ends of said fuel-shafts, nozzles at the lower ends of said fuel-shafts opposite said passage for delivering air or oxygen into the lower part only of the fuel in said shafts, a gas-escape pipe independent of the air-supply nozzles, having branches communicating respectively with the upper ends of said fuel-shafts for carrying off the gases therefrom, a valve at the intersection of said pipes for closing either branch discharge-pipe while the other remains open to discharge the gases from its fuel-shaft, and a collecting-box located below said smelting-shaft and having opening and closing devices.
- 652,081 and 652,082. **WATER-GAS GENERATOR.** James W. Chisholm, San Francisco, Cal. In a gas-generating apparatus, a regenerator consisting of several closely-connected chambers, each having receptacles containing materials of opposite polarities, a dust-chamber in direct and close communication therewith, and a furnace in direct and close communication with the dust-chamber.
- 652,085. **STAMP.** Martin R. Driscoll, Frisco, Utah. The combination of a head or boss having a socket open at its upper end, a plug located in the lower portion of the socket and having a convexed upper surface, arms engaging the plug at the periphery and extending upwardly therefrom in the socket, and a stem held between the upper portions of the arms and engaging the convexed surface of the plug.
- 652,106. **DISINTEGRATOR.** Rollin Hathaway, Detroit, Mich. In combination with a vat adapted to gyrate, means for giving the same a gyrating motion upon a lower universal joint.

- 652,119. **METHOD OF MAKING SULPHURIC ANHYDRIDE.** Rudolph Knietzsch, Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik, same place. The process consists in passing a gas containing sulphur dioxide and oxygen through a chamber containing a contact substance while removing from the contents of said chamber excess of heat due to the reaction.
- 652,179. **AIR-DRYING PROCESS.** James Gayley, Pittsburg, Pa. The method of drying air, which consists in passing the air through a cooling-chamber and intermittently interrupting its flow therethrough, whereby the air is caused to have alternate periods of rest and motion, cooling the air in contact with the cooled surfaces, and delivering the air so dried to a furnace or converter.
- 652,193. **FURNACE FOR ROASTING ORES.** Harrison B. Meech, Denver, Colo. A furnace for roasting ores having two or more ovens, each of said ovens having an opening in the bottom or bed thereof, and a shaft with longitudinal blades located in each of said openings, said shaft extending through the wall of said furnace, and mechanism for simultaneously rotating said shafts from the outside of said furnace.
- 652,198. **DUMPING-CAR.** Samuel Stewart, Woodward, Ala., assignor of one-half to Frank M. Eaton, same place. A pivotally mounted car-



body, a cylinder and air or steam pipes connected therewith, a rack and pinion forming an operative connection between the piston-rod of said cylinder and said car-body, whereby the said car-body may be tilted.

- 652,208. **CRUSHING-MILL.** Robert A. Hadfield and Alexander G. M. Jack, Sheffield, England. Crushing apparatus comprising a hollow shaft, a crushing-head carried by said shaft, a fixed ring surrounding said



crusher-head and mounted independently thereof, an upright pillar extending upwardly within the shaft which rests upon and is vertically supported internally at or near its upper end solely by said pillar, and means for imparting gyratory motion to said shaft.

- 652,226. **MANUFACTURE OF OPEN-HEARTH STEEL.** Ambrose Monell, Pittsburg, Pa. The method herein described of making steel which consists in introducing into a basic open-hearth furnace iron oxide and lime and molten pig-iron, substantially eliminating phosphorus from the iron while the iron is at a comparatively low temperature; withdrawing, at an early stage in the removal of carbon, the bulk of the slag containing the eliminated phosphorus, and heating the bath of metal and oxidizing the carbon until the carbon has been reduced to the point at which the metal is to be tapped.

GREAT BRITAIN.

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

- Week Ending May 19th, 1900.
- 10,850 of 1899. **TREATING ZINC FUMES.** T. Ryan and N. Hughes, Flint. Treating zinc fumes, tallings, etc., by adding caustic alkali and precipitating the zinc as oxide by means of carbonic acid.
- 12,232 of 1899. **GAS ABSORBER.** C. Still, Bruch, Germany. Improved absorbers for catching the gaseous by-products of coke ovens.
- 13,141 of 1899. **COAL DRILL.** W. F. Osborn and J. Morewood, Sheffield. An improved renewable drill for coal drilling machines.
- 14,303 of 1899. **COAL HANDLING.** W. H. Wall, Nanaimo, B. C. System for moving and discharging coal trucks on wharves.
- 15,206 of 1899. **HARDENING STEEL.** C. G. Meissner and R. Bennewitz, Magdeburg, Germany. A composition for use in hardening and tempering steel tools.
- 472 of 1900. **ZINC SMELTING.** C. Casorette and F. Berbani, Milan, Italy. A furnace for smelting zinc ores with carbon and with the aid of the electric current.
- 4,467 of 1900. **BLAST FURNACE GAS RECEIVER.** H. Rochling, Dieden-hofen, Germany. A drawing-off apparatus for gases of blast furnaces, particularly applicable where there is much dust.
- Week Ending May 26th, 1900.
- 9,175 of 1899. **TIN ORE DRESSING.** J. Rule, Camborne. An improved construction of buddle for dressing tin ores.
- 1,892 of 1900. **ZINC RETORT.** A. G. Clark, Cincinnati, O., U. S. A. An improved lining of retort for treating zinc ores that contain much iron.
- 2,290 of 1900. **PARTING BULLION.** H. Thofern, Paris, France. Method of oxidizing metals by means of superheated steam and air blown through their solutions, particularly for separating precious metals from bullion.
- 2,906 of 1900. **ZINC FURNACE.** J. D. James, Jersey City, U. S. A. A grate for zinc furnaces that produces a softer clinker than usual.
- 6,045 of 1900. **TUNGSTATE OF SODA.** G. T. Holloway and H. W. Lake, London. A method of producing tungstate of soda.

PERSONAL.

Mr. James W. Neill is in Butte, Montana.

Mr. Ezra Rue of Elgin, Ill., visited Central City, Colo., this week, where he has mining interests.

Mr. R. G. Legg resigned his position as superintendent of the Dexter Mine at Trescavora, Nev., on July 1st.

Mr. Victor M. Clement returned to Salt Lake City from California 10 days ago to remain a fortnight or more.

Mr. L. Humphrey of Central City, Colo., is in New Mexico, examining mining property for a New York syndicate.

Mr. P. L. Kimberley arrived in Salt Lake City last Saturday and probably will remain in Utah a fortnight, if not longer.

Mr. T. H. Oxnam, formerly with De La Mar's Mines, is on his way to London. He will visit the Paris Exposition before he returns to this country.

Senator S. V. Newell of the Concrete Mining Company, operating in Gilpin County, Colo., is spending a portion of his vacation in Milwaukee, Wis.

Nat Baxter, Jr., president of the Tennessee Coal, Iron and Railroad Company, is in the East. Mr. Baxter spends the greater part of his time in Birmingham.

Mr. Thomas Dempster of Chicago, Ill., paid a visit to the property of the Banta Hill Gold Mining Company near Central City, Colo., during the past week.

Dr. T. Kochibe, the director of the Imperial Geological Survey of Japan, has arrived at San Francisco on the steamer "Pippon Maru" on his way to the Paris Exposition.

Mr. W. F. Snyder has returned to Utah from a trip to Chicago and New York, having succeeded in interesting a coterie of wealthy people to investigate the worth of some promising mines.

Mr. Fred W. Bradley, of San Francisco, has been appointed to succeed the late Capt. Thomas Mien in the management of the mining interests of the London Exploration Company on the Pacific coast.

Mr. Allen Kinkead has resigned his position as foreman of the Best & Belcher and Gould & Curry mines, to accept a position in South Africa. He will leave Virginia City for New York about July 4th.

Mr. F. L. Bosqui, who has been superintendent of the cyanide department of the Peck reduction plant at Pandora, Colo., has been appointed superintendent of the entire plant. He succeeds Mr. Carl Andersen, who will go to Arizona.

Mr. H. W. Hardinge, of Denver, Colo., has just returned from a trip to Arizona, where he has been investigating zinc-lead producing mines which have been idle for years, with a view to their profitable reopening by the employment of modern improvements in concentrating and smelting.

Captain J. R. De La Mar sailed from Liverpool for New York a week ago. He will spend several days near the Atlantic Coast, and is booked to be in Salt Lake City July 15th. His large mining undertakings in Utah, Nevada and California will detain him in the United States for two months or longer.

Mr. R. Kondo, president of the Ashio Copper Mining Company, of Shimotsuke, Japan, and Mr. Masayuki Otagawa, mining engineer of the company, have been spending some time in this country, where they have visited a number of the leading mines. They expect to sail from New York July 14th, on their way to visit the Exposition in Paris.

Mr. Chauncey G. Newton has resigned his position as mining engineer with the Century Coal Company of Valga, Barbour County, W. Va., to accept the position of superintendent and engineer for the Congo Coal & Mining Company of Congo, Parry County, Ohio. The change takes place in about a month. Mr. Newton's successor has not yet been named.

Professor W. B. Clark, of Johns Hopkins University and the Geological Survey of Maryland, has been appointed by the Governor of Maryland, Commissioner on behalf of the State of Maryland to act with a similar Commissioner on behalf of the State of Pennsylvania and the Superintendent of the United States Coast and Geodetic Survey in the re-establishment of the old historic Mason & Dixon line, in part forming the boundary between Maryland and Pennsylvania.

OBITUARY.

Hamilton Smith, well known both in this country and abroad as a mining engineer and

mine operator, died suddenly at Durham, N. H., July 4th. His death was caused by heart failure, the immediate result of over-exertion while boating. Mr. Smith was the son of Hamilton Smith and grandson of Valentine Smith. He was a native of Louisville, Ky., and 60 years of age. As a mine operator he was identified with some of the largest deals in mining properties in the United States, particularly in gold and copper mines. He was a member of the firm of Smith & Perkins, of New York, and was for a number of years actively connected with the Exploration Company of London, representing its interests in America. He was an expert mining engineer and his opinions on mining properties were regarded with great respect, both here and in England. We hope to publish a fuller obituary in our next issue.

Charles A. Martine, who died in Georgetown, Colo., recently, was born in Germany in the year 1838. He received a thorough scientific education at the University of Goettingen and in his early youth numbered among his intimate friends such distinguished German scientists as Liebig, Plattner and others. He came to this country in the year 1858, and as one of his old-time friends, Professor Charles Joy, was then professor of chemistry at Columbia College, he went to him as assistant, and remained in New York in this position for a year or two. He spent some time in Buffalo, where he made many friends. At the outbreak of the War he volunteered his services, and was for four years a chief engineer in the United States Navy. His very thorough mechanical skill was of great service on shipboard. At the close of the War, in 1866, he crossed the plains and went to Central City, Colo., remaining there, however, but a few months, going over the mountains into what is now the town of Georgetown, in the summer of 1867. His thorough knowledge of chemistry and metallurgy prompted him to make the first effort to reduce the silver ores discovered about this time in the mountains surrounding Georgetown. The firm of Garritt, Martine & Company was formed, and in what was known as the "What-Cheer" Mill he produced the first silver bars ever made in the State of Colorado, in the winter of 1867. This antedates the metallurgical treatment of ores by the late Senator Hill at Blackhawk, and to Mr. Martine belongs the credit of having first successfully reduced into bullion the silver from the complex ores of this district. In 1870 he entered into partnership with the late G. W. Hall and General Frank J. Marshall, and built a sampling mill for the purchase of ores. He was intimately connected with the development of the mines of this district, and did much toward placing the mining and treatment of the ores upon a thoroughly practical basis. Mr. Martine was a man of very high scientific attainments, and especially excelled in the sciences of metallurgy, mineralogy and kindred subjects. He was of an exceedingly retiring disposition, but his cabin in the town of Georgetown was the center of interest to many distinguished men who in the early days visited the camp. He entertained at different times Generals Grant and Sherman and many other well-known men. He was looked up to by the entire community as a man of great learning, and everything with which he was connected bears the imprint of his strong character. Living comparatively alone, he passed his leisure time in study. His books of reference were of the best and he kept himself abreast of the times by taking the leading journals published, both in this country and abroad, on science, literature and art. A fluent scholar, he read with equal ease in French or in German. He was an active member of the Colorado Scientific Society, and also held membership in the Loyal Legion. Although he had no relatives in this country, he had a host of friends who will learn of his death with great sorrow. Fully conscious to the last, he faced death as he had the hard life of the early pioneer, with fortitude.

SOCIETIES AND TECHNICAL SCHOOLS.

Royal Society of Canada.—The nineteenth meeting was held in Ottawa, Canada, from May 28th to May 31st inclusive, in the Assembly Hall and rooms of the Provincial Normal School. Besides fellows of the Society from various provinces there were delegates from affiliated societies in all parts of the Dominion of Canada who reported as to the work done by them. Rev. Professor Clark, the principal of Trinity University, Toronto, delivered the annual address "On the Work of the Royal Society." Numerous papers bearing upon history, science and belles-lettres were read. The following is a list of the officers of the society elected for the ensuing year: President, Dr. Louis Honore Frechette; vice-president, President Loudon of Toronto University; honorary secretary, Sir John G. Bourinot; honorary treasurer, Dr. James Fletcher. In the Geological and Biological Section the following officers were elected: Chairman, Dr. A. H. Mackay, Halifax, Nova Scotia; vice-chairman, Professor F. D. Adams, McGill University, Montreal; secretary, Professor G. U. Hay, St. John, New Brunswick.

The Western Pennsylvania Central Mining Institute.—This association met in Pittsburgh last week. About 50 members were present. T. B. DeArmit is president of the Institute and called it to order. James Blick is secretary. The business began with remarks by President DeArmit as to the financial condition of the Institute. He reminded the members of the Institute that their organization had secured much useful legislation for their work and the miners, and cautioned them not to give up the work they have already begun. Fred C. Keighly of Uniontown read a paper on "Bituminous Coal Mining Operations of the Past, Present and Future." He traced the history of the discovery of coal in the earliest ages down to the present, and mentioned the various uses to which it had been put as a fuel. He showed that the first discovery of coal in America was made by Father Hennepin, a Catholic priest, in 1669, in Illinois. The city of Pittsburgh was laid out in 1764, and 20 years later the privilege to mine coal was granted by William Penn. Anthracite coal was discovered in 1768. Mr. Keighly spoke of modern appliances for mining coal and predicted that many more improvements would soon be made. The members of the Institute and their friends visited the Homestead mills of the Carnegie Company, and the Carnegie Library during the afternoon.

Engineering Association of the South.—On Friday, June 15th, the Association held its annual outing at Mount Pleasant, Tenn., where the Local Committee on Entertainment gave a hearty welcome and throughout the day exerted themselves to make everyone have the most delightful time. At the plant of the Tennessee Phosphate Company the party was entertained. After the plants of this company were thoroughly inspected the special was run up the Mount Pleasant Southern Railway to the plant of the American Phosphate Company, where dinner was served. After dinner a short business session was held, and in the absence of President Geddes, Mr. John B. Atkinson of Earlington, Ky., was called to the chair. Ballots for membership were canvassed and resulted in the election of the 15 applicants. Applications for membership were received from two gentlemen. Resignation of Mr. Howard White, Jr., was accepted. Resolutions thanking the following parties were passed: President M. H. Smith of the Louisville & Nashville Railroad, for the transportation of the party, and other officials of said road who contributed largely to the success of the occasion; the ladies; the committee on arrangement and the local committee; and the various phosphate companies. The business session then adjourned. Under the guidance of Messrs. H. D. Ruhm, general manager, and G. F. Blackie, superintendent of the American Phosphate Company, an inspection of their recently completed plant was made. Much credit is due Messrs. Ruhm and Blackie, who were the designers and constructors. The special then made a run to the Bluegrass Phosphate Company's and International Phosphate Company's works, after inspecting which, the return trip to Nashville was begun.

Society for the Promotion of Engineering Education.—The eighth annual meeting began at Columbia University, New York, July 2d. In the absence of President Ira O. Baker of the University of Illinois, Vice-President Robert Fletcher of the Thayer School, Dartmouth, presided. Prof. James M. White of the University of Illinois read President Baker's annual address. The paper said there are 89 institutions which had classes in 1898-9, while the total number of students was 9,679, with graduates for the year 1898-9 of 1,413. In the afternoon Prof. J. B. Johnson, dean of the College of Mechanics and Engineering in the University of Wisconsin, read a report for the committee on industrial education. Prof. Johnson described the demands at present for a specific industrial training for particular employments and the present agencies in America for meeting the demand. These consist of manual training schools, art industrial schools, textile schools, engineering schools, agricultural colleges, night schools, correspondence schools, and schools maintained by large manufacturing industries. While these were all to be commended, according to the report, it pleaded for more specific trade or monotechic schools similar to those of Germany. A general discussion of the report followed. It was decided to continue the committee for a year. Before the close of the meeting a paper on secondary technical education in mechanical and electrical lines was read by Prof. A. L. Williston, director of the department of science and technology in Pratt Institute.

The society elected the following officers for the ensuing year: President, Prof. C. O. Marvin, of the Kansas State University; vice-president, Prof. Albert Kingsbury, of the Worcester Polytechnic Institute; secretary, Prof. H. S. Jacoby, of Cornell University; treasurer, Prof. C. A. Waldo, of Purdue University.

American Association for the Advancement of Science.—At the closing meeting in New York last week, it was decided to hold the next an-

nual meeting of the association at Denver, Colo., beginning August 24th, 1901. The following officers were elected:

President—Charles Sedgwick Minot, Harvard Medical College, Cambridge.

Vice-president of the various sections of the General Council—Mathematics and Astronomy, James MacMahan, Cornell University, Ithaca; Physics, D. B. Brace, University of Nebraska, Lincoln; Chemistry, John H. Long, Northwestern University, Evanston, Ill.; Mechanical Science and Engineering, H. S. Jacoby, Cornell University, Ithaca; Geology and Geography, C. R. Van Hise, University of Wisconsin, Madison; Zoology, D. S. Jordan, Leland Stanford University, Stanford, Cal.; Botany, B. T. Galloway, Department of Agriculture, Washington; Anthropology, J. Walter Fewkes, Bureau of American Ethnology, Washington; Economic Science and Statistics, John Hyde, Department of Agriculture, Washington.

Permanent secretary—L. C. Howard, Department of Agriculture, Washington.

General secretary—William Hallock, Columbia University.

Secretary of the Council—D. T. McDougall, Botanical Gardens, New York.

Secretaries of the sections—Mathematics and Astronomy, H. C. Lord, Ohio State University, Columbus; Physics, J. O. Reed, State University of Michigan, Ann Arbor; Chemistry, W. McPherson, Ohio State University, Columbus; Mechanical Science and Engineering—W. H. Jacques, Massachusetts Institute of Technology, Boston; Geology and Geography, R. A. F. Penrose, Pierce, Ariz.; Zoology, H. B. Ward, University of Nebraska, Lincoln; Botany, A. S. Hitchcock, State Agricultural College, Manhattan, Kan.; Anthropology, G. G. McCurdy, Yale, New Haven; Economic Science and Statistics, C. A. Bennison (unattached), Cambridge, Mass.; Treasurer, R. S. Woodward, Columbia University.

INDUSTRIAL NOTES.

The Birmingham Rail and Locomotive Company of Birmingham, Ala., has sold 50 tons of steel rail to a sugar plantation in the United States of Colombia, South America, shipment to be made in August next.

It has been announced that the boiler works of the James Rees & Sons Company and the works of the Carroll-Porter Boiler and Tank Company, in Pittsburg, both of which were destroyed by fire last week, will be rebuilt at once.

The American Sheet Steel Company is overhauling the old Meadow rolling mill property at Scottsdale, Pa. It is expected the plant will be in shape to be operated in August. Two annealing furnaces and a large warehouse are being built at the plant, and new rolls will replace worn-out ones.

President H. B. Shields, of the Girard Iron Company, Girard, O., states that Mattie Furnace is not to be blown out for repairs. Although the furnace is in the fourth year of its present equipment, it is enjoying its usual run, and will not be blown out until absolutely necessary. Mattie Furnace is regarded as one of the best producers in the Valley.

A company, composed of York, Pa., men, with a capital of \$300,000, has leased for 20 years the mining right of 6,200 acres of land in the Tonawanda Indian Reservation, Genesee County, New York. The company will erect a mill at Buffalo and work a gypsum deposit into plaster. The new plant will be in operation by November next.

Robeson furnace, at Robeson, Pa., which had been in continuous blast for nearly two years, has been blown out for repairs. This is one of the largest stacks in the Lebanon Valley, and had been producing an average of about 1,100 tons weekly ever since it went into blast. It will take about six weeks to reline the stack and complete the necessary repairs.

Fraser & Chalmers, Chicago, have received from the Anaconda Copper Mining Company orders for a large amount of machinery for the new concentrating plant which will have a capacity of 4,000 tons per day. This machinery includes 24 heavy pattern 5-ft. Huntington centrifugal roller quartz mills, 24 sets of 40 by 60-in. crushing rolls, with forged steel shells, and 24 Blake crushers, sizes 24 by 12-in. and 15 by 9-in.

The Jeanesville Iron Works Company, Denver Branch, A. Middlebrook, manager, reports the following recent sales and shipments. The City of Grand Junction, Colo., compound pump, capacity 1,500,000 per day. Parral, Mexico, compound condensing mine pump and 9 B sinker. B. & M. Mine at Ward, Colo., high lift station pump. Victor Fuel Company, Denver, two electric station pumps. S. J. Sullivan, Leadville, Colo., 9 B sinker. El Paso Mine, Cripple Creek, Colo., 9 B sinker.

The E. A. Humphries Brick Company has be-

gun the manufacture of all kinds of special shapes of brick, including sleeves, nozzles and runner brick for steel plants, at its works at Gratztown, near West Newton, Pa. A large amount of special machinery has been installed, which will greatly increase the capacity of the plant, and which will also make a more uniform brick than heretofore. Samples of the work are now being sent out to many of the steel plants. E. A. Humphries, the president of the company, has been connected with the H. C. Frick Coke Company for many years, and B. F. Johnston, general manager, has had wide experience in the manufacture of these shapes, as manager of the Manufacturing Company's works.

The Aultman Company, at Canton, O., reports that its recent orders include a sand-handling system for the foundry of the Massillon Iron and Steel Company, at Massillon, O.; two large No. 5 Aultman rock crushers for the Bonnet Company, of Canton, O.; one No. 5 rock crusher and one car-haul for the Page Woven Wire Fence Company, of Monessen, Pa.; refuse conveyors for the Acker Lumber Company, of Livermore, Ky., and the Hall & Lyon Company, of Waverly, N. Y.; one complete plant for the manufacture of tile and building blocks for the Beatty Fire Clay Company, of Magnolia, O.; one tippie-house equipment for the Indian Run Coal Company, of Canton, O.; one complete system of elevating and conveying machinery for A. W. Colwell & Company, at Marine City, Mich.; six ingot charging machines for the Wellman-Seaver Engineering Company, of Cleveland, and a pulp carrier for the Munroe Falls Paper Company, of Munroe Falls, O.

The American Bridge Company has issued a circular giving particulars of the consolidation which have been already published in our columns. A corrected list of the various companies forming the consolidation is as follows: American Bridge Works, Chicago, Ill.; Berlin Iron Bridge Company, East Berlin, Conn.; Buffalo Bridge & Iron Works, Buffalo, N. Y.; Carnegie Steel Company (Keystone plant), Pittsburg, Pa.; Edge Moor Bridge Works, Wilmington, Del.; Elmira Bridge Company, Elmira, N. Y.; Gillette-Herzog Manufacturing Company, Minneapolis, Minn.; Groton Bridge & Manufacturing Company, Groton, N. Y.; Hilton Bridge Construction Company, Albany, N. Y.; Horseheads Bridge Company, Horseheads, N. Y.; Lafayette Bridge Company, Lafayette, Ind.; Lassic Bridge & Iron Works, Chicago, Ill.; N. J. Steel & Iron Company, Trenton, N. J.; New Columbus Bridge Company, Columbus, Ohio; Pittsburg Bridge Company, Pittsburg, Pa.; A. & P. Roberts Company (Pencoyd Iron Works), Pencoyd, Pa.; Post & McCord, Brooklyn, N. Y.; Rochester Bridge & Iron Works, Rochester, N. Y.; Schultze Bridge & Iron Works, Pittsburg, Pa.; Shiffler Bridge & Iron Company, Pittsburg, Pa.; Union Bridge Company, Athens, Pa.; Milwaukee Bridge Company, Milwaukee, Wis.; Wrought Iron Bridge Company, Canton, Ohio; Youngstown Bridge Company, Youngstown, Ohio. The executive organization is made up entirely of men of large practical experience, headed by Percival Roberts, Jr. Joshua A. Hatfield has been appointed assistant to the president, and will also have charge of the sales of the rolling mill products of the Pencoyd plant. The engineering department is in charge of Mr. Charles C. Schneider, formerly chief engineer of the Pencoyd Iron Works, with the title of vice-president, in charge of engineering. Mr. Schneider has full charge of all questions of engineering, including the preparation of all plans, estimates and working drawings, and of all engineers of the company, whether engaged in contracting, operating or erecting departments. The operating department is in charge of Mr. Charles M. Jarvis, formerly president of the Berlin Iron Bridge Company, with the title of vice-president in charge of operating. All local managers are under the direct charge of a general manager, Mr. James P. Kennedy, formerly president of the Youngstown Bridge Company. The erecting is also in charge of the operating department, and this is under Mr. William Wennas, as superintendent. All the sales of the company are in charge of the contracting department. This is divided into three distinct parts, railway contracting, highway contracting and structural contracting. The railway contracting is in charge of Mr. Charles Macdonald, formerly president of the Union Bridge Company. The highway contracting is in charge of Mr. Frank Conger, formerly president of the Groton Bridge and Manufacturing Company, and the structural contracting is in charge of Mr. W. H. McCord, formerly of the Post & McCord Company. The preparation of all proposals and contracts is in charge of this department. The mechanical department has been made of equal importance with all other departments, and has been placed in charge of Mr. James Christie, formerly mechanical engineer of the Pencoyd plant, with the title of vice-president. The mechanical details of all the various plants belong to this department. The financial department is in charge of Mr. William H. Connell, formerly president of the Edge Moor Bridge Works, as treasurer, with F. M. Wytgan, formerly general manager of the Wrought Iron

Bridge Company, and F. H. Schmidt, formerly secretary and treasurer of the Youngstown Bridge Company, as assistant treasurer. The auditor is Mr. Charles C. Price, formerly with the Pencoyd Iron Works. The purchasing department is in charge of Mr. Francis W. Heisler, formerly purchasing agent for the Edge Moor Bridge Works, with headquarters at 259 South Fourth street, Philadelphia, Pa. The assistant purchasing agent is Mr. E. A. Muench, formerly purchasing agent for the A. & P. Roberts Company. The secretary of the company is Mr. Douglas O. Morgan, formerly a member of the law firm of Seward, Guthrie & Steele.

TRADE CATALOGUES.

J. H. Frenier & Son, of Rutland, Vt., successors to Frenier & Le Blanc, issue a very neat twelve-page pamphlet describing the special sand pump they manufacture. This device has been well tested at numerous mills and quarries for pumping sand, crushed ore, pulp slimes and tailings. It has no valves and is not open to the objections to a centrifugal pump. The pamphlet shows its construction very clearly.

The Baldwin Locomotive Works, of Philadelphia, Pa., has issued an illustrated pamphlet of 35 pages describing its exhibit at the Paris Exposition. The pamphlet gives a brief history of the works and describes at length two types of locomotives recently built by the Baldwin Works for export. These are the "American Compound" express locomotives built for the French State railways and the "Mogul" locomotives built for the Great Northern line of England.

The Thew automatic steam shovel for which many points of excellence are claimed is described in an 8-page circular issued by the Thew Automatic Shovel Company, of Cleveland, O. This shovel has been installed at seven iron ore docks and has been well tested. Its dipper has a horizontal motion imparted by a sliding trolley, from which the dipper is suspended by an adjustable arm and about which it rotates. The shovel thus differs widely from the usual type of shovel in which the point of rotation is fixed and the motion of the dipper is controlled by a direct thrust along the dipper arm. All movements on the Thew shovel are stated to be governed by levers so arranged as to be easily operated by one man. Wire ropes are used instead of chains for moving the dipper and the turntable on which the shovel is mounted revolves in an entire circle.

The Great Northern Portland Cement Company, of Detroit, Mich., issues a handsome prospectus that treats of the plans of that company, incorporated with a capital stock of \$5,000,000. The company intends to establish a large plant at Baldwin, Mich., 30 miles east of Ludington, where the company has 6,000 acres of land, much of which is underlaid by marl and clay suitable for the manufacture of Portland cement. The president of this company is George Anderson, Detroit; first vice-president, Charles A. Strelinger, Detroit; second vice-president, Burton W. Yates, Detroit; treasurer, David Ogilvie, Detroit; secretary, Charles B. Parsons, Detroit; auditor, Arthur E. Barley, Detroit; directors, George Anderson, Charles A. Strelinger, David Ogilvie and Lemuel H. Foster, all of Detroit; William Fillingham of East Orange, N. J.; C. Frederick Smith and Frederick W. Garvin of New York, and Burton W. Yates and Charles B. Parsons of Detroit; consulting engineer, R. C. Carpenter, Cornell University, Ithaca, N. Y.

MACHINERY AND SUPPLIES WANTED.

If any one wanting machinery or supplies of any kind will notify the "Engineering and Mining Journal" what he needs he will be put in communication with the best manufacturers of the same.

We also offer our services to foreign correspondents who desire to purchase American goods of any kind, and shall be pleased to furnish them information, catalogues, etc.

All these services are rendered gratuitously in the interest of our subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, and have no pecuniary interest in buying and selling goods of any kind.

GENERAL MINING NEWS.

Oil Production.—In May the New York, Pennsylvania and West Virginia, Buckeye, O., South-eastern, O., and Indiana fields completed altogether 1,489 new wells, having an average daily capacity of 22,059 bbls., showing an increase of 140 wells and 1,077 bbls. in production, as compared with April. There were 1,218 wells drilling on June 1st, or 46 more than on May 1st. The total receipts by the pipe lines in May were 4,696,861 bbls., while the deliveries during the month were 4,042,902 bbls. The stocks on June 1st were 25,291,978 bbls., showing an increase of 813,018 bbls., as compared with May 1st. The average prices of crude petroleum in May were:

Part of the contention of the defence was that the location of the Concentrated was defective in the notice not stating in the affidavit that the affiant "had read the contents and knew them to be true."

The plaintiff showed that some 800 mining locations had been made in the county and more than 500 of them contained the same error, therefore it became a common error and became valid.

Another contention was that while the Concentrated location was the older the patent on the Florence was obtained first and priority should date from patent.

The judge ruled that on account of the defect in the location notice priority should date from patent, but notwithstanding his ruling the jury found on question of fact for plaintiff. W. F. Word, of Helena.

The Florence Company has been a steady dividend-payer for several years, so the verdict, unless reversed on appeal, will carry heavy damages.

Silver Bow County.

The Parrot Silver and Copper Company has commenced suit against Arthur P. Heinze, F. Augustus Heinze and the Montana Ore Purchasing Company to have the defendants restrained from carrying on mining operations in what is known as the 1,100-ft. level of the Nipper Mine. The plaintiff claims title to the ore bodies on that level for the reason that they are alleged to apex within the surface boundaries of the Adventurer lode claim. The plaintiff further alleges that the defendants have unlawfully and without its consent entered in and upon the disputed territory and are mining and extracting ore therefrom and will continue so to do unless restrained by an order of the court. Pending the final determination of the cause the court is asked to restrain the defendants from further trespass.

NEVADA.

Elko County.

(From Our Special Correspondent.)

Bull Run.—The 10-stamp mill which is being set up will start operating in August and the cyaniding annex to handle the tails will be in commission in September. A. H. Smith and J. M. Murphy are the principal owners and they and their associates are practical miners and the undertaking has the ear-marks of success. Bull Run is a gold proposition, situated on Bull Run Mountain, about 35 miles north of Tuscarora, 80 miles from Elko, the nearest railroad station.

Tuscarora.—The workings of the Dexter and Tuscarora are connected, in appearance forming one mine, and one surface equipment would suffice for both. Exploration is opening handsome high grade gold ore bodies. No stoping is done.

Young America.—After some little experimenting the 10-stamp mill is handling 30 tons per diem. Power is supplied by a gasoline engine. Another gasoline engine operates the hoist and gives the best of satisfaction. It is said Young America is making a clean profit.

NEW MEXICO.

Grant County.

John C. Rutherford, Charles R. Smith and G. M. Rutherford of Grant County have incorporated the Wilson Mining and Milling Company, with \$30,000 capital, with offices at Stein's Pass. The directors are Geo. B. Wilson, at Graham; D. Wilson, Geo. B. Wilson, Jr., John C. Rutherford and Charles R. Smith.

OREGON.

Jackson County.

Golden Standard Mining Company.—This company has bonded its mine near Jacksonville to a Montana man for six months, and the latter has started extensive operations for rapid development work, while the bond lasts. Casey & McWilliams are in charge of the mill and do custom work while the property is under bond. The price is not stated, but it is reported to be in the neighborhood of \$50,000.

PENNSYLVANIA.

Anthracite Coal.

Archbald.—Work has been resumed at this colliery after several months' idleness. The breaker has received a thorough overhauling, a new engine house has been erected, and the section-motion engines which have been in use at the colliery have been replaced by a first-motion engine. About 600 hands are employed.

Bituminous Coal—Connellsville District.

Hamilton Coal Company.—This company has been formed at Tarentum and has purchased 800 acres of coal lands opposite that town. In the purchase are the farms of Caldwell and Ross. The officers are: President, Robert Fields; vice-president, Herbert Russ; secretary and treasurer, D. G. White. Besides these officers the directors are: Samuel Lamond, J. N. Stewart, H. W. Boyd and William Kern. R. A. Caldwell will be the assistant superintendent.

(From Our Special Correspondent.)

Charles F. Hood, who has a patent process for the manufacture of briquettes, gave a suc-

cessful exhibition of the value of his process and its fuel, at his laboratory. The briquettes were half coke waste and slack from the Pittsburgh District. They are about 6 in. long and 4 or 5 in. in diameter. They do not break with severe handling and burned freely. There was no clinker with the ash and less of the latter than with ordinary coal. There will be a company organized to manufacture these briquettes.

The late James G. Blaine, who always had great faith in coal land as an investment, had a tract of 600 acres near Elizabeth, Pa. The tract has been bought by the Barnes-Thompson syndicate, of Uniontown, the deal involving \$350,000.

The old Poundstone farm, south of Uniontown, was purchased from J. V. Thompson, the banker and coal operator of Uniontown, and E. D. Fulton, Esq., of Uniontown, by the Rocks Coal Company, of Connellsville. There are 119 acres in the tract and the price paid for it was \$325 an acre. This is a high rate for coal in that section. The land borders for ½ mile on the Monongahela River, and for ½ mile on the Baltimore & Ohio Railroad. The company will open mines on the tract and develop the land. Francis Rocks of Connellsville owns five-eighths of the stock; E. D. Fulton and J. V. Work, both of Uniontown, each one-eighth, and Bernard O'Connor of Connellsville one-eighth.

A despatch from Pittsburgh, June 28th, says: "One of the quickest coal deals on record has been completed. A tract of about 1,100 acres was secured near Canonsburg, and during the day openings were made and the coal is being mined. The new owners are three sons of James Jones, the old operator, who retired from business when he sold his interests in the River Coal Combination. The entire cost of the property was \$125,000. The mines are to be equipped with the latest improved machinery, the improvements to cost \$75,000. It is expected that within a few weeks the daily output of coal will be 3,000 tons. The mines are on the line of the Chartiers Valley branch of the Pan-Handle road."

SOUTH DAKOTA.

Custer County.

(From Our Special Correspondent.)

Grand Junction.—The owners of this mine have had the ore vein sampled thoroughly preparatory to a sale.

Newark.—The shaft in this mine is being put down 200 ft. on a wide vertical of ore.

Spokane.—The Crown Hill Company has run the new 50-ton concentrating plant 2 weeks, the first clean-up being satisfactory. The ore is a galena, averaging about \$60 per ton. The company is mining and treating by cyanide quantities of low-grade ore at Crown Hill station, 1 mile east of Ragged Top.

Lawrence County.

(From Our Special Correspondent.)

Boston-South Dakota.—This company is running 40 stamps in the old Minerva Mill, in Black-tail Gulch. The ore is in large cement beds, the values being fair.

UTAH.

(From Our Special Correspondent.)

Bullion and Ore Shipments.—During the week ending June 30th there were sent forward from the different smelters 29 cars, or 1,206,650 lbs. lead-silver bullion, 5 cars, or 249,750 lbs. copper bullion. In the same week there were shipped to smelteries outside of the State for treatment, 67 cars, or 2,528,700 lbs., lead-silver and gold ores and 2 cars, or 80,400 lbs., copper ore.

Cyanide Products.—Consignments of products from cyaniding mills for June, marketed at the Salt Lake branch of the Argentine plant of the American Smelting and Refining Company, amounted to about \$85,000. This compares favorably with the corresponding month of 1899.

Lead Situation.—Beginning with July 2d the uniform price at which lead in ores will be settled for during the next 12 months is \$4.12½ per 100 lbs. It is understood that the producers of Utah have signed contracts with the American Smelting and Refining Company on this basis, with the understanding that like contracts are entered into by the producers of Idaho, Montana, Colorado and Missouri, which, it is said, has been done. Very little lead ore was marketed at Salt Lake in the last 10 days of June, as shipments generally were held back to obtain the advantage of the advance. Mine owners appear to be quite well satisfied with the plan of a uniform price for the lead in their ores, though a few wish that other arrangements were adopted.

Juab County.

(From Our Special Correspondent.)

Tintic Shipments.—For the week ending June 30th there were sent forward from the 3 railroad points of the district 127 cars of ore and 1 bar of bullion, contributed as follows: Centennial-Eureka, 39 cars; Mammoth, 28 cars ore, 1 bar bullion; Swansea, 12 cars; Gemini, 16 cars;

Ajax, 8 cars; South Swansea, 8 cars; Bullion, Beck, 7 cars; Godiva, 5 cars; May Day, 4 cars; Star Consolidated, 3 cars; Showers, 2 cars; Humbug, 1 car.

Bullion-Beck.—There was talk of an assessment or a close-down this week, as sort of side issue of the suit of E. W. Wilson, trustee in bankruptcy of the estate of John Beck, to recover 51,000 shares from J. A. Cunningham, which Beck claims were hypothecated for a loan. It will not be easy to get at the truth relative to the mine or mill till the ownership of this block of stock is finally determined—more's the pity.

Plute County.

(From Our Special Correspondent.)

Annie Laurie.—Manager L. C. Huck and Superintendent W. G. Filer, after devoting several days in camp, returned to Salt Lake. Mr. Huck is to remain in Utah giving his attention for the next few months to the construction of the equipment. Foundation for the 150-ton cyaniding mill is complete. The lumber for the buildings and long flume will begin to arrive next week. Exploration of the mine progresses most favorably. Average gold content of the ore is \$16 per ton. Mr. Huck states that the expenditure for mine and equipment will exceed \$500,000 by the time the mill is placed in commission. The electric power plant will be the finest in Utah.

Blue Bird.—A second high-grade shoot is cut on lower tunnel. It is 18 in. thick and carries \$96 gold. Manager Ryan says it resembles the shoot in the upper tunnel from which \$24,000 of No. 1 rock was marketed.

Huck Placer.—John Weimer is having the Huck Placer surveyed for patent. He positively affirms that he will hold the ground taken up and extensively improved by the Snyder Improvement Company. Until he made the surprising discovery none imagined this was placer ground.

Sevier.—Since cutting the ledge in the drift from lower tunnel no further work has been done at this point, owing to foul air. A new blower and Pelton wheel will be installed next week and this uncovering will be further proven. Point where the vein is cut is 700 ft. vertically below upper workings, and next to the Annie Laurie is the most important development in Gold Mountain.

Salt Lake County.

(From Our Special Correspondent.)

Shawmut.—Everything at the mill is waiting on the machinery. Exploration the past 6 months has uncovered large bodies of paying copper rock.

West Mountain Placer.—The signs are again hope-inspiring that this undertaking is nearing the end of its long hard pull. In No. 1 incline there is gravel carrying \$5 gold a cubic yard. The point of chief interest is, that the difficulties of getting at it and handling are about surmounted.

Summit County.

(From Our Special Correspondent.)

Park City Shipments.—For the week of June 30th the total smelter products sent forward from the camp was 1,172,460 lbs., made up as follows: Silver King, crude 355,420 lbs., concentrates 205,800 lbs.; Daly-West, crude, 410,670 lbs.; Anchor, concentrates 200,570 lbs. Production is being held back, due to the settling price of lead, which for this week is \$3.62½ per 100 lbs., while next week it will be \$4.12½. July promises to be a banner month for the outpouring of Park City mines.

Silver King.—Daly-West.—A rumor of a proposed union of Silver King and Daly-West properties is current. There seems slight likelihood of this happening, but if it should come to pass it would be the greatest lead-silver property in the country.

Tooele County.

(From Our Special Correspondent.)

Chloride Point.—The mill will be in commission again in July.

Daisy.—Permission of the court is asked by the receiver to borrow \$5,000 to resume operations, on a presentation that the mine can be made to more than pay expenses.

De La Mar-Mercur.—Another step is taken in the joining together of the De La Mar and Mercur mines. An objection was made by the Mercur folk to placing 200,000 shares in the treasury and this point prevailed, so that each 100 shares of the original Mercur will be replaced by 166 2-3 shares of the new company. It is understood that Captain De La Mar will be president; John Dern, vice-president; Harturg A. Cohen, general manager; George Dern, assistant general manager, and George Z. Edwards, superintendent.

Ophir.—From 4 to 6 cars of lead concentrates are shipped each week.

VIRGINIA.

Frederick County.

London & Virginia.—At Whitehall, June 28th, this property, including 400 acres of land, was sold at public sale. It was bought by Mr. William O. Gantz of New York City for \$15,800. This property was worked before the War for gold.

WASHINGTON.

Kittitas County.

In the Peshastin District John Snyder and others are operating a hydraulic claim. They have 10 claims on the creek, extending for a distance of nearly 3 miles. They have a 2-mile ditch, with 115-ft. fall from the lake, whence the water supply comes.

Culver.—This mine lately shipped a lot of 8 tons picked ore to the smelters.

Okanogan County.

Kruger Mountain.—This camp is a new one and the chief operators are prospectors and the original claim owners. Kruger Mountain is on the international line and runs parallel to the Okanogan River and Osoyoos Lake to the northeast of them. The best prospects so far discovered are on the east or Similkameen slope of the mountain. The mines so far opened are the Dividend, the Golden Chariot and the Lakeview. The ores generally carry gold and copper.

Stevens County.

A large bed of marble is reported in the north-western corner of the county, on Kettle River, near Baulne's Ranch, just south of the international boundary. It has been examined by experts and pronounced of fine quality.

Whatcom County.

There is considerable excitement over a discovery said to have been made of gold in the beach sands near Blaine. The location is near the mouth of the Nooksak River.

FOREIGN MINING NEWS.

CANADA.

British Columbia—East Kootenay District.
(From Our Special Correspondent.)

Crow's Nest Pass Coal Company.—The management has 200 coke ovens in operation. These will shortly be increased to 250 ovens.

North Star.—The management is shipping 100 tons daily. Frank Robbins is superintendent.

St. Eugene.—The smelter is treating about 50 tons daily.

Sullivan.—The company is shipping 2 cars daily.

British Columbia—West Kootenay District.
(From Our Special Correspondent.)

Ore shipments.—The output of ore from Rossland mines for the half year ending June 30th amounted to 72,000 tons, divided as follows: Le Roi, 52,000; War Eagle, 10,600; Center Star, 7,000; Iron Mask, 1,500; occasional shippers, 900. The shipments for the corresponding period of last year were 64,000 tons, made up as follows: Le Roi, 41,000; War Eagle, 20,500; Iron Mask, 1,200; Center Star, 1,100; occasional, 200.

British America Corporation.—In this company's Columbia & Kootenay property pay ore has been found in the foot-wall of the main ledge about 1,000 ft. below where the run appears on the surface. The dimensions of the ore body so found are not given.

Center Star.—The engine, skips, cable gallows and ore bins are being changed to the new conditions, the mine being temporarily closed during the alterations.

Le Roi.—For the six months ending June 30th the output of ore amounted to 51,000 tons. The foundations for the new hoist are complete. The shaft has been timbered to the 800-ft. level. The work of sinking to the 900-ft. level will be resumed shortly. The management is now shipping about 600 tons daily.

War Eagle.—According to the statement of the manager considerable progress is being made on the fifth, sixth and seventh levels. The new machinery is reported to be working well.

Nova Scotia—Cape Breton.

Dominion Coal Company.—The shipments of coal from the company's mines in June were 226,000 tons. For the four months of the company's fiscal year, from March 1st to June 30th, the shipments were 645,000 tons, against 431,735 tons in 1899, and 334,187 tons in 1898.

Ontario—Sudbury District.

(From Our Special Correspondent.)

Canadian Copper Company.—The output of this company is on a larger scale than in any previous year. Seven furnaces are constantly turning out matter and the company is preparing to work 2 more new mines in the township of Snider on the line of the Manitoulin & North Shore Railway, which is to run from Sudbury to Georgian Bay, traversing the main nickel range almost from end to end.

Demand for Nickel.—Owing to improved con-

ditions in the nickel market and to the advent of several new companies in the field in past 2 years, there is far more activity in nickel mining in the Sudbury District than ever before. Most of the mines on the main range have already been bought up, and, judging by the present outlook, very few, if any, desirable properties will be left unsold by next fall.

Victoria.—Ludwig Mond's men have been exploiting this mine in Denison for 15 months, and are now beginning to put up a large smelting plant near Ranger's siding on the Soo line. H. W. Hixon, of Montana, has been engaged as manager of the mine and works.

NEWFOUNDLAND.

The Belle Island mines, the scene of the recent strike, have closed down. The companies have withdrawn their staffs and will open mines in Canada, preferring this course to a submission to the terms of the strikers. The steamer "Regulus" had to return to St. Johns, having been unable to land her load of machinery on the island, owing to the refusal of the strikers to permit any work. The entire cargo had to be put ashore at Harbor Grace, where it will be stored pending the termination of the strike.

COAL TRADE REVIEW.

New York. July 6.

Anthracite.

Business continues quiet and the much-quoted "midsummer dullness" is held responsible for this condition. The advance in prices noted last week has had little effect one way or the other. Of course it does not apply on existing contracts, and it is looked upon chiefly as a caution to dealers to close their fall contracts in good season. Very little new business has been done and the holiday on Wednesday added to the blank in the trade.

Production in June was larger, and that for July will probably show well also, though there is some talk of a general restriction in mining. There is a general feeling, however, that good stocks on hand for the fall trade will do no harm.

There is less activity in shipments westward, as the Lake trade is well supplied, or perhaps over-supplied at present.

Notes of the Week.

The Lehigh Valley Coal Company makes the following statement for May and the six months of its fiscal year from December 1st to May 31st:

	May.	Year.
Earnings....	\$1,466,363	\$8,518,825
Expenses.....	1,503,450	8,894,836
Deficit.....	\$40,087	\$376,011

For the six months the earnings increased \$330,240, and the expenses \$361,845; leaving an increase of \$31,605 in the deficit.

Bituminous.

A slight improvement is noticeable in the Atlantic seaboard soft coal trade, though there is still some backwardness in the purchases by large consumers. This is undoubtedly due to the fact that some sellers are offering all grades and kinds of coal, irrespective of quality, wishing to make as many sales as possible before the market becomes stocked. This will likely be the case when the Georges' Creek strike is settled, which may be soon if the reports of miners' wishes are correct. It appears as though the men are desirous of returning to work, but the producing interests are disposed to hold off until they attain their end. Meantime meetings are held between the two factions looking toward an early settlement of the strike.

In the Far East business has improved somewhat, and along the Sound there is also a better demand, but in New York harbor buying is limited.

A slight falling off in all-rail buying is noticeable. Stocks of coal at the shipping ports are plentiful and rates are easy. No delay is reported in the transportation from mines to tide.

Coastwise vessel rates continue firm and vessels are in fair supply. Concerning export business we understand charters have been booked to France from Philadelphia, Baltimore or Norfolk, Va., on the basis of 17s. (\$4.08). There are many inquiries from foreign consumers, while some producers here have been obliged to turn down orders owing to their regular business.

We quote current rates of freight from Philadelphia as follows: Providence, New Bedford and the Sound, 65¢@70¢; Boston, Salem and Portland, 75¢@80¢; Portsmouth and Bath, 80¢; Lynn, 90¢; Newburyport, 95¢; Bangor, 90¢; Dover, \$1.15@1.25 and towages; Gardiner, 80¢@85¢, and towages; Saco, \$1.15 and towages, with 10¢@15¢. above these rates from Chesapeake Bay ports.

Birmingham, Ala. July 2.

(From Our Special Correspondent.)

The miners belonging to the United Mine Workers of America, who are in majority in the mines of Alabama, have failed to agree, so far, on a contract for the ensuing year. It may be a week before a contract is arrived at or

it is possible that a strike of indefinite period may result. The miners and operators in this State have been holding a conference for some days, but have failed to come to a conclusion satisfactory to both sides. The miners first held a convention, appointed a scale committee, that committee reported on a scale which was adopted in the convention and presented to the operators. The scale asked for an advance of 10c. per ton in mining wages, 8 hours to constitute a day's work, uniform wages for day men, which means advances at many places, a semi-monthly pay day and several other things. This scale was promptly refused by the operators, and the operators and miners each appointed members of a joint scale committee, and that committee was in session 3 days with but little success. Work will be suspended for a few days in the mines until some agreement can be arrived at or a strike declared. The outlook is anything but favorable in this State. The miners have been working hard for the last 12 months and have been able to save some money. The operators claim that they have some coal on hand, but no great supply is visible.

There is no telling at this writing what will be the result. If the miners return to work there will be a demand for all the coal that can be mined this year. The new mines being opened in this State will experience some delay if a strike should occur in the State. There has been no labor trouble in the State recently except in two small places in Shelby County.

A good price has been obtained for the product in this State and the operators have many orders on hand which will last them for weeks to come. Much, therefore, depends on what the miners will do as to the making of a new contract.

Cleveland, O. July 3.

(From Our Special Correspondent.)

Coal shippers, in taking account of the stuff that has been shipped up the Lake so far this year find, from the reports gathered the latter part of June, that they have now on the docks at the upper Lake ports as much coal, and even a little more, than had been carried up by the first of September last year. In addition to this the shippers have a vast amount of contract tonnage this year which is moving the coal rapidly. This almost assures a reversal of conditions which prevailed last fall. Then the shippers were at the mercy of the vessel interests and had to pay an increase in rates such as the owners might demand. Now the shippers are to be in a position to dictate to a certain degree, and would be more thoroughly in control of the situation were it not for a compact among the owners that is keeping the rates up. All the shippers can do now is to prevent an advance in the rates, whereas the conditions under ordinary circumstances would warrant them in forcing a change in the rates which would be to their advantage. The compact among the Cleveland vessel owners has been able this week to head off a second attempt to break the coal rate to Duluth. Two boats were put in here Saturday, by a Buffalo broker, for Duluth at 40c. The same firm and the same broker broke the rate at Buffalo a few weeks since and it was thought the result would be the same here. The manner in which the owners rallied and kept up the rate has brought out the rumor that the Bessemer Steamship Company is behind the owners urging them to maintain the rates and threatening to turn loose all of the tonnage tied up on the Lakes if they allow a break. They see that this would mean demoralization in all lines of trade and so refrain. The movement from the mines to Lake ports and up the Lakes continues brisk, with good dispatch to boats. Carrying rates are unchanged.

Pittsburg. July 4.

(From Our Special Correspondent.)

Coal.—There is but little change in the coal situation as to the demand and prices. The demand exceeds the supply, but prices remain the same. The Pittsburg Coal Company, the railroad coal combination, is mining about 60,000 tons daily and during the past few weeks has been buying about 8,000 additional tons each day. A number of new coal companies are being formed in this district and an unusually heavy tonnage will be produced this year. The latest new company was formed by David G. Thomas and Harry P. Jones, sons of James Jones, the old coal operator, who sold his large interests to the Monongahela River Consolidated Coal and Coke Company, the river coal combination. The Jones brothers last week bought 1,100 acres of valuable coal land on the Chartiers branch of the Panhandle Road, about 20 miles from Pittsburg, for \$125,000 and are now opening mines. They will be equipped with the latest improved machinery at a cost of \$75,000 and will soon have a daily output of 3,000 tons. A report was extensively circulated during the week to the effect that the River coal company had struck a solid rock at one of its mines in Washington County and that the supposed valuable coal land in Greene County adjoining was worthless. It was subsequently shown that the report had been circulated by speculators who

general impression here is that prices will be adjusted before long.

Pittsburg, July 4. (From Our Special Correspondent.)

The prediction made last week that prices would go down to bed rock before there was any buying in iron and steel has been confirmed as far as prices are concerned, but not as to buying. It will probably require some further shading of prices before consumers are convinced that the lowest notch has been reached.

Pig Iron.—The sales of Bessemer pig iron this week did not aggregate more than 1,000 tons, the price being \$18 for a 500-ton lot and \$19.50 for several smaller lots. It is believed that \$17 could be done for a large order. There were no sales of foundry iron.

Steel.—There were no sales of Bessemer steel billets. Some manufacturers do not believe that billets will go any lower, while others predict \$22 billets within another week or when buyers begin to make inquiries. Tank plates are quoted as low as 1.30c.

Sheets.—There have been no sales of any consequence during the week that would warrant any change in the quotations given last week, which were 3@3.05c. for No. 27 and 3.05@3.10c. for No. 28.

Ferro-manganese.—The price of 80% domestic dropped yesterday when a sale was made at \$85, but \$100 is still quoted for small lots.

New York, July 6.

The market is quiet and buyers are still waiting for prices to reach bottom, whenever that may be.

Pig Iron.—There is more demand for small lots, which is not strange, as foundry yards are generally empty. Prices have been shaded still further, and we quote: No. 1 X foundry, \$19@20; No. 2 X, \$17.50@18.50; No. 2 plain, \$16.50@17. For Southern irons on dock, New York: No. 1 foundry, \$20.25@20.75; No. 2, \$19@19.50; No. 3, \$17.50@18.25; No. 1 soft, \$20.25@20.75; No. 2, \$19@19.50; gray forge, \$16.50@17.

Cast Iron Pipe.—There are quite a number of orders to be had, chiefly for small pipes in moderate sized lots.

Bar Iron.—Demand is for small lots and the market unsteady. Common bars are quoted as low as 1.45c. for large lots on dock; refined bars, 1.60@1.65c.

Plates.—Business is about the same, and prices are unchanged. We quote for large lots at tide-water: Tank, 1/4-in. and heavier, 1.60@1.70c.; tank, 3/16-in., 1.70@1.75c.; shell, 1.75c.; flange, 1.85c.; marine, 2.20c.; universals, 1.60@1.70c.

Structural Material.—Business is better than in any other section of the market, and more is in sight. We quote in large lots at tidewater: Beams, 2.10c.; channels, 2.10c.; angles, 2c.; tees, 2.15c.; zebs, 2.10c.

Steel Rails and Rail Fastenings.—No reduction is announced yet, and we continue to quote for standard sections, \$35 f. o. b. Eastern mills. Smaller rails are quoted: 12-lb., \$40; 16-lb., \$40; 20-lb., \$40; 30-lb. to 40 lb., \$38; 40-lb. to standard, \$36, with the usual advance for small orders. We quote angle bars, 2.20c.; fish plates, 2.15c.; spikes, 2.20c.; bolts, 3.20c.

METAL MARKET.

New York, July 6.

Gold and Silver.

Gold and Silver Exports and Imports At all United States ports in May and year.

Table with 4 columns: Metal, 1899, 1900, 1900. Rows include Gold Exports, Gold Imports, Silver Exports, Silver Imports, and Excess.

This statement includes the exports and imports at all United States ports, the figures being furnished by the Treasury Department.

Gold and Silver Exports and Imports, New York For the week ending July 6th, 1900, and for years from January 1st, 1900, 1899, 1898, 1897.

Table with 5 columns: Period, Gold Exports, Gold Imports, Silver Exports, Silver Imports, Total Excess or Imp. Rows include weekly and yearly data.

Exports of gold were in small parcels to various ports; imports were from the West Indies. Exports of silver went chiefly to London; imports were from Mexico.

The United States Assay Office in New York reports the total receipts of silver at 48,000 oz. for the week. Total since January 1st, 2,556,000 oz.

Average Prices of Silver per oz. Troy.

Table with 7 columns: Month, 1900, 1899, 1898. Sub-columns for London and New York prices in Pence and Cents.

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

Average Prices of Metals per lb., New York.

Table with 9 columns: Month, Copper, Tin, Lead, Spelter. Sub-columns for 1900 and 1899 prices.

Commencing with March 17th, the prices given in the table for copper are the averages for electrolytic copper; this is the case for both 1899 and 1900. The average price for Lake copper for the year 1899 was 17.61c. For January, 1900, the average price of Lake copper was 16.33c.; for February, 16.08c.; for March, 16.59c.; for April, 16.94c.; for May, 16.55c.; for June, 16c.

Prices of Foreign Coins.

Table with 3 columns: Coin, Bid, Asked. Rows include Mexican dollars, Peruvian soles, Victoria sovereigns, etc.

Financial Notes of the Week.

Business is much quieter and the midsummer dullness is beginning to be felt very generally. At the same time trade cannot be called depressed. Money is in good supply and rates have not advanced. No gold is reported taken for export this week so far.

The unsettled condition of affairs in China has a tendency to stiffen the price of silver. This is on the theory that exports would be stimulated and imports contracted. The market closes today at 28 7/16d.

The monthly comparative statement of the Government receipts and expenditures shows that the total receipts for the month of June were \$51,435,832, and the expenditures \$33,540,675, leaving a surplus for the month of \$17,895,157. The receipts for the 12 months of the last fiscal year amount to \$568,988,948, and the expenditures to \$487,759,171, making a surplus for the year of \$81,229,777. The receipts for the full fiscal year

Imports and Exports of Metals.

Large table with 5 columns: Port, Exports, Imports, Exports, Imports. Rows include New York, Baltimore, Philadelphia, and Total United States for various metals.

*New York Metal Exchange returns. †By our Special Correspondent. ‡Not specified. §Monthly returns. Treasury Department. ¶Report of Mr. John Starbuck. ¶ Week June 28th. **Week ending June 26th. Exports include domestic and foreign metals.

have been derived from the following sources: Customs, \$233,857,958, an increase over 1899 of \$28,729,577; internal revenue, \$296,299,388, an increase of \$22,862,227; miscellaneous, \$38,831,601 an increase of \$2,400,000. The expenditures for the last fiscal year were \$118,313,008 less than for the fiscal year 1899.

The statement of the United States Treasury on Tuesday, July 3d, shows balances in excess of outstanding certificates as below, comparison being made with the statement of the corresponding day last week:

Table with columns: June 27, July 3, Changes. Rows: Gold, Silver, Legal tenders, Treas. notes, etc.

Treasury deposits with national banks amounted to \$101,790,323, showing a decrease of \$2,276,634 for the week.

The statement of the New York banks—including the 63 banks represented in the Clearing House—for the week ending June 30th, gives the following totals, comparisons being made with the corresponding weeks in 1899 and 1898:

Table with columns: 1899, 1898, 1900. Rows: Loans and discounts, Deposits, Circulation, Reserve, Specie, Legal tenders, Total reserve, Legal requirements, Balance, surplus.

Changes for the week, this year, were increases of \$91,600 in circulation, \$455,400 in specie, \$193,800 in legal tenders and \$332,525 in surplus reserve; decreases of \$1,556,500 in loans and discounts, and \$2,733,300 in deposits.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

Table with columns: Banks, Gold, Silver, 1899, 1900. Rows: N.Y. Ass'n, England, France, Germany, Spain, Aus.-Hun., Neth'nds., Belgium, Italy, Russia.

The returns of the Associated Banks of New York are of date June 30th and the others are of date June 29th, as reported by the Commercial and Financial Chronicle cable. The New York banks do not report silver separately, but the specie carried is chiefly gold coin. The Bank of England reports gold only.

Shipments of silver from London to the East for the year up to June 21st, 1900, are reported by Messrs. Pixley & Abell's circular as follows:

Table with columns: 1899, 1900, Changes. Rows: India, China, The Straits.

Totals... \$2,938,242 \$4,282,106 I. \$1,343,864 Arrivals for the week, this year, were £165,000 in bar silver from New York and £15,000 from the West Indies; total, £180,000. There were no shipments this week.

Indian exchange continues strong, and the Council bills offered in London were taken at an average of 15.97d. per rupee. There is still a good deal of buying of silver for Indian account.

The coinage executed at the mints of the United States in June, and the six months of this year, is reported by the Bureau of the Mint as below:

Table with columns: June, Jan.-June. Rows: Denomination, Double eagles, Eagles, Half eagles, Quar. eagles.

Table with columns: Total gold, Dollars, Half-dollars, Quarter-dol., Dimes.

Table with columns: Total sil., Five c. nicks., One c. bronze.

Table with columns: Total mnr., Total cn.g., Total 1899.

As compared with May the total coinage in June, 1900, shows a decrease of \$5,542,851, owing chiefly to the lesser gold mintage.

Other Metals.

Daily Prices of Metals in New York.

Table with columns: June-July, Sterling Exchange, Silver, Copper, Lead, Spelter. Rows: 30, 2, 4, 5, 6.

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

Copper.—The market has been quiet and without special feature, the holiday having interfered with business and some of the larger mills being closed down for inventory. Demand from abroad continues good. We quote Lake at 16c.; electrolytic, in cakes, wirebars and ingots at 15 1/2@15 3/4c., in cathodes at 15 1/2@15 3/4c.; casting copper at 15 1/2c.

The London market, which closed last week at £71 15s. for spot, £71 17s. 6d. for three months, opened at £71 15s. for spot, £71 17s. 6d. for three months. At the beginning of the week it fluctuated but little, but on Thursday it declined to £71 2s. 6d. for spot and three months. It closes at £71 for spot and £71 2s. 6d. for three months.

Statistics for the second half of June show a decrease in the visible supplies of 100 tons. Refined and manufactured sorts we quote: English tough, £75 10s.@£76 10s.; best selected, £76 10s.@£77 10s.; strong sheets, £84; India sheets, £82; yellow metal, 6 1/2d.

Tin.—The market has fluctuated in sympathy with the violent changes in London, but business has been of small volume. Buyers are reluctant to take hold heavily in view of the uncertain condition of the market. Prices have ranged from 31 to 32c.

The London market, which closed last week at £144 for spot, £134 for three months, opened at £145 for spot, £137 10s. for three months, and immediately declined to £139 for spot, £132 10s. for three months. On Tuesday it was £142 for spot, £134 for three months; on Wednesday £140 10s. for spot, £133 15s. for three months, and on Thursday £139 for spot, £133 for three months. It closes at £139 for spot and £132 10s. for three months.

Statistics for the month of June show a decrease in the visible supplies of 100 tons.

Imports of tin into the United States in May were 7,283,453 lbs., against 4,744,534 lbs. last year. For the five months ending May 31st the imports were: From East Indies, 15,274,569 lbs.; Australasia, 336,096; Great Britain and Holland, 17,244,807; other countries, 235,289; total, 33,090,761 lbs., against 35,129,308 lbs. in 1899, showing a decrease of 2,038,547 lbs., or 5.8%, this year.

The visible supplies of tin on July 1st are reported as below, in long tons of 2,240 lbs.:

Table with columns: Store, Afloat, Totals. Rows: Great Britain, Holland, U. S., exc. Pacific ports.

Totals... 9,326 5,866 15,192 The total is less by 1,234 tons than on June 1st; and less by 3,576 tons than on July 1st, 1899.

Exports of tin from the Straits for the four months ending April 30th were, in long tons:

Table with columns: 1899, 1899, 1900. Rows: To United States, To Europe, To China and India.

Totals... 16,631 15,368 15,314 The total this year was less by 54 tons, or 0.4%, than in 1899; and by 1,317 tons, or 7.9%, than in 1898.

Spelter.—The market continues strong and active. A good business is doing in this country and we also hear of inquiries from abroad. We quote St. Louis at 4.15@4.20c., New York at 4.30@4.35c.

The European market has experienced a sharp advance, our cables quoting good ordinaries at £20 5s.

Exports of spelter or metallic zinc from the United States in May were 6,174,386 lbs. For the five months ending May 31st the exports were 24,645,784 lbs., against 12,635,429 lbs. in 1899; an increase of 12,010,355 lbs., or 95%, this year. Exports of zinc ore for the five months were 14,874 tons, against 9,630 tons in 1899; an increase of 5,244 tons, or 54.4%, this year.

Imports of spelter, or metallic zinc into Great Britain for the five months ending May 31st were

32,114 long tons; in 1899 they were 30,822 tons, showing an increase of 1,292 tons, or 4.2%, this year.

Lead.—The market this week experienced a most unexpected decline of 1/2c. per lb. Although buyers, generally, are poorly covered, they are not taking advantage of the lower prices, being quite at a loss to understand the recent violent fluctuations. Lead in New York is now selling at 4.07 1/2@4.12 1/2c., and in St. Louis at 4.02 1/2@4.07 1/2c.

The European market has been firmer, Spanish lead being quoted at £17 7s. 6d.@£17 10s., English lead 2s. 6d. higher.

Imports of lead into the United States and re-exports of foreign lead are reported by the Bureau of Statistics of the Treasury Department as follows, for the five months ending May 31st, in pounds:

Table with columns: 1899, 1900. Rows: Lead in ores and bullion, Lead, metallic.

Table with columns: Total imports, Exports of foreign lead, Excess of imports, Excess of exports.

The imports this year show a decrease of 8,027,252 lbs., or 9.1%, while the exports increased 15,907,767 lbs., or 24.7%. Of the imports this year 70,466,748 lbs. (88.1%) came from Mexico; 7,882,985 lbs. (9.9%) from Canada, and the balance of 2% from other countries.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is quiet at 4.07 1/2c. Trading is very light.

Antimony.—There is no change.—We quote Cookson's at 10 1/2c.; Hallett's at 9 1/2c., and U. S. Star at 9 1/2@9 3/4c.

Nickel.—The price continues firm at 50@60c. per lb., according to size and terms of order.

Platinum.—Consumption is increasing and prices are strong and likely to go higher. For ingot platinum in large quantities \$18.20 per Troy oz. is quoted in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72c. per gram, showing an increase of 1 1/2c.

Quicksilver.—The New York quotation is unchanged at \$51 per flask for large lots; for small orders \$52.50@\$54 is asked. San Francisco quotations are \$51.50@\$52 for local deliveries, and \$46.50@\$47 for export.

The London price continues £9 10s. per flask, with the same figure quoted from second hands.

Exports of quicksilver from all United States ports for the five months ending May 31st were 471,472 lbs., against 560,375 lbs. in 1899; showing a decrease of 88,903 lbs., or 15.9%, this year.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Table with columns: Aluminum, Per lb., Ferro-Titanium, Per lb., Ferro-Tungsten, Magnesium, Manganese, Manganese Cop., Nickel-alum, Bis-muth, Chromium, Copper, red oxide, Ferro-Molyb'dum, Tungsten (Best).

Variations in prices depend chiefly on the size of the order.

LATE NEWS.

The Atlantic Mining Company, of Michigan, reports for June an output of 299 tons copper, against 244 tons last year. For the six months ending June 30th the total was 1,645 tons, against 1,411 tons last year; an increase of 234 tons, or 16.7%.

The Baltic Mining Company reports a total output of 61 1/2 tons copper in June. This company is doing prospecting work chiefly.

The Wolverine Mining Company produced 239 tons copper in June, against 279 tons last year. For the six months ending June 30th the output was 1,363 tons, which compares with 1,368 tons last year, the totals being almost the same in both years.

Leadville, Colorado.

(From Our Special Correspondent.)

Tarshish Mining Company.—This new shaft has reached the quartzite at 656 ft. and the sulphide contact is now to be developed. Development is also to be conducted at the 265-ft. level, where \$65 ore was encountered when the shaft was being sent down.

Silver Cord.—Through the Yak Tunnel the new lessees of the Silver Cord, known as the Cooper Leasing Company, are shipping 100 tons of good iron ore per day from the old Cleora shaft. When all connections are made the different claims of the company will likely be leased and all will then be placed on the shipping list, being enabled to handle the immense low-grade bodies that have long lain idle through the cheap method of transportation through the Yak Tunnel.

STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing companies like Alamo, Anaconda, and others with columns for location, par value, and prices for various dates from June 29 to July 5.

BOSTON MASS.

Table of stock quotations for Boston, listing companies like Adven's Cons, Actua, and others with columns for par value, number of shares, and prices for various dates from June 29 to July 5.

COAL AND INDUSTRIAL STOCKS.

Table of coal and industrial stock quotations, listing companies like Am. Sm. & Ref., Am. S. & W. Co., and others with columns for par value and prices for various dates from June 29 to July 5.

BALT LAKE CITY, UTAH.

Table of stock quotations for Salt Lake City, Utah, listing companies like Ajax, Buckeye, and others with columns for shares, par value, bid, and asked prices.

PHILADELPHIA, PA.

Table of stock quotations for Philadelphia, listing companies like Am. Alkali, Bethlehem Iron, and others with columns for location, par value, and prices for various dates from June 29 to July 5.

TORONTO, ONT.

Table of stock quotations for Toronto, Ontario, listing companies like Ontario, Golden Star, and others with columns for par value and prices for various dates from June 23 to June 29.

SAN FRANCISCO, CAL.

Table of stock quotations for San Francisco, California, listing companies like Belcher, Best & Belcher, and others with columns for location, par value, and prices for various dates from June 29 to July 5.

CALIFORNIA OIL STOCKS.

Table of California oil stock quotations, listing companies like Blue Goose, Buckhorn, and others with columns for name of company, number of shares, par value, and prices for various dates from June 4 to June 20.

SPOKANE, WASH.

Table of stock quotations for Spokane, Washington, listing companies like Butte & Boston, Conjecture, and others with columns for par value, week, and sales.

California and Producers Oil Exchanges. Total sales, 2,950 shares. *H. Holiday. *Ex-dividend.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.

Table of stock quotations for Colorado Springs, Colo., listing various companies and their share prices from June 25 to June 30.

Colorado Springs Mining Stock Exchange. Total sales, 1,149,563 shares.

MONTREAL CANADA.

Table of stock quotations for Montreal, Canada, listing companies and their share prices for the week of June 9 and June 29.

Montreal Stock Exchange. Total sales, 67,551 shares.

MEXICO.

June 21.

Table of stock quotations for Mexico, listing companies and their share prices as of June 21.

DENVER, COLO.

Table of stock quotations for Denver, Colo., listing various companies and their share prices from June 25 to June 30.

Official Quotations Denver Stock Exchange. Total sales, 141,800 shares.

PARIS.

June 14.

Table of stock quotations for Paris, listing companies, countries, products, and their share prices as of June 14.

LONDON.

June 22.

Table of stock quotations for London, listing companies, countries, and their share prices as of June 22.

DIVIDEND-PAYING MINES.

Table with columns: Name and Location of Company, Authorized Capital Stock, Shares Issued, Dividends (Paid, Total to Date, Latest), Name and Location of Company, Authorized Capital Stock, Shares Issued, Dividends (Paid, Total to Date, Latest). Lists various mining companies and their financial details.

G. Gold. S. Silver. L. Lead. C. Copper. Z. Zinc. Q. Quicksilver. I. Iron. This table is corrected up to July 2d. Correspondents are requested to forward changes or additions.

CHEMICALS, MINERALS, RARE ELEMENTS, ETC.—CURRENT PRICES.

Table with multiple columns listing various chemical and mineral products (e.g., Abrasives, Borax, Magnesium, Salt) along with their units, measurements, and current prices. Includes a 'THE RARE ELEMENTS' section with prices for elements like Barium, Beryllium, and others.

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. This table is revised up to June 9. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable. See also Market Reviews.