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In the next issue of the "Engineering and Mining Journal"—for January 5th, 1901—we will, according to our usual custom, sum up the progress of the mineral industry during 1900. With each year we are able to make our statistics more nearly complete and the necessary estimates closer to the actual production. Next week we hope to give the facts and figures of a record which will surpass that of any preceding year.

The report of the Boston Consolidated Copper Mining Company, an abstract of which is given in another column, really tells very little about the operations of the company except that the work of exploration has been continued. From the further particulars published in London we learn that the discoveries made have been only of very low-grade ore. The opening of a shoot of sulphide ore, said to be 180 ft. long, is considered the "most important and encouraging result." This, however, so far as explored, carries only from 1 to 3 per cent. copper and about \$2 per ton in gold. The explorations so far made certain seem to support the opinions of the property expressed in our columns at different times. The report can hardly be called an encouraging one, and it is not surprising that the latest quotations of the stock given in London are considerably below par.

The British iron trade seems just at present to be in a state of collapse. Scotch pig iron warrants, which were selling on December 1st at \$16.48, had fallen on December 15th to \$14.46, and the cable this week reports a further fall, warrants selling down to about \$13. A similar fall is reported in Cleveland iron, which some time ago sold above Scotch pig, but has now resumed its usual place and is selling at from 50 cents to \$1 below Scotch iron. The furnace-owners in Scotland claimed that, owing to the present high prices of coal, they had been losing money at the higher prices, and a number of them have already put their furnaces out of blast, preferring to remain idle than run at the loss which \$12 or \$13 pig iron would entail upon them. Of course a great deal is said about American competition; but a falling off in orders and a general contraction in business are really responsible. It is quite probable, however, that a reaction will follow. The boom in the iron trade is over for the time, but the actual volume of business is still very large, and we do not doubt that the ironmakers will find work enough to do, though not at boom prices; while the coal prices will gradually be adjusted to changed conditions.

Discoveries of coal in the Yukon continue to be reported, and it looks as if a considerable area might be opened up. This will be of great importance in relation to future mining operations in the territory. The latest of these discoveries in the Yukon, as reported by our correspondent there, is about 3 miles west of the Dalton Trail and about 20 miles south of Carmack's Station on the Lewis River, near the junction of that stream and the Nordenskiold or Hoochi River, some 60 or 70 miles above Fort Selkirk. It is reported by Mr. Porter, the discoverer, that there are three or four parallel beds of several feet thickness each, lying easy to work, with abundant timber, and an easy grade to the Main River. These late discoveries extend the area of the late Cretaceous or early Tertiary deposits which are found at the mouth of the Big Salmon to a distance east and west of something like 80 miles and proportionally diminish the probable placer area. The coal is apparently a typical lignite and is reported to contain 67 per cent. carbon; but this is probably an ultimate analysis and not the amount of fixed carbon. As wood is becoming a scarce article on the Yukon River, these discoveries may be of considerable value. Mr. Larsen, of Montana, is said to be interested in the locations.

There seems to be a general impression that the purchase of the Pennsylvania Coal Company's property by the Morgan interests was sudden and altogether unexpected. This may be so as far as the general public is concerned; but to those who were well informed it was not altogether a surprise. In commenting upon the litigation over the proposed Delaware Valley & Kingston Railroad over nine months ago the "Engineering and Mining Journal" said: "No one who has followed the project of another coal road believes that its promoters are influenced by pure philanthropy or that its construction will lead to stove size being quoted in New York at \$2 per ton. . . . The antagonism of the Erie, however, is easily understood, and it is quite possible that the movement may end with the Erie getting a controlling interest in the Pennsylvania Coal Company."

There is reason to believe that the result indicated by the statement above quoted from our report of the anthracite coal market, dated March

23d, 1900, was contemplated at the time, though neither party was then ready to enter into final negotiations.

There continues to be reports of transfers of property of individual operators, and many of them are probably anxious to sell out while good prices can be had. Whether there is a corresponding anxiety to buy on the other side remains to be seen.

As is already well known, the Australian Gold Recovery Company, owning the MacArthur-Forrest cyanide patent in West Australia, has been endeavoring to collect its fees from various users of the cyanide process in that colony. A decision just given by the Judicial Committee of the Privy Council in London, to which the Lake View Consols, Limited, appealed from the judgment of the Western Australian courts, has upset the claims of the Australian Gold Recovery Company by deciding that the patent is invalid.

The patent laws of Western Australia were only inaugurated in 1888, when it was enacted, *inter alia*, that any British patent current at the time should become good for Western Australia. Among these was the British MacArthur-Forrest patent 14,174, of 1887. In 1895 this patent was upset in England by the Pielsticker litigation, but leave was given to amend the claim by substituting the expression "dilute solution of cyanide" for cyanide generally. The amendment should have been effected at the same time in the West Australian patent. The Privy Council has now decided that the patent was never good in West Australia, and also that the amendment was never validly effected. The consequence is that the Australian Gold Recovery Company has lost its patent entirely and is unable to collect any of the past fees. The effect of the judgment as regards the future of the patent does not matter very much, as they have a very short time to run. The only wonder is that this decision has been so long delayed.

#### SAULT STE. MARIE CANAL TRAFFIC.

The preliminary report of the business of the Sault Ste. Marie Canals, through which passes all the traffic between Lake Superior and the lower lakes, has now been made up for the full season of navigation. The season was an unusually long one, the American Canal having been opened for business April 19th and closed December 12th, while the Canadian Canal was opened April 23d and closed December 16th; each canal, therefore, having been open 238 days. The total number of vessels passed through during the season was 19,452, against 20,255 last year, showing a decrease of 803 vessels, or 4 per cent. The freight moved by these vessels, however, showed an increase of 387,263 tons, or 1.5 per cent., the total rising from 25,255,810 short tons in 1899, to 25,643,073 tons in 1900. The average cargo this year was 1,318 tons, while in 1899 it was 1,247 tons. The total this year was made up of 20,532,493 tons east-bound and 5,110,580 tons west-bound freight. Of the vessels passing the canal this year 14,426 were steamers and 5,026 barges or sailing vessels.

Thus east-bound freight was 80.1 per cent. of the total and west-bound 19.9 per cent. The passages through the American Canal were 84.2 per cent. of the total and the freight carried 92.1 per cent.; the Canadian Canal reporting 15.8 and 7.9 per cent. of the respective totals. The mineral freights included in the total tonnage were as follows, in short tons:

	1899.	1900.	Changes.	Per ct.
Anthracite coal.....Tons	841,287	515,515	D. 325,766	38.7
Bituminous coal.....Tons	3,099,606	3,971,402	I. 871,856	28.1
Total coal.....Tons	3,940,887	4,486,977	I. 546,090	13.9
Iron ore.....Tons	15,328,249	16,174,659	I. 846,419	5.5
Pig and other iron.....Tons	214,585	135,585	D. 79,000	36.3
Copper.....Tons	120,090	131,066	I. 10,976	9.1
Building stone.....Tons	39,063	48,902	I. 9,839	25.2
Salt.....Bbls.	316,336	328,895	I. 12,559	4.0

Anthracite coal shipments were light all through the season just closed, and in October were practically stopped by the strike in Pennsylvania, shutting off the traffic during what are generally the heaviest months of the season. Bituminous coal traffic, on the contrary, were heavy from the start, and continued large up to the close. The iron ore traffic was lighter than had been expected, and the heavy shipments of the early months were not kept up, the business gradually declining as the season advanced. Coal and iron ore together furnished 80.6 per cent. of the total freight passing through the canals. Separating the freights by direction, iron ore was 78.8 per cent. of the east-bound tonnage, while coal formed 87.8 per cent. of the west-bound.

A falling off in grain traffic from Duluth assisted in lowering the total tonnage below the expected figure and in disappointing the expectations of the vessel owners. Nevertheless the total tonnage was the largest ever recorded. The position of the Sault Canal as a great artery of traffic is further established by the past season, during which the average daily record was 82 vessels and 107,744 tons of freight.

#### WHAT IS "ORE"?

In reply to the question whether there has ever been any definite determination by the United States Supreme Court, or other high judicial authority, of the meaning of the word ore, I do not remember any such definition by a United States Court.

If I am correct in my impression that no such definition has been made, I think the reason is simple. The United States mining law provides for the exploration and purchase of "all valuable mineral deposits" upon the public land. Section 2320 of the Revised Statutes speaks of "rock in place, bearing gold, silver . . . or other valuable deposits." The term "ore" does not occur in these sections. But by Section 2336 it is provided that in the case of intersecting lodes, the prior location shall be entitled to all the "ore or mineral" contained within the "space of intersection." The application of this section does not seem likely to require a separate and precise definition of "ore"; and, so far as I know, has never involved such a definition.

The United States decisions always speak of "ore" or "mineral" in the sense of material valuable to the miner; and, in *Burke vs. Macdonald* (2 Idaho, 646), and *Montana Cent. Ry. vs. Migeon* (68 Federal, 811), a distinction was made between such material and barren "vein-matter."

The nearest approach which I can recall to a judicial consideration of the question, What constitutes an "ore"? were made in the celebrated New Jersey zinc cases (*Zinc Company vs. Franklinton Company*, 13 Equity, 222, and *15 Equity*, 418; and *Lehigh Zinc and Iron Company vs. New Jersey Zinc and Iron Company*, 55 Law, 350), in which, according to my recollection, many learned experts testified on this point. But the decisions themselves seem to follow in interpreting the mining leases or grants under discussion, the rule of common law, that the intention of the parties (if it can be ascertained) rather than any scientific later definition of the terms they used, must control. Hence it was held that the material called "zinc ore," at the time when a given lease was executed, must be so considered in the construction of the grant, although it might be proved to have contained much material not zinc ore. In one of these cases, moreover, the court held that the zinc or zinc ore conveyed by the lease must consist of veins, strata or masses "in quantity and richness worth mining for zinc." As a whole, these cases do not set up any general definition of "ore," but only construe a given (and very peculiar) pair of mining leases, in the light of proved (and very peculiar) local and temporary conditions.

Though the courts have not declared themselves on this question, there are several definitions in current technical literature which throw some light on the logic, the history and the usage of the term "ore."

The word itself is derived from the Anglo-Saxon "ora," related to "ar" (brass or bronze)—a form which can be traced through many other languages, including the Latin. In like manner, the German "Erz" originally meant brass or bronze. Unquestionably, the earliest notion of "ore" was that of a mineral compound, in which a valuable metal was contained, not in its metallic state, but in combination with other substances. But rocks containing native metals are now universally included (in English literature, at least) among ores, though loose earth containing native metals is not so included.

Prof. Tarr, of Cornell University, in his "Economic Geology of the United States" (1894), says: "An ore may be defined as a mineral with a metallic base;" but qualifies this definition by adding that it may be a native metal or a metal with a "mineralizer," and that, properly speaking, the metallic constituent should be predominant. He doubtless means predominant in value; since, in many ores, the proportion of metal by weight or volume is relatively small. There is no doubt, for instance, that material containing 0.02 per cent. of gold, or 0.1 per cent. of silver, or 4 per cent. of copper, would be, under favorable conditions, a profitable ore of the corresponding metal. Prof. Tarr adds further, that "the miner considers an ore to be a mineral with a metallic base, occurring in sufficient abundance to be economically valuable; but, from the scientific standpoint, a grain of magnetite in a granite rock is as much an ore as a bed of this mineral."

It may be said with some force, perhaps, that there is, in fact, no really "scientific standpoint" in the case, because the term "ore" is itself not scientific, and science has other terms more discriminating and more precise.

The International Dictionary gives two definitions of "ore," namely: "1. The native form of a metal, whether free and uncombined, as gold, copper, etc., or combined, as iron, lead, etc. Usually the ores contain the metals, combined with oxygen, sulphur, arsenic, etc. (called 'mineralizers')."

"2. (Mining) A native metal or its compound, with the rock in which it occurs, after it has been picked over, to throw out what is worthless."

The Standard Dictionary defines "ore" as follows:

"A natural substance, sometimes forming part of a rock, containing one or more metals. The term is applied usually to a mineral from

which the metal can be profitably extracted, but is sometimes extended also to non-metallic minerals, as 'sulphur-ore.'

After studying these and other definitions, I feel warranted in the modest claim that my own definition, given twenty years ago in my "Glossary of Mining and Metallurgical Terms," is as good as any of its successors. It describes an ore as "a natural mineral compound, of the elements of which one, at least, is a metal," while it recognizes also the occasional application of the term to the compounds of non-metallic substances, such as sulphur. It does not, however, declare that, to be an "ore," a mineral compound must be workable with profit; because, being a mining engineer, I was then (as I am, in greater measure, now) sorrowfully familiar with material that, while unquestionably "ore," had been found to be unquestionably not "pay-ore"! Even among miners "ore" is something that may or might pay for working, not necessarily that will do so. And herein, to the eye of the philosophic observer, lies the vacuum which occupies the place of a "scientific standpoint" for this problem of nomenclature!

R. W. R.

#### NEW PUBLICATIONS.

"Electric Wiring Tables." By W. Perren Maycock. London and New York; Whittaker & Company. Pages, 144. Price, \$1.

This little book of tables is intended for the use of electrical engineers and especially for those engaged in fitting electric lights. It is based entirely on British practice and British standards, and for that reason will be of use chiefly to engineers on the other side of the water, though American electricians may obtain some useful hints from it.

"A Manual of Assaying." By Alfred Stanley Miller. New York: John Wiley & Sons, and London; Chapman & Hall, Limited. Pages, 96; illustrated. Price, \$1.

The author says that the plan of this book is a departure from that of other books on the subject. This departure seems to consist chiefly in scattering the descriptions of the apparatus used in assaying through the book in a somewhat miscellaneous way. Apart from this there is practically nothing new about the manual and it hardly seems worth while to have made a book for the solitary purpose expressed in the preface, when we have so many excellent manuals on assaying already available for students and assayers in practice. It is to be regretted also that a very brief and incomplete index should have been considered sufficient.

"Armario de la Minería Metalúrgica y Electricidad de España." Compiled by Don Adriano Contreras. Seventh year, 1900. Madrid, Spain; "The Revista Minera." Pages, 528.

This is the seventh year of the publication of this manual which was started by the late Sr. Roman Criol, and has been continued by his successor, Sr. Adriano Contreras. It is the first and the only attempt to give a general and connected view of the mineral industries of Spain. The official statistics in that country not only lacked completeness, but their collection was extremely slow and the annual number, which is issued in connection with the "Revista Minera," is a valuable book. Besides the mineral statistics it contains a record of official orders and publications relating to mines and minerals, a list of mining and metallurgical companies operating in Spain with their officers, directors, etc., and a list of graduates of the mining schools with their addresses. It is a work indispensable to anyone concerned in Spanish mines, and is, as we have already noted, the only publication which furnishes similar information.

"Specifications for Steel Bridges." Taken from "De Pontibus." By J. A. L. Waddell. New York; John Wiley & Sons, and London; Chapman & Hall, Limited. Pages, 178; with tables and diagrams. Price, \$1.50.

These specifications are taken from Mr. Waddell's larger book, "De Pontibus." They have been published in this form on account of a considerable demand from engineers, draftsmen and computerers, who find the former work too large to use for specifications only. At the same time some changes have been made to bring the work up to date and to accommodate the increase in the weight of railroad equipment, and rolling stock which has come about within the last few years. The book contains general specifications governing the designing of steel railroad bridges; specifications for railroad draw spans; specifications for the design of highway bridges and draw spans; specifications governing the manufacture, shipment and erection of steel bridges and similar structures; and the compromised standard system adopted for live loads on railroad bridges. Appended to these are a number of tables useful in computing strains on bridges and similar work. Mr. Waddell's reputation as a bridge engineer is well known, and the authority which his former work has acquired in use will be sufficient to give this new volume a standing at once.

"Geological Survey of Michigan. Volume VIII, Part I. Clays and Shales of Michigan; Their Properties and Uses." By Dr. H. Ries. Lansing, Mich.: State Printer. Pages, 68; illustrated.

Dr. Ries, who is generally recognized as a high authority on clays and clay industries, has made here a careful preliminary report on the abundant resources of Michigan in clays and shales, which is of much economic value. It is divided into three parts, the first treating generally of the properties of clays and shales and the second of their uses; while the third describes specifically the various clays of the State and the tests made of them. While no kaolin has yet been found in Michigan, there are extensive beds of clay well adapted for stone-ware, tiles, drain pipe and similar work. Good brick clays and shales suitable for the manufacture of paving brick abound and are utilized in many places. No good fire-clay is known, though in some of the coal measures a so-called fire-clay exists. The shales of the Coldwater series are well adapted for use in making Portland cement, and this

manufacture is already a considerable industry. The clay resources of the State are of value and add considerably to the industrial output. Dr. Ries gives some valuable hints as to the possibilities of further development.

"Geological Survey of Canada. Report on the Geology and Natural Resources of the Country Traversed by the Yellow Head Pass Route from Edmonton to Tete Jaune Cache." By James McEvoy. Ottawa, Canada: Public Printer. Pages, 44; illustrated.

This monograph gives some interesting details concerning some little known section of Alberta and British Columbia. The only previous explorations on this line were the preliminary reconnaissances made in 1871-76 for the Canadian Pacific Railway for which the Yellow Head Pass was one of the lines originally suggested; and passing notes on portions of the country by the Palliser expedition in 1859, and by Milton and Cheadle in 1863. These, however, give only sketches of the region, and the object of Mr. McEvoy's work was to secure more definite information on the geography and geology of the country. A large part of it is mountainous, and upon the whole it is not a region inviting settlement. The timber on the lower slopes of the mountains has been largely destroyed or damaged by fires, while the only indications of mineral values are some outcroppings of galena and a few of lignite. The river valleys are narrow and the lower country is interspersed with lakes, generally surrounded by swamps or "muskeg." The report gives a very good idea of the region and such particulars as were developed by examination.

#### 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.

"Ontario: Report of the Bureau of Mines, 1900." Archibald Blue, Chief of Bureau. Toronto, Ont.; Public Printer. Pages, 240; illustrated.

"Water-Power." By Joseph P. Frizell. New York; John Wiley & Sons, and London; Chapman & Hall, Limited. Pages, 564; illustrated. Price, \$5.

"Grundzuege der Siderologie." Part I. By Hanns Freiherr von Jueptner. Leipzig, Germany; Arthur Felix. Pages, 316; illustrated. Price (in New York), \$1.50.

"Salzbergbau und Salinenkunde." By E. A. Fuerer. Braunschweig, Germany; Friedrich Vieweg & Sohn. Pages, 1124; illustrated; Price (in New York), paper, \$12.50; or cloth, \$13.25.

"Road Making and Maintenance." By Thomas Aitken. London; Charles Griffin & Company, Limited, and Philadelphia; The J. B. Lippincott Company. Pages, 440; illustrated. Price, \$6.

"Practical Coal Mining." By George L. Kerr. London; Charles Griffin & Company, Limited, and Philadelphia; the J. B. Lippincott Company. Pages, 462; with 520 illustrations. Price, \$1.

"Übersichts-Karte der Salzbergwerke und Salinen nebst Erläuterungen." Compiled by E. A. Fuerer. Braunschweig, Germany; Friedrich Vieweg & Sohn. Folding Map, with Cover. Price (in New York), 35 cents.

"The Principles, Construction and Application of Pumping Machinery." By Henry Davy. London; Charles Griffin & Company, Limited, and Philadelphia; The J. B. Lippincott Company. Pages, 296; illustrated. Price, \$6.

"Michigan: Seventeenth Annual Report of the Bureau of Labor and Industrial Statistics." Joseph L. Cox, Commissioner of Labor; John Holbrook, Deputy Commissioner. Lansing, Mich.; State Printers. Pages, 166.

#### CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials 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.

#### Methods of Mine Examination.

Sir: In your issue of October 20th you published a paper by Mr. O. H. Packer on "Methods of Mine Examination." There is probably no duty which falls to the lot of the mining engineer in the practice of his profession wherein the data are so uncertain and the result must necessarily be so largely a matter of judgment as in the valuation of a mine, and there seems to be room for different opinions as to some points raised by Mr. Packer.

In the first place, I must take exception to the complaint of Mr. Packer as to the deficiency of ethics in the profession of mining engineering. I have no expectation that the profession of mining engineering will ever be put on the same basis as medicine; nor is there good reason why it should be. The profession of medicine stands on a peculiar plane. It is indeed a science by which those who profess it earn their livelihood, but the physician and surgeon have necessarily relations of a peculiarly confidential character with their clients; and, as a rule, their practice is untainted by commercialism. That such is the case and that an unfair advantage is taken of it by many persons is demonstrated by the numerous unpaid bills due to the average practitioner, which he makes no attempt to collect. There are few physicians who would refuse to help a stranger in need, even though it were certain that no payment for services could be expected. Nothing could be more different than the practice of the profession of mining engineering wherein philanthropy is no consideration at all.

The mining engineer, especially he who makes a specialty of mine examination, does not even stand on the same professional plane as an architect, who, in the practice of his profession, produces works of permanence, which, if worthy, may give him something above his purely

pecuniary remuneration. The engineer who is engaged in construction may possibly have something of that feeling, but he whose work it is to examine mines can be stirred by no other incentive than to do his work well for its own sake, and, besides proper payment for his services, can look for no other satisfaction than that the results shall verify the fidelity of his labor and the accuracy of his judgment. A mining engineer who is engaged in such a practice stands on the same professional plane with the lawyer; his professional work is not essentially scientific, artistic or philanthropic, but, on the contrary, is simply commercial. There are good lawyers and bad ones, honest and dishonest; so there are mining engineers. We cannot reasonably expect to see the ethics of mining engineering advanced beyond those of the law, and there is no reason to believe that any organization among mining engineers would effect a discrimination between the good and the bad, the honest and the dishonest, any more than the bar associations do among lawyers. In short, the business man who has need of the services of a mining engineer is likely to retain them on the recommendation of some acquaintance, precisely as he will retain the services of a lawyer. The continuance of the connection in either case will depend on the ability and reliability of the engineer or the lawyer as demonstrated by himself. It is in that way that relations are established between commercial professional men and their employers; it is the natural and common-sense way and it is visionary to look for any other.

Reverting to the technical features of Mr. Packer's paper, I am inclined to regard it as pedagogic rather than practical. We fear that if an engineer should undertake to make the examination of a well-developed mine in the manner that Mr. Packer suggests, his work, which is a tedious and laborious one under any circumstances, would be prolonged to an undue time. The capitalist who employs an engineer to examine a mine is generally anxious for a quick report, and to conform to his requirements the engineer must be as expeditious as possible. I am of the opinion that many of the mistakes which are made by engineers reporting upon mines are due to failure to give their work the time which should be allowed to do it properly, and frequently, no doubt, this failure is attributable to the obligations of their employers. The engineer should insist on such time as he feels is required to do his work to his satisfaction, and should refuse to undertake any work in which he is not free in that respect; but, on the other hand, he should not waste his time in doing work which can be done equally well by assistants, nor will the experienced engineer do so.

It is necessary, of course, that the engineer who is making a practice of mine examination should understand assaying in order that he may know that the assayers to whom he entrusts his samples do their work properly; also, he should understand surveying in order that he may interpret the plans that have been made by other surveyors and measure the ore reserves; but that he should personally make his own assays and surveys is entirely impracticable from a commercial standpoint. It is important also that the engineer should be something of a geologist, at least in so far as ore deposits are concerned, and in examining a mine the experienced engineer will naturally consider its geological features, but we do not think that the engineer who is sent from one end of the country to the other for the commercial examination of mines, inspecting perhaps 10 or 12 in the course of a year, will have much time for the investigation of the general geology of the district in which the property under examination is found, and even if he should attempt such investigation it would necessarily be so superficial that any opinions he might form would be quite as likely to mislead him in his work as they would be to guide him properly. I do not think, therefore, that the experienced engineer will lose any time on general geological investigations. Nor will he undertake to settle metallurgical questions. This is not to say that the treatment of the ore of the mine under examination is not a question to be investigated; but with the progress in scientific knowledge the total has been so largely increased that no one man can hope to know it all even in his own profession, and professions have consequently become specialized. The mining engineer may understand the methods of ore dressing and gold milling, especially since they are commonly practiced in direct connection with mines, but he is not likely to have anything but general information as to other milling processes and still less of smelting, and he will therefore consult a metallurgical specialist if there is any doubt as to the treatment of the ore. The function of the mine-examining engineer is, in brief, resolved to the determination of the quantity of ore in sight in the mine, its average grade, its net value and the probability of the extension of the ore beyond the limits of actual exposure. In arriving at these results he will employ the services of assayers and surveyors, and possibly of geologists and metallurgists, and will melt down all the data in the crucible of his own brain with the flux of his experience, and the concentrated ingot will be the gist of his report.

In thus limiting the functions of the mine-examining engineer, the chief points for consideration as to the method of making the examination are (1) the system of taking samples and (2) the system of measuring the ore reserves. I am familiar with numerous technical papers on these subjects and the opinions of many engineers who are experienced in such work; yet with these data and those obtained in my own experience, I must confess that I have been unable to formulate any dicta as to the way a mine should be examined. I have attempted to prescribe rules for my own guidance, but when I have been confronted with a problem for their application I have been apt to find that there was something new in it which the rules did not fit, so that a new set of rules had to be formulated for that particular mine. There is a great variety in mines. Like horses, each one has its own individuality, and I fancy that it is quite as difficult to prescribe rules for the examination of a mine which would be universally applicable, as it is to prescribe rules for the purchase of a horse. Practically all that can be laid down in our opinion is that the samples should be truly representative of the ore, or as nearly as may be a general average of all the ore that is exposed in the mine, and that the ore which is estimated as "in sight" is really in sight, and is exposed in blocks of

moderate size. If the ore be of high grade and variable in character, more samples must be taken than if it be low grade and uniform, on the same principle that the smelter in purchasing ores governs his method of sampling. Similarly, larger blocks of ore may be more safely estimated from the exposure of their sides in a great deposit of low-grade, uniform ore than they can be in a vein of rich ore of pockety character. I think it is desirable that an engineer making a report upon a mine should accompany it by drawings showing precisely what he has reckoned as ore in sight and where he has taken his samples, not necessarily for the information of his employer alone, who probably would not understand such data anyway, but that the report may be submitted if need be to another engineer. If the capitalists who have reports on mines made for them should sometimes lay their reports before an independent engineer for his criticism, I am disposed to think that many discrepancies would be reconciled and some mistakes might be avoided.

Boston, Nov. 3, 1900.

Walter Renton Ingalls.

#### THE OIL SHALES OF THE LOTHIANS, SCOTLAND.

At a recent meeting of the Edinburgh Geological Society, Mr. Henry M. Cadell made an address, in which he said that although the mineral oil industry had existed in Scotland for 30 years, the Geological Survey had never published any general account of the rocks of the lower carboniferous system which had added so much to the well-being of a large district and its inhabitants. The Scottish mineral oil industry bore conspicuous testimony to the skill, courage and enterprise of his countrymen in meeting and surmounting formidable obstacles in the path of industrial progress, and to their pertinacity in sticking to their guns for long years, and ultimately overcoming the fierce American competition that was for many years directed against them, and designed to crush them out of existence, and extinguish the whole industry. He had wandered among the oil districts of Pennsylvania, Ohio, the Caspian and Burma, and had often seen the liquid fuel spouting high into the air, or being pumped like water from below. It was, therefore, with a feeling of pride that they could point not only to the continued existence of the Scottish oil industry, but even to its comparative degree of prosperity amid such adverse conditions. Necessity had been in a most conspicuous way the mother of invention in the shale works, and had engendered a spirit of scientific aptitude and inventiveness that might never have been developed under easier circumstances, and the lessons learned in her hard school were now earning a well-merited reward. The correct reading of the geological sections and the structure of the oil shale districts was for several reasons a matter of no small difficulty, and no geologist had up till now been successful in working out the structure by merely examining the surface outcrops and natural sections. It was necessary to compare natural sections with mining information derived from pits and borings all over the district, and even then there still remained many uncertainties and gaps to fill up, and much was still left in this direction for future geological investigators to accomplish. In the shale districts, several well-marked horizons or landmarks existed for the guidance of mining men and geologists. The lowest of these was the Burdiehouse, Camps, or Queensferry limestone, which was, in the West Calder District, 2,400 ft. below the hurlet or carboniferous limestone, and above which were to be found all the oil shales hitherto worked, with the exception of the shales of Pumpherston, which were situated 600 ft. below that landmark. Above this limestone were the barracks shale, an inferior seam, then the Dunnet, 500 ft. higher up, under the Binny sandstone, then the Broxburn shale above the sandstone, and the Fells shale above the marls that covered the Broxburn seams. The Houston coal, with its distinctive green and red overlying marls, formed another very conspicuous landmark all over the district, and above the marl only one seam of value—the Raeburn shale—was to be found. Oil shale was now worked for ammonia as well as oil, and the production of sulphate of ammonia, which had a high agricultural value, formed an important branch of the industry. The lowest seams of shale at Pumpherston were richest in ammonia; and Mr. Cadell thought it likely that the shales richest in ammonia would prove to be those in which the proportion of animal to plant remains was greatest, while the shales richest in hydrocarbon, such as those of Broxburn, probably contained an excess of vegetable matter.

**CANALS IN HUNGARY.**—The Danube-Save Canal, which the Hungarian Government proposes to construct, is for the purpose of providing a short and cheap route for the transport of bulk freights to Fiume. The canal will run from Vukovar on the Danube to Samac on the Save, and will have a length of 57½ kms. The distance between these two points by the natural waterway is 479 kms. From Samac it is intended to make the Save navigable as far as Sissek, a distance of 288 kms. From Sissek the route will be continued to Karlstadt, a distance of 135 kms., by making the river Kulpa navigable between these two points. From Karlstadt to the port of Fiume the route will be by rail.

**THE USE OF CONCRETE IN MINES.**—At the collieries of the John Cockerill Company at Seraing, in Belgium, concrete has been extensively used instead of brickwork for lining circular shafts, lining drifts, air-passages, etc. The concrete used has been made entirely from blast furnace slags, those from forge-iron broken to 30 or 50 mm. being used as ballast, while the mortar is made of granulated slags, hydraulic lime in the proportion of 5 to 1 by volume and slag cement. These are incorporated in a mortar-mill, but no addition of water is necessary, as the granulated slag contains enough. Slag cement is made of about 75 per cent. of granulated gray iron slags and 25 per cent. of slacked lime. When the slags are tolerably uniform in character chemical analysis of the materials is not necessary except when the furnace charges contain magnesia, which should not be present to a greater extent than 3 per cent. The materials required for a cubic meter of concrete are 0.750 cubic meter granulated slag and 0.150 cubic meter hydraulic lime.

## SOME EXPERIENCES IN THE NOME DISTRICT, ALASKA.

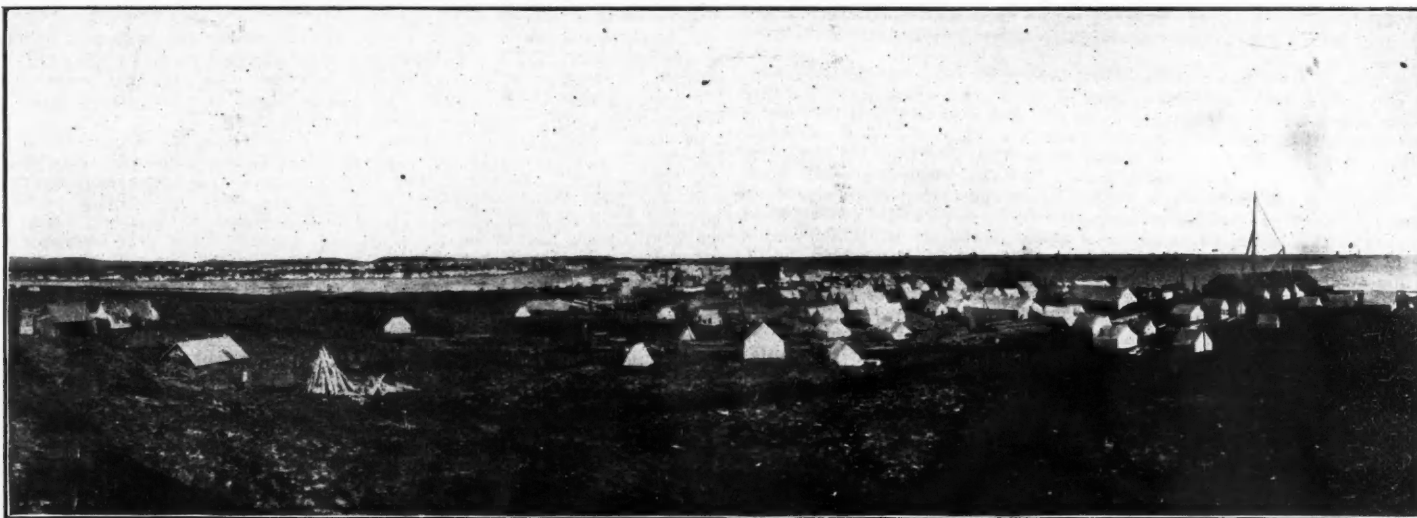
Written for the Engineering and Mining Journal by Barry Searles.

The rush of the season to Cape Nome, Alaska, of some 30,000 to 40,000 men, women and children of all sorts and conditions and representing every trade and profession, resulted in grave disappointment to the great majority, while the few new-comers that met with any success were principally those who catered to the crowd, at exorbitant prices while their money lasted; which in most cases was not for many weeks, as they had gone with limited means, believing that fortune awaited all, as represented by friends who had preceded them and met with more or less success and by the unqualified recommendation of the press in general and the transportation companies in particular.

The discovery of rich placers on the upper Yukon and Klondike in 1897, which yielded some \$2,500,000 in that year and increased to \$16,000,000 in 1899, together with the discovery of the rich beach and placers at Nome that produced some \$3,000,000 in 1899, had so attracted the attention of the outside world to Alaska that even the oldest and most conservative mining men were credulous as to exceptional opportunities at Nome. It is therefore not to be wondered at that as early as May vessels from every port on the Pacific Coast, packed like army transports with anxious gold-seekers, commenced arriving at Dutch Harbor, Unalaska, which is the largest of the Fox Islands, a group of the Aleutians. This beautiful harbor, located approximately 166° 30' west longitude and 57° 45' north latitude, is open to navigation throughout the year, and being in the gateway to the North, is visited by practically every vessel bound for Bering Sea and Yukon River ports, for the purpose of replenishing supplies of coal, water, etc. By the end

that at times it appeared as if it had closed in on them, so that either advance or retreat were cut off. Within a few hours it would break up so that a fresh start could be made in some direction, which was as often to the south as to the north, much to the disappointment of the passengers; but after 7 days' manoeuvring through the picturesque sea of icebergs, they at last, on the 15th of June, reached Nome. This town is located at the mouth of Snake River, approximately 165° 30' west longitude and 64° 30' north latitude. On this date many boats arrived and every person seemed to think his fortune depended upon his reaching shore with the least possible delay. The transportation companies were equally anxious to get all on shore, so they could look over the town and general prospects sufficiently to ensure them a fair return passenger list from the "cold feet" that were sure to develop.

There being no harbor, the steamers are obliged to anchor 2 to 3 miles off shore on account of shoal water. The prevailing wind is on shore, and is usually heavy, which makes landing, right side up, the first uncertainty of the camp that all are obliged to face. After several days' delay by storm, baggage and cargo were discharged and the town of Nome, which consisted of a few small wooden buildings, tents and dugouts began to grow. The mercantile and business people who had faith in the camp were busy planning improvements, working as many men as possible throughout the 24 hours; buildings grew as if by magic, and 40-ft. lots on the front street sold as high as \$5,000 to \$8,000. Vessels were arriving daily, all heavily loaded with passengers and cargo of every description. Immense quantities of lumber, merchandise and machinery were dumped upon the beach for miles, in the vicinity of Nome, forming almost impassable barriers to traffic, while the streets of Nome throughout the 24 hours were filled with a surging crowd. The "sour doughs" or old miners out on the creeks, hearing of the great invasion, came to have a look and help swell the crowd.



VIEW OF NOME, ALASKA.

of May every imaginable manner of craft that would float was arriving and rapidly filling up the harbor. April and May had been stormy months on the Pacific, and as the boats were overcrowded and passengers poorly fed, all were glad to arrive where they could indulge in a bath and get off their sea legs for a few days.

The shores were lined in every direction with men and women, digging for clams, fishing, cooking, washing, building boats, etc. The villages of Unalaska and Dutch Harbor, the former chiefly Esquimaux, were kept lively by baseball and football games, drinking, gambling, free fights and gun plays during the necessary delay waiting for the ice to break up in Bering Sea; while many took this opportunity to examine the coast line, which is very circuitous and indented by many small bays, mountains, and extinct volcanoes rise in most grotesque outline abruptly from the coast to an elevation of several thousand feet, and as they were at this time covered with snow to the lower slopes, prospecting inland was impossible.

The island is of igneous origin; volcanic tuffs, porphyry, trachyte, rhyolite and diorite or diabase are the predominating rock formations exposed. Some small quartz veins as well as the more mineralized portions of porphyry carry small quantity of gold. The best indication of value seen was at what is known as the Cooley Mine, located on the coast 3 miles from Unalaska village, where quartz veins 4 ft. and upward in thickness are found in diorite or diabase formation. These veins, which have been prospected by some 400 ft. of tunneling at an elevation of about 500 ft., are reported to carry \$6 to \$7 in free gold and about 5 per cent. sulphurettes with value of \$75, making a total ore value of about \$10 per ton. The location is favorable and the prospect may develop into a mine, although the country is badly broken up. This property is financed by English capital.

The steamer "Senator," which had made several attempts to find a passage through the ice to Nome, returned to Dutch Harbor on June 8th, having followed the revenue cutter "Bear" to within 400 miles of Nome. This was a signal for all the boats to start as soon as possible. Those which had not been able to complete their supplies were being loaded by every available means, passenger volunteering to assist, believing that a few hours' start of the crowd at Nome would give them a choice of the rich diggings which they had pictured in their minds as awaiting them. Most of the boats got away on June 9th and 10th, but soon after entering Bering Sea encountered float ice, which increased as they approached the mouth of the Yukon River to such an extent

Hundreds of prospectors were leaving daily for the creeks and beach, while boat building and waiting for horses and outfits delayed many for several days.

The beach between Nome and Cripple rivers, a distance of about 20 miles, was soon crowded with two and three tiers of tents; rockers, sluices and all manner of gold-saving machines were set up as long as there was room for them, regardless of the extent or value of available sands to work. Centrifugal and rotary pumps operated by oil, gasoline and steam engines were chiefly used for elevating the necessary sea water for sluicing. Owing to the exceptionally mild winter the best of this beach had been worked over by the miners that wintered there—many from the Klondike and Yukon having arrived after the close of navigation. This was most disappointing to those who had staked and worked rich claims for a few weeks last season and had gone outside with the proceeds, to return with machinery with which to work on a large scale. As the beach had been thrown open to all, they could at best only stand on an equal footing with new-comers. The remaining gold, which was very fine, flaky and bright, easily amalgamated and caught on blankets or carpet fairly well. Amalgamated plates were used on nearly all the machines and were especially necessary at the tail end of the sluice-boxes, where the fines were separated by passing through sieves and over broad plates.

Some of the smaller portable sluicing plants did fairly well for a short time by cleaning up the black and ruby sands on bed-rock more carefully than had been done previously. The larger, more costly and unwieldy plants were at a disadvantage and the small hand machines and rockers did well to cover expenses. An occasional small spot would be found that had not been previously worked which would give the lucky finder a few ounces of gold as a sample of what the beach was when worked for the first time and encourage him to work on, many days making little or nothing, in the expectation of again striking pay.

The beach between Nome and Cripple rivers will average less than 200 ft. wide from low tide to the Tundra bank, which is from 8 to 15 ft. high; the bed-rock in this area is above low tide and in most cases from 1 to 4 ft. deep. The pay is generally confined to 1 ft. next to bed-rock or clay.

The efforts to work the sands below low tide did not meet with much success, owing to several reasons, chiefly the rough ground swell, method of working, and lack of care in selection of ground to work. The bars at exceptional low tides have proved good pay and there may be a portion

of this gold obtained, at such tides and with a calm sea, by those who are fully prepared to take advantage of these conditions, which seldom exist. The most important strike on the beach was at Topkok at the mouth of the river of the same name, about 40 miles to the southeast of Nome.

The bed-rock on the beach, to the northwest of Cripple River especially, is often below the low-tide level, which makes it more difficult to prospect as the sea water leaches through the sand rapidly. This may account partly for the poor results from long stretches of beach.

There is no doubt about the source of the fine beach gold being the same as that of the coarser gold found in the rivers, creeks and gulches. With every flood or high water in the creeks, immense quantities of light sand, etc., are carried down to the sea, where the reduced current and heavy salt water, together with the action of the tide and prevailing winds, have a concentrating action and favor the deposition of the fine gold with the black and ruby sands, owing to their high specific gravity. By this action of the sea against the river outlets, especially during heavy storms and tidal waves, the large sand spits or bars which have been thus formed are perceptibly changed and many of the river outlet channels have been clearly shifted more than a right angle. I may note here the sweeping away of buildings on Water street at Nome during the big storm of the year, when Snake River outlet was changed.

Thus far the richest beach diggings found have been near the old and present outlet channels of Snake, Nome and Topkok rivers, into which the richest creeks yet discovered empty—such as Anvil, Dexter, etc. In these rivers sand bars are found which have tempted dredging operations, which did not meet with the expected success. The endless chain and bucket dredge was used and all material handled put through sluices. As there was not the necessary horizontal motion to allow stripping and wasting worthless material, bed-rock could not be closely cleaned. Ice in the banks was also among the difficulties. Owing to low water in the rivers, the dredging was confined to points near the mouths of Snake and Nome rivers, whereas banks exist higher up these rivers that pan better and have been claimed; these will doubtless be tried in time.

Anvil Creek, the best discovery yet developed, rises on the northwest side of Anvil Mountain and runs west of the same 3 miles to the Tundra, thence winds through the Tundra for  $4\frac{1}{4}$  miles to Snake River, about 6 miles from its mouth. In the 12 claims from the head of Anvil to Discovery Claim the creek varies from 50 to 300 ft. wide from rim to rim, the bed-rock being from 2 to 7 ft. deep. The fall varies from 2 to 4 per cent. and the water supply below Specimen Gulch—at No. 6 above Discovery—is usually sufficient for one sluice head. During early spring and fall rains, two and three sluice heads are available. By a system of dams the water is caught up and used twice on each claim. In this stretch of creek the gold is mostly in grains about like rice; the bed-rock sand being very rich and often showing from \$1 to \$5 per pan. Generally there is very little gold found in the gravel above 2 ft. from bed-rock, although the practice is to sluice all excepting the top 1 ft., which is stripped and wasted. The gravel worked in the center of the pay channel (40 to 100 ft. of which has been exposed) has averaged from \$10 to \$50 per square yard in the different claims, the richest being Discovery and Nos. 1 above and below; where the largest nuggets are found, often 1 oz. in weight and some up to 20 oz., very little quartz being attached to the gold. Some scheelite or calcium tungstate is always found in the sluice-boxes upon cleaning up, but not in sufficient quantity to necessitate extra clean-ups, as is the case on Snow Gulch, where the tailings of the first workings give coarse gold upon reworking, the high specific gravity of the scheelite causing it to fill up the riffles quickly, if in sufficient quantity, and allow the gold to pass over. No mercury nor plates are used in any of the sluicing on the creeks. This scheelite carries gold and samples have assayed as high as 50 oz. per ton. Below Discovery, on Anvil Creek, the width increases, as also the depth to bed-rock, while the fall diminishes. Claims Nos. 2, 3, 4 and 5 below Discovery are being opened and promise well, but are not expected to give a rate of yield equal to those above, some of which have yielded \$5,000 per day with one sluice head.

Dexter Creek rises on the east side of Anvil Mountain and empties into Nome River. It has 12 claims, is dry except in early spring and fall and is narrower and steeper than Anvil; but the yield per cubic yard from this creek and its gulches compares very favorably. These are exceptional creeks, and with the few exceptions of gulches, like Snow on Glacier Creek, have been the main producers thus far.

After studying the beach and rich diggings on the above creeks and vicinity, I proceeded to prospect systematically the country to the north and west of Nome. Moving along the coast by sail boat, I found the rivers too low to ascend by boat and was obliged to make supply camps at the mouths of Nome, Snake, Penny and Cripple rivers and go inland as light as possible in order to reach the head-waters. I prospected in Cape Nome, Cripple, Granite and Sinrock districts.

The formation from the coast inland for 15 to 20 miles is metamorphic; schists and slates having a strike northwest and southeast dipping 40° to 70° to the northeast predominate. Above the horizon of 300 ft. elevation, blue and white crystallized limestone is found with monocline or arrested anticline appearance. Considerable white quartz is seen on limestone terraces, in the lower creek bottoms and on the mountain sides. Where schists and slates appear, some stringers of quartz are also seen. The above formations show little mineralization, but all give trace of gold by fire assay.

In the higher mountains from 15 to 50 miles inland more igneous formations are seen, and the indications for gold quartz improve with distance from the coast. There are outcrops within 15 miles of Nome which may develop value. These are held at a high figure and no work has yet been done.

In some 300 miles' travel inland I had no difficulty in panning out fine colors of gold in nearly every creek where bed-rock was reached; but pay dirt outside of the Anvil Mountain locality in the Nome District had not been developed to any extent. No pay quartz has been proved up, although encouraging prospects have been found on the head-waters of Nome, Cripple and Sinrock rivers; but, owing to the distance from the coast and the difficult conditions, they remain as yet undeveloped.

Many of the creeks are deep to bed-rock, 15 to 20 ft., and have little fall. The ground being frozen more or less throughout the year, these will have to be worked as winter diggings, using steam thawers, as in the Klondike. Most of the higher creeks and gulches or shallow workings, where there is a fall and gold is found, carry little or no water, excepting in early spring, when rocking can be done.

The whole country has been staked, for speculators, to the tops of mountains for 50 miles from the coast, as high as 100 and 200 claims being staked for one person. Practically no real development work has been done. Owing to the prevailing method of jumping claims and recording in different districts and the manner of keeping records, it was next to impossible to ascertain the number of claimants to a piece of property. It is evident that every claim of proven value will be brought into litigation before titles are of any real value. The appointment of receivers by Judge Noyes upon his arrival at Nome, August 1st, tied up most of the producing claims.

Before August 1st it was almost impossible to secure passage on outgoing vessels. The confidence and expectations of the majority was so shaken that the return rush was nearly equal to the original. Nome, the city of melody and harmony, as its name implies, has changed to a city of discord and discontent. Small-pox, typhoid and pneumonia had broken out and some 4,000 people were applying to the military authorities daily for food. Many more had not sufficient means with which to go out or remain during the long winter. All construction had been discontinued and buildings were left in all stages of completion; outfits, machinery, lumber and merchandise of all kinds, excepting food, coal and blankets, could not be sold at the cost of freight.

Transportation companies reduced their rates for third-class passage and the Government carried out hundreds free. Many of those who remained collected supplies for winter and scattered, some going up the Yukon, while others will winter in the Norton Bay region and around Council City on Fish River, above Golovnin Bay, where some good finds have been reported.

I should estimate the gold output from Nome for the season of 1900 at approximately \$3,000,000, while the rush has cost not less than \$10,000,000. A portion of the latter loss, however, has been net profit to the transportation and trading companies, most of whom have many claims which will probably absorb all their profit.

Of these transportation companies the Wild Goose Mining and Trading Company has done most to improve conditions at Nome and throughout the district. Having a line of steamers and sailing vessels, the company has established many trading posts and has built 5 miles of light railroad from the mouth of Snake River to Discovery Claim on Anvil Creek, the center of the mining operations that will be undertaken in Anvil Mountain and vicinity. The company has put in water-works and electric lights for Nome and will erect a quadruple-expansion duplex Riedler 9-in. pump, at a point on Snake River where the railroad crosses. This will deliver 200 miners' inches of water on top of Anvil Mountain, an elevation of 700 ft., which will be used for the purpose of sluicing the benches, gulches and creek gravel surrounding this mountain. This pump is on the ground and will be erected next season; it is not expected to start until late in the season, and will probably not materially affect the output for next season. This, I anticipate, will exceed that of this year, but the following year should turn to account a considerable amount of gold that would otherwise not be obtainable.

I do not wish to depreciate the mineral resources of Cape Nome region, as I look for some good developments there; but the rush of the season of 1900 and the resultant conditions are to be regretted, as it certainly will retard development by its discouraging effect upon capital.

The photograph shows the sand spit and upper part of Nome with the mouth of Snake River. The outlet at one time was where the railroad beach landing is seen, with the derrick.

**SHIP-BUILDING IN THE UNITED STATES.**—The Bureau of Navigation, Treasury Department, reports that in the five months from July 1st to November 30th there were 495 vessels, of a total of 149,963 gross tons, built and registered in the United States.

**COAL-MINING COMPANY IN LIBERIA.**—The United States Consul-General at Monrovia, Mr. Smith, reports under date of October 15th, 1900, the organization of a prospecting company for the purpose of coal mining in the vicinity of Grand Cape Mount, Liberia.

**UTILIZATION OF BLAST FURNACE GAS IN GERMANY.**—United States Vice-Consul-General Hanauer, of Frankfurt, writes November 3d that on October 30th, representatives of the largest iron works in France and Belgium visited the Hoerde Mining and Rolling Mills Association, at Hoerde, near Dortmund, Prussia, to inspect the electrical central station for utilizing the gas coming from the blast furnaces. The plant when fully completed will have a force of 6,400 H.-P. At present, three twin motors of the Oechelhauser system are run by this furnace gas to produce electricity for supplying power and light for the Hermann rolling mills. A fourth motor of 600 H.-P. and four others of 1,000 H.-P. each are now in process of construction to serve like purposes.

**LARGE CARGOES ON THE LAKES.**—The Cleveland "Marine Review" gives the following additional notes of large cargoes on the lakes during the season just closed: "Iron Ore—Steamer 'William Edenborn,' A. B. Wolvin of Duluth, managing owner, 7,446 gross or 8,339 net tons, Two Harbors to Conneaut; tow barge 'John Smeaton,' owned by Bessemer Steamship Company of Cleveland, 7,446 gross or 8,339 net tons, Duluth to Cleveland, draft 18 ft. 1 in.; tow barge 'Manila,' Minnesota Steamship Company of Cleveland, 7,300 gross or 8,237 net tons, Two Harbors to South Chicago, draft of 18 ft.

"Coal—Steamer 'I. L. Elwood,' owned by American Steamship Company, A. B. Wolvin of Duluth, manager, 7,688 net tons anthracite, Buffalo to Duluth; steamer 'J. J. Hill,' owned by American Steamship Company, 7,119 net tons of bituminous, Lorain to Duluth."

## NOTES ON THE FOSSIL IRON ORES OF GEORGIA.\*

Written for the Engineering and Mining Journal by S. W. McCallie, Assistant State Geologist.

The red fossil iron ores of Georgia are confined mainly to Dade, Walker and Chattooga counties, in the northwestern part of the State. These deposits were worked to a limited extent at a few points prior to the Civil War, but only within recent years have they become producers of commercial importance. As early as 1863 the value of the ores in the manufacture of high-grade charcoal iron seemed to have been quite generally known. The Confederate Government during the latter part of that year began the construction of two or more furnaces in Lookout Valley with a view of obtaining iron suitable for ordnance purposes. Immediately after the war, in 1866, the deposits were examined and favorably reported upon by Prof. James Hall, late State Geologist of New York, whose report had much to do with the development of the iron industry in Dade County, and at the same time attracted the attention of investors to the similar deposits of Walker and Chattooga counties.

The iron-ore mining industry of Dade County reached its greatest development some 20 years ago, when the furnace at Rising Fawn was

a yellowish, or brown color. Interlaminated with the more shaly portion of the formation occur the layers of limestone, varying from 1 in. to 1 ft. or more in thickness. The limestone is always highly fossiliferous and usually carries a high percentage of iron. In places, the more ferruginous limestone weathers into a soft, earthy iron ore, but more frequently the residual product is a reddish clay. The sandstones are usually fine grained and thin bedded. However, in Taylor's Ridge and Dirt Seller Mountain they are often coarse grained and massive. The most marked features of the sandstone are their cross-bedding and their numerous casts of fossils. They evidently carry a considerable amount of iron as an accessory mineral, as is shown by their reddish color upon weathering.

The fossil iron ores, as above stated, occur in one or more beds, and are generally found near the center of the Rockford formation. In the knobby region forming the northern terminus of Pigeon Mountain there are 3 well-developed beds located one above the other. At Estelle, a few miles south of this point, two of these beds have been extensively worked. In the northern part of Chattooga Valley there are two workable beds, while on Taylor's Ridge there is only one. As a general rule, when there is more than one bed, the lower is of the greater commercial importance. This holds good not only as to the character of the ore itself, but also as to the persistence and the uni-

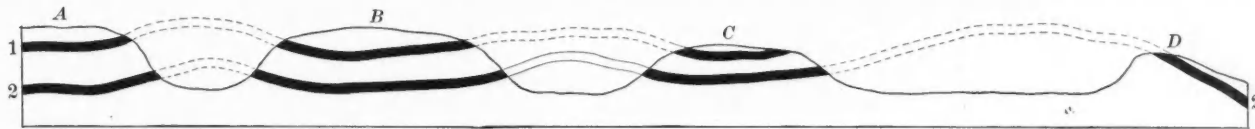


FIG. 1.—GEOLOGICAL SECTION, GEORGIA-ALABAMA STATE LINE TO GREENBUSH, GA.

in blast. At that time the entire output of the several mines in Lookout Valley aggregated from 300 to 400 tons per day. The various mines of Walker and Chattooga counties were developed later, and only within the last 2 or 3 years have they reached a daily output of 500 tons.

The topography of that part of the State in which the fossil iron ores occur is distinctly mountainous, the most marked distinguishing feature being long, narrow valleys, flanked on one or both sides by precipitous cliffs of carboniferous sandstone, varying from one to several hundred feet in height. Back of the sandstone cliffs are elevated table-lands, often a mile or more in width, which are known as Lookout, Sand and Pigeon mountains. The streams leading down from the table-lands have cut deep and wide gorges in the carboniferous strata in

form thickness of the bed. Besides the workable beds here referred to there are in some places frequently as many as half a dozen thin layers varying from 2 to 6 in. in thickness. These layers often run high in metallic iron, but they are too thin to be worked with profit. Some idea may be had of the persistence of the main iron-ore beds when it is stated that they often extend for miles with but little or no change in thickness. The main workable bed in Lookout Valley extends from one end of the valley to the other, a distance of 15 miles, with practically no change.

These beds seem to have been originally thin layers of highly ferruginous limestone made up largely of crinoid stems and other animal remains, extending over wide areas of Silurian sea-bottom. In the



FIG. 2.—SURFACE MINING ON PIGEON MOUNTAIN, WALKER COUNTY, GEORGIA.

places, thus frequently giving a very irregular or sinuous outline to the valleys. The natural features of the area are primarily due to the geological structure of the region. The valleys are all typical anticlinal valleys resulting from the wearing away of huge anticlinal folds of the carboniferous and the underlying strata. In two instances, Dirt Seller Mountain and Taylor's Ridge, the iron ores outcrop near the summit of the mountain or the ridge, but in most cases they are found near the base of the mountain, from which they are often separated by a chain of low hills of Fort Payne chert. Beneath the Fort Payne chert, and separated from it by a thin layer of black Devonian shale, is the Rockford formation, the great red fossil iron-ore-bearing series.

The Rockford formation, as defined by Dr. Hayes, includes all of the Silurian system above the Chickamauga limestone, and corresponds to the Red Mountain or Clinton formation of Alabama. Stratigraphically, it occupies the same position in the geological scale as the fossil iron-ore series of New York and Pennsylvania. The Rockford formation in Georgia attains a maximum thickness of about 1,000 ft. and consists of shales, sandstones and thin beds of limestone, with one or more layers of workable iron ore. In Taylor's Ridge and Dirt Seller Mountain the formation is made up largely of sandstone, while in Lookout and Chattooga valleys shales predominate, and the calcareous beds at the same time become more numerous. The shales, when fresh, usually have a bluish color, but when weathered they assume

process of mountain-making at the close of the Paleozoic times these beds, with the overlying carboniferous strata, were thrown into huge anticlinal folds, which were subsequently removed by erosion and transformed into valleys, along the sides of which are now to be found the outcroppings of the iron ore. The total length of ore outcroppings thus brought to the surface in Dade, Walker and Chattooga counties aggregates more than 150 miles. The thickness of the iron-ore beds varies from a few inches to 7 ft. The average thickness of the workable beds may be placed at about 24 in. of merchantable ore. The beds are usually divided into two or more layers by a parting of shale from a fraction of an inch to 6 in. or more in thickness. The ores of the different individual layers vary but little in character and in the amount of iron present. There is, however, one marked exception to this general rule, at Dirt Seller Mountain, where the lower layer becomes quite silicious, on account of the presence of water-worn pebbles of sandstone.

Each ore bed, where it has been long exposed to atmospheric agencies, always carries two varieties of ore, namely, the soft ore and the hard ore. The former is that part of the bed which has had its lime removed by the leaching process of acidulated waters, while the latter still retains its lime. The soft ore always runs much higher in metallic iron than the hard ore, and for this reason it is eagerly sought, and first worked. In most cases the soft ores are quite superficial rarely ever extending to a depth of more than 10 or 15 ft. below the surface. Nevertheless, in some places the soft ores cover an area of

\*By permission of the State Geologist.

several acres, owing to the strata lying nearly horizontal, or where the iron-ore bed conforms in dip to the slope of the hill on which it outcrops.

The relative chemical composition of the soft and the hard ore is shown by the following analyses of samples taken from Lookout Valley:  
Hard ore: Metallic iron, 32.19; lime, 23.04; phos., 0.304. Soft ore: Metallic iron, 59.00; sil., 9.11; phos., 0.092.

It is a common belief among miners that the hard ore decreases in its percentage of iron as its depth from the surface increases. There are, however, some places in which this general rule does not seem to hold good. A noted exception is the upright bed at Bronco, which has been worked to the depth of 200 ft. with little or no change in the character of the ore. A number of analyses made from samples of ore taken from the Bronco mines show that the hard ore at that point runs from 40 to 45 per cent. metallic iron.

There are two methods of mining the red fossil iron ores, which depend upon the depth they lie beneath the surface. When they are superficial, that is, lying from a few inches to 10 ft. beneath the surface—in which case they are nearly always soft ores—they are mined by what is known as the "stripping" method. This method consists simply in removing the earth by shovel, drag-scraper or otherwise, and raising the ore by means of a pick or crow-bar. The cost of mining by this process varies from 10 to 60c. per ton, depending upon the thickness of the overburden to be removed. The greater part of the ores so far mined in Dade, Walker and Chattooga counties have been raised by this method. Where the ore lies at a greater depth than 10 ft. from the surface underground mining is resorted to. More or less of this method of ore mining has been carried on at Bronco, Estelle, Rising Fawn and at other points, both in Dade and Walker counties.

The fossil iron ores are generally quite favorably located for economic working. The outcropping in most places occurs on hillsides at elevations varying from 50 to 500 ft. above the general level of the surrounding country. As a result of this elevation, perfect self-drainage is insured. The elevation also, at the same time, makes it possible to deliver the ore to the valley below by means of inclines at a comparatively small cost. Furthermore, the railroad facilities have been greatly improved in the last few years, so that at present with only one exception, namely, the deposits of Taylor's Ridge, the ores are only a short distance removed from the railroad. The main output of the red iron-ore mines of Georgia is at present being consumed by the Rome and Tennessee furnaces. There is also a considerable amount of hard ore used by the Chattanooga Paint Factory in the manufacture of red paint. The entire output of the several mines last summer aggregated about 600 tons per day. This output could be increased to almost any amount if the price of the ore justified the opening of the mines along the entire 150 miles of ore-outcropping.

Fig. 1 is a geological section from the Georgia-Alabama line in Dade County to Greenbush in Walker County, showing the mode of occurrence of fossil iron ore and coal. In this 1 is the coal and 2 fossil iron ore; A is Sand Mountain, B Lookout Mountain, C Pigeon Mountain and D Taylor's Ridge.

Fig. 2 is a general view of surface mining on the west side of Pigeon Mountain in Walker County. Fig. 3 is a general view of the iron ore mines at Sleepy Hollow in Walker County. Fig. 4 is from a photograph of the Estelle Ore-bank in Walker County, showing underground mining.

#### THE SULPHOCYANIDES OF COPPER AND SILVER IN GRAVIMETRIC ANALYSIS.\*

By R. G. Van Name.

The author calls attention to the early work of Rivot and later Fresenius on the estimation of copper gravimetrically as cuprous sulphocyanide and says that the method has never come into general use, apparently because of the difficulty and inaccuracy attendant upon weighing the precipitate upon dried paper filters. The author avoided this in some experiments he conducted by performing the filtering and weighing upon asbestos in a perforated platinum crucible.

The method of conducting a determination was as follows: A suitable quantity of a standard copper sulphate solution was run from a burette, diluted to a convenient volume, a few cubic centimeters of a saturated solution of ammonium bisulphite added, and the copper precipitated by an excess of ammonium sulphocyanide. The precipitate was allowed to settle, collected upon asbestos in a weighed crucible, washed with cold water and dried at 110° until no further loss of weight took place. The copper sulphate solution was made up exactly decinormal and the standard confirmed electrolytically. As the ammonium sulphocyanide solution was slightly above decinormal, 13 c. c. represent a small excess (about one cubic centimeter) above the amount theoretically required to precipitate 25 c. c. of the copper sulphate solution. The ammonium bisulphite, which had been recently prepared by saturating aqueous ammonia with sulphur dioxide, was always used in sufficient quantity to give the liquid a strong and permanent odor of the latter.

The presence of various amounts of free sulphuric acid up to 12 per cent. of the total volume of liquid does not exert a sufficient solvent effect upon the cuprous sulphocyanide to interfere materially with the accuracy of the process, but it retards the precipitation, making it necessary to increase the time of standing before filtering in proportion to the amount of acid present. In several determinations the precipitation was visibly incomplete even after several hours standing. Hydrochloric acid apparently has no greater disturbing influence than sulphuric acid.

The time required to dry the cuprous sulphocyanide at 110° is in general from two to three hours. Heating much longer than this is not to be recommended, as a gradual increase in weight begins to take place. This tendency to increase in weight, however, need not interfere materially with the accuracy of the process unless the drying is prolonged far beyond the necessary time.

The method is easily handled and is capable of considerable accuracy.

\*Abstract of article in "American Journal of Science."

It is evidently much less likely to be interfered with by the presence of other metals than the other gravimetric methods for copper, and may therefore be directly applied with good results in many cases where the use of the electrolytic or the oxide method would involve a previous separation.

The sulphocyanide of silver, unlike that of copper, is soluble in an excess of ammonium or alkali sulphocyanides and this fact prevents the use of the latter to precipitate silver for gravimetric estimation. The reverse process, however, the precipitation of a soluble sulphocyanide by an excess of silver nitrate, furnishes a convenient means of standardizing sulphocyanide solutions and in general for estimating thiocyanic acid. When freshly precipitated the sulphocyanide of silver resembles the chloride in appearance, but when allowed to stand a few hours becomes finely granular and is very easily filtered and washed. It may be safely dried to a constant weight upon an asbestos filter at 110° to 120° but at a somewhat higher temperature is decomposed leaving a residue of silver sulphide.

Determinations were made as follows: Portions of 25 c. c. of an approximately decinormal solution of ammonium sulphocyanide were measured from a burette diluted with 100 c. c. of water and silver nitrate added in excess. The precipitate was collected upon asbestos in a platinum crucible, washed with cold water and dried to a constant weight at 115°, the drying requiring usually between two and three hours.

The filtering is facilitated by allowing a few hours for the precipitate to settle; but this is by no means essential, as it is easy with a little care to obtain a clear filtrate even when the filtering is performed at once. The solution of ammonium sulphocyanide was prepared from a pure salt, especially tested and found free from chloride. This point is of importance; chlorine is a common impurity, and its presence in any considerable quantity will vitiate the results.

In some determinations the quantity of silver nitrate was not measured, but regulated by the eye alone, thus making conditions the same as would ordinarily prevail in analytical work. The author concludes from a comparison of results that the estimation of sulphocyanides by precipitation with silver nitrate and direct weighing of the precipitate is wholly permissible. The method is extremely simple and the results are quite accurate.

#### SAKHALIN COAL.

Coal was first discovered on the island of Sakhalin, off the coast of Siberia, as long ago as 1787, and has been worked since 1852, but the production was very small until recently. Two coal basins are now worked, according to a recent note by F. F. Kleye, in the "Oesterreichische Zeitschrift für Berg und Huettenwesen." In 1899 the output from the Due Basin was 1,500,000 poods (24,570 metric tons), and from the Mgatsch Basin 800,000 poods (13,104 metric tons). Coal outcrops have been found at other points, but are not worked at present, as they are at points not easy of access from the coast.

The coal from the Due Basin differs from that obtained at Mgatsch. It is looked upon as the best variety, for forge and factory purposes, found in the East; the calorific power of the air-dry coal is 8,249 calories, and the yield of coke equals 65 per cent. For marine boilers it is considered too small and too smoky. It is friable and will not stand much handling. Mgatsch coal is harder, and can be raised in larger lumps, and gives only a light, gray smoke. For ship use it was tested in the Russian Pacific fleet and found a good steam raiser, the flame being regular and not too long, and the consumption about 20 per cent. less than Due coal or Takasima (Japan) coal. Unlike the latter it does not corrode the firebrick linings of boiler furnaces. The tests further showed a calorific power of 7,174 calories, 87.9 per cent. of combustible matter, 10.2 per cent. of ash, and 1.8 per cent. of moisture. The ratio of consumption, compared with Cardiff steam coal, was ascertained to be as 13 to 10.

As the result of attempts to improve the character of Due coal by judicious admixture of Mgatsch coal, the two producing companies have agreed to pool their output, it being found that the Mgatsch coal checks the tendency of the other to break up, while that property enables even the smallest particles of Mgatsch coal to be properly utilized; the steam-raising power of the mixture greatly exceeds that of either used alone, and the tendency to smoke is reduced. Five grades are prepared for market—unmixed Due coals for forge, factory and steamer use; un-screened Mgatsch coal for steamers; screened Mgatsch, which makes an excellent steam coal for marine work; Mgatsch smalls, and mixed Mgatsch and Due coals, unrivalled in the Pacific for ships' use.

The demand for these grades is very brisk in the Amoor District, and shipments are made to Vladivostok, Port Korakovsky, Petropavlovsk, Port Arthur, etc., the supply being less than the demand. The supply could be very largely increased if additional capital was put in the mines and if more labor could be obtained.

A NEW ASIATIC RAILROAD.—Last October four parties of engineers began setting stakes for the proposed railroad from Orenburg, the eastern terminus of a railroad, on the border between Europe and Asia, some 250 miles south of the Siberian Railroad, southeastward to Tashkend, in Turkestan, the terminus of a branch of the Asiatic Midland Railroad, till lately called the Trans-Caspian. The whole line will be about 1,000 miles long, nearly all through an arid country on which Tartar hordes pasture vast herds and flocks. The line will pass the north end of the Aral Sea about half way between the termini and the southern half will be in the valley of the Syr Daria, the ancient Iaxartes, which, where water is available for irrigation, is very productive, and yields among other things cotton, though the elevation is great and the winters are severe. This road will make a much shorter route to Central Asia, Afghanistan and India than the Trans-Caspian line, and an all-rail route. It is hoped to utilize the Syr-Daria for transporting materials, but it is questioned whether the depth required, 2½ ft., can be had over considerable stretches.



## NEW MEXICO COAL MINES.

Coal mining so far in New Mexico has been confined to 7 districts according to Mine Inspector John W. Fleming. These are the Gallup-Clarkville District in McKinley County, the heaviest producer; the Blossburg Region in Colfax County; the Madrid-O'Mara regions in Santa Fe County; the Monero District in Rio Arriba County; the San Juan River region in San Juan County; the Carthage pits in Socorro County, and the White Oaks-Capitan district in Lincoln County.

During the fiscal year ending June 30th last 35 mines have been worked in 6 counties as follows: McKinley County, 9 mines, employing 971 men and yielding 543,150 tons, valued at \$780,333; Colfax County, 8 mines, employing 527 men, outputting 399,206 tons worth \$602,107; Santa

The veins are 4 to 7 ft. thick. The coal is marketed in New Mexico, Arizona and California.

In south Santa Fe County bituminous and anthracite coal rest one above the other. Here the main bituminous seam, which has been opened by a slope 2,266 ft, is 3 to 5 ft. thick and underlying it is a 3-ft. stratum of anthracite. Over \$7,000 was put into improvements about the mines during the past year. They are operated under lease by the Colorado Fuel and Iron Company, and the town of Madrid, made up of coal miners and their families, has a population of 1,200 to 1,500.

Extensive properties are operated by the Raton Coal and Coke Company near Gardiner, about 4 miles from Raton, in Colfax County. The mines are well equipped. There are numerous veins, the largest being 6 to 7 ft. thick.

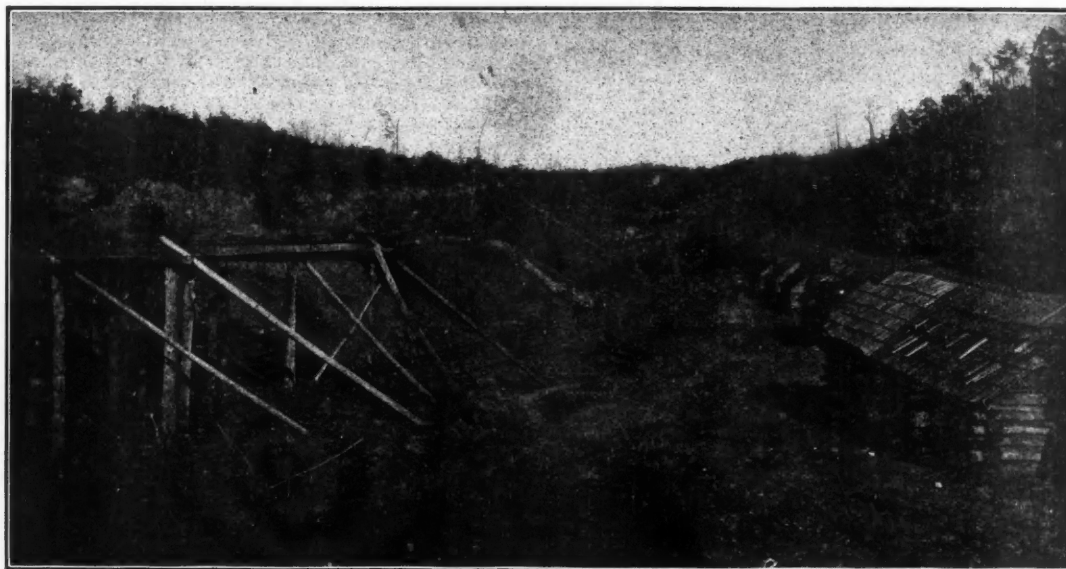


FIG. 3.—SLEEPY HOLLOW IRON ORE MINE, WALKER COUNTY, GEORGIA.

Fe County, 3 mines, employing 230 men, and yielding 110,212 tons worth \$218,000; Lincoln County, 6 mines, employing 204 men, yielding 88,060 tons valued at \$177,277; Rio Arriba County, 4 mines, employing 63 men, yielding 35,706 tons, worth \$47,388. At Carthage, Socorro County, one mine is in operation which employs 17 miners and the year's output was 6,000 tons, valued at \$12,000, and 4 mines have been worked in San Juan County intermittently during the past year yielding 815 tons for local consumption.

The total output of coal for the year ending June 30th, 1900, was 1,187,334 tons, the estimated value of which was \$1,837,165. This is an

Crossing westward over the main vertebra of the Rocky Mountains many evidences of coal are found east of Embudo in southern Taos County and beyond the Rio Grande, in Rio Arriba County. In the Monero and Lumberton regions, is another coal-field where a number of companies have been working for 18 years or more. Here the veins are 3 to 6 ft. thick. Thence toward the southwest coal croppings are found at intervals and extend to the Gallup fields.

On the San Juan River and in the vicinity of Aztec are large and rich coal areas yet unworked. As in Santa Fe County several seams of natural coke have been encountered in San Juan County.



FIG. 4.—ESTELLE ORE BANK, WALKER COUNTY, GEORGIA.

increase in tonnage over the previous fiscal year of 138,800 tons, and an increased value of \$236,577. The total number of employees in and about the mines was 2,015, an increase of 135. Trade has been exceedingly brisk all through the year. Although production has increased, the demand for the product has been much greater than the supply. At all mines, except the very small mines, the operators were unable to fill all of the orders received, and on account of the scarcity of miners were unable to meet the demand.

In the Gallup District there are 5 known workable seams, one above another, the lowest at a depth of 100 ft. The field extends an unknown distance north and west. The first development work was done in 1881, but the industry did not assume important proportions until about 1885.

In Socorro County south and west of Magdalena are extensive coal measures, and further east, in Lincoln County, are the newly opened deposits about White Oaks and at Capitan. The veins are 3 to 5 ft. thick, averaging nearly 4 ft.

Although opened scarcely a year ago, the pits about Capitan, owned by the New Mexico Fuel Company, John A. Eddy and others, have proved very profitable. Over \$25,000 has been spent in improvements here during the year, and nearly \$200,000 worth of coal has been mined and marketed, mostly in Texas, Mexico and Arizona.

In western San Miguel and northern Santa Fe County are indications of workable coal deposits. Recently a 24-in. seam of bituminous coal has been reported within 3 miles of the city of Santa Fe.

The coke production of the territory for the year ending June 30th, 1900, amounted of 42,803 tons, of which 21,953 tons were produced at the coke ovens at Waldo, in Santa Fe County, and the remainder at Gardiner. The coke runs from 85 to 87 per cent. in fixed carbon; 11 to 13 per cent. in ash; 1 per cent. in moisture, and 0.75 per cent. in volatile matter. It takes about 1.55 tons of coal to make 1 ton of coke. The coal used came from the Starkville Mine, Las Animas County, Colo.

During the year there were 15 employees killed and 25 injured by accident. The chief cause was falls of rock and coal, from which 8 deaths and 13 injuries resulted. This shows an average of 7.44 killed and 12.41 injured per 1,000 employees at or in the mines.

#### PYRITIC SMELTING AND HOT BLAST.

Written for the Engineering and Mining Journal by S. E. Bretherton.

Pyritic smelting is the utilization of sulphides as both flux and fuel, the metallic bases, excepting copper, uniting with the silica to form a slag, and the copper acting as a collecting agent to gather the precious metals into a copper matte, the sulphur uniting with the oxygen of the blast to generate heat, just as the carbon from fuel does. Some of the first questions asked by parties contemplating the erection of a matting furnace for the reduction of a great variety of ore—especially if it is to be a custom plant—are:

1. Can as high a percentage of the values, gold and silver, be saved with copper as with lead?
2. Can the ore be smelted as cheaply as with lead?
3. Can as many tons of ore be put into one ton of shipping product as in lead smelting?
4. Can copper matte be sold as readily as lead bullion?
5. Can as refractory ore be smelted as in lead smelting?
6. Can as cheap a slag be made?
7. Will the ore require more preliminary crushing and roasting?
8. Will a plant of the same capacity cost more than if the ore is to be smelted in a lead furnace?
9. Is the matting process as suitable for as many different characters of ore?
10. Will the copper matting process cost more or less than smelting ore with lead for a saving agent?

Question No. 1 can be answered positively by stating that the writer—who has been in the lead smelting business twelve years, and the copper smelting business five years as superintendent and metallurgist in both cases—found that after introducing his large heated matte settling arrangement there was no loss of gold, slightly over 1 per cent. loss of silver, and an immense gain in copper over the dry assay, and only a slight loss from the wet assay. This was done at a custom plant which is still running, where the ore was all purchased, sampled by the regular coning and quartering methods, and assayed. The concentration was from 8 to 15 tons into one ton of 50 to 60 per cent. copper matte, first operation.

2. If the ore contains sufficient sulphur to act as fuel, and hot blast is used, the ore can be smelted for less than half the regular cost of lead smelting; in fact, for about what the preliminary rolling and roasting alone costs in lead smelting.

3. As 12 per cent. lead is about the minimum amount which can be used in lead smelting and do good work, 8 tons into 1 is about the best concentration; but in copper smelting 1 or 2 per cent. copper in the ore can be the minimum amount and do good work, and the concentration is that much greater accordingly.

4. There is a greater demand at the present time for copper than for lead.

5. On account of the more rapid smelting of the charges in the blast furnace, greater heat and more silicious slag, as a rule, much more zinc can be smelted without trouble when matting than when lead smelting.

6. On account of being able to force more silica and zinc into the slag, it costs less for flux.

7. As there is no preliminary roasting required, if hot blast is used, nothing but an ordinary coarse crusher is required for the largest lumps.

8. A 200-ton plant where all the ore would have to be roasted—unless roasted in heaps, and then there is the capital tied up for months in the ore—if hot blast is used so as to dispense with fine crushing and roasting, can be built for about one-third the regular cost.

9. On account of being able to make a greater variety of slag without danger of serious losses, when copper matting, it is suitable for a greater variety of ore, excepting ore rich in lead, which should go to a regular lead furnace.

10. On account of the advantages just enumerated for pyritic smelting it does not cost more than one-third to one-half the ordinary cost of lead smelting. Of course, if cold blast is used, and ordinary matting resorted to, the system has but little advantage over ordinary lead smelting, excepting that it requires less copper to save values than it does lead, and a more silicious slag can be made when matting.

The question comes up, What ore is suitable for pyritic smelting, or, as I would call it, semi-pyritic smelting? The ore should contain sufficient sulphur to make the desired matte necessary for clean work in the first operation, using fuel. Then, as the sulphur is in excess of the amount required to form the matte, the percentage of fuel can and should be reduced in the blast furnace, so that the oxygen from the blast will unite with the sulphur and not carbon. Quite often, in my experience, after using hot blast, when the matte got over 65 per cent. copper, too rich for clean work, the foreman would add either more coke or more sulphide ore, to reduce the grade of the matte. I found mixtures—the lime usually has to be added—of 3 per cent. and over copper, 20 to 30 per cent. iron, 8 to 13 per cent. lime, up to 10 per cent. zinc, 10 per cent. alumina, 30 to 36 per cent. silica, 10 to 30 per cent. sulphur the safest limits. The original ore may carry a very high per cent. of zinc, alumina, or sulphur, but the percentages are reduced by the time the ore is fluxed; that is, the excess of bases properly neutralized with silica. Of course, too much zinc is objectionable, but it can be utilized to better advantage as a base in copper smelting than in

lead smelting; in fact, zinc-blende seems to give less trouble in a blast furnace with hot blast than when roasting in a reverberatory furnace, as it requires so much more heat to liberate its sulphur than when roasting ordinary pyrites; and it must be with hot blast that the oxygen, not having to unite with fuel, has a better chance to combine with the sulphur where such an intense heat exists as in the blast furnace. Of course, at times, when it is necessary, copper as low as 1 per cent. will answer to save the values. Some metallurgists claim that no copper is necessary, and an iron matte will save the values, and mixtures containing much less iron and more silica can be smelted to better advantage than those I have named; but it will make these notes too long, to go into the question of the different combining powers of each base with silica, and when each should be added or reduced on account of the specific gravity of the proper slag to be made for matte settling purposes.

The first heat required is for heating the air blast up to the temperature when the oxygen will combine with either the carbon of the coke or the sulphur contained in pyrites; then the necessary heat for melting ores and fluxes so that they will combine to form the proper silicates for fluid and clean slag is produced by the oxidizing of the fuel added to the charge by the free oxygen contained in the blast. If cold blast is used, any free oxygen going in with it is required to oxidize the extra fuel required to heat the blast, thus leaving none for the sulphur. If more cold blast is used so as to get still more free oxygen, it drives the heat still further away from the tuyere openings into the furnace and reduces the smelting area of the furnace in that proportion, driving the heat higher up in the furnace, burning the fuel and smelting the ore so near the top of the furnace that any metals volatilized have no chance to get caught. It keeps the fuel burning so high above the tuyeres that it leaves very little for the blast to encounter as it enters, unless a large quantity has been used.

When the cold blast enters the furnace from the tuyere openings, and encounters the hot material without fuel mixed with it to generate the heat, a crusted furnace is soon the result, starting at the tuyere nozzle and reducing the capacity of the furnace until it closes it. This is the result when too much cold blast is used, or too little fuel is used with the cold blast. By the use of the hot blast this trouble is greatly increased, and the hotter the blast is the better it is, up to a point where all the remaining heat necessary for smelting can be produced by the combination of the oxygen in the blast with easily oxidized elements in the ore, such as sulphur, arsenic, etc. When these elements are not in sufficient quantity to produce by oxidation the balance of the heat without making too high a concentration; that is, when there is not enough sulphur to make matte for the regular clean working of the furnace; then sufficient fuel should be used in order to save the necessary sulphur for making a proper grade of matte. With a hot blast, a cool top, and careful feeding, a more uniform grade of matte is made than it has ever been possible to make by the use of the cold blast. At the same time, there is less loss of precious metals by volatilization.

The advantages of a hot blast over a cold blast are in the improved chemical conditions, economy of fuel, and the greater capacity of the furnace. Where the blast is heated without any expense, every degree of heat so obtained is a saving of a percentage of coke needed for fuel in the working of the furnace. As a matter of fact, the saving goes beyond that point, because the cold blast chills the charge at the point of contact in the furnace from each one of the tuyeres, thus reducing the activity of the coke furnished, and imposing an increased demand on it.

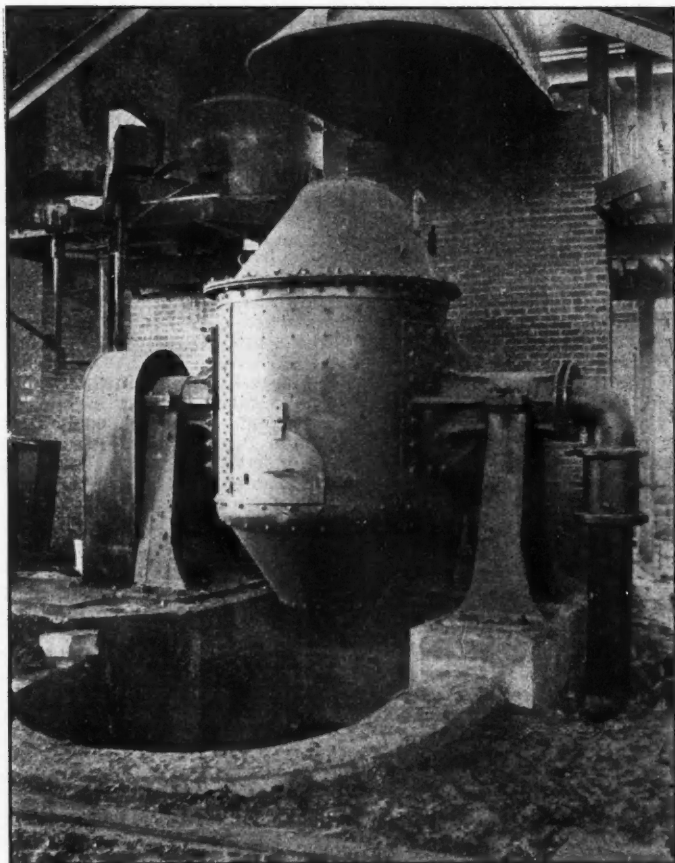
This chilling action reduces the capacity of the furnace in proportion to the area occupied by the chilled portions, and near the nozzle of each tuyere will be found a large surface of the charge chilled below the fusing point by the action of the cold blast, which, with hot blast, would be kept active. This proportion cuts a material figure, so that the use of the hot blast in that direction alone is a decided advantage. As a matter of fact, it has been found in the practical working of furnaces on a large scale that it is advantageous to heat the blast by separate ovens, where the expense for fuel in operating these ovens was more than double the saving of the fuel in the furnace charge. It was found that the increased capacity of the furnace, and the improved chemical conditions which resulted in bringing about a more thorough fusion of the ore, more than compensated for the extra cost of the fuel to heat the air. This fact having been demonstrated on a large scale, one can see how much advantage it will be in the cost of operating any furnace if the air can be heated automatically without cost. Realizing the field for the improvement in that direction several inventions have been brought out to accomplish that end. Most of those I have seen utilized the heat escaping from the fumes of the furnace by means of coils of pipe, at some distance above the feed floor of the furnace. Where a furnace is properly fed and properly operated so as to prevent volatilization of the precious metals, there should be very little heat above the feed floor, so that to utilize the invention it is necessary to keep a strong blast running through the entire charge of the furnace, igniting the free atoms of sulphur and the coke on the top of the charge. This causes a heavy loss by volatilization where the ore contains any tellurides, lead, or other volatile substances, and destroys a great portion of the fuel heat before the charge reaches the oxidizing portion of the furnace. In other cases, attempts have been made to use the waste heat escaping from the slag, but this has been taken in such a way that the fumes from the slag were driven back into the furnace again, furnishing an impure blast with a great portion of the free oxygen already removed.

The object of my researches has been to secure a hot blast which would furnish the air heated to a sufficient degree of heat to prevent chilling, at the same time increasing the capacity of the furnace and minimizing the use of fuel; and to accomplish this without any additional cost for operation. This I have been able to do by what is known as the Bretherton hot blast apparatus. In constructing this apparatus I have kept in mind the principal features required for its successful operation, doing away with the back pressure on the blower so that the volume of air would not be minimized; taking the heat from the escaping heat of the hot slag by building an oven around the forehearth, the oven having flues passing through it for the escaping fumes

of the slag; and augmenting the heat acquired in that manner somewhat by using a set of air jackets above the water jackets around the furnace, the air having a continuous passage from the blower to the tuyeres. In this way I have been able to keep the top of the furnace cool, so as to prevent volatilization.

The first and most important item to consider when heating the air blast is that it in no way interferes with the regular working of the blower, as the blast passes through the blower, cold. All calculations as to the amount of blast required and used can be based on the regular volume handled by the blower, the same as when using cold blast. It is customary to calculate the amount of blast furnished by the tables sent out by the manufacturers to the different blowers. In this way, the amount of free oxygen sent into the blast furnace, whether heated or cold, can be calculated, provided there is no obstruction to the free passage of the air through the heating apparatus. It is therefore necessary that the area of the heating box shall be larger than the inlet where the cold blast enters, so that no back pressure is created. The outlet of this heating box should be made with nearly double the capacity of the inlet.

By our latest arrangement at Silverton, Colo., we not only utilize what little heat there is to be saved practically above the feed floor, but utilize the heat which would otherwise go to waste, through a much needed, large enclosed matte settling arrangement. It is the same ar-



TROPENAS STEEL CONVERTER AT SARGENT WORKS.

angement, excepting that all the heat in that case was obtained from the slag and the wood burned on the settler's surface, as in the one we first started with. With that we reduced our fuel to one-third, and dispensed with all preliminary roasting, where we had been roasting two-thirds of the ore and concentrates smelted.

THE TROPENAS PROCESS FOR STEEL CASTINGS.

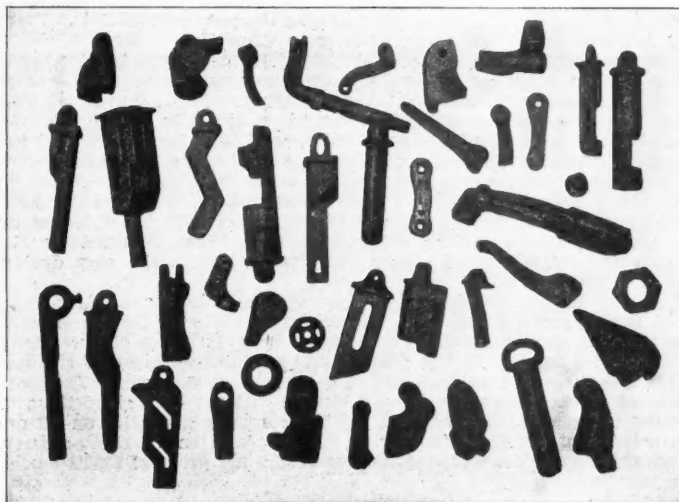
Since March, 1900, the Sargent Company, of Chicago, Ill., has operated a plant at Chicago Heights manufacturing small steel castings, making the steel by what is known as the Tropenas process. This method was adopted after several years of experience with open-hearth and crucible steel plants, and after a careful study of the subject of steel making at home and abroad, where the process is in successful operation in some 40 different plants.

The Tropenas process consists in the use of special converters in which pig iron and selected scrap, previously melted in a cupola, are subjected to an air blast of 3 to 4 lbs. pressure per square inch, directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig iron, and after a period varying from 16 to 20 minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferro-manganese, of ferro-silicon, or both, to bring up the silicon, manganese and carbon contents to the specified proportions, when the metal is drawn off into a ladle and poured. The process is very simple and the product very regular.

The peculiar advantage of the Tropenas process lies in the fact that the resultant metal is better and consequently more fluid than that produced by any other method, and it is this fact which makes it valuable in the manufacture of small and intricate castings, as it can be

poured over the lip of the ladle in as small a stream as desired, and will run through thin sections, producing solid castings free from pinholes and cracks. Any grade of metal is readily produced by varying the additions. It is consequently valuable not only in the production of low carbon steel of the maximum permeability, so much desired in electrical castings, but also in the production of special grades of hard steel for mining machinery parts and other purposes.

The plant at Chicago Heights is in very successful operation, producing from 20 to 30 tons of castings per day, with a much larger capacity. All classes of general machinery, railroad, mining and electrical castings are turned out, fully equalling in physical properties and chemical composition the best open-hearth steel. The castings are sound and solid, with a smooth surface and the metal will stand forging and welding. Miscellaneous castings, unless otherwise specified, are made of mild steel, which is tough and machines readily, having a tensile strength per square inch of from 65,000 to 75,000 lbs., with an elongation of 20 to 30 per cent. The accompanying illustrations show a few of the castings made of Tropenas steel. They are solid and true to pattern, equalling in every respect forgings of all kinds,



CASTINGS MADE WITH TROPENAS STEEL.

which they are intended to replace, as they can be furnished in much less time and at a lower cost, especially where special dies and appliances for forging are made.

Wherever possible, all patterns are molded by machinery, which insures uniformity. Every attention is devoted to securing the best result, both in quality and workmanship. All kinds of work in the shape of special castings for automobile construction, general railroad, mining, electrical and machinery parts, where lightness and strength are desired, can be made in Tropenas steel equal in all respects to forgings. Castings can be made from 1 lb. up in weight.

RECENT DECISIONS AFFECTING THE MINING INDUSTRIES.

Specially Reported for the Engineering and Mining Journal.

DUTY ON SCRAP STEEL.—In making steel boiler plates, the plates, after leaving the rolls, are subject to a process of shearing whereby the rough, ragged, and uneven edges are cut off, so as to leave the boiler plate true and commercially acceptable and practically serviceable. The pieces which fall off in this process are rough and irregular in size and shape, and are known in the trade as scrap steel, and are only used for remanufacture by remelting or heating and welding to-

gether for making tacks and trunk iron. Such merchandise is dutiable at the rate of \$4 per ton under the provisions of paragraph 122, act of July 24, 1897, and is not dutiable at the rate of four-tenths of 1c. per pound under paragraph 135 as steel in all forms and shapes.—Appeal of A. Milne & Company from Collector of Customs at New York; United States Board of General Appraisers.

#### ABSTRACTS OF OFFICIAL REPORTS.

##### New Elkhorn Mining Company, Limited.

The report issued from the London office covers the period from January 1st, 1899, to September 30th, 1900. For the year 1899 there was a profit of £4,302; for nine months of 1900 a loss of £694, leaving a balance of £3,608. Adding £322 brought forward from previous account left a total on hand of £3,930.

The directors' reports says: "There has been no expenditure on capital account during the periods under review, but, as shareholders have been already informed, the Montana property has become exhausted, and the whole of the properties and assets of the company in that State have been disposed of. The amount realized by the sale was £4,185, and the total available balance of unexpended capital amounts to £14,051. The available liquid resources of the company therefore at September 30th, 1900, amounted to £17,981, but against this amount must be placed the current expenses of the company since that date. The condition of the Leadville properties continues unaltered, and the only expenditure incurred has been for the due preservation and maintenance of the plant and works, payment of taxes, etc. In accordance with the intentions of the board, as stated in their circular of July 29th, 1900, Mr. W. S. Kelley, the general manager, made an examination of these properties last August. Upon receipt of his report, the board resolved to accept the offer of Mr. W. Heape, a director, to proceed to the mines and confer with Mr. Kelley regarding his report, and generally with regard to the conditions governing the company's property. Mr. Heape has now returned, and made his report. The directors are not unanimous as to the course to adopt under existing circumstances, but a majority of them are in favor of continuing the development of the properties, and it remains for the shareholders at the forthcoming meeting to decide whether this shall be done, or, in the alternative, that the company shall be liquidated, the properties sold to the best advantage, and the available capital distributed."

##### Boston Consolidated Copper and Gold Mining Company, Utah.

The report of this company covers the year ending September 30th, 1900. The balance sheet of the Utah Company shows liabilities as follows: Capital stock, \$1,000,000; due London company, \$80,503; sundry creditors, \$3,032; total, \$1,083,535. The assets were: Cost of property, \$1,000,000; expenditure, less income, \$66,435; supplies, etc., \$1,198; cash, \$15,902; total, \$1,083,535.

Expenditures during the year for development and current expenses were \$52,145. The total work done during the year was 2,811 ft. Total expenditures up to September 30th were \$170,847.

The statement submitted to the stockholders' meeting in London says: "The amount expended by the American company upon the development of the property, office and general expenses, etc., during the past year, less the amount realized from ore sales, etc., was \$48,636. During the year a large amount of development work has been done, and the managing director states that 2,811 ft. were driven in the various tunnels, drifts, crosscuts, etc. In the last report your board referred to tests being made by Mr. Edison upon the company's ores, and the managing director now states that better results have been arrived at by the company's own milling department than those obtained by Mr. Edison and by others who have experimented upon the ores during the past year.

"In view of the very important developments that have taken place upon the property it has been determined to postpone for the present the erection of a concentrating mill, as he anticipates the necessity of erecting a smelter in the near future for the treatment of the sulphide ores already developed and in process of development. The management at the mines has deemed it wise to lease limited portions of ground to practical miners, who pay the company a royalty on all ore extracted and assist materially in the exploration of the property. From this source the company has received a net profit of \$3,099 during the year."

#### THE DULAIT-FORGET ELECTRIC ROCK DRILL.

According to M. Cuvellette, as condensed for the Institution of Civil Engineers, the Dulait-Forget drill is a percussive drill driven by an electro-motor, the percussive action being obtained by the release of a coiled spring which is compressed by a cam attached to a fly-wheel rotating in a horizontal plane. The electro-motor is mounted on a movable carriage and connected with the fly-wheel of the drill by a Marotte flexible shaft and bevel gearing, giving a change of speed of about 3 to 1 or 420 revolutions of the drill cam to 1,300 of the motor per minute. Motors of different kinds have been used, the principal trials having been made with one of 1½ H. P. taking a continuous current of 14 amperes at 110 volts with a yield at full load of 78½ per cent., or 1.65 H. P. The drill springs are of variable stiffness, requiring pressures of 60, 80, 100 or 120 kgs., for a compression of 7 cm., the length of the working stroke. Stronger springs of square section, requiring 140 kgs. pressure, have been tried without any great advantage. The work of compression represents about 4½ kilogrammeters per stroke, or, at a speed of 420 strokes per minute, 31½ kilogrammeters per second. As the motor absorbs 7 amperes at 220 volts, giving 123 kilogrammeters, the useful effect is about 25 per cent. or 20 per cent., taking into account the losses between the motor and primary dynamo. Under similar conditions an Eclipse drill No. 5, worked by compressed air, gives a little less than 30 per cent. Subsequently a more powerful drill, known as No. 3, has been adopted, giving three times the effect for little more than double the power, which is supplied by a continuous-current motor

of 3½ H. P., taking 30 amperes at 110 volts, with a yield of 80.25 per cent. This drill has been used at the Flaviac Mines in driving a cross-cut 2.25 m. square and 1,350 m. long, though rocks of variable hardness, including silicious marls of the Oxford clay, mica schist and granite. The plant, including a primary dynamo of 11 kilowatts, switchboard conductors, cables and insulators, three rock drills with stands, motors and carriages, cost about 10,000 fr. (\$2,000). The cost of insulated cables, amounting to 2.50 fr. per meter, is nearly that of a compressed air conduit of equal capacity. The drills are non-automatic, the blows being struck continuously in the same plane, the rotation and forward feed of the tool being effected by hand. The rate of driving per week has varied from 8.40 m. in mica schist up to 12.20 m. in mica schist and granite; and the cost from about \$17 up to \$23 per meter.

#### DEVELOPMENTS IN THE CRABTREE COAL-FIELD, PENNSYLVANIA.

Written for the Engineering and Mining Journal by Wm. Gilbert Irwin.

The new plant of the Jamison Coal and Coke Company, located about 3 miles north of Greensburg, the county-seat of Westmoreland County, Pa., which has just begun operations, is one of the most complete in the Western Pennsylvania coal-field. This plant consists of 300 coke ovens, 200 of which have already been completed and put in operation. They are built in double blocks, and the ovens on either side are charged from the one larry system which traverses the ovens.

The excess gas arising from the coking process will be utilized as fuel by the 600-H.-P. water-tube boiler plant which affords the power. The coal washer, which is not yet completed, will have a capacity of 1,500 tons for each day of 10 hours. The tipples are constructed of structural steel, and the same material enters largely into the construction of the framework in the two shafts, both of which are 187 ft. deep. Steel coal bins are also used.

The Jamison Coal and Coke Company is one of the largest firms operating in northern Westmoreland County, being capitalized at \$1,500,000, and controlling 3,600 acres of the 7-ft. vein in the Crabtree District. Beside the improvements mentioned above, this firm has had in operation for some years a plant known as Jamison No. 1, consisting of 300 ovens, with a daily output of 1,000 tons. In addition to its coal lands this firm owns 900 acres of surface, and has erected fine houses at each of its plants for its workmen.

While this company is at present the largest operator in the Crabtree Field, there are several other concerns engaged in coke making and in the shipment of raw coal from this field. This rich coal district lies to the north of the main line of the Pennsylvania Railroad and extends from Latrobe and Greensburg northward to the West Penn Branch and the Indiana and Armstrong County line. While there have been extensive developments in this field for a dozen years, it has been only during the past two years that the district has obtained its present recognition.

**A FRENCH COLLIERY SHAFT.**—The Arthur de Buyer shaft of the Ronchamp Colliery in the east of France has just been finished, says the London "Colliery Guardian." The shaft is 1,010 m. deep, with a clear diameter of 4 m., being brick-lined from top to bottom and tubbed with cast-iron rings for a height of 90 m., where it passes through the water-bearing measures. Exactly 60 months were occupied in sinking, lining and putting in the guides. While at the depth of 10.5 m. the temperature of the rock was 10.5° C. it was found to be 47.5° C. at the total depth; and yet the temperature of the air at the bottom of the shaft does not exceed 31° C., which will be considerably reduced when the Rateau fans are started that will deliver 80 cubic meters of air per second with a water-gauge of 230 mm. The surface works are now being pushed forward, so as to bring the shaft into operation as soon as possible; and the double-tandem horizontal winding engine, driving two cylindro-conical drums of 5.5 m. and 10.8 m. diameter, is to be erected in the course of next year. The pulley platform of the iron head-gear will be 36 m. above surface level; and the pulleys are to be 6 m. in diameter.

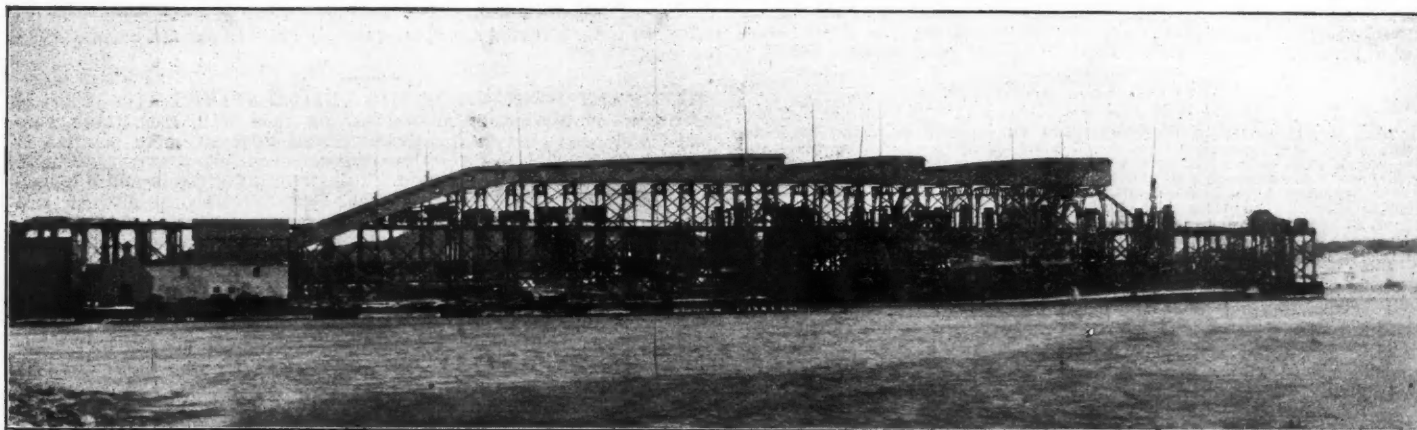
**COAL IN VICTORIA.**—At the Imperial Institute in London, November 19th, a lecture on "The Coal Resources of Victoria" was delivered by Mr. James Stirling, mining representative of Victoria, Australia. The lecturer said that the Australian Colonies had large areas of coal-bearing territory, and up to the present had produced 100,000,000 tons of coal for the world's consumption, the largest output being from New South Wales. About ten years ago he was deputed to investigate the Gippsland coal-fields, determine their character and extent, and select sites for boring. The Colony was then depending on New South Wales for its coal supply, at an outlay of about £750,000 per annum. He was able to prove that within a given area of Jurassic rocks there were a number of seams of good black coal from 2 ft. to 5 ft. in thickness. The absence of railway communication and dense forest made transit almost impossible, and conflicting interests of coal importers retarded development for a few years. Now, with the extension of railway communication, there were half a dozen collieries at work, employing nearly 1,000 men and giving an annual output of over 250,000 tons. An examination of the structure of the rock showed that the sandstones and shales were made up of materials derived from the wearing down of ancient volcanic rocks. The quality was that of a good domestic steam coal, a special feature being that it gave off only a light smoke, which made it valuable for naval purposes. In the Latrobe Valley, in Gippsland, boring had proved the existence of deposits over 267 ft. in thickness. In one section the phenomenal occurrence of a series of such beds making an aggregate of over 700 ft. was disclosed. In several places shafts had been sunk through beds of from 20 ft. to 200 ft. thick, and at the Morwell Company's mine, on the banks of the Latrobe, a coal-bed, 70 ft. thick was being worked as a quarry by open face.

## THE LARGEST COAL CONVEYOR IN THE WORLD.

According to advices from Cape Breton, the improvements which have been made on the large coal dock of the Dominion Coal Company have been completed and the conveyors are in full operation. The loading was formerly accomplished by railroad cars operated on a two-level system of standard gauge double track, the cars being lowered after emptying on the upper level by means of a drop-table, invented by Mr. Hiram Donkin, resident manager of the company. After being lowered they returned by gravity incline to the inshore end of the dock. This system worked admirably and gave rapid dispatch to vessels in loading, when there was a full supply of coal in the cars; but this is the most expensive form of storage known. After rejecting, on account of expense, a scheme of placing a pocket above the pier, the matter was placed in the hands of the Robins Conveying Belt Company, of New York, which designed and carried out the present installation. This consists of a storage of 10,000 tons in bins under the railroad at the inshore end of the dock and mechanical means for carrying the coal from the storage and delivering it simultaneously into three or four hatches of a steam collier lying

## MINE VENTILATION IN AUSTRALIA.

The Victorian Mines Ventilation Board has practically concluded its labors, and it is expected that the full text of the report will shortly be available, says the "Australian Mining Standard." Mr. A. W. Howitt, chairman of the board, has communicated the following: The board has completed its final report, which contains certain definite recommendations as to the ventilation of mines. With regard to the allocation of the reward of £1,000, it is understood the board recommends that a portion of this amount should be awarded to the Massie system. It is also understood that fresh legislation will not be required to give effect to the most important of the board's recommendations in reference to ventilation. Under section 135 of the Mines Act, 1897, the Minister for Mines has full power to require that "an adequate amount of ventilation be provided". The "adequate amount of ventilation" is defined as "100 cu. ft. of air per minute for each man and boy, and 150 cu. ft. per minute for each horse, except in cases where noxious gases exist, in which case the quantity of air required shall be 500 ft. respectively." This provision of the act has remained virtually a dead letter, owing



COAL DOCK OF DOMINION COAL COMPANY AT CAPE BRETON, WITH ROBINS CONVEYOR.

alongside the dock. This is accomplished by means of two belt conveyors of large size, the first of which runs through a tunnel under the storage bins, then rises to a height of about 25 ft., at which point it delivers its load to the second conveyor which elevates the coal an additional height of 35 ft. to a point 30 ft. above the track level of the dock. At this height it is carried the entire length of the dock with unloading devices at three or four points, by means of which a part of the coal on the belt can be deflected into chutes which run down to the collier's hatches.

The scope of the operation is only appreciated when it is explained that the regular working capacity of the conveyors is 750 tons per hour and that this quantity of coal can be carried a distance of 1,000 ft. and

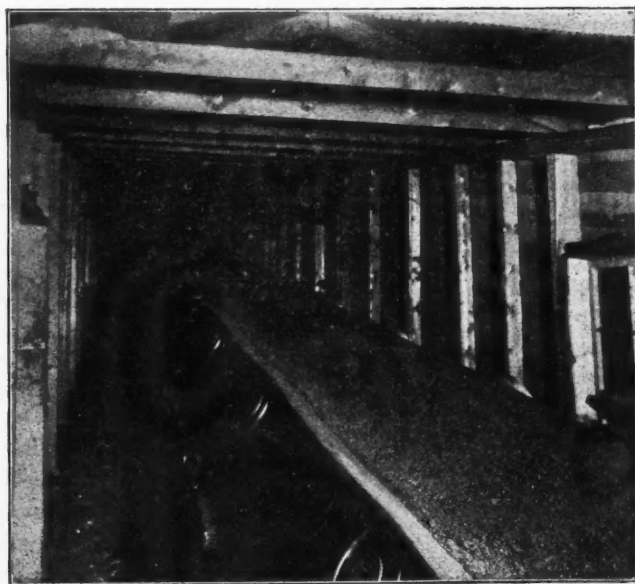
to the Mines Department being unable to indicate to mine owners any system of ventilation by which this legal requirement could be reasonably satisfied. With the official adoption of a practical scheme, such as the Ventilation of Mines Board believes it has submitted, this provision could be revived and enforced as an act of administration. An amendment of the section may, however, be necessary where it provides that "all drives in quartz workings by which any two mines are connected shall, if considered necessary by the Inspector of Mines, be kept open for ventilation and for escape drives; and upon the order of any Inspector of Mines, authorized by the Minister, companies shall construct such connecting drives where the works are not more than 300 ft. apart, for ventilation and escape, at their joint expense." In order to give effect to certain of the board's recommendations, this limitation of the distance to 300 ft. will probably have to be extended.

## 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.)

261.—Johnstonite.—This mineral, a supposed new garnet, has been described by W. A. MacLeod and O. E. White. It is a brownish-yellow garnet occurring in trapezohedral crystals in trachyte at Port Cygnet, Tasmania. An analysis gave:  $\text{SiO}_2$ , 36.87;  $\text{Al}_2\text{O}_3$ , 7.28;  $\text{FeO}$ , 17.12;  $\text{MnO}$ , 14.68;  $\text{HgO}$ , 12.49;  $\text{CaO}$ , 11.98. The analysis shows a strong resemblance to the spessartite from Colorado, which is similar in occurrence.

262.—Mohawkite.—In a recent paper in the "American Journal of Science," Dr. George A. Koenig, of the Michigan College of Mines, writes at length of this mineral and of stibiodomeykite, domeykite, albedoite and some artificial copper arsenides. Arsenic, it seems, is found in small amount in the refined or smelted copper of all the Lake Superior mines, being lowest in the ore from the Calumet & Hecla conglomerate, and highest in that from the amygdaloid beds worked by the Mohawk, Wolverine, Arcadian, Isle-Royale, Baltic, Atlantic, etc. Whitneyite was first found near the present Mohawk Mine; faliated domeykite was found in East Houghton in 1898, and a similar vein has long been known on the Huron location. Algodonite has been found in the Quincy amygdaloid of the Pewabic Mine, while the most important find of copper arsenides yet made is in a cross fissure of very varying dimensions on the Mohawk. From this locality has been taken Mohawkite, also an antimonial domeykite more abundant than the mohawkite, for which the name of stibio-domeykite is proposed, and some curious mixtures of domeykite and whitneyite. Mohawkite is described thus: Form, massive; no crystallization of any sort observed; structure mostly fine granular, sometimes compact. Color on fresh surface, gray with a faint tinge of yellow; tarnishes very easily, and the tarnish is apt to be ultimately dull purple. Very brittle, and owing to the granular structure the hardness is uncertain; approximately 3.5. Spec. gr., 8.07. In closed tube



ROBINS COAL CONVEYOR IN OPERATION.

delivered into a vessel without interfering in any way whatever with the former car system, which can be operated at the same time if desired.

One of the illustrations shows the coal dock with the conveyor structure in place. The interior view shows one of the conveyors in operation but only partially loaded.

It is said that the total cost of loading the coal by this system, including interest and depreciation, power and labor, is considerably less than one-quarter of a cent per ton.

gives no sublimate of arsenic; only a slight sublimate of  $As_2O_3$ . Melts in the tube at cherry heat, and colors the glass blue, cobalt, if the heating be kept up for a few minutes. In the open tube the reactions are similar but more pronounced. Gives on charcoal in O. F. copious vapors of  $As_2O_3$ , odor of arsenic and ultimately a globule of metallic copper. If a fragment of the mineral be placed in a shallow cavity on charcoal, alongside of a borax bead of equal size or somewhat larger, and both fused together in the point of the blue flame, so that the metallic globule be exposed to the air, then the borax bead will assume the pure blue color of cobalt. If this treatment be kept up for some time and a fresh borax bead be taken every minute, then a brown nickel bead will be obtained, and finally a blue or red copper bead; thus proving all the metals present except the trace of iron. This test (Plattner's) should be used always in examining metallic arsenides.

A careful analysis of pure material shows: Cu, 61.67; Ni, 7.03; CoO, 2.20; Fe, trace; As, 28.85; total, 99.75; and the atomic ratio: Cu, 0.9803; Ni, 0.1200; Co, 0.0373.

This is an exact ratio of Cu, Ni, and Co to As of 3 to 1. All gradations of replacement within the ratio of 3:1 may be expected. Synthetic experiments lead Dr. Koenig to consider this ratio as representing an especially strong one, because he has obtained it artificially in well-defined crystals. The molecule  $Cu_3As$  is the strongest of all, the other ratios seeming to partake more of the nature of alloys, of unsatisfied bonds.

#### 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.)

What is Ore?—The term "ore" has, I believe, been defined by the United States Supreme Court or other high court. I shall be much obliged if you will quote this definition in your next number.—M.

Answer.—An extended answer to this question will be found on our editorial page, where the meaning of the word "ore" is thoroughly discussed.

Pelatan-Clerici Process.—Can you tell me of any mine where the Pelatan-Clerici cyanide process is in practical use? Can you give any information as to results and economy?—M. B. C.

Answer.—We do not know of any mine in this country where the Pelatan-Clerici process is now in use. It was employed at the De Lamar Mine in Idaho for some time, but was abandoned there. More recently it has been in use at the Cochiti Mine in New Mexico, but the plant there, we are informed, has been taken out recently. For results, etc., see the "Engineering and Mining Journal," August 7th, 1897.

Concentrating Silver-Lead Ores.—Will you please consider the following problem in concentration of silver-lead ores: The ore is galena, carrying gray copper, which in turn seems to carry the silver. The gangue matter is heavy spar, or barytes. Analysis shows the ore to run: Silver, 19 oz.; lead, 13.7 per cent.; silica, 43.9; barytes— $BaSO_4$ —23.9. In order to effect separation from the barytes we have found it necessary to grind to 40 mesh. By doing this and concentrating at the rate of 4.25 to 1, we save 99 per cent. of the lead, but the tailings assay 17.50 oz. silver. The gray copper and the barytes seem to pass off together. Our neighbors, who have quartz for gangue matter instead of barytes, have the same difficulty in attempting to save the silver.—W. P. K.

Answer.—In still further answer to this question—see "Engineering and Mining Journal," November 3d, December 8th and 15th last.—Mr. Theodore Breidenbach writes us from Rat Portage, Canada, as follows: "At a gold mine in Transylvania (Hungary) where I was employed as manager and metallurgist years ago, I solved the problem of extracting the heavy spar from gold-containing concentrates by means of a chemical reduction process, whereby  $BaSO_4$  was won as a by-product, the selling of which—it being an excellent paint—covered the cost of the process."

Imports of Iron Ores.—By your issue December 22d I notice that imports of iron ore into the United States for the 10 months ending October 31st were nearly double the same period last year and about four times greater than same period 1898. 1. Will you assign a cause for this? 2. Have we no ore of the character imported, or is it duty free and brought here in ballast? 3. Will you furthermore state what variety or varieties of iron ores are imported—their especial uses, and in a general way their composition? 4. What would be highest and lowest prices for hematite iron ore f. o. b. smelter?—E. A. J.

Answer.—1. The reason for this increase in the imports is very simple. It is the greater activity in the iron trade and the increased number of furnaces in blast which are located near the seaboard and are likely to use imported ores. In 1898 also the work in the Cuban iron mines was stopped.

2. We have in this country iron ores of almost every description known and the only object in importing any ores is that they can be obtained in some localities more cheaply than native ores. The ores are usually brought here in full cargoes, in vessels chartered for the purpose. There is a duty of 40c. a ton on iron ores.

3. The iron ores imported are chiefly hematite ores from Cuba with some from Spain. These ores, for the most part, run from 55 to 60 per cent. in metallic iron and under the Bessemer limit in phosphorus. They are not imported for any special use, but are smelted in blast furnaces either alone or in combination with other ores.

4. By consulting the "Engineering and Mining Journal" each week you will see the current prices of Lake Superior ores at Lake ports.

This is a convenient standard to go by. The freight from Lake ports to the majority of furnaces using these ores will vary from 75c. to \$1.50 or \$1.75 per ton, which must be added to the price at the Lake ports.

COAL DISCOVERIES IN GERMANY.—A discovery of coal recently made at Benna, in Saxony, is said to be important, and a company has been formed to develop the new field.

IRON PRODUCTION IN GERMANY.—The output of the German blast furnaces in October was, in metric tons: Foundry iron, 127,126; forge iron, 144,655; Bessemer pig, 47,685; Thomas (basic) pig, 423,254; total, 742,720 tons. For the 10 months ending October 31st the total output was 6,920,934 tons, against 6,719,843 in 1899; showing an increase of 201,091 tons, or 3 per cent. this year.

COAL EXPORTS OF GREAT BRITAIN.—The total exports of coal, coke and briquettes from Great Britain in the 11 months ending November 30th were 42,503,014 long tons, which compares with 39,619,132 tons in 1899 and 33,008,265 tons in 1898. The shipments of coal for the use of steamers engaged in foreign trade amounted this year to 10,706,150 tons, bringing the total quantity shipped abroad up to 53,209,164 tons.

MERCHANT TONNAGE OF THE UNITED STATES.—The report of the Bureau of Navigation shows that on June 30th, 1900, there were owned and registered in the United States 7,053 steamers (registered tonnage, 2,657,797); 13,271 sailing vessels (1,884,842 tons); 3,009 tow-boats and barges (622,200 tons); a total of 23,333 vessels and 5,164,839 tons. Of these vessels 16,532 (2,727,892 tons) were on the Atlantic and Gulf coasts; 3,167 (1,565,587 tons) on the Lakes; 1,417 (258,456 tons) on Western rivers; 2,203 (601,212 tons) on the Pacific Coast; 14 (11,692 tons) in the Hawaiian Islands.

PEAT-COKE IN RUSSIA.—According to a report made by the French Ministry of Foreign Affairs, coke has been produced from peat in Russia, at the cost of 10 copeks per pood (\$3.05 per ton), against four times that rate for coke from coal, by Engineer Ziegler, who turns out two different products—black coke, which gives out no flame and leaves but little ash while being suitable for all the purposes that require coal, and brown or half-coke, which burns with a slight flame and is suitable for heating. It is hoped to reduce the cost of production by one-half, and at the same time to obtain about 2,500,000 poods (40,983 tons) of coke, together with a quantity of wood-alcohol and other valuable by-products.

#### PATENTS RELATING TO MINING AND METALLURGY.

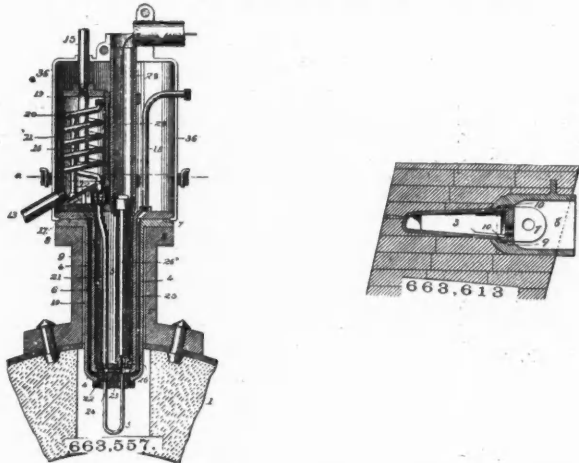
##### UNITED STATES.

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 December 11th, 1900.

- 663,441. PROCESS OF MAKING FUEL FROM FLOOR-DUST, HOUSE REFUSE, ETC. John M. Jameson, Wigston Fields, England. The process of treating or converting the consumable matter from floor-dust, and house refuse into fuel by grinding it along with charcoal and mixing therewith oil so that the whole mass assumes the consistency of paste in a condition for molding and drying.
- 663,459. DEVICE FOR SLAKING LIME AND DRYING ARTIFICIAL STONES, ETC. Wilhelm Olschewsky, Berlin, Germany. A device consisting of a truck, the body of which is formed of a chamber for receiving lime and having a movable cover adapted to be closed air-tight, and means for inlet of steam into said chamber, its cover forming a platform on which artificial stones are placed, to withdraw heat from the chamber and its contents and thus reduce the tension due to dry-slaking therein.
- 663,485. ROLL FOR ROLLING BILLETS. William S. Bidle, Cleveland, Ohio. A pair of co-operating rolls provided each with a body portion having grooves formed in it longitudinally, channel-forming sections arranged a suitable distance apart.
- 663,497. HYDRAULIC-PRESSURE DREDGING MACHINE. Friedrich Hoffmann, Slegersdorf, Germany. The combination with an elevating tube, of a turbine at the lower end of the tube to loosen and force upward through the tube solid matter, a curved shield partly surrounding the turbine and vertically adjustable independently of the turbine to regulate the inflow of water to the turbine.
- 663,500. GAS OR AIR COMPRESSOR OR PUMP. James Keith, London, England. In combination with a gas holder having a movable bell and a delivery outlet, a continuously-operating forcing pump connected with said gas holder, a pipe placing said holder in communication with the suction side of the pump, a valve for said pipe, and means operated by the abnormal rise of the bell for opening said valve.
- 663,516. FASTENER FOR WELL-CASINGS. Daniel I. Rowland, Palisade, Neb. A fastening comprising reversely-arranged eyes on the joined extremities of the casing lengths or sections, and arranged in alternation in circumferential alignment, and a wire threaded through the eyes and the ends thereof interlocked to draw it snugly against one of the lengths or sections.
- 663,557. PYROMETER. David Baker, Chicago, Ill. The method of measuring high degrees of heat, which consists in extracting the moisture from steam, passing the dry steam through a chamber exposed to the heat to be measured, permitting the steam to attain the temperature of this heat, mixing the steam after its passage through the chamber with a quantity of the dry steam not subjected to the heat to be measured, and finally determining the temperature of the mixture.
- 663,568. PROCESS OF WORKING PEAT AND MANUFACTURING SAME INTO BRIQUETTES. Ladislaus Galecki, Warsaw, Russia. The process consists in cutting or dividing up the peat while in the bog, thoroughly agitating or mixing the divided mass while still in the bog, removing the agitated mass and filtering the same, molding the filtered material into briquettes, and finally drying the same.
- 663,572. SUBSTITUTE FOR GUTTA-PERCHA. Salomon Heimann, New York, N. Y., assignor, by direct and mesne assignments, to Lucas Toch, Herman Mayer and P. C. Ralli, same place. A substitute for gutta-percha, consisting of finely-pulverized peat, resin oil and amyl acetate.

663,613. BOSH-PLATE. Arnold K. Reese, Baltimore, Md., assignor of one-half to Elizabeth Smeeth, Chicago, Ill. The combination with a box or holder adapted to be permanently set in the outside of the

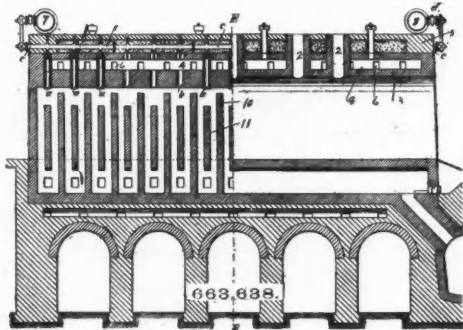


furnace-wall and having a tapered opening in its inner end, of a bosh plate having tapered sides conforming to the opening in the box or holder, and adapted to fit tightly therein, said bosh plate being hollow and having its inner end closed, and water connections to said plate.

663,618. COMPOSITION OF MATTER FOR ENAMELING METAL WARE. Wilbur Topping, Harvey, Ill. A composition consisting of borax, feldspar, quartz, fluorspar, soda, saltpeter, pipe clay, or similar substance, and water, or other suitable liquid.

663,623. APPARATUS FOR GENERATING GAS. Donald Cameron, Frederick J. Commin and Arthur J. Martin, Exeter, England. The combination of a covered gas generator, a gas receiver connected therewith, and means for drawing off the gas from the generator, said means being operated by the rise and fall of the contents of the generator.

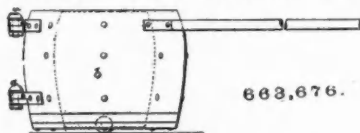
663,638. COKE OVEN. Heinrich Poetter, Dortmund, Germany. The combination of a coke oven, a heating chamber, partitions in the heating chamber, nozzles in the top of the chamber above partitions,



a gas pipe communicating with the nozzles, means for supplying gas to both ends of pipe, an air chamber above the oven, air passages beside the nozzles and inclined toward each other so that the air and gas currents meet and commingle above the partitions.

663,651. APPARATUS FOR ELEVATING AND HANDLING COAL. Alfred M. Acklin and William J. Patterson, Pittsburg, Pa., assignors to the Heyl & Patterson Company, same place. The combination with a stationary supply bin having a discharge opening, and a stationary chute or reservoir, of an overhead travelling carriage running on tracks between the bin and chute, elevator mechanism supported by the carriage, and a reservoir supported by the carriage at the delivery end of the elevator and adapted to discharge into the chute.

663,676. CRUCIBLE-SHAKER. John Illingworth, Newark, N. J. An improved hand-shaker for crucibles, comprising a pair of hinged jaws

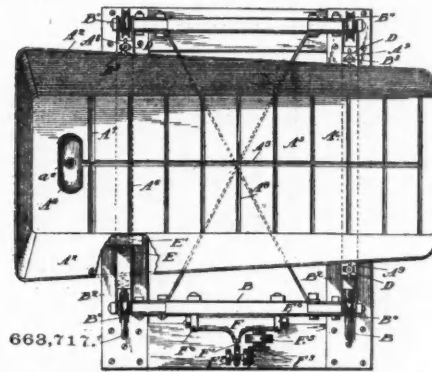


having handles to facilitate opening and closing, and having balls projecting down from the under side.

663,701. MANUFACTURE OF OPEN-HEARTH STEEL. Ambrose Monell, Pittsburg, and Rees James, Munhall, Pa., assignors to the Carnegie Steel Company, Pittsburg, Pa. The method consists in introducing into a basic open-hearth furnace mill cinder or scale and lime and molten pig iron, substantially dephosphorizing the iron while the iron is at a comparatively low temperature, and at an early period of the operation of decarbonizing, without withdrawing the metal, withdrawing from the furnace the bulk of the slag containing the phosphorus eliminated from the metal, 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.

663,719. ELECTROLYTIC APPARATUS. Hermann Becker, Paris, France. In an electrolytic apparatus for the separation of metals lighter than the electrolyte from which they are extracted, a collecting device of metal of a recessed conical form having its internal face in position to be immersed in the electrolyte in fusion above the cathode with its upper face uncovered by the electrolyte, in combination with a vessel having a contracted part at its lower end, means for cooling said contracted part, an insulating stopper traversed by a support for the cathode, said cathode having a tapering external surface for facilitating the rise of the globules of metal, an anode surrounding the cathode, suitable electric conductors for connecting the anode and the cathode with the means for producing electricity, and a conductor for connecting in shunt the collector.

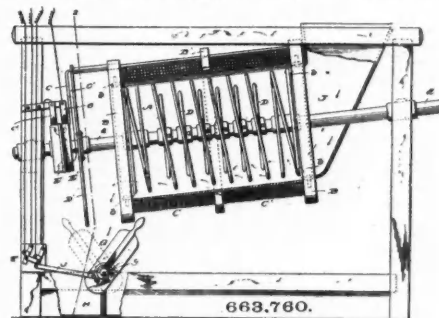
663,717. GOLD-MINING OR PLACER MACHINE. Charles Barwick, Denver, Colo. The combination with a reciprocating frame, of a concentrating pan provided with a closed end and an open end mounted transversely of the said frame, and set at an inclination downward from the said open end; a well or pocket in the bottom of said pan near its closed end, a longitudinal channel in the said bottom leading to the said well or pocket; transverse channels leading to



the said longitudinal channel; perforated lugs on the side edges of the said pan, screw-threaded bolts mounted in the said frame and engaging the said perforated lugs; coiled springs interposed between the said lugs and the said frame surrounding said bolts; and thumb nuts engaging the ends of the said bolts for adjusting the inclination of the said pan upon the said frame.

663,759. PROCESS OF PRODUCING SOLUTIONS OF ZINC CHLORIDE, ETC. Carl Hoepfner, Frankfurt-on-the-Main, Germany. The process consists in reacting upon an oxide or insoluble salt of zinc in presence of water with sulphurous acid to form soluble zinc bisulphate, precipitating from the bisulphate so obtained the insoluble monosulphite of zinc, and treating the latter with a chloride of an alkali metal to form zinc chloride.

663,760. MAGNETIC ORE-SEPARATOR. August Johnson, Moline, Ill., assignor to the Barnard & Leas Manufacturing Company, same place. In a magnetic separator, the combination of a solenoid through



which the material to be separated is passed, and a series of magnets arranged within the solenoid and out of contact with the inner circumference thereof.

663,764. MAGNETIC SEPARATOR. Emil Kreuser and Hugo E. Langguth, Mechnernich, Germany, assignors to Mechnernicher Bergwerks-Actien Verein, same place. An apparatus for separating substances of different magnetic susceptibility, consisting of two magnets arranged one above the other, the upper one comprising a rotatable cylindrical magnet, and an inclined slide or chute being projected between the magnets into the center of the magnetic field at the point of least distance between the magnetic surfaces.

663,800. CLAY-SCREENING APPARATUS. Horace G. Virgin, Penrith, W. Va. A clay-screening apparatus having an inclined sieve, a gang of brushes mounted on the sieve, a framing connecting the brushes together, a link pivotally connected to the framing, and a revolvably-driven crank shaft to which the link is also pivotally connected.

663,824. APPARATUS FOR APPLYING COATINGS OF METAL TO BOILER TUBES OR OTHER ARTICLES. Lee West, Wellston, Ohio, assignor of seven-twentieths to Benjamin F. Kitchen, same place, and John E. Harper, Glen Roy, Ohio. A fluxing tank, a furnace arranged in suitable relation thereto, a perforated top wall for the said furnace, a hood mounted upon the said wall, and a hinged plate secured to each side of said hood and adapted to permit of the entrance and removal of a tube or other article to the furnace.

663,840. PROCESS OF MAKING LIGHT MAGNESIA. William M. Zitt, Chicago, Ill., assignor to the McConnell Asbestos Company, Limited, Pittsburg, Pa. The process of producing a light, voluminous body containing magnesia, consisting in mixing pulverized magnesia with water in the proportion of 1 part of magnesia to not less than 3 parts of water, and adding ammonia thereto.

GREAT BRITAIN.

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

Week Ending November 10th, 1900.

- 22,965 of 1899. METAL FORMING. C. Bletry, Paris, France. In machinery for squirting metals, method of keeping the metals perfectly liquid.
- 23,613 of 1899. STEEL CONVERTERS. J. E. Mitchell, Burnley. Improvements in Bessemer converters with the object of economizing heat.
- 4,269 of 1900. ELECTROLYTIC CELL. H. K. Moore and E. A. Allen, Boston, U. S. A. Cells for the electrolytic decomposition of salt.
- 13,950 of 1900. BLAST FURNACE. A. Sahlén, Millom, Cumberland. Blast furnaces with cooling pockets or boshes arranged in a spiral.

Week Ending November 17th, 1900.

- 20,925 of 1899. ELECTROLYTIC PROCESS. C. Lucknow, Cologne. Process for producing caustic lyes, ammonia, and hydroxides of alkaline earths by electrolysis.
- 24,751 of 1899. STEEL CASTING. R. A. Hadfield, Sheffield. Improved arrangements for a foundry for casting steel.
- 25,335 of 1899. COAL WEDGE. J. Sugden, Barnsly. Improvements in hydraulically-operated wedges for breaking down coal.

## PERSONAL.

Dr. A. Groethe is slowly recovering from the effects of an operation for appendicitis at St. Luke's Hospital, El Paso, Tex.

Mr. N. H. McFadden, of Pittsburg, Pa., is at Callahans, Siskiyou County, Cal., looking over the ground, preparatory to building a dredge on the South Fork of Scott River.

Capt. J. B. Elliott, president of the Southern Car and Foundry Company, will shortly take up headquarters in Birmingham, Ala. The company will erect a plant in the Birmingham District.

W. A. Dennis, for many years superintendent of the Mountaineer Mill and Mining Company's property at Nevada City, Cal., and who on account of ill health was compelled to resign about a year ago, has regained his health and taken charge of the company's property.

Mr. Douglass Gordon, president of the International Trust Company, of Baltimore, Md., has been spending some days in Birmingham, Ala. The International Trust Company assisted in the formation of the Alabama Consolidated Coal and Iron Company, interested in pig iron and coal and coke production in Alabama.

Mr. D. H. Bacon has been chosen chairman of the board of directors of the Tennessee Coal and Iron Company. Mr. Bacon has had many years' experience in the Lake Superior Iron Regions, working his way up from timekeeper in a mine at Ishpeming to general manager of the properties controlled by the Federal Steel Company.

Mr. J. A. Mohr, who since 1895 has been first assistant chemist of the Duquesne plant of the Carnegie Steel Company, last week tendered his resignation to become chief chemist at the Carrie furnaces of that company at Rankin. Harry Walters has been promoted to succeed Mr. Mohr at Duquesne.

## OBITUARY.

Evan P. Warner, secretary and treasurer of the La Follette Coal, Iron and Railway Company, and superintendent of the Tennessee Northern Railway, died December 26th at Knoxville, Tenn. He was until 5 years ago a resident of Lexington, Ky.

## SOCIETIES AND TECHNICAL SCHOOLS.

Michigan Engineering Society.—The 22d annual convention will be held in Ann Arbor, Mich., January 8th, 9th and 10th.

## INDUSTRIAL NOTES.

The new blast furnace of the Canada Iron Furnace Company, at Midland, Ont., was formally opened on December 18th. Michipicoten ore will be used.

London papers announce that a contract for 20,000 tons of steel rails and fish plates for the Victorian Railways has been placed with the Illinois Steel Company, of Chicago.

The Edward P. Allis Company, of Milwaukee, Wis., has taken an order for 2 complete stamp mills, with power, etc., to be delivered at Para, South America. All parts of the machinery are to be sectionized for mule transportation to the interior.

The American Steel Hoop Company is preparing at its Youngstown, O., works a large consignment of iron and steel bars for shipment to Bombay, India. The same works have on hand a large order for small beams for Buenos Ayres, Argentina.

M. P. Dalton, managing director of the Boston & Denver Mining and Milling Company, owners of the Bobtail 80-stamp mill at Black Hawk, Colo., reports that the 24 Woodbury tables in use at that mill are running steadily, producing 10 tons of concentrates daily and saving 80% of the values.

The Brown Hoisting Machinery Company, of Cleveland, O., has already given out contracts to rebuild the buildings destroyed by fire on December 18th. Most of the machinery was badly damaged. The firm had a large number of orders in hand and the fire was most unfortunate. The loss is estimated at \$500,000, fully covered by insurance.

The J. Geo. Layner Company, of Denver, Colo., recently took an order for a compound air compressor for the Globe plant of the American Smelting and Refining Company. The Standard Mining and Smelting Company, of Colorado City, the Union Gold Extraction Company, of Florence, Colo., and the Colorado-Philadelphia Reduction Company are using Layner's compressors.

The Free State Fertilizer Works is the name given a new industry which has been recently organized at Carrollton, Ga., by Kramer, Mandeville & Company. E. G. Kramer has been elected president and treasurer, L. C. Mandeville, vice-president, and Mr. Henry C. Lovvorn, secretary. The purpose is to make high-grade commercial fertilizers. It will be capitalized at \$25,000.

The Filer & Stowell Company, Milwaukee, Wis., has begun work on a 6,000-H.-P. compound engine for the Republic Iron and Steel Company, of Youngstown, O., the largest ever handled by the former company. It will have a high-pressure cylinder of 40 by 60 in. and a low-pressure cylinder of 80 by 60 in. The wheel, which is segmented, weighs 130,000 lbs., and the whole engine complete weighs 900,000 lbs.

The A. Leschen & Sons' Rope Company, of St. Louis, Mo., will open on January 1st an office and warehouse at 92 Center Street, New York City, where it will carry a full stock of wire rope. Mr. C. H. Tucker, secretary and treasurer of the company, made arrangements last week, when in New York. At the same time he closed a contract for a Leschen Company's rope tramway 19,000 ft. long to be shipped to South America.

Independent window glass manufacturers, including more than 40 manufacturers, have organized the Independent Window Glass Company, with a capital of \$300,000, under the laws of New Jersey. C. P. Cole, of Lancaster, O., will be president; L. S. Cunningham, of Pittsburg, Pa., vice-president, and George Schlostein, of Bradford, Pa., secretary and treasurer. The new company will dispose of the product of the independent factories. The organization will be a competitor of the American Window Glass Company.

The American Bridge Company has a contract to furnish to the Compagnie des Chemins de Fer de Porto Rico 2 133-ft. spans for the Manati River bridge, Porto Rico. The company has also taken a contract for 3 large viaducts on the Chicago, Burlington & Quincy Railroad and is building a 300-ft. draw-span for the same company. The Rock Island Railroad has also placed a contract for 3,500 tons of material to be delivered during 1901. Among other large contracts is the structural steel work for the new 14-in. continuous mill for the Carnegie Steel Company at the Duquesne Steel Works.

The Buffalo, Rochester & Pittsburg Railroad has placed a large order with the Buffalo Forge Company, of Buffalo, N. Y., for apparatus for its shops at Du Bois, Pa., comprising two 170-in.  $\frac{3}{4}$  housing fans, with 9 by 10-in. horizontal center crank direct-connected engines, and 14,272 ft. of Buffalo fan system heater, for heating and ventilating the machine shop, and for heating the roundhouse one 140-in.  $\frac{3}{4}$  housing fan, with direct-connected 8 by 8 horizontal engine and heater. There is also included the installation of Buffalo down-draft forges, together with a No. 7 B volume blower and a 70-in. planing-mill exhaustor for the forge shop.

John H. Converse, of the firm of Burnham, Williams & Company, which controls the Baldwin Locomotive Works, testified before the Industrial Commission last week that the industry was established in 1831, and to-day the works are the largest in the world. The capacity of the plant is 1,200 locomotives a year. The capital employed is estimated at not less than \$10,000,000. About 8,500 hands are engaged at the works. Mr. Converse gave as reasons for the introduction of American locomotives abroad the possibility of earlier delivery, preference for American locomotives as to type, size and details, and the question of price.

The J. H. Montgomery Machinery Company, of Denver, Colo., reports recent sales: A 25-stamp mill, complete, with power, for the Golden Rule Copper Company, of New York City, to be shipped to Arizona; a 1-horse whim, with harness, cable, etc., complete, to W. de H. Washington, Ariz.; ore cars to the Golden Crown Mining and Milling Company, S. D.; air compressor to the Pike's Peak Power Company, Victor; consignment of brick machinery to James McNeen, Leadville; 1-horse whim and equipment, ore buckets, etc., to J. G. Clark, Deming, N. M.; 1 6 by 8 duplex compressor to R. L. Richman, Denver; 4 concentrating tables to Dr. Henry F. Campbell, Sargent, Colo.; ore cars to Golden Crown Gold Mining and Milling Company, Lead, S. D.

## TRADE CATALOGUES.

"Where the New Century Will Begin," an attractive little 16-page pamphlet sent out by the Joseph Dixon Crucible Company of Jersey City, N. J., gives some interesting information about a matter that is likely to be discussed just now. Incidentally the pamphlet calls attention to the merits of Dixon's American graphite lead pencils.

The Jeffrey Manufacturing Company, of Columbus, O., issues a 96-page special illustrated catalogue and price list of elevating and conveying machinery for saw-mill, lumber and wood-working industries. The catalogue shows log and pulp wood conveyors, shaving carriers; also the standard Jeffrey steel link chains, sprockets, etc.

Sturtevant engines for electric light plants and other high-grade work are described in Catalogue 103, an illustrated pamphlet of 50 pages, published by the B. F. Sturtevant Company, of Boston, and the Sturtevant Engineering Company, of London. These engines, the company states, are to meet all demands for refinement in regulation and maximum horse-power with minimum weight and floor space. They are built with throttling or automatic, upright or horizontal.

Circular No. 1,032, issued by the Westinghouse Electric and Manufacturing Company, of Pittsburg, Pa., describes the Westinghouse No. 56 railway motor. Circular No. 1,033 describes direct-current engine-type generators for currents of 125 volts. Direct-current engine-type generators constructed particularly for supplying power to motors operating machine tools, cranes, elevators, ventilators, pumps, drills, etc., in factories, schools and mines is described in circular No. 1,034. The Westinghouse 12a railway armature for railway service requiring motors of moderate power is described.

The Jeanesville Iron Works Company, of Jeanesville, Pa., issues an 80-page pamphlet printed on heavy paper and containing remarkably clear cuts illustrating its mine and special pumping machinery. The company states that since its establishment in 1843 it has made a specialty of building and repairing mine pumps, and has sought to build a pump that will stand rough usage and handle water containing a high per cent of sulphuric acid, yet at the same time be so put together as to permit of quick and cheap repairs. The catalogue shows small boiler feed pumps, duplex mine pumps of various patterns, including the Anthracite type of special design, and powerful pumps for various mines. A double-gear electric pump is shown which was designed to pump 1,200 gal. per minute against 1,100 ft. head.

## 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.

## CALIFORNIA.

## Amador County.

(From Our Special Correspondent.)

Bunker Hill.—The shaft has been pumped out and retimbered to 700 ft., leaving about 100 ft. to be timbered. When this is done sinking and drifting will start. A large force of men is employed under Superintendent C. R. Downs.

Defender.—Work has started again at this mine near West Point under the management of F. B. Joyce. Talcott & Company have given up the bond.

Free American.—Work at this mine about 7 miles east from Sutter Creek is progressing rapidly. The water is under control and sinking has been resumed on the Tucker Shaft, which will drain the other 2 shafts. Good ore is in sight.

Fremont Consolidated.—The Fremont 3-compartment shaft is down 400 ft. and sinking continues. A crosscut is being run west on the vein. The Gover shaft has been cleaned out and repaired to 200 ft. and a new gallow's frame and engine house have been erected. New pumps have also been put in. The mines are located  $1\frac{1}{2}$  miles north from Amador City.

Modoc.—The tunnel at this mine,  $\frac{3}{4}$  of a mile east of Pioneer, has been extended, and in making the upraise the bottom of the shaft was struck. There are 4 ore shoots in the mine, some of the ore assaying as high as \$60 per ton.

## Calaveras County.

(From Our Special Correspondent.)

Berdona.—The new working shaft is down 70 ft. in good ore. The new hoist has been completed and sinking will continue. The Creighton property adjoining is also being developed.

Buffalo Consolidated.—This group of mines in



Salt Spring Valley, northwest from Copperopolis, has been developed to a depth of 300 ft. and a good body of ore opened up by drifts and crosscuts. Arrangements are being made to put in heavier machinery.

Hexter.—The tunnel being driven for the channel by Bryan, Jennings & Company is now in 1,400 ft. with 600 ft. more to go before the channel can be reached. The property comprises about 2 miles of the old Carral Flat channel, which is known to be very rich in gold. Work ceased on the channel on account of the influx of water; this tunnel drains the mine.

Lightner.—The chlorination plant at this mine near Angels, will be completed in a few days when work will begin on the sulphurets from the mill.

Oriole.—This mine, 1½ miles from Angels, has been shut down on account of an influx of water, the pumps not being able to handle it during the recent rains.

Rockingham.—The shaft at this mine at Glencoe is down 275 ft. and a tunnel which is used for drainage has been run 240 ft. The 3-ft. vein averages \$8.50 per ton. A drift has been run for 300 ft. A. O'Donnell is superintendent.

Sunrise.—Development work is being pushed at this mine near Railroad Flat, and a steam hoist is being erected. Good ore has been struck at the bottom of the shaft and sinking will continue. The vein is 5 ft. wide, average assays being \$16 per ton. Clyde Weatherwax, the present owner, has 8 men at work. The large hoist at the Lampson Mine at Railroad Flat is to be installed. The shaft is down 100 ft.

#### El Dorado County.

(From Our Special Correspondent.)

St. Clair.—The mill at this mine at Kelsey is completed and has started up.

#### Kern County.

(From Our Special Correspondent.)

Butte Lode Mining Company.—This company has realized over \$6,000 in gold from a mill run of 72 tons of ore from the Butte mine. Twenty men are employed. All the ore now taken out is said to be rich.

#### Lassen County.

(From Our Special Correspondent.)

Daisy Dean.—Work at this property at Hayden Hill is suspended temporarily. Some very fine ore has been taken from the mine. No reason is given for the shut-down.

#### Placer County.

(From Our Special Correspondent.)

Basin Consolidated Drift.—Twelve men are employed at this mine at Deadwood. The main working tunnel is now in 4,000 ft., showing the gravel encountered to be from 1 to 4 ft. thick and that the average width of the channel is 60 ft. John W. Dunlap is superintendent.

Hidden Treasure.—The white channel is breasted out to a width of 800 ft. and on the lower or blue channel a gangway has been run 1,200 ft. north and south from the station. This latter channel is reached by a 32-ft. shaft, the gravel being raised by an electrical hoist. An upraise is to be made for ventilation. The average amount of gravel handled per day of 24 hours is 500 cars. About 175 men are employed.

Lloyd.—The new main tunnel at this quartz mine on the American River, 4 miles east from Blue Canyon, is in 200 ft. The ledge is very wide and a number of tunnels have been run. J. B. Knapp is superintendent.

Hyatt.—This mine, in Quartz Hill District, is shipping ore regularly to the smelter. About 25 men are employed in mining and hauling the ore. A number of other mines are also hauling ore over the Keswick Bridge.

#### Nevada County.

(From Our Special Correspondent.)

Gaston Ridge.—There are now 30 stamps in operation at this mine, 10 having recently been added. Fifty men are employed and the management anticipates a successful year.

Experts are inspecting the tailings and gravel beds on Shady Creek, and if the report is favorable an English syndicate will put in a dredge.

#### San Bernardino County.

(From Our Special Correspondent.)

Needles Smelter.—This smelter, with a capacity of from 80 to 100 tons per 24 hours, has started up. T. H. Barclay is in charge.

#### Sierra County.

(From Our Special Correspondent.)

Twin Eagles.—Operations have started again at this mine at Gold Point. Men are stopping ore under the superintendency of J. S. Wilbur, and the mill will start up soon. The cyanide plant is to start up at the same time.

#### Siskiyou County.

(From Our Special Correspondent.)

Brown Bear & Fraction.—The owners of these mines on White's Gulch have purchased 2 concentrators, a rock breaker and a water wheel from the owners of the Knownothing, which will be added to the milling plant as soon as possible. On this property is a large ledge of \$12 ore.

Dewey.—Prospect work continues. The tunnel work is being pushed and considerable dead work will be done during the winter. Machinery for the mill is being hauled in, and will be erected at once.

Jillson & Roberts.—Late developments are said to show a well-defined ledge about 28 ft. wide. The output for November was \$45,000. The pay roll is \$6,000 per month. The property is located in the Cottonwood District near Hornbrook.

#### Trinity County.

(From Our Special Correspondent.)

Galvin Dredger.—This dredger on Weaver Creek, near Weaverville, has begun work and is said to do well. Three shifts of 9 men each are worked.

#### Tuolumne County.

(From Our Special Correspondent.)

Goldwin.—The machinery for the 10-stamp mill at this mine near Jamestown is on the ground, and the grading for the mill site is about completed. The main shaft is down 300 ft. on a 9-ft. vein. A. H. McClintock is manager.

Laurel.—This group of mines near Arastraville is looking very promising. In the east crosscut at the 200-ft. level a strong shoot of ore 12 ft. wide was encountered, which is said to average over \$30 per ton in free gold, besides carrying high-grade sulphurets.

Mount Hood.—The bond on this property near the Rawhide has been extended to June, 1901, and sinking from the 100-ft. to the 200-ft. level is under way. J. H. Burkhart is superintendent.

Shawmut.—The new chlorination works and canvas plant are ready for work. The pipe line 10,000 ft. long is completed to the site of the 100-stamp mill, to be erected in the spring. A powerful hoisting plant is also to be put in. C. E. Uren is superintendent, employing a large force of men.

#### COLORADO.

##### Clear Creek County.

(From Our Special Correspondent.)

Cleveland.—P. Mixsell, of Idaho Springs, has secured options on this and adjoining claims. He will drift on both sides of the 400-ft. shaft of the Cleveland.

Mattie.—The water is being taken out of the mine and the mill has been completely overhauled for handling a concentrating ore. The Mattie has a record of producing \$1,500,000 worth of ore.

Monarch Company.—This company has started work on the McClelland Tunnel, to open the Freeland Mines. The distance is about 6,000 ft. and the depth will be about 2,300 ft. If carried out on legitimate lines it will prove to be one of the best tunnels in Clear Creek County because of the great number of prominent veins that will be opened.

##### Gilpin County.

(From Our Special Correspondent.)

Calumet Gold Mining and Milling Company.—Connections with East shaft have been made, furnishing ventilation throughout lower workings and the working force is being increased. Daily shipments, about 40 tons, heretofore made by wagon to Idaho Springs, will now go over the Tramway Company to Black Hawk and from there by the Colorado & Southern Railroad; about 40 men are at work extracting a good grade of smelting ore. I. Clayton, Russell Gulch, is manager.

Ophir-Burroughs.—A 1-in. cable 2,000 ft. long has been received. About 40 men are busy and heavy shipments are made, the ores carrying very fair values. A. Waters, Nevadaville, is manager.

Peck & Thomas.—Local parties have struck ore at 120 ft. and the first shipment of mill dirt gave returns of 4 oz. gold per cord, tailings selling for \$20 per ton, while a trial lot of smelting ore gave values of \$90 per ton. A new shaft building is being erected and a plant of machinery is to be put up. C. Truscott, Central City, is manager.

Puzzle.—An addition has been erected to the main building and the machinery has been overhauled. Daily shipments average about 20 tons, half of which is smelting ore. W. Ballantyne, Central City, is manager.

Rome-Gardner Mining Company.—A nice pay streak is opening in the 600 west level, and shipments are made to the Rocky Mountain Concentrator at Black Hawk. J. W. Bostwick, Central City, is manager.

Tonawanda Leasing and Mining Company.—

This company is employing 60 men, and the quality of ore taken out lately has been better, some of the ore running as high as 5 oz. gold per cord, including tailings. The main tunnel is in over 4,000 ft. The daily tonnage is nearly 90 tons, which is handled in the Perigo Mill. E. M. Messiter, Perigo, Colo., is manager.

#### Lake County—Leadville.

(From Our Special Correspondent.)

Leadville Production.—The output shows a remarkable increase, as many leases expire January 1st on which renewals cannot be obtained. The tonnage is almost 3,000 tons daily.

Agassiz.—A new shaft is being sunk by lessees and at 40 ft. a drift is being run under a vein of lead ore.

American Smelting and Refining Company.—The improvements are completed and have cost in the neighborhood of \$230,000 for the Arkansas Valley plant, making it one of the finest in the West. It is rumored that the Bimetallic Smelter will also be improved and will operate on sulphide bodies from one of the big sulphide producers of the camp.

Bison.—Sinking to the lower contacts is proving very hard work. The past 100 ft. has gone through sand so fine that it has to be taken out with pumps. The shaft is 600 ft. deep and Manager Campion will soon cut a station and prepare to open up the Midas and Penrose iron shoots.

Bohn Mining Company.—The company will sink the shaft 50 ft. deep to open up the iron ore bodies tapped by the diamond drill. In recent prospecting in the upper levels a vein of high-grade copper has been opened, the first discovery of the kind in the Leadville basin.

Buckeye.—This old Fryer Hill claim next to the Chrysolite has been leased by local people and the old shaft now 340 ft. deep is to go down to granite about 200 ft. This is the first attempt to prospect the lower formations on that part of Fryer Hill.

Cady.—An extensive iron body is being developed at the 180-ft. level and shipments have averaged 20 tons daily throughout the year.

California Gulch Mining Company.—Drifting goes on but no ore has shown so far. Exploration with a diamond drill is also going on.

Chip.—The drift is opening fair iron ore, of which 30 tons a day are shipped.

Cloud City Mining Company.—Engine and boiler rooms are completed and a fine plant of machinery is being put in place to sink to the ore zone.

Coronado Mining Company.—The management claims to be about prepared to make this proposition a producer from two levels of an average of 100 tons a day of fair-grade iron ore.

Delante.—This mine is being explored at the 400-ft. level and much new prospecting and development work is under way to open the Poverty Flat iron ore shoots.

Fisk-Julia Group.—An Eastern syndicate under H. B. Collins is carrying on important new work. They are operating at 315 ft. and have put machinery in position to facilitate the work.

First National.—New lessees have opened up a nice ore body at the 250-ft. level and start regular shipments January 1st.

Gallagher.—A new shaft has just been completed by lessees who are drifting on the second contact.

Harrison Reduction Works.—The old smelter operated years ago by St. Louis parties has been idle since the panic. It is understood that an attempt is being made to make a large concentrating mill out of the plant.

Maid of Erin Mines Company.—This company will suspend operations January 1st. Some 30 different sets of lessees have been carrying on important work and shipping heavily. The entire ground is now under lease to the new A. M. W. combination, which has decided not to sub-lease any part of the territory.

Modoc.—This Carbonate Hill property, which has been idle for many months, will resume under the direction of lessees about January 1st.

Muldoon.—The drift has gone in 60 ft. on a good iron body and the lessees are now upraising. Bunches of lead carbonate indicate a lead body.

Ollie Reed.—The new shaft on this gold belt claim is 250 ft. deep. The shaft lies near the Winnie claim and goes after the same ore shoots.

Valentine Mining Company.—At the 500-ft. levels are being run for an ore body. A diamond drill is also exploring at No. 2 shaft.

#### Larimer County.

Boston & Colorado Copper Mining Company.—Creditors of this company have filed liens and attachments on the Empire copper mine at Fort Collins, its buildings and machinery, to the amount of \$3,521. The company has spent nearly \$40,000 in an effort to develop the Empire lode and make it a paying proposition. The mine is

equipped with a \$10,000 plant of machinery, good buildings, etc., and until about 2 months ago kept double shifts at work. Since about November 1st no work has been done.

#### Saguache County.

**Independent.**—Several hundred men are busy at this mill at Crestone. The main building is 80 by 315 ft. and contains 100 stamps weighing 1,050 lbs. each and dropping 110 times per minute. The pulp that runs over the copper plates goes to the vanner room below, where are 40 large Frue vanners. South of the main building is the 250-H. P. Corliss engine which drives the entire machinery, and the boiler room, containing 5 large boilers. East of the boiler room is a building 40 by 110 ft. occupied by the crushers. The tram cars coming from the mine are run on a hoist and carried into the third story of the building, where the contents are dumped into bins above the crushers. After going through the crushers the ore is carried by a belt 200 ft. to the main building and fed to the stamps. Just west of the mill is being erected a building 12 by 20 ft. which will be occupied by 2 automatic samplers to test the tailings. Just west of the crusher another sampler room is being built 12 by 24 ft. where the ores will be sampled before going to the crusher. On the north of the main building another room 24 by 30 ft. is being put up to be used as a retort and melting room. The mine is opened by 2 tunnels; the upper one is 300 ft. long. The lower one, 300 ft. below, is 900 ft. long and through it the ore goes to the mill.

#### San Juan County.

(From Our Special Correspondent.)

**Gold Bug-Repeal.**—Winter supplies for 10 men have been laid in at this claim near Silverton and development work will continue, the ore being held for shipment until spring.

**Golden Fleece.**—A Boston company is working this Silverton property under option. Sinking and drifting on high-grade streaks is being pushed.

**Golden Gate.**—Colorado Springs parties are driving a 700-ft. cross-cut to cut this vein.

**Gold King Mill.**—Eighty stamps are dropping regularly on Gold King-American ore. The mill has a capacity of 200 tons daily and produces an average of 75 tons of concentrates besides the amalgam.

**Good Bye.**—Spear et al. are operating this property on Bear Creek. The streak is small and is sylvanite and exceedingly rich. The ore is shipped to Denver in 100-lb. lots.

**Grand View Crosscut.**—This tunnel is being driven by Orza Reynolds to tap the Columbia and several others owned by the Golden Horn Mining Company. About 200 ft. remain before the Columbia vein is cut.

**Hidden Treasure.**—A crosscut is being driven under contract to cut the vein at greater depth.

**Hoosier Tunnel.**—This big drive is in 650 ft. and work will continue until snow necessitates a shut-down. The breast is in a vein of copper and tungsten, samples of the latter going as high as 80% tungsten acid.

**Idaho.**—Superintendent Hanson is retimbering the tunnel near Silverton and getting ready to push development this winter. In a lower level 3 ft. of good ore is being opened.

**I. X. L.**—Livingstone Brothers et al. are working this Silverton property and have a narrow streak of high-grade ore, which pays expenses. Shipments are made to Durango smelters.

**Minnie Gulch Mining & Tunnel Company.**—Manager Sam Martin is pushing things, with a force of 90 men. This company owns several hundred acres of valuable ground, together with all water rights in both Minnie and Maggie gulches.

**Minnie Gulch Mining and Tunnel Company.**—The new ore house is completed and also the wagon road. A big air compressor and new engine are to be installed.

**Natalie Mining and Milling Company.**—This Silverton company owns a group of 20 claims and a mill site, and has 1,200 ft. of development work completed. Large bodies of concentrating ore have been opened averaging over \$20 per ton. A 4,000-ft. tunnel, 7 ft. in the clear, is being driven under contract, and 12 air drills are at work.

**New York.**—This property in the Needle Mountains District is operated by Eastern owners. Ten miners are employed retimbering the old workings.

**North Star-Dives.**—A sale of these Silverton properties is one of the probabilities of early spring. The output now is 1 car-load per month of very rich ore.

**Notaway Mining Company.**—The workings of this property are in ore of a quality desired by the local smelter and contracts have been made for the entire production.

#### Summit County.

(From Our Special Correspondent.)

**Pride Mining Company.**—This company, with \$1,500,000, owns a group of claims on Collier Mountain, in Snake River Mining District, 8 miles from Montezuma, and 7 miles from Keystone Station on the Denver, Leadville & Gunnison branch of the Colorado Southern Railway. The claims are at an altitude of over 10,500 ft. G. W. Crawford is president and H. C. Michelsen secretary. Russell R. Stuart and James E. Newell, of Syracuse, N. Y., are interested in the company.

#### Teller County—Cripple Creek.

**Dorcas Milling Company.**—The machinery of this company's plant at Florence has been thoroughly tested. Everything proved satisfactory and the mill is now ready for business. L. Janin, Jr., is superintendent.

(From Our Special Correspondent.)

The output of the Cripple Creek District for November was 7,492 tons of smelting ore, valued at \$524,440, and 36,745 tons of milling ore, valued at \$918,625; making a total of 44,237 tons, valued at \$1,443,065.

**German American Gold Mining Company.**—This company, which owns several claims, is saving ore from the Puzzle Lode recently cut by the Ophelia Tunnel.

**Gold Coin.**—It is reported that a most important strike has just been made at the 800-ft. level, where a 2-ft. body of ore has been opened which assays about 5 oz. gold to the ton. It is significant that this rich ore is found so deep.

**Gold Dollar.**—This mine on Beacon Hill is installing a new boiler and compressor. Machine drills will be used in driving the main contact. The Gold Dollar has lately come into prominence as a steady shipper. It is announced that the November output is about 600 tons of ore valued at \$21,000.

**Grace Greenwood Gold Mining Company.**—The stockholders at Colorado Springs on December 18th unanimously ratified the sale of the Grace Greenwood claim to the Anaconda Company for 80,000 shares of stock in the latter company. The Grace Greenwood adjoins the Kittie M. of the Anaconda Company and has been a good producer. There are two sets of lessees at work.

**Ingham Gold Mining Company.**—The directors of this company have declared a dividend of 1/2% on total amount of capital stock outstanding, to be paid January 15th. This is an outcome of the Doctor-Jack-Pot consolidation.

**Kitty M. Leasing Company.**—This company, working the Kittie M. claim of the Anaconda Company, has declared a dividend of \$1,500. The main Anaconda shaft is to be sunk to 1,000 ft., being now down 800 ft.

**Little Bessie Gold Mining Company.**—At the annual meeting on December 18th, directors were elected as follows: Dr. J. W. Graham, Sherwood Aldrich, P. Shove. The treasurer's report showed a cash balance of \$4,000.

**Magna Charta Mining and Milling Company.**—This company has brought suit in the District Court against the Colorado Gold Miners Company to have title to certain property on Ironclad Hill, sold for taxes a few years ago, declared valid.

**Orphan Gold Mining Company.**—The case of the minority stockholders of this company and of the Orphan Bell against Williams has been reset for February 20th. Mr. Spurgeon has surrendered his lease. The defendant is to make no sale or lease nor give any bond on the property in dispute. Nor shall any consolidation of two companies take place pending the hearing of the case.

**St. Thomas Gold Mining Company.**—This company, owning the St. Thomas claim, which it recently purchased from the Mabel M. Company, has ordered a complete plant and mining will begin at once. The main shaft is now down 300 ft. and work for the present will be confined to exploring there.

#### IDAHO.

##### Elmore County.

**Red Warrior Mining Company.**—E. F. Phelan, of Rocky Bar, is manager of this company, which owns some 20 claims on Red Warrior Mountain, the one developed this year being known as the Shields. Here a short tunnel is run which gives them at the apex of the hill not more than 400 ft. of backs. It is now stated that a long tunnel from the north side of the mountain will be run, beginning at the creek level, and giving from 1,000 to 1,200 ft. of depth. It will be 3,000 to 5,000 ft. long, 5 by 7 ft., and when under the apex of the mountain will have 1,000 ft. vertical depth, 5 by 7 ft. in the clear. The water in Bear Creek has been taken over, and about half a mile above the town of Rocky Bar a dam will be constructed and the water diverted to a ditch running alongside the mountain to a point below Reser's Mill, where the Red Warrior Mill and cyanide plant will be moved. Here power for running the plant will

be generated. The Red Warrior Company is composed of Chicago men.

#### MICHIGAN.

##### Copper—Houghton County.

(From Our Special Correspondent.)

**Baltic.**—The Wisconsin Bridge and Iron Company is erecting a self-supporting stack, 140 ft. high, which will rest on a solid block of concrete 16 by 18 ft. on surface, and 20 ft. deep.

**Calumet & Hecla.**—The fire at this company's No. 1 coal shed, at Lake Linden, is out; about 500 tons of coal were consumed. The ironwork for the new sawmill and the new stamp mill is beginning to arrive, and construction will begin shortly. The iron beams for the roofs of the new power houses on the amygdaloid lode are going up.

**Rhode Island.**—This company claims to have found a new lode west of the Pewabic lode. It is about 30 ft. wide and carries good copper rock. The new lode is probably identical with the West lode found at the Franklin and Quincy.

**Tamarack.**—No. 5 shaft struck the Calumet & Hecla conglomerate just before midnight on December 19th at a depth of 4,567 ft. There will be 4 levels from the shaft to the lode above this point. The upper level is in a considerable distance. The lode when cut is reported to look well. Work on the shaft has been underway nearly 6 years.

**Trimountain.**—No. 3 hoisting plant has gone into commission. No. 1 shaft is now 325 ft. deep, No. 2 225 ft., and No. 3 95 ft. There remains but 75 ft. to connect Nos. 1 and 2 shafts by a drift at the first level. About 30 men are at work at the stamp-mill site.

**Winona.**—A new lode is reported located on this property by the diamond drill. The lode is 20 ft. wide.

##### Copper—Ontonagon County.

(From Our Special Correspondent.)

**Mass Consolidated.**—A mass of copper weighing a ton was found this week. A shipment of 30 tons of copper will be made to the smelters in a few days.

**Victoria.**—This company will make its second shipment of mass copper to the smelters in a few days.

#### Wayne County.

**Armour & Company,** of Chicago, have decided to be independent of the National Salt Company, and have bought a salt mine in the salt beds, near the St. Clair Flats, north of Detroit. The mine yields about 400 bbls. a day, or about 112,000 lbs., an amount equal to the packing firm's consumption each day. In the vicinity a refinery will be erected, where the salt will be prepared for packing uses and put up in parcels for delivery at the Armour plant in Chicago. It is said that the salt can be put at the top of the mine for 15c. per bbl.

#### MISSOURI.

##### Jasper County.

(From Our Special Correspondent.)

**Joplin Ore Market.**—The drop in spelter last week was promptly followed by a cut of \$1 per ton in the price of zinc ore and the best price paid was \$28 per ton for the ore from the Morning Star Mine on the Granby land at Oronogo. The balance of the Oronogo ore sold at \$27 and \$27.50 per ton. The Independence ore, which sold last week at \$29 per ton, was reported in this week's sales. It was reported that a small lot of ore sold at Central City at \$29.50 per ton, but the amount was not over 4 or 5 tons at the outside. Quite a lot of Joplin ore sold for \$27.50 and \$28 per ton. Lead sold all the week at \$23 per 1,000 lbs. Following is the shipment by camps for the week ending December 22d:

	Zinc lbs.	Lead lbs.	Value.
Joplin	2,336,740	517,720	\$43,454
Carterville	1,446,580	336,890	25,831
Galena-Empire	2,101,550	196,550	30,792
Webb City	359,660	53,450	5,545
Duenweg	117,080	83,250	2,944
Carthage	193,360	.....	2,610
Carl Junction	50,520	.....	682
Springfield	34,000	.....	459
Roaring Springs	155,200	.....	1,707
Central City	102,970	14,920	1,630
Cave Springs	496,280	7,420	6,623
Stotts City	42,300	.....	592
Granby	620,000	59,000	7,900
Seneca	72,480	24,990	1,057
Zincite (Belleville)	273,680	.....	3,694
Spring City	96,660	23,990	1,712
Oronogo	442,470	10,180	6,339
Aurora	870,740	22,120	9,149
Ash Grove	.....	37,000	814
Spurgeon	80,270	72,730	2,516
District total	9,892,710	1,460,210	\$156,050
Total 51 weeks	477,604,920	57,835,980	\$7,861,521

During the corresponding week last year, the best grades of zinc ore sold at \$37 per ton and lead at \$27.50 per 1,000. The lead sales were less than last week by 196,630 lbs., the zinc sales

greater and the value greater by \$57,638. For the corresponding 51 weeks last year, the lead sales were less by 10,079,560 lbs., the zinc sales were greater by 26,197,470 lbs. and the value greater by \$2,850,287. As compared with the previous week the sales show an increase of 393,390 lbs. of zinc and 99,240 lbs. of lead and of \$2,812 in value.

**Mining Land Sales.**—H. E. Bucklen, of Chicago, has purchased the Kraft 80 acres near Spurgeon for \$3,000 and the William German 90 acre tract in the same locality for \$7,000, making \$80,000 that he has invested. J. F. Wise and N. P. Perry, 2 of the heaviest operators in the district, have purchased 120 acres of fine mineral land in Possum Hollow, just west of Joplin for \$24,000. Some extensive ore bodies are located on the tract and 2 mills have been contracted for on prospects recently opened up by J. B. W. Amsden and Morgan & Johnson. The land was the property of Col. Wm. H. Phelps and A. G. Cochran, of the Missouri Pacific road, and the estate of S. H. H. Clark, late president of the Union Pacific road. Thomas Jones, of Webb City, and M. H. Hudson, of New York, have purchased the Melleville Mill and lease at Center Valley, north of Webb City, for \$45,000, and numerous other deals are being negotiated.

**Anderson.**—Shellabarger & Brenner, the owners of this 6-acre lease, has started a 125-ton mill running. They are sinking the main shaft deeper and opening 3 new drifts which will give plenty of ore to run double shifts.

**Devonshire Mining Company.**—This Boston company has recently started a 125-ton mill at its great Cowboy Shaft on the Roaring Springs lease of the Wilkes ground; the property which is a noted producer has been worked with hand jigs.

**Great Scott Mining Company.**—This company, which has a large zinc prospect on the land of the United Zinc Company at Joplin, will start its new 150-ton mill in about 2 weeks.

**Ingersoll Lease.**—G. L. Cole is superintending the construction of a 100-ton mill on this new lease of the Calumet Lead and Zinc Company's land at Neck City, where a fine mine has been developed.

**Missouri Blanket Vein Company.**—This company, which is composed principally of members of the North American Coal Company, has had its big mill at Center Valley torn down and removed to its lease at Prosperity. It is said that the company has spent about \$40,000 trying to adapt coal mining machinery to zinc milling and will entirely remodel and rebuild the mill at Prosperity.

**Sand Ridge Mining Company.**—R. P. Bowyer, general manager for this company at Aurora, has about completed a new 150-ton mill which will be started soon. There is an immense amount of crush rock on the dump awaiting the completion of the mill and the property will be a very large producer.

**War Eagle Mining Company.**—The company will at once rebuild its mill at Joplin, it having opened up another big run of zinc ore 25 ft. below the present working level.

#### MINNESOTA.

(From Our Special Correspondent.)

The State Railroad Commission has summarily reduced the rate of freight to be charged by the iron ore carrying roads 20c. a ton, as follows: From the Mesabi Range to 60c.; from Souda mines, 70c., and from Ely, 80c. This makes a difference on 9,500,000 tons of just about \$1,900,000. The Eastern Minnesota road is not included in the order. The roads will go to court to secure a modification of the order on account of the commission's methods, and because the action had been determined long before the hearing.

#### MONTANA.

##### Fergus County.

**Yogo Sapphire Mines.**—The method of working these deposits is as follows: The entire contents of the vein are taken out and exposed to the weather. After a year the clay matrix becomes sufficiently disintegrated to undergo a first washing, which usually yields quite a number of good stones, besides a considerable quantity of ordinary and—on account of the distance from cheap transportation—worthless corundum. In this operation all the worthless clay is washed away, leaving behind 30% to 50% of the original mass, still in lumpy or granular form. This is again weathered a year and again washed. Some very fine stones have been recovered. During last season one was found weighing 19 carats. Between 40 and 50 men are employed in the underground and surface operations during the working season, which begins in May and terminates in October. During winter underground development proceeds, but no washing is done. All the good stones are shipped by express to London for cutting. The stones found are of brilliant luster, but usually of pale tints, blues, greens and yellows. Solid dark tints, like the Oriental sapphire or emerald or topaz are rare. The stones occur in veins of clay, probably decomposed dikes, in a mica schist country rock.

#### Lewis & Clarke County.

**Montana Mining Company, Limited.**—The company reports that the output for November was: Gold, 1,810 oz. and silver, 9,610 oz., obtained from 2,200 tons of ore crushed in the mill, and from 11,928 tons of tailings from the dams brought under treatment. The estimated realizable value of the produce of the crushings is \$10,600, and of tailings \$31,300, a total of \$41,900. The expenditure was: Working expenses on revenue account, \$9,500; outlay on developments, \$6,600; taxes, etc., \$1,100; permanent improvements and machinery, \$100; treatment of 11,928 tons of tailings, \$15,254; redemption of cost of tailings plant, \$546; total, \$33,100, leaving estimated net profit \$8,800. In November 30 stamps of the 60-stamp mill were employed for 29 days. The tailings plant was in operation for 30 days. The entire cost of the plant having been repaid to capital, the earnings will no longer be subject to the redemption charge.

Referring to circulars of May 15th and August 8th last, the directors inform shareholders that the questions raised being considered of sufficient importance for presentation to a higher tribunal, leave has been granted the Montana Mining Company to carry an appeal to the Supreme Court of the United States at Washington.

#### NEVADA.

##### Lincoln County.

(From Our Special Correspondent.)

**Searchlight District.**—The Keystone Mining Company is developing the Chittenden group of mines by a tunnel which is now in over 300 ft., tapping the ledge at a depth of 148 ft. Water is scarce and arrangements are being made to bring it from the mountains, about 10 miles distant.

##### Nye County.

R. Stewart and E. Dunlap have located a group of claims in Tonopah District, 59 miles southeast of Sodaville and 50 miles from Belmont. The gangue is quartz carrying gold and silver.

**Pacific Copper Company.**—This company claims to have large veins of copper ore exposed on its ground near Soda. S. A. Knapp, of Hawthorne, one of the owners, has charge.

##### Storey County.

The Gold Hill Miners' Union recently elected the following officers for the ensuing term: President, E. P. Holmes; vice-president, Joseph Minnedow; secretary, J. B. McGinnis; treasurer, F. L. Clark; conductor, Richard Raglin; warden, Thomas Stack; trustees, Patrick Pollard, John McKenzie and J. Crocker.

#### NEW MEXICO.

##### Santa Fe County.

**Copper Hill Mining Company.**—Philip Rear-don, formerly of Cripple Creek, has succeeded J. K. Turner as manager of this company's group of 6 claims at Rinaconda, on the Rio Grande River, 50 miles north of Santa Fe. Two tunnels, one 200 ft. and one 600 ft., have been run, showing a wide vein, said to carry good copper values. A 20-stamp concentrating mill is to be erected. The country rocks are mica, schist and quartzite.

##### Taos County.

**Copper King.**—This mine at Red River has 3 shifts sinking the main shaft.

#### NEW YORK.

##### Genesee County.

The Standard Plaster Company Works is building a large mill for the manufacture of stucco at Black Rock, Buffalo, N. Y. It has purchased mining rights for a large amount of gypsum near Indian Falls, N. Y.

#### NORTH CAROLINA.

##### Gaston County.

(From Our Special Correspondent.)

Barytes is being mined at a location 5 miles from Bessemer City and shipments are being made in lump. The property has been purchased by C. L. Lorton, formerly of Cripple Creek, Colo. They have erected a steam hoist and are down some 50 ft. on a well-defined ledge of good white baryte.

#### NORTH DAKOTA.

##### Burleigh County.

**Lignite Mines.**—At the lignite mine at Wilton electric coal cutter and drills have been installed. The manager, E. C. Washburn, is hampered by the short supply of labor, but hopes to have the output 200 tons a day by January 1st. About half of the output will go to consumers in Bismarck, while the balance will be shipped to consumers throughout the State. The Ecklund Mine is to be opened again and will ship 50 tons daily.

#### OREGON.

##### Baker County.

Among the more important Eastern Oregon mines adding new equipment this season are

the following: The Columbia has added a 10-stamp mill; the Golconda a mill of the same size and a hoist; the North Pole, besides enlarging its cyanide plant, has a lot of general machinery and has built 1½ miles of tramway, the longest in Oregon; the Richmond has a 10-stamp mill; the Bald Mountain a 20; the Red Boy has four 500-H. P. boilers and 300-H. P. hoist; the King Solomon a 10-stamp mill; the Alma a 5-stamp mill; the Mammoth a 5-ft. Bryan mill; the Baby McKee a complete air compressor plant. Since January 1st, it is said, over 250 car-loads of machinery have arrived at Sumpter Station and a lot more is on the way.

**Diadem Gold Mining Company.**—A new set of officers has been elected by this company, operating at Sumpter. It is necessary that the majority of the board of directors be residents of Oregon. The new trustees elected are J. H. Roberts, N. C. Richards and Dr. Anderson. The first is president, Mr. Richards, vice-president, and Otto Herlocker is secretary and treasurer. Charles Bonner, formerly of Montana, is to act as superintendent. The mine will be developed this winter, under contract, which will be let in a few days. A Montana syndicate is said to be furnishing the money for this work.

##### Grant County.

**Red Boy.**—The hoisting plant at this mine is now enclosed and the work of placing the machinery progresses rapidly. The 3 big boilers are being cased in with brick, and the smoke-stack, 6 ft. in diameter and 180 ft. tall, has been put on its stone foundation.

##### Jackson County.

Kubl Brothers' mine on Galice Creek has at present 7 men at work. The shaft on the 425-ft. level is down 60 ft. East and west drifts have been run in from the bottom of the shafts.

#### PENNSYLVANIA.

##### Bituminous Coal.

(From Our Special Correspondent.)

A deal has been closed between John McFadyen, of Greensburg, acting for a syndicate composed of George F. Huff, Richard Coulter and other Westmoreland men, and the Indiana County Deposit Bank, for a tract of land located in Susquehanna Township, Cambria County. The price paid is \$11,000. The Indiana Bank is supposed to be a syndicate, composed of Judge Harry White, of that county; Judge A. V. Barker, of Cambria County, and others who have made large purchases of coal land in the Black Lick.

**Pittsburg & Baltimore Coal Company.**—The new mines being opened at Adamsburg will be ready to begin mining about April 1st. The company has erected 200 houses for its workmen. A 12-miles-long branch, known as the Andrews Run branch, is being built off the Sewickley branch of the Southwest road, to take the output.

**Washington Coal and Coke Company.**—This company has appointed H. R. Hyndman assistant sales agent. The growing trade of this company necessitated the position. At Star Junction this company now has the greatest bituminous coal and coke plant in the State.

#### SOUTH DAKOTA.

##### Custer County.

(From Our Special Correspondent.)

**Big Bend Company.**—It is stated that this company cleaned up \$35,000 from its placer mine on Rapid River last season. Messrs. Roessler & Johnson, of New York, furnished the capital. The plant will be enlarged to a 1,000-yd. per day capacity.

**Etta.**—G. S. Harris, of Philadelphia, is reported to have bargained for 500 tons of spodumene from the Etta tin mine. Frank McLaughlin, of Keystone, has the contract.

**Grand Junction.**—It is stated that a deal for this mine, 6 miles northwest of Custer, has been closed with New York City men.

**Saginaw Mining Company.** This company, organized in October, has started work on a group of claims north of the North Star Mine, 8 miles northwest of Custer. The president of the company is C. C. Curtis, of Vassar, Mich.; secretary and treasurer, L. E. Holland, of Saginaw, Mich. Capitalization of the company is 1,500,000 shares, par value \$1. The deed in escrow given by Buel R. Wood and Thomas McLaughlin, of Custer, to the Saginaw Mining Company, of Michigan, has been delivered by the owners.

##### Lawrence County.

(From Our Special Correspondent.)

**Belt Development Company.**—P. A. Gushurst, of Lead, has been elected a director of this company, of Colorado Springs, Colo., which proposes to develop the Kirk property south of Lead.

**Belt Development Company.**—It is currently reported that P. A. Gushurst, of Lead, has been appointed general superintendent of the Kirk property that is to be developed by the Belt Development Company, of Colorado Springs. It

is said that the machinery for the hoisting plant has been ordered.

**Bullion.**—A sump is being made and sinking will be resumed. At the 75-ft. level, a drift has been started, following a strong ledge of galena ore.

**Central City.**—Central City has been very dead for 10 years, although it was once a lively camp. It was killed when the Homestake Company began building up Lead, but this company will soon have 3 stamp mills in operation on the Central City side and will erect a large cyanide plant too.

**Cleopatra Mining Company.**—R. B. Hughes, general superintendent, brought to Deadwood last week a gold brick from the cyanide plant at the Cleopatra Mine, in Squaw Creek Gulch, which netted \$187 oz. of gold. The mill is treating about 45 tons of ore daily.

**Columbus.**—This property, owned by Ruth & Lardner, in Sawpit Gulch, at Central City, is being watered for a pending sale. There is a stamp mill, with a large amount of mine development.

**Dakota Mining Company.**—This company claims to have raised \$30,000 with which to erect a 100-ton cyanide plant in Deadwood. The company has been running a 20-ton experimental plant at Central City for several months. The mines are the Gunnison and Jack Pot, in Portland District. The company also owns a group of claims in the Ragged Top District. The officers are: President, S. V. Noble; vice-president, Seth Bullock; secretary, John R. Wilson; treasurer, John Hunter, all of Deadwood. Considerable stock is held in Minneapolis and Omaha.

**Deadwood-Bear Gulch.**—L. E. Tomblin, one of the heaviest stockholders in this company, has returned to the Hills from Aurora, Ill., for the purpose of starting work on the company's ground in Bear Gulch.

**Galena Mining Company.**—This company claims to be employing 30 men at the Hoodoo and Eureka Claims and to have 15 men employed at the Bullion Mine, cross-cutting a big ledge.

**Golden Reward.**—This company has encountered a large shoot of silicious ore in a west drift in the Union Mine, in the Ruby Basin District. The shoot is said to be 8 ft. high. It is supposed to be the shoot recently cut by the Horseshoe Mining Company, in the Lucile Mine, farther north. The Union Mine was acquired by the Golden Reward Company from the Deadwood & Delaware. The company will start about January 25th sinking a diamond drill on a ledge of free milling ore found some time ago at the bottom of the Tornado shaft, in the Bald Mountain District. It is stated that the ledge has been cut for 30 ft. and the average value is equal to the Homestake ore.

**Hardin Companies.**—The consolidated Hardin companies have begun clearing out the Chicago & Two Bit shaft and assessment work is being done on the other properties.

**Highland Chief.**—This old mine is soon to start up. The new cyanide plant of the Imperial Company will be built within 1 mile of the mine. The mine has a ledge of gold ore, partly free milling. Adjoining the Highland Chief is the Elm City group, which will be worked soon. The property is owned by J. A. Galer, P. P. Gilman and Gus Kellar, of Deadwood. The Monarch Mine, in the same camp, will also ship ore to the smelter. Myron H. French, of Kansas City, an owner of the Highland Chief Mine in Spruce Gulch, has been in Deadwood. He is having a series of tests made on the ore with the cyanide process.

**Imperial Mining Company.**—This company has started a shaft on the Blacktail side of the American Express Mine. The erection of the cyanide plant in Deadwood, it is said, will start in 2 weeks.

**Pluma Mining Company.**—T. A. Harvey and W. C. Ballard, of Des Moines, Ia., principal owners in this company, have been at the mine. The 20-stamp mill is being repaired. The company has been reorganized, now having 5,000,000 shares of stock, par value \$1 per share. The mine is at Pluma.

**Portland Mining Company.**—H. W. Seamans, one of the directors of this company, of Clinton, Ia., has been in Deadwood. He states that the new 50-ton cyanide plant at Central City will be enlarged in the spring. The ore comes from the Bald Mountain District.

**Uncle Sam.**—The foundation for the new steam hoist is completed and work on the building is rushed. Twenty of the 60 stamps are repaired and will start dropping about January 15th. Nickolas Treewick, formerly foreman of the Homestake Mines, is in charge. The mine is located at Perry, on Elk Creek, close to the Black Hills & Ft. Pierre Railroad.

**Wasp No. 2.**—Ore is treated at the new cyanide plant in Yellow Creek, for less than \$3 per ton. The ore is hauled 1,000 ft. by a tramway, capacity of mill being 50 tons daily. The mill was erected by James Hardgering, of Rapid

City, and R. F. Flinterman, of Deadwood, who is the present chemist. The ore is crushed to about 5 mesh, being very porous.

Pennington County.

(From Our Special Correspondent.)

**British-American Gold and Copper Company.**—J. M. Sweeney, of Detroit, treasurer and general manager of this company, with G. G. Metzger and C. Locke Curtis, of Toledo, O., have been out to this company's ground in Butcher Gulch in Lawrence County, and 5 miles west of Rockford in Pennington County.

**Crown Hill Company.**—The capitalization of this company has been increased from \$500,000 to \$1,000,000 to enlarge the capacity of the concentrating plant at the Spokane Mine and erect a cyanide plant at the Crown Hill Mine, near Ragged Top.

**Golden Slipper.**—Chicago parties have bonded this mine, 4 miles east of Hill City. A shaft is down nearly 300 ft. and considerable ore, averaging \$20 per ton, has been treated. It is owned by Charlie Rolland, at Oreville, John Truax, Hill City, and others.

**Gopher Mining Company.**—The second clean-up has been made by this company on ore from the Lena Mine, 4 miles north of Hill City. The first run made was at the Hebert Tremaine Mill, which netted \$123 per ton gold. The second clean-up has been made at the 5-stamp mill at the Sunnyside Mine, which nearly joins the Lena on the south. It is stated that the ore ran nearly as well as in the first clean-up. The company is erecting a hoist.

**Joe Dollar.**—Chicago men have bonded this property in Palmer Gulch, owned by Del Canfield and Jack Forsyth, of Hill City.

**Wealthy Group.**—Sioux Falls men have purchased this group of 6 claims on the Keystone Belt, a short distance north of the Holy Terror Mine. There is a 20-stamp mill on the ground, erected some time ago by the Price & Baker Company, of Rapid City. A 2-compartment shaft has been sunk 100 ft. on a strong quartz ledge, supposed to be the Holy Terror. This will be sunk deeper.

#### UTAH.

(From Our Special Correspondent.)

**Bullion and Ore Shipments.**—During the week ending December 22d there were sent forward from the different smelteries 14 cars, or 582,911 lbs., of lead-silver bullion; 3 cars, or 152,555 lbs., copper bullion. In the same week the shipments from different camps to smelteries outside of the State aggregated 131 cars, or 5,449,320 lbs., of ore and concentrate products and 1 car of copper ore.

**Dividends in 1900.**—The record for 1900 shows that 14 Utah mines have paid dividends aggregating \$2,437,500, compared to a total of \$1,803,000 paid in 1899 by 13 mines. Park City has taken first honors from Tintic, its mines having distributed \$1,577,500 during the current 12 months, as against \$785,000 during 1899. A corresponding increase may be counted on for the coming year, while the Tintic dividend-payers are almost sure to double the 1900 total.

Juab County.

(From Our Special Correspondent.)

**Tintic Shipments.**—For the week closing December 21st there were sent forward from the 3 tintic railroad points 115 cars of ore and 9 cars of concentrates, made up as follows: Centennial-Eureka, 39 cars; Gemini, 22 cars; Grand Central, 10 cars; Mammoth, 8 cars; Tesora, 8 cars; Swansea, 6 cars; Carissa, 5 cars; May Day, 4 cars; Star Consolidated, 4 cars; South Swansea, 3 cars; Godiva, 2 cars; Humbug, 1 car, and Joe Bowers, 1 car. All these are ore. Eureka Hill shipped 9 cars concentrates.

Salt Lake County.

(From Our Special Correspondent.)

**Last Chance.**—The mill is turning out a concentrate product carrying values of \$50 per ton, and about 40 tons are piled up each week. It is claimed the mine will supply material for the mill for a long period.

**Upper Bingham Railroad.**—Good progress is being made on the railroad grade to the Bingham copper and gold properties, on which over 150 men are employed. This work thus far has been favored by open weather and is about completed to Bear Gulch. While not built entirely for one mine, the Bingham Copper and Gold will supply the road 200 tons of ore daily.

Summit County.

(From Our Special Correspondent.)

**Park City Shipments.**—In the week of December 22d the smelting products marketed through the Mackintosh sampler made a total of 2,952,840 lbs., which represents the output of the camp. The several contributors were: Silver King crude, 1,067,210 lbs., concentrates 304,230 lbs.; Daly-West, crude 754,760 lbs.; Ontario, crude 609,270 lbs.; Anchor, concentrates 217,340 lbs.

**Ontario.**—From the Marsac Mill 25,380 oz. silver bullion were shipped in the week ending December 22d from Ontario ore. The mine ends the year in better physical condition than 12 months ago. The only cloud is the unsettled Crown Point litigation.

**Silver King.**—Announcement of the \$100,000 Christmas dividend, which brings the mine's dividend record for 1900 up to a round \$1,000,000, was not a surprise. It is probable that the dividend rate for 1901 will be increased. The ore recently opened from 1,200-level carries higher copper values than any heretofore found in the property, running 5% and over, as well as above an ounce in gold besides the customary lead and silver contents.

Tooele County.

(From Our Special Correspondent.)

**Consolidated Mercur.**—President—Manager Cohn is instructed by Captain De La Mar not to send out monthly statements of tons treated and gold yield. The alleged cause for this sudden change is that Eastern shareowners object to the publicity of receiving such notifications by mail. This reason sounds absurd.

**Overland.**—The enlarged mill will go into commission in January.

**Sacramento.**—With the new mill improvements the forecast for 1901 is bright.

Washington County.

(From Our Special Correspondent.)

**St. George Copper.**—Under the Snyder regime most satisfactory ore uncoverings are reported in the past 60 days. Since the gasoline hoist was put in the shaft has been sunk 100 ft., opening the 350-level below the main working tunnel. This deepest working, according to reports, has exposed a strong ore body of better than 30% copper. There is an equally good showing on 300-level, and a new strong ore body is opened on 185-level. The little water-jacket smelter will be in commission fully 25 days this month. Three cars of copper, 12,000 lbs., are already shipped and at least as much more will follow by New Year's.

#### WASHINGTON.

Ferry County—Republic.

(From Our Special Correspondent.)

**Republic Power and Cyaniding Company.**—The first clean-up in the mill refinery was completed December 15th and exceeded the results anticipated. D. C. Jackling, superintendent, states that he has not had a single result from the tanks for over a week of less than 93% extraction, and some of them gave over 95%. He further states that some of the tailings turned out of the mill ran below \$1 per ton. He said: "This is the best work I have ever done, but it has only confirmed my expectations." The bullion of gold and silver turned out was a trifle over 925 fine.

The 3 ball pulverizers will be replaced with 6 Griffin mills. The mill is now treating something over 100 tons of ore per day. The pulverizers will be replaced without more than a few days' stopping. The mills are now in transit from Boston, Mass. Mr. Jackling hopes to have them in place and the mill running to its full capacity of 200 tons per day not later than February 15th, when the company expects to be purchasing custom ore.

**Republic & Kettle River Railway Company.**—This company, incorporated at Republic in August for operating in connection with 6 miles of road in British Columbia territory, from Grand Forks, B. C., to Nelson, Wash., a line between the latter point and Republic. The trustees of the Republic Company are Warner Miller, of New York; C. J. McCuaig and A. A. Ayer, of Montreal, Quebec; R. G. Edwards Leckie, D. F. Hallahan, J. C. Ralston and Andrew F. Burleigh, of Republic. The executive officers are: Warner Miller, president; R. G. Edwards Leckie, vice-president; D. F. Hallahan, secretary and treasurer; J. C. Ralston, Chief Engineer, and Andrew F. Burleigh, general counsel. The right to locate the road over the Indian lands in Washington has been granted by the Interior Department and the matter of adjusting the claims through the Indian allotments on the Colville reservation is in the hands of the Commissioners on Indian Affairs. The locating survey of the Republic and Kettle River Railway was completed about December 4th and estimates and reports are being prepared.

#### WEST VIRGINIA.

Barbour County.

(From Our Special Correspondent.)

**Candace Coal and Coke Company.**—This is a new company with a capital of \$37,500. The company is composed principally of Scottsdale, Pa., people, among them being J. S. Parker, C. B. Parker, A. K. Stauffer and J. R. Smith. The company has a tract of 1,500 acres near Phillipi, and will develop this at once.

**Kurtz-Chatterton Copper Mining Company.**—This company on December 1st made the first payment of \$20,000 for the property which has

been held by it for a year past under bond and lease. Another \$10,000 will be paid within the next 90 days, and the remaining \$20,000 within a year. Members of the company from Cincinnati and Omaha recently visited the property and state that the concentrating plant will be enlarged and the output increased. The ore bodies are said to be increasing in size and grade.

#### WYOMING.

##### Carbon County.

**Battle Lake Tunnel Site Company.**—This new company owns a group of claims on the divide between the heads of Cow and South Spring Creeks, formerly owned by Messrs. Thomas Russell, Rice, Dorgan and others. The company has recently put up a good-sized boiler, compressor, drills and other machinery to drive a long tunnel under their claims. The tunnel is now in 100 ft. Work will go on all winter with 18 to 20 men working 3 shifts.

**Cumberland.**—This group of 26 claims is to be extensively developed this winter. The company has recently let a contract to S. Palmer, its superintendent, to drive a 900-ft. tunnel. Mr. Palmer has just finished installing his machinery, which consists of a 25-H. P. boiler, a 9 by 12 Ingersoll compressor and 2 Leyner drills. The Cumberland group lies about 9 miles south of the Elk group on the west slope of Wood Mountain near the head of Lake Creek.

**Elk Group.**—This group of 4 claims lies on the southwest side of Elk Mountain, at the north end of this belt, and is owned by Messrs. Wilcox and Crane and the Kaylor Brothers. The vein is about 20 ft. wide. Two short tunnels have been run on the vein, the upper one being near the hanging wall and the lower and longer one on the foot. The vein matter is soft and much decomposed and the ore streaks are not continuous, though about 2 ft. of high-grade copper glance is more or less persistent. The vein appears to lie between quartzite and limestone, with considerable lime in the gangue.

### FOREIGN MINING NEWS.

#### ASIA.

##### India—Mysore.

**Colar Gold-field.**—The total output for November is reported at 41,772 oz. crude, an increase of 1,330 oz. crude over last year. For the 11 months ending November 30th the total was 451,603 oz. crude, which compares with 404,854 oz. last year, showing an increase of 46,749 oz. or 11.3%. The total this year was equal to 419,443 oz. fine gold, or \$8,669,886.

#### AUSTRALASIA.

##### Victoria.

The career of one of the rich mines on the historic gold field of Creswick, and which has distributed among the fortunate shareholders nearly £250,000 in dividends, is gradually drawing to a close, says the "Australian Mining Standard." Next to the Madame Berry, which up to 1899 won 387,313 oz. of gold, of the value of £1,588,515, and paid royalty £128,317, and distributed £855,450 in dividends, the Berry Consols was the most important mine on the Creswick field. During the past half year the company has disbursed £17,000, equal to 17s. per share, among the shareholders. All points that warranted prospecting have been exhausted, and operations for the future will be confined to reducing the ground opened. A large portion of the machinery has already been sold, and as the remaining payable ground measures about 48,875 superficial feet, the manager states that this will occupy about 3 months to take out, when the prosperous career of the mine will be brought to a close. The financial statement for the last half-year shows the amount of gold won to have been 7,127 oz., realizing £29,750, and material sold £515, making, with a balance of £4,033, a total of £34,300. The expenditure for the term was £31,688, leaving a credit balance of £2,611. The total gold yield to the end of September was 220,699 oz., realizing £916,393. The grand total of dividends is £366,500, and calls £76,000. The company has declared a dividend of 1s. 6d. for November, equal to £1,500.

#### CANADA.

##### West Kootenay—Boundary District.

(From Our Special Correspondent.)

**Granby Smelter.**—This smelter, which blew in August 21st, has in 108 working days treated 45,000 tons of ore that yielded 1,650 tons of 50% matte. This is equivalent to 825 tons of metallic copper, in addition to the gold and silver values. Of the total shipments, 95% was contributed by the Knob Hill, Old Ironsides, Victoria and Paris mines, owned by the Miner-Graves syndicate.

**Snowshoe.**—This mine, in Wellington Camp, has just ordered a 20 Rand drill air compressor. The property is owned by the British Columbia (Rossland & Slocan) Syndicate. The mine has been under systematic development for over a year.

#### Ontario.

The report of the Provincial Bureau of Mines

shows that gold mining made slow headway during the half year ending in June. Only 8 working mines reported, several having been idle owing to enlargements of machinery and other causes. The product from 22,177 tons of ore crushed was 9,983 oz., valued at \$156,269 gold, and \$141 silver. The silver mines showed a yield of 85,000 oz. from 12,000 tons of ore, the money value being \$51,000.

Nickel copper ore to the amount of 87,808 tons was raised, and 100,073 tons on the dumps were smelted, yielding 12,323 tons of matte estimated to contain nickel to the value of \$413,771, and 1,784 tons of copper valued at \$165,968.

The pig iron output was 32,279 tons, valued at \$511,209 at the furnaces. For the first time in the history of the province open-hearth steel was produced. Metal products of all sorts for the 6 months were valued at \$1,353,287 or two-thirds of the total for the entire year 1899.

The blast furnaces of the Canada Iron Furnace Company, at Midland, Ont., were formally opened on December 18th. A dispatch to the Montreal "Gazette" says: "The directorate of the Canada Iron Furnace Company is composed of Messrs. P. H. Griffin and Hon. T. Guilford Smith, of Buffalo, N. Y., connected with the largest car wheel manufacturing concerns in the United States, with branch works in Canada and in Europe; Messrs. Geo. E. Drummond, James T. McCall, and Thomas J. Drummond, of the firm of Drummond, McCall & Co., whose direct connection with the iron trade of Canada, both as merchants and manufacturers, extends over a period of 20 years; and Messrs. A. F. Gault, of Montreal; George Gudewill, of New York; F. H. Clergue, of Sault Ste. Marie, and E. V. Douglas, of Philadelphia, the two last mentioned being late additions to the board, forming a link between the new industry at Midland and the great iron interests of the Michipicoten mines, as well as the iron and steel works to be erected at Sault Ste. Marie. Mr. John J. Drummond is the general superintendent of the company's works."

### COAL TRADE REVIEW

#### New York. Anthracite.

Dec. 28.

The demand for anthracite coal shows no falling off, nor so far as sales-agents at New York can see is there likely to be any marked decrease in demand for weeks. Operators are doing their best to supply orders which continue to come in from every part of the country whither hard coal is shipped at this season of the year. The holidays, however, will keep down the output this week and next. The miners, with full time and good wages for 2 months, have had a merry Christmas and during the past week the mines have not been able to run with full forces.

In Chicago territory, as at other Western points where coal is shipped by rail, demand is brisk, with little prospect of the supply catching up to consumers' needs. At all inland points in the East and along the seaboard consumers are clamoring for coal. At New York Harbor coal for spot delivery is as scarce as last week. Consumers getting little comfort from their regular firms are going around looking for odd lots, but in the great majority of cases they simply waste time, as every company has regular buyers to whom it must give preference unless it wants trouble. All sizes are in short supply. One man who had no stove coal in his yard is reported to have gone to every firm in the city that he thought could let him have a spot cargo of that size, but with no success, although he was willing to pay a bonus.

It may be said that the recent purchase of a controlling interest in the Pennsylvania Coal Company was purely the act of the house of J. P. Morgan & Company, consequently all newspaper stories as to what roads would handle the output and how it would be marketed were pure moonshine. Other stories about the folly of interested roads not securing such a control a year or more ago have no better foundation. The Pennsylvania Coal Company's stock was so widely held that no group of men was able to turn over a controlling interest; to secure this it was necessary to buy shares in open market, something at which a board of directors would hesitate, though the act offered no difficulties to a powerful financial house.

With demand great, prices are naturally very firm, and there are reports of better than circular figures being had for spot coal. We quote free burning white ash, f. o. b. New York Harbor, as follows: Broken, \$4; egg, \$4.25; stove and nut, \$4.50. The steam sizes are even harder to get than the prepared sizes and we continue to quote: Pea, \$3, buckwheat, \$2.25@2.50.

#### Bituminous.

The demand for coal in the Atlantic seaboard bituminous trade is somewhat easier, except for the better grades. The demand would be even weaker were it not for the restriction on output, due to poor car supply at the mines. Car supply along the Pennsylvania Railroad has dropped to less than 50% of the number wanted, though it is a trifle better with the Baltimore & Ohio. The

rather mild weather is keeping coal consumption below what might be expected at this season. Some coal is still going forward on old contracts, but there is still no talk of new business, and probably will not be for a few weeks yet. The shoal-water ports are out of the market until spring. Foreign trade is now of slight importance and but few inquiries from abroad are coming in.

A considerable tonnage of the poorer grades of coal has been shipped to point beyond Cape Cod. It does not seem to be badly wanted and will probably be sold at low figures affecting prices for the time being. The best grades are wanted, they are in short supply and their tonnage is but a small per cent. of the total, but they set a standard by which other grades are priced. Along Long Island Sound there is a better demand for the lower grades, while consumers will take all they can get of the better grades. The movement of high-class coal to this territory is heavier than it has been. New York Harbor trade is fairly large; no shortage is reported and producers are usually up to their orders with deliveries. All-rail consumers are getting more coal than those in any other territory.

Transportation from mines to tide is very bad; cars come through slowly or get lost on the way. Car supply is poor. The coastwise vessel market is in a remarkable state. Vessels have been scarce for several weeks at the shipping ports, a large number being apparently detained to the eastward. At the same time ocean freight rates are low. We quote as follows from Philadelphia: Providence, New Bedford and the Sound, 65@70c.; Boston, Salem and Portland, 75@80c.

At New York Harbor ports best Cumberland coal is selling at about \$2.85, f. o. b.; Clearfield, best grades, \$2.50@2.65, f. o. b.

#### Birmingham, Ala. Dec. 24.

(From Our Special Correspondent.)

There is no change in the condition of the coal market in Alabama. The demand is still exceedingly heavy. Assistant State Mine Inspector John McDonald states that a large number of new mines are being opened up in this State and preparations are being made for further development. During the past week announcement was made that T. H. Aldrich has purchased a good tract of several hundred acres of land near Bessemer, in this county, and had commenced work opening coal mines thereon. It was also announced that the Galloway Coal Company, which operates mines in Walker County, had secured by purchase and lease 2,000 acres of coal lands near Daly Creek, in Bibb County, and would commence at once the opening of a slope and 2 drifts. Mr. McDonald states that the production is very heavy, and while there may be some falling off on account of the holidays, that as soon as the new year comes on the shipments will be greater than ever before in the history of the State.

Edward Flynn, the new president of the Alabama District No. 20, United Mine Workers, has taken charge of the office. He states that there are no troubles in the mining regions of Alabama. He says that the selling price of pig iron, on which the coal miners' wages are based, lacked but a few cents the last time of being sufficient to warrant an increase in the miners' wages. A fairly good price obtains for coal right now.

There is a good demand for coke, and some is being brought to the State from West Virginia; while coal is also being brought into Alabama from Kentucky, the Louisville & Nashville Railroad using 15 car-loads daily of Kentucky coal, not being able to have demands met by Alabama operators.

#### Cleveland, O. Dec. 26.

(From Our Special Correspondent.)

This week has seen a number of charters of vessels made to hold coal now on the docks during the winter and for delivery to Lake Michigan in the spring, 50c. being the price. It is expected that this advance chartering will be light, confined in fact to the coal left over from the season of navigation just closed, but shippers take it to mean that the opening rates will approximate 35c., the vessel men exacting the extra 15c. for holding the coal.

The movement of domestic coal is quite heavy and the question seems to be to obtain enough cars with which to move it. This feature alone will prevent any movement to the lakes for winter storage, as the cars are too few to handle the material that must be moved at once. The prices have not changed. This week has seen a drop in the price of coke from \$2.75 to \$1.75, and upon this basis large contracts are being made with the furnacemen.

#### Pittsburg. Dec. 26.

(From Our Special Correspondent.)

Coal.—All the coal mines of the Pittsburg District were closed yesterday and many of them are idle to-day on account of the Christmas holiday. As a result the production will be considerably curtailed this week. Great interest is being taken in the price question for the new scale year, which begins on April 1st. This matter is to be determined at the joint confer-

ence to be held at Indianapolis next month. The Pittsburg District executive board of the United Mine Workers has been holding meetings almost daily for a week considering new demands that are to be made. It is not believed that any material advance will be asked in the general mining rate, as it was increased 14c. a ton last year, but advances will be asked in other points of the scale that will increase the cost of production. The changes that are to be urged by the miners from this district are being kept secret.

**Connellsville Coke.**—There was an improvement in the coke production last week and fully 500 ovens were added to the active list. No official announcement has yet been made as to prices for next year. There was a report to-day that there would be a cut, but this is doubted. The report says that Connellsville coke will sell at \$1.75 for furnace and \$2.25 for foundry and that outside producers are offering furnace coke for next year's delivery at \$1.40. Of the 20,960 ovens in the region, 15,517 are active and 5,442 are idle. The production last week was 165,787 tons, an increase of nearly 10,000 tons. The shipments for the week aggregated 9,083 cars, distributed as follows: To Pittsburg and river tipples, 3,608 cars; to points west of Pittsburg, 3,801 cars; to points east of Connellsville, 1,674 cars. This was a decrease of 134 cars compared with the previous week. Deliveries of coke for the balance of the year are at ruling prices—\$2 for furnace and \$2.25@2.50 for foundry.

**Shanghai, China. Nov. 14.**

(Special Report of Wheelock & Co.)

**Coal.**—No change; inquiries are small and little business has been done. Arrivals for the fortnight were 18,823 tons. We quote per ton: Welsh Cardiff, 27@28 tael (\$17.98@18.65); Australian Wollongong, cargo, ex-go-down, 12 tael (\$8.04); and other sorts, 7.50@8.50 tael (\$4.99@5.96); Chinese, Kaiping lump, 7.50@10 tael (\$4.99@6.67); dust, 5 tael (\$3.33), and mixed, 5.50@6 tael (\$3.66@4); Japan, all contracted for.

**Kerosene Oil.**—Weak, and prices have declined. No arrivals. Stocks are: Devoe's, 784,797 cases; Batum, 474,925 cases, and Langkat, nil; total, 1,259,722 cases. Quotations per case are as follows: American Devoe's, 1.80 tael (\$1.21); Russian Batum, Anchor Chop, 1.76 tael (\$1.18); and bulk oil, 1.70 tael (\$1.14) in two tins.

**SLATE TRADE REVIEW.**

**New York. Dec. 28.**

The list of prices per square for No. 1 slate standard brand f. o. b. at quarries in car-load lots, is given below:

Size, inches	Mason's Village.	Bangor.	Bangor Ribbon.	Alb'n, or Jackson Bangor.	Char'n Keys no	Peach Bottom.	Sea Gr'n.	Unfed'g Green.	Red.
24 x 14	6.50	3.50	3.00	3.00		5.10	2.90		
24 x 12	6.60	3.50	3.00	3.00	3.80	5.25	2.90	3.75	
22 x 12	6.60	3.50	3.25	3.00		5.25	2.90	3.75	
22 x 11	6.50	3.75	3.25	3.00	4.00	5.25	2.90	4.00	
20 x 12	6.90	3.75	3.25	3.00		5.25	2.90	3.75	
20 x 11	6.80		3.25	3.00		5.25	2.90		
20 x 10	6.80	4.25	3.50	3.25	4.00	5.35	2.90	4.25	16.50
18 x 12	6.80	3.75	3.00	3.00		5.25	2.90	3.50	
18 x 11	7.00						2.90	3.75	
18 x 10	7.00	4.25	3.50	3.25	4.00	5.35	2.90	4.00	10.50
18 x 9	7.00	4.50	3.50	3.25	4.00	5.35	2.90	4.25	10.50
16 x 12	6.80	3.75	3.00	3.00		5.25	2.85	3.50	
16 x 10	7.00	4.25	3.50	3.25	4.00	5.25	2.85	4.00	10.50
16 x 9	7.00	4.25	3.25	3.00	4.00	5.35	2.85	4.25	10.50
16 x 8	7.00	4.50	3.50	3.25	4.25	5.35	2.85	4.25	10.50
14 x 10	6.60	3.75	3.25	3.00		5.25	2.70	3.75	10.50
14 x 9	6.51						2.70	3.75	10.50
14 x 8	6.60	3.75	3.25	3.00	4.00	5.10	2.70	4.25	10.50
14 x 7	6.40	3.75	3.25	3.00	3.75	5.10	2.50	4.25	10.50
12 x 10	5.75						2.50	3.25	
12 x 9	5.60						2.50	3.25	
12 x 8	5.50	3.50	3.00	2.85		4.85	2.50	3.50	9.00
12 x 7	5.00	3.25	2.85	2.85	3.25	4.85	2.25	3.50	9.00
12 x 6	4.80	3.25	2.85	2.85	3.25	4.75	2.25	3.50	8.50

A square of slate is 100 sq. ft. as laid on the roof

The close of the year finds the trade expectant of increased business in 1901, not only from home consumers, but from export account, owing to the strike of quarrymen in Wales. Prices are nominally unchanged.

**IRON MARKET REVIEW.**

**NEW YORK, Dec. 2, 1900.**

**Pig Iron Production and Furnaces in Blast.**

Fuel used	Week ending		From Jan., '99.		From Jan., '00.	
	Dec. 29, 1899.	Dec. 23, 1900.	Tons.	F'ces.	Tons.	Tons.
An'racite & Coke.	257	333,428	176	222,525	11,254,307	13,439,517
Charcoal.	30	8,743	31	6,850	285,561	376,785
Totals..	287	342,171	207	229,375	11,539,868	13,816,302

The iron market is as quiet as might be expected in the last week of the year. Hardly any new business is reported and buyers have evidently stopped work until the new year opens.

The general expectation is that a large amount of business is coming forward in January. Buyers will, of course, want concessions, but they will hardly get them, since most mills are very comfortably fixed as far as orders are concerned. Whether reductions may be looked for later remains to be seen. The structural steel mills and those making bar iron, merchant steel and plates seem pretty confident of the future. Although many orders for rails have been placed, there is still a little game of bluff going on between the railroads and the rail mills, which does not seem likely to result in much advantage for either side.

There have been reports of lower contract rates offered on coke. Low prices have been quoted, but the number of contracts made at a reduction has been small.

**Birmingham, Ala. Dec. 24.**

(From Our Special Correspondent.)

The conditions of the iron market have quieted down owing to the holiday season and the time for taking stock, but the trade is not bad. The furnacemen are hopeful for an early recovery, and efforts are being made to keep shipments up.

The statement is made that there were shipped during the year 1900 more pig iron from Alabama and Tennessee for export than during the year 1899. During the year 1899 the shipments to foreign ports amounted to 167,003 tons. Figures are being compiled now which show that the export shipments this year will amount to more than 200,000 tons.

The statement is made that the total amount of iron shipped away from this State during the year 1900 will not compare favorably with that handled during the year 1899, the export and domestic shipments all considered. This is accounted for in the fact that last year there was some surplus iron to work off, while the shipments made during the year 1900 will represent the amount manufactured this year. The warrant yards hereabouts do not contain more than 40,000 or 50,000 tons, and the shipments are greater than the production, and have been for the last 5 weeks.

During the past week a contract was made for the location of big car works in this district, to be constructed by the Southern Car and Foundry Company, and the site to be between Pratt City and Ensley, on the property of the Tennessee Coal, Iron and Railroad Company. The plant will be able to construct 10 wooden and 10 pressed-steel cars a day, and the steel will be provided by the Tennessee Company's steel plant at Ensley. The plant is to be constructed during the coming spring and will probably represent an outlay of more than \$500,000.

The steel plant at Ensley is working harder now than ever before. The work on the steel-rail mill is not being delayed. It is expected that this plant will supply the structural steel for the car works mentioned above.

The following are the quotations: No. 1 foundry, \$11.50@12.50; No. 2 foundry, \$10.50@11.50; No. 3 foundry, \$9.50@10.50; No. 4 foundry, \$9.50@10; gray forge, \$9.50@9.75; No. 1 soft, \$11.50@12.50; No. 2 soft, \$10.50@11.50.

**Cleveland, O. Dec. 25.**

(From Our Special Correspondent.)

**Iron Ore.**—The time of the ore men and the vessel owners on the lakes is now divided between contemplating the meaning of this year's movement of iron ore and prospecting as to next year's prices. The annual report has been compiled but recently, showing a lake shipment of 18,570,310 tons, as against 17,901,196 for the year previous. With this season opening two weeks before last year, and with the lakes as free from ice now as they were at this time a year ago, the increased movement is only a little over 600,000 tons. In connection with this statement it must be remembered that the increased carrying capacity on the lakes last year was 4,000,000 tons, which makes the ore increase all out of proportion to what might have been expected. The future prospects are gloomy, seeing that the new vessels now being built by the shipyards, or already launched, will have a carrying capacity of an additional 3,000,000 tons, and the loss by wreck and by removal to the coast has not been more than 500,000 tons capacity. Nothing has been done toward fixing the prices of ore for next year, and until this is done there is a general belief that the decrease in the price will not be as heavy as has been expected, seeing the tendency to fail in some of the old range ore mines.

**Pig Iron.**—There is a gradual falling away in the pig-iron business, due probably to the near approach of invoice times. Buyers have covered their immediate needs and are devoting their time now to covering for the future, which is going on steadily, making the spot business

light. Despite this fact the market is strong at \$13.50 and \$14 for No. 2 and No. 1 foundry, respectively, with some furnaces holding for better prices. Basic is still selling at \$13.50, with off basic quoted at \$12.50, but with no business. No Bessemer sales have been made.

**Finished Material.**—Bridge companies are buying heavily of steel plate and angles now. Suburban lines are buying heavily of steel rails, and the transactions have been large during the week just closed. The pool prices prevail. Ship plate is also in demand owing to an order for five new craft soon to be constructed by the American Ship Building Company. There is still a heavy demand for bars, with the supply limited and prospects of prompt deliveries poor. The mills are beginning to show grave signs of congestion, the only plants not being clogged being those producing rails, and even these capacities are fast being covered. Practically nothing is being done with billets.

**Philadelphia. Dec. 27.**

(From Our Special Correspondent.)

**Pig Iron.**—The inquiries received Monday and to-day indicate that a buying movement will probably set in early in the new year, particularly among users of foundry irons, although it is likely that concessions will have to be made, except on the very best brands. The makers say the chances at present are that current rates will be held. As to forge iron, business has been done on a basis of \$15 and some mill owners who have secured a good deal of business recently will cover just as soon as they can get the mixtures they want at their price. Basic is also selling fairly well at old figures.

**Billets.**—The market is quiet, but those who use billets have seen fit to go slow as to contracting. Our people do not believe billets are worth what they are paying for them, considering the cost of ore to the manufacturers. There will be no large orders placed, though consumptive requirements will be fully met.

**Merchant Bars.**—None of those who represent the Eastern Pennsylvania bar iron interests take a gloomy view. The central Pennsylvania mills are doing even better than our Schuylkill Valley mills, having a large and more constant local market. Prices run from 1.35c. to 1.50c.

**Nails.**—The local demand for nails for this time of year is said to be better than usual.

**Sheets.**—All representatives are able to report an exceptionally active demand at strong prices, though the margins are narrow. The distribution for December has been above the average. Speaking of the year's business, a leading house says: The mills have been pretty fully employed all year and the results will compare favorably with any former year.

**Merchant Steel.**—Agents of manufacturers who made a tour of their territory during December say the trade is a little cautious about buying in a large way. Most users are carrying good stocks, believing that no material variation in prices is probable. With the crucible steel production under strong control and other kinds in no danger of a drop, the users of merchant steel need not expect much regard to be paid to their appeals for lower quotations.

**Pipes and Tubes.**—Next week our mills start up with an increment of orders from urgent buyers. The market is strong and enterprises calling for pipe work are numerous.

**Plates.**—The managers of this industry look for a revival of orders. There is also a fresh increase of inquiries from foreign sources, but the figures we have to meet will interfere. Foreign manufacturers are shading prices down to cost almost, but for all that our plate mill people are in high feather as to 1901 business. These have been no change in quotations and by next week the smaller class of buyers will be heard from.

**Structural Material.**—The bridge builders, or rather some local people who speak for them, say that there is in sight a great deal of new work. It has been the policy of the railroad managers not to make known all their requirements, but they now feel safe in making new contracts. It is pretty well known how much bridge material will be wanted up to April 1st. The smaller requirements will also be much greater. Quotations unchanged.

**Steel Rails.**—Those who speak for our steel rail makers intimate that as many rails could be sold at \$28 as at \$26, but it is not intimated that there will be any advance. The action of a good many roads in not buying excites no particular comment. Makers take the ground that, all things considered, rails are worth all they are selling for. The amount of projected mileage and the comfortable condition of the money market make rail manufacturers feel safe in their attitude against concessions.

**Scrap.**—Scrap dealers are on the lookout for all the good steel scrap that can be controlled.

Pittsburg. Dec. 26. (From Our Special Correspondent.)

There is nothing doing in the iron and steel markets this week. All the mills in the district were closed for Christmas. Some shut down on Saturday night, but the majority closed on Monday night. All of the big Carnegie plants, Jones & Laughlins and most of the other large mills will be put in operation again this evening. Advantage was taken of the suspension to make needed repairs, so that no time was really lost. The workers in the mills not controlled by the Amalgamated Association are agitated over possible wage adjustments on January 1st. The Carnegie Steel Company, as already announced, has given its 15,000 workmen notice of an adjustment when the present scale expires on December 31st. No intimation has been given as to whether a serious wage reduction is contemplated or not. The men, however, seem to think that a cut will be made. The new scale will not be announced until late this week and probably not until Monday. The Bessemer Furnace Association has been discussing the wage question and it is believed that at a meeting to be held at Cleveland this week that a reduction of about 10% will be ordered. There is no change in quotations for iron and steel products, but prices are firm and it seems probable that some lines will be advanced after the first of the year.

Pig Iron.—The sales of Bessemer pig iron this week did not exceed 200 tons. The price remains at \$13, Valley furnace, and \$13.90 delivered Pittsburg. The prices of foundry and gray forge are the same as last week and no sales of any consequence are recorded.

Steel.—No Bessemer billets were sold this week, but the price remains firm at \$19.75 delivered Pittsburg. Open-hearth billets are quoted at \$1 a ton higher. Tank plate remains at 1.35c. and steel bars at 1.25c. A good demand is expected at the opening of the year.

Sheets.—The demand for sheets continues good and all the mills in this district are busy. No. 27 is quoted at 2.85@2.90c. and No. 28 at 2.95@3c. Galvanized sheets are in demand at 70 and 5c off, with no allowance for freight.

Ferro-manganese.—The leading producer continues to quote 80% domestic at \$62.50.

New York. Dec. 28.

Business in the local iron market is largely suspended during the holidays. Prices are firm.

Pig Iron.—Buying is rather light. Quotations are nominally unchanged. We quote for Northern iron, tidewater delivery: No. 1 X foundry, \$16.75@17.75; No. 2 X, \$15.50@16; No. 2 plain, \$14.75@15.25; gray forge, \$14.50@14.75. For Southern irons on dock, New York No. 1 foundry, \$15.25@15.75; No. 2, \$14.50@15; No. 3, \$14.25@14.50; No. 4, \$13.50@14; No. 1 soft, \$15.50@15.75; No. 2, \$14.25@14.50.

Bar Iron and Steel.—Demand is fairly good. Prices show no change. We quote common bars at 1.35c. for large lots on dock; refined bars, 1.45c.; soft steel bars, 1.40c.

Plates.—The market is unchanged, with prices firm and business fair. We quote for large lots at tidewater: Tank, 1/4-in. and heavier, 1.65c.; flange, 1.75c.; marine, 1.85c.; firebox, 1.85c.; universal, 1.60c.

Steel Rails and Rail Fastenings.—Local sales are light. There are inquiries in the market for over 10,000 tons for shipments in small lots abroad, principally to Mexico, Argentina, Japan, Australia and South Africa. Light rails are selling between \$25@30. Standard sections are quoted at \$26. Splice bars are 1.35@1.40c.; spikes, 1.55c.; fish plates, 1.35c.; bolts, 2.10@2.30c.

Structural Materials.—Demand is light this week, but a fairly heavy tonnage has been coming here. We continue to quote large lots at tidewater: Beams, 1.65c.; channels, 1.65c.; angles, 1.30c.; tees, 1.70c.; zees, 1.65c.

Cartagena, Spain. Dec. 5.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—The iron-ore market continues slow and buyers are still indifferent for contracts for next year. Owing to rain and floods early in the month, work in the mines was in many cases interrupted, and much damage done to properties in general. Further, there is still much trouble with regard to small leaseholders, whom mine owners consider incompetent to respond to the heavy liabilities in connection with the new law referring to employers' liability. Insurance companies, however, are doing a big trade in covering these risks. Prices for iron ores remain firm; one or two sales for forward delivery have been done at rather higher prices than asked for prompt shipment. During the month 11 cargoes of iron

ore have been shipped from this port, 10 of which were of dry ore and 1 of manganiferous ore. Freight rates have fallen considerably during the month, and steamers are now obtainable at reasonable rates.

Quotations are as follows, f. o. b. shipping port, buyers to pay any new tax that may be levied: Ordinary 50% Portman ore, 7s. 3d.@7s. 9d. per ton; special low phosphorus, under 0.03%, 7s. 6d.@ 8s.; extra quality, under 0.015% P, 8s. 6d.; special ores, 9s.; specular ore, 60% iron, 11s.; lump magnetite, 60% iron, 12s. 6d. For manganiferous iron ores quotations are: No. 1, 20% Mn and 20% Fe, 15s. 3d.; No. 1 B, 17% Mn and 25% Fe, 12s. 3d.; No. 2, 15% Mn and 30% Fe, 12s.; No. 3, 12% Mn and 35% Fe, 9s. 9d.

Other Exports.—Other exports of metals in November were: 7,017 kgs. old copper to Marseilles and 1,695 kgs. to Antwerp; 100 tons old iron to Genoa; 20 tons copper pyrites to Marseilles.

METAL MARKET.

New York. Dec. 28.

Gold and Silver.

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

Table with columns: Metal, November (1899, 1900), Year (1899, 1900). Rows include GOLD, SILVER, and Excess.

Gold and Silver Exports and Imports, New York For the week ending December 27th, 1900, and for years from January 1st, 1900, 1899, 1898, 1897.

Table with columns: Period, Gold (Exports, Imports), Silver (Exports, Imports), Total Excess, Exp. or Imp.

Exports and imports of gold were in small parcels, to and from different ports. Imports of silver were from the West Indies; exports went chiefly to London.

The United States Assay Office in New York reports the total receipts of silver at 41,000 oz. for the week. Total since January 1st, 4,774,000 oz.

Average Prices of Silver per oz. Troy.

Table with columns: Month, 1900 (Lond'n, N. Y.), 1899 (Lond'n, N. Y.), 1898 (Lond'n, N. Y.).

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 columns: Month, COPPER, TIN, LEAD, SPKLITE (1900, 1899).

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 17.6c. For January, 1900, the average price of Lake copper was 16.3c.; for February, 16.0c.; for March, 16.55c.; for April, 16.4c.; for May, 16.5c.; for June, 16c.; for July, 16.16c.; for August, 16.58c.; for September, 16.69c.; for October, 16.64c.; for November, 16.8c.

Prices of Foreign Coins.

Table with columns: Bid, Asked. Rows include Mexican dollars, Peruvian soles, Victoria sovereigns, Twenty francs, Spanish 25 pesetas.

Imports and Exports of Metals.

Table with columns: Port, Week, Dec. 26 (Expts, Impts), Year 1900 (Expts, Impts). Rows include New York, Baltimore, Philadelphia.

Total United States.

Table with columns: Articles, Oct. 1900 (Expts, Impts), Year 1900 (Expts, Impts). Rows include Antimony, Copper, Iron, Lead, Manganese, Nickel, Nails, Quicksilver, Steel, Tin, Zinc.

Import Duties on Metals.

The duties on metals under the present tariff law are as follows: Antimony, metal or regulus, 1/4c. a lb. Lead, 1/4c. a lb. on lead in ores; 2 1/2c. per lb. on pigs, bars, etc.; 2 1/2c. on sheet, pipe and manufactured forms. Nickel, 6c. per lb. Quicksilver, 7c. per lb. Spelter or zinc, 1/4c. per lb. on pigs and bars, 2c. on sheets, etc. Copper, tin and platinum are free of duty.

Financial Notes of the Week.

Business is still suffering from the depression of the holiday season, and there is nothing of special importance to be noted.

Business has been quiet during the past week, and the silver market has been rather inactive, but with firm undertone. Business to-day has been done at a better price than has prevailed for several days.

The statement of the United States Treasury on Wednesday, December 26th, shows balances in excess of outstanding certificates as below, comparison being made with the statement of the corresponding day last week:

	Dec. 19.	Dec. 26.	Changes.
Gold.....	\$99,269,909	\$97,767,721	D. \$2,502,188
Silver.....	8,748,884	8,688,388	D. 60,496
Legal tenders.....	10,178,657	9,559,751	D. 618,906
Treas. notes, etc..	80,057	172,655	I. 92,598
<b>Totals.....</b>	<b>\$118,277,507</b>	<b>\$115,88,515</b>	<b>D \$3,488,992</b>

Treasury deposits with national banks amounted to \$98,649,584, showing a decrease of \$200,346 for the week.

The statement of the New York banks—including the 66 banks represented in the Clearing House for the week ending December 22nd—gives the following totals, comparison being made with the corresponding week in 1899 and 1898:

	1898.	1899.	1900.
Loans and discounts.....	\$712,213,100	\$673,315,900	\$787,098,700
Deposits.....	814,951,800	740,395,700	838,804,400
Circulation.....	16,236,300	15,996,900	30,902,500
Reserve:			
Specie.....	168,865,700	143,963,100	159,041,000
Legal tenders.....	54,491,300	51,519,900	60,157,100
<b>Total reserve.....</b>	<b>\$224,357,000</b>	<b>\$195,483,000</b>	<b>\$219,198,100</b>
Legal requirements.....	203,737,950	185,098,925	209,701,100
<b>Balance, surplus.....</b>	<b>\$19,619,050</b>	<b>\$10,384,075</b>	<b>\$9,497,000</b>

Changes for the week, this year, were increases of \$178,500 in circulation, \$1,385,700 in specie, \$820,000 in legal tenders and \$3,171,625 in surplus reserve; decreases of \$5,661,300 in loans and discounts and \$3,863,700 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:

Banks.	1899.		1900.	
	Gold.	Silver.	Gold.	Silver.
N.Y. Ass'n.....	\$143,933,100	.....	\$159,041,000	.....
England.....	146,478,085	.....	150,691,315	.....
France.....	375,417,565	\$232,594,580	466,330,770	\$222,079,975
Germany.....	122,905,000	63,300,000	135,120,000	69,605,000
Spain.....	68,000,000	71,475,000	69,875,000	82,075,000
Neth'ldas.....	18,800,000	29,815,000	21,390,000	28,010,000
Belgium.....	14,705,000	5,350,000	14,705,000	7,350,000
Italy.....	77,435,000	7,500,000	77,245,000	8,850,000
Russia.....	431,895,000	24,840,000	360,120,000	30,110,000

The returns of the Associated Banks of New York are of date December 22nd, and the others are of date December 21st, 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.

Indian exchange is stronger and Council bills in London have commanded a rate of 16.02d. per rupee. More shipments of silver to India are expected.

Shipments of silver from London to the East for the year up to December 13th, 1900, are reported by Messrs. Pixley & Abell's circular as follows:

	1899.	1900.	Changes.
India.....	\$5,010,525	\$7,154,739	I. \$2,144,214
China.....	1,379,675	2,162,486	I. 782,811
The Straits.....	274,785	793,616	I. 528,831
<b>Totals.....</b>	<b>\$6,664,985</b>	<b>\$10,112,841</b>	<b>I. \$3,447,856</b>

Arrivals for the week, this year, were £230,000 in bar silver from New York and £3,000 from Australia; total, £233,000. Shipments were £156,575 in bar silver to Calcutta.

The foreign merchandise trade of Great Britain for the 11 months ending November 30th is reported by the Board of Trade as below:

	1899.	1900.
Imports.....	\$414,339,264	\$477,275,947
Exports.....	502,015,816	325,882,016
<b>Excess Imports.....</b>	<b>\$112,323,448</b>	<b>\$151,393,931</b>

The imports show an increase of £32,936,683, or 7.4%, and the exports an increase of £23,866,200, or 7.9%; leaving an increase of £9,070,483, or 6.4%, in the excess of exports.

Other Metals.

Daily Prices of Metals in New York.

December.	Silver.			Copper.			Spelter.			
	Sterling Exchange.	Fine oz. U. S.	London.	Lake. U. S. ¢/lb.	Electrolytic U. S. ¢/lb.	London £/ton.	Lead U. S. ¢/lb.	N. Y. ¢/lb.	St. L. ¢/lb.	
22	4.84 1/2	63 3/4	29 1/2	16 1/2	16 1/2	.....	26 1/2	4.32 1/2	4.20	4.00
24	4.84 1/2	64	29 1/2	16 1/2	16 1/2	.....	27	4.32 1/2	4.17 1/2	3.97 1/2
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	4.84 1/2	64	.....	16 1/2	16 1/2	.....	28	4.32 1/2	4.17 1/2	3.97 1/2
27	4.84 1/2	64	29 1/2	16 1/2	16 1/2	72 1/2	27 1/2	4.32 1/2	4.17 1/2	3.97 1/2
28	4.84 1/2	63 3/4	29 1/2	16 1/2	16 1/2	72 1/2	27	4.32 1/2	4.17 1/2	3.97 1/2

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former £ 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 Christmas holidays have interrupted business. In London the exchange was closed the first half of the week, and on this side the market was very quiet. The London market opened on Thursday £1 higher than it closed last Friday and this brought out a number of foreign buyers. Prices have not changed, and we quote Lake copper at 16 1/2 c.; electrolytic in cakes, wirebars and ingots at 16 1/2 c., in cathodes at 16c.; casting copper at 16 1/2 c.

The market for standard copper, which closed last week at £71 18s. 9d. for spot, £72 10s. for three months, opened on the 27th at £72 17s. 6d. for spot, £73 10s. for three months, and the closing quotations are cabled as £72 12s. 6d. for spot, £73 7s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £75 5s. @ £75 15s.; best selected, £78 10s. @ £79; strong sheets, £83; India sheets, £82; yellow metal, 7d.

The steamer "Astoria," which arrived in New York this week from Yokohama, Japan, brought 1,654 ingots and 6,610 slabs of copper.

Imports of copper into Great Britain for the 11 months ending November 30th were, in long tons:

	1899.	1900.
Ore.....	118,131	97,452
Matte and precipitate.....	75,475	80,403
Fine copper.....	53,925	66,500
<b>Total, in fine copper.....</b>	<b>103,476</b>	<b>116,447</b>

The total, as expressed in fine copper, shows an increase of 12,971 tons, or 12.6% this year. Of the imports this year the United States furnished 1,129 tons ore, 8,187 tons matte and 26,290 tons fine copper.

Tin.—The London exchange was closed from Friday of last week until Thursday, the 27th. Meanwhile, in our market a sharp advance took place in consequence of heavy buying on the part of some of the large operators. Spot tin continued to be in good demand and sold as high as 28c. At the close we quote spot tin at 27 1/2c. January delivery at 26 3/4c.

The London market, which closed last week at £118 5s. for spot, £118 10s. for three months, opened £6 higher, at £124 5s. for spot, £124 2s. 6d. for three months. It closes at £122 for both spot and three months.

Imports of tin into Great Britain for the 11 months ending November 30th were: Straits, 22,863 tons; Australasia, 2,687; other countries, 4,433; total, 29,983 long tons, against 24,475 tons in 1899; an increase of 5,508 tons, or 22.8%, this year. Exports of tin this year were 17,092 tons, against 16,093 tons in 1899; an increase of 999 tons, or 6.2%, this year.

Lead.—The market continues without change. Not much business is reported this week and the quotations remain at 4.20 @ 4.32 1/2c. St. Louis, 4.32 1/2 @ 4.37 1/2c. New York.

The foreign market for Spanish lead is somewhat firmer, being £16 5s., with English lead at £16 10s.

Imports of lead into Great Britain for the 11 months ending November 31st were, in long tons:

	1899.	1900.
From:		
Spain.....	90,062	82,497
United States.....	29,162	36,436
Australasia.....	50,754	50,405
Other countries.....	11,006	12,671
<b>Totals.....</b>	<b>180,984</b>	<b>182,009</b>

The increase shown this year was 1,025 tons, or 0.6%. The receipts from the United States increased 7,274 tons and from other countries, 2,665 tons; while there was a decrease of 349 tons in lead from Australia, and of 7,565 tons from Spain. The lead credited to the United States was chiefly Mexican lead refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: There is positively nothing new in pig lead. The metal has buyers and sellers in a limited way

at 4.20c. for Missouri lead and 4.32 1/2c. for de-silverized lead.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of December 5th, as follows: The average price of silver during the past month has been 15.75 reales per ounce. The average price of lead has been 95.25 reales per quintal on wharf equivalent to a price of £16 0s. 8d. per ton of 2,240 lbs. f. o. b. Cartagena at an average exchange of 33.23 pesetas to £1. The export of pig lead during November has been: 1,435,657 kgs. to Aberdeen; 1,306,563 kgs. to London; 932,084 kgs. to Marseilles; 225,000 kgs. to Antwerp; total, 3,899,304 kgs. Exports of silver, 4,223 kgs. silver bars to Marseilles.

Spelter.—The market has been quiet and depressed. Not much business has been done and somewhat lower prices have been accepted. We quote St. Louis at 3.97 1/2c., New York at 4.17 1/2c. Our cables report the foreign market at £18 12s. 6d. for good ordinaries, and specials 5s. higher.

Imports of spelter or metallic zinc into Great Britain for the 11 months ending November 30th were 63,670 long tons, against 63,804 tons in 1899; a decrease of 134 tons, or 0.2%, this year.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of December 5th, as follows: The market for zinc ore has improved, and recently a big transaction is reported made at better prices. Exports from Cartagena in November were 3,-895 metric tons blende to Antwerp.

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

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

Platinum.—Consumption continues good and prices are strong. For ingot platinum in large quantities \$18.20 per Troy oz. is quoted in New York. In London a recent quotation gives 75s. per ounce, unmanufactured, and 77s. 6d. @ 80s. for crucibles, etc. This is very nearly on a parity with New York prices.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72c. per gram.

Quicksilver.—The New York quotation continues unchanged at \$51 per flask for large lots, with \$52.50 @ \$54 asked for small quantities. San Francisco prices are \$48 @ \$48.50 on local deliveries, and \$43.50 @ \$44 on export orders. The London price is £9 2s. 6d. per flask, with the same price named from second hands.

Imports of quicksilver into Great Britain for the 11 months ending November 30th were 895,-488 lbs. (3,877,184 lbs. in 1899). Exports were 1,-825,982 lbs. (2,187,402 lbs. in 1899), showing an excess of exports this year of 930,494 lbs., against an excess of imports of 1,689,782 lbs. in 1899.

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

	Per lb.	Per lb.
Aluminum.....	33 @ 37c.	.....
No. 1, 90% ingots.....	31 @ 34c.	Ferro-Titanium (20%)... \$1.00
No. 2, 90% ingots.....	42c	Ferro tungsten (37%)... .30c
Rolled sheets.....	20 @ 23c.	Magnesium..... \$2.75 @ 3
Alum.-bronze.....	33 @ 39c.	Manganese (over 99%)... \$1.05
Nickel-alum.....	\$2.25	Manganese 'Cop (20% Mn)... .32c.
Rismuth.....	1.00	Manganese a Cop (30% Mn)... .38c.
Chromium (over 99%).....	50c.	Molybdenum (Best)..... \$1.45
Copper red oxide.....	\$1.00	Phosphorus..... 50c.
Ferro-Molyb'dum (50%).....	\$1.00	American..... 70c.
Ferro-Titanium (100%).....	90c.	Tungsten (Best)..... 86c.

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

LATE NEWS.

Piute County.—Utah.

(From Our Special Correspondent.)

Annie Laurie.—Gold Mountain's great event, the launching of the Annie Laurie, will take place about January 1st. At this writing everything is in position for the initial campaign. In the past season, while the mill was being built, most of the exploration was fruitful of good results. The mill is 200 tons capacity, combination cyaniding and amalgamation. The Kimberley-Huck syndicate of Chicago have every reason to be well content with conditions.

Foreign Coal Markets.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of December 15th that coal has become scarcer, and prices have advanced accordingly. Quotations are: Best Welsh steam coal, \$4.56 @ \$4.80; seconds, \$4.44; thirds, \$4.32; dry coal, \$4.20 @ \$4.44; best Monmouthshire semi-bituminous, \$4.20 @ \$4.44; seconds, \$4.08; best small steam coal, \$2.28 @ \$2.52; seconds, \$2.04 @ \$2.28; other sorts, \$1.92.

These prices for Cardiff coals are f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire coals are all f. o. b. Newport, exclusive of wharfage, and are for cash in 30 days, less 2 1/2% discount.

A further decline is noticeable in outward freight rates in all directions. The supply of tonnage is greatly in excess of the demand.



CHEMICALS AND MINERALS.

(For further prices of chemicals, minerals and rare elements, see page 780.)

New York. Dec. 28.

Heavy Chemicals.—Sales of next fire domestic high-test alkali are reported at 75@80c. per 100 lbs. f. o. b. works, while prompt sales by second-hands were made at 72 1/2 @75c. f. o. b. works. Domestic high test caustic soda continues to sell for next year's delivery at \$1.75@1.80 per 100 lbs. f. o. b. works. Bicarb. soda is stronger, and some orders for 1901 delivery were taken at \$1.12 1/2 per 100 lbs. for ordinary grades, f. o. b. works. Sal soda is weak, and lower prices are looked for next year. More bleaching powder for 1901 shipment has been booked at quotations below. Chlorate of potash shows a little more business for 1901 at \$8.50 per 100 lbs. f. o. b. works for both crystals and powdered.

We quote per 100 lbs. as follows: Domestic soda ash in bulk is worth 2 1/4c. per 100 lbs. less than quotations below.

Table with 4 columns: Articles, Domestic (F.o.b. Works, In New York), Foreign (In New York). Rows include Alkali, Caustic Soda, Sal Soda, Bicarb Soda, Bleach Pdr., and Chl. Pot. Cryst. powder.

Acids.—Consumers are making more inquiry for next year's deliveries, and some orders for sulphuric and other acids were booked at quotations. Blue vitriol is in better demand for export, especially as time freights are easier.

Table with 2 columns: Articles, Price per 100 lbs. Rows include Quotations as below, Acetic, Blue Vitriol, Aqua Fortis, Muriatic, and Muriatic 22%.

Copperas.—New makers have increased competition, and sales are reported at less than 45c. per 100 lbs.

Mineral Paints.—At the meeting in New York on December 20th by the 23 makers of dry colors in the United States who favor consolidation for mutual benefit, the following committee was named to appraise the real estate and machinery of the factories: George S. Mephin, of G. S. Mephin & Klein, St. Louis, Mo.; C. K. Williams, Jr., of C. K. Williams & Co., Easton, Pa.; J. M. Wells, of Wells & Hall, Ogdensburg, N. Y.; William Conners, of the American Seal Company, Troy, N. Y.; Henry C. Stewart, of the S. P. Wetherill Company, Philadelphia, Pa. A report by this committee is expected by January 15th.

Brimstone.—The 7,415 tons that arrived at New York this week have gone to consumers. Best unmixed seconds on spot sold at \$22@22.50 per long ton, while shipments are held at \$21@21.25, and best thirds at \$2 per ton less. Imports of brimstone into Great Britain in the 11 months ending November 30th were 20,986 long tons, against 19,562 tons last year, showing an increase in 1900 of 1,424 tons.

Pyrites.—Business continues fair, as consumers have begun stock taking preparatory to ordering their supplies of pyrites. Prices unchanged. Imports of pyrites into Great Britain in the 11 months ended November 30th were 671,426 long tons, against 632,204 tons last year; an increase of 39,222 tons in 1900. We quote as follows: Mineral City, Va., lump ore (basis 45%), \$4.75 per long ton and fines \$4.20. Charlemon, Mass., lump, \$5.50 and fines \$5. Spanish pyrites, 12@14c., as to percentage of sulphur contents, delivered ex-ship New York and other Atlantic ports. Spanish pyrites contain from 46@51% of sulphur; American from 42@44%.

Fertilizing Chemicals.—Leading ammoniates are in better request for shipment. Shipments of sulphate of ammonia from Great Britain to the United States in November are estimated at 422 long tons. Quotations are: Sulphate of ammonia, gas liquor, \$2.75@2.82 1/2 per 100 lbs.; blood, \$2.07 1/2 per unit, f. o. b. Chicago; tankage, \$1.85@1.90 and 10c. per unit, f. o. b. Chicago; Calcutta bone-meal, \$22 for best grades and \$19 for ordinary grades; domestic steamed ground bone, \$19@19.50 per ton.

Nitrate of Soda.—The steamer "Nordkyn" arrived with 7,464 bags. Spot nitrate of soda is

worth \$1.80@1.82 1/2 per 100 lbs., and futures are about the same.

Messrs. Jackson Brothers, of Valparaiso, Chile, write us under date of November 17th as follows: The European market has been very dull and exporters have not been disposed to enter into any new operations. On the other hand, few producers have any available stocks for this year, so that prices have been maintained, and more so, as heavy arrivals of tonnage have tended to weaken freight rates considerably. The production during October was 2,953,000 qtls., making a total for the 10 months of 26,469,000 qtls., against 25,051,000 qtls. in 1899, or say an increase of 1,418,000 qtls. The consumption of the world is advised for the same period as 26,973,000 qtls., or say 504,000 qtls. less than that of last year to same date. We quote 95%, November-December, at 5s. 7 1/2d.; January-February, 5s. 6 1/2d., and 96%, November-December, at 5s. 9d., all ordinary terms sellers. The price of 5s. 7 1/2d., with an all-round freight of 31s. 3d., stands in 7s. 9 3/4d. per cwt., net cost, and freight without purchasing commission. Reported sales for the fortnight to November 17th were 166,000 qtls.

Phosphates.—Few new orders are reported. A charter of 1,229 tons from Fernandina to Ghent is noted at 18s. 6d. (\$4.44), January sailing. Royalties from the South Carolina mines this year up to December 1st amounted to \$21,271, against \$31,947 in the previous year. This falling off of \$10,676 in royalties by the State is due partly to the inability of the mining companies to secure sufficient vessels for shipping their rock.

Reports are heard of the discovery of good phosphate rock about 4 miles southwest of Prattville, in Alabama.

Table with 4 columns: Phosphates, Per Ton F.o.b., U. n' d Kingdom or European Ports, Unit, Long ton. Rows include Fla. hard rock, Fla. land pebble, Fla. Peace River, Tenn. rock, Tenn. domestic, Tenn. crude, So. Car. rock, So. Car. crid., Algerian rock, Algerian rock.

\* Fernandina. † Mt. Pleasant. ‡ At mines. § On vessels, Ashley River.

Liverpool. Dec. 11. (Special Report of Joseph P. Brunner & Co.)

The market for chemicals is quiet generally so far as new business is concerned, attention being principally devoted to clearing up deliveries on contracts expiring at the end of this month.

The exports of alkali and bleaching powder for the month ending November 30th, according to the Board of Trade returns, are as follows: To all quarters, cwts., alkali 293,527; bleaching powder 110,764; to United States alone, cwts., alkali 40,816; bleaching powder 74,457.

As compared with November, 1899, the above figures show a marked falling off. Shipments of alkali and bleach to America are very light, especially alkali.

Soda ash is firm, and while quotations vary according to market, the range for tierces is about as follows: Leblanc ash, 48%, £5 12s. 6d. @ £5 17s. 6d.; 58%, £6 2s. 6d. @ £6 7s. 6d. per ton net cash. Ammonia ash, 48%, £4 10s. @ £4 15s.; 58%, £4 15s. @ £5 per ton net cash. Bags, 5s. per ton under price for tierces. Soda crystals are held for £3 7s. 6d. @ £3 10s. per ton, less 5% for barrels, or 7s. less for bags, and a fair business is passing. Special quotations for a few favored markets. Caustic soda is quiet but steady at the following figures: 60%, £9 5s.; 70%, £10 5s.; 74%, £10 15s. @ £10 17s. 6d. per ton; 76%, £11 5s. @ £11 10s. net cash. Bleaching powder continues to stiffen and for hardwood £6 15s. @ £7 per ton net cash is quoted, but export demand is light, the bulk of sales being for home consumption. Chlorate of potash attracts little attention from buyers and is dull at 3 3/4d. per lb. net cash. Bicarb. soda is moving off quietly at £6 15s. per ton, less 2 1/2% for the finest quality in 1 cwt. kegs, with usual allowances for large packages, also special quotations for certain favored markets. Sulphate of ammonia is inclined to harden, although without quotable change on spot prices ranging from £11 @ £11 2s. 6d. per ton, less 2 1/2% for good gray 24@25% in double bags f. o. b. here. Nitrate of soda is unchanged and quiet on spot at £8 10s. @ £8 15s. per ton, less 2 1/2% for double bags f. o. b. here, as to quality.

Messina, Sicily. Dec. 1. (Special Report of Emil Fog & Sons.)

Brimstone.—As the market grew stronger disidents' zeal for signing the new contract became weaker until it was evident that the signing of the agreement had again been a failure and, consequently, the great sacrifices made by the Anglo-Sicilian Company have been useless. One must only regret that buyers abroad profited so little by the late opportunity to secure part of

their future wants at low prices. This is now over. The Anglo-Sicilian Company will not sell except at high prices. The fusion time is over and dissident sellers are few and scarce. The renewal of the old contract for another 5 years is not certain yet. Still, nobody has doubts of its prolongation, although the Anglo-Sicilian Company will probably dispose of not more than 60%, or perhaps less, of the total production, which, however, seems to be reduced, as stocks are actually about 30,000 tons less than last year. On account of low lemon prices at New York freights of ballast lots of brimstone declined to 7s. 9d. to New York. We quote per long ton as follows: Best unmixed seconds, 76s.; best thirds, 67s. 6d.; refined block sulphur (100%), 83s.; refined roll, in casks, 90s.; sublimed flowers, extra pure, in bags, 98s.; superior, 95s. 6d., and current, 94s., all f. o. b.

MINING STOCKS.

Complete quotations will be found on pages 777 and 778 of mining stocks listed and dealt in at:

Boston. Philadelphia. Montreal. Colo. Springs. Salt Lake. London. Denver. San Francisco. Mexico. New York. Spokane. Paris. Toronto.

New York. Dec. 23.

Speculation this week was very quiet, owing to the Christmas holiday. Copper shares did not fluctuate as widely as last week. Amalgamated made sales at \$92.87 1/2 @ \$94.25, and Anaconda at \$47 @ \$48.50.

In the Colorado group sales were limited. Anaconda brought 50c.; Cripple Creek Consolidated, 12 1/2c., and Mollie Gibson, 24c.

Alice, of Montana, made a sale at 40c., and Kingston & Pembroke, of Ontario, at 25c. Brunswick, of California, sold at 20c.

The contract placed by the Philadelphia & Reading Railway Company yesterday, with the Cambria Steel Company, of Johnstown, Pa., for 500 steel gondola cars, marks a new departure in the business of the latter company. Heretofore, the Cambria Steel Company's manufactures have been confined largely to steel rails. Recently, however, the concern enlarged its plant in anticipation of extending its business.

An officer of the company says that the Reading Company's order for cars was the first received by the organization, and that the work of the future would depend in a great measure on the success of the present undertaking. The company's plant will be altered to suit the requirements of car-building.

It was reported in Wall Street to-day that an issue of \$35,000,000 bonds of the Erie Railroad, to take over the property of the Pennsylvania Coal Company, had been underwritten by J. P. Morgan & Company, the First National Bank, and other banking interests. The bonds will be a collateral trust on the property of the Pennsylvania Coal Company, and virtually a purchase-money mortgage. The bonds will bear 4% interest, and, it is stated, will be offered for subscription at 92 1/2%. The purchase-price for the property, offered by J. P. Morgan & Company, was, it will be remembered, 51%, or \$27,600,000. It is generally believed, however, that J. P. Morgan & Company were able to secure a considerable amount of stock on the open market before their general offer to the shareholders was made, and on all stock so acquired is, of course, entitled to the 200% dividend, or whatever sum is realized from the sale of the company's treasury assets, not included in the purchase-price.

Boston. Dec. 27. (From Our Special Correspondent.)

Boston has had a broad and active market this week, in spite of the holiday and the near approach of the end of the year. Business has been very good, and with a few special exceptions stocks have been strong. While industrials had the call, the coppers were not neglected.

The Lake coppers sold well, Calumet & Hecla ranging around \$825, while Tamarack was again higher at \$335. Quincy was quoted at \$174 and Osceola at \$75. Quite a demand is springing up for the newer lake companies, and this was not discouraged by reports that the lake people were selling out.

The blind pool stocks continued to show the weakness which has characterized them lately, though with slight recoveries at the close. Amalgamated sold at \$92 after the recovery. Boston & Montana was quoted at \$323; Butte & Boston, \$84; Arcadian, \$22. The movement is so clearly from the inside that one is rather at a loss to detect the motive. These stocks are good to let alone.

In the miscellaneous coppers Utah Consolidated brought \$34; British Columbia, \$22; Bingham, \$16; Santa Fe, \$7. Quite a demand for these stocks has developed recently.

The gold stocks were brought into notice by a special demand for Cochiti, which ran the price up to \$13, some 6,500 shares changing hands on Wednesday alone. No outsider seems to understand the motive.

Dominion Coal was quoted at \$38; Dominion Steel at \$22 1/2; New England Gas and Coke at



STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing companies like Alamo, Alice, Amalgamated, etc., with columns for location, par value, and prices for Dec. 21, 22, 25, 26, 27.

BOSTON, MASS.†

Table of stock quotations for Boston, Mass., listing companies like Adventure Con., Aetna Con., Allouez, etc., with columns for name of company, par value, shares issued, and prices for Dec. 20, 21, 22, 24, 25, 26.

COAL AND INDUSTRIAL STOCKS.

Table of coal and industrial stocks including Am. Sm. & Ref., Am. S. & W. Con., Col. Fuel & I., etc., with columns for company name, par value, and prices for Dec. 21, 22, 24, 25, 26.

\*Holiday. Total sales, 389,145.

SAN FRANCISCO, CAL.

Table of stock quotations for San Francisco, Cal., listing companies like Belcher, Best & Belcher, Caledonia, etc., with columns for company name, location, par value, and prices for Dec. 21, 22, 24, 25, 26.

\*Holiday.

CALIFORNIA OIL STOCKS.\*

Table of California oil stocks including Blue Goose, Buckhorn, Cal. Standard, etc., with columns for company name, no. of shares, par value, and prices for Dec. 1, 8, 15, 22, 29, 5, 12, 19, 26, 31.

\*Producers' Oil Exchange, San Francisco. Total sales, 60,727 shares. †Holiday.

PHILADELPHIA, PA.‡

Table of stock quotations for Philadelphia, Pa., listing companies like Am. Alk., Am. Cement, Bethlehem Iron, etc., with columns for company name, location, par value, and prices for Dec. 20, 21, 22, 24, 25, 26.

Total shares sold, 40,969. § Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia. \*Holiday.

SALT LAKE CITY, UTAH.

Table of stock quotations for Salt Lake City, Utah, listing companies like Ajax, Alice, Bullion-Beck & Ch., etc., with columns for company name, shares, par value, bid, asked, and prices for Dec. 22.

TORONTO, ONT.

Table of stock quotations for Toronto, Ont., listing companies like Ontario, Golden Star, Ham Reef, etc., with columns for company name, par value, and prices for Dec. 15, 17, 18, 19, 20, 21.

Total shares sold, 187,783.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.:

Table of stock quotations for Colorado Springs, Colo., listing companies like Acacia, Alamo, Anaconda, and others with columns for price and sales.

Colorado Springs Mining Stock Exchange. Total sales, 904,898 shares.

MONTREAL, CANADA.

Table of stock quotations for Montreal, Canada, listing companies like Big Three, California, and others.

Montreal Stock Exchange. Total sales, 28,400 shares.

MEXICO.

Table of stock quotations for Mexico, listing companies like Durango, Barradon y Cab, and others.

DENVER, COLO.:

Table of stock quotations for Denver, Colo., listing companies like Acacia, Alamo, and others.

Official Quotations Denver Stock Exchange. Total sales, 117,000 shares.

SPOKANE, WASH.

Table of stock quotations for Spokane, Wash., listing companies like Crystal, Deer Trail, and others.

PARIS.

Table of stock quotations for Paris, listing companies like Acieries de Creusot, Anzin, and others.

LONDON

Table of stock quotations for London, listing companies like Alaska Mexican, Anaconda, and others.

\*Ex-Dividend. \*Ex-Right.

DIVIDENDS.

GOLD, SILVER, COPPER, ZINC, LEAD AND QUICKSILVER COMPANIES.

Table with 14 columns: Number, Name and Location of Company, Authorized Capital Stock, Shares Issued, Dividends (Paid, Total to Date, Latest), and another set of columns for a second list of companies.

COAL, IRON AND OTHER COMPANIES.

Table with 14 columns: Number, Name and Location of Company, Authorized Capital Stock, Shares Issued, Dividends (Paid, Total to Date, Latest), and another set of columns for a second list of companies.

This table is corrected up to December 8th. Correspondents are requested to forward changes or additions.

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

Table with multiple columns listing various chemicals and minerals such as Abrasives, Borax, Cadmium, Calcium, Cement, Chromic acid, etc., along with their respective units and prices.

THE RARE ELEMENTS.

Prices given are at makers' works in Germany, unless otherwise noted.

Table listing rare elements such as Barium, Beryllium, Boron, Cadmium, Cesium, etc., with their units and prices.

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 Nov. 21. 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.

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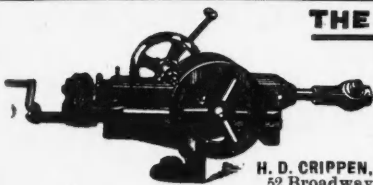
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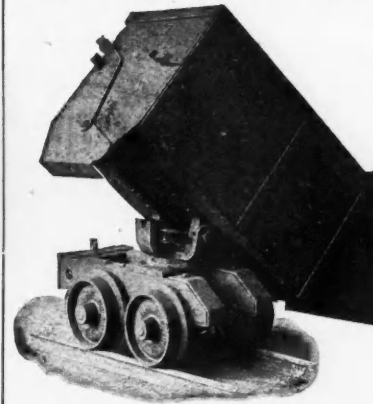
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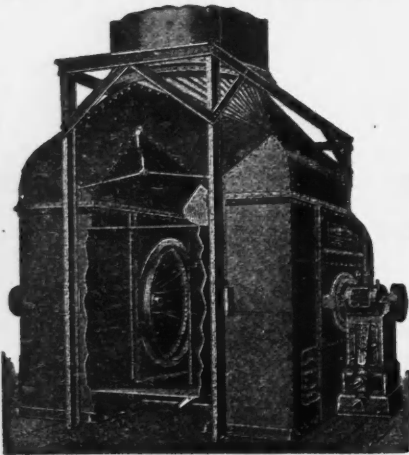
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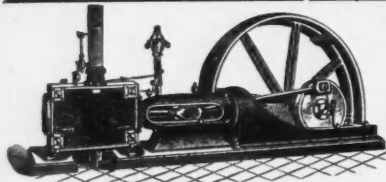


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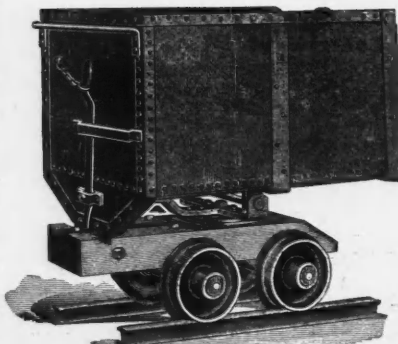
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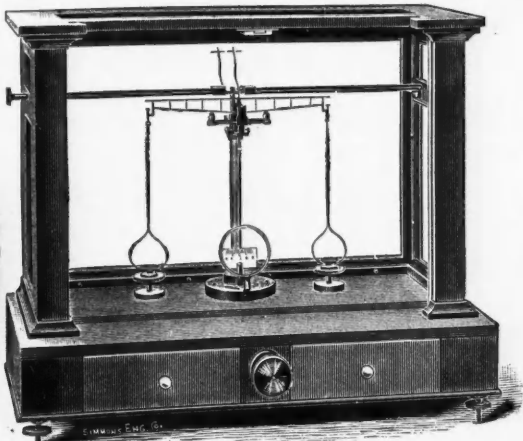
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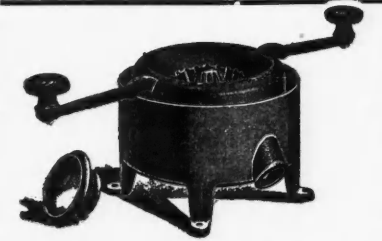
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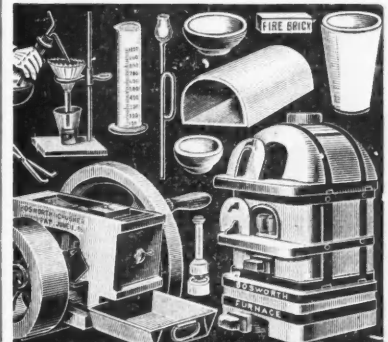
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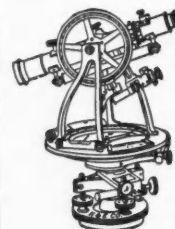
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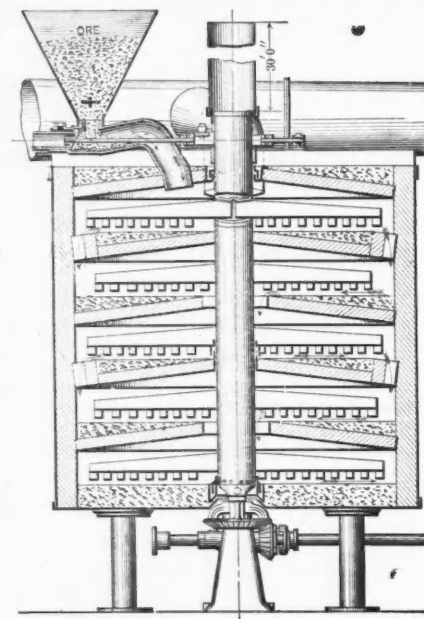
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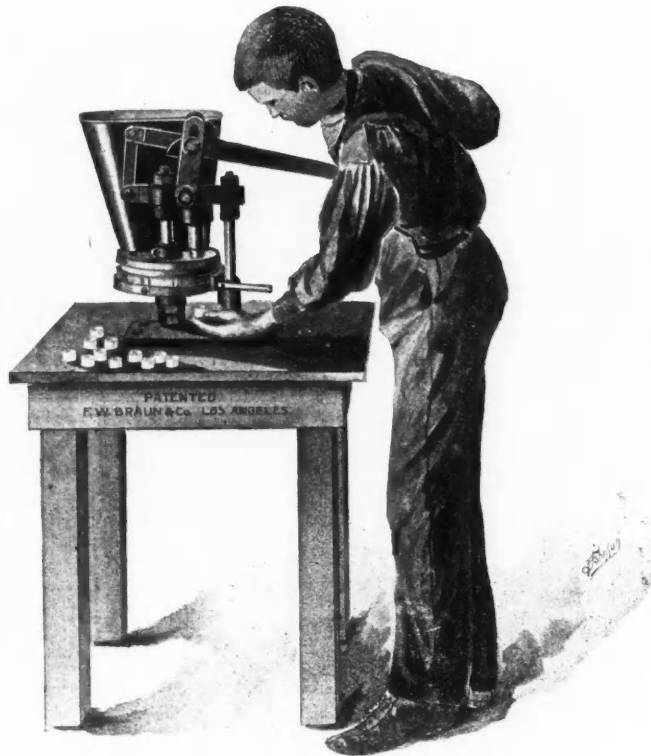
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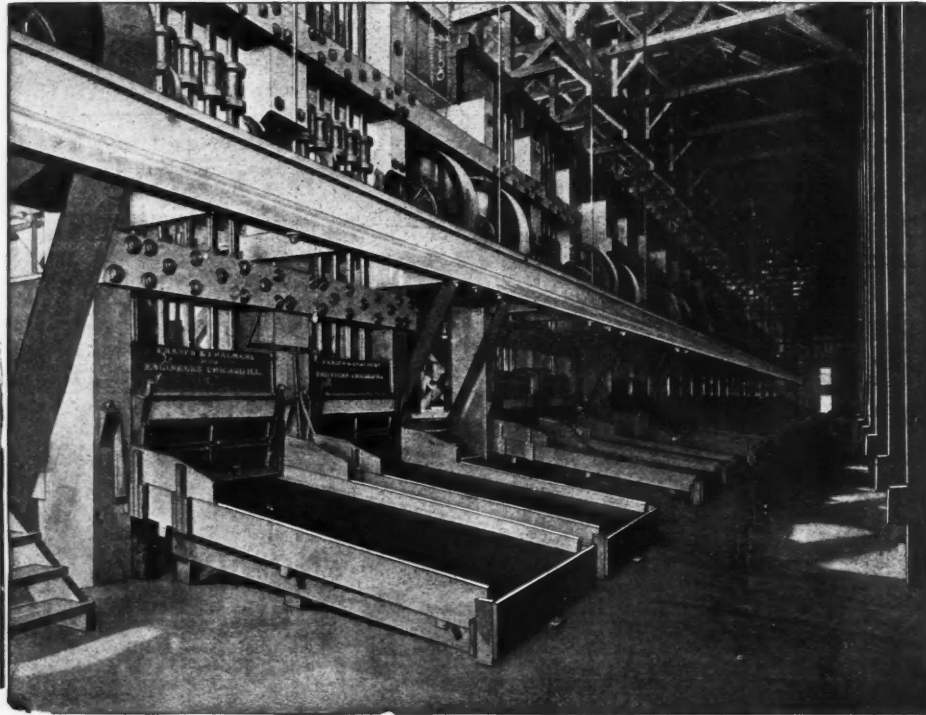
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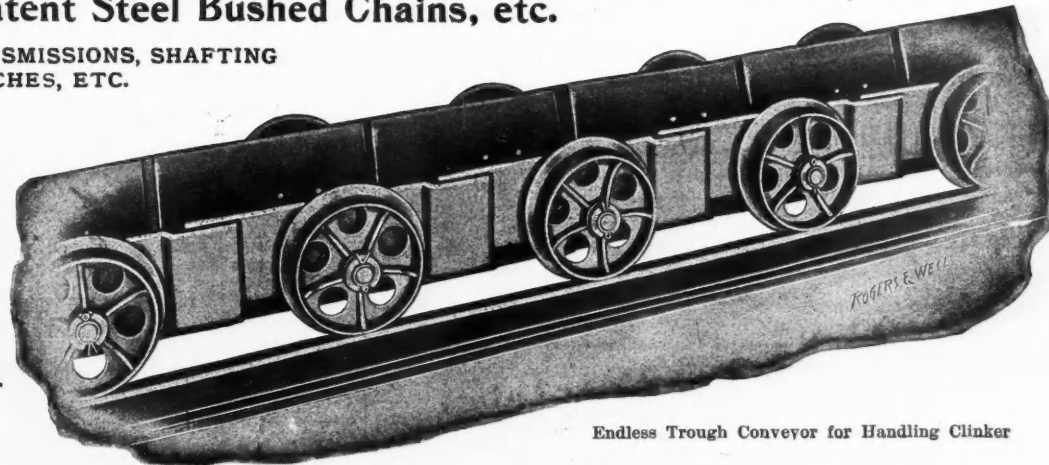
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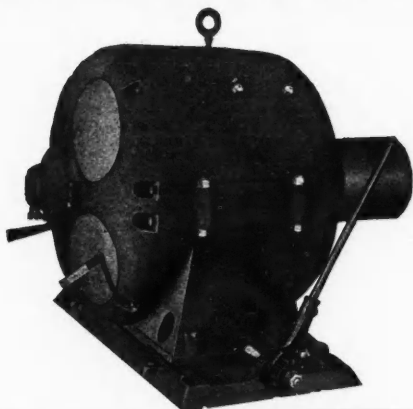


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Cor. 87th & Wallace Streets CHICAGO, U. S. A.

**BUYERS' CLASSIFIED DIRECTORY.**

<b>Adjustable Stocks and Dies.</b>	<b>Blocks, tackle.</b>
Armstrong Mfg. Co., Bridgeport, Conn..... 44	Hunt Co., C. W., West New Brighton, N. Y..... 15
Crane Co., Chicago..... 2	Leschen & Sons Rope Co., A., St. Louis..... 13
Morris P. Hollingsworth, Philadelphia, Pa..... 15	Link-Belt Machinery Co., Chicago..... 13
<b>Air Compressors.</b>	Macomber & Whyte Rope Co., Chicago, Ill..... 27
Allis, The E. P., Co., Milwaukee, Wis..... 57	<b>Bleaching Powder.</b>
American Diamond Rock Drill Co., New York..... 41	Acker Process Co., Niagara Falls, N. Y..... 24
American Eng. Works, Chicago..... 1 & 19	Fuerst Bros. & Co., New York, N. Y..... 45
Bullock, The M. C., Mfg. Co., Chicago, Ill..... 45	<b>Blowers.</b>
Clayton Air Compressor Works, N. Y..... 34	Buffalo Forge Co., Buffalo, N. Y..... 2
Colorado Iron Works Co., Denver, Colo..... 34	Sturtevant, B. F., Co., Boston, Mass..... 32
Davis, The F. M., Iron Works, Denver, Colo..... 35	<b>Blue Printing Apparatus.</b>
Denver Engineering Works, Denver, Colo..... 56	Emerson Mfg. Co., F. W., Rochester, N. Y..... 5
Fraser & Chalmers, Chicago, Ill..... 12 & 16	Keuffel & Esser Co., New York..... 5
Gates Iron Works, Chicago, Ill..... 36	<b>Boilers.</b>
Hall Steam Pump Co., Pittsburg, Pa..... 31	Abendroth & Root Mfg. Co., New York, N. Y..... 14
Hendy Mach. Wks., Joshua, San Francisco, Cal..... 25	Allis, The E. P. Co., Milwaukee, Wis..... 17
Ingersoll-Sergeant Drill Co., N. Y..... 26	Aultman Co., The, Canton, O..... 12
Leyner, J. Geo., Denver, Colo..... 27	Beggs & Co., James, New York..... 14
McKiernan Drill Co., New York..... 14	Billin, C. E., & Co., Chicago, Ill..... 19
Mine & Smelter Supply Co., The, Denver, Colo..... 25	Bacon, E. C., New York, N. Y..... 9
New York Air Compressor Co., New York..... 45	Colorado, The, Iron Works Co., Denver, Colo..... 3
Norwalk Iron Works Co., So. Norwalk, Conn..... 45	Davis, F. M., Iron Works Co., Denver, Colo..... 5
Rand Drill Co., The, New York, N. Y..... 28	Denver, The, Eng. Works Co., Denver, Colo..... 6
Snyder & Co., F. I., Chicago..... 24	Ehrsam & Sons, J. B., Enterprise, Kan..... 1
Stillwell-Bierce & Smith Valve Co., The, Dayton, O..... 31, 45, 46	Fraser & Chalmers, Chicago, Ill..... 12
Sullivan Mach. Co., Chicago, Ill..... 41	Hendy Machine Works, Joshua, San Francisco, Cal..... 26
Weber Gas & Gasoline Engine Co., Kansas City..... 44	Murray Iron Works Co., Burlington, Ia..... 2
<b>Amalgamators.</b>	Pollock, W. B., & Co., Youngstown, O..... 14
Urie Mining Mach. Co., Kansas City..... 32	Ridson Iron Works, San Francisco, Cal..... 21
<b>Amalgam Plates.</b>	Scaife & Sons, W., Pittsburg, Pa..... 25
American Eng. Works, Chicago..... 1 & 19	Stillwell-Bierce & Smith-Valve Co., The, Dayton, O..... 31, 45, 46
Denver Engineering Works, Denver, Colo..... 36	Tippet & Wood, Phillipsburg, N. J..... 15
Flint & Lomax Elec. Co., Denver, Colo..... 1	Webster, Camp & Lane Machine Co., Akron, O..... 44
Mine & Smelter Supply Co., The, Denver, Colo..... 35	<b>Boiler Compounds.</b>
<b>Anti-Friction Metals.</b>	Dearborn Drug Co., Chicago, Ill..... 18
Ajax Metal Co., Philadelphia, Pa..... 1	Parsons, J. H., & Co., Chicago, Ill..... 21
American Eng. Works, Chicago..... 1 & 19	Pittsburg Boiler Scale Resolvent Co., Pittsburg, Pa..... 33
Besly, C. H., & Co., Chicago, Ill..... 48	<b>Boiler Fronts.</b>
Chester Steel Casting Co., Philadelphia, Pa..... 29	Denver Engineering Works, Denver, Colo..... 36
Graphite Lubricating Co., Bound Brook, N. J..... 1	Lunkenheimer Co., The, Cincinnati, O..... 48
Magnolia Metal Co., New York, N. Y..... 1	<b>Boiler Oil Feeders.</b>
National Steel Castings Co., Montpelier, Ind..... 29	Powell Co., The Wm., Cincinnati, O..... 48
Phosphor Bronze Sm. Co., Philadelphia, Pa..... 29	<b>Boots and Shoes.</b>
Raymond Lead Co., Chicago, Ill..... 46	Putnam & Co., H. J., Minneapolis, Minn..... 16
<b>Appraisers.</b>	<b>Brass Goods (Cocks, Valves, Etc.).</b>
American Appraisal Co., New York..... 6	Amer. Engineering Works, Chicago, Ill..... 1
<b>Arsenic.</b>	Beggs & Co., James, New York..... 14
Fuerst Bros. & Co., New York, N. Y..... 46	Besly, C. H., & Co., Chicago, Ill..... 45
<b>Assayers. (See also pages 4 and 5).</b>	Crane Co., Chicago, Ill..... 2
Hagstoz Co., Ltd., T. B., Philadelphia, Pa..... 46	Detroit Lubricator Co., Detroit, Mich..... 42
Hunt, Fred. F., New York City..... 24	Eddy Valve Co., Waterford, N. Y..... 2
Independent Assay Office, El Paso, Texas..... 21	Graphite Lubricating Co., Bound Brook, N. J..... 1
Mariner & Hoskins, Chicago, Ill..... 21	Jenkins Bros., New York, N. Y..... 30
Ogden Assay Co., Denver, Colo..... 46	Ludlow-Seroy Wire Co., St. Louis..... 2
Penn. Smelt. & Ref. Co., Philadelphia, Pa..... 46	Lunkenheimer Co., The, Cincinnati, O..... 48
Pitkin, Dr. Lucius, N. Y. City..... 24	Powell Co., The Wm., Cincinnati, O..... 48
Reckhart, D. W., El Paso, Tex..... 21	Wood, R. D., & Co., Philadelphia, Pa..... 25
Ricketts & Banks, N. Y. City..... 24	<b>Brattice Cloth.</b>
St. Louis Sampling & Testing Works, St. Louis..... 24	Besly, C. H., & Co., Chicago, Ill..... 48
Seaman Bros., El Paso, Tex..... 24	<b>Brick Machinery.</b>
Simmonds & Wainwright, N. Y. City..... 24	Freese, E. M., & Co., Gallon, O..... 28
Wood, Henry E., Denver, Colo..... 5	<b>Bridges.</b>
<b>Assayers' and Chemists' Supplies.</b>	American Bridge Co., New York..... 28
Ainsworth, W., Denver, Colo..... 3	California Wire Works, San Francisco, Cal..... 43
Baker & Co., Newark, N. J..... 3	Detroit Bridge & Iron Works, Detroit, Mich..... 2
Baker & Adamson Chem. Co., Easton..... 3	Koken Iron Works, St. Louis, Mo..... 28
Becker, Christian, New York, N. Y..... 3	Leschen & Sons Rope Co., A., St. Louis..... 48
Braun & Co., F. W., Los Angeles, Cal..... 11	Scaife & Sons, W. B., Pittsburg, Pa..... 28
Bullock & Greshaw, Philadelphia, Pa..... 3	<b>Briquetting Machines.</b>
Denver Fire Clay Co., Denver, Colo..... 3	Chisholm, Boyd & White Co., Chicago, Ill..... 14
Entriken, J. C., Malvern, Pa..... 3	Mould Co., Henry S., Pittsburg, Pa..... 1
Elmer & Amend, New York, N. Y..... 3	<b>Brokers (Mining Lands and Stocks).</b>
Fish Drug & Assay Supply Co., Butte, Mont..... 3	Atkin & Co., L. L., Colorado Springs, Colo..... 10
Fuerst Bros. & Co., New York, N. Y..... 46	Bell, J., San Francisco, Cal..... 6
Hell, Henry, Chemical Co., St. Louis..... 3	Bogy Investment Co., L. C., Denver, Colo..... 10
Hoffman, Plintner & Co., Mexico City, Mex..... 3	Bretting, E. N., Marquette, Mich..... 6
Kohlbusch, H., New York, N. Y..... 3	Chisholm, Matthew, & Co., Colorado Springs..... 10
McIntosh, Huntington Co., Cleveland, Ohio..... 3	Crosby, Ehrlich, Syndicate, Colorado Springs..... 10
Penn. Salt Mfg. Co., Philadelphia, Pa..... 25	Currie & Kitley, Toronto, Ont..... 6
Roesler & Hasslacher Chem. Co., New York..... 1, 24	Dangerfield & Hart, Joplin, Mo..... 6
Sargent, E. H., & Co., Chicago, Ill..... 3	Dorsy Investment Co., Colorado Springs, Colo..... 10
Smith & Thompson, Denver, Colo..... 3	Edsall, Key & Co., Colorado Springs, Colo..... 6
Solvay, The Process Co., Syracuse..... 3	Douglas, Lacey & Co., New York..... 6
Taylor, John, & Co., San Francisco..... 3	Harlow Mining Agency, The, Nogales, Ariz..... 6
Troemmer, Henry, Philadelphia, Pa..... 3	Johnson & Roester, New York..... 24
Western, The, Chemical Co., Denver, Colo..... 3	Meyer, Clarke, Rowe Mines Co., Kansas City..... 6
White Co., The, Chicago, Ill..... 3	Ore Bin Co., Ltd., Van Ande, B. C..... 11
<b>Attorneys at Law.</b>	Palmer & Co., H. P., Spokane, Wash..... 6
Dowe & Hartridge, N. Y..... 6	Reed & Hamlin, Colorado Springs, Colo..... 10
Dunsan & Hanchette, Hancock, Mich..... 6	Rowland, John A., Helena, Mont..... 6
Harlow, W. P., Nogales, Ariz..... 6	Thompson Investment Co., New York..... 6
Hartman, Francis M., Tucson, Ariz..... 6	Tucker, Ballard & Co., Colorado Springs, Colo..... 10
Kinney, Clesson S., Salt Lake City, Utah..... 6	Tulleys, L. W., Council Bluffs, Ia..... 6
<b>Attorneys (Patent).</b>	<b>Brokers (Oil Lands and Stocks).</b>
Barnaclo, F. W., Baltimore, Md..... 48	Campton, R. Y., Los Angeles, Cal..... 6
Johnston, Thos. J., N. Y..... 21	Fox, Chas. P., Bakersfield, Cal..... 6
<b>Axles (Solid and Hollow).</b>	George, Chas. J., Los Angeles, Cal..... 6
American Eng. Works, Chicago..... 1 & 19	Grand Pacific Oil Co., San Francisco, Cal..... 7
Bethlehem Steel Co., So. Bethlehem, Pa..... 29	Hollingsworth & Co., W. L., Los Angeles..... 6
Latrobe Steel Co., Philadelphia, Pa..... 1	Los Angeles Oil & Invest. Co., Los Angeles..... 7
<b>Balances (See Scales and Balances).</b>	McPherson & Co., Geo. W., Bakersfield, Cal..... 6
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Leschen & Sons Rope Co., A., St. Louis..... 48	Midway Oil Co., San Francisco, Cal..... 7
<b>Bankers.</b>	Taylor & Seroy, Bakersfield, Cal..... 6
Handy & Harman, New York..... 6	<b>Buckets (Automatic).</b>
<b>Bearing Metal.</b>	American Engineering Works, Chicago, Ill..... 1, 19
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American Engineering Works, Chicago..... 1 & 19	Brown Holst and Conv. Mach. Co., Cleveland..... 48
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Chester Steel Casting Co., Philadelphia, Pa..... 29	Hunt, C. W. Co., Staten Island, N. Y..... 43
Macomber & Whyte Rope Co., Chicago, Ill..... 21	Jeffrey, The, Mfg. Co., Columbus, O..... 13 & 44
Magnolia Metal Co., New York, N. Y..... 1	Weber Gas & Gasoline Engine Co., Kansas City..... 44
National Steel Castings Co., Montpelier, Ind..... 29	Webster, Camp & Lane Machine Co., Akron, O..... 44
Raymond Lead Co., Chicago, Ill..... 46	<b>Cableways (Incline and Horizontal)</b> (See Wire Rope Tramways).
<b>Belt Dressing.</b>	<b>Cableways, Suspension.</b>
Ironides Co., Columbus, O..... 45	Amer. Steel & Wire Co., New York..... 44
Joseph Dixon Crucible Co., Jersey City, N. J..... 40	Binder, Carl, Chicago, Ill..... 42
<b>Belting.</b>	California Wire Works, San Francisco..... 43
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Hendrie & Bolthoff Mfg. Co., Denver, Colo..... 34	Lidgerwood Manuf'g Co., New York..... 42
Jeffrey, The, Mfg. Co., Columbus, Ohio..... 13, 42	
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Bristol, The, Co., Waterbury, Conn..... 1	
<b>Belt Fasteners.</b>	
Bristol, The, Co., Waterbury, Conn..... 1	
Quaker City Rubber Co., Philadelphia, Pa..... 17	
<b>Blasting Batteries, Caps and Fuse.</b>	
Ingersoll-Sergeant Drill Co., New York..... 25	
Lan, J. H. & Co., New York, N. Y..... 28	
Rand Drill Co., New York..... 48	

# BUYERS' CLASSIFIED DIRECTORY.

Macomber & Whyte Rope Co., Chicago, Ill.	27
Montgomery, J. H., Machinery Co., Denver, Colo.	45
Ropeway Syndicate, Ltd., London, Eng.	42
Trenton Iron Co., Trenton, N. J.	43
<b>Candlesticks (Miners).</b>	
Indlow Saylor Wire Co., St. Louis, Mo.	2
<b>Carbons, Boritz, etc.</b>	
Bandler, Bernard, New York, N. Y.	41
Levy, H., New York, N. Y.	40
Lexow, T., New York, N. Y.	41
Yawger, I. C., New York, N. Y.	41
<b>Cars (Dump, Mine and Ore).</b>	
Allis, The E. P. Co., Milwaukee, Wis.	37
American Engineering Works, Chicago, Ill.	19
Austin Mfg. Co., F. C., Harvey, Ill.	38
Bullock Mfg. Co., M. C., Chicago, Ill.	41
Colorado The, Iron Works Co., Denver, Colo.	41
Fraser & Chalmers, Chicago, Ill.	12
Hendrie & Bolthoff Mfg. Co., Denver, Colo.	34
Kilbourne & Jacobs Mfg. Co., Columbus, O.	2
Kappel, A., New York, N. Y.	37
Rupp, Fried., Magdeburg, Prussia, Germany	1
Link-Belt Machinery Co., Chicago, Ill.	13
Mine & Smelter Supply Co., Denver, Colo.	35
Urle Mining Mach. Co., Kansas City, Mo.	32
Wonham & Magor, New York, N. Y.	15
<b>Case Hardening Materials.</b>	
American Carburizing Co., New York, N. Y.	2
<b>Castings.</b>	
Ajax Metal Co., Philadelphia, Pa.	25
Bethlehem Steel Co., So. Bethlehem, Pa.	29
Chester Steel Casting Co., Philadelphia, Pa.	25
Chrome Steel Works, Brooklyn, N. Y.	29
Graphite Lubricating Co., Bound Brook, N. J.	39
Latrobe Steel Co., Philadelphia, Pa.	25
National Steel Castings Co., Indianapolis, Ind.	25
Sargent Co., The, Chicago, Ill.	25
Taylor Iron & Steel Co., High Bridge, N. J.	29
Western Forge Co., St. Louis, Mo.	29
Wood, R. D., & Co., Philadelphia, Pa.	28
<b>Cement Machinery.</b>	
Bartlett & Co., Cleveland, O.	2
Bethlehem Foundry & Mach. Co., Bethlehem, Pa.	39
Bradley Pulverizer Co., Boston, Mass.	39
Cresson Co., Geo. V., Philadelphia, Pa.	39
Gates Iron Works, Chicago, Ill.	36
Kent Mill Co., New York, N. Y.	38
Smith & Co., L., New York, N. Y.	38
Sturtevant Mill Co., Boston, Mass.	39
<b>Channeling Machines.</b>	
Ingersoll-Sergeant Drill Co., New York, N. Y.	25
Rand Drill Co., New York, N. Y.	48
Simpson Manufacturing Co., Chicago, Ill.	39
Sullivan Machinery Co., Chicago, Ill.	41
<b>Chemical Engineers.</b>	
Dearborn Drug Co., Chicago, Ill.	18
<b>Chemicals.</b>	
Acker Process Co., Niagara Falls, N. Y.	24
Baker & Adamson Chem. Co., Easton, Pa.	3
Braun & Co., F. W., Los Angeles, Cal.	11
Bullock & Crenshaw, Philadelphia, Pa.	3
Elmer & Arnold, New York, N. Y.	3
Fair Drill & Assay Supply Co., Butte, Mont.	3
Fuerst Bros. & Co., New York, N. Y.	46
Grassell Chem. Co., Cleveland, O.	47
Hoffmann, Pinther & Co., Mexico City, Mex.	3
Henry, H., Cement Co., St. Louis, Mo.	3
Illinois Zinc Co., Peoria, Ill.	3
Matthiesen & Hegeler Zinc Co., La Salle, Ill.	46
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.	25
Roessler & Hasselacher Chem. Co., New York, N. Y.	1, 24
Sargent, E. H., Co., Chicago, Ill.	3
Solvay, The, Process Co., Syracuse, N. Y.	3
Western Chemical Co., Denver, Colo.	3
Ward & Co., J. C., Brooklyn, N. Y.	24
<b>Chemists. (See Assayers).</b>	
<b>Chloride of Lime.</b>	
Fuerst Bros. & Co., New York, N. Y.	46
<b>Coal and Coke Producers and Dealers.</b>	
Berwind White Coal Mfg. Co., New York, N. Y.	9
Caster, Curran & Bullitt, Philadelphia, Pa.	9
Consolidation Coal Co., Baltimore, Md.	9
Davis Coal & Coke Co., New York, N. Y.	9
Flemington Coal and Coke Co., New York, N. Y.	9
Stickney, Conyngham & Co., New York, N. Y.	9
Ward & Olyphant, New York, N. Y.	9
<b>Coal Cutters.</b>	
Ingersoll-Sergeant Drill Co., New York, N. Y.	25
Jeffrey, The, Mfg. Co., Columbus, O.	13
Link-Belt Machinery Co., Chicago, Ill.	13
Sullivan Machinery Co., Chicago, Ill.	41
<b>Coal and Ore Handling Machinery.</b>	
Aultman Co., The, Canton, O.	42
Bartlett & Co., C. O., Cleveland, O.	42
Brown Hoisting Machinery Co., Cleveland, O.	43
Hunt Co., C. W., West Brighton, N. Y.	45
Jeffrey Mfg. Co., Columbus, O.	13
Leschen & Sons Rope Co., A., St. Louis, Mo.	43
Macomber & Whyte Rope Co., Chicago, Ill.	27
Link-Belt Machinery Co., Chicago, Ill.	13
Robins Conv. Belt Co., Chicago, Ill.	13
<b>Coal Mining and Washing Machinery.</b>	
Jeffrey, The, Mfg. Co., Columbus, O.	13
Leschen & Sons Rope Co., A., St. Louis, Mo.	43
Link-Belt Machinery Co., Chicago, Ill.	13
<b>Coke Ovens.</b>	
Solvay Process Co., Syracuse, N. Y.	27
<b>Colleges (Engineering).</b>	
Chicago School of Assaying, Chicago, Ill.	9
Lawrence Scientific School, Cambridge, Mass.	9
McGill University, Montreal, Canada.	9
Massachusetts Institute of Technology, Boston.	9
Michigan School of Mines, Houghton, Mich.	9
Missouri School of Mines, Rolla, Mo.	9
Rensselaer Polytechnic Institute, Troy, N. Y.	9
<b>Compressed Air Shop Tools.</b>	
Clayton Air Compressor Works, N. Y.	1
<b>Contractors' Supplies.</b>	
Austin Mfg. Co., F. C., Harvey, Ill.	38
Contractors Plant Mfg. Co., Buffalo, N. Y.	44
Kilbourne & Jacobs Mfg. Co., Columbus, O.	2
Macomber & Whyte Rope Co., Chicago, Ill.	27
<b>Conveyors.</b>	
Aultman Co., The, Canton, O.	42
Bacon, E. C., New York, N. Y.	39
Bartlett & Co., C. O., Cleveland, O.	2
Brown Hoisting Machinery Co., Cleveland, O.	43
California Wire Works, San Francisco, Cal.	43
Colorado The, Iron Works Co., Denver, Colo.	36
Cooper, Hewitt & Co., New York, N. Y.	43
Dawford & McCrimmon Co., Brazil, N. Y.	42
Javis, F. M., Iron Works Co., Denver, Colo.	35
Denver Engineering Works Co., Denver, Colo.	36
Hunt Co., C. W., West Brighton, N. Y.	45
Leschen & Sons Rope Co., A., St. Louis, Mo.	47
Jeffrey, The, Mfg. Co., Columbus, O.	13
Lidgerwood Mfg. Co., New York, N. Y.	44
Link-Belt Machinery Co., Chicago, Ill.	13
Montgomery Machine Co., J. H., Denver, Colo.	45
Robins Conveying Belt Co., N. Y.	4
Simpson Manufacturing Co., Chicago, Ill.	36
Ropeway Syndicate, London, England.	42
Trenton Iron Co., Trenton, N. J.	43
Urle Machine Co., Kansas City, Mo.	32
Volcan Iron Works, San Francisco, Cal.	42
<b>Copper Producers and Dealers.</b>	
American Metal Co., The, New York, N. Y.	24

Atter, Smelting & Refining Co., New York	38
Arizona Copper Co., Clifton, Ariz.	24
Atlantic Mining Co., Atlantic Mfne, P. O., Mich.	9
Balbach Smelting and Refining Co., Newark, N. J.	24
Baltimore Copper Works, Baltimore, Md.	24
Bath, Henry & Son, London, England.	24
Bond, V. & Co., New York, N. Y.	24
Canadian Copper Co., The, Cleveland, O.	24
Copper Queen Con. Mfg. Co. of Arizona, New York, N. Y.	9
Detroit Copper Mfg. Co. of Arizona, Morenci, Ariz.	9
Greene Consolidated Copper Co., New York, N. Y.	9
Marcken Copper Co., New York, N. Y.	24, 27
Nichols Chemical Co., New York, N. Y.	24, 27
Orford Copper Co., The, New York, N. Y.	24
Pass, C. & Co., Bristol, England.	24
Penn. Salt Mfg. Co., Philadelphia, Pa.	25
Phelps, Dodge & Co., New York, N. Y.	46
United Metals Selling Co., New York, N. Y.	9 & 24
<b>Corrugated Iron.</b>	
Scafe & Sons, W. B., Pittsburg, Pa.	28
<b>Cranes.</b>	
Brown Hoisting Machinery Co., Cleveland, O.	43
Bucyrus Co., So. Milwaukee, Wis.	32
Marion Steam Shovel Co., Marion, O.	32
Whiting Foundry Equipment Co., Harvey, Ill.	16
<b>Crank Pins.</b>	
Bethlehem Steel Co., So. Bethlehem, Pa.	29
<b>Crucibles, Graphite, Etc.</b>	
Denver, The, Fire Clay Co., Denver, Colo.	30
Dixon, Joseph, Crucible Co., Jersey City, N. J.	3
<b>Crushers—See Pulverizers.</b>	
<b>Cyanide.</b>	
Braun & Co., F. W., Los Angeles, Cal.	11
Fuerst Bros. & Co., New York, N. Y.	46
Roessler & Hasselacher Chem. Co., N. Y.	1, 24
<b>Cupel Machines.</b>	
Braun & Co., F. W., Los Angeles, Cal.	11
<b>Cyanide Vats—See Tanks.</b>	
<b>Diamond Drills.</b>	
American Diamond Rock Drill Co., New York, N. Y.	41
Bullock, The M. C., Mfg. Co., Chicago, Ill.	41
Sullivan Machinery Co., Chicago, Ill.	41
<b>Diamond Drill Carbons.</b>	
Bandler, Bernard, New York, N. Y.	41
Levy, H., New York, N. Y.	40
Lexow, The, New York, N. Y.	41
Yawger, I. C., New York, N. Y.	41
<b>Draft Mechanical.</b>	
Buffalo Forge Co., Buffalo, N. Y.	2
Sturtevant Co., B. F., Boston, Mass.	38
<b>Drafting Materials.</b>	
Altender, Theo., & Son, Philadelphia, Pa.	8
Bergner, C. L. & Sons, Boston, Mass.	8
Besly, C. H., & Co., Chicago, Ill.	48
Bluff & Buff Mfg. Co., Boston, Mass.	48
Dietzen, Eugene, Co., Chicago, Ill.	8
Emerson Mfg. Co., F. W., Rochester, N. Y.	8
Gurley, W. & L. E., Troy, N. Y.	8
Keuffel & Esser Co., New York, N. Y.	8
Lalle, J. S. J., Denver, Colo.	8
Leitz, The A. Co., San Francisco, Cal.	8
Mahn & Co., St. Louis, Mo.	8
Queen & Co., Philadelphia, Pa.	3, 8
Wirtz, P. & R., Berlin, Germany.	8
<b>Drafting Room Furniture.</b>	
Emerson Mfg. Co., F. W., Rochester, N. Y.	8
Keuffel & Esser Co., New York	8
<b>Dredging Machinery.</b>	
Borges & Co., James, New York, N. Y.	14
Bucyrus, The, Co., So. Milwaukee, Wis.	32
Hammond Mfg. Co., Portland, Ore.	32
Hendy Mach. Wks., Joshua, San Francisco, Cal.	26
Jeffrey, The, Mfg. Co., Columbus, O.	13, 42
Leschen & Sons Rope Co., A., St. Louis, Mo.	43
Marion Steam Shovel Co., Marion, O.	32
Risdon Iron Works, San Francisco, Cal.	31
Thev Shovel Co., Lorain, Ohio.	2
Urle Mining Mach. Co., Kansas City, Mo.	32
Wolf & Zincker Iron Wks. Co., Portland, Ore.	32
<b>Drills (Core).</b>	
American Diamond Rock Drill Co., New York, N. Y.	41
Bullock, The M. C., Mfg. Co., Chicago, Ill.	41
Reuter, Son & Co., Chas., Baltimore, Md.	41
Sullivan Machinery Co., Chicago, Ill.	41
<b>Drills (Hand).</b>	
Jackson Drill & Mfg. Co., Denver, Colo.	41
<b>Drills (Rock).</b>	
Allis, The E. P. Co., Milwaukee, Wis.	37
Austin Mfg. Co., F. C., Harvey, Ill.	38
Bullock, The M. C., Mfg. Co., Chicago, Ill.	41
Denver Engineering Works, Denver, Colo.	36
Fraser & Chalmers, Chicago, Ill.	12 & 16
Hendy Mach. Wks., Joshua, San Francisco, Cal.	26
Ingersoll-Sergeant Drill Co., New York, N. Y.	25
Keystone Driller Co., Beaver Falls, Pa.	27
Leyner, J. Geo., Denver, Colo.	27
McKernan Drill Co., New York, N. Y.	14
Rand Drill Co., The, New York, N. Y.	45
Sullivan Machinery Co., Chicago, Ill.	41
<b>Dryers (Mechanical).</b>	
Buffalo Forge Co., Buffalo, N. Y.	2
Colorado Iron Wks. Co., Denver, Colo.	34
Cummer, F. D., & Sons Co., Cleveland, O.	32
Davis, F. M., Iron Wks. Co., Denver, Colo.	35
Denver, The, Eng. Works Co., Denver, Colo.	36
<b>Educational Institutions. (See page 9.)</b>	
<b>Electrical Batteries.</b>	
Weston Elect. Inst. Co., Newark, N. J.	48
<b>Electrical Machinery Supplies.</b>	
Besly, C. H., & Co., Chicago, Ill.	48
Flint-Lomax Elect. & Mfg. Co., Denver, Colo.	40
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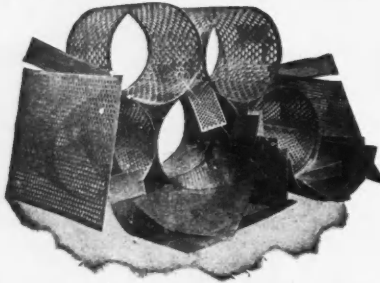
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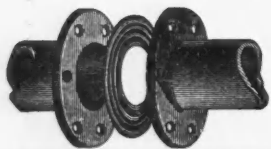
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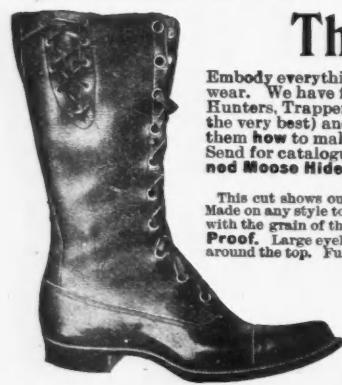


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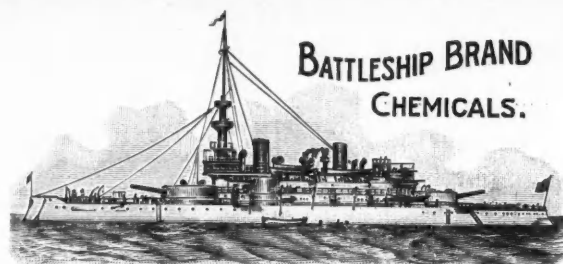
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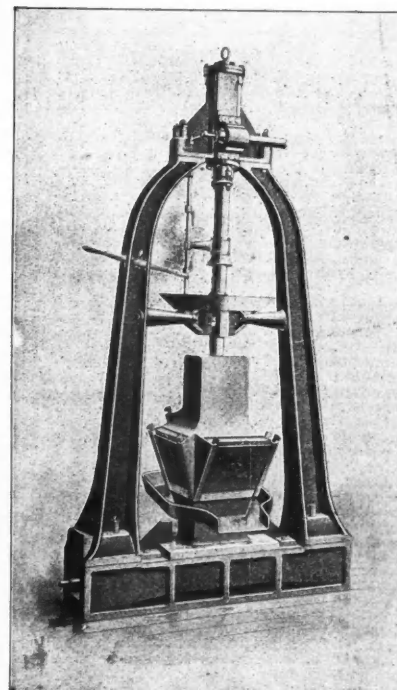
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**1911 WANTED—EXPERT, TO** operate a zinc smelting plant; must have knowledge of assaying and know how to handle men. Particulars regarding experience and qualifications treated in strict confidence. Address M. W., ENGINEERING AND MINING JOURNAL.

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**1915 WANTED FOR THE AUS-**tralian Colonies, a first-class mechanical draughtsman acquainted with general engineering and metallurgical machinery. Good pay to the right party and steady employment. Address, stating age, experience and remuneration required, DRAUGHTSMAN, ENGINEERING AND MINING JOURNAL.

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**METALLURGIST AND MINING** engineer wishes position as manager or superintendent. Experienced in planning, erecting and running concentrating, smelting, refining and electrolytic works in the United States and Mexico. Familiar with best methods used in those countries and Europe. Address R. L., ENGINEERING AND MINING JOURNAL. No. 18,890, Jan. 5.

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**MINING ENGINEER—A GRADU-**ate of the Central School of Paris, speaking French, English, Spanish and Portuguese, and experienced in gold, copper and diamond mines, desires a position as superintendent. Has been in Mexico three years and is now in Brazil. Would do prospecting or accept position to examine and buy diamond and gold lands. For references write to the ENGINEERING AND MINING JOURNAL. Address VENAN-COURT, Diamantina, Minas Geraes, Brazil. No. 18,898, Dec. 29.

**WANTED—BY A PRACTICAL** miner, position as assistant manager. Can assay, and also make surveys and is a good accountant. Accustomed to handling men; 8½ years' practical experience in South America and one year in British Columbia. Well posted in up-to-date machinery. Speaks and writes Spanish. Address PRACTICAL, ENGINEERING AND MINING JOURNAL. No. 18,903, Jan. 26.

**DRAFTSMAN, EXPERIENCED IN** smelter work, desires position. Best of references given. Will go anywhere. Address L. A. S., ENGINEERING AND MINING JOURNAL. No. 18,909, Jan. 5.

**CIVIL AND MINING ENGINEER** desires engagement. Experienced in the installation, generation, transmission and maintenance of power of every description, especially electrical; also designing, construction and operation of concentrating and washing plants and machinery. Electric haulage, railroads and tramways, surveying and assaying. Has just completed designing and erecting large coal and coke plant operated by electricity. First-class references. Willing to go to any part of the world. Address M. H. V., ENGINEERING AND MINING JOURNAL. No. 18,908, Dec. 29.

**WANTED SITUATION BY CYANI-**der and assayer. Four years' Transvaal experience with pyritic and non-pyritic ores. Capable of managing a cyanide plant of any size. Best testimonials. Address CYANDER, ENGINEERING AND MINING JOURNAL. No. 18,906, Dec. 29.

**CHEMIST AND ASSAYER, COM-**petent graduate, with best references, and some experience desires position; object, experience; salary second consideration. Address SULPHUR, ENGINEERING AND MINING JOURNAL. No. 18,907, Jan. 19.

**WANTED—POSITION AS MANA-**ger, superintendent or mill foreman with old established company. 20 years' Western experience. Best of credentials. Understands assaying. Wish to change from present position. Address J. H. BAKER, care Clear Lake Mining Co., Steeplecock, Grant Co., New Mex. No. 18,904, Jan. 26.

**CHEMIST, GRADUATE, WITH SEV-**eral years' practical experience, desires position immediately. Best references. Salary moderate. Address B. S., Box 175, ENGINEERING AND MINING JOURNAL. No. 18,905, Dec. 23.

**PROPOSALS.**

Space under this head is sold at the uniform rate of \$1.15 an inch, each insertion; minimum charge, \$1.15 a week.

**FILTERS.**—Sealed proposals addressed to the Louisville Water Company, for the construction of a system of American (mechanical) filters, will be received at said company's office until 12 o'clock noon, January 26, 1901, upon plans and specifications submitted by said company. The work is subdivided into twenty-four different parts, any one or all of which may be bid for by the same party or firm of contractors, as follows: I.—For pipes, specials and gate valves, outside of and under the filter house. II.—For ways in filter house to support an electric crane. III.—For three filter tanks. IV.—For 20-inch, 30-inch and 36-inch pipes and specials connected with three filter tanks. V.—For gate valves. VI.—For six balanced 20-inch piston valves. VII.—For six floating weirs. VIII.—For sand layer support and strainer system for three filter tanks. IX.—For electric traveling

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**New and Improved Service to Pinehurst, N. C.**

A model New England village, located at an altitude of six hundred and fifty feet, among the pine-clad sand hills of North Carolina, and is reached by train direct via Southern Railway and its connections. The only line operating Pullman drawing-room buffet sleeping cars into Pinehurst. Train leaves New York daily, except Saturday, arriving at Pinehurst following morning, 11 o'clock. Pullman drawing-room sleeping cars and dining cars New York to High Point, connecting with Pinehurst "Special," a most magnificent train operated especially for this travel. Commencing January 3d, 1901, and every Tuesday and Thursday thereafter, a special Pullman drawing-room buffet sleeping car will be operated between Washington and Pinehurst. This car will be opened in station at Washington for occupancy at 8.30 P. M. upon arrival of trains from the East and New England States. Round-trip tickets are now on sale, and sleeping-car reservation can be made by addressing either of New York offices, 271 or 1185 Broadway. For further particulars call on or address Alex. S. Thweatt, Eastern Passenger Agent, 1185 Broadway, New York City.

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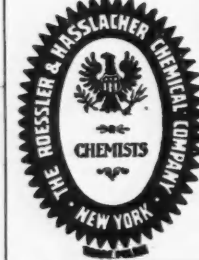
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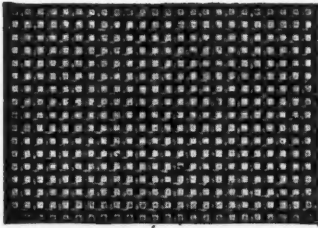
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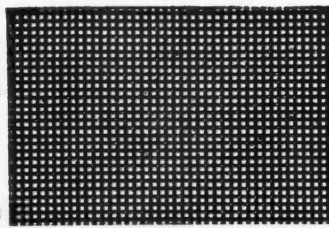
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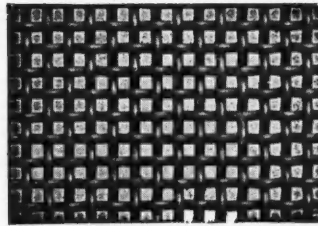
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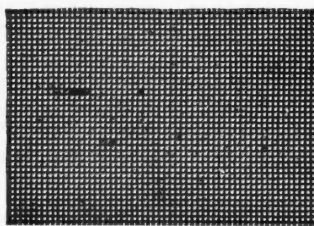
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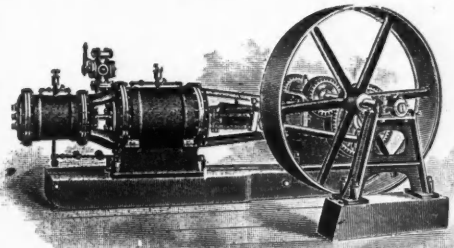
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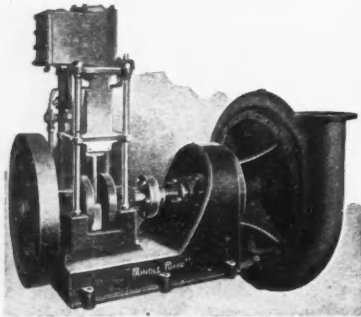
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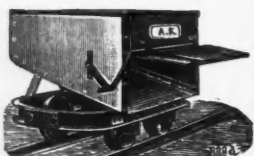
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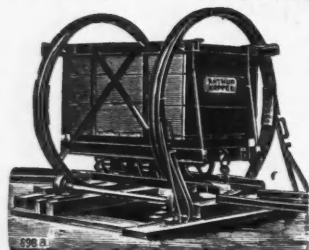
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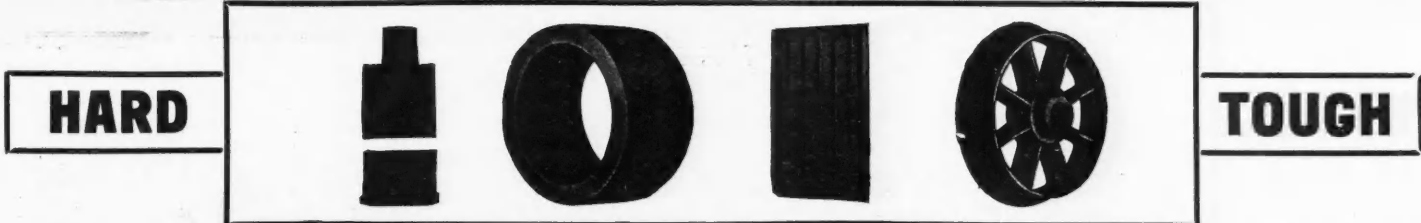
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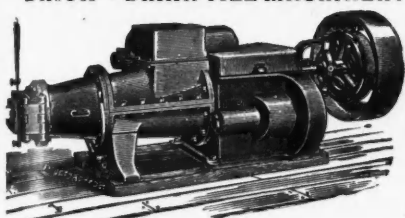
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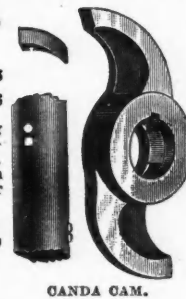
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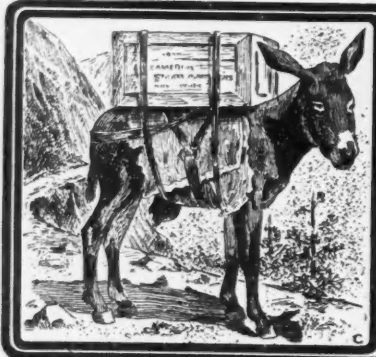
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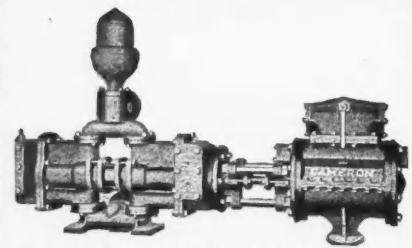


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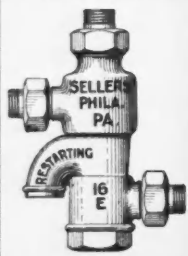
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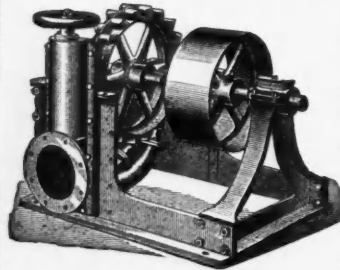
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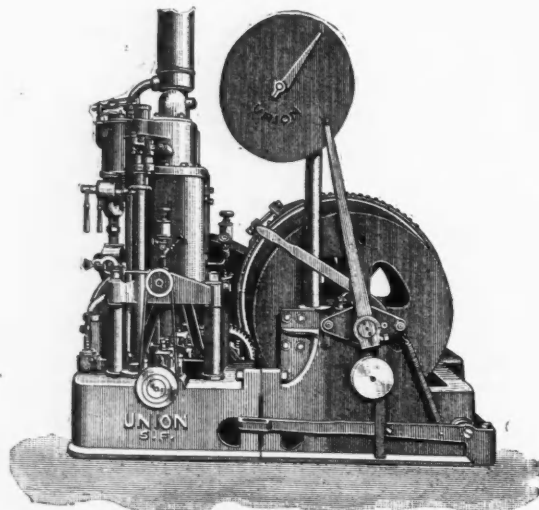
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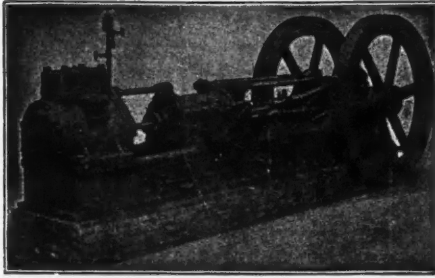
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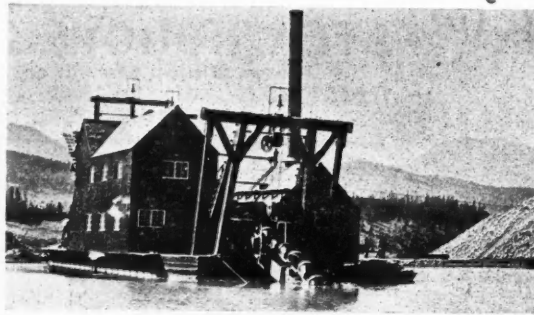
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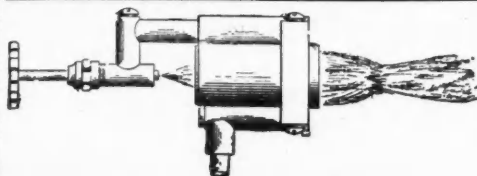
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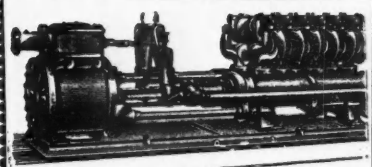
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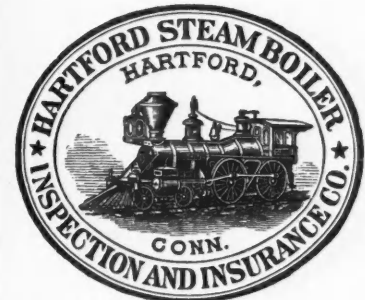
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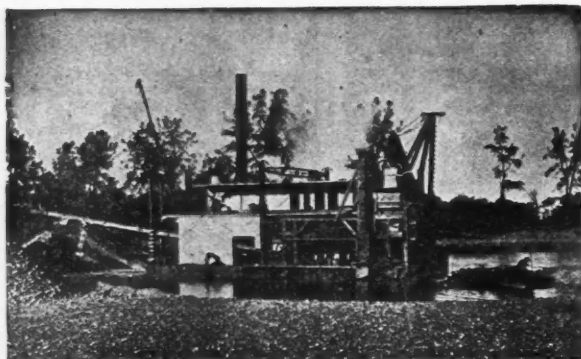
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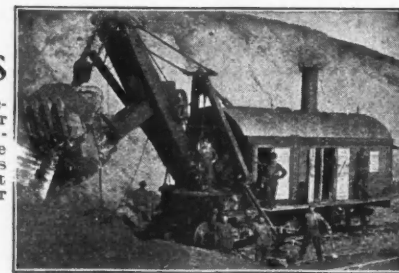
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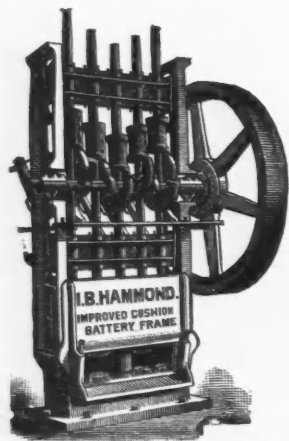
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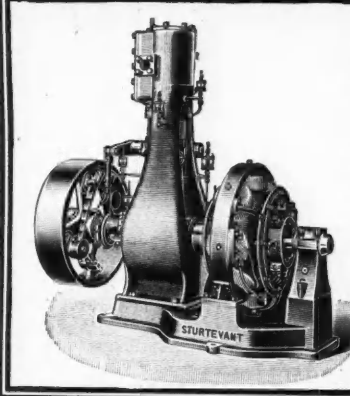
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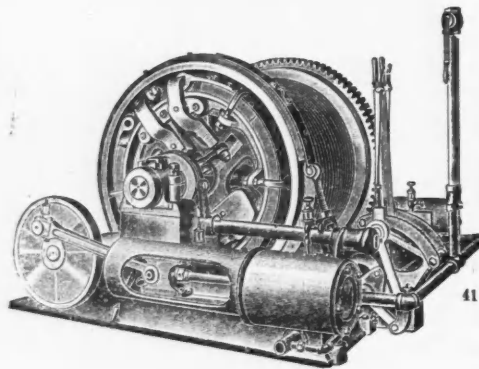
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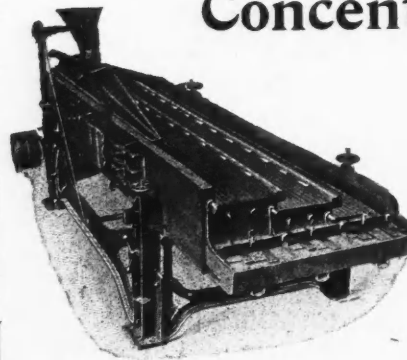
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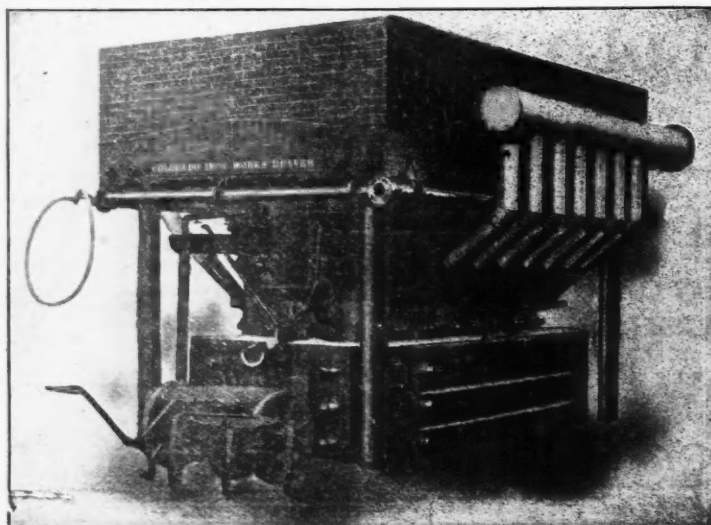
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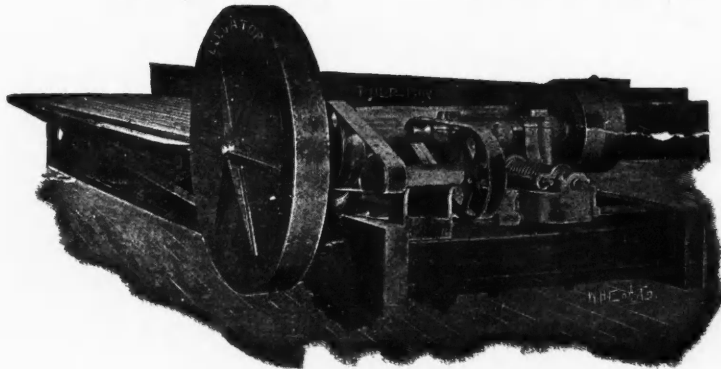
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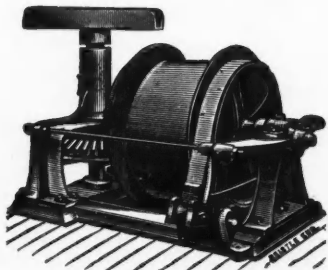
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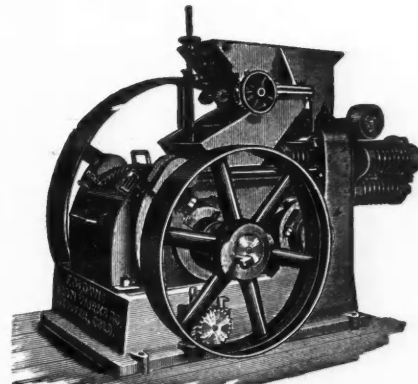
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14x30	16,000	80x12	40x8	100	1,600	1,400
16x36	25,000	96x12	48x8	80	2,500	2,400

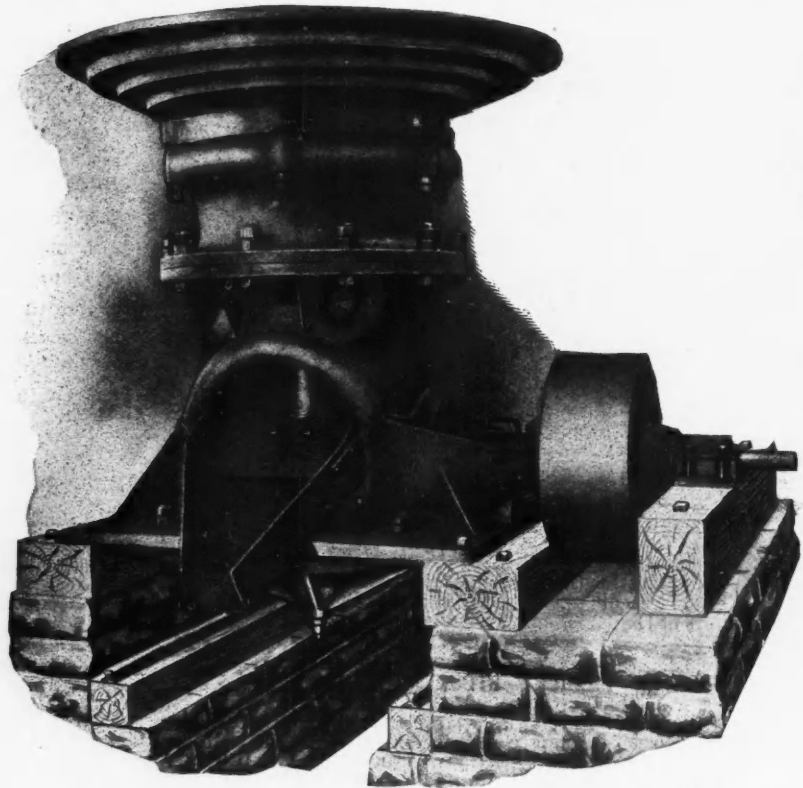
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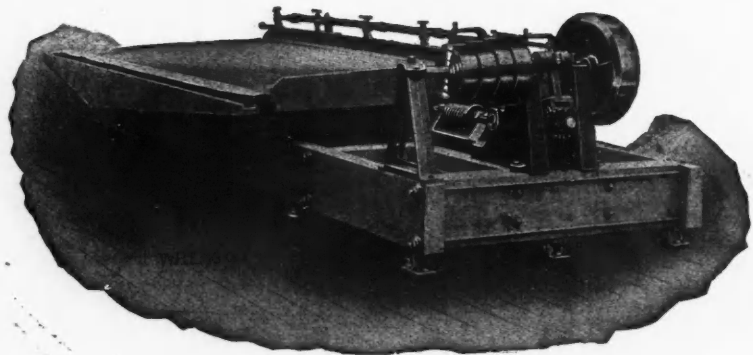
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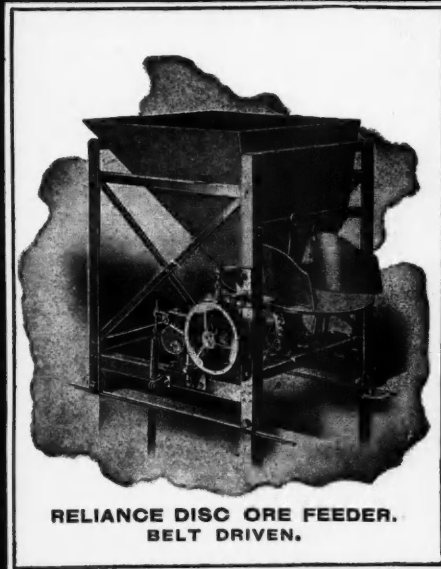
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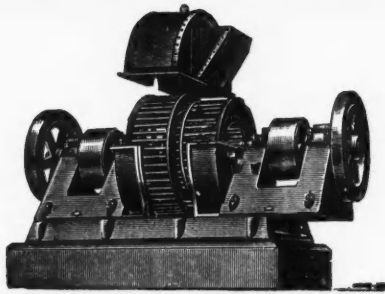
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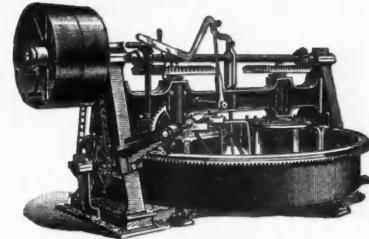
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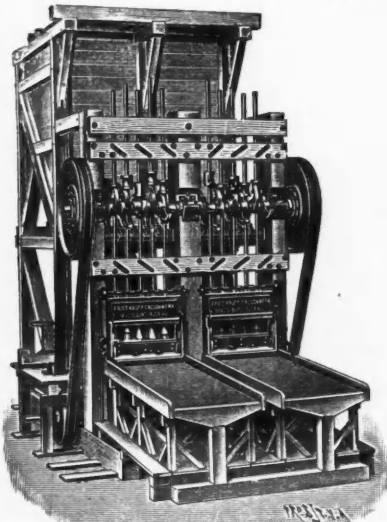
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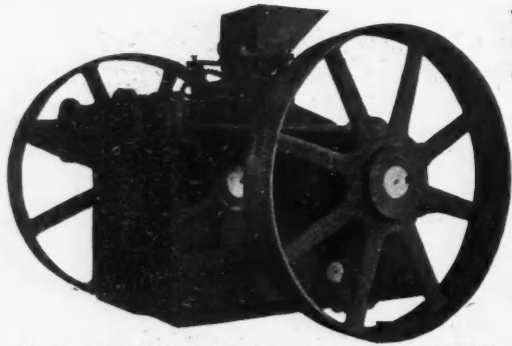
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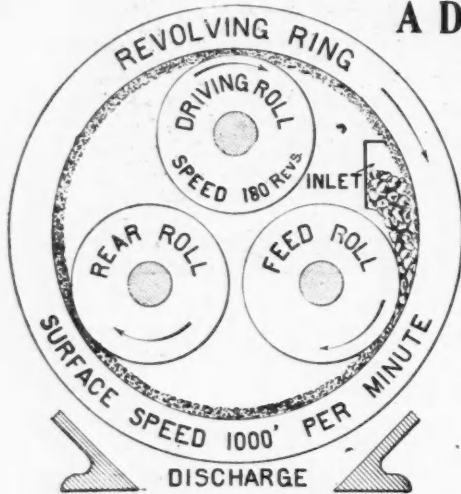
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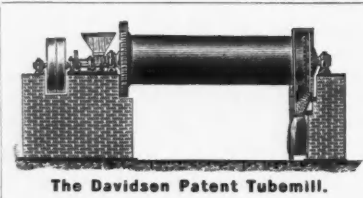
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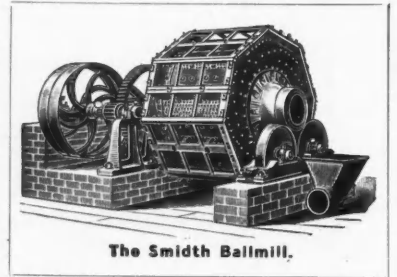


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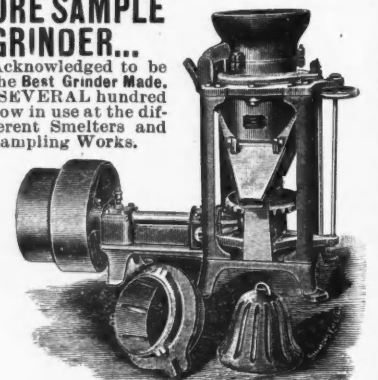
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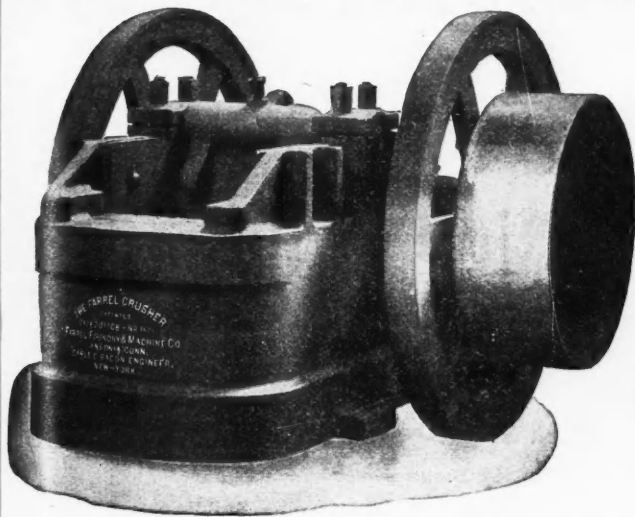
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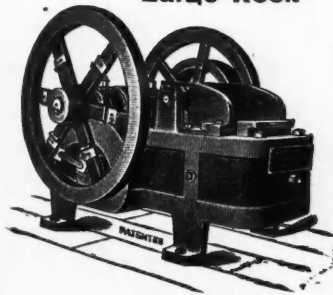
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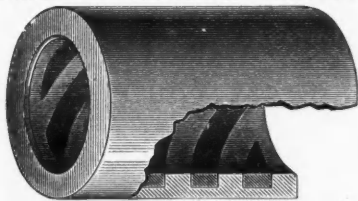
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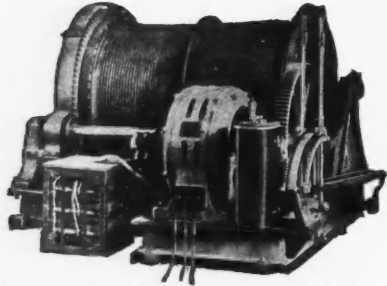
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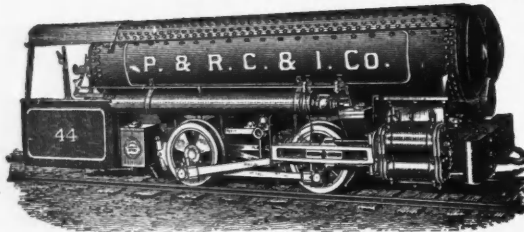
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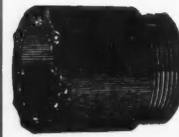


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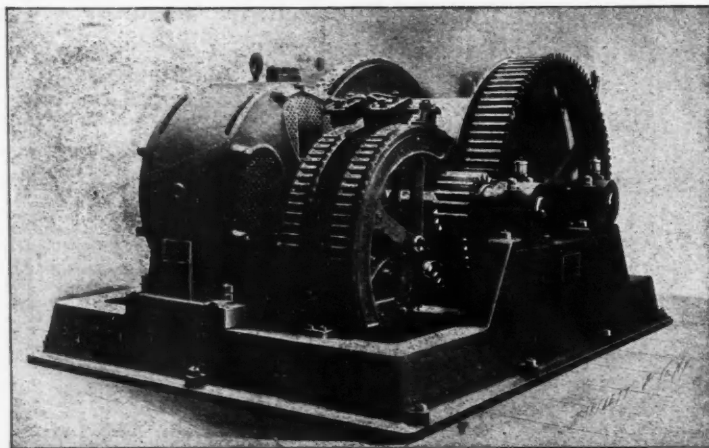
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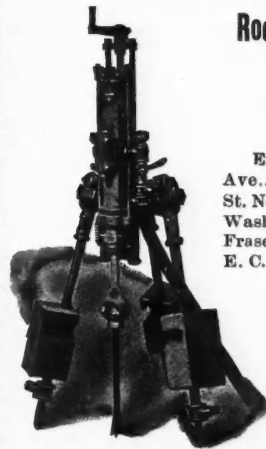
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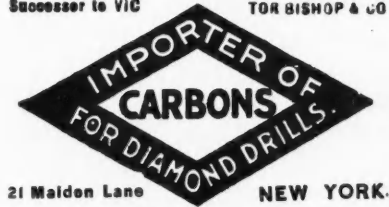
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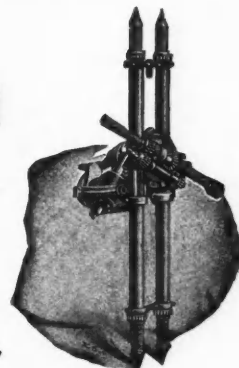
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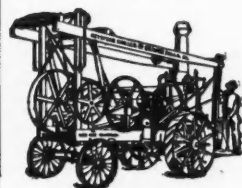
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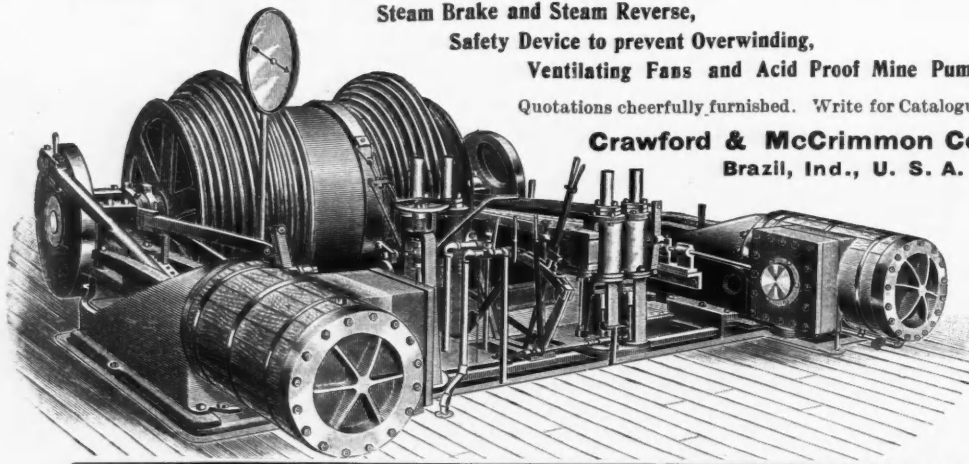
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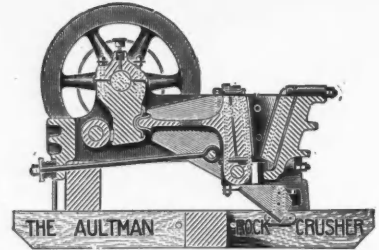
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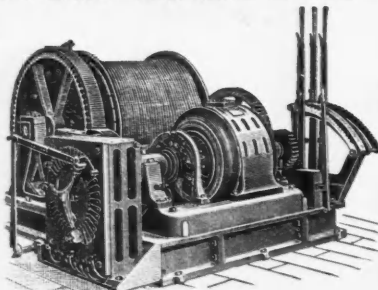
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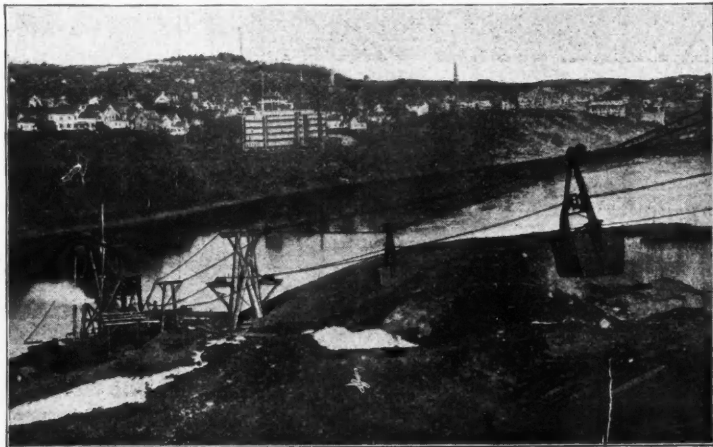
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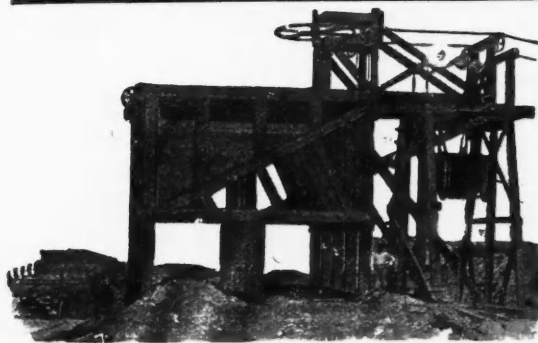
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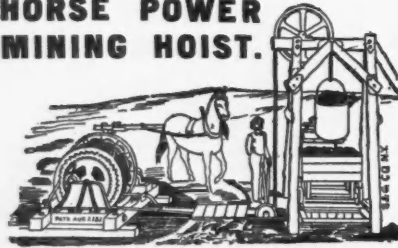
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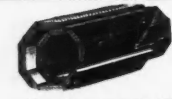
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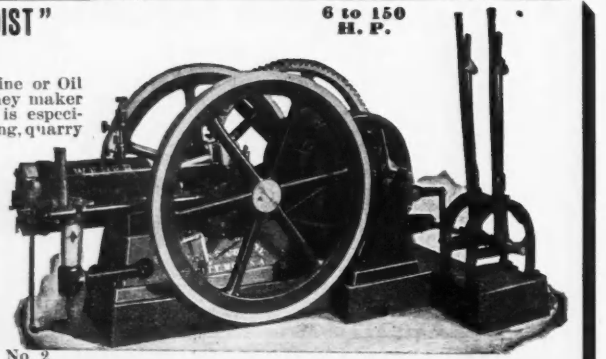
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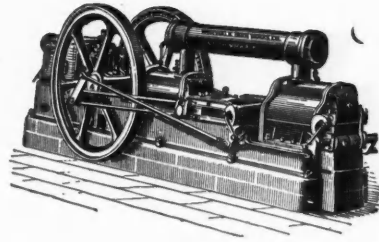
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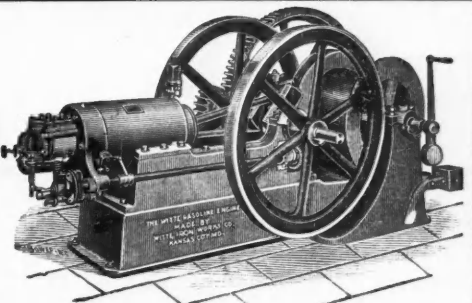
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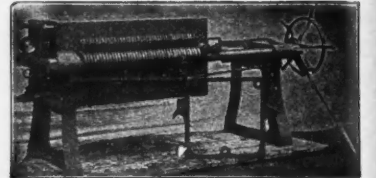
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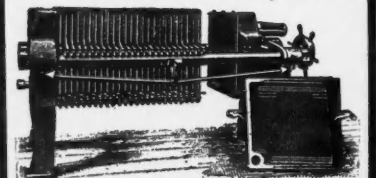
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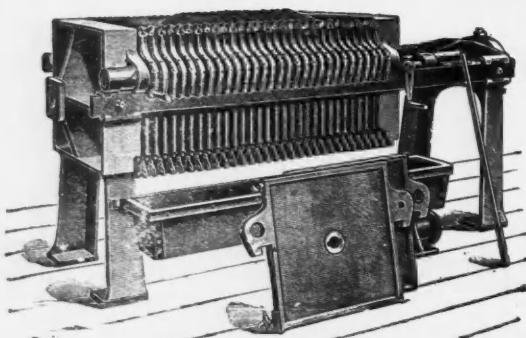
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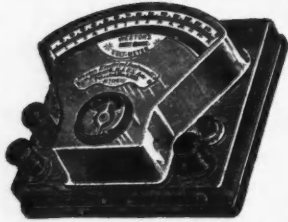
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