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COPPER PRODUCTION in the United States, according to the reports made to Mr. John Stanton, as statistician for the companies, again showed a decrease in February, although a much smaller one than in January. For the two months ending February 28 the total production reported was 39,286 long tons, which was less than that for the corresponding period in 1901 by 4,493 tons, or 10.2 per cent. The foreign reporting mines, on the other hand, showed a gain this year of 2,600 tons, or 19.7 per cent, reaching a total of 15,842 tons.

The chief feature of the statement this year is the very large increase in exports from the United States. These were 16,108 tons in February and 31,129 tons for the two months, against 16,456 tons for the corresponding period last year. The increase this year was 14,673 tons, or 89.2 per cent. In the two months this year we exported 79.2 per cent of our output, against 37.6 per cent last year. The change shows the extent of the foreign buying which followed the decline in prices.



THE COMMITTEE ON COINAGE of the House of Representatives has made a favorable report on the bill providing for the adoption by the United States of the metric system. It provides that after January 1, 1904, all the departments of the Government, in the transaction of all business requiring the use of weight and measurement, except in completing the survey of public lands, shall employ and use only the weights and measures of the metric system; and after January 1, 1907, the weights and measures of the metric system shall be the legal standard weights and measures of and in the United States. Only two negative votes were recorded in the committee. This is a step in the right direction and it is to be hoped that the measure will become a law. There should at least be no middle ground. Attempts have been made to secure a compromise between our present heterogeneous system—if system it may be called—and the metric system. Such an action would be worse than leaving the standards as they are. In technical and scientific work the metric system has already been largely adopted and we will have advanced several degrees when the metric standards have been legalized.



THE COLORADO Legislature, now in extra session, is still wrestling with the problem of mine taxation. Mention has been made of the first decision of the Lower House to leave the determination of the value of a mine to the county assessor, who was to judge such values as he would those of "a cow or a hog." A sober second thought resulted in a modification of this view as follows:

"The assessor shall proceed to determine the net proceeds for said preceding year of any such producing mine or mines, and shall, for the purpose of taxation, value such producing mine or mining claim at a sum not exceeding the amount of the said net proceeds for the said preceding year. . . ."

In this form the section went to the Senate, and the finance committee of that body made an important change, in substituting gross for net output, as the basis of values, but at the same time introduced the dangerous precedent of limiting the assessable

value to one-fourth of the gross output. Why one-fourth was taken, instead of one-half or one-eighth, is not made clear. Naturally those more concerned in the revenue than in its sources desire to include all the value possible, while the mine owners and operators would favor any reduction they can get. The question is still under discussion, and as the result will doubtless be regarded as a precedent in many western States, the decision becomes a vital one to the industry at large. The salient portion of the Senate amendment reads as follows:

"The assessor shall determine the gross proceeds of any such producing mine or mining claim for said preceding year, and shall, at the same time, determine the net proceeds as herein defined for said preceding year, and shall, for the purpose of assessment for taxation, value such producing mine or mining claim at a sum equal to one-fourth of the said gross proceeds for said preceding year for any such mine or mining claim; provided, however. . . ."

To many who are not directly identified with the mining industry, and yet look for fair play and equal treatment for all, the proper method of mine taxation would appear to be a reasonable tax on the full gross output, and such a tax on surface improvements as a fair determination of their value may justify; as we indicated in our article last week.



### ZINC PRODUCTION OF THE WORLD.

We have received from Messrs. Henry R. Merton & Company, of London, their estimate of the spelter production of the world in 1901. They have prepared similar estimates for many successive years, and long experience has enabled them to approximate very closely the actual production. In the following table we give this statement, substituting for the year 1900 the actual production as stated in *The Mineral Industry*, Volume IX. The figures are in long tons of 2,240 pounds:

	1900.	1901.	Changes.
Rhine, Belgium and Holland...	186,320	199,285	I. 12,965
Silesia.....	100,705	106,385	I. 5,680
Great Britain.....	29,830	29,190	D. 640
France and Spain.....	30,620	27,265	D. 3,355
Austria and Italy.....	6,975	7,700	I. 725
Poland.....	5,875	5,935	I. 60
Total Europe.....	360,325	395,760	I. 15,435
United States.....	110,028	122,830	I. 12,802
Total.....	470,353	498,590	I. 28,237

It will be seen in this table that the total production of spelter, or metallic zinc, showed last year an increase of 6 per cent. The gain made by the European producers was 4.3 per cent, while in the United States it was 11.6 per cent, showing a much higher ratio. In Europe the increase in output was made in the face of some depression in trade and of lower prices; the average for good ordinary brands in London in 1901 having been £17 os. 7d. per ton, against £20 5s. 5d. in 1900, a reduction of 15.9 per cent. In this country there was also a drop in prices, the average New York quotation for the year 1901 being 4.08 cents per pound, against 4.39 cents in 1900, a decrease of 7.1 per cent. The difference to some extent reflects the better condition of trade and the stronger demand for the metal here.

The depressed condition of the trade in Europe was further shown by the decrease in shipments

from the United States. In 1900 these exports reached a total of 20,001 long tons of spelter, but in 1901 they fell to 3,022 tons. The decrease of 16,979 tons considerably exceeded the increase in production in European countries, so that the supplies there last year were somewhat less than in 1900.

Looking at the European returns, we find that the gain in production was made up by increases of 7 per cent in the Rhine, Belgium and Holland, and 5.5 per cent in Silesia. In France and Spain there was a decrease of 10.8 per cent, while in the other countries there was but little change. The United States produced 24.6 per cent of the world's total in 1901, as against 23.4 per cent in 1900.



#### ORIGIN OF EXTRA-LATERAL RIGHT IN THE UNITED STATES MINING LAW.

Upon re-reading my article on "Mining Law for the Philippines," published March 8 in this JOURNAL I note one omission which, though it does not essentially affect my view as to the origin of our American "extra-lateral right," may, perhaps, impair the completeness of the historical statement, made in support of that view. Namely, I did not say, as I might have said, that at an early stage of placer-mining for gold in California, "square locations" without extra-lateral rights were prescribed or recognized by the inhabitants of some mining camps. If any reader was led by my article to suppose that, in my opinion, no other mining locations than those made upon defined "gulches," or upon lodes, and appropriated in claims of one (longitudinal) dimension, existed on the Pacific Coast before the first legislation by Congress on the subject, this supplementary acknowledgment on my part may serve to set me right with him, and with the truth of history.

Nevertheless, the fact remains that "square locations" for placer-mining were, in the early days here considered, few and exceptional, being ordained in such localities only as presented relatively large areas of auriferous ground, not clearly bounded between the banks (not too far apart) of a recognizable stream-channel. I think the Grass Valley District of California presents an instance of such exceptional local mining laws, enacted (as usual) by mass-meetings of the inhabitants, and influenced by a prevalent opinion that the form of possessory title based on the ordinary conditions of gulch-mining would give too much to a discoverer or locator upon a "hill-digging," or a widely-extended basin-deposit, without definite and reasonable channel-boundaries.

In short, the residents of the mining camps of that period made such regulations concerning mining titles as they deemed just in theory and practicable in execution. Both in theory and in practice, lode-titles seemed to them to be similar to simple, ordinary gulch-titles, and were consequently defined in accordance with that analogy. That, in some gold-bearing districts, by reason of the local conditions, the gulch-rules were not followed, only proves this much, at least, of my main contention: namely, that the early mining regulations of California were not "inherited" nor copied from any source whatever, but were devised by the several communities, to suit the local conditions of each. Moreover, I venture to repeat, as a proposition beyond question, that, wherever boundaries (not too obscure nor too far apart) defined an auriferous "gulch," the mining claims upon that gulch were measured in one (longitudinal) dimension only; that this custom was simply and naturally transferred to the measure-

ment of claims upon "lodes," which, in many cases (and particularly in the gold-belt of the California Sierra), could be conveniently appropriated in the same way, having relatively great longitudinal extension, relatively limited width (bounded by walls), and unknown depth.

Early writers, like Mr. Gregory Yale and Gen. H. W. Halleck, upon the subject of Californian mining law, have apparently favored the notion that the Spanish *Ordenanzas* (which were practically the mining code of Mexico, and therefore of California, when the United States, by the treaty of Guadalupe Hidalgo, acquired the latter) inspired or largely moulded the regulations adopted by the autonomous mining communities of the Pacific Coast in 1849 and the years immediately following. This impression is highly superficial, and far from correct. The historian finds, on the contrary, matter for profound astonishment in the fact that the new mining communities of that period adopted so little (practically, as I shall show, nothing at all) from the code and customs prevalent, up to the very recent date of the transfer of sovereignty, in the territory which they had, peacefully but multitudinously, invaded.

The Spanish and Mexican law of that period comprised, as to mineral lodes, only four essential elements—all others being simply matters of administrative detail,—namely:

1. The unconditional, inalienable, and permanent retention by the Government of the rights to gold and silver in its territory.

2. The leasing of such rights for annual or limited periods, upon payment of certain prescribed rent or royalty, for areas included within certain surface-lines, and for the ground beneath the surface, bounded by, and not extending beyond, vertical planes through the said surface-lines.

3. The permission that a surface-claim, located upon a discovered lode, might be so surveyed (according to the officially observed dip of the lode at and near the surface) as to give to the locator, as a probable maximum, about 600 feet (200 *varas*) of vertical depth of mining, before reaching the level at which the vein would (according to the surface-indications) pass out of his ground. This depth, it may be remarked, was that at which, in the period when the *Ordenanzas* were framed, mining usually ceased to be profitable.

4. The grant of certain prior rights, in the procurement of lease or license from the Government, to the discoverer of a lode and to locators upon it, in the order of priority.

Now, of these four characteristic provisions, the first three were not merely rejected, but absolutely ignored, by the miners of California. In forty years, during which I have crossed the Continental Divide some fifty times, and visited nearly every mining camp on the Pacific Coast, I have never seen or heard of a local American lode-mining code embodying any one of these three features.

The fourth feature—namely, the preference or reward granted to a discovered or prior locator—was not at all peculiar to the Spanish law. It has been a part of every mining code in history. It is so obvious as to be, in any new community, inevitable. In fact, it is nothing more than the application to mining titles of the immemorial principle which has obtained as to wild lands, wild animals or any treasure previously unknown and unappropriated. There is no reason to believe that this particular provision was consciously taken from the Spanish *Ordenanzas*, or the German *Bergrecht*, or any other mining code, ancient or modern.

I repeat, therefore, that the significant fact in the history of the local mining-regulations of 1849-51 on the Pacific Coast, is the entire absence of any rules adopted, or any influence derived, from the Spanish mining code so recently in force throughout California.

The only explanation of this strange phenomenon which I have been able to find is comprised in certain propositions, which are, I confess, in large degree, only suggestive and speculative, but which are partially confirmed, and in no point contradicted, by my personal recollections of early conditions in the mining camps of the Pacific Coast, or the reports, which I have received from the lips or the pens of those who knew these conditions a few years before me. I suggest, therefore, with considerable confidence, the following considerations:

1. Although, prior to the Mexican war, the Spanish mining law of Mexico was nominally in force, it never had been actually administered in California, because there had been no mining in that territory. Marshall had not made the effective discovery of gold; and the alleged knowledge of this metal possessed by the Indian nation or the Spanish friars had not given birth to any industry, regulated by law. Hence, the pioneers who swarmed into California in 1849 found no mining law in operation there.

2. Of this vast multitude of immigrant adventurers, relatively few, I think, came from Mexico or Spain. If we consider that the discovery of gold followed close upon a war, in which the United States had conquered and humiliated Mexico, even to the occupation of its proud, historical capital, we can easily understand how, on the one hand, Mexicans would be less eager than those of any other country to settle under the hated American rule in regions lately their own, but lost to them as the result of overwhelming military defeat, while, on the other hand, American miners and adventurers, giving "tone" also to the sentiments of other nationalities, would be likely to regard the Mexican miner with contempt, as the representative of an inferior and conquered race. That such a feeling, even then, was unjust, and that, as a general verdict, it would now be preposterous, goes without saying. But that it did exist, and that the character of much of the Mexican immigration from the border-zone furnished some grounds for it no one can deny.

I have never heard of a single instance in which Mexican miners brought with them any knowledge of the mining law of their own country, which could be applied in the new region.

It was, as I believe, in consequence of the two causes thus set forth, that neither the recent nominal presence of Mexican laws, nor the actual presence of a small minority of Mexican immigrants, led to the slightest recognition, in the self-made regulations of our mining camps, of the principles or details of the Mexican system. Indeed, I have never been able to find proof that this system was ever considered, or had ever been heard of, by the framers of the primitive California mining codes.

Finally, I wish to point out that the foregoing argument is not purely academic, but has a direct practical bearing upon the subject of my preceding article, which was a protest against the imposition of the "law of the apex" and its "extra-lateral right" upon the Philippine Islands. For such mining law as has heretofore existed in those islands has been Spanish law, based upon the principles of the *Ordenanzas*; and it is well to bear in mind that the American system which somebody has proposed to

substitute for it is not, historically was not, and could never be or have been a normal development of those principles. The substitution would be as violent, revolutionary and unnecessary as it would be foolish.

R. W. RAYMOND.



### THE OSCEOLA COPPER COMPANY.

The Osceola Consolidated Mining Company was formed some years ago by the consolidation with the old Osceola Company of two other properties in the Lake Superior copper district, the Kearsarge and the Tamarack Junior. The Osceola had been fairly prosperous, though not considered as one of the first rank among Lake properties; the Kearsarge was comparatively new but of considerable promise, while the Tamarack Junior was at best a doubtful proposition. The company is one of those known as Bigelow companies, which are controlled by a well known group of Boston and New York capitalists, and which has lately been—to say the least—amenable to Amalgamated influences.

We have had frequent occasion to criticise the companies of this group for the policy adopted by the managers of keeping back information from the stockholders and publishing only such statements as they were obliged to. We have warned investors against this policy of secrecy, and have said frequently that those who bought and held stock in concerns which adopted it had themselves to blame for disaster when it came.

On the Osceola stockholders the trouble came with the publication last week of an unusually frank report for the year 1901. During that year dividends of \$6 a share had been paid; but the accounts now submitted show that they had not been earned. The company realized from all sources a total of \$1,934,437; but the expenses, including construction and development, amounted to \$2,151,296, or \$216,859 more than the receipts. The payment of \$576,900 in dividends on top of this deficit not only absorbed the surplus of \$552,261 reported at the opening of the year, but left a debit balance of \$241,498 at its close.

We may say at the outset that no question has been raised as to the management of the mining property. A very large amount of development work has been done, and Capt. Parnall seems to have exercised good judgment in its direction, especially in limiting the expenditure on the Tamarack Junior. Something has been said about the expenditure on the new mill; but the mill was a necessity if the mine is to have any life at all, and its first operation has shown a notable economy, both in running expenses and in the closer saving of copper. Reductions of 24 per cent in the cost of stamping rock, and of 64 per cent in the loss of mineral in the tailings are improvements not to be despised.

The criticisms made by the protesting stockholders, which certainly seem to be justified by the facts, relate to the Boston management and its handling of the mine product entirely. The actual sales of copper from the Osceola realized in 1901 an average of 13.90 cents per pound, according to the statement of the directors. But reports covering the same period have already been issued by Lake companies, and—taking two of these concerning whose managements there is no question in anyone's mind—we find that in the same period the Quincy Company realized an average of 16.20 cents and the Atlantic 15.76 cents per pound. If the Osceola Company had obtained the same average price as the Quincy it would have earned \$315,640 more than it did last year. Or if we admit—as is claimed—that Quincy copper brings a little more usually

than the average for Lake ingot, and take the Atlantic price as a fair one, the addition to Osceola earnings would have been \$255,257. These are sums which stockholders do well to inquire about.

There is a somewhat peculiar sentence in the directors' report, which says: "The management wishes to assume the responsibility for the price which the company has received for its copper during the year 1901—13.90 cents per pound." With whom should the responsibility rest? Why should the management "assume" a responsibility which, in fact and in law, already rested upon it? It looks very much as if the directors were uneasily conscious of a general belief that they had not acted upon their own judgment, but were merely puppets moving at the dictation of the interest which has demoralized the copper market by using it to influence stock gambling operations in Wall Street.

The cause for the low price realized is not given in the report, but it appears in the statement made by the president at the meeting. In reply to Mr. H. M. Knowlton, whose high standing, knowledge of the law, and insistence upon a hearing would not suffer his questions to be ignored, as those of some other stockholders were, Mr. Bigelow said—we take the Boston *Herald's* very full report of the meeting—"that the company sold its copper for the first three months and then withdrew from the market for the remaining nine months, believing it to be better policy to hold to the 17-cent level, and 'not knowing' that competitors were underselling them."

That is, the company apparently withheld its copper from the market when good prices were being realized, and sold the surplus so accumulated when the market broke. The company earned somewhere between \$250,000 and \$300,000 less than it should have received because the managers "did not know" what it was their business to know—and what everyone else did know, who had any connection with the copper market at all. We are afraid that this plea of ignorance cannot be accepted; at least it ought not to be and will not be if the protesting stockholders are in earnest—as they seem to be.

The climax of the situation came at the annual meeting in Boston last week, which was not one of the cut-and-dried affairs stockholders' meetings are apt to be. Whether the directors actually hold a majority of the stock, we do not know; but they had in their possession a large number of proxies, most of them given before the appearance of the report made the position clear to stockholders generally. There were in attendance, however, some stockholders who know their rights and were resolute to maintain them, though they were for the time being in a hopeless minority. They persisted in speaking and in pressing their views in spite of the determined opposition of the managers. The minority brought forward two propositions, the appointment of an independent committee of stockholders to investigate the company's affairs, and the adjournment of the meeting for a week, in order to permit any stockholders who wished to withdraw their proxies in view of the developments of the report, an opportunity to do so. The first proposition was rejected by a vote of 59,350 shares to 3,693; and on the second motion being offered a scene occurred which deserves to be recorded. President Bigelow, though steadily endeavoring to stop discussion, had acted throughout with courtesy—as might be expected from him—but all the managers were not so discreet. We quote here again from the report given in the Boston *Herald*:

"A motion was then offered to adjourn the meeting for a week. The chairman asked: 'Do you want a stock vote on that?'"

"Protests followed on the waste of time which would be involved by a stock vote.

"Director T. Henry Brooks—There are only 3,000 shares about against the present management. We have had altogether too much fuss and riot here. We have the power, and by — we will use it.

"Immediately after making this observation, Mr. Brooks asked leave to withdraw it.

"Thereupon Mr. John B. Moran sprang to his feet, and in indignant tones, said: 'You have got the power now, but you won't have it long.'

"Boyd B. Jones, with still greater warmth of manner, protested as follows: 'It is an indication of wickedness and wrongdoing to say such a thing. You have got the power, but you have also got some duties, and we will make you perform them, if we have to go through every court in the land. I want you to understand that you cannot, because you have a great bundle of proxies, trample under foot the rights of these stockholders. You ought to be ashamed of yourself. We have got the power to make you do what is right, and I for one have enough confidence in your president to believe that if I could come up here into his office and ask to look at his books, and make an independent investigation, it would be seen that instead of him having the power to turn me down, he would have the manhood and honesty to place those books at my disposal. You, sir (addressing Mr. Brooks), owe an apology to every man here, and I hope I may never again see a man standing in a room of stockholders and forgetting the fact that he is their servant. When you go home to-night, sir, you had better think over the relation between you and the stockholders. Then you will be able to come back and do what is right, and be a decent man.' Loud applause greeted this protest.

"Mr. Brooks then made a formal apology, but it was uttered in such low tones as to be practically inaudible.

"Mr. Moran asked the chairman to put the motion for adjournment for a week. The chairman said the vote must be a stock vote.

"Mr. Knowlton—There is no use in taking a stock vote. Everybody knows that the proxies used here were received before the situation was understood. If the meeting is adjourned, I believe enough proxies will be recalled to change the result. I respectfully challenge the management to continue the meeting for a week.

"The chairman—I do not propose to adjourn for a week.

"Mr. Knowlton—They do not dare to adjourn for a week.

"The chairman—Did you say we did not dare?"

"Mr. Knowlton—I say exactly that you do not dare.

"The chairman—I think you will find yourself mistaken.

"Mr. Jones—That is rather an unfortunate expression, though Mr. Knowlton is sincere in what he says. I have heard, Mr. President, that there is a person in close connection with this company, and with you, Mr. President, who was 'copper short' in London. Now I do not pretend to say such statements as this should stand as against the well known reputation and successful administration that has characterized the Bigelow management. Yet we have the right, also the duty, of looking at the books of the company. You are going to be put in the position of putting your hands on the throats of the minority stockholders. I say that position is not a worthy one, and does not do justice to the Bigelow management."

This scene was certainly unparalleled in a Boston meeting; but it showed the spirit of the minority, and it was only right that the brutal insolence of Director Brooks should meet with such prompt and telling rebuke.

It is needless to say that the adjournment was voted down. At the close of the meeting, however, President Bigelow decided to make a concession and on his own authority appointed an investigating committee consisting of Messrs. Knowlton, Hardy and Brigham. It does not appear exactly what this committee can do, in the absence of any specific authority from the stockholders.

While we hope that the minority of the Osceola proprietors will insist upon their rights, we are free to say that the stockholders generally have themselves to blame for their present position. They acquiesced in the policy of secrecy as long as matters went smoothly, and disregarded all warnings. If they had acted in time they might be in a very different position to-day.

## BRITISH COLUMBIA COAL FIELDS.

BY WILLIAM M. BREWER.

There is a historical feature connected with the discovery and development of the coal fields of British Columbia which is of sufficient interest to be referred to by the writer as an introduction to the following descriptive article of the various coal fields and collieries on Vancouver Island and the Mainland. Dr. George M. Dawson, Dominion geologist, in his report dated March 1, 1887, refers to the fact that Dr. W. F. Tolmie in 1835 was the first to make known the occurrence of coal on Vancouver Island. It was not until about 1849 that any systematic exploratory work was commenced. This was inaugurated by the Hudson's Bay Company, which brought a number of coal miners from England to Vancouver Island. Suquash, situated on the north-east coast, about semi-distant between Port McNeil and Beaver Harbor and near the head of Queen Charlotte Sound, was selected for boring. Two seams of coal outcropped on the beach at this point, the upper being about 1 foot and in places 2 feet in thickness, and the lower about 6 inches with about 1 foot of soft shale separating the two seams. A short tunnel was driven and several borings made. From the former it is reported that in all about 9,000 tons of coal were mined, and the bulk of it shipped to Victoria. A record of three borings is included in Dr. Dawson's report, two of these in the immediate vicinity of Suquash, and the other at Kirk River on the beach about 2½ miles easterly from Port Rupert in Beaver Harbor. The borings at Suquash were continued to depths of 329 feet 4½ inches and 265 feet 4 inches, respectively; that at the Kirk River was carried to a depth of 180 feet 7 inches. An examination of these records does not show that any coal seams of commercial value were encountered, but as work was carried on continuously from 1849 to 1853, there were undoubtedly several other trial shafts and borings besides those of which the records were obtained by Dr. Dawson. About the latter date, according to history, coal was discovered at Nanaimo, about 100 miles northwest from Victoria by water, and the force of miners transferred to that point, where extensive collieries are being operated to-day by the New Vancouver Coal and Land Company which acquired its title from the Hudson's Bay Company.

The area of Cretaceous rocks, in which occur all the coal measures on Vancouver Island, has not yet been definitely fixed by actual surveys. There are five known occurrences of rocks belonging to this period on Vancouver Island in which coal seams occur. At the northern end of the Island, there are two areas on Quatsino Sound on the west coast, the Port McNeil Beaver Harbor area on the east coast, a few miles only from the head of Quatsino Sound; and the Comox area on the east coast along the northwest shore line of the Strait of Georgia. Towards the southern end of the Island occur the Nanaimo, Wellington and Extension areas which embrace the most important fields so far known at present, and within their boundaries are the most extensive collieries in this portion of British Columbia.

The history of these coal-fields dates back to about 1853, when boring operations were suspended at Suquash because of the discovery of a wide seam of coal in Nanaimo Harbor on the east coast of the Island, and about 100 miles by water from Victoria. Until 1862 the Hudson's Bay Company mined coal from a shaft sunk within the present city limits of Nanaimo. During that year a large area of this coal-field was acquired by the New Vancouver Coal Mining and Land Company, Limited, an English corporation which is still actively engaged in coal mining in the same field with headquarters and main working shaft still located at the outskirts of the city of Nanaimo.

Soon after the organization of this company, the late Hon. Robert Dunsmuir, who had been in the employ of the Hudson's Bay Company as a miner, commenced systematically to prospect the territory outside of the lands acquired by the New Vancouver

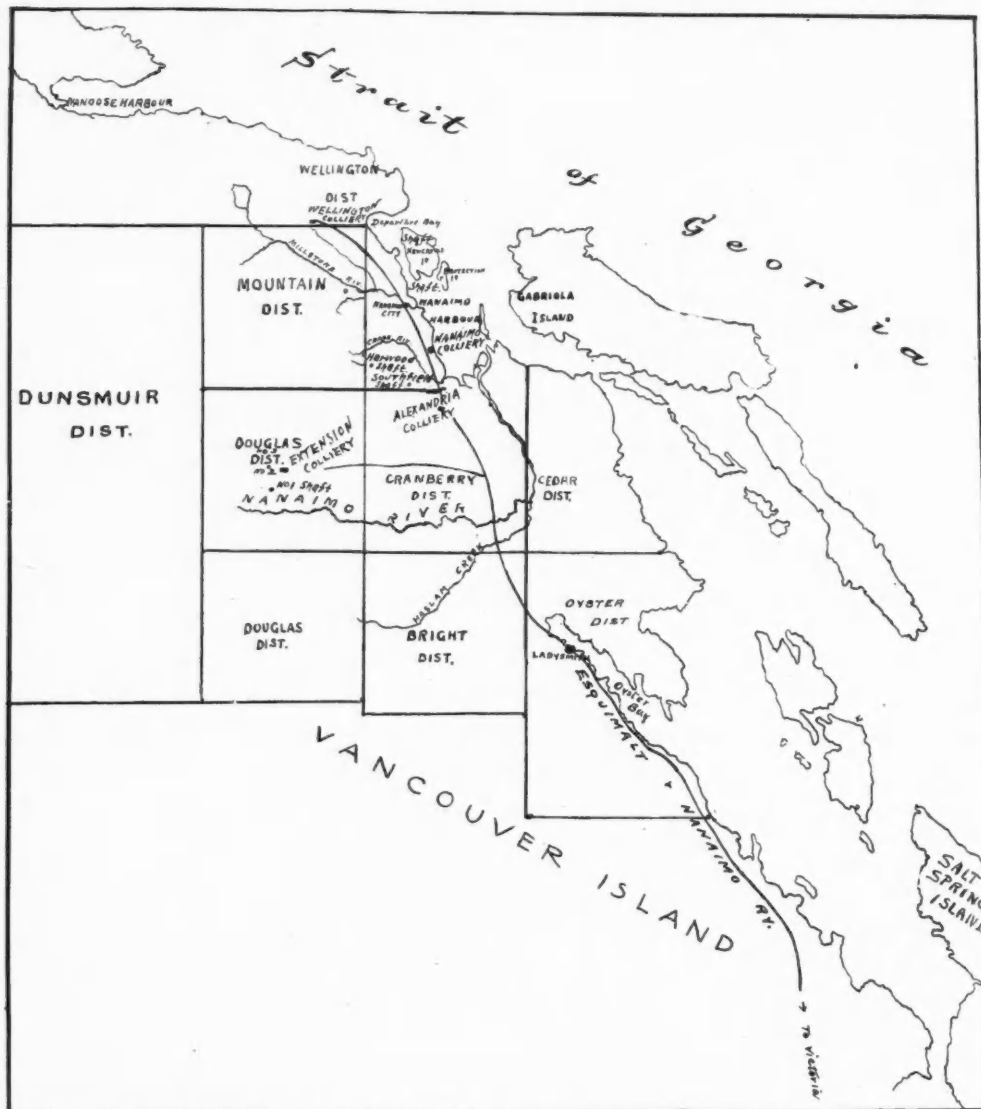
Coal Company. He first located the Harewood field at a distance of about 3½ miles to the west from Nanaimo and secured 9,500 acres for an English company which has since sold the tract to the New Vancouver Coal Mining and Land Company. Later he discovered the Wellington field about 6 miles northerly from Nanaimo, which he acquired himself, a short time previous to the entrance by British Columbia into the federation of the provinces.

This portion of the history of the development of the coal mining industry in British Columbia is important, because as a direct result of Mr. Dunsmuir's work, it has followed the building of the Esquimalt & Nanaimo Railway, as well as the opening up of the collieries at Wellington, Extension, Alexandria and Union, the latter about 50 miles up the east coast of the Island from Nanaimo. In all of these enterprises he was, during his life, the prime

group of islands in the Straits of Georgia easterly from Nanaimo Harbor should also be included in this territory; these are Newcastle, Protection, Gabriola and Salt Spring.

On Vancouver Island these coal-fields form the water-shed of the Nanaimo, Millstone and Chase rivers with their tributaries. Portions of this territory are rough and rugged, erosion having cut in places deep gullies and canons for the beds of the streams, and although no high mountains occur within the boundaries of the coal-fields, yet there are numerous bluffs and ridges, with mountain peaks towering above this rugged country to the south and west beyond the boundaries of the productive coal-fields. The most prominent of these are Mt. Brenton to the south and Benson to the west.

*Geology.*—The fields referred to occupy the most southerly area of Cretaceous rocks on Vancouver



SKETCH MAP OF COAL MINES, VANCOUVER ISLAND.

mover and organizer. Associated with him in building the railroad and operating all the collieries, except Wellington, were the late Senator Leland Stanford, the late Charles Crocker, the late C. P. Huntington and General Bullard of California, who were the organizers of the Southern Pacific Railway. In the Wellington colliery some officers in the British Navy were associated with Mr. Dunsmuir, but their interests were purchased by that gentleman previous to commencing construction of the Esquimalt & Nanaimo Railway.

*Geography.*—The situation of the Wellington, Nanaimo, Alexandria, Harewood and Extension coal-fields is on the east coast of Vancouver Island, and the territory covered by them extends along the shore line from a point a few miles east of the mouth of the Nanaimo River to the neighborhood of Nanaimo Harbor, almost directly west from the entrance of Burrard Inlet on the Mainland side, and at the head of which is located the city of Vancouver. The

Island. To what distance this Cretaceous area extends towards the interior of the island is not yet known positively. The mountains referred to are composed almost, if not entirely, of igneous and metamorphic rocks classed by the late Dr. Dawson, director of the Dominion Geological Survey, as belonging to the "Vancouver Series," in which he included all the igneous and metamorphic rocks together with the crystalline limestone of which the greater portion of the island is composed. The islands referred to are also made up principally of the Cretaceous coal measures.

Natural outcroppings of coal occur in many portions of the coal-fields under consideration. The dip of the seams varies from about 1 foot in 12 feet to 1 foot in 5 feet, and the strike usually nearly east and west. The direction of the dip varies because of the number of anticlineals and synclineals which occur. On Gabriola Island there is apparently a basin covering considerable area where the coal dips towards

a common center from the various points of the compass. This had been demonstrated by diamond drill boring as well as the fact that a thickness of nearly 2,000 feet of shale overlies the coal seam. The roof of the coal throughout the entire area is variable, sometimes being composed of conglomerate, at others of shale, and in some cases sandstone; the floor is sometimes sandstone, but usually shale. Fire clay of commercial value is wanting in this portion of the island.

There are two productive seams known as the Douglas and the Wellington, the latter underlying the former. At the Nanaimo and Alexandria collieries the Douglas seam is mined, and on a portion of the Nanaimo field both seams are productive, but at the Wellington and Extension collieries, the Wellington seam only is mined, the Douglas having been carried off by erosion.

Much faulting has occurred through this portion of the Island which of course causes complications in the workings. For instance, a bore-hole on the Harewood property exposed a workable seam of coal, but a shaft sunk about 200 feet from the bore-hole failed to intersect the seam at the depth estimated, and later investigations proved that a fault had occurred in the space between the shaft and bore-hole, which was not apparent on the surface, and the

ing a valley lying between two ridges. On the north side the coal measures dip northerly and on the south side southerly. The field to the north which has not yet been opened covers an area of about 5,000 acres, that to the south immediately adjacent an area of 2,400 acres. Beyond the southern boundary of this, a fault occurs and the coal is not picked up again for a distance of about 2 miles to the south. At that point No. 1 slope was driven on the south slope of Mount Benson, from which the coal mined on that side of the fault is hauled to the surface and shipped to Extension over a narrow gauge railway 3 miles in length.

On the north side of the fault in addition to the main tunnel already referred to, there are two other openings designated as slopes Nos. 2 and 3 which have been connected with the main adit level, but at the time of the writer's visit were closed because of the fire which broke out during the summer of 1901. Preparations are being made to flood these slopes. This could not be done economically during the summer, because the water necessary would have to have been pumped up a considerable distance and elevated about 300 feet, but during the rainy season the accumulation of surface water above the level of the slopes can be carried into the burning mine by gravity.

in cars of about 1½ tons capacity by mules, from the levels to the inclines, where a cable is clipped on and the loaded cars are lowered by means of an electric winch, of 50 horse power, stationed near the face of each incline to the sidings on the main tunnel level which is double tracked.

There, the loaded cars are coupled together and hauled to the weighing scales at the mouth of the tunnel by an electric motor. At Nos. 1, 2 and 3 slopes the coal has heretofore been hauled to the surface by steam hoists, but since the connections have been completed between the tunnel and Nos. 2 and 3 slopes these hoists will be only used in future to lower the loaded cars to the main tunnel level and haul the empties up the slopes to the entrances of the levels. The main tunnel sidings and winch stations are lighted by incandescent lights. Two 10-ton electric motors are in use for haulage through the tunnel.

The tunnel opening is well ventilated by a 10-ft. Murphy double fan working at 180 revolutions per minute; all the other openings are ventilated by Guibal fans.

Inclines have been run on each side of the tunnel on the rise of the coal, the levels are driven off the inclines and the workings are all long wall.

At the mouth of the tunnel a building 1,717 feet in length by 18 feet in width covers the tracks, scales and tipples, forming a covered way from the mouth of the tunnel to the screen house. The loaded cars are all run to tipples and dumped by means of a lever into the screens which separate the lump from the nut and slack. The lump coal passes over a travelling picking table 50 feet in length to the loading shutes, and into 25 ton railway hopper cars. The screening and loading capacity is 4 long tons per minute. Two dynamos, each of 250 volts power, furnish the electricity for lighting the entire plant and haulage. The boiler plant, 48 by 40 feet, electric power house 60 by 35 feet, and blacksmiths shops 35 by 60 feet are built of brick, adjacent to each other, and in the vicinity of the frame buildings used for offices, storehouses, etc.

The fuel used in the boilers is the slack coal unwashed. All coal mined in British Columbia is weighed as it comes from the mines previous to screening. The output from this colliery during 1901 was 415,580 long tons; the sales 369,154 long tons.

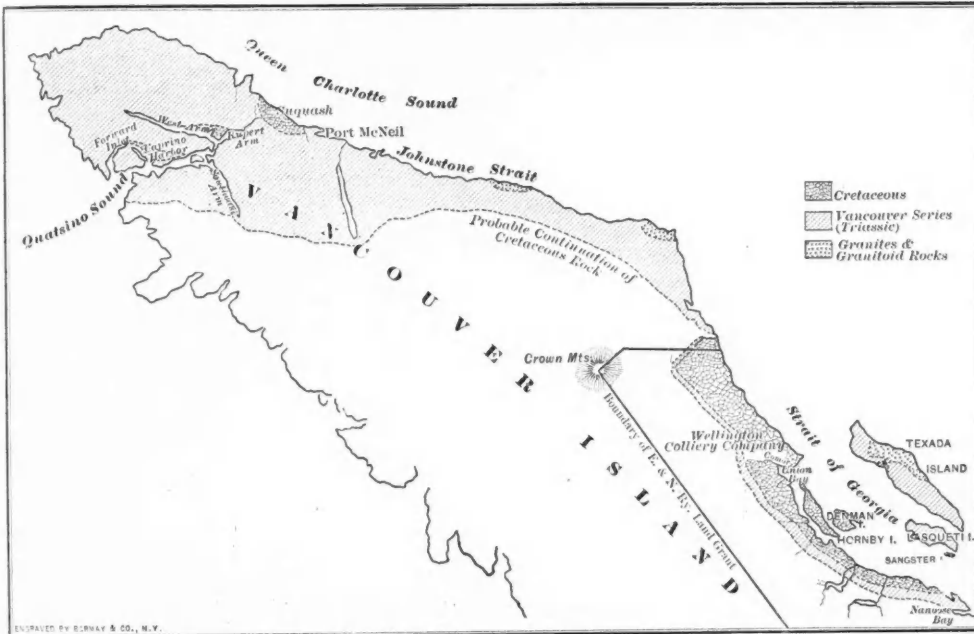
The Extension Colliery is about 13 miles by present branch railway from Ladysmith on the main line of the Esquimalt & Nanaimo Railway, over which the coal is hauled to the wharves at Oyster Bay, where the town of Ladysmith has been built within the past two years. A shorter branch is being constructed which will reduce this distance to 9½ miles.

On the shore of Oyster Bay, bunkers have been built with a capacity of 9,700 tons, while the wharves are so constructed as to afford a loading capacity of about 5,000 tons per day into vessels. There are three wharves, one 1,000 feet long by 40 feet wide, with three standard gauge railroad tracks, another 400 feet long by 60 feet wide with four railroad tracks, and a transfer wharf for handling freight to the steam ferry which plies between Ladysmith and Vancouver.

A Robinson washer with a capacity of 400 tons per day receives the slack coal from bunkers. After washing, the clean small coal is elevated by bucket elevator to the bunkers or to a chute for loading into vessels. This is shipped by steamer to the coke oven plant at Comox, about 60 miles to the northwest on the east coast of the Island.

A cleverly devised arrangement for regulating the flow of coal down the chutes from the wharf into vessels deserves mention. It is a movable lip fastened at the bottom side of the discharge end of the loading chute to which levers are attached and worked by a Chinaman on the wharf. Instead of shutting off the flow by a shutter dropping down on the moving coal, this iron lip is pulled up and the flow of coal is easily and quickly regulated.

*Cranberry District. Alexander Colliery.*—To the northeast from the Extension mines is situated the



AREAL GEOLOGY OF COAL MINING REGION ON VANCOUVER ISLAND.

down-throw had been 80 feet. Another instance is at Extension, where the main working tunnel was driven half a mile to catch the coal seam on the dip; beyond the intersection a fault occurred and the tunnel being driven another half mile, picked up apparently the same seam, the dip in both cases being to the south.

The total area of the productive territory cannot be estimated because no accurate detailed geological survey has been made. With the exception of the Wellington colliery proper and the acreage owned by the New Vancouver Coal and Land Company, and a few small holdings, the entire field is included in the land grant of the Esquimalt & Nanaimo Railway.

In the following description of the collieries in these coal fields, the writer will begin at the southern portion.

*Douglas District. Extension Mines.*—Operations by the Wellington Colliery Company, Limited, were commenced at these collieries about three years ago, when an adit 14 by 8 feet was started under the coal seam and driven 1 mile in a southerly direction with the dip of the coal. This tunnel serves to-day for transporting the coal to the surface from a field having a superficial area of 2,400 acres. The breast of the tunnel is about 300 feet below the surface. Nature has done a great deal towards forming this field advantageous for economic mining. The upper folds of an extensive anticlinal have been eroded off, leav-

All of these openings are on the coal seam known as the Wellington. A record of three bore holes on the line of the main tunnel and ahead of its present breast shows the following: No. 1, bore at a depth of 402 feet, coal was encountered underlying conglomerate, below that the record reads:

Coal	1 foot
Shale	9 inches.
Coal	2 " 7 "
Coal and shale	1 " 3 "
Coal	4 " 3 "
Coal and shale	6 " 6 "
Coal	7 " 9 "
Coal and shale	6 " 6 "
Coal	2 " 9 "

No. 2 bore on same line, coal encountered at a depth of 509 feet underlying conglomerate, below that the record reads:

Coal	2 feet 3 inches.
Shale	9 "
Coal	3 "
Coal and shale	6 "
Coal	6 feet

No. 3 on same line, coal encountered at a depth of 519 feet underlying conglomerate, below that the record reads:

Coal	4 feet 3 inches.
Coal and shale	9 "
Coal	1 " 3 "
Shale	2 "
Coal	1 " 10 "

A portion of this field, but apparently limited in extent, lies to the south of the Nanaimo River, while all that portion already referred to lies to the north of the river.

At the tunnel opening, the coal as mined is hauled

Alexandria Colliery, which has been in operation about 6 years, but was closed down at the time of the writer's recent visit. The output from this colliery during 1901 was 71,829 long tons, of which 70,450 were sold. The operator is the Wellington Colliery Company, Limited.

The Nanaimo River apparently forms the southern boundary of the productive coal measures from the point where it is crossed by the Esquimalt & Nanaimo Railway westerly to near the South Fork. The coal outcrop is easily traceable along the line of the railroad from a short distance north of the river to the Alexandria Colliery. The dip is nearly east and the seam is the Douglas or upper of the two workable seams in this portion of the island. The Wellington seam, which is worked at Extension, has not been opened near Alexandria, if it occurs in that field while the Douglas seam has evidently been eroded off in the Extension field.

The thickness of the seam at Alexandria averages about 8 feet with a maximum thickness in places of 22 feet. Where this extreme thickness occurs a portion of the coal is left in the roof if it is not so located as to leave the whole thickness as pillars.

The upper portion of the coal, where the seam is thickest, is softer than the lower and a poorer quality.

The slope has been driven 2,500 feet to the east, with levels run off to the north and south at about 200 feet from the mouth. The pillar-and-stall system of mining is carried on. The roof is often sandstone and the floor a shale, but no fire clay of commercial value occurs so far as known.

Rope haulage operated by steam at the pit head is used for bringing coal to the surface, but mules are used to convey the loaded cars from the levels to the slope.

A screening plant furnished with the necessary triples, and having a capacity of handling 500 tons daily, is situated near the mouth of the slope, from which the coal is dumped into 25-ton railway cars and hauled to Ladysmith for transfer to vessels, or washed for making coke.

Although the mine was idle at the time of the writer's visit, yet the Murphy fan, by which the mine is ventilated, and the pump are kept running as it is expected active operations will be resumed early in the present year.

**Nanaimo Colliery.**—This colliery is owned and operated by the New Vancouver Coal Mining and Land Company, Limited, which acquired that portion of the field adjacent to Nanaimo Harbor and underlying the Straits as well as the Islands of Newcastle, Protection, Gabriola, and a portion of Salt Spring, from the Hudson's Bay Company, in 1862. This property embraces a total acreage of about 30,000 acres. The shipments during 1901 reached a total of about 500,000 long tons.

The openings at this colliery are shafts Nos. 1 and 2 Esplanade; vertical depth of each 634 feet. No. 1 is the main working shaft, while No. 2 is an up-cast for ventilating all the workings between No. 1 and Protection Island. Protection Island shaft is situated about 1 mile north from No. 1 shaft; vertical depth 670 feet. Southfield No. 5 shaft is situated 3 1-2 miles south of No. 1 shaft; vertical depth 504 feet. Harewood shaft is 3 1-4 miles west from No. 1 shaft; vertical depth 226 feet. Newcastle shaft is in the centre of Newcastle Island to the northwest from Protection Island; vertical depth 380 feet. The air shaft is connected with workings under Protection Island, for ventilating field north from that island. Slopes and levels have been driven from these shafts to work the extensive field east, north, and south.

The seam of coal chiefly worked at this colliery is the Douglas, its thickness varies from 2 feet to 20 feet. Except on Gabriola Island, the coal dips to the east at an incline of about 1 foot in 12. Boreholes have demonstrated that under Gabriola Island there occurs a basin with the coal dipping from the different points of the compass towards a common centre. The underground workings have not yet reached this basin.

The upper portion of the seam where it reaches its maximum thickness is softer, and a poorer quality of coal usually than the lower, but because of the lack of regular stratification of the coal itself, the entire thickness has to be mined. The lower portion of the seam in these thick places averaging about 8 feet in thickness is a much harder coal, and most of it is therefore sold for domestic fuel, while the remainder is an excellent steaming coal.

In the northern portion of the field near the boundary of the Wellington District, the Wellington seam, a coal of better quality than the Douglas, occurs underlying the latter and is also being mined. The extent of the productive coal-field to the west from Nanaimo cannot be estimated from present knowledge, but the seam is workable on the Harewood tract, 3 1-4 miles west, which embraces an area of 9,500 acres, and is also owned and operated by the New Vancouver Coal Mining and Land Company. To the east of Nanaimo Harbor under the sea, the productive area of the coal field extends an undetermined distance.

The main slope from the bottom of No. 1 shaft has been driven 7,200 feet towards the east. All the workings from and connected with No. 1 shaft except those under Newcastle and Protection Islands, are under the water. From a point about 1,800 feet down the main slope another has been driven towards the southeast in good coal. This slope extends for about 4,500 feet and will work a territory 3 miles square, the coal varying from 5 to 10 feet in thickness. About 1,500 feet further down the main slope a level has been driven to the north connecting the main slope of Protection Island.

Since all the workings have been connected with No. 1 shaft and the endless rope haulage installed, the hoisting plant heretofore in use on Protection Island will be abandoned, and the entire output hoisted through No. 1 shaft.

Shafts Nos. 1 and 2 are circular, being 17 feet and 14 feet respectively in diameter and timbered with cedar blocks; all the other shafts are rectangular in shape. Two Howells mining drills worked by compressed air are used in the mine. Two Ingersoll-Sargeant cutting machines also worked by compressed air are in use.

The No. 1 and Protection Island shafts are equipped with two cages with a carrying capacity of 2 cars each 1½ tons loaded. The Protection Island shaft is 20 by 12 feet, Harewood shaft 16 by 8 feet, No. 5 shaft 20 by 8 feet. The two latter are equipped with cages, carrying only one car each. The total length of underground tracks is 36 miles.

In addition to the electric motors on Nos. 1 and 2 levels and about 100 mules for handling cars between the stalls and levels, a system of endless rope haulage has recently been installed near the bottom of No. 1 shaft to replace the old one of single rope, and winches to serve Nos. 3, 4 and 5 levels. The Danville, Ill., Foundry and Machine Company have furnished this plant. The Morgan clip will be used.

Two Guibal fans, one 36 feet by 12 feet at No. 2 upcast shaft, the other 14 feet by 5 feet at the Newcastle Island shaft, are operated in the workings known as the Nanaimo Colliery proper. About 150,000 cubic feet of air per minute ascends through the former and about 40,000 cubic feet per minute through the latter.

At the No. 5 or Southfield Mine, 3½ miles south from Nanaimo, a Murphy fan is used passing about 65,000 cubic feet of air per minute. At the Harewood Mine a Murphy fan is also used which passes about 40,000 cubic feet of air per minute.

The water which accumulates in the mines is not excessive, and is easily handled by the aid of two pumps at the bottom of No. 1 Esplanade shaft, one at Harewood and three at No. 5 Southfield shaft.

Although there are four surface plants for hoisting, the most important are those at Protection Island and No. 1 Esplanade shafts. The former of these, although very complete in every equipment, is to be abandoned as soon as the endless rope haulage is operated, when the output from both the shafts will be hoisted through No. 1 Esplanade. A de-

scription of that will consequently suffice for the purposes of this article.

The top of the gallow's frame is 65 feet above the surface and 35 feet above the floor to which the mine cars are hoisted. From the cage the cars are run by gravity to the scales, then to a revolving tippie, through which the coal is dumped on to the screens, the coal is separated into the different sizes, the nut, fine coal and dross passing through chutes directly into their respective railway 5-ton hopper cars, the lump coal is delivered on to a picking table 60 feet in length, divided into sections, one for large size, another for smaller sizes and the centre for rock and waste. The hoisting and loading capacity is 1,000 tons in eight hours, and seven men are sufficient to handle the entire output, three of these working at the picking table. A Shepard washer is located under the screen house, but only a limited portion of the output passes through it.

In the engine house are two Oliver & Company Chesterfield engines of 300 horse power each; two others of the same size and pattern, but built in Peterboro, Ontario, are used at Protection Island shaft. The boiler plant consists of 16 boilers. The electricity used in the mine for lighting and haulage is generated by two Edison dynamos, 250 volts each, stationed in a detached building near the engine house.

There are 10 miles of broad gauge railroad connecting the various shafts with the wharves from which all the coal mined is shipped by water to Victoria and California ports, except that sold for local consumption in the city of Nanaimo. The loading system at the wharves was designed by W. H. Wall, the company's mechanical engineer. The railroad cars are run by gravity to the shipping stages, where each car is elevated by a hydraulic lift to a height of 38 feet above extreme high tide and discharged into chutes arranged to suit any height of vessel and pour coal into three hatches simultaneously. The bunker capacity at the Nanaimo wharf is 10,000 tons, while that at Protection Island wharf is 7,500 tons. The wharves are lighted by electricity, so that night operations can be carried on with perfect safety. The company employs 1,100 men in all.

**Wellington District.—Wellington Colliery.**—This mine, which was the scene of the late Hon. Robert Dunsmuir's operations on his own behalf, was closed down late in 1900, presumably having been worked out so far as profitable operations can be conducted through the old openings. The coal produced from this mine belonged to the Wellington seam, and was of such a superior quality that it commanded the highest price in the California markets. The results from this mine made a millionaire of Mr. Dunsmuir, besides furnishing the bulk of the capital required to build the Esquimalt & Nanaimo Railway. The shipping point for this colliery was Departure Bay to the north from Nanaimo Harbor. There an extensive wharf and plant for shipping were erected and operated until the mine was closed down.

**West Wellington Colliery.**—This mine adjoins the Wellington property on the west. The property has not been actively operated for some years. When it was, the output was shipped from Nanoose Harbor 6 miles distant and connected with the mine by means of a wooden tramway. To the north and west from Nanoose there occur limited areas of the igneous and metamorphic rocks of the Vancouver Series which form a break in the continuity of the Cretaceous Coal Measures for a short distance, and divide the Wellington and the fields south of it from the Comox coal-fields to the northwest. In another article the writer will describe these latter, which are of vast importance and furnish the bulk of coal used by ships in the Alaska trade and a portion used by the British Northern Pacific Squadron stationed at Esquimalt Harbor near Victoria.

**COAL DEPOT AT KINGSTON.**—Vice-Consul-General Murphy, of Frankfort, says that, according to the *Frankfurter Journal*, the Hamburg-American Line has decided to establish a coal depot at Kingston, Jamaica, where not only its own vessels but others will be supplied with coal.

**THE CANADIAN MINING INSTITUTE.**

We supplement the report of the annual meeting of the Canadian Mining Institute, given in our last issue, by abstracts of some additional papers presented at the meeting.

**PLAN AND SECTIONS OF THE ATHABASCA MINE, ON TOAD MOUNTAIN.**

By E. NELSON FELL, NELSON, B. C.

The vein cuts across a well defined contact between a schistose eruptive rock and a more recent granite. This area of schistose rocks and its northern contact with the granitoid area is shown in the reconnaissance map, published in *Part B, Annual Report, Vol. IV, of the Geological Survey of Canada*. It is a narrow vein about 1 foot in width; the gangue is quartz, heavily charged with sulphides of iron, zinc and lead, containing high values in gold and about the same number of ounces of silver as ounces of gold.

The chief characteristics of the vein are that it is remarkably well defined; that it is very continuous; that it is broken by innumerable faults, some of which have occasioned considerable displacement of the vein; that it passes from the

are numerous aplite (acidic) dikes of earlier origin than the vein, and minette (basic) dikes of later origin than the vein. One of the latter follows a prominent fault plane throughout the mine and is shown in section through C D. Not only is the vein faulted, but it is subject to remarkable rolls, in the course of which it sometimes assumes a horizontal position and sometimes a sharp "dip upwards," if I may use the expression. This is especially noticeable along the contact of the granite and the schist. As a result of these displacements, drifts are frequently seen at the same horizon, although 150 feet apart on the dip of the vein. It is hardly necessary to say that to meet these extraordinary conditions, an extraordinary system of mining was necessary, which was inconvenient and expensive and could not have been carried out at all, unless the gold contents had remained persistently high.

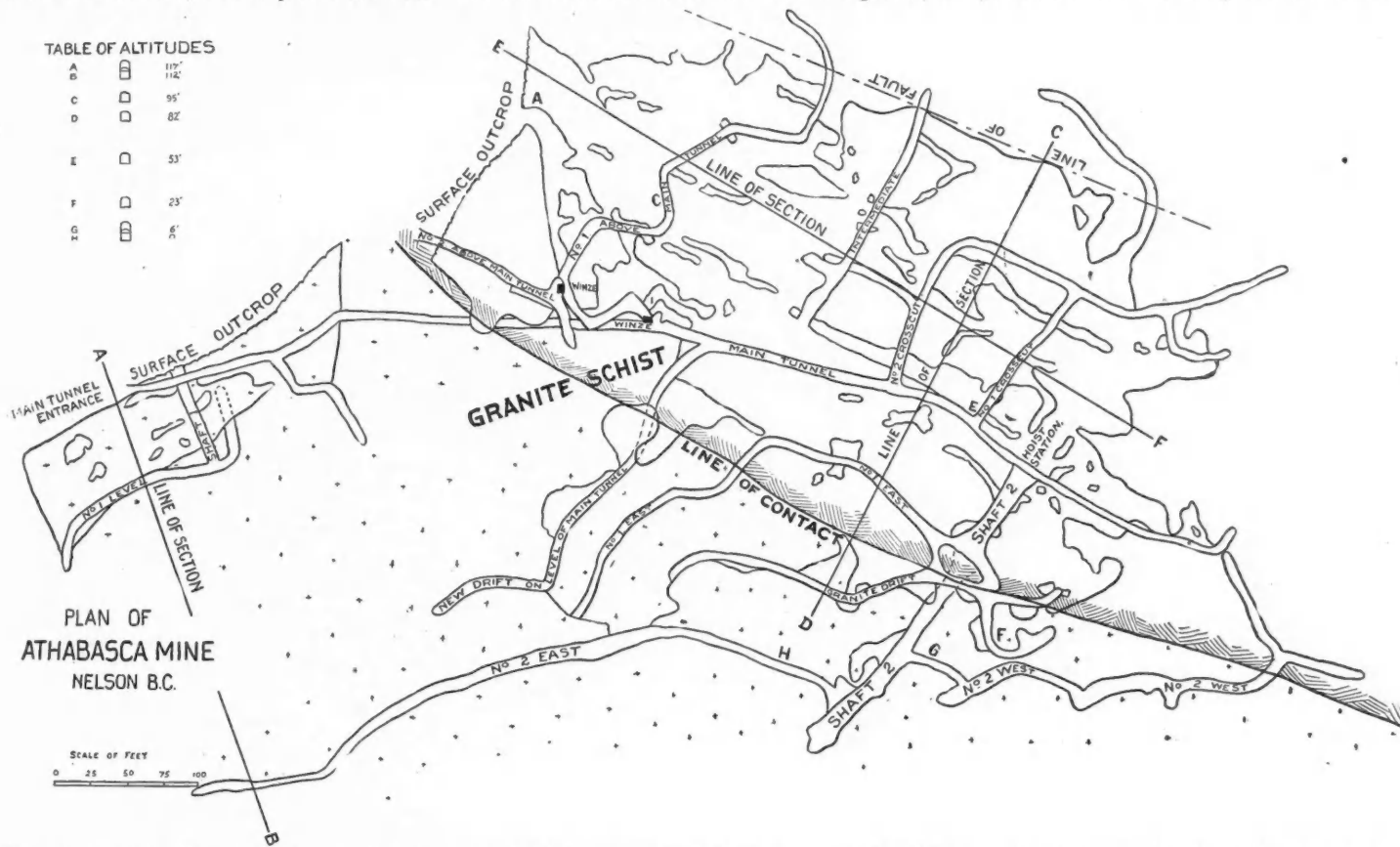
At the end of the main tunnel, the ground became unusually disturbed; stoping had to be abandoned here and a small shaft was put down from the point marked "hoist station," which ultimately passed into the granite. Along the contact, both in the schist and to a lesser extent in the granite, a

A few general points may be summed up as noteworthy.

1. The vein occurs cutting both granite and schist.
2. There is a remarkable concentration of values along the contact, especially on the schist side.
3. The values in the granite do not average as well as in the schist; the vein being inclined to be more uneven, both in size and contents.
4. The vein in the granite is found in a more normal condition and is better adapted for mining.
5. In the schist the vein is flat and very much disturbed by faults and folds, and finally enters upon an area of ground which is so shattered that all traces of the vein are lost. It is probable that it will be recovered here at some deeper point, approach being made from the granite.
6. Extreme caution must be exercised in undertaking the opening up of a vein in shattered ground of this kind. Theories of parallel ore bodies and numerous veins may be rudely dispelled by events, and the plan of work must be held continually subject to modification. Only the most shadowy esti-

TABLE OF ALTITUDES

A	□	117'
B	□	112'
C	□	95'
D	□	82'
E	□	53'
F	□	23'
G	□	6'



schist into the granite without any interruption or disturbance; that the values encountered in the granite are good, but not so good as those in the schist, with a tendency, perhaps, to be a little pockety. In the map herewith the granite is indicated by crosses, the schist is in blank.

The discovery of the vein was made and work was commenced on a prominent exposure in the granite. A tunnel was run in at the point marked on the plan "main tunnel entrance," and a shaft was sunk on the vein near the portal and the vein stopped out down to a fault; to recover the vein on the other side of this fault, cross-cuts were put in, both on the hanging and the foot-wall side, but without result.

The main tunnel was then carried on into the schist, and, shortly afterwards, encountered what was then supposed to be a second vein. This vein was very flat, and disturbed by a most remarkable series of faults, running in every possible direction. The faults were, practically always, normal; and, in following the vein up to the surface, there was a general tendency to a downward throw at each fault running east and west (section through C D) and an upward throw at each fault running north and south (section through E F.)

Associated with the vein (in the schist especially)

remarkable concentration of values occurred which yielded very fine results in the mill; but below the contact in the shaft, and in the drifts to the west of the shaft, the vein was found in patches only, cut off by faults every few feet and thrown by each fault from 50 to 100 feet.

Eastward from the shaft, No. 2 East was carried about 500 feet, meeting the vein in fine condition about 200 feet east of the shaft, and carrying it to the present face, without faults, well defined, with a regular dip of about 45°. As this work proceeded, it became more and more evident, until there was finally no room for doubt, that this vein was the same as that on which Shaft No. 1 had been sunk, and that we had now come round, on the other side of the fault, to a point on the vein which lay about 220 feet from the point where it faulted. The throw of the vein along the dip of the fault was about 175 feet. The outcrop on the surface was then sought for and uncovered under the wash. This is illustrated in the section through A B. It is an interesting matter for speculation as to what the results might have been, had the work originally been done at this outcrop, instead of at the bolder and richer outcrop below. It is not impossible that the history of the mine would have been materially changed.

mates can at any time be made of ore in sight, and the plan of operations can only be outlined in a vague way. To open up a mine of this description is an entirely different proposition to that of opening up a regular ore body. It would appear, however, that the vein, where it is now being worked in the granite, has at last reached a condition of permanency, and it is likely that it will retain this character, as further depth is attained.

I have attempted to outline the doubts and difficulties connected with opening up an ore body of this character. This is a class of mining, however, which opens up attractive possibilities and cannot be neglected. This vein yielded in 30 months \$350,000 from 11,500 tons of ore. It is an open question whether the system of limited liability company organization is adapted to a mining proposition of this kind. For conducting large operations on lines which can be definitely and permanently foreseen and laid out, the present system is no doubt to be preferred. But I believe that a system of assessable stock would be found to be more economical and, speaking generally, more suitable for working a property of the kind under discussion.

The maps above referred to were prepared by Mr. H. W. Mussen, superintendent of the mine.

THE COPPER-BEARING VOLCANIC ROCKS IN THE  
EASTERN TOWNSHIPS OF THE PROVINCE  
OF QUEBEC.

By JOHN ALEXANDER DRESSER, RICHMOND, QUE.

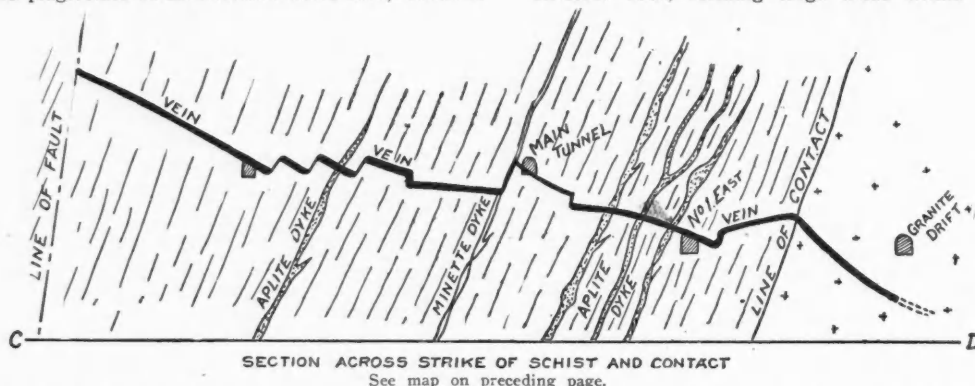
The copper-bearing rocks of the Eastern Townships of the Province of Quebec have long been known to comprise three principal belts which run approximately parallel to the north-easterly trend of the Green Mountains in their extension into Canada. These belts are about 25 miles apart where crossed by the St. Francis River, and are themselves some 2 miles wide in each case along that river, although elsewhere they are often considerably wider.

The most westerly of these, which is the first met in approaching the district from the St. Lawrence Valley, is an extensive band of limestone which is sometimes associated with glossy black slates or graphite shales. Small igneous intrusions are known to occur in the vicinity of most of the copper deposits of this belt, and in some cases the igneous rock itself carries copper. The best known deposits in this band are the once famous Acton Mine, the adjacent deposits at Upton, as well as the mines formerly worked at Roxton, Wickham and St. Flavien.

The central or Sutton belt contains, among others, Harvey Hill Mine at Leeds, the Halifax in the township of that name, the Viger in Chester, the St. Francis in Cleveland, the Balrath in Melbourne, and Sweet's mine in Sutton. The country rock of this belt has been generally described as chloritic, micaceous, talcose or nacreous slate, and has been regarded as sedimentary in origin and the correlation of various deposits has been made on that assumption. Within the last two years, however,

of the rock, a supposed sandstone, had not been hitherto questioned, as far as can be learned, by the many previous observers of it during the past fifty years. A specimen which was handed the writer by Mr. Pierce proved, on microscopic examination, to be a quartz porphyry, the rapidly cooled equivalent of a granite. In structure it is a typical porphyritic rock having phenocrysts of quartz, orthoclase and plagioclase in an indeterminable base, which is

phenocrysts of feldspar can be seen, some of which extinguish parallel to principal axes, and hence are orthoclase. Quartz occurs in phenocrysts and also in the finer crystalline ground mass along with feldspar. Chlorite, brown iron oxide and a colorless mica are found in small amount. The rock is a granite porphyry. Subjection to pressure since solidification has given it somewhat of a cataclastic structure. Another rock, forming large areas within this



SECTION ACROSS STRIKE OF SCHIST AND CONTACT

See map on preceding page.

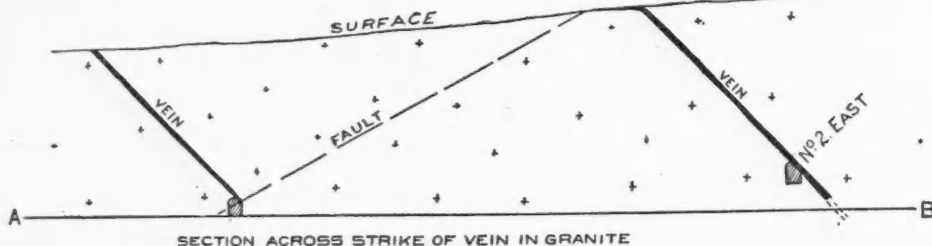
probably a fine grained aggregate of quartz and feldspar. A little colorless mica and a few fragments of some carbonate which are present, are doubtless secondary constituents. Strain shadows in the quartz phenocrysts and a cataclastic structure point to the subjection of the rock to intense pressure since its solidification. This is also evidenced in the hand specimen by a well developed cleavage.

As the rock was known to be one of considerable extent, specimens were subsequently taken by the writer at various points across the belt between Sherbrooke and Lennoxville, and from several of the

belt, is that which is frequently quarried for road metal and other purposes in the city of Sherbrooke. It is a very highly altered rock, gray or greenish gray in color, and is commonly spotted with reddish brown iron oxide. In the microscopic section it is found to contain prominent masses of rhombohedral carbonate, a part of which at least are attacked by cold acid. Probably both calcite and dolomite are present, or a carbonate of lime with a varying magnesium percentage. The carbonate occurs in a fine base containing a certain amount of colorless mica, and is a secondary constituent, being one of the results of the decomposition of earlier lime bearing components of the rock. Grains of quartz occur in some instances so as to give the appearance of crushed phenocrysts.

These are the chief rock types yet noted besides certain sedimentary outliers generally of minor extent within this belt. It is noticeable that in their general characters these igneous rocks appear to be very similar to the Klondike series of the Yukon Territory as described by Mr. R. G. McConnell in the *Preliminary Report* of the Geographical Survey of Canada for 1900, or to certain of the Keewatin series described by Mr. W. McInnes, with microscopic notes by the writer, in the *Report* of the Geological Survey of Canada for 1897.

The whole igneo-metamorphic complex is occasionally cut by dikes which, from their undisturbed position and fresh state of preservation, are evidently of a very much later age than the main rock masses. The dikes were the latest rocks to form in the region, while the country rocks were the earliest, thus showing this belt to have been the scene of volcanic eruptions at very widely different times, at one or more of which the lavas



SECTION ACROSS STRIKE OF VEIN IN GRANITE

See map on preceding page.

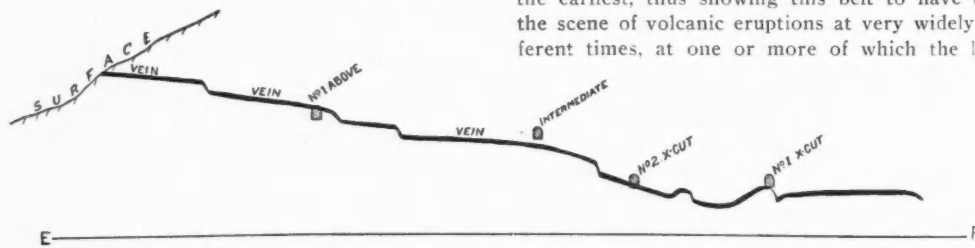
it has been found by the writer that these rocks in most cases at least are disguised volcanoes of early geological age and much altered in character. A preliminary mention of this was made in a recent publication by the writer, in which it was shown that the rocks are somewhat variable, but that a considerable portion probably was originally a diabase, and that the greater part was amygdaloidal. Copper is found, not in true veins, as far as observed, but in lenticular masses conforming to the well-developed cleavage of the rock. The gangue is commonly calcite and quartz, and the character of the deposits such as to indicate the deposition contemporaneously with the gangue. The secondary derivation of the ore from the country rock is further evidenced by the fact that the latter commonly yields a small percentage of copper on assay.

Still more recently, a similar discovery regarding the nature of the rock in the Ascot belt, the most easterly of the three bands, has been made by M. G. H. Pierce. This area includes, amongst many others, the widely known Albert and Eustis Mines at Capelton, the Howard and others at Suffield, the Ascot and the Sherbrooke near the city of Sherbrooke, the Moulton Hill, a few miles east of the St. Francis River, and the Garthby deposits 40 miles farther eastward. The country rock has not been usually described as differing essentially from that of the Sutton belt in general character, unless it be that the micaceous and nacreous slates have been found to predominate in the former while the chloritic prevail in the latter.

During the course of a recent visit to the Suffield mines, Mr. Pierce observed a massive appearance in the hanging wall of the Silver Star Mine which suggested to his practised eye the probability of its igneous origin, although the sedimentary character

nearest mineral deposits. From these it is apparent that the Ascot belt, like that of Sutton, is a complex mass consisting chiefly of old and highly altered volcanic rocks.

A specimen was taken from a cutting for the street railway on the northern outskirts of the village of Lennoxville, which appeared to be representative of a large part of the igneous belt, especially towards the southern side. In the hand specimen it is a greenish gray, fine massive rock with a rusty weathering in places. It carries a little pyrite, and



SECTION APPROXIMATELY PARALLEL TO STRIKE OF SCHIST

See map on preceding page.

also shows strings of epidote distinguished by their lighter yellowish green color. It is an exceedingly hard rock. By the aid of the microscope, it is found to have a finely crystalline quartz-feldspar base, in which are larger crystals of phenocrysts of quartz and plagioclase feldspar. There are no primary bisilicates present, any original constituents of that character being now represented by the secondary minerals, epidote and chlorite. The rock is, therefore, a variety of altered quartz-porphyrityrite.

Another rock, which cuts that just described in the form of a dike near the locality of the last specimen, but which appears to comprise a larger independent mass elsewhere, is light gray in color and carries a little pyrite. Under the microscope large

ejected carried copper, silver and gold. From the fact that the ore bodies in many instances follow the cleavage of the rock, the form thus given the deposits causes them to easily simulate bedded veins, which they have commonly been thought to be, owing to the cleavage having been generally mistaken for stratification. In view, however, of the igneous character of the country rocks the collection of various deposits on assumed stratigraphical grounds becomes useless, both in the case of the Ascot and of the Sutton belts and the opinions regarding the mode of occurrence of the ores also call for revision. This is all the more important as the copper ores commonly carry appreciable amounts of both silver and gold.



**THE MINERAL PRODUCTION OF GREAT BRITAIN IN 1901.**

We have received copies of the preliminary report of the Inspectors of Mines of Great Britain, giving the production of the mines of the United Kingdom for the year 1901. The report is issued at a much earlier date than usual, but gives complete returns from all operations under the coal mines and metaliferous mines acts; the returns from the quarries are not included, not being completed as yet.

The figures for the mines working under the coal mines act are as follows, in long tons:

	1900.	1901.	Changes.
Coal	225,170,163	219,037,240	D. 6,132,923
Clay and shale	181,686	140,067	D. 41,619
Fire clay	2,844,676	2,834,997	D. 9,679
Iron pyrites	9,078	7,661	D. 1,417
Iron ore	7,667,578	6,849,926	D. 817,652
Limestone	28,064	27,715	D. 349
Oil shale	2,282,221	2,354,358	I. 72,137
Petroleum	.....	.....	I. 8
Sand	2,215	.....	D. 2,215
Sandstone and Gaster	105,594	91,254	D. 14,349

Total tons..... 238,291,275 231,343,224 D. 6,948,051

The important point about this statement is the fact that the coal production shows a decrease for the first time in several years. This decrease was 2.7 per cent, and was due partly to lighter exports, but in a greater degree to a smaller demand from the blast furnaces and iron works.

The return for the mines operated under the metaliferous mines act is as follows, also in long tons:

	1900.	1901.	Changes.
Arsenic	4,081	3,361	D. 720
Arsenical pyrites	9,573	2,578	D. 6,995
Barytes	27,456	26,413	D. 1,043
Bauxite	5,779	10,191	I. 4,412
Chalk	10,214	4,564	D. 5,650
Chert and Flint	3,721	2,976	D. 745
Clay and shale	111,570	104,907	D. 6,663
Copper ore and precipitate	9,488	6,792	D. 2,696
Fluorspar	1,413	4,164	I. 2,751
Gold ore	20,802	16,374	D. 4,428
Gypsum	152,720	151,199	D. 1,521
Igneous rocks	97,698	98,912	I. 1,214
Iron ore	1,863,714	1,671,025	D. 192,689
Iron pyrites	3,201	2,577	D. 624
Lead ore	31,985	32,552	I. 567
Limestone	589,042	512,158	D. 76,884
Manganese ore	4,262	1,646	D. 2,616
Ocher, amber, etc.	4,270	5,228	I. 958
Rock salt	159,860	151,348	D. 8,512
Sand	27,026	11,863	D. 15,163
Sandstone	258,346	230,604	D. 27,742
Slate	166,695	154,324	D. 12,371
Tin ore (dressed)	6,000	6,542	I. 542
Uranium ore	41	79	I. 38
Wolfram	8	18	I. 10
Zinc ore	24,675	23,582	D. 1,093

Total, tons..... 3,590,650 3,235,977 D. 354,673

The total iron ore shown in the above tables is 8,521,051 tons in 1901, against 9,531,292 tons in 1900; a decrease of 1,010,241 tons. A considerable quantity of iron ore is also taken from open workings which come under the quarries act, and this quantity is not yet reported.

The report says: "In examining the statistics of output given in these tables, it must be borne in mind that the figures do not in all cases represent the total production of the minerals for the year. Large quantities of several important minerals—such as iron ore, limestone, sandstone, slate, clay, etc.—are obtained from quarries under the quarries act and from other open workings, the returns from which are not yet available. The totals for coal and for the ores of copper, lead and zinc may, however, be regarded as substantially complete."

The total number of persons employed in mines—not including quarries—is reported as follows:

	1900.	1901.	Changes.
<b>Coal Mines</b>			
Underground	624,223	647,822	I. 23,599
Above ground	155,829	158,913	I. 3,084
Total	780,052	806,735	I. 26,683
<b>Metal Mines:</b>			
Underground	20,019	18,804	D. 1,215
Above ground	14,446	13,639	D. 807
Total	34,465	32,443	D. 2,022
<b>All Mines:</b>			
Underground	644,242	666,626	I. 22,384
Above ground	170,275	172,552	I. 2,277
Total	814,517	839,178	I. 24,661

It is somewhat singular that the number of employees should show an increase in a year of declining production. This is probably due to less regular working of the coal mines in some districts.

**CHANGES IN THE SUDBURY NICKEL DISTRICT**

By Our Special Correspondent.

It is stated on good authority—and all the circumstances point to the same conclusion—that the biggest nickel deal in the history of the Sudbury District has been consummated recently by the transfer of the stock of the Canadian Copper Company to a powerful syndicate of American capitalists, composed of Col. R. M. Thompson, Charles M. Schwab, E. C. Converse, Joseph Wharton and others. The consideration is said to have been in the neighborhood of \$9,000,000. The property embraced in the deal is certainly one of the most valuable mining estates on the American continent, and consists of a large number of the best nickel mines in the district, one of which, the Creighton Mine, in the southwest corner of the township of Snider, and 11 miles from Sudbury, is an immense body of high-grade ore. The smelting plant of the company is also of considerable value, over a dozen furnaces, including the bessemerizing works, being in complete working order at Copper Cliff, besides the machinery and rock houses at six different mines. It is only fair to say in this connection that the business record of the Canadian Copper Company in the Sudbury District for the past 15 years has been of the highest order for honorable dealing in every way. The men's wages and all other bills were paid in hard cash to the last cent on the 15th day of every month, even in the dull years when the company had to pile up matte in the yard for months at a time.

But Col. R. M. Thompson, who seems to be the leading spirit in the new syndicate, is regarded by the mine owners and people of the district as the most able, shrewd and energetic man concerned in the industry, and great changes are expected to take place under his management in the near future, not only in the working of the mines, but also in the treatment of the ores.

The Mond Nickel Company has not gone into the new combine, but is going to continue operations on its own basis. A fine and unexpected body of ore has lately been discovered on the fifth level of the company's head mine in Denison, and preparations are being made this winter for the working of a second mine belonging to the company in the township of Garson, and known as the Cryderman Mine. But this company will have to secure more mines in order to carry on operations on anything like an extensive scale.

The Lake Superior Power Company (Clergue syndicate of Sault Ste. Marie), which has been exploiting a nickel mine in the township of Creighton in a rather slow way for the past four years, is coming forward now. The company has purchased two other mines, and is building a three-furnace smelting plant near the Creighton Mine with a capacity of over 300 tons a day.

In short, there is every prospect of unprecedented activity and interest in nickel mining in the Sudbury District during the coming season. Nearly all the unsold properties are being negotiated for, mostly by new parties, and one of the old companies, and the chances are that by the end of the year any one who wishes to get a good nickel mine will have, like Sancho Panza, to "lick the plate" for it.

**MINERAL PRODUCTION OF THE DUTCH EAST INDIES.**

We are indebted to the Colonial Department of the Netherlands for advance statements of mineral production of the Dutch East Indies for the fiscal year 1901, as given below.

In Java the only production reported is 97,308,800 liters (612,005 barrels) of petroleum.

In Sumatra the petroleum output was 169,842,000 liters (1,068,189 barrels). The coal production was 196,207 metric tons from the Ombilien mines, and 20,700 tons from Bahangan, a total of 216,907 tons. The tin production was: Banka, 202,720 pikuls; Billiton, 80,203; Singkep, 13,152; total, 296,075 pikuls, or 17,923 long tons.

In Borneo the mineral output included 59,252 metric tons of petroleum, and 6,131 tons of coal.

**THE PROPOSED TONTO RESERVOIR.**

By A. P. DAVIS.

One of the largest reservoir sites in the West is under examination by the United States Geological Survey. It is situated at the junction of Salt River and Tonto Creek, Arizona, and intercepts the drainage of nearly 6,000 square miles of mountainous country.

Below the confluence of the two streams mentioned, the river enters a long, narrow gorge, with sharp sides of solid rock, favorable for the location of a masonry dam. During the past summer borings were made in this cañon to determine the most favorable location for a dam, and the depth and character of bed rock. Surveys were also made to determine the cubical contents of the dam, and the capacity of the reservoir for each ten feet of elevation from the bed of the river to a height of 200 feet above. At this height the reservoir would hold nearly 1,000,000 acre-feet, or more water than the great reservoir now in construction on the Nile; or than any other artificial reservoir in the world.

The dam required, however, would be very large, and would consume about 150,000 barrels of hydraulic cement in its construction. The isolated location of this site, the mountainous region by which it is surrounded and the high rates of freight both by rail and by wagon, would bring the cost of cement delivered at the site to nearly \$9 a barrel, and so augment the cost of the structure as to render the project of doubtful practicability. To obviate this difficulty the experts of the Survey made explorations for materials from which cement could be manufactured, and chemical analyses proved the suitability of certain materials which occur in abundance at no great distance from the site. To confirm the chemical tests, a sample quantity of cement was actually manufactured from the materials discovered and subjected to the chemical and physical tests usually imposed upon such cements, with the result that the material proves to be a true portland cement of superior quality.

For the construction of this dam, water-power will be developed, to be used in quarrying and handling rock, mixing mortar, etc., and may also be used for grinding rock for the manufacture of cement. The construction of a cement mill with a capacity of 300 barrels per day, the development of sufficient power to run such a mill, and the manufacture of the cement necessary for the construction of the dam, will cost only about one-third the sum necessary to import the same quantity of cement from established factories, and will save nearly \$1,000,000 in the construction of the dam.

The proposed project will bring under irrigation nearly 200,000 acres of desert lands, besides furnishing a more reliable supply to a large area now irrigated by the precarious flow of the streams in their natural state.

**FOREIGN MINERS IN SCOTLAND.—**

*The London Iron and Coal Trades Review* says: "It is probably among the things not generally known that foreigners are playing an increasingly important part as working miners in Scotland. It is stated that at present between 4,000 and 5,000 aliens are employed alongside Scottish miners in the pits of Lanarkshire, while fresh importations are arriving at intervals. For the most part, the men who come over are Poles and Lithuanians. The foreigners do not confine themselves to any particular district, going whithersoever they can find work, but, generally speaking, their headquarters are at Motherwell, Wishaw, and surrounding villages. As a workman, the average Pole or Lithuanian is said to be considerably behind the Scottish miner. In a number of the pits employing these men the rules have been translated into the Russian language, and hung up alongside the ordinary English prints; but this has not altogether solved the difficulty, as many of the foreigners understand only one dialect. Three or four different languages or dialects are spoken by the foreign miners."

**ONTARIO MINERAL PRODUCTION.**

Mr. Thomas W. Gibson, director of the Bureau of Mines, has compiled the statement given below of the mineral production of Ontario for the year 1901, which is issued in advance of the complete report.

The director's comments say that for purposes of comparison the statistics for 1900 are also given; and it is satisfactory to note that the aggregate value of the production for 1901 shows a material gain over that for 1900, the increase being about 27 per cent. Almost the whole of this increase is in the products of metalliferous mines and works, the value of which is about 100 per cent more than in the previous year. Most of the non-metallic products also show increased values, but these are largely offset by a falling off in the yield of petroleum, and a reduction in the quantity and value of petroleum products.

The chief increases are as follows:

	Quantity	Per cent.	Value.	Per cent.
Copper, lbs.	2,346,000	35	\$269,399	84
Nickel, lbs.	1,802,000	25	1,103,344	145
Iron ore, tons.	182,236	201	62,623	56
Pig iron, tons.	53,984	86	765,637	82

The principal decreases are: Petroleum, 1,948,283 gallons, or 8 per cent in quantity; \$401,105, or 21 per cent in value; natural gas, \$56,640, or 14 per cent in value.

The good demand and relatively high prices for nickel, which have prevailed for some time, are reflected in the output for 1901, the largest yet

In the case of petroleum the quantity given is the number of gallons of crude output, while the value is that of illuminating oil and other products of refinement, and in addition the value of the crude used as such for fuel and gas-making purposes, which absorbed about 15 per cent of the yield.

The action of the Government in stopping the export of natural gas from the Essex field to Detroit explains the diminution in value of this product.

The values of the several products are calculated at the selling prices at the mines or works, not at the prices of the refined or finished articles. If the latter basis had been adopted, as is sometimes done, the value of the copper output for the year would have been about \$1,450,000 instead of \$589,080, and of nickel about \$4,440,000 instead of \$1,859,970; while the aggregate value of the year's production would have been increased by about \$3,400,000. It is not clear, however, that this method of tabulating values is applicable to unrefined or partially treated metals which are exported for the final processes, when it would not be employed in the case of other raw or unfinished materials; and the values at the mines or works have accordingly been adhered to.

Strictly speaking, the value of the iron ore, both native and foreign, smelted into pig iron, and of the pig iron converted into steel, should be deducted from the aggregate value of the year's production; the foreign ore because it is not a product of On-

silver, and are by far the most productive in California. In fact, the operations of this company alone have brought Shasta County far in the lead among the producing counties of the State, exceeding all other by several million dollars annually. Moreover, the necessity of purchasing fluxing ores at the furnaces has had the result of opening some hundreds of quartz mines, as the miners have now a local market for ores which could not be shipped to a distance or could not bear the expense of individual reduction works. This, as stated, has made Shasta the most active and productive mining county in the State.

Notwithstanding that the extensive operations of the company have brought prosperity to the locality and given employment to some thousands of men directly and indirectly, it has been more or less hampered ever since the smelters began work, by those who considered themselves or their property injured by the smelter fumes. The company has bought up thousands of acres of land in order to prevent suits, etc., but the suits still continue to be brought. Recently a man brought suit for \$15,000 damages to an orchard and the jury awarded \$600. He also sued for an injunction to stop further fumes from the smelters. During the trial of these proceedings in the first week of February, Mr. Lewis T. Wright, general manager of the company, testified that if his company were enjoined from proceeding with the roasting and smelting until it could condense the fumes, it would be necessary to close down the smelting plant at Keswick altogether, mine only the best ore, and ship that elsewhere to be smelted. Mr. Wright contended that there is no practical method of condensing the fumes of a copper roasting and smelting plant, although there are some theoretical ones. This shutting down the smelters would be a severe blow to the county if carried out, but constant annoyance and threat of injunction might cause a decision as intimated by Mr. Wright. The Bully Hill smelters of Capt. De La Mar, started last year, are in the same county.

It was by actions of this kind, and by frequent injunction suits, finally resulting in a sweeping injunction, that the farmers of the Sacramento Valley finally succeeded in killing off the great hydraulic mining industry which at that time was yielding about \$10,000,000 a year. This impoverished a large section of northern California, which has never recovered completely from the blow. Now, when congressional action permits the hydraulic mines to operate in that region, the restrictions are such that the mines yield less than a million a year and comparatively few are worked. The center of activity of hydraulic mining has shifted to Siskiyou, Trinity, Humboldt and Del Norte counties, where there are no navigable streams and no restrictions on the operations.

And more surprising are the efforts being made to hamper the operations of the Copper King Mine in Fresno County.

The same spirit of antagonism is carried to the extent of bringing legal proceedings to prohibit the use by the company, owning this property, of steam traction engines and wagons for conveying the ores of the mine to the railway station. This action was based on no logical necessity whatever. No injury had been inflicted upon anyone by reason of this method for transporting ores, during the entire time of the operation not a solitary run-away had occurred, nor were the roads in the slightest degree injured; on the contrary, they were made the better by reason of the use of traction engines, and the maintenance which this company always kept up.

The smelters of the Copper King, Limited, recently completed, are located at what is known as Seal Bluff Landing on the shores of Suisun Bay on the northern arm of the bay of San Francisco, from which point they have rail connection to Bay Point, the joint railway station of the Southern Pacific and Santa Fe systems.

It is necessary to convey the ores from the mine to these works and the only practicable method is by traction engines to reach the railway. Hauling by teams is physically impossible, the number of ve-

**MINERAL PRODUCTION OF ONTARIO FOR 1901.**

Product.	Quantity.	1900.	Value.	Quantity.	1901.	Value.
<i>Metallic.</i>						
Copper.....lbs.	6,728,000		\$319,681	9,074,000		\$589,080
Gold.....oz.	18,767		297,861	14,293		244,443
Iron ore.....tons.	90,302		111,805	272,538		174,428
Nickel.....lbs.	7,080,000		756,626	8,882,000		1,859,970
Pig iron.....tons.	62,386		936,066	116,370		1,701,703
Silver.....oz.	160,612		96,367	151,400		84,830
Steel.....tons.	2,819		46,380	14,471		347,280
Zinc ore.....tons.	500		500	1,500		15,000
Total Metallic.....			\$2,565,286			\$5,016,734
<i>Non-metallic.</i>						
Actinolite.....tons.				521		3,126
Arsenic.....lbs.	606,000		22,725	1,389,056		41,677
Building stone.....			650,342			850,000
Carbide of calcium.....tons.	1,005		60,300	2,771		168,792
Cement, natural rock.....bbls.	125,428		99,994	138,628		107,625
Cement, Portland.....	306,726		598,021	350,660		563,255
Corundum.....lbs.	120,000		6,000	1,068,000		53,115
Brick, common.....No.	249,430,000		1,379,590	259,265,000		1,530,460
Brick, paving.....	2,710,000		26,950	3,689,000		37,000
Brick, pressed and terra cotta.....	11,561,000		114,419	12,846,000		104,394
Feldspar.....tons.	4,000		5,000	5,100		6,375
Graphite.....	1,802		27,030	1,000		20,000
Gypsum.....	1,095		18,050	1,554		13,400
Iron pyrites.....				7,000		17,500
Lime.....bush.	3,893,000		544,000	4,100,000		550,000
Mica.....lbs.	1,286,000		91,750	854,000		37,219
Natural gas.....			392,823			336,183
Pottery.....			157,449			193,950
Petroleum.....imp. gals.	23,381,783		1,869,045	21,433,500		1,467,940
Salt.....tons.	66,588		324,477	60,327		323,058
Sewer pipe.....			130,635			147,948
Talc.....	1,000		5,000	400		1,400
Tile, drain.....No.	19,544,000		209,738	21,592,000		231,374
Total Non-metallic.....			6,733,338			6,805,791
Add Metallic.....			2,565,286			5,016,734
Total Production.....			\$9,298,624			\$11,822,525

recorded. The increase in value is greater than the increase in production, for the reason that the nickel-copper mattes in which the metal is contained now being produced at the Sudbury mines are of much higher grade than heretofore. The same remarks apply to copper, the price of which was well maintained until about the close of the year, when it broke heavily. Part of the copper output was from the non-nickeliferous mines on the north shore of Lake Huron.

The increased production of iron ore is due to the development of the Helen Mine in Michipicoton, which shipped freely during the year, both to Ontario furnaces and the United States.

The greater output of pig iron is owing to the fact that there are now three furnaces in operation as against two in 1900, the Canada Iron Furnace Company's smelter at Midland having been blown in about the end of that year. There were smelted 109,009 tons of Ontario ore and 85,399 tons imported from the United States, in all 194,408 tons; the proportion of native ore used being thus about 56 per cent.

Since the beginning of the present year steel-making, heretofore carried on at Hamilton only, has been begun at the Clergue works, Sault Ste. Marie.

tario, and the native ore and pig iron to prevent the value of these articles being reckoned twice. The items would amount to about \$500,000; but it has not been thought necessary to make the deduction, and with this explanation there is no danger of the matter being misunderstood.

Arsenic, carbide of calcium and corundum are beginning to be important products. The first and last named are not mined elsewhere in Canada, arsenic not elsewhere in America.

The ton used throughout is the statutory ton of 2,000 pounds.

**SMELTERS' TROUBLES IN CALIFORNIA.**

FROM OUR SPECIAL CORRESPONDENT.

It is only within the past few years that there have been any copper smelting furnaces operating in California, but there are now about half a dozen, several of which are large plants. They are all at isolated localities, distant from cities—most of them near the respective mines. The most extensive plants are in Shasta County, and the largest one in the State is that of the Mountain Copper Company, Limited, at Keswick, a few miles from the town of Redding. The mines of the company are yielding between five and six million dollars a year in copper, gold and

hicles and animals necessary to handle one hundred tons of ore per day, the average output of the Copper King Mine, would have utterly destroyed, not only this road, but any road. The traffic would in a few weeks have rendered the road impassable for anyone, as well as the company. But the people who used the road with teams, objected to the use of the engines and induced the supervisors to bring the suit referred to. The mining company contends that if it is prevented hauling ore by traction engines it will have to quit mining altogether. The court, on the trial, did not grant a permanent injunction as prayed for, but maintains a temporary injunction until the company can show cause why it should be allowed to use the engines.

The company has been employing a hundred men in Fresno County, but since the litigation has reduced its force one-half. It spends about \$15,000 a month at the mine and thereabouts and buys its supplies locally.

The road in question was the ordinary rough mountain road before the advent of the company. The mining company filled up the "chuck" holes, built culverts, reduced grades, constructed bridges, bought rights of way and made numerous fills to fit the road for its engines. In this work it expended some \$30,000 and it has cost about \$1,000 a month to maintain the road. They "oil" the road with crude petroleum to keep down the dust and give a hard, uniform surface after the fashion now prevailing in the oilbearing regions of the State. Mile posts have been erected and water tanks placed; and the road has been made a road in fact as well as in name. After all this effort, others, privileged to use the road, without cost to themselves, have objected so strongly to the use of engines that the mining company has been put to great expense and trouble in litigation.

It seems that the mining company, before deciding on the use of engines for hauling, tried to arrange contracts with teamsters to haul a specified large amount of ore, they to give bonds for faithful performance of the contract. The company was unable to find teamsters enough to undertake the contract and accordingly purchased the engines.

Since the suits against the company were commenced there seems to have been a change, at least in public sentiment, if the numerous interviews in the local county papers are correct. The business men of the towns deplore any interference with the operations of the mining company. It is confessed even by those driving teams that the employees of the company make every effort to prevent disturbance to teams. It is an imperative duty of the men on each train to assist any teamsters whose horses become frightened, and the engine is always stopped on the approach of teams. It seems that there was about the same sort of difficulty when bicycles came into use and the advent of automobiles on the roads had the same effect. But the horses became accustomed to those vehicles as they doubtless will to the traction engines. The traction method of hauling the ore has been shown to be the only practicable one; horses and mules could not perform the work. Teamsters were offered the highest rate the ore could bear, but they declined.

The Copper King Mining Company has arranged to use its engines so as to interfere as little as possible with ordinary travel on the road. The road is used but little during the day and three engines make a round trip from Clovis to the mines at night. These leave about half an hour apart every evening and take five hours to reach the mines, and the return trip is made by six or seven o'clock the next morning. The road averages 40 feet in width, in some places widening to 60 feet. There are water-supply tanks at different points and the road is kept free from dust by the use of crude petroleum.

The Copper King Company began working these mines in 1897 and has now quite an extensive plant. At the mine there are the office, boarding house, bunk house, staff and manager's residences, assay office, conveyor house, crusher-house, powder house, oil house, carpenter and blacksmith shops, timber sheds, stables, and numerous residences.

There are two 25,000-gallon tanks for oil and water storage. The boiler house has two 80-h. p. boilers using either oil or wood fuel; a 150-h. p. Corliss engine; a 75-kilowatt Western Electric standard type dynamo developing power for electric lighting and for six motors in different departments. The double drum electric hoist is driven by a 40-h. p. motor and the No. 2 Gates crusher by a 20-h. p. motor, another of equal capacity furnishing power for the underground pump. A 10-h. p. motor drives the system of ore conveyors and other motors force the air for the forges and blowers.

At the railroad end, at Clovis, there are other boilers and dynamos, with blacksmith and repair shops, stables, residences, etc., and 20 men are employed at the station.

The smelting works of the company at Seal Bluff Landing on the San Francisco Bay shore handle not only their own ores, but attend to general custom work as well.

From this it may be noted that the operations of the company are important and it seems odd that any effort should be made by the residents of the county where the mines are located to interfere with the haulage of ore by its own methods. The company conducts by far the largest metal mining operations in the southern portion of the State and the only mining being done in a county mainly noted heretofore for its oil wells and its product of grapes and raisins. It would appear that if the company is enjoined from using traction engines to haul its ore, then it will have to cease its mining operations, just as the Mountain Copper Company of Shasta County must cease smelting if injunctions are maintained against it on account of smelter fumes. Moreover, if traction engines may be thus prohibited at that point, they may be elsewhere. A large copper company in San Bernardino County is about to use such engines in hauling its material from mine to rail and it may be interfered with also.

This kind of thing will naturally deter people from making mining investments in localities where they are likely to be disturbed or hampered, if the operations are to be on such a scale as to change conditions prevalent or to give an opportunity for people of a certain class found in most places to annoy and hamper others who are successfully carrying on large enterprises.

**BESSEMER STEEL PRODUCTION IN THE UNITED STATES.**

The American Iron and Steel Association presents complete statistics, received direct from the manufacturers, of the production of bessemer steel ingots and castings in the United States in 1901; also of the production of bessemer steel rails by the producers of bessemer steel ingots. The ingot statistics include a few thousand tons of bessemer steel castings.

*Ingots.*—The total production of bessemer steel ingots in 1901 was 8,713,302 gross tons, against 6,684,770 tons in 1900, showing an increase in 1901 of 2,028,532 tons, over 30 per cent. The production of 1901 was by far the largest in our history. The following table gives our production of bessemer steel ingots and steel castings in the last six years, including the production of the Robert-Bessemer and Tropenas works. Of the production last year 6,764 tons were steel castings, against a similar production in 1900 of 6,467 tons. The figures are in long tons:

1896.....	3,919,906	1899.....	7,586,354
1897.....	5,475,315	1900.....	6,684,770
1898.....	6,609,017	1901.....	8,713,302

Below is given by States the production of bessemer steel ingots in the last four years:

	1898.	1899.	1900.	1901.
Pennsylvania ....	3,402,254	3,968,779	3,488,731	4,293,439
Ohio .....	1,489,115	1,679,297	1,388,124	2,154,846
Illinois .....	1,105,049	1,211,246	1,115,571	1,324,217
Other States.....	612,608	727,092	692,344	940,800
Total.....	6,609,017	7,586,354	6,684,770	8,713,302

There were no Clapp-Griffiths works in operation in 1901 and only two Robert-Bessemer plants were active. Seven Tropenas plants were at work, the same number as in 1900. All the Robert-Bessemer

and Tropenas plants were employed in the production of steel castings.

*Rails.*—The production of all kinds of bessemer steel rails by the producers of bessemer steel ingots in 1901 was 2,836,273 gross tons, against a similar production in 1900 of 2,366,921 tons of 2,240,767 tons in 1899. The maximum production of bessemer steel rails by the producers of bessemer steel ingots was reached in 1901. The year of next largest production was 1900, which was closely followed by its predecessor, 1899. In 1887, fourteen years ago, 2,044,819 tons were made. This was the fourth year of largest production. The following table shows the production by States of bessemer steel rails by the producers of bessemer steel ingots in the last four years. The figures given do not include a small quantity of rails made each year from purchased blooms or from re-rolled steel rails, statistics for both of which products for 1901 are not yet available.

	1898.	1899.	1900.	1901.
Pennsylvania ....	1,052,771	1,224,807	1,195,255	1,406,008
Other States.....	902,056	1,015,960	1,166,666	1,430,265
Total.....	1,954,827	2,240,767	2,361,921	2,836,273

At the request of the manufacturers the Association reported for 1897, for the first time, the production of bessemer steel rails weighing 45 pounds and less than 85 pounds to the yard from those weighing less than 45 pounds and over 85 pounds. This separation is continued for 1901, as follows:

	Under 45 pounds	45 pounds	85 pounds	Total.
	and less	than 85	and over.	
Pennsylvania .....	80,001	1,095,279	230,728	1,406,008
Other States.....	60,213	1,106,958	263,094	1,430,265
Total, 1901.....	140,214	2,202,237	493,822	2,836,273
Total, 1900.....	154,796	1,605,067	602,058	2,361,921

It will be noticed that there was a considerable decline in 1901 in the production of steel rails weighing 85 pounds and over as compared with 1900. This is somewhat of a surprise.

The total production of rails in 1901 will include rails made from open-hearth steel and iron rails. When all the figures are collected it will probably be found that our total production of all kinds of rails in 1901 was about 2,875,000 tons.

Great Britain's largest annual production of Bessemer steel rails was in 1882, when she made 1,125,785 tons. In 1901 we more than doubled her best year's work.

**QUICKSILVER PRODUCTION OF THE WORLD.**

We are indebted to Sr. Vincente Spirck for figures showing the quicksilver production of the European mines for the year 1901. To these we have added an estimate for our own production; and we give the figures in the table below, comparing them with the statement of *The Mineral Industry* for 1900. This table covers practically the quicksilver output of the world with the exception of Mexico. The figures are in metric tons:

	1900.	1901.	Changes.	Per ct.
Austria .....	550	512	D.	38
Italy .....	220	278	I.	58
Russia .....	340	368	I.	28
Spain .....	1,111	846	D.	265
United States.....	967	992	I.	25
Total metric tons	3,188	2,996	D.	192
Total, flasks.....	91,873	86,340	D.	5,533

The production of Italy includes all the working mines. That of Austria is from the Idria mines. The Spanish output includes 786 tons from Almaden and 80 tons from the smaller mines.

The Mexican production in 1900 was 335 tons. If we allow the same for 1901 it would bring the world's total production for the year up to 3,331 metric tons, against 3,523 tons in 1900.

**GERMAN COAL PRODUCTION.**—The output of coal in Germany in the month of January is given as below by the *Kohlen Zeitung* in metric tons:

	1901.	1902.	Changes.
Coal .....	9,541,080	8,706,212	D.
Brown coal (lignite)	3,865,163	3,708,407	D.
Total .....	13,406,243	12,414,619	D.

Of the total this year Prussia furnished 8,147,956 tons of coal and 3,109,134 tons of brown coal.

### RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

**WHAT WILL BE TAKEN AS PAYMENT TO PREVENT FORFEITURE.**—There is a valid payment preventing forfeiture of an oil lease, provided for in case no well was commenced in 30 days, unless the lessee paid the lessor a certain sum of money at a certain bank, where within thirty days the lessee called at the bank with a check for the lessor, and being informed that he was out of town left the check with the cashier, who informed him it would be accepted as cash and placed to the credit of the lessor, after which it was so credited and paid.—*Sayers v. Kent* (50 *Atlantic Reporter*, 296) Supreme Court of Pennsylvania.

**WHEN PART HAS NO LIEN FOR ADVANCES.**—The owners of a mine agreed that one of the owners should make certain improvements and acquire additional property, and that the other owners should not be personally liable for any part of the sum so expended, but that their interest in the mine should be chargeable with their proportion of such expenditures, and that such owners should be entitled to a certain interest in the entire property when the proceeds were sufficient to pay the sum so advanced and interest on same, or when they paid their proportion thereof. It was held that such contract and advances did not give the owner making the improvements a lien for the advances on the interest of the other owners.—*Frowenfeld v. Hastings* (66 *Pacific Reporter*, 180); Supreme Court of California.

**ASSUMPTION OF RISK BY ONE NOT AN EMPLOYEE.**—In an action to recover damages for personal injuries alleged to have been caused by reason of the negligence of a mining company, where the evidence shows that the one injured, by the invitation of the manager of the company, but not as a servant or employee, and that with knowledge of the dangerous condition of the mine at the place where the injury occurred, by reason of props not being put under the roof to prevent the falling of rock, and that such party, who was an experienced miner, continued his work, and while so engaged sustained the injuries complained of by reason of rock falling from the roof, which had not been properly propped up, he is not entitled to recover, having assumed the risks incident to his continuing his work with knowledge of the dangerous condition of the surroundings.—*Sloss Iron and Steel Company v. Knowles* (30 *Southern Reporter*, 584); Supreme Court of Alabama.

**PARTIES ONLY BY EXPRESS AGREEMENT IN THE OIL BUSINESS.**—Owners in common of interests in oil lands, carrying on the business of producing oil, each one paying his share of the expense, and selling on his own account his share of the oil in the pipe line, do not become partners except by express agreement to that effect; and a stranger selling supplies for use on the common property to some of the part-owners, cannot maintain an action against the others, as partners, for the price of the supplies, unless such other part owners have so conducted themselves in the business, or made such statements, as to lead the stranger to believe, before making the sales, that they were partners. And a statement by one that they were partners is not a sufficient foundation for the conclusion that the party making it was a partner, if such statement was made in another suit, where it appears that there was no express agreement, that he had acquired his interest separate from his associates, that he furnished and paid his part of the machinery and expenses, that he sold his share of the oil separately, and that prior to the sale to his associates of the property, he said and did nothing to induce the seller to believe that he was a partner.—*Baker v. Brennan* 12 *Ohio District Court Reporter* 211; Circuit Court of Ohio.

**THE NATURE OF PROPERTY CONVEYED UNDER OIL LEASE.**—Where by the terms of an oil lease there was no grant of the oil as it existed in the earth, so that there was no passing of the title to the oil in its natural state, and the right was limited to the mining and excavating or the pumping and raising of the oil on the premises, the court of appeals of New York said: What was the right? Was it real estate or personal property? It is said that leases of this character are corporeal hereditaments, and that petroleum oil is a mineral, and is a part of the realty like coal, iron and copper. It is true it is a mineral substance; but it widely differs from the minerals named, which are solids, having a fixed location in the earth, like the rock itself. Petroleum oil is a fluid found in the porous sandstone of the earth. In some instances it doubtless exists in pools, but where are the pools located? They may be under the lands in which the well is drilled; they may be in the abutting or in distant lands, and may drain into the lands through seams or crevices in the rock, and then be extracted from the earth and reduced to possession by the operator. In this respect oil resembles water as it exists in the earth—especially salt and mineral waters, which have a market value—and is largely governed by the same principle or rule of law. It consequently was held at a very early day in the history of the petroleum production that a man could not be restrained from boring for oil upon his own premises, although he located his well within a few feet of the line, and would necessarily drain the oil from his neighbor's land, if any existed therein. We consequently are of the opinion that no title to the oil vested in the lessee referred to above until it had been taken from the ground and reduced to possession. The right to the oil under such a lease is personal.—*Wagner v. Mallory* (62 *Northeastern Reporter*, 584); Court of Appeals of New York.

**WHEN OIL AND GAS LEASE WILL NOT BE ENFORCED.**—Oil and gas leases stand upon quite different grounds for leases of other immovable property. The governing principle in gas and oil leases is the discovery and production of gas or oil and is a condition precedent to the existence and continuance of any vested estate in the demised premises. Where the only consideration is prospective royalties to arise from exploration and development, failure to promptly explore and develop the demised premises renders the agreement a *nudum pactum*, and works a forfeiture of the lease, for it is of the essence of such a lease that the work of exploration shall be commenced and prosecuted with promptness. The smaller the tract of land granted, the more imperative is the need of prompt exploration and development, because the lessor is entitled to his royalties as promptly as it can be had, and delay endangers the drainage of the oil and gas from his premises through wells in the immediate vicinity. Leases of coal, stone, and other like materials are corporeal, and constitute an essential part of the land itself, and are capable of present, absolute grant, while oil and gas are of a fugitive and volatile nature, a grant of either of which creates only an inchoate right, which will become absolute only upon its reduction to possession. A lease of a mine for oil or gas is a mere incorporeal right to be exercised in the land of another. It is a *profit à prendre*—to be taken, which may be held separate and apart from the possession of the land itself. Where, except for an expressed consideration of \$1, the lessee gave no consideration for the lease; nor was bound by any enforceable promise or covenant, for the breach of which the lessor would have a right of action to compel the payment or yielding of any further consideration; having merely a right to a portion of the oil when it has been produced and saved and actually transported, such lease is without consideration, and must be held void, as being unfair, inequitable and against good conscience, and which no court ought to enforce.—*Federal Oil Company v. Western Oil Company* (112 *Federal Reporter*, 375); Circuit Court of the United States, District of Indiana.

### ABSTRACTS OF OFFICIAL REPORTS.

*Osceola Consolidated Mining Company, Michigan.*

The report of this company covers the year ending December 31, 1901. The balance sheet at the close of the year shows assets as follows: Cash, accounts and copper in Boston, \$1,014,265; cash and supplies at mine, \$207,302; wood-lands, \$44,149; Mineral Range Railroad Company stock, \$100,000; Lake Superior Smelting Company stock, \$60,000; total, \$1,425,716. The liabilities were: Accounts payable at mines, \$271,628; accounts payable at Boston, including advances on copper, since paid from the sale of same, \$1,395,586; total liabilities, \$1,667,214, showing a balance of liabilities December 31 of \$241,498. There still remains in the treasury 3,850 shares of this company's stock which is not included in above statement.

The income account for the year may be stated as follows:

	Total.	Per lb. copper, cents.
Copper sold, interest, etc.....	\$1,934,437	14.10
Total cost at mines.....	1,699,536	12.38
Balance, mining profit.....	\$234,001	1.72
Construction.....	451,760	3.29
Deficit for the year.....	\$216,859	1.57
Dividends paid, \$6 per share.....	576,900	.....
Total deficit.....	\$793,759	.....
Credit balance, Jan. 1, 1901.....	552,261	.....
Debit balance, Dec. 31, 1901.....	\$241,498	.....

The actual average receipts per pound of copper were 13.90 cents, which was brought up to 14.10 cents, as above, by interest and miscellaneous receipts. The total amount paid for new construction was \$483,481, of which the sum of \$31,721 was provided from the special construction fund, leaving a balance of \$451,760, as above.

The mine statement shows that the total rock raised was 958,272 tons; rock stamped, 793,207 tons. The total mineral obtained was 18,807,616 pounds, averaging 72.968 per cent copper. The actual quantity of copper made is not stated, but at the percentage given it would work out at 13,723,541 pounds. The cost of stamping rock in the old mill was 29.22 cents per ton; in the new mill 22.01 cents.

The total openings on all branches of the property were: Shafts, 1,560 feet; levels, 21,589 feet; winzes, 486 feet; openings for pillars, 5,394 feet; total, 29,030 feet. This work was distributed among the different branches of the property as follows: Osceola, 18,969; North Kearsarge, 5,769; South Kearsarge, 4,132; Tamarack Junior, 160. The report says:

"At the Osceola branch there has been practically a new mine opened up in the foot wall side of the lode in addition to the large amount of regular sinking and drifting in excess of ground exhausted by stoping. At North Kearsarge Branch, 918 feet of large three-compartment shafts have been raised and sunk, and, by reason of the new equipment referred to in the last report, the mine has been opened up from a mere exploratory scale, with one small single compartment shaft, to the possibilities of a large producer. At South Kearsarge Branch, 193 feet of shafts and 3,940 feet of large drifts have been opened up during the year, and to date no stoping has been done, although the drifts showed very little that we do not consider good stoping ground. At Tamarack Junior Branch we have been working on such ground opened as would justify dollar for dollar, and removing the pillars left in the past in some of the richer stretches of the lode. This latter has been expensive mining on account of the heavy timbering necessary to secure the miners from injury in removing the pillars."

The report of Superintendent W. E. Parnall refers at length to the improved mortars used in the new mill, and says that in the old mill it has never been possible to reduce the losses in the tailings below an average of 0.26 per cent. In the new mill the average last year was 0.094 per cent. This difference means 2.39 pounds of copper per ton of rock, the importance of which is illustrated as follows:

"The two Osceola mills the past year stamped 687,094 tons of rock. A difference of 2.39 pounds

per ton means 1,642,154 pounds of ingot copper, which at say 10 cents per pound figures a value of \$164,215 in round numbers. Add to this a difference of cost in stamping of say 5 cents per ton (it will certainly amount to that much), which is \$34,354, and we have a total of \$198,569."

The directors' report says: "In the foregoing statement it will be noted, in the first place, that the net income for the year has not been sufficient to pay the dividends declared, so that a portion of the dividends must be regarded as a distribution of the surplus which had been accumulated in the past. At the time of the declaration of the last dividend it was expected that the copper on hand would be sold at the same price as had been received during the first part of the year. About this time, however, the price of copper rapidly declined until it became necessary to sell a portion of our copper on hand at a low price. Of course, could this sudden decline have been foreseen there would have been no dividend declared for the latter half of the year.

"The management wishes to assume the responsibility for the price which the company has received for its copper during the year 1901—13.90 cents per pound; all of the copper was sold through the United Metals Selling Company, the successors of Lewisohn Brothers, who have been our selling agents for many years past. It was thought by the officers of those companies for which the United Metals Selling Company acts as selling agent that there was no necessity for reducing the price of copper much below 17 cents, particularly as the other competitive companies who sell through various channels had repeatedly expressed the same views. On the well-founded supposition that these competitive companies were not selling below 17 cents, we sold all we could at that price, and still believe that had the competitive companies acted upon the views they expressed the price would have remained stable. It was discovered, however, to our cost, that the market was being undersold, and that we had been occupying the position of maintaining the price and allowing our competitors to sell under this protection. As soon as the management was thoroughly convinced of this, it began to market its copper, but to do this was forced to meet all cuts in price made by its competitors.

"We regret that we have had this experience, not only because it has for the current year decreased the revenue of the company, but for the further reason that it has convinced us that any future harmonious action between the various copper producers for their mutual advantage is out of the question.

"It will also be noted that the company has during the year not only exhausted its surplus, but on December 31, 1901, showed a balance of liabilities of \$241,498. Against this, however, there are in the treasury 3,850 shares of treasury stock, which at present prices is more than sufficient to offset this liability. This situation has been brought about by the very largely increased amount of money needed for new construction and development. It was deemed for the best interests of the stockholders that this work should be pushed to completion as rapidly as possible, so that the company might be in a position to produce its copper at the lowest possible cost and in the most economical manner. Otherwise, this construction account would have spread over a much longer period, thus making a more favorable showing for this year. What has been accomplished through the expenditure of this money is best told by our superintendent in his report.

"With practically all extraordinary construction finished, the future prosperity of the company depends, of course, upon the price received for copper. It should be borne in mind that the cost per pound of producing our copper has increased at least 20 per cent, owing to the higher prices paid for labor and supplies. This amounts to nearly 2 cents per pound."

*Atlantic Mining Company, Michigan.*

The report of this company covers the year ending December 31, 1901. The financial balance at the close of the year showed assets as follows: Cash,

\$11,263; copper on hand, \$89,207; cash and supplies at mine, \$96,368; merchandise in store at mine, \$76,166; accounts receivable, \$5,342; total, \$278,346. The liabilities were: Indebtedness at mine, \$86,910; loans, \$80,000; accounts payable, \$15,737; total, \$182,647, leaving a balance of assets amounting to \$95,699.

The mine report shows the following results for the year: Ground broken in openings and stopes, 24,883 fathoms; rock stamped, 409,124 tons; product of mineral, 6,317,645 pounds; product of refined copper, 4,666,889 pounds; yield of refined copper per cubic fathom of ground broken, 187 pounds; yield of rock treated, 11.4 pounds per ton, or 0.57 per cent.

Some details of development work and costs for the year are: Sinking shafts, 281 feet, average cost \$24.52 per foot; forks, 11 feet, \$13.78 per foot; winzes, 72 feet, \$10.63 per foot; drifts, 6,623 feet (8 by 10 feet), \$4.84 per foot; stoping, 22,320 fathoms, \$4.09 per fathom.

The following statement shows the receipts and expenses with the averages per ton of rock stamped and per pound of refined copper:

	Total.	Per ton. Rock.	Per lb. Copper. (Cents.)
Copper sold.....	\$735,577	\$1,7977	15.76
Mine expenses.....	\$573,342	\$1.4013	12.29
Smelting, freight, etc.....	62,954	0.1539	1.35
Running expenses.....	\$636,296	\$1.5552	13.64
Construction and exploration.....	191,144	0.4669	4.09
Total expenses.....	\$827,440	\$2.0224	17.73
Deficit .....	\$91,863	\$0.2247	1.97
Received for lands sold.....	11,600	0.0283	0.25
Balance .....	\$80,263	\$0.1964	1.72
Surplus for previous year.....	175,962	...	...
Surplus, Dec. 31, 1901....	\$95,699	...	...

The average mine expenses per ton were made up as follows: Mining, selecting and breaking, and all surface expenses, including taxes, \$1.1048; transportation to mill, \$0.0767; stamping and separating \$0.2198; total, \$1.4013. As usual with this company, the expenses are given in the report with much detail.

The report of Agent F. McM. Stanton says: "A decrease in the yield of the rock of nearly 0.6 pound of copper per ton cannot positively be accounted for, but is probably the result of treating a large portion of the rock from the extreme northern and southern portions of the mine. There is apparently no difference in the yield of the rock in the bottom of D shaft, which is the deepest portion of the mine. The new compressor plant has relieved our work greatly. The main pumping plant is in poor condition, is overtaxed and is operating very uneconomically, but it is expected that by relieving it of a large portion of its work by the addition of auxiliary pumps, costs can be cut down in this department."

The directors' report sums up the work of the year as follows: "A low record of the yield of the rock was reached during the year, as will be noted in the table of monthly yield which is appended; the average yield having been only 11.4 pounds of refined copper per ton of rock stamped. The lowest yield was in the months of March and April, since then a gradual improvement has taken place, and it is hoped that a further increase will be manifested during the current year.

"The expenditures for new machinery and other improvements have again been large. Early in the year the directors determined to take advantage of the high price of copper and to make without delay such improvements as would be required in order to place the mine in the most favorable position to produce copper with economy, and thus to be prepared to meet a break in the market price of copper which was foreseen but came sooner than was expected, and the operations of the current year should begin to be benefited by these expenditures to the extent of a marked reduction in the cost of handling the rock.

"Owing to unforeseen conditions, larger expenditures than were anticipated were required to make the banks on each side of the new dam entirely secure from leakage, and the original estimate of cost of its construction has been considerably exceeded.

"In addition to the large hoisting plant at D shaft,

named in last report, it has been advisable to install a high duty compressor plant, of capacity sufficient to provide for the requirements of the entire mine. This plant replaces a series of small compressors installed from time to time, as the exigencies of the work demanded, which have become worn by years of work, and are not equal to the duty now required of them, nor are they as economical in operation as modern machines of the first class. Both of the plants named will be driven by steam appliances of the most approved type, and their use should effect a large saving in fuel and the cost of operation.

"A coal yard with trestle work for unloading cars, and appliances for handling coal with economy, has been installed at the mine, for the purpose of receiving coal by the Copper Range Railroad direct from vessels, instead of storing it on our dock at Portage Lake, as heretofore, thus making quite a reduction in its cost as distributed at our boiler plants.

"The mine store building erected in the early days of the mine was entirely too small to properly handle the business now transacted, and had become dilapidated from age. It was therefore determined to erect a new building for this purpose, of better plan and construction, and in a more suitable location. This building should pay for itself in a short time by increased business and more economical handling of goods.

"The extension of the northerly levels in the Baltic Mine discloses a change in the course of the Baltic Lode, which, if it continues, would carry that lode somewhat to the west of our former explorations in search of it on our Section 16, and we have resumed the exploration in a westerly direction. Although the exploring drift has not yet penetrated any formation that resembles the Baltic Lode, yet we are encouraged to believe that the lode will soon be reached."

**NEW PUBLICATIONS.**

*Furnace Draft. Its Production by Mechanical Means.* By William Wallace Christie. New York; the D. Van Nostrand Company. Pages, 44; illustrated. Price, 50 cents.

This is a brief treatise showing the advantages of mechanical draft over ordinary chimney draft, and describing some of the appliances used to produce draft. The different systems are fairly illustrated and a number of useful tables are added, with accounts of tests and experiments.

*Twelfth Census of the United States. Population. Part 1.* William R. Merriam, Director of the Census. Washington; United States Census Office. Pages, 1,006.

This is the first volume to appear of the series which will embody the results of the census of 1900. It is given up entirely to the statistics of population, including those of States, of counties and of the minor civil divisions, such as cities, towns, villages, etc. It includes also the division of population by sex, color, native and foreign birth. The volume includes several interesting maps and diagrams showing the distribution of population and similar figures.

*Ohio Society of Surveyors and Civil Engineers. Proceedings of the Twenty-second Annual Meeting. 1901.* Frederick J. Cellarius, Secretary. Dayton, O.; published by the Society. Pages, 168; illustrated. Price, 50 cents.

This volume records the proceedings of the Ohio Society of Surveyors and Civil Engineers at its twenty-second yearly meeting. It contains a number of interesting papers, with the discussions which their reading called out, and also the reports of officers and committees of the Society. The papers relate largely to questions affecting road-building and municipal engineering, and include some valuable records of experience in those lines.

*Directory to the Iron and Steel Works of the United States; to which is Added a Complete List of the Iron and Steel Works of Canada.* Fifteenth Edition; Corrected to December 31, 1901. Compiled

by the American Iron and Steel Association, James M. Swank, General Manager. Philadelphia; Published by the Association. Pages, 428. Price, \$10.

It is not necessary to speak here of the value and importance of this work, which is the recognized official list of the iron and steel works of the United States. It is enough to say that in supervising its preparation Mr. Swank has shown his accustomed care and thoroughness. While no criticism is called for, an outline of its contents may be of interest to our readers. The present edition is divided into four parts, as follows:

Part I, occupying 151 pages, is chiefly devoted to the presentation of a full list of the consolidations and reorganizations that have taken place in the American iron trade during the last few years, with a full account of their capitalization and of the properties absorbed by them, mentioning also the names of previous owners of the properties. The names of directors, executive committees, and other officers are given in full. Coal and iron ore mines, coke ovens, lake vessels, railroads, limestone quarries, and all properties other than iron and steel works that have been acquired by the consolidated or reorganized companies are fully described, as are the iron and steel works themselves. Some of the older manufacturing companies of the country, which have been neither consolidated nor reorganized, are also for special reasons included in Part I. All the iron and steel works and other properties of each consolidated, reorganized, or other company that is mentioned in Part I are described in one connected narrative, no matter in how many States they may be situated, and under a displayed title. In other words, a chapter is devoted to each company that is described in Part I. This is an entirely new feature of the *Directory*.

Part II, occupying 164 pages, embodies a complete description of all iron and steel works in the United States that are not described in Part I. The arrangement in Part II is by States and districts, as in previous editions, but with this difference, that all the iron and steel enterprises in each State and district are grouped together, the furnaces coming first and then the rolling mills and steel works and forges and bloomeries. A complete list of recently abandoned iron and steel works, classified by States, is a feature of Part II.

Part III occupies 71 pages and is devoted to the classification by States of the iron and steel works of the whole country (except blast furnaces) according to their products—the Bessemer steel works, the open-hearth steel works, the crucible steel works, all the steel casting works, the iron and steel rail mills, the structural mills, the plate, sheet, and skelp mills, the tinplate and terne plate works, the cut-nail works, the wire-rod mills, and the wire-nail works. This classification will be found to be very convenient for ready reference.

Part IV occupies 13 pages. While Parts I, II, and III were passing through the press in the late months of 1901 changes were taking place in the officers of many of the companies whose works are described in its pages and some new enterprises noted in the directory as having been undertaken were completed. All these and some other changes which had taken place prior to December 31, 1901, are fully noted in this part, so that the whole book may be regarded as complete down to the date mentioned. We have even noted some changes in officers, etc., that have since taken place.

This edition of the *Directory* also contains a complete account of the iron and steel enterprises in the Dominion of Canada which had been completed or undertaken down to December 31, 1901.

#### BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the *ENGINEERING AND MINING JOURNAL*.

*The Copper Hand-Book*. By Horace J. Stevens. Volume II., for the year 1901. Houghton, Mich.; Horace J. Stevens. Pages, 416. Price, in buckram, \$2; in morocco, \$3.

*A Practical Treatise on Mine Surveying*. By Arnold Lupton. New York and London; Longmans, Green & Company. Pages, 416; illustrated. Price, \$5.

*Aide-Memoire du Mineur et du Prospecteur*. By Paul F. Chalon. New edition, enlarged and entirely rewritten. Paris, France; Ch. Beranger. Pages, 412.

#### CORRESPONDENCE

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

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

#### *New Developments in the Mesabi Iron Range.*

Sir: In a summary of a talk which I gave before the Geological Society of Washington on certain new developments in the Mesabi Iron Range, which appeared in the *ENGINEERING AND MINING JOURNAL* of February 22, the statement is made that "The phosphorus in the ore deposits is a residual product and not a concentration." The statement should read: "The phosphorus in the ore deposits is a concentration and not a residual product." The original rock from which the ores have altered contains a lower percentage of phosphorus than the ores.

C. K. LEITH.

Madison, Wis., March 5, 1902.

#### *The Troy Copper Company.*

Sir: In your issue of February 22 inst. under General Mining News for Pinal County, Arizona, I note among the officers of the Troy Copper Company that my name appears as consulting engineer.

Will you kindly correct this statement, as I resigned my position with them about one year ago, and have not been connected with them since in any capacity.

GEO. S. ANDRUS.

Globe, Ariz., Feb. 27, 1902.

#### *Buyers of Molybdenum and Chrome.*

Sir: In the *ENGINEERING AND MINING JOURNAL* of February 15 one of your correspondents asks for the names of buyers of molybdenum, stating that he has some for sale. We notice that you give him only the names of American buyers. We desire to state that we are always open to buy molybdenum, and hope, therefore, that in the future you will kindly keep our name before you as buyers of this mineral. We also call attention to your issue of January 4 in regard to the chrome ore in New Caledonia, in which you state that you will be pleased to furnish your correspondents with particulars as to the sellers of this mineral. We shall be glad to be put in communication with parties who are open to sell.

EVERITT & CO.

Liverpool, England, Feb. 24, 1902.

#### *Tungsten Deposit in Washington.*

Sir: An article in your issue of March 1, by Mr. Fred. D. Smith, on "The Osceola, Nevada, Tungsten Deposits," recalled to mind a deposit of wolframite which I happened upon last summer, in Stevens County, Washington. The mineral occurred in a gangue of white and gray quartz, between walls of granite. A number of claims had been staked upon the vein, but nothing beyond assessment work had been done. I visited the property in the company of the owner of one of these claims, and found at one point a shaft of some thirty feet in depth, but full of water, and, of course, inaccessible. At another point upon this claim, a tunnel had been run in upon the vein to a distance of about 50 feet, and from this tunnel, or drift, and its dump, I brought away a number of excellent specimens. The mineral occurs in crystals ranging in size from very small up to perhaps a pound in weight; these crystals are disseminated with considerable regularity through the quartz, but appear to be somewhat concentrated near both

walls. From observation of both the above-mentioned workings, and such points of the outcrop as were visible, I should judge the vein to average about 4 feet in thickness; the dip is about 75°, and the walls are very distinct, giving an excellent parting from the vein matter.

I found that the claims had been taken up in the hope that the vein matter would yield one or both of the precious metals; the wolframite was supposed to be a mysteriously heavy iron ore, which view had been strengthened or confirmed by local assayers. The returns of these assayers showed but small amounts of gold and silver, too small to warrant working the property for their recovery alone, under the present conditions of the district. After my very brief visit I am not prepared to say or even estimate the percentage of wolframite contained between walls, but my impression was that the ore was very rich. The location is but 28 miles, by good wagon road, from the railroad, and it would seem that by the expenditure of a small amount of capital for the erection of a concentrator, the property should be made to pay.

W. S. THYNG.

Pullman, Wash., March 6, 1902.

#### *Platinum (?) in Wyoming.*

Sir: I have noticed in your columns several references to the discovery of platinum in Wyoming, first, in the article by Wilbur C. Knight, and later in your editorial correction regarding the true discoverer of this metal in the Rambler ore.

This Rambler ore has been shipped during the winter to the Boston & Wyoming Smelter at Grand Encampment and there reduced to a high-grade matte. If I am correctly informed, the smelter has until recently operated almost exclusively on this ore. I have made the assays on practically all of this high-grade matte and have noticed the presence of a third metal remaining with the gold and silver after cupelling. This metal is too dark to be mistaken for silver. In many of its reactions it acts like platinum and in very small quantities might be mistaken for it. The fact that it remains with the gold and silver after repeated cupelling would lead the assayer to call it platinum.

In order to get sufficient of the metal to work with I used a considerable quantity of certain metallic "bottoms" found under the above-mentioned matte, in which the metal was concentrated. I have found by a number of conclusive tests, some of which I give below, that this metal is palladium and not platinum. I cannot assert positively as yet that there are not traces of platinum present with the palladium.

I separated the metal with the gold and silver by the regular combination method, parted (after first alloying with considerable silver) with concentrated sulphuric acid, finding part of the metal in solution on strong heating. I then dissolved the residue in aqua regia, precipitated as sulphide in acid solution, and found the bulk of the sulphide insoluble in sodium sulphide with excess sulphur. I then ignited the sulphide and converted into chloride and found the following reactions: A heavy flesh-colored precipitate with ammonia soluble to colorless solution in excess, a black precipitate with potassium iodide, a gelatinous precipitate with cyanide of mercury, a reddish precipitate with caustic soda, yellow crystal with ammonium chloride insoluble on dilution, yellow crystals with potassium chloride soluble on dilution.

These and other reactions taken with the brittleness of the metal and its bluish coating on heating, together with a low specific gravity, have led me to the conclusion stated above.

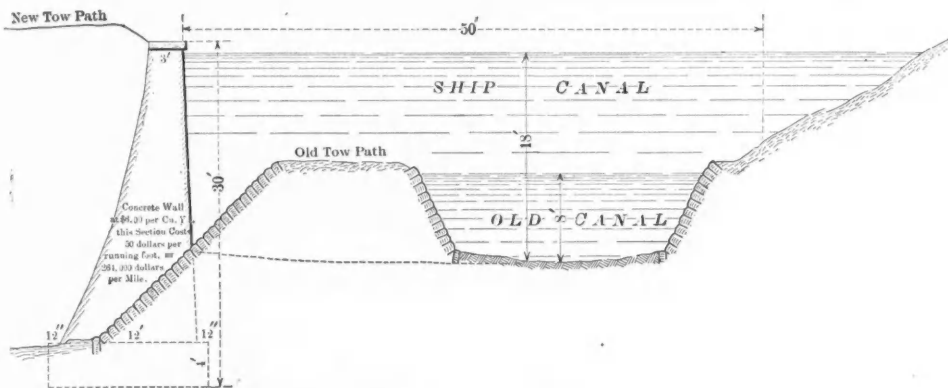
I should be pleased to learn from those who have reported platinum in the Rambler ore on what tests they base their reports.

WINTHROP COOLIDGE.

Blue Island, Ill., March 1, 1902.

*Plan for Enlarging or Making a Canal.*

Sir: The enlargement of the canals of the State of New York is now being discussed in the Legislature, and there has been in the newspapers of late on account of the decline of the port of the City of New York, much discussion relative to the deepening of the Erie Canal with the view of increased tonnage, and advantages to be derived thereby. The accompanying sketch, made at my suggestion some years ago, may give practical engineers an opportunity to discover whether the plans are of practical value, and useful in enlarging or in constructing new canals. Transportation on canals for a long time has not been much in favor, as the railroads give much quicker transit, but there is opportunity not only in the State of New York but others where deep water canals can be made profitable, and the people of the city and State will not be satisfied until the Erie Canal is made of sufficient depth to float larger vessels to the city of New York and across the city by the Harlem Canal. Then, if necessary, to transfer freight to the largest vessels on the East River, which can reach the ocean through Long Island Sound.



PROPOSED CANAL SECTION.

I have used beton, or concrete, for foundations for a number of anthracite coal breakers, engine, pump and other foundations in the past twenty years, and believe it far preferable to cut stone, and not more expensive.

The French people have used beton for bridges two or three decades past, and there are some notable instances of late of its use in bridges, etc., in this country. There would be many advantages in adopting this method in enlarging the Erie Canal, as a very large portion of the work could be done in the warm season of the year, while the canal was in use. Cement is made in New York and adjoining States; stone is easily obtained, and the transportation of all materials on the canal would be cheap. The beton can be placed in the walls as prepared on the boat with little hand labor. Prison labor could be made available in the warm season, as comfortable barracks could be maintained. Why not work the prisoners and save expense to the State? While the canal is in use, dredging on one side may be completed, and then electric or steam power used while dredging the other side. Floating dredges would not interfere with ordinary use of the canal. The sketch is drawn, showing bank on one side, but two concrete walls would be used mainly, and expense is marked as for one wall, at the highest rate for concrete, and it is presumed that two walls may be built at cost named for one on the sketch, and that no towpath would be needed. With two such walls the outcry about steam or electric power for transportation affecting banks or wall would cease, and the "patient" mule might be excused from further duty. It is too late any way to think of such power for transportation in this section of our country. As to cost of such canals, good beton or concrete walls may be made for from \$3 to \$6 per cubic yard, and engineers can readily make estimates as to the size, quantity of material required, etc., etc. The sketch affords only suggestions.

WM. H. RICHMOND.

Richmond Hill, Scranton, Pa., Feb. 19, 1902.

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. Preferences will, of course, always be given to questions submitted by subscribers. Books referred to in this column can be obtained from the Book Department of the ENGINEERING AND MINING JOURNAL.

**Cryolite.**—Can you tell me through your columns whether or not the cryolite mines at Evgitok, Greenland, are still worked? What firm in the United States imports the mineral from them?—F. W. S.

**Answer.**—The cryolite mines in Greenland are steadily worked. All the mineral sent to the United States is taken by the Pennsylvania Salt Manufacturing Company, whose office and works are at Natrona, Pa. That company has a contract for a fixed proportion of the output, the balance going to Denmark.

**Vanadium.**—We have some customers who desire to learn something of the value of vanadium, whether

there is a market for the ore, if so, the name and address of those who buy; also name and address of those who are prepared to treat it.—B. D.

**Answer.**—Vanadium is not treated in this country at present. Some ore has been mined in Colorado and sold chiefly to foreign parties. The Alloys Syndicate of London, England, and some French houses are the chief users. Messrs. Poullot & Voilleque, of Cashen, Colo., are buyers of the ore, and can doubtless inform you as to the quantity they are prepared to take and the grade of ore which is salable.

**New York Mining Law.**—Will you kindly tell me if the finder of ore on a property has any rights that a property owner need respect according to the law in New York State?—R. H.

**Answer.**—According to the law of New York mines of gold or silver, and of copper, tin, iron and lead can be acquired by the discoverer from the State, all such mines being held to belong to the State. The requirements are a proper license from the Secretary of State and the payment of a small royalty. If the mines discovered are on private property, however, the discoverer must obtain the consent of the owner of the surface before he can enter upon the land to carry on mining operations.

You can obtain a copy of the State mining law—which is Article VI of the public land law—from the Secretary of State at Albany. It will be your best plan to do this and see just how you stand.

**Wood as a Fuel for a Reverberatory Furnace.**—We have copper pyrites in quartz carrying good values in gold and silver. We have abundance of pine and oak wood. Could a reverberatory furnace with hearth 10 feet long be operated on these ores with this class of wood for fuel? If so what would the probable consumption of wood be as compared with coal? Would it be best to mix the woods, and if so in what proportions?—M. A. C.

**Answer.**—With regard to this question, which was published in our issue of February 22, Mr. S. W. Tyler, of Denver, Colo., writes us as follows: "Let me recall to you the long continued and successful operations of the Boston & Colorado Smelting Company, of which the late N. P. Hill was the organizer and manager, at Black Hawk, in Gilpin County, Colorado. For many years prior to the removal of the works to Argo, near Denver, wood (pine and spruce at that) was the sole fuel used in the reverberatory matting furnaces.

"Last year, at Washington Camp, Arizona, I saw the ordinary black oak of the district successfully used as fuel in running down the partially roasted ores of the Pride of the West Mine to merchantable copper matte. As you suggest, a deep fire-box is found necessary. Ten feet length of hearth is much too short to get the best effect from the flame. Sixteen feet is better."

THE H. H. STEAM TRAP.

All users of steam, either for heat or power, recognize the value of an automatic steam trap for relieving, without loss of steam, the water which, by condensation, accumulates in steam devices, be it either of high or low pressure service. James McCrea & Company, Chicago, Ill., the manufacturers of the H. H. Steam Trap, claim it to be the most modern device of its kind in the market. It is sold under a guarantee to work successfully under all pressures from 1 to 150 pounds, and to deliver the water against any back pressure not exceeding five pounds less than the steam pressure at the traps. The accompanying illustration (Fig. 1) shows the construction of this trap, which consists of a cast-iron bed blade and a removable dome of sufficient size to accommodate the seamless float which is

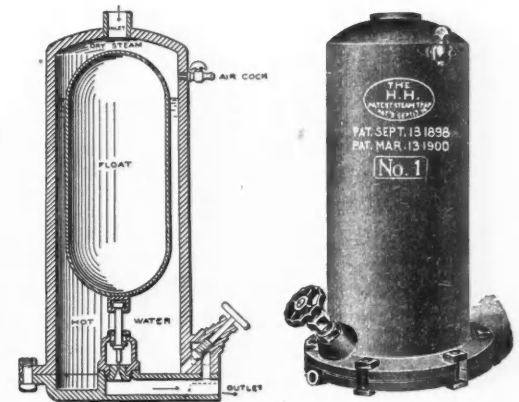


Fig. 1.

Fig. 2.

THE H. H. STEAM TRAP.

made of high grade copper, and equipped with non-corrosive phosphor bronze valves, easily renewable in cast of wear, thus making the trap practically as good as new at slight expense. As the trap is always two-thirds full of water, it makes an effective seal and prevents the loss of steam.

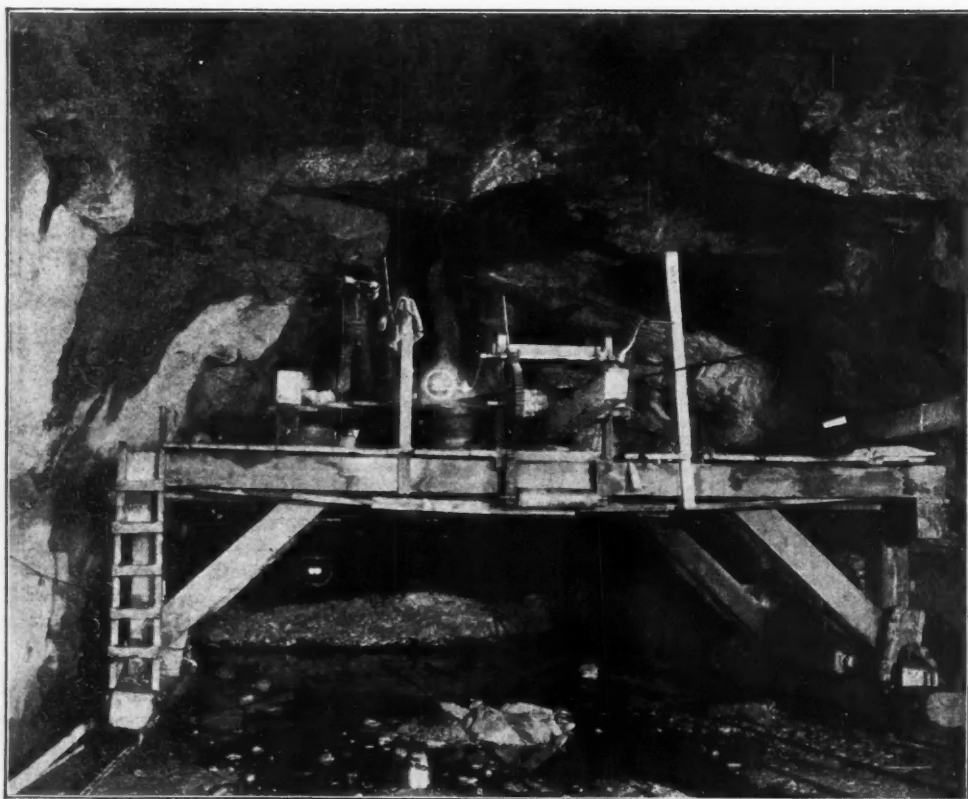
The ease with which the trap may be opened will be seen by glancing at Fig. 2. By simply loosening the nuts, the dome holding the nuts in place will slip out releasing the two parts instantly. The inlet connection (see Fig. 1) is at the top and the discharge is at the bottom of the trap. When starting it, the valve at the discharge should be closed and the air valve at the top opened. When the air has had time to escape the air vent is closed and the trap is ready to work. If at any time the trap does not appear to work satisfactorily, the air valve should be opened for a moment.

The traps are furnished with or without a glass gauge and buyers should state particularly the style desired. Both high and low pressure valves are furnished, and it is well when ordering to state the exact pressure or variation of pressure under which it is desired to operate the trap. The traps are thoroughly inspected before being sent out, the tests being under full steam pressure.

**ACETYLENE LAMPS IN NEW YORK SUBWAY.**

The New York subway excavation is making remarkable progress. Half the digging has already been done, at a cost of \$13,750,000. The excavation has been accomplished at a rate which surpasses all records. In 19 months there have been removed 1,113,000 cubic yards of earth and 450,000 cubic yards of rock, largely due to the many improved methods which the contractors have adopted to facilitate their operations.

Ira A. Shaler, who has the contract for the tunnel from 34th street to 41st street in Park avenue, is one of the leaders in this respect. The cut shows one of his special appliances to facilitate his rather difficult undertaking. It is a large platform or stage, mounted on wheels, running on an ordinary rail, and is moved either backward or forward as desired, by means of the windlass. Mr. Shaler considers it invaluable for scaling after blasts and for additional drilling on the sides and roof to form out the tunnel as the work advances. The cut also indicates a new light which Mr. Shaler uses with much satisfaction. It is one of the Baldwin acetylene lamps, which are rapidly coming to the front for mine and tunnel work. As seen, four men are working by the light from one lamp; two other lamps further in on a muck pile are also indicated, but cannot be distinctly seen owing to the peculiar effect of the light on the plates. Mr. Shaler, who has about 40 of these lamps in daily use, considers them by far the best light he has been able to procure. They are said to be economical in use, give off no smoke or smell, and for a small heading are excellent, as they consume little oxygen and do not materially vitiate the air in close places.



ACETYLENE MINE LAMP, GIVING LIGHT TO FOUR MEN IN SUBWAY TUNNEL.

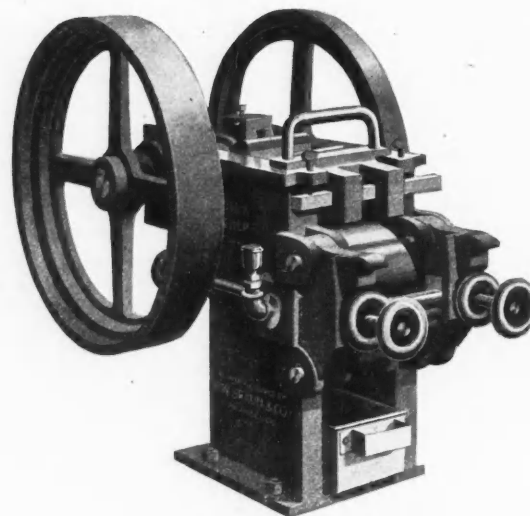
The manufacturers state that already more than 100 mines are using these lamps to a greater or less extent; several others are considering putting in a large supply.

**PROPOSED LOCOMOTIVE WORKS AT CORNWALL, ONTARIO.**—Commercial Agent Hamilton writes to the State Department from Cornwall, February 15, 1902: A strong and influential movement is being made to get the American Locomotive Company, of Chicago, to establish a plant here. Twenty-five acres of land will be necessary, which will be readily supplied, as well as water power, exemption from taxes, etc.

**THE "PERFECTION" ORE CRUSHER.**

A crusher of improved form for laboratory use has recently been placed on the market and has many good points to commend it to anyone wishing to crush or pulverize small quantities. It is ar-

times. The capacity, as will readily be seen, depends on the size of the product desired. The tests referred to above were made with a crusher, operated by a half-horse power motor, and speeded to 200 revolutions per minute.



BRAUN'S ROLL CRUSHER.

ranged to be operated by hand or power and will crush ore from 2 inches in diameter to a 100 mesh. The machine is a combination of jaw and roll crusher, the stationary jaw in ordinary crushers being replaced in this by an upper movable jaw and a steel roll. The heavy crushing is done against

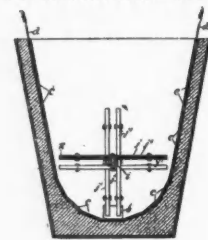
The manufacturers, F. W. Braun & Co., Los Angeles, Cal., have had a machine similar to this on the market a number of years, but believe that this improved type will meet the needs of assayers and others still better than the old pattern.

**PATENTS RELATING TO MINING AND METALLURGY****UNITED STATES.**

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the *ENGINEERING AND MINING JOURNAL* upon receipt of 25 cents.

*Week Ending March 4, 1902.*

- 694.348. **APPARATUS FOR TREATING METALS.**—George C. Carsons, Redding, Cal. A blowpipe or jet composed of hollow carbon having an internal sleeve split and lapped, and forming a reinforcement for said carbon.
- 694.349. **PROCESS OF RECOVERING GOLD FROM REFRACTORY ORES.**—Henry R. Cassel, New York, N. Y. The process consists in converting the ore into a pulp, adding a salt capable of yielding by electrolysis oxidizing and dissolving agents, agitating the mixture and simultaneously electrolyzing it under such conditions as to oxidize the refractory elements, dissolve the gold and reprecipitate the dissolved gold in the form of a black powder, and finally adding a solvent to redissolve such black powder.



694,350.

- 694.350. **APPARATUS FOR RECOVERING PRECIOUS METALS FROM REFRACTORY ORES.**—Henry R. Cassel, New York, N. Y. The combination of a vessel with a lining composed of grooved carbon plates, and of metal conducting-strips contained within the grooves of said plates.

- 694.355. **CONVEYING APPARATUS.**—James G. Delaney, New York, N. Y., and Thomas S. Miller, South Orange, N. J. In combination, two relatively moving supports, a load-carrier, a ropeway whereon said load-carrier is transferred from one support to the other, a tension mechanism tending to hold said ropeway taut and consisting of a float immersed in a fluid.

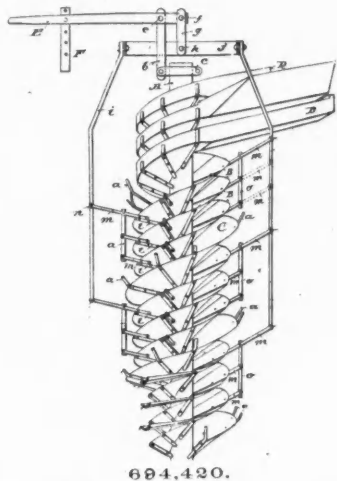
- 694.378. **HOISTING AND CONVEYING APPARATUS.**—Henry H. Guffin, Indianapolis, Ind. In a hoisting and conveying apparatus, a way, a carriage adapted to travel on said way, a receptacle, a sheave attached to said receptacle, a rope attached to the block of said sheave and passing thence over a sheave in said carriage, thence under the sheave attached to the receptacle, thence over a second sheave in said carriage, thence around a sheave located at a point outside the line of said way, thence back and over an idler located in the carriage, means for operating said rope, and means for dumping said receptacle.

the upper jaw, and the material pulverized between the roll and the lower part of the vibratory jaw which is ground to fit the roll. Three small rolls or chokes prevent back motion in the large roll. Adjustment is accomplished by screws pressing on opposite sides of the boxes, in which the roll is journaled. A special feature is the ease and thoroughness with which the machine may be cleaned.

With ore of average hardness, between 40 and 60 pounds an hour can be crushed and a third of this product will be a 60-mesh powder or finer. It may be adjusted to crush a 100 mesh, but to obtain the finer powders, it is necessary to screen the product and run it through the crusher several



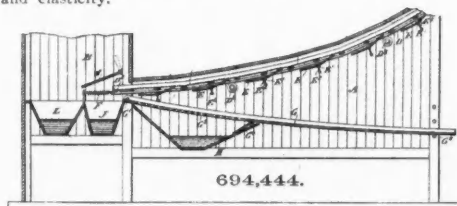
694,383. UNLOADING APPARATUS.—George H. Hulett, Cleveland, Ohio, assignor of one-half to Webster, Camp & Lane Machine Company, Akron, Ohio. In an unloading apparatus, the combinations with a leg, of a scraper carried by said leg and movable in a horizontal plane at right angles to the longitudinal axis thereof and means for moving said scraper longitudinally.



694,383.

694,420. SEPARATOR FOR ORE, COAL, ETC.—James N. Rice, Scranton, Pa., assignor to Anthracite Separator Company, Hazleton, Pa., a corporation of Pennsylvania. A suitably-supported spiral having overlapping segments in combination with arms connecting with the radial overlapping edges of such segments, and rods to which said arms are pivotally secured, said rods being movable and adapted by their movements to change the angles of the segments with which they are connected.

694,424. COMPOUND OF MAGNESIA.—Emil Rueff, New York, N. Y. A compound of magnesia, carbon dioxide, and water, which contains at least twice as many molecules of magnesia as of carbon dioxide, and more molecules of water than of magnesia, said compound being very finely divided and light, forming porous lumps in the presence of water, being a bad conductor of sound and heat, and possessing when pressed or molded great tensile strength and elasticity.



694,444.

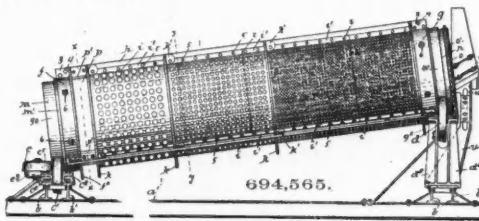
694,444. ORE-CONCENTRATOR.—William Thurmond, Hillsboro, N. Mex., assignor of five-twelfths to William E. Nelson and Charles H. Jones, Denver, Colo. In an ore-concentrator, an exhaust-chamber, a draft-chamber at one side of the exhaust-chamber and opening into the lower portion of the same, the bottom of the draft-chamber being provided with apertures in the end adjacent to the exhaust-chamber, and an inclined reciprocating screen arranged in the upper part of the draft chamber and having its lower end projecting into the exhaust-chamber, said screen being formed of a plurality of sections arranged at different angles to one another, the uppermost section having the greatest inclination.

694,521. CYANIDE PROCESS OF EXTRACTING PRECIOUS METALS FROM ORES.—Bastiaan W. Begeer, Florence, Colo., assignor of one-half to Jeremiah M. Hower, Jr., of Florence, Colo. A process consisting in setting in motion a solution of cyanide of potassium, introducing oxygen repeatedly to the moving liquids, and finally subjecting precious-metal-bearing material to the action of the solution thus prepared.

694,534. PROCESS OF BORING HOLES IN ROCK, ETC.—Francis H. Davis, New York, N. Y., assignor to Davis Calyx Drill Company, New York, N. Y., a corporation of West Virginia. The process consists in milling or grinding the rock with a free or loose material, introducing water under pressure into the hole to carry up the millings or grindings, and after the hole has reached a predetermined depth, maintaining a substantially uniform pressure upon the water at the bottom of the hole, regardless of the depth of the latter, to carry the millings or grindings a portion of the way only to the surface of the hole without carrying the milling or grinding material therewith, and catching said millings or grindings at a point intermediate the bottom and top of the hole.

694,535. APPARATUS FOR BORING HOLES IN ROCK OR SIMILAR MATERIAL IN THE EARTH'S STRATA.—Francis H. Davis, New York, N. Y., assignor to Davis Calyx Drill Company, New York, N. Y., a corporation of West Virginia. The combination with a hollow boring-rod, a hollow bit carried thereby, the working face of which is adapted to co-operate with shot substantially as described, and means whereby water may be forced into said bit and thence upward around same at a substantially

uniform pressure regardless of the depth of the hole, to carry away the millings or grindings therefrom, said means including a cup disposed above the bit for catching the said millings or grindings, said cup carried by the drill-rod and adapted to be lowered and raised therewith as the drill-rod descends and ascends.



694,565.

694,565. REVOLVING SCREEN.—Volney W. Mason, Jr., New York, N. Y., assignor to Taylor Iron and Steel Co., High Bridge, N. J., a corporation of New Jersey. An inclined revoluble screen-cylinder having means for supporting its lowermost end, consisting of a pair of cylinder-supporting rolls engaging the side of the cylinder, and an end-thrust roll engaging the end of the cylinder, disposed substantially midway between said cylinder-supporting rolls and revoluble on an axis substantially in alignment with the perpendicular radius of said cylinder.

694,556. CASTING-MOLD.—Ssemon Michailoff, Odessa, Russia. A mold consisting of separable parts each composed of a number of layers of material of different porosity, the meeting edges of the parts combining to form a dovetail groove and a filling, material in said grooves to form a continuous inner surface with the inner layer.

694,569. FURNACE FOR HEATING INGOTS OR BILLETS.—John B. Nau, New York, N. Y. A furnace, comprising a heating-chamber having an opening at one end for the introduction of ingots or billets and an opening at the opposite end for their discharge, a bridge or flame-port wall above the discharge-openings, a platform above and outside the discharge-opening, a gas-flue and an air-flue carried by the platform, gas-ports and air-ports leading respectively from such gas and air flues and uniting in pairs in a flame-port through which the flame passes into the furnace.

694,621 and 694,622. DISTILLING OIL.—Jesse A. Dubbs, Pittsburg, Pa. A method which consists in forcing air through the oil while the latter is maintained at a vaporizing temperature, and then subjecting the distillate while heated to the action of air.

694,658. ELECTROLYTIC PROCESS.—Jules Meurant, Liege, Belgium. The process of coating easily-oxidizable metals with metals less oxidizable and whose chlorides are soluble in water, which consists in forming an aqueous solution of the chlorides of said metals, adding thereto a compound of a metal of the alkalis containing oxygen and adding thereto a solution of chloride of ammonia and a carbohydrate, placing in the mixture the body to be coated as cathode with a suitable anode and passing an electric current.

694,688. METHOD OF IMPROVING CASTINGS OF ALLOYS CONTAINING COPPER AND ZINC.—Erwin S. Sperry, Bridgeport, Conn. The method consists in adding to the alloy while in a molten condition a predetermined quantity of arsenic that will wholly oxidize out in the pouring and then pouring in the usual manner, the resulting casting being wholly free from arsenic and without dross or scale.

694,699. ART OF REFINING COMPOSITE METALS.—Titus Ulke, Sault Ste. Marie, Canada. A process of refining nickeliferous-copper material which consists in electrolytically depositing the copper from an acid solution of such material with an anode of the same material; periodically withdrawing a portion of the electrolyte as it becomes poorer in copper and richer in nickel, separating the copper and nickel salts contained in the withdrawn electrolyte; electrolytically depositing the nickel from a non-acid bath of the nickel salt by the use of an insoluble anode; periodically withdrawing and concentrating portions of the impoverishing nickel-bath, and periodically restoring to the copper and nickel baths respectively, the copper and nickel salts obtained from the withdrawn solutions.

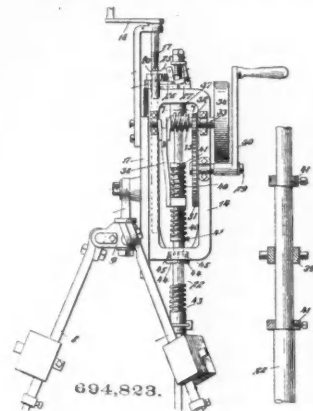
694,731. MANUFACTURE OF COMPOUND INGOTS AND MOLD THEREFOR.—Sylvester A. Cosgrave, Pittsburg, Pa., assignor to Aaron French, Margaret L. Paterson, and Maria B. Cosgrave, Pittsburg, Pa. The method consists in pouring two or more metals in two compartments or chambers having adjacent walls formed of a material fusible by said metals, and filling the space intermediate of said walls from each of said compartments prior to the fusion of the wall of the compartment.

694,734. ORE-SAMPLER.—Charles R. Foster, Blue Island, and Winthrop Coolidge, Chicago, Ill. In an ore-sampling machine the combination of a hopper and a divider disposed one above the other and means for imparting to said hopper and divider simultaneous lateral reciprocating movements in opposite directions.

694,752. MANUFACTURE OF STEEL BY THE OPEN-HEARTH PROCESS.—William B. Hughes, Philadelphia, Pa. The method consists in providing the hearth of the furnace with a bath of purified molten iron, pre-melting, outside of the furnace, oxide of iron and mixing said molten oxide with lime to form thereby a highly-oxidizing liquid basic slag, pouring into the bath of purified molten iron on

the hearth of the furnace a charge of impure molten iron and then bringing the molten slag into contact with the full bath of molten iron on the hearth of the furnace so as to remove impurities therefrom.

694,802. MANUFACTURE OF CEMENT.—Jacob Steiger, London, England. A process for the manufacture of a silicated magnesia cement in dry form, which consists in mixing a concentrated hot solution of chloride of magnesium with a powdered silicious material, heating the same to and above 130 degrees C., reducing the mass to a dry powder by continued heating and adding calcined magnesite, substantially as set forth.



694,823.

694,822 and 694,823. DRILL.—Robert Binnie, Bolivar, Pa. The combination of a frame-bar, a casing or the like sliding thereon, a feed-screw carried by the frame-bar, a gear-wheel having a nut formed thereon, the nut engaging the feed-screw and the gear-wheel being held on the casing to turn thereon, a drill-rod, a gear-wheel splined on the drill-rod and meshed with the first-named gear-wheel, a rotating crank-shaft, a connecting-rod between the crank-shaft and drill-rod, to reciprocate the drill-rod, a worm fastened to the crank-shaft, and a worm-wheel splined on the drill-rod and meshed with the worm.

GREAT BRITAIN.

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

Week Ending February 20, 1902.

- 23,647 of 1900. ELECTROLYTIC DEPOSITION OF METALS.—H. C. Harrison and J. Day, London. Apparatus for the rapid electrodeposition of metals with a current of high density and producing tough metal, the electrolyte being projected tangentially on the surface of deposit.
- 1,849 of 1901. ELECTROLYTIC TREATMENT OF ALKALI METALS.—A. Brochet and G. Ranson, Paris, France. Electrolyzing sulphides of alkali earth metals in the presence of a chloride, thus producing hydrated oxides.
- 2,297 of 1901. LEAD SULPHATE PIGMENT.—J. B. Hannay, Dumbarton. An improved process and plant for producing sulphate of lead pigment direct from galena.
- 2,404 of 1901. PIG-IRON BREAKER.—T. Winterbottom, Whitehaven. Improved construction of feed tables for pig-iron breaking machines.
- 3,329 of 1901. CYANIDE-MAKING.—Deutsche Gold and Silver Scherde Anstalt, Frankfurt, Germany. Making cyanamide and then converting to cyanide by treating it further with a carbon compound.
- 3,977 of 1901. BRIQUETTE MACHINE.—P. R. Bjorling, London. Machinery for making briquettes with a plunger at each end of the block.
- 5,350 of 1901. SIZING-SCREEN.—W. MacDermott, London. An improved form of screen submerged in water, for sizing fine ores, irrespective of their specific gravity.
- 17,580 of 1901. SULPHIDE ORE TREATMENT.—A. D. Carmichael, Broken Hill, N. S. W. Mixing sulphate of lime with sulphide ores, treating mixture in blast furnace where sulphide of calcium and sulphate of the metal are formed; the subsequent oxidation of the sulphide of calcium giving sufficient heat to roast the ores.
- 21,546 of 1901. ZINC-BARIUM PIGMENT.—International Chemical Company, Jersey City, U. S. A. Manufacture of a white pigment, consisting of a mixture of zinc hydrate and barium sulphate.
- 22,627 of 1901. MELTING FURNACE.—H. J. J. Chartier, Philadelphia, U. S. A. Improved melting furnaces for metals of comparatively low melting point.
- 23,060 of 1901. STEEL MAKING.—W. Pruzkowsky, Schodnica, Galicia, Austria. A set of steels, containing small quantities of chromium cobalt, molybdenum and titanium that can be welded and also hardened by chilling.
- 24,234 of 1901. ELECTRIC FURNACE.—C. A. Keller, Paris, France. An improved electro-metallurgical furnace on a large scale, for producing carbides, etc.
- 25,058 of 1901. CONCENTRATOR.—The Wilfley Concentrator Company, London. Detailed improvements in the Wilfley concentrating table.

## PERSONALS.

Mr. Walter Fitch, of Beacon, Mich., recently visited Houghton, Mich.

Mr. J. R. Robertson, of Philadelphia, Pa., is at Atlin, B. C., examining quartz mines there.

Mr. E. E. Chase, mining engineer, of Denver, Colo., is at present in Arizona, examining copper properties.

Mr. A. J. Bettles, of the Newhouse engineering staff, returned to Salt Lake recently from Colorado and Arizona.

Mr. Thomas F. Cole, president of the Oliver Mining Company, recently visited the copper district of Northern Michigan.

Mr. H. M. Crowther returned recently to Salt Lake from the examination of properties for eastern parties in Southern Utah.

Mr. William A. Paine, of Boston, president of the Copper Range Consolidated Company, is in the Michigan copper district.

Mr. James MacNaughton, superintendent of the Calumet & Hecla Mine, recently returned to Calumet, Mich., from Chicago.

Mr. Bertram Hunt, of San Francisco, Cal., is in San Diego County, Cal., making arrangements to erect a cyanide plant to work tailings.

Mr. W. Roberts, superintendent of the Idaho-Continental Mine, at Nelson, B. C., has been in Duluth, Minn., the head office of the company.

Mr. William Kelly, of Vulcan, Mich., a member of the board of control of the Michigan College of Mines, recently visited Houghton, Mich.

Mr. J. M. Longyear, of Marquette, was recently in Houghton, Mich., to attend a meeting of the board of control of the Michigan College of Mines.

Mr. H. Z. Brook, of Hancock, Mich., is manager of the Northwestern Development Syndicate, which is working the Camborne group, near Nelson, B. C.

Mr. Robert McF. Doble, of San Francisco, consulting engineer, is in Mexico engaged in the examination of hydro-electric transmission projects in the interests of eastern capitalists.

Mr. Walter A. S. Chrimes has been elected to the board of directors of the Osceola Consolidated Copper Mining Company to succeed the late Mr. Leonard Lewisohn.

Mr. Wm. Akers returned recently to Salt Lake, Utah, from a business trip to New Mexico, as consulting engineer for the Toledo and Modoc Mining companies.

Mr. G. V. Mitchell, who has been assistant manager of the Cache Creek Placer at Granite, Colo., for several years past, has resigned to accept a position with a mining company in South America.

Messrs. Douglass Gordon, R. H. Edmonds, Charles T. Westcott, Joshua Levering and W. C. Seddon, of Baltimore, Md., visited the properties of the Alabama Consolidated Coal and Iron Company in Alabama last week.

Mr. E. O. Hopkins, president, and Mr. J. W. McQueen, secretary-treasurer of the Sloss-Sheffield Steel and Iron Company, have been in New York City attending the meetings of stockholders and directors of the company.

Mr. J. J. Shannon, superintendent of the Ensley, Ala., furnaces of the Tennessee Coal, Iron and Railroad Company, has tendered his resignation. Mr. Shannon has been with the Tennessee Company as a furnaceman for years.

Mr. G. McLean has resigned as superintendent of the Detroit Copper Company's mines, in Morenci, Ariz., and Mr. M. H. McLean, his brother, the present assistant superintendent, has been appointed his successor.

Mr. W. A. Kousnetzoff, of Vladivostok, Siberia, is traveling at the instance of the Russian Government in California. He is visiting gold mines and inspecting the methods in use, and is especially to study dredger mining.

Mr. Joseph Schulte, of Nurepelt, Belgium, a famous expert metallurgist, has been in Denver, Colo., in consultation with the officers of the American Smelting and Refining Company concerning the new zinc plant to be erected at Pueblo.

Messrs. J. F. Mason, manager of the Buena Ventura Mining Company of Mapimi; James F. Wardner, formerly an associate of Mr. A. Evans, of the San Luis Mining Company, of Panuco, and Luis Peyri, of Nieves, recently visited Torreon, Coahuila, Mex.

Mr. C. E. Bunker has succeeded Mr. W. A. Prichard as superintendent of the Keystone Mine at Amador City, Cal. Mr. Bunker, who is a graduate of Stanford University, has completed the construction of a new mill for the Keystone equipped with machinery made by the Allis-Chalmers Company, of Chicago, Ill.

Mr. A. M. Fellows, formerly general sales agent of the Missouri-Pacific Coal Company, has been ap-

pointed general sales and purchasing agent, with offices in the Equitable Building, Sixth and Locust streets, St. Louis, Mo. Mr. J. G. Puterbaugh has been appointed assistant general sales agent with offices in the same building.

Mr. Edward H. Coxe, of Springfield, Ill., in addition to his duties with the Jones & Adams Company, at Springfield, Ill., and the Catlin Coal Company, at Catlin, Ill., will, beginning April 1, become mining engineer of the Miller Creek Coal Company, on the Iowa Central Railway, about 6 miles from Oskaloosa, Ia. Mr. J. S. Jones, of Chicago, is president of all these companies.

Prof. Regis Chauvenet, for many years at the head of the Colorado School of Mines at Golden, Colo., is about to sever his connection with that institution and resume his practice as a mining, metallurgical and chemical expert with his brother, Mr. William M. Chauvenet, the latter, however, retaining the St. Louis office long known as Regis Chauvenet & Brother while Prof. Chauvenet will remain in Denver.

Mr. Edwin Hawley, having resigned as assistant general manager of the Southern Pacific Railroad, that office has been abolished. Mr. L. H. Nutting has been appointed general eastern passenger agent, with headquarters at 349 Broadway, New York City. His jurisdiction will extend over the seaboard territory and Europe. Mr. L. P. Spence is appointed general eastern freight agent, with headquarters at 349 Broadway, New York City. His territory, like that of Mr. Nutting, is the seaboard and Europe. The gentlemen named have had wide experience and may be expected to act to the advantage of the company.

Messrs. W. Pellew-Harvey and E. Nelson Fell have formed a partnership as mining and metallurgical engineers under the style of Pellew-Harvey & Fell, with offices at 31 Walbrook, London, E. C. Mr. Pellew-Harvey has had several years' practice as consulting engineer, etc., covering the fields of Nova Scotia, British Columbia, and the Western States of America, and, in addition, has held the position of metallurgist in charge of the Vancouver branch of the Provincial Government Assay Office. Mr. Fell has had an experience of 20 years in Brazil, also in the Southern States, and more especially in the Western states and territories of America and Canada in the designing, erection and care of mining plants, and the management of properties. The firm will make examinations and reports in any part of the world covering mining and metallurgical operations, and will act as consulting, mining and metallurgical engineers.

## OBITUARY.

Edward North, 2d, who died February 8, at Ouray, Colo., was graduated from the Massachusetts Institute of Technology with the Class of 1900. He was the son of S. N. Dexter North, chief statistician of the United States Census and secretary of the National Association of Wool Manufacturers. On graduating from the institute North received an appointment from Carroll D. Wright, of the Department of Labor, to go abroad for the purpose of making a report on coal mine labor in Europe. On his return in October he entered Harvard for a post-graduate year. The following summer he was appointed a member of a United States Geological Survey party about to start work in Colorado. He remained here until October 1901, when he entered the service of the Camp Bird mines. He worked there in the cyanide mill for 4 months and was then transferred to the mine, where he had been but a few days when his death occurred.

Bryan Donkin, a prominent British mechanical engineer, died at Brussels, Belgium, April 3, of heart disease. Mr. Donkin was born in 1835. His father and grandfather were both successful mechanical engineers. He studied at the University College of London, and at the Ecole Centrale des Arts et Metiere in Paris, and after serving an apprenticeship at the Bemondeley Works of his uncle went to St. Petersburg in 1859 to superintend the erection and construction of the largest paper mill in Europe. In 1868 he became a partner of the Donkin firm, and on its conversion into a limited liability company in 1889 became its chairman. In the early 70's Mr. Donkin became interested in the scientific side of engine design and began a series of tests of engines and boilers that occupied much of his attention until his death. His work in this field attracted wide attention and had great influence in bringing about present standards of engine construction in Great Britain. He did particular service in pointing out the losses by condensation in steam cylinders and the prevention of such losses by jacketing and superheating. In the early 90's Mr. Donkin took up the investigation of internal combustion motors, and in 1895 published a standard work on "The Gas Engine." Among other subjects which he investigated were forced draught, centrifugal fans, automobiles and the flow of air through pipes. Mr. Donkin was a facile writer, and a frequent contributor

to periodicals and the proceedings of engineering societies.

## SOCIETIES AND TECHNICAL SCHOOLS.

NATIONAL ASSOCIATION OF MANUFACTURERS.—The seventh annual meeting will be held in Indianapolis, Ind., April 15 to 17, inclusive. Over 900 manufacturing plants hold membership. This will be the first meeting of the association as far west as Indiana and the manufacturers of the State are making extensive arrangements for its proper entertainment. E. P. Wilson, of Cincinnati, O., is secretary of the association, and T. C. Search, of Philadelphia, Pa., president.

UNIVERSITY OF WASHINGTON.—Although it is hardly two years since the School of Mines was established, nearly 100 students are enrolled. The school was founded to give those desiring a thorough technical education in mining engineering, metallurgy and geology. The total registration for 1900-1901 was 41. The freshman class this year numbers 40. Prospective courses have attracted those wishing in a short course to prepare for practical work in the mineral fields of Washington and Alaska. The number in this line of work has nearly doubled in the last year. The pupils in the school of mines come from greater distances than in any other department in the college. Many are from Alaska, while an equal number are registered from Wisconsin, Illinois, Texas and New York.

AMERICAN CHEMICAL SOCIETY, NEW YORK SECTION.—At the regular monthly meeting at the Chemists' Club, on March 7, Mr. M. T. Bogert presided, and the following papers were read: "A Synthetic Inorganic Method for the Preparation of Ethylene from Acetylene," by O. W. Palmenberg; "A Case of Corrosion of Iron Pipe," by W. P. Mason; "The Action of Sulphuretted Hydrogen Upon Arsenic Acid," by L. W. McCoy; "A New Method for the Approximate Determination of Uric Acid in Urine," by Julius Rudisch and Leopold Boroschek.

Mr. Palmenberg in his paper reviewed the published processes for producing ethylene from acetylene, stating that many of them were inoperative, and describing a method which had been found satisfactory in his hands.

Prof. Mason exhibited a piece of iron water main which had been laid between the Atlantic City reservoirs and the city. This main had failed in several places from corrosion proceeding from the outside; the iron appearing to have been removed by an acid condition of the soil, which is of a peaty character.

A paper on "Recent Commercial Utilization of Casein" was postponed until the next meeting.

The Research Committee announced that a medal will be offered for the best paper read at the meetings during the coming year.

COOPER UNION CHEMICAL SOCIETY.—An interesting illustrated lecture on "Qualities and Standards of Materials" was delivered by Dr. Charles F. McKenna at Cooper Institute, New York, on March 15. In the audience were many students and visiting professors, and a number of ladies.

Dr. McKenna asserted that the view usually taken by engineers is too contracted and mostly confined to a study of the elastic properties of materials, whereas he would have every material, whether for construction or technical purposes, examined under the greatest variety of chemical and physical forces. He called attention to the condition of affairs in New York City, where many different departments and bureaus conduct tests and inspections of materials in an imperfect way without intercommunication or standardization, and often without the slightest reference to previous scientific work. The Department of Buildings has no laboratory. It is probable that all the materials supplied to the city could be inspected and tested in a scientific manner for one-half of one per cent of their cost. Dr. McKenna recommends in this connection a central laboratory for the city, which could serve as a Bureau of Standards, receiving its standards for the use of the citizens from the new Bureau in Washington.

The Cooper Union Chemical Society has a membership of about 80, and its officers for the current year are: President, John Vogt; vice president, Constant W. Booth; secretary, Albert Hilbert, and treasurer, Alfred A. Rhodes.

## INDUSTRIAL.

The Arthur Fritsch Foundry and Machine Company, of St. Louis, Mo., is reported to have secured a contract for crushers from British Columbia parties.

The Sargent Company, manufacturers of draw bars, knuckles and coupler parts, located at Fifty-ninth and Wallace streets, Chicago, Ill., is having plans drawn and specifications prepared for an extension to give it approximately 3 times the capacity of its present plant.

The Brown Hoisting Machinery Company, of Cleve-

land, O., has obtained an order through Graham, Hinkley & Co., of New York City, for two hoisting crabs, which are to be shipped to the City of Mexico. The Brown people have also got an order in hand from the Japanese house of Takata & Co., of New York City, for some hoisting trolleys for Japan.

There were 784 establishments engaged in the manufacture of clay products in Indiana last year, with 5,926 wage-earners and products valued at \$4,253,529, an increase in the value over the previous year of 34.4 per cent. Encaustic tiles are manufactured at Indianapolis. The burning is done with natural gas. The clay for the lower priced tiles abounds in Clay, Owen and Lawrence counties.

Notices of a special meeting of the stockholders of the Tidewater Iron and Steel Company, Chester, Pa., to be held on May 7, have been sent out. The meeting has been called for the purpose of considering the issue of additional preferred stock, bearing 8 per cent cumulative dividend to the amount of \$6,000,000. At present the company is stated to be earning 10 per cent. The Investment Co., of Philadelphia, has agreed to underwrite the stock.

The Allis-Chalmers Company, of Milwaukee, Wis., is installing at the Worcester, Mass., power station of the Consolidated Street Railway Company an engine having a normal capacity of 3,000 h. p. with an overload capacity up to 4,500 h. p. Its total weight will be 400 tons. The cylinders are 40 and 78 in. by 48 in. stroke. The fly wheel is 24 ft. in diameter and weighs 80 tons. A 2,000-kw. General Electric generator will be run directly connected to the engine.

The contract for the machinery of an aerial wire rope tramway, connecting the Ferris-Haggerty group of mines with the Boston-Wyoming Smelter, at Grand Encampment, Wyo., has been let to the A. Leschen & Sons Rope Company, St. Louis, Mo. The tramway to be installed is the Leschen Company's patent, which operates automatically in receiving and discharging. This will be the longest aerial tramway in the world.

The Eugene Dietzgen Company, of Chicago and New York City, has changed the location of its New York office to 119-121 West Twenty-third street. For the convenience of its patrons in the West, the company has just opened the branch at the latter address, where it will carry a full line of goods. This new branch is under the management of Mr. Joseph Dannheiser, who was formerly with the company's Chicago house.

The Penberthy Injector Company, of Detroit, Mich., was recently exonerated by a coroner's jury from any responsibility for the boiler explosion in its factory last November. The blame was placed upon the boiler manufacturer. The Penberthy Company announces that it has re-established its factory with a full working force, and on account of the demand for its product has put on a double shift, and is now working night and day.

The Liberty Manufacturing Company, of Pittsburg, Pa., writes that it has just received an order from Fraser & Chalmers, of London, England, for turbine cleaners, besides orders from firms on this side of the water for turbine cleaners for boiler tubes and economizer tubes. The Liberty Company is able to trace these orders directly to some old advertising matter, and calls attention to the fact thinking that it may prove of interest to other advertisers who are inclined sometimes to question the value of an advertisement after the printers' ink has grown cold.

Recently the barytes mines and works of Dingee, Weinman & Co., of Lynchburg, Va., passed into the hands of the Mephram & Krausse Manufacturing Company, of St. Louis, Mo. This company now owns the barytes and whitening business of 3 firms, including that of the Page & Krausse Mining and Milling Company and of George S. Mephram & Klein, in Missouri. In acquiring the Lynchburg, Va., works the company has facilitated shipments to the eastern trade by reducing the cost of freight to purchasers. The combined output of barytes is said to be sufficient to supply the demand in this country. The consolidated company will utilize the various patents and processes that have been used by the subsidiary concerns.

#### TRADE CATALOGUES.

Mine cars, cages, skips, buckets, wheels and axles are described in catalogue No. 3, an illustrated 18-page pamphlet published by the Denver Engineering Works, of Denver, Colo. The mine cars priced include the Denver ore car, standard ore car, scoop cars, bottom and side dump cars, and coal mine cars.

The Burt Manufacturing Company, of Akron, O., has issued two neat little booklets describing the Cross oil filter and the Burt exhaust head, copies of which will be mailed to any one upon application. The Cross oil filter was awarded the highest medal at the Pan-American Exposition and the company states that its sales have extended to 28 different countries, while 9 governments have adopted it for war vessels, arsenals, etc.

The 1902 catalogue of the Foster Engineering Company, of Newark, N. J., is a neat illustrated pamphlet of 96 pages. It contains detailed information in concise form about the company's valves, which are stated to be in use in many manufacturing plants including salt and chemical works and oil refineries, also in mines and collieries. The company makes as its specialty the Foster pressure regulator. This is of the spring-and-diaphragm type and is described in detail. Other devices described are back-pressure valves, free exhaust valves, non-return valves, combination valves for stationary and marine service, float valves and the Foster fluid-actuated speed governor.

Catalogue No. 17, a 50-page pamphlet, published by the Risdon Iron Works, of San Francisco, Cal., is entitled "Gold Dredging Machinery." It gives considerable information about dredging for gold, and describes in detail, giving expenses, the work of a Postlethwaite dredge built by the Risdon Works, which owns the Postlethwaite patents on dredges and improved gold plates and riffles. Numerous cuts show the construction of various parts of the dredge equipment, and others show Risdon dredges in operation under varying conditions in California, Colorado, Idaho and Montana. The pamphlet is well worth perusal by any one interested in gold dredging.

The Wellman-Seaver Engineering Company, of Cleveland, O., issues a large 4-page pamphlet describing briefly the new manufacturing plant that it will soon have in operation. The buildings are notable on account of their great height (the main and erecting shop is 69 ft. high from floor to underside of roof trusses), the wide spans of the main roofs, the large amount of light secured and the solidity of construction. Electric travelling cranes form a conspicuous part of the equipment. In the main shop the 80-ft. span is commanded by 50 and 10-ton cranes on separate run-ways. Windows and skylights are fitted with ribbed glass while heating and ventilating are accomplished by the Sturtevant hot air system.

The John H. McGowan Company, of Cincinnati, O., issues booklet No. 25, a little 44-page pamphlet illustrating and describing those designs of its pumps for which there is a current demand. The company's high-pressure pumping engines for mine service have water ends of heavy and compact design, so constructed, it is said, as to secure absolute alignment under any pressure. The valve areas are large and the steam end is described as having all the latest provisions for adjustment and lubrication. This pump is recommended as desirable for handling impure or gritty water. The company also manufactures power pumps, deep well pumps, air compressors and feed-water heaters and purifiers. Woodward, Wright & Company, of New Orleans, represent the John H. McGowan Company in the Gulf States.

#### GENERAL MINING NEWS.

**Oil Exports.**—In February the United States exported 4,791,623 gals. crude oil; 1,022,326 gals. naphthas, 49,250,829 gals. illuminating, 5,735,945 gals. lubricating and paraffin, and 2,023,644 gals. residuum; total, 62,824,367 gals., as against 64,609,667 gals. in the same month last year. In the first two months of the present year the exports totaled 154,527,182 gals., showing an increase of 4,385,764 gals., or 3 per cent., as compared with the corresponding period in 1901.

#### ALABAMA.

(From Our Special Correspondent.)

State Mine Inspector J. deB. Hooper announces the coke production of Alabama for the year 1901 to have been 2,180,625 tons, with 7,086 ovens in operation. There were 5 counties producing coke during the past year, as follows: Bibb County, 467 ovens, 862,450 tons coke; Jefferson County, 5,211 ovens, 1,824,141 tons coke; St. Clair County, 60 ovens, no coke; Talladega County, 122 ovens, 3,876 tons coke; Tuscaloosa County, 665 ovens, 137,000 tons of coke; Walker County, 401 ovens, 129,363 tons coke; total, 7,086 ovens, 2,180,625 tons coke. In 1900 there were 6,492 ovens and 2,119,917 tons coke manufactured.

Announcement is made that the Alabama Consolidated Coal and Iron Company will erect 50 coke ovens during the present year, and the Republic Iron and Steel Company is now completing 300 ovens at Thomas. There will be between 500 and 600 new ovens constructed in Alabama during the present year.

#### WALKER COUNTY.

(From Our Special Correspondent.)

**Black Diamond Coal Company.**—This company, incorporated under the laws of Alabama, has acquired 600 acres of land and opened mines. The capital stock is \$10,000, all paid in. The output within the next three months will be 300 tons of coal per day.

#### ALASKA.

**Pacific Coal and Transportation Company.**—This organization, with a capital stock of \$1,000,000, proposes to begin the development of coal fields at Cape Lisburne, near tidewater. Fred. W. Wellington, of Worcester, Mass., is the president. An office has

been established in the Equitable Building, Boston. The following are the officers: Fred. W. Wellington, president; Isaac Chase, vice-president; F. W. Huestis, secretary and treasurer. Board of directors: Fred W. Wellington, Worcester; Frank A. Holden, Providence, R. I.; William O. Webber, Boston; Isaac Chase, Cambridge; Henry T. Schaeffer, Boston; Frederick W. Huestis, Boston.

#### ARIZONA.

##### COCHISE COUNTY.

**Coconino Copper Company.**—At the annual meeting in Jersey City, March 10, these directors were elected: Peter L. Kimberly, Henry M. Ryan, Donald Grant, Thomas F. Noonan, Moise Dreyfus, Aquilla Nebeker, A. E. Nusbaum, Lawrence P. Boyle, and W. S. McCormick.

##### GRAHAM COUNTY.

(From Our Special Correspondent.)

**Arizona Copper Company, Limited.**—The directors have received a cable message from Clifton that the production for the month of February was equivalent to 1,104 short tons of copper.

#### CALIFORNIA.

##### AMADOR COUNTY.

(From Our Special Correspondent.)

**Buena Vista.**—This copper mine, near Ione, has closed down for a few weeks. There is much water and heavier machinery may be necessary.

**Central Eureka.**—On this mine, at Sutter Creek, W. R. Thomas superintendent, it is expected that the additional 20 stamps will be ready to drop by April 15.

**Lincoln.**—At this mine, at Sutter Creek, E. C. Voorheis president and manager, the shaft is down 1,870 ft. A cross-cut will be started when 2,000 ft. is reached.

**Oncida.**—The mill of this mine, at Jackson, which has 60 stamps, is crushing between 9,000 and 10,000 tons of ore monthly.

**South Eureka.**—At this mine, at Sutter Creek, J. F. Parks superintendent, good ore has been found in the development work between the 1,800 and 2,000 ft. levels.

**Wildman-Mahoney.**—These 2 mines, at Sutter Creek, are under the same ownership, with John Ross, Jr., as superintendent. The Wildman shaft is now retimbered nearly to the bottom. The Mahoney shaft, now down 1,200 ft., continues to be sunk deeper.

##### CALAVERAS COUNTY.

(From Our Special Correspondent.)

**Aetna.**—Jos Pierano and Ralph Lemus are about to begin work on this mine, near Murphys. A boiler has been put in to furnish steam for the pump.

**Bradley & Osborne.**—This mine, near Angels, has been bonded to men who intend developing it at once.

**Gwin.**—This mine, at Gwinmine, F. F. Thomas superintendent, keeps 80 stamps dropping on good ore and employs 200 men.

**Ozark.**—The tailings of this mine, between Murphys and Angels, are being washed for the third time by P. Mitchler and J. Richmond.

**Penn Mining Company.**—This company operates the Penn, Hecla and Satellite mines at Campo Seco, and employs about 100 men, working a sulphide copper ore carrying both gold and silver. The principal product is copper. The owner is J. K. Harmon, of Chicago, Ill., and A. C. Harmon is manager.

**Prospecting Dredging Land.**—Near Jenny Lind 2 companies are prospecting with drilling rigs. The River Bed Company is working in the bed of the river, and Hammon & Corndorf are sinking in the bottom lands along each side. The holes are sunk to the hard-pan, about 60 ft. The earth is brought up by a sand pump and washed. The casing is then pulled up and the hole filled in. The holes are drilled about 100 yd. apart. The land is under bond.

##### DEL NORTE COUNTY.

(From Our Special Correspondent.)

**Smith River Copper Company.**—This company, August Quitow, superintendent, at Crescent City, is to develop its claims near the junction of the South Fork and Smith River.

#### HUMBOLDT COUNTY.

(From Our Special Correspondent.)

**Clover Flat.**—M. W. Heinrich, of Eureka, manager, reports that work is prosecuted with vigor, and night shifts will soon be put on.

**Miller Bros.**—This mine, near the mouth of Hopkins Creek, on Klamath River, is being put in order for larger operations.

**Placer Mines.**—All along the Klamath River the mines are running full blast, there being an abundance of water.

#### INYO COUNTY.

(From Our Special Correspondent.)

**Baker Placer.**—S. A. Baker recently struck the pay streak in his placer claim 2 miles from Citrus, and is taking out gold.

**Millspaugh Mtn and Mining Company.**—This company, at Ballarat, A. N. Millspaugh superintendent, has been doing development work for some time with 15 men at work. The new milling plant is completed.

KERN COUNTY.

(From Our Special Correspondent.)

**Alladin Group.**—These mines, at Mohave, owned by Dr. W. J. Nelson, of Los Angeles, have a shaft 100 ft. deep, which is being sunk 100 ft. deeper. Ore will be shipped to Barstow for treatment.

**Bobtail.**—This mine, near Mohave, has been purchased from G. Ropper and D. Craighton by San Francisco men.

**Exposed Treasure.**—The 13 claims of this company, near Mohave, W. J. Nelson manager, are being developed and some are producing. Twenty stamps have recently been added to the mill. Eighteen miles of pipe line have been laid for water, and a cyanide plant has been installed. P. H. McDermott is manager, W. J. Nelson having resigned. The property and plant, owned largely by New York men, cost upward of \$400,000. The deepest shaft is 600 ft., and the total amount of underground work is about 6,000 ft.

LOS ANGELES COUNTY.

(From Our Special Correspondent.)

**Hercules Oil Refining Company.**—This oil refinery, at Los Angeles, G. H. Gillons general manager, is now the largest of its kind in the southern part of the State. During the past 12 months upwards of \$50,000 has been expended in construction alone. In refining petroleum with an asphalt base the company is producing between 8,000 and 10,000 tons of asphalt yearly.

**Red Rover.**—At this mine, at Acton, a fine 4-ft. ledge of good ore has recently been struck. The mine has been unproductive for some time, though formerly it paid well. The recent strike was made near the old workings. The mine is owned by Governor Henry T. Gage, H. O. Collins, George J. Denis and others, of Los Angeles. There is a mill on the property. There are a number of other mines at Acton, but little has been done at the camp for several years.

MADERA COUNTY.

(From Our Special Correspondent.)

**Coarse Gold Camp.**—Among the mines at this camp being developed is the Flying Dutchman, owned by Krohn Bros. It is now under bond to San Francisco men. Work on the Waterloo is to start shortly. Operations on the Texas Flat have started, the surveys for pipe lines being completed.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

**Mariposa Commercial and Mining Company.**—This company, with offices at 223 Crocker Building, San Francisco, operates the mines on the famous Mariposa estate. Last year the company operated 4 producing mines—the Princeton, Mariposa, Louis and Josephine. There were also 16 mines operating under lease which produced gold last year. The company employs 210 miners under the superintendence of Chas. C. Derby, of Mount Bullion.

NEVADA COUNTY.

(From Our Special Correspondent.)

**Blue Tent.**—Good progress is being made with the tunnel by Superintendent Graham, and the force is to be increased.

**Eagle Bird.**—This mine, at Maybert, which has been idle some time, is to be worked again by the Wilkes-Barre, Pa., owners.

**German.**—This mine is to be equipped with a large plant as soon as the roads are fit for hauling in machinery. The mine is at Washington, and is owned by a company, of which M. D. Cooley is superintendent and Ely J. Hutchinson, of Concord, president.

**Gold Tunnel.**—It has been rumored that the Reward Mine, at Nevada City, would shortly become the property of this company, A. D. Allan superintendent, and the Reward's machinery removed to the latter mine. It is now stated that the arrangements have been perfected by which the Gold Tunnel, California and Reward mines will be worked through a shaft sunk deep enough to develop all three.

PLUMAS COUNTY.

(From Our Special Correspondent.)

**Bonnie Lee.**—A strike has been made at this mine of some very high grade ore. A mill is to be put up in the spring.

**Eclipse.**—At this mine, at Ophir, the mill is being rebuilt, and a hoist is being put in.

**McGill & Standart.**—It is reported that the 20-stamp mill of this mine at Greenville, will be used as a custom mill, and that a new 60-stamp mill will be erected.

**Ralston Divide.**—On the Blacksmith claim belonging to this French company, men have been put at work.

SAN BENITO COUNTY.

(From Our Special Correspondent.)

**Cerro Bonito.**—Treadwell Bros., of San Francisco, Cal., have purchased from Flint & Company this quicksilver claim, and work is to be started.

**Panoche.**—The copper mine at Panoche, owned by J. Mouesca, is to be developed at once.

SAN DIEGO COUNTY.

**Picacho.**—The excavations for the great dry-crushing cyanide plant are completed. The Colorado Iron Works Company is getting together the material for the building. Work on the railroad to the mill site is progressing well.

SAN LUIS OBISPO COUNTY.

(From Our Special Correspondent.)

**Happy Go Lucky.**—This quicksilver mine in Pico Creek has been bonded by Mr. Miner, of Cambria, who will start work at once.

**Madrone.**—This quicksilver mine is to be equipped with suitable plant by W. Mayhall and others.

**Oceanic.**—This quicksilver mine is showing up well and the force has been increased.

SIERRA COUNTY.

(From Our Special Correspondent.)

**Belcher.**—In this mine, at Monte Cristo, owned by the Fir Cap Consolidated Mining Company, W. J. Belcher superintendent, miners have found the gravel on the west rim of the channel. The tunnel is in 725 ft.

**Oriental.**—This mine, near the Croesus, at Alleghany, has been pumped out by Superintendent M. W. Mather, and will be opened. It has not been worked for many years. A 1,300-ft. drain tunnel is to be run.

**Plumbago.**—At this mine, belonging to the Croesus Gold Mining and Milling Company, Mason W. Mather superintendent, a drain tunnel of 770 ft. is started. The mine is producing largely and is equipped with a fine plant. The property is over the ridge from Alleghany, Sierra County, but mails reach it through Moores Flat, Nevada County, it being across the Yuba River from that place.

SISKIYOU COUNTY.

(From Our Special Correspondent.)

All the gravel mines at Hamburg are working. J. W. and W. R. Maplesden are operating hydraulic claims, as are Hammer, Brown, Loar & Co.

**Cherry Hill.**—This quartz mill, at Cherry Creek, is about to start on ore from the old upper workings. The new low tunnel is in about 900 ft.

**Hawkinsville Ditch.**—This ditch, from Greenhorn, is now full of water and supplying several companies with water for washing.

**Hardscrabble.**—This property, at Etna, is being operated by the Siskiyou Mining and Development Company under the superintendence of B. A. Cardwell. The old works have been cleaned out and the ledge is being developed.

**Little Humbug District.**—Fabricius & Rider have a good water supply. Hubbard, Dusel and others are likewise busy hydraulicking.

**Placer Mines.**—Heavy rains have brought an abundant supply of water to the gravel claims throughout the county.

**Red Bird.**—This company, working the Myers ground, near Yreka, has found a new ledge.

**Tacoma & Oro Fino Company.**—This company is opening up a number of claims near Oro Fino.

TRINITY COUNTY.

(From Our Special Correspondent.)

**Brown Bear.**—This mine, at Deadwood, C. Dobler superintendent, has been obliged to close down temporarily, as it was flooded with water by storms.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

**Black Oak.**—This mine, at Soulsbyville, Scott Bros. owners, is reported to be in bonanza again. The strike was made at bottom of the 1,050-ft. shaft.

**Campo Seco.**—Work on the new 2-compartment shaft at Campo Seco is started under Superintendent Hall.

**Golden West.**—This company has bonded the Comstock Ranch, near Columbia, for \$30,000.

**Hidden Treasure.**—J. F. Anderson, of Soulsbyville, has bonded a half interest in this mine at Cherokee to parties who are to run a tunnel to find the river channel.

**Independence.**—This mine, at Soulsbyville, is being unwatered by the bonders.

**John Royal.**—This mine, near Columbia, has been bonded by Eugene Day and others.

**Lost Fox.**—This mine, at Carters, J. E. Engel superintendent, owned by the Grapevine Canyon Mining Company, of San Francisco, is to have a new 20-stamp mill. Nearly all the work on this mine, which is one of a group of six, was done in 1901.

**Mack.**—This mine, at Big Oak Flat, has closed down, and a number of miners have filed liens.

**Mount Jefferson.**—In this mine, at Groveland, J.

M. Meigham superintendent, 3 shifts are at work. The vein in which the shaft is being sunk is 33 ft. wide.

**Republican.**—Ten stamps are dropping on good ore from this mine at Jacksonville.

COLORADO.

BOULDER COUNTY.

**Boulder Oil Wells.**—At the McKenzie well tubing has been inserted and pumping started. The derrick of the Monarch Oil Company, on the Ingram farm, is completed. Machinery has been ordered and drilling will soon begin. The Boulder-Valmont, located on the south side of Boulder Creek, north of the Valmont Buttes, perhaps half a mile east of the King well, has had its machinery installed, and is drilling. The Blue Jacket's derrick is complete. Machinery is on the road, and drilling will soon begin. This derrick is southwest of the Keystone. The Bingham derrick is ready for machinery, also the Citizens'. The drill of the Cleveland Company is steadily going down. Other derricks still further west are waiting for machinery. The Aurora and Crystalline both have derricks up. Machinery is being placed on the Aurora. The Jasper derrick is finished.

(From Our Special Correspondent.)

**Morning Star.**—After a period of idleness this mine has been unwatered and is being worked.

CLEAR CREEK COUNTY.

**Golden Hecla Mining and Milling Company.**—This company has a capitalization of \$250,000. The incorporators are J. W. Boyd, R. C. Quick and W. A. Haggott, of Idaho Springs, who recently secured the Silver Horn group of claims on Ute Creek, and will start development. This property has a tunnel driven for over 500 ft., by the former owner, L. McLean.

**Idaho Springs Reduction Company.**—The new mill has started. It has a capacity of 125 tons of ore per day. The mill will treat ores from about Idaho Springs, but considerable will be handled from Gilpin County. The Colorado & Southern has constructed sidetracks so that the ore can be brought in by the cars and dumped directly in the mill.

**Silver Plume Board of Mines and Trade.**—This organization intends to call attention to the mineral resources of the district about Silver Plume, and will send out printed matter giving statistics of production, etc. The directors are: J. M. Jayne, president; W. J. Guard, secretary; J. P. Proutt, treasurer, and C. S. Desch, C. H. Dyer, W. H. Stephens and E. H. Jennings.

FREMONT COUNTY.

**American Zinc-Lead Company.**—This company's smelter has been bought by the United States Reduction and Refining Company. It has been in operation at Canon City for about 10 years, under the management of President D. C. Freeman. Its business is chiefly the handling of low-grade zinc bearing lead ores, which are not handled to any great extent by the American Smelting and Refining Company. These ores come largely from Utah and Leadville. The product is copper matte, containing the precious metals, which is shipped or refined. The by-product consists of zinc-lead pigment used largely in the manufacture of paints. The general offices will be at Colorado Springs, where the offices of the United States Reduction and Refining Company are located. There will also be a branch office at the works in Canon City. The managing board will be the same as that of the parent organization, and will include C. M. Mitchell, C. L. Tutt and Spencer Penrose. D. C. Jackling will be the manager of the plant.

HINSDALE COUNTY.

(From Our Special Correspondent.)

**Golden Fleece.**—The mill started up March 11. The connection of the tunnel with the old works has been made and the mine prepared for a regular output.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

There is practically no change in the sulphide situation. The output at present is largely from the oxidized iron ores and is about 1,800 tons a day of all classes of ore. Work is being pushed upon the independent smelter at Salida, the Ohio & Colorado Smelting Company, while it is announced that the Robinson Pyritic Smelter will resume operations within 60 days. There is also some talk of a resumption of operations on the Boston Gold Copper Company plant. With these three smelters going the situation would be greatly improved.

**B. B. Group.**—A tunnel and cross-cuts have proved a good body of siliceous ore near Rocky Point lode and arrangements have been completed for work this summer.

**Belle.**—The new strike in this St. Kevin proposition has opened up a good vein that is said to average \$25 to \$40 to the ton. The lower grade ore of this and surrounding territory will probably be treated by concentration this summer. The erection of several mills is possible.

**Gold Basin Mining Company.**—This is a lease on the old Big Four territory. In a new drift 75 ft below the first strike another very good strike has been made; the first assays are reported to show 17 ozs. gold and 200 ozs. silver. The extent of this strike is not yet known.

**New Monarch Mining Company.**—While developing the Little Winnie, Lida and New Monarch claims, Manager Goodwin is also pushing new work on the Virginus claim where a nice body of lead ore has been encountered, said to run from \$20 to \$40 per ton. The new Monarch is prepared to ship 300 tons a day from its sulphide bodies to its new smelter at Salida as soon as the plant is completed.

**St. Kevin.**—The lessees have resumed shipments and have a body of siliceous ore running 75 per cent silica but a series of samples from a new find averages 1 oz. gold and 20 to 120 ozs. silver.

**Valley Leasing Company.**—This comprises the Valley, Forest Rose and Dispute claims leased and bonded to Springfield, Mass., men. The new shaft is already well under way. A fine new plant of machinery is being installed.

**Yak Mining, Milling & Tunnel Company.**—In addition to new prospecting work about 50 tons of zinc and 50 tons of iron sulphides are shipped daily. The zinc product goes to Iola, Kans. A zinc product from the Sierra Nevada is being shipped east.

## MINERAL COUNTY.

(From Our Special Correspondent.)

**Humphrey's Mill.**—This plant has begun to handle the ores from the Great Bachelor and Last Chance vein and the claims of the United Mines Company. The ore is delivered to the mill through the Humphreys and Wooster Tunnel.

## OURAY COUNTY.

(From Our Special Correspondent.)

**Ouray Tunnel Mines Company.**—The comprehensive system of development projected by A. E. Reynolds on this property demanded a large increase in motive power, and there is being installed at Ouray an electric power plant, near the tracks of the Denver & Rio Grande Railroad. The building is 96 by 50 ft., with walls of concrete and roof of corrugated steel. A concrete partition divides the building into boiler room, 38 to 45 ft., and engine and dynamo room, 54 by 45 ft. The machinery being set up was furnished by the General Electric Company, and comprises 2 3-phase generators, developing 250 kw., at 10,000 volts pressure. There is an induction motor of 40 h. p., an electric generator of 125 volts, and a multi-polar generator of 125 volts. The steam plant was furnished by the Allis-Chalmers Company, and comprises 2 Reynolds-Corliss cross-compound condensing engines of 400 h. p. each, directly connected to run at 112 1-2 strokes per minute. Steam will be provided by 3 Scotch boilers. A Reynolds feed water heater and Reynolds independent jet condenser will be used.

A coal house, 73 by 24 ft. has been built. Loaded cars will be dumped into bins of 500 tons' capacity. Mechanical conveyors and stokers will feed the furnaces, and mechanical conveyors will remove the waste. The transmission line, now up, is a little over 6 miles long. At the motor station at the mines a step-down transformer will reduce the 10,000-volt pressure to 500, and a rotary transformer will give a direct current of 800 volts for the motor.

The Revenue Company is now using 550 kw., generated at stations along the Uncapaghe River, all of direct current type. The variation in the power furnished, due to low water on the long winters, determined the use of steam as a motive power. The plant now going in here will provide an aggregate of 1,050 kw. electric energy, or about 1,400 h. p.

## SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

**Snow Slides.**—Great damage has been done to property and a large number of lives have been lost by the recent snowslides.

As near as can be learned 12 men were killed at the Liberty Bell Mine, and 10 were badly wounded. The loss to the company will be nearly \$10,000 and the mine will be shut down for at least 2 months. The Smuggler-Union suffered a loss of over \$5,000 and 2 men were killed. An avalanche came from near the top of the divide between the Virginus and the Sheridan mines and crashed in the boarding house of the Sheridan Mine in Marshall Basin, almost destroying it and killing one man and wounding several others. The Ajax slide has completely demolished the residence occupied by C. W. Van Law, superintendent of the Smuggler-Union Company's mill at Pandora. The wind that accompanied the slide broke every window on the north side of the big mill. The Bobtail slide tore away the tension station of the tramway, leaving it almost as a complete wreck as at the time of fire of last November. One man was killed and several injured.

The Silver Chief Mill, in Bear Creek Basin, is gone, and only a few pieces of boards mark the place where

it stood. It was owned by W. H. Trout and ex-Governor Alva Adams, and was used principally for sampling and testing.

**Gold King.**—A recent slide in Gold King Basin carried away over 200 ft. of the surface tramway and snowsheds, but no one was hurt.

**Dead Wood Tunnel.**—This tunnel, which has been under way several years, has cut the famous Nevada vein at a depth of 960 ft. It was driven entirely by hand. Its total length is 1,855 ft., and the vein where it intersected is 8 ft. wide. Assays show the ore to run from \$18 to \$20 per ton, in gold and silver, principally in gold. Drifting both ways will start about April and a mill will be constructed. The mill will be extended to cut other promising veins. The Nevada Mine is owned by the Milwaukee-Ophir Mining Company and is located on Yellow Mountain about 1 mile from the town of Ophir. Twenty years ago it was the leading producer of gold and silver in the San Juan country, and employed over a hundred men. George R. Dolf is resident manager.

## TELLER COUNTY—CRIPPLE CREEK.

**El Paso.**—Hendrie & Bolthoff, of Denver, representing the Webster, Camp & Lane Machine Company, have been awarded the contract for the new 2,000-ft. hoist. A Pittsburg concern will furnish 2 258-h. p. boilers. Work on the shaft and ore houses and engine room will proceed.

**Granite.**—This mine has passed from the control of D. H. Moffat and Eben Smith to the United States Reduction and Refining Company. It is said that the price was about \$500,000, which was paid for an 82-100 interest in the company. Three months ago an option was given Messrs. MacNeill, Tutt and Penrose, the managing board of the United States Company, and the mine was bonded. Clarence C. Hamlin is general manager, with Dan McCarthy superintendent.

## IDAHO.

## BLAINE COUNTY.

**Idaho Consolidated Gold Mining Company.**—It is reported that William H. Dowe, of New York City, is organizing this company to work a number of properties on the Hailey gold belt. The mines owned are the Croesus and Croesus Extension, the Hattie, the Big Camas, the Golden Star, the Bird group and the Montana group, the two groups last named comprising 14 claims. The Croesus, Big Camas, Hattie and Golden Star all have bodies of ore opened. On the Croesus there is a 10-stamp mill. This it is said will be replaced by a new 40-stamp mill. The grading is all done, the walls built and the lumber ordered. The mill will soon be on the ground. On the Hattie a new 20-stamp mill has been erected. The Golden Star also has a new mill of 20 stamps. On the Big Camas a 40-stamp mill is being erected.

The mills on the Croesus, the Big Camas and the Hattie are all to be in operation in June. The Golden Star may also be started up. The mills are to have Wilfley tables. Electric power furnished by a dam and generating plant on the Snake River at Shoshone Falls is proposed for power.

## BOISE COUNTY.

**Idaho Last Chance Gold Mining Company.**—This company is capitalized with 300,000 shares of the par value of \$1 each. The company has a bond and lease on the Last Chance mining claim adjacent to the town of Quartzburg. Its officers are John W. Burton, president; W. D. Southworth, vice-president, and W. H. King, secretary and treasurer, who, with John T. Hodson and J. H. Stallings, are directors.

## IDAHO COUNTY.

**Dixie District.**—There has been considerable activity all winter about Dixie, The Gold Bug and Columbia, recently consolidated, have had the contract for 100 ft. of sinking and 150 ft. of drifting completed. The mill on the Dixie Queen, controlled by W. H. Plummer, of Spokane, and the Hye Brothers will start up as soon as the spring thaw comes. A 4-stamp mill is being put on the North Star. On Crooked River a 10-stamp mill is being erected on the Hogan property. On Big Creek, a small crew of men has been working at development, and in the Helen Gould a 100 ft. tunnel has been run.

## LEMHI COUNTY.

(From Our Special Correspondent.)

**Gold Stone Company.**—This company, at Pratt Creek, according to a report received at Salmon City, has cut its vein at a vertical depth of 600 ft. by a long cross-cut tunnel. This is a gold proposition, and the ore is said to be quite free. The property is equipped with a 10-stamp mill, which the company intends to have in shape by early spring.

**McKinley Group.**—This group of claims, 8 miles north of Salmon City, has recently been bonded by Col Sherron, who is actively developing it. The property carries a 30-ft. vein, said to give an average value of \$10 per ton in free gold. In addition a 100-ft. zone of mineralized siliceous schist is thought to carry

enough gold to pay for milling. This proposition somewhat resembles the Black Hills mines, the foot-wall formation is granite and the hanging wall schist or slate. The property promises to become a big milling proposition.

## SHOSHONE COUNTY.

**Hibb Brothers' Placer.**—A large consignment of iron pipe and a giant for hydraulic mining recently arrived at Orofino for Hibb Brothers for use on their placer properties on Alder Creek. The plant will be installed at once.

## ILLINOIS.

**Illinois Coal Miners' and Operators' Convention.**—After being in session nearly 4 weeks, the miners finally voted on March 13 to accept a schedule of wages and conditions that is virtually the same as last year's.

## INDIANA.

**Indiana Coal Miners' and Operators' Convention.**—The joint conference of operators and miners in the bituminous coal fields of the State has been resumed at Terre Haute. Each side is prepared to make concessions and an agreement will likely be reached soon.

**Indiana Oil Output.**—The output for February was 550,000 bbls., a decline of only 89,930 bbls. from January. The value of the production was \$439,406. The average daily runs were 19,617 bbls. The total shipment of oils were 873,049 bbls.

## GRANT COUNTY.

(From Our Special Correspondent.)

The most prolific oil producer in the Indiana field at the present time is believed to be No. 16 well, on the Carroll farm, north of Hartford City, owned by the Standard Oil Company. It produces 250 bbls. a day and has done so from the start.

**Imperial Oil Company.**—This company, at Marion, has incorporated with \$150,000. The directors are: I. E. Ackerly, of Pittsburg, Pa.; J. D. Case, of Franklinville, N. Y.; Minor, Gray & Roy Wellman, of Friendship, N. Y., and W. J. Reed, of Avon, N. Y.

## JASPER COUNTY.

(From Our Special Correspondent.)

Present indications are that oil has been found in paying quantities in this county. F. W. Powers and other Lafayette men are drilling wells and leasing land.

## KNOX COUNTY.

(From Our Special Correspondent.)

**Black Diamond Coal Company.**—This company has been organized and incorporated with \$15,000 capital to operate a coal mine near Westphalia. The incorporators are August Dill and Henry Lohider.

## MICHIGAN.

## COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

**Osceola Consolidated Mining Company.**—The annual meeting of this company, held in Boston, March 13, was very different from the usual run of such meetings. The publication of the annual report had aroused much interest among stockholders, and a number of them attended and insisted upon a hearing, and upon answers to their questions. These were represented chiefly by Messrs. Homer Albers, John B. Moran, Boyd B. Jones and Hosea M. Knowlton. The questions related chiefly to the sales of the company's copper during the year and the reasons for the low average price secured. President Bigelow attempted to stop all discussion, but the protestants insisted upon a hearing, and obtained it. The management admitted that the Osceola had held back its copper for nine months, when prices were high, and made some other admissions which were not to its advantage. A motion was made for the appointment of a committee of stockholders to investigate matters, but after a long discussion it was voted down by 59,350 to 3,693 shares. Towards the close of the meeting a very sharp passage occurred between Director Brooks and some of the minority stockholders. A motion to adjourn for a week in order to give stockholders an opportunity to change their proxies, if they wished to do so, was also voted down. The management held proxies, issued before the publication of the report, which they used in these votes. At the close of the discussion, in which the chairman intimated his intention to press the advantage which the proxies gave him, the report of the auditor was agreed to, and the following board of directors was announced: Albert S. Bigelow, William J. Ladd, Edward S. Grew, J. Henry Brooks, Joseph S. Bigelow and Walter A. S. Chimes, all of Massachusetts, and William E. Parnall of Michigan.

Finally Chairman Bigelow said: "Now that my list of directors has passed, by the exercise of the power which has been referred to here, I myself nominate as an investigating committee Mr. Knowlton, Alpheus Hardy and Mr. Brigham."

This committee was accepted by the meeting, but Mr. Knowlton suggested it was possible he should

propose some other person to take his place on the committee.

A summary of the annual report and full comments on the report and the meeting will be found elsewhere in this issue.

**Copper Shipments.**—Shipments of copper by rail are heavy, and the opening of navigation this year will find practically no metal in storage.

**Arcadian.**—About 1,200 ft. east of the Arcadian lode, at a depth of 300 ft., the diamond drill recently encountered a lode 6 ft. wide, well charged with copper. The drill has been moved east several hundred feet.

**Copper Range Railroad.**—The road is hauling a large amount of timber from the southern part of the county for mining companies. About 15 cars per day are received at the mines.

**Elm River.**—A small force is extending the cross-cut from the bottom of the exploratory shaft to cut the lode recently struck with the diamond drill.

**Franklin Tailings.**—C. D. Hanchette, of Hancock, Mich., has secured permission from the United States War Department to remove all the tailings from the old Franklin stamp mill, outside of the harbor lines, and forming an obstruction to navigation.

**Isle Royal Consolidated.**—Sinking Nos. 1 and 2 shafts to the 17th level is under way. The shafts will be connected at the 13th and 14th levels this month.

**John Duncan Land Company.**—At the annual meeting John Duncan, of Calumet, was elected president and Charles Smith, of Lake Linden, secretary and treasurer. The company voted an option to Henry Baer on mineral lands in Ontonagon County and on the Gogebic iron range.

**Old Colony.**—Diamond drill work is progressing and will be continued until a complete cross-section is obtained. Two new shafts will be started shortly, one on the Old Colony lode.

**Quincy.**—A new drum, 22½ ft. in diameter, made by the Allis Works, of Milwaukee, Wis., is being put in at No. 5 engine house to take the place of the old drum, which has been in continuous service for over 10 years. A force will repair the timbering in No. 6 shaft. This will slightly affect the production this month.

**Winona.**—Exploratory work continues, 40 men being employed. The territory south of No. 2 shaft is rich, especially in the 4th level. Drifting on the 6th level is under way, and the shaft is sinking to the 8th.

**Wolverine.**—The steel portion of the new mill at Traverse Bay, Lake Superior, is finished and the Wisconsin Bridge and Iron Company has removed its force to Grand Rapids, Wis. A large part of the machinery is installed in the mill and the remainder will be set up at once.

#### COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

**Allouez.**—The water in the old workings on the Allouez conglomerate lode has been lowered from the 13th to the 15th level. The work will be continued until the remaining 300 ft. are removed.

**Mohawk.**—The Wisconsin Bridge and Iron Company, of Milwaukee, Wis., has completed the steel work on its new mill. A force of carpenters will be put on the wood work.

#### COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

**Belt.**—The work of examining and exploring this property will soon be under way. The option is controlled by Capt. W. A. Dunn and Chicago and Cleveland parties.

**Mass Consolidated.**—Samuel James, formerly assistant assayer at the Tamarack-Osceola mills, has been appointed assayer and copper washer at the mill. Sinking in D shaft, on the Butler lode, 2,100 ft. west of B shaft is under way. The shaft is an old one and is being cut down from surface. After some depth is gained cross-cuts will be run to tap the different lodes and the shaft will be connected with B shaft by a drift.

**Norton Lumber Company.**—This company, of Duluth, Minn., has purchased 400 acres of land on the mineral range adjoining the Elm River property on the north. The land comprises 10 forties in T. 52, R. 36.

**Penn.**—Capt. W. A. Dunn, agent for Pickands, Mather & Company, of Cleveland, O., has stopped explorations and shipped the equipment to Houghton, as the option has expired. The 2 old shafts were sunk to a depth of about 90 ft., but nothing very promising was encountered.

#### IRON—MENOMINEE RANGE.

**Appleton.**—The Eleanor Iron Company is to reopen this mine at Loretto which has been idle since 1894, when the buildings on the property burnt down. The shaft is down 250 ft. John H. Wills, of Ishpeming, will be mining captain and Martin O. Johnson, mining engineer.

**Beaufort.**—This mine near Iron Mountain was recently sold by Oglebay, Norton & Company to Rogers,

Brown & Co., but will be under the management of the former owners this year. About 75 men are employed under Superintendent Hopkins.

#### MINNESOTA.

(From Our Special Correspondent.)

Attempts made in the recent tax session of the State Legislature to tax iron ore at 5c. a ton on the output in lieu of a valuation tax on mines, and attempts to reduce the rates of transportation by 20c. a ton flat, failed. The former was fought by all interests on the ranges and in the county where mines are, and the latter was a matter of general legislation that came up in a session professedly devoted entirely to tax legislation. The reception of the latter measure, however, gives ground for the opinion that a similar measure may be tried with more probability of success at the next regular session.

Shipment of iron ore from the mines to Lake Superior docks will commence about March 25 unless the weather grows severe before that date. The Eastern Railway of Minnesota will probably be the first shipper, and expects to have its docks filled before the first vessels load. It is booked for a gross shipment this year of 4,000,000 tons. The road's new ore dock will be ready at an early date, though scarcely as soon as was hoped. The Duluth & Iron Range road will be hauling ore a little later, and the Duluth, Missabe & Northern will not fill its docks till vessels begin to move.

The opening of navigation is expected soon, and boats will be moving about April 10. There is a concerted movement among independent vessel owners to hold ships back till May 1, but the ore carriers belonging to mining and steel making concerns will be on the move as soon as possible, as will the package freighters of the trunk lines. Independent vessel men see that an unusually early opening will ruin all chances of a higher rate for the summer than 70 to 75c. a ton from the head of Lake Superior and they want to hold the rate at 80c, at which price a large tonnage of outside ore has been contracted.

Stripping has started for the summer at a number of mines, and will be in full swing in about two weeks.

The large laboratories at the ports of Two Harbors and Duluth belonging to the United States Steel Corporation, will be moved to the range. The Two Harbors laboratory, in charge of Mr. R. B. Greene, will be moved to Eveleth, and the Duluth laboratory, under the direction of Mr. E. T. Griese, to Hibbing.

#### IRON—MESABI RANGE.

(From Our Special Correspondent.)

**Pitt Iron Mining Company.**—This company, with a property on the east side of T. 58, R. 17, has about 10,000 tons on surface and will ship about 40,000 tons this season. E. C. Garlick, who has been on the range more or less since the opening of the Commodore Mine in 1893, has sold his interest in the company to C. E. Pope, of Cleveland, and has been succeeded as manager by Clarence E. Moore, of the La Belle Iron Company, of Ohio, who is chief stockholder in the mining company. The mine will be improved and extended as fast as possible. The shaft is down 100 ft. and is in ore, which extends to 175 ft. from surface. Two skips are running and a road from the main line of the Duluth & Iron Range is graded. Drills are proving the 40 acres west of the new mine on which the company has an option for lease.

**Sharon Ore Company.**—This mine will ship this year 250,000 tons of ore from its mine at Buhl. In addition there will be stripped 400,000 cu. yd. of surface, sand, hardpan and boulders. There is a stripping contract in force amounting to 1,100,000 yd., to be moved during the coming 2 years. Drake, Stratton & Company have this. Another year the mine will be capable of a very large output. Its ore area is large and is being extended by discoveries north and south of the pit, 3 drills being in continuous operation. It is estimated that about 30,000,000 tons of ore have been shown up.

#### IRON—VERMILION RANGE.

(From Our Special Correspondent.)

**United States Steel Corporation.**—About 1,400 men are at work in this company's properties. Of these some 350 are at the Minnesota hard ore mines at Soudan, the rest at Ely. Shipments for 1902 from these mines, it is said, are expected to be about 1,800,000 tons, of which there will be some 275,000 tons from the Minnesota, 600,000 from the Chandler, 650,000 from the Pioneer, 200,000 from the Savoy and Sibley and 100,000 from the Zenith.

#### MISSOURI.

##### JASPER COUNTY.

(From Our Special Correspondent.)

**Joplin Ore Market.**—The price of zinc ore advanced 50 cents per ton during the past week, while the lead ore market remained unchanged. The zinc ore situation is more encouraging than at any time since the first of the year. Demand is excellent, and much ore

has been bought for future delivery. The highest price paid was \$32 per ton for the product of the Royal Blue Mine on the Granby land. Much zinc ore brought \$31.50 and \$31 per ton, and the assay basis ranged from \$26 to \$29 per ton for 60 per cent zinc ore. High-grade ore was much in demand. Lead ore brought \$21.75 per 1,000 pounds delivered. During the corresponding week of last year zinc ore's top price was \$27.50 per ton, and lead ore brought \$23.25 per 1,000 pounds delivered. The production was 19 carloads of lead ore greater and 7 carloads of zinc ore less than last week.

Following is the turn-in by camps of the Joplin District for the week ending March 15:

	Zinc lbs.	Lead lbs.	Value.
Joplin .....	3,296,440	434,960	\$58,507
Cartersville .....	2,107,120	342,630	34,545
Galena-Empire .....	1,394,360	172,030	20,496
Aurora .....	704,700	70,260	10,422
Webb City .....	401,410	11,730	5,173
Oronogo .....	540,820	11,110	8,138
Duenweg .....	359,020	50,910	6,133
Carthage .....	667,100	.....	10,340
Spurgeon .....	175,270	.....	3,300
Neck City .....	193,350	.....	2,900
Cave Springs .....	102,780	4,520	1,537
Carl Junction .....	124,130	.....	1,802
Granby .....	182,000	25,000	2,104
Stettin City .....	132,570	.....	1,822
Ash Grove .....	60,000	55,600	1,843
Sherrwood .....	77,480	.....	1,085
Zincite .....	68,550	2,900	1,071
Reeds .....	59,970	.....	840
Total .....	10,939,100	1,256,480	\$147,138
Total, 11 weeks.....	112,181,300	13,173,910	\$1,801,715

Zinc value for week, \$147,829; lead, \$27,309; zinc value, 11 weeks, \$1,518,460; lead, \$283,255.

#### ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

State Geologist Buckley recently took a trip through the disseminated lead belt preparatory to having a careful contour map made of the district.

**American Lead and Baryta Company.**—This company has started drilling at Shibleoth, and has ordered 2 more diamond drills to explore the deep disseminated ground. This is expected to range from 600 to 900 ft. deep on its lands.

**Columbia Lead Company.**—This company has shut down its mill to make some changes, but work is actively continued in its two mines.

**Desloge Lead Company.**—This company has completed its No. 4 shaft after only 4 months' work.

**National Lead Company.**—This company has considerably increased its output. It is now raising over 1,000 tons of ore a day, and is about to sink a new shaft, No. 4.

#### MONTANA.

##### BEAVERHEAD COUNTY.

**Indian Queen.**—This old mine is owned by Joseph Annear, Joseph Broughton and the estate of Richard Dawe. An 800-ft. tunnel taps the ledge at a depth of 450 ft. below surface. A shaft has been sunk 150 ft. at a point 100 ft. from the face of the tunnel, and is to be sunk 100 ft. deeper. The vein is about 20 ft. wide, but the ore is irregularly distributed. A recent shipment to Butte is reported to have shown 40 per cent copper.

##### BROADWATER COUNTY.

**Freiberg.**—Frank D. Miracle, who owns a controlling interest in this mine, not far from the East Pacific at Winston, has given a bond and lease upon the property to James and Charles Whitehead and John Newell. The mine is one of the oldest of the district, and has produced what is claimed to have been the richest gold ore ever found in this State. The property is developed by 2 tunnels on the lead, one of 800 ft. and the other 600 ft. The mine has been closed only a short time.

##### FERGUS COUNTY.

**Philippine.**—Considerable development work is being done on this group of claims, at the head of Armell's Creek, by C. A. Case, who has a bond on the property. A strata of volcanic cinders is reported encountered, which runs from \$1.20 to \$2.10 in gold per ton.

##### GRANITE COUNTY.

(From Our Special Correspondent.)

**Rock Creek Mining Company.**—This company is formed to work the Sapphire deposits along the bed of Rock Creek. The incorporators are C. D. McClure, A. B. Ewing, Moses Rumsey, H. S. Rumsey, all of St. Louis, Mo., and Paul Fusz and Frank D. Brown, of Phillipsburg. The company has a capital of \$200,000, of which \$100,000 has been subscribed.

**Granite-Bi-Metallic.**—Nearly all of the machinery for the 500-h. p. motor for the big 250-drill air-compressor at this mine has arrived at Granite. One portion of the motor alone weighed 14 tons, and required 32 horses to transport it to the mine. The compressor when installed will be easily the largest in the State. The concrete foundation has been completed. An excavation is now being made for the foundation for the motor. Power will be transmitted

from the motor to the compressor by means of a rope drive, the pulleys for which contain 19 grooves.

## LEWIS &amp; CLARKE COUNTY.

**Paramount Mining Company.**—This company is working the old Penobscot mine near Helena. Matt W. Alderson is acting president of the company. Present operations are confined to prospecting for a vein in the hanging wall.

## MADISON COUNTY.

**Lester.**—A rich strike of free gold ore is reported in this mine, owned by Armour & Jeffrey.

**South Boulder Mining Company.**—This company's mines are on the south slope of Hollow Top Mountain, a few miles south of Pony. The new 10-stamp mill recently completed a 2 months' test run that is reported to have shown a close saving. The mill has closed until spring, when water power can be used.

## POWELL COUNTY.

**Queen of the Hills.**—Robideaux & Jennings' Mill is running steadily on ore from this mine. A force of about 12 men is employed in the mine and mill.

**Vipond Group.**—Archie McIntyre, of Walkerville, is opening this group of 5 quartz claims in the Vipond Mining District. He is sinking a 300-ft. shaft and driving 2 tunnels. The shaft is now 1660 ft. deep and one of the tunnels is in about 200 ft. All of the hoisting from the shaft is done with a whim. The ore contains copper, gold and silver, and is shipped to Denver for treatment.

## SILVER BOW COUNTY.

**Miners' Union.**—F. Augustus Heinze has secured a bond on the Miners' Union lode claim, the consideration being \$150,000 and the bond to run one year. This is a full patented claim adjoining the Cora Mine, which Mr. Heinze has been working for some months. The mine is owned jointly by G. W. Stapleton and wife, John Noyes and wife, P. J. Brophy and wife, George Casey and Josephine M. Lyons, a sister of the late Gregory M. Lyons. Miss Lyons is the owner of a one-fifth interest.

## NEW YORK.

## FRANKLIN COUNTY.

**Chateaugay Ore and Iron Company.**—This company has increased its capital stock from \$1,500,000 to \$2,750,000, of which the Delaware & Hudson Company holds \$1,400,000. An important discovery of iron ore is reported on the company's property at Lyon Mountain.

## NORTH CAROLINA.

## ROWAN COUNTY.

**Gold Hill Copper Company.**—At the annual meeting of the stockholders in Jersey City, N. J., on March 10, after the routine business was gone over, the following officers were elected for the ensuing year: Walter George Newman, president; R. T. Marsh, vice president; Wm. H. Richardson, secretary and treasurer. Directors—Gustave Reinberg, Wm. H. Richardson, C. L. Downes, Hon. W. A. Blair, S. M. Newman, R. T. Marsh, Walter George Newman.

## OHIO.

**Coal Miners' Wages.**—The operators and miners of the Zanesville sub-district have settled their differences. The pick mining scale in force last year, 85c. a ton, was decided on with an increase of 20c. a yard in room turning. The machine scale was agreed upon for the present, but a committee of 5 from each side is at work on a permanent scale. The price heretofore paid will prevail meanwhile. It is \$2.75 a day for the runner, \$2.50 for the helper and 50c. a ton for loading room coal and 60½c. for entry coal.

## OREGON.

## JACKSON COUNTY.

**Elisha Ray.**—The Smith Bros. have ordered a gas-line hoist and electric drill put in at this mine near Gold Hill.

**Glacier Mound Placer.**—Dr. W. H. Andrews, of Grant's Pass, has sold to M. C. Ament for the Golden Drift Mining Company, this 10 acres of placer ground in Dry Diggings. The doctor located this in 1895 and has worked it more or less every winter and spring by sluicing. The new owners will work it with pipe and giant.

**Oriatt.**—These hydraulic mines, in the Pickett Creek District, were recently bonded by George W. Trefren to a company of San Francisco men. The consideration is \$25,000. These mines are well equipped with a hydraulic plant, and are among the leading placer gold producers of the county.

## JOSEPHINE COUNTY.

**Gold Bug Mining Company.**—This company, on Mt. Reuben, is installing a complete cyanide plant. This property has been a good producing mine for over 3 years, and is now in rich sulphurets.

**New Hope.**—This group of 7 claims is located 3 miles northeast above the Gold Bug on the east side of Mt. Reuben, near Grants Pass. This mine has been owned for the past three years by C. D. Burnett, Mr. Hudson and R. F. Gibson. They have some 500 ft. of tunnels and inclines, with a series of ledges running from 2 to 16 ft.

**Oregon Bonanza.**—This mine, on Williams Creek, is equipped with a good hoist, and with shafts and tunnels, some 665 ft. of work. Development is proceeding under W. R. Rogers, principal owner and manager.

## MALHEUR COUNTY.

(From Our Special Correspondent.)

**Humboldt.**—This group, reported as showing up well, as now owned by the Coats Brothers, whose sons are operating both groups and the quartz mill.

**Mormon Basin Mining District.**—This district includes the Mormon Basin, Malheur and Amelia sections in the northern part of Malheur County, and the southerly 4 miles of Pedro Mountain in Baker County. Mormon Basin is about 11-2 miles long and as wide, and was formerly a rich placer mining camp. Placer mining is still carried on by 4 companies. The district is about 20 miles northwest of Huntington, on the Oregon Railway and Navigation Company's line and 22 miles southwest from Express, and about 40 miles due southeast of Sumpter. The elevation is about 4,700 ft. The general formation in the south half of the district is a schistose slate, with dikes of porphyry. The northern half of the district, from the south end of Pedro Mountain, is mostly in the granite formation. The values in both sections are principally free gold, carrying high-grade sulphide. Very little quartz mining was done in the district prior to 1899, but at least 20 claims are now being developed.

**Tarbell.**—This group, 80 rods south of the Coats' quartz mill, is a regular producer and is being worked by an increased force. At the Coats' mill the concentrates are said to have averaged \$263 for two consecutive months.

## PENNSYLVANIA.

## ANTHRACITE COAL.

**Plymouth Coal Company.**—This company, which operates mines at Luzerne Borough and Plymouth, has gone into the hands of a receiver. The People's Bank of Wilkes-Barre was appointed to act as receiver. The company's property is valued at \$500,000.

## SOUTH DAKOTA.

## CUSTER COUNTY.

(From Our Special Correspondent.)

**Black Hills Porcelain Clay and Marble Company.**—The company is working 26 men on its marble and mica properties, and is getting ready to develop the lithograph stone quarry.

**Chilcoat.**—The incline shaft is down 275 ft., and the ore at the bottom is reported 7ft. wide, averaging over \$7 a ton, free milling and concentrating. Two shifts are working.

**North Star.**—The excavations and foundations for the 20-stamp mill are finished, and the company is beginning the building. The mill will stand a few rods from the north of the shaft. It is probable that a cyanide plant will be put up.

## LAWRENCE COUNTY.

(From Our Special Correspondent.)

**Blacktail Ground Sold.**—T. R. Bryns, of Chicago, representing an eastern syndicate, has purchased the Realization Group of Ernest May and George Johnson and the Penobscot group of R. M. Maloney. The former is situated at Garden City and brought \$110,000. The latter is near the head of Blacktail Gulch and the consideration was \$30,000. The Realization is said to show a shoot of ore 20 ft. thick and over 100 ft. wide, averaging \$5 a ton.

**Colorado-Dakota.**—The company intends to build a 300-ton cyanide plant near Crown Hill Station this year.

**Custom Cyanide Plant.**—A Boston, Mass., syndicate has purchased a site in Deadwood, and will build a cyanide plant for custom work.

**Horseshoe Mining Company.**—There has been a complete reorganization, the new company being capitalized at \$10,000,000. The principal office of the Milwaukee, Wis., and the officers are: D. E. Murphy, Milwaukee, president; Frank G. Bigelow, Milwaukee, vice president; W. K. Murphy, Milwaukee, secretary; Anson Higby, Deadwood, S. D., general superintendent; R. W. Rodda, Deadwood, mine superintendent. The company is remodeling the chlorination plant at Pluma and installing cyanide tanks capable of handling 125 tons of ore a day.

**Imperial Mining Company.**—The new 250-ton cyanide plant in Deadwood has started on Blacktail Gulch ore. It is patterned after the mill of the Union Extraction Company at Florence, Colo., and is built on level ground.

**Lucky Strike Mining Company.**—The company owns the Bird and Funston groups on Box Elder, embracing 320 acres, and is planning to build a mill. C. A. Allen, O. W. Matson and others of Deadwood are the incorporators.

**Montezuma.**—The mine is producing 60 tons of ore a day for the Deadwood & Delaware Smelter, where

it is used as flux. The ore carries 45 per cent sulphur, 36 per cent iron, from one to two per cent copper, and a trace of gold. The smelter formerly brought its copper flux from Montana.

**Pennsylvania Gold Mining Company.**—A 100-ton cyanide plant is to be built by the company in Deadwood Gulch. An 8-ft. ledge of ore is exposed said to assay \$30 a ton. Albert Wilson of Williamsport, Pa., is president; C. C. Worthington, of Muncie, Pa., is secretary and A. B. Worthington of Muncie is treasurer.

**Pluma Mining Company.**—The hoisting plant in use at the Eureka shaft of the Galena Mining and Smelting Company has been purchased and is being hauled to the Pluma property at Lead, where it will be set up.

**Spearfish Mining and Reduction Company.**—The 300-ton cyanide plant is running. The ore is taken from open pits and hauled half a mile to the mill on a tramway by a steam locomotive.

## UTAH.

**Salt Lake Bullion Settlements.**—For the week ending March 15 the banks made settlements on ore, etc., as follows: Bullion, \$71,400; gold bars, \$12,000; silver-lead ores, \$148,700; copper bullion, \$78,200; auro-cyanides, \$1,100. For the week ending March 8, the settlements were made by the banks thus: Bullion, \$57,000; gold bars, \$12,000; silver-lead ores, \$163,800; copper bullion, \$30,000.

## BEAVER COUNTY.

**Beaver Copper and Gold Mining Company.**—This company is capitalized for 300,000 shares of the value of \$1 each. The officers are: Frank C. Morehouse, president; John Fargie, vice-president; Leonard G. Brown, secretary and treasurer, and these, with John S. Daveler and Humphrey D. Brock, are directors. The company owns 12 mining claims in the North Star District, adjoining the Copper King group at Milford.

**Imperial Copper Mining Company.**—The adjourned meeting held recently in Chicago resulted in the old board of directors being unanimously re-elected. The board then organized, with A. B. Lewis as president; W. H. Alexander, vice-president; J. P. Haynes, treasurer. These, with Charles C. Goodwin and C. J. Coughy, constitute the directorate.

## IRON COUNTY.

(From Our Special Correspondent.)

**Iron Lands.**—The iron lands of this district are reported nearly all closed out. About 60 men are now employed in doing exploration work in different parts of the field.

**Johnny.**—It is reported that the stock set aside for developing and equipping the property has been sold, and the company now has means to go ahead with the work.

**Ophir.**—It is the intention of the manager, Mr. Lathrop, to increase the supply of water by sinking another well in the bed of the creek. It is affirmed that the failure of F. C. Andrews will in no way interfere with the future of the plant.

## JUAB COUNTY.

**United States Mining Company.**—Henry F. Samson has filed a damage suit against this company for \$13,014. He alleges that in May, 1901, he was in peaceable possession of the Kempton Mine, and that to extract ore from the same it was necessary to utilize the old Neptune tunnel. The defendant, he alleges, blew up and destroyed portions of this tunnel. Samson states that he cleaned out and repaired the tunnel once, only to have the defendant again destroy it.

(From Our Special Correspondent.)

**Tintic Shipments.**—For the week ending March 15 shipments were as follows: Bullion-Beck, 7 cars; Gemini, 10; Eagle & Blue Bell, 3; May Day, 4; Yankee Consolidation, 7; Carisa, 4; Grand Central, 7; Lower Mammoth, 2; Mammoth, 4; Swansea, 6; Star Consolidated, 2; South Swansea, 2; Tesora, 6 cars ore; May Day Mill, 2 cars, Mammoth Mill, 2 cars; Tesora Mill, 6 cars.

**Fish Springs Shipments.**—Shipments for the week ending March 15 are as follows: Utah, 1 car.

**Ajax-Lower Mammoth.**—Connection has been completed between the properties which will give ventilation and escape from either mine in case of accident.

**La Reine.**—The control has passed to local investors who are planning an active campaign. The Board has been reorganized as follows: J. Barnett, president; F. H. Schmidt, vice-president; A. L. Day, treasurer; A. H. Peabody, secretary; these with D. S. Taggart are directors. An assessment of 1c. a share was called at the same meeting.

**Mammoth.**—It is stated that Geo. Moore is to be retained for testing the ores and on his recommendation the company will act in erecting a mill for the cyaniding ores.

**May Day.**—The dry concentration process is giving fairly good satisfaction. Some alterations are being

made which Manager F. Flindt claims will give much greater capacity.

**Sioux and Utah.**—The territory in these two groups, comprising 13 patented claims, is under option to J. A. Underwood, superintendent of the Carisa. The option calls for the payment of over \$150,000 within 6 months' time. This ground has been worked in former years to some advantage, but under the new management it is the intention to start systematic development.

**Tetro.**—An arrangement has been effected whereby the company can work its territory through the winze that was put into Godiva ground.

**West Morning Glory.**—This property has been closed down and the force of 15 men is idle. Operations have been carried on by Thos. Weir, who has a bond that matures on April 1st and calls for the payment of \$20,000. Some good ore is claimed to have been opened up and if the bond is allowed to lapse the owners may continue work.

## SALT LAKE COUNTY.

(From Our Special Correspondent.)

**Bingham Shipments.**—The shipments for the week ending March 15, were: Queen Mill concentrates, 1 car; Sampson, 1 car; Yosemite No. 1, 2 cars.

**Ben Butler.**—Judge Hall has issued an order enjoining plaintiffs and defendants from working certain territory at Bingham under dispute. A bond of \$10,000 is to be exchanged between plaintiffs and defendant. The Liberal people are to be allowed to carry on their work in the upraise under conditions later to be imposed.

**Bingham Consolidated.**—Assurance has been given that the new converter material will be shipped from the manufactory in Milwaukee by March 20. If this is done the management says it will be turning out its own pig copper by April 15. Everything is in readiness for the converter to be placed the moment it arrives.

## SUMMIT COUNTY.

**Quincy Mining Company.**—This company, at Park City, has obtained an injunction restraining the Little Bell Company from doing any further work in Quincy territory and the defendants named, Little Bell Mining Company, Little Bell Consolidated Mining Company, Daly-West Mining Company, J. E. Bamberger, Simon Bamberger and Solon Spiro, are asked to show cause on March 31 why the injunction shall not be permanent.

The Little Bell is working on the south side of the Quincy and the Quincy is working on the south side of the Daly-West and the presumption has been that the Daly-West Company had an idea that the contact vein in its property passed through the Quincy and apexed in the Little Bell. This is generally understood to have been the reason why the Daly-West acquired control of the Little Bell and why operations have been going on under the direction of the Daly-West's superintendent, John A. Kirby. To stop this work, it is said, the Quincy has got out its restraining order.

(From Our Special Correspondent.)

**Park City Shipments.**—Shipments for the week ending March 15, were: Daly-West, 2,138,150 lbs.; Ontario, 1,777,470 lbs.; Quincy, 1,244,730 lbs.; Anchor, 200,930 lbs.; Silver King, 1,536,450 lbs.

## TOOELE COUNTY.

(From Our Special Correspondent.)

**Garrison Gold and Copper Mining Company.**—This property is being developed by a small force of men. The management has begun a preliminary survey for patent of its 10 claims on Dutch Mountain, in the Deep Creek District. J. S. Garrison is manager.

**Hidden Treasure.**—As soon as the roads are ready for heavy traffic shipments will begin to move toward the smelters. It is reported that the breast of the tunnel has 5 ft. of good ore.

**Mercur Consolidated.**—The tailings plant (at Manning) has closed down, awaiting warm weather. The leaching tanks have been emptied, and the contents in bullion marketed. About 20 men have been placed on the retired list until the opening of the mill, about April 1.

**Mono.**—Grading for the new concentrator has started under the supervision of Mr. Sprunt. It is expected this plant will handle ore from some neighboring mines besides its own.

**Utah Queen.**—Manager Hunt reports a shipment of 3 cars ready for the market. The contents are reported as 60 oz. silver, 25 per cent lead, 5 per cent copper and \$3.50 gold per ton.

## WASHINGTON.

## FERRY COUNTY—REPUBLIC.

(From Our Special Correspondent.)

**California.**—It is reported that a tramway will soon be started to connect with the Washington & Great Northern Railroad, near San Poil Lake, 12 miles distant.

**Gold Ledge.**—The tunnel is in 910 ft. The diamond drill outfit will be put in use without delay.

**Kettle Valley Lines Railway.**—The Republic & Kettle River branch expects to be running trains into Republic by April 5. Much of the track has yet to be ballasted. It is expected that active work will be resumed on most of the idle productive mines within 30 days. It is thought there will be quite an excitement when the railroads begin hauling ore.

**Zala Consolidated.**—A rich shoot of ore was recently struck in the cross-cut from the lower tunnel.

## WEST VIRGINIA.

## MONONGALIA COUNTY.

A. C. Fulmer, of Meyersdale, Pa., has bought 2,000 acres of coal land along the Morgantown & Kingwood Railroad, and will, at once, open a mine to employ several hundred men.

## FOREIGN MINING NEWS.

## ASIA.

## INDIA—MYSORE.

**Kolar Gold-field.**—The total output of gold reported in February was 40,053 oz. This makes a total of 81,665 oz. for the two months ending February 28, against 83,593 oz. for the corresponding period in 1901; showing a decrease of 1,928 oz., or 2.3 per cent. The total this year was equal to 73,499 oz. fine gold, or \$1,519,224.

## AFRICA.

## TRANSVAAL.

Reports of additional mines and mills starting up continue to be received. The Glen Deep started March 5, with 30 stamps running; the Nourse Deep on March 3, with 20 stamps; the Ferreira Deep on March 1, with 30 stamps. The Ferreira Gold Mining Company received authority on March 5 to start 50 stamps, and will begin work as soon as labor enough can be secured.

**Rose Deep, Limited.**—This company reports for the period from the resumption of work on December 16 to January 31 a total of 50 stamps at work and 11,360 tons of ore crushed. The yield was, from mill, 2,476 oz.; tailings, 1,283 oz.; slimes, 200 oz.; total, 3,960 oz. fine gold; an average of 0.35 oz. to the ton.

## AUSTRALIA.

## NEW SOUTH WALES.

**Broken Hill Proprietary Company.**—This company reports that during February the total output of the refinery was 384,492 oz. silver, 5,071 tons lead and 39 tons hard or antimonial lead.

## WESTERN AUSTRALIA.

The gold output reported for February was 152,693 oz. crude. This makes a total of 320,853 oz. crude for the two months ending February 28; this was equal to 290,843 oz. fine gold, or \$6,011,726.

**Great Boulder Consolidated.**—This company's return for the two months, ending February 28, shows results as below, the gold being given in crude ounces:

	Tons worked.	Gold ozs.	Oz. per ton.
Oxidized ore.....	4,599	5,824	1.27
Sulphide ore.....	11,323	21,273	1.88
Totals.....	15,922	27,097	1.70

The total gold won was equal to 19,970 oz. fine gold, or \$412,777; an average return of \$25.92 per ton. The oxidized ore plant has 30 stamps and a cyanide plant for tailings. The sulphide plant has a capacity of 200 tons a day.

## CANADA.

## NOVA SCOTIA—CAPE BRETON.

**Dominion Coal Company.**—This company's shipments of coal for the month of February were 146,158 tons. For the fiscal year, which ended February 28, the total shipments were 2,412,525 tons, against 1,957,300 tons for the preceding year.

## MEXICO.

## CHIHUAHUA.

(From Our Special Correspondent.)

**Montezuma Lead Company.**—This company has added six Wilfey tables to its plant. A spur of the Central has been completed to the company's "Novodad" and ore will be treated from this mine in the same mill. The company has ordered 2 new Baldwin locomotives for the narrow gauge road that runs to the different properties it is working.

## DURANGO.

(From Our Special Correspondent.)

There is a movement on foot to establish a mining exposition in Torreon under the title of the "Gran Exposicion de Mineralogia y Metalurgia de Torreon." A publication setting forth the objects and scope of the proposed exposition is to be issued. The active promoter of the enterprise is Sr. B. de Cornely.

David Shaw, of Durango, has denounced 100 mining pertencencias in a gold, silver and copper mine, situ-

ated in Tahuahueto el Alto, municipality of Tehuantepec, Santiago Papasquiaro.

Oliver Regden and associates have applied for a re-survey and readjustment of the Denver Mine, situated in the Sierra de Can Lorenzo, Cuencame.

Senor Benjamin F. Larriere has applied for a denouncement of 30 mining pertencencias in a gold, silver and copper vein situated in the Cuapam Mountains, municipality of Otaez.

Henry Fisher has denounced 400 mining pertencencias in the La Espina, a gold, silver and copper mine situated in Gachupines, municipality of Pueblo Nuevo.

Good progress is being made in the construction of the railroad from Hornillas, on the Mexican Central Railway, to the mining district of Mapimi. It is expected that the road will be ready for traffic in less than two months; 15 km. of grading are already done. The Descrubridora Mining Company is building the road.

**Avino Mining Company.**—This company's mines at Avino, are still idle. The work of installing a new concentrating plant is going on. The ores of these mines are of low grade and difficult to work. Operations with the processes in use have not resulted profitably. The entire plant is being reconstructed at great cost. The work has been under way for 4 months, and will probably not be completed until well into the summer. The construction pay-roll for February amounted to a little over \$20,000.

**Las Becerras.**—The action of the mining property, consisting of the Las Becerras and Vacas No. 1 mines, took place recently. The mines are situated in the Mineral de Vacas, Partido de Nombre de Dios. The bidders were Messrs. Francisco Asunsolo, Indalecio Sanchez Gairto and John Flynn. The bidding was active. Mr. Flynn stopped at \$30,000, and the other two competitors alternately raised each other's bid until the properties were knocked down to Senor Asunsolo for the sum of \$65,000. The mines are part of the estate of Maude Irene Campbell, a minor, and were sold under the order of court.

**Los Remedios.**—This copper mine in Mapimi District has been bonded to M. E. Parks.

**National Dynamite and Exploration Company.**—The following gentlemen have been elected as officers and directors: Saturnino A. Sauto, president; Julio L. Limatour, vice-president; Enrique Tron, treasurer; Enrique C. Creel, Porfirio Diaz, Jr., directors; J. F. Brittingham, business manager; George P. Col, technical director.

**Torreon Smelter.**—This plant, which has been idle for some time, is expected to blow in during March.

**Vacas.**—It is reported that there will soon be a change in ownership of these mines, so long in bitter litigation. E. R. Chapman, of New York, is quoted as saying that Mr. Warner, of the Warner-Quinlan Asphalt Company, Jacob Amos, and Aruthur R. Peck, of Syracuse, N. Y., have bought a controlling interest.

**Velardena.**—The reported sale to New York men seems to be unfounded, but it is believed that negotiations for a sale have been in progress. The mines are actively worked day and night. Four furnaces are running.

## SONORA.

(From Our Special Correspondent.)

Increased activity is manifested in placer mining in the Yaqui river district.

**Creston-Colorado.**—A body of very rich ore has been struck on the 600-ft. level of this mine at La Colorado. Native silver and gold are both reported in the ledge. The company is erecting a high board fence around its works and as many as 15 Mexican miners have been arrested at one time for stealing ore.

**Kansas City & Sonora Mining Company.**—This company, at Galivan, recently started up a 10-stamp Boss process mill to treat ore from 5 silver claims.

**Mexican Anthracite Coal Company.**—This company has a concession to construct a railroad from El Salto, connecting with the Sonora railroad at or near Moreno. The company is also permitted to prolong the line from Moreno to San Carlos, or the port of Guaymas, providing it gives notice of the intention to do so within 4 years.

**Nogales Mining Company.**—This company, near Magdalena, has started a 20-stamp mill on its free gold ores.

## NEW CALEDONIA.

**Nickel Corporation, Limited.**—The Bulletin du Commerce, of Noumea, of February 8, notes the arrival of M. Reichembach, the new manager of this company's mines. He was accompanied by Mr. Bradley and Major Leckie, who are well known in connection with nickel mining in Canada.

**Thio District.**—Several nickel properties in this district are to be opened and actively worked. Messrs. Bardey & Roland have acquired two mines, the Prise de l'Alma and the Prise de Rivoa, both near Port Bouquet. M. Bruthiaux has begun work on the Puy-de-Dome Mine at Knakue. A tramway 3 km. long is being built from Port Bouquet to the mines.



MINING STOCKS.

(Complete quotations will be found on pages 434 and 435 of stocks dealt in at):

Table listing stock exchanges: New York, Boston, Philadelphia, Colo. Springs, Mexico, London, Paris, Toronto, San Francisco, Salt Lake City, Spokane, St. Louis.

New York. March 20.

Amalgamated copper attracted much attention, as it fluctuated around the lowest price on record. The fact is, stockholders are dissatisfied with the management in delaying the dividend meeting for the convenience of certain directors who are usually out of town at this time.

Ontario Silver, of Utah, made a sale at \$8 3/4, and Horn Silver at \$1.60.

Further transactions in Quicksilver of California are noted, at \$10 1/2 @ \$11 for the preferred shares, and \$3 3/4 for the common.

Alice, of Montana, advanced 1c. to 49c., on moderate trading.

In the Colorado group business is mostly in the Cripple Creek shares. Portland sold at \$2 1/4 @ \$2 1/2, while Elkton sold down to \$1.13, and Isabella at 24c.

Comstock shares are higher, Consolidated California & Virginia selling at \$1.30, Ophir at \$1, and Mexican at 33c.

Large advertisements have recently been published in Eastern newspapers by the Olalla Copper Mining & Smelting Company, capitalized at \$8,000,000, and claiming to own mines at Olalla in the Similkameen and Keremeos Valley, British Columbia.

Boston. March 19.

(From Our Special Correspondent.)

Mining shares continued under pressure and as a result a drooping market has been witnessed, with few exceptions, the past week. The tone to-night, however, was improved. The remark made by President Bigelow at the Osceola Mining annual meeting last week that there would be no fun in copper mining the next two years left a bad impression among holders of this class of securities.

The statement is made that the Tamarack report will show a similar condition to that of the Osceola, in that the \$20 paid last year was not earned. In fact, it is said that the company got no more for its copper than Osceola and the cost was over 11 cents per pound, leaving something over 2 1/2 cents profit per pound.

Copper Range fell \$1.75 to \$43.50, but has recovered to \$45.75. Tri-mountain has been very quiet with sales at \$100 @ \$105. During February, this mine produced over 300 tons of mineral, yielding 80 per cent ingot, which would give over 44 lbs. of ingot to the ton of rock stamped.

Dominion Coal touched \$117 to-day, which is its record. The close a week ago was \$103.50. Dominion Iron & Steel fell to \$39.50, but persistent buying orders caused it to advance to \$47.12 1/2.

A protective committee has been formed by Cochiti Gold Mining stockholders, although their names have not been made public as yet. The stock will be deposited and negotiable receipts provided.

Colorado Springs. March 15.

(From Our Special Correspondent.)

The advance noted last week in Cripple Creek stocks was not maintained, and the market closed to-day, recording a lower register of prices in almost every stock.

The week was not without its advances, nor was the tone one of loss during the entire seven days past. The market hardened perceptibly early in the week, but the strength imparted was merely temporary.

Elkton was undoubtedly responsible for a degree of the weakness. The company declared a dividend of 4 cents per share last week, which did not have the effect of strengthening the stock, and the price declined from \$1.28 to \$1.19 1/2.

Among the preferred prospects, Sunset-Eclipse was a prominent leader. At the close of last week these shares sold at 12 1/2c. On Monday the price dropped to 10 3/4c. at 11 1/4c., with free selling from 12 1/4c. down to 11 1/4c.

Salt Lake City. March 15.

(From Our Special Correspondent.)

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The May Day has declared a dividend of 1c. a share to be paid on March 20. The Yankee Consolidated has posted a dividend of 5c. to be paid. The March dividend has just been paid.

The Grand Central Mining Company, of Colorado, formed to take over the property of the company of same name in Utah, has filed its acceptance of the provisions of the Utah constitution.

of Provo, Utah, is named to accept service for the new company.

San Francisco. March 15.

(From Our Special Correspondent.)

More business has been done this week in Comstock shares. Buying orders were larger and there was a somewhat firmer tone to the market.

Consolidated California & Virginia sold at \$1.30; Ophir, \$1 @ \$1.05; Silver Hill, 56c.; Caledonia, 43c.; Mexican, 30c.; Hale & Norcross, 29c.; Sierra Nevada, 12c.; Gould & Curry, 10c.

The sworn monthly statements of the companies, as filed in their offices, show cash on hand as below on March 1, with expenses paid, unless otherwise stated: Andes, \$932; Alta, \$39, with indebtedness of \$3,244; Alpha Consolidated, \$1,380; Best & Belcher, \$8,496, with indebtedness of \$17,500; Bullion, \$1,677; Caledonia, \$5,681, with February expenses unpaid; Consolidated New York, \$151; Consolidated California & Virginia, \$38,068, with one car of concentrates in transit; Confidence, \$2,159, with February expenses unpaid; Crown Point, \$801; Challenge Consolidated, \$1,730; Consolidated Imperial, \$821; Chollar, \$401; Exchequer, \$80; Gould & Curry, \$3,355, with bills receivable of \$17,500 and liabilities of \$14,490; Hale & Norcross, \$3,755; Justice, \$1,855, with liabilities of \$5,215; Mexican, \$248, with liabilities of \$500; Ophir, \$757; Overman, \$5,171, with February expenses unpaid; Potosi, \$569; Savage, \$1,050; Segregated Belcher, \$48; Sierra Nevada, \$195; Silver Hill, \$13,562; Standard Consolidated, \$108,910—of which \$104,735 is in United States bonds—with February expenses and clean-up to be accounted for; Syndicate, \$3,344; Union Consolidated, \$6,559; Utah Consolidated, \$514.

The Belcher Company reports an indebtedness of \$12,216 on March 1.

On the Producers' Oil Exchange trading was only moderate and changes in price were slight. Peerless sold at \$6.75; Home, \$3.85; Monte Cristo, \$1.20; Sterling, \$1.15; Four Oil, 53c.; Sovereign, 17 @ 18c.; Lion 7 @ 8c.; Petroleum Center, 7c. Home and Four Oil were special favorites in the trading.

London. March 7.

(From Our Special Correspondent.)

The South African mining market has been comparatively quiet this week. People are not inclined to buy largely at present as the number of speculators desirous of realizing is so great that no strong rise can

DIVIDENDS.

Table with columns: Name of Company, Date, Latest Dividend Per Share, Total to Date. Lists dividends for various companies like Am. Agric. Chem., Bartolome de Medina, etc.

ASSESSMENTS.

Table with columns: Name of Company, Location, No., Delling, Sale, Amt. Lists assessments for companies like Ajax, Belcher, Ben Butler, etc.

be expected for some time. The illness of Mr. Rhodes has had a depressing effect on all Rhodesian shares, especially Chartered. There is an impression gaining ground that Mr. Rhodes' health is showing signs of giving way permanently and that the rumors that have been current for several years now have not been devoid of foundation. It is to be hoped that these fears will not be realized, for the energetic opening up of Rhodesia depends a good deal on him.

The West Australian market has been very dull the last few weeks, and Lake Views especially have suffered. No news has been received from the mine since Mr. Govett's alarmist telegrams, but private information seems to be leaking through of a decidedly adverse nature and bears are having it all to themselves.

Some efforts are being made to resuscitate the old Great Condurrow Mine, which is close to the Dolcoath Mine in Cornwall. The mine has been shut down for 30 years or more, and the shafts are all full of water, so that no examination can be made. The public, more especially in the west of England, are being invited to subscribe for 30,000 shares in a new company formed, called the Great Condurrow Tin and Copper Mining Company, Limited, but, as the method of flotation does not commend itself to prominent moneyed men, it may be doubted if much response will be made.

Combinations in the South Wales iron and coal trades are not confined to the Guest Keen & Company circle, for other iron works and collieries are about to amalgamate. These companies are owned and controlled by Messrs. Baldwin, Beck, Wright and Butler, and the names of the firms are: E. P. & W. Baldwin, Limited, Wright, Butler & Company, Limited, the Bryn Navigation Colliery, Limited, the Curnavon Iron and Steel Works, the Landore Blast Furnaces, and the Aberdare Colliery Company. The combination will not be so notable by any means as that of Guest Keen & Company, but it forms an additional proof of the existence in Great Britain of a real wish to fight foreign competition by means of consolidation and economies.

Paris. March 9.

(From Our Special Correspondent.)

The mining stock department of the Bourse shows somewhat more activity; though the boom in South Africans is apparently over for the present. The copper stocks are generally stronger in view of the reported increase in buying for consumption. The zinc and lead shares show but little change. The same thing can be said of the metallurgical stocks. Such in brief are the conditions.

The foreign merchandise trade of France for the month of January is reported by the Ministry of Commerce as below:

	1901.	1902.
Imports .....	Fr. 396,131,000	Fr. 362,989,000
Exports .....	285,113,000	314,080,000
Excess, imports.....	Fr. 111,018,000	Fr. 48,909,000

The decrease in imports was 33,142,000 fr., and the increase in exports 28,967,000 fr.; leaving a decrease of 62,109,000 fr. in the balance of imports.

The total production of coal in France for the year ending December 31 is reported as below in metric tons:

	1900.	1901.	Changes.
Coal and anthracite...	32,721,562	31,613,036	D. 1,108,526
Lignite .....	682,736	688,721	I. 5,985
Totals.....	33,404,298	32,301,757	D. 1,102,541

The larger decreases are found in the mines worked by the great metallurgical companies, such as Blanzay and Creusot. The decrease in coal last year was 3.4 per cent, and the increase in lignite 0.9 per cent, leaving a total decrease of 3.3 per cent.

Upon the whole, the situation is more hopeful, and one may look for better business before long.

AZOTE.

## COAL TRADE REVIEW.

ANTHRACITE.

New York. March 21.

A brief spell of cold weather and high winds stimulated retail buying during the week and was responsible for the consumption of a lot of coal. But for the cold wave the market would have been very quiet. It is not yet certain that the spring price list will not be out about April 1, consequently dealers are buying only for immediate needs. At the mines things are slowly getting in shape after the recent floods. The Reading has all but a small fraction of its collieries running and is sending out a pretty heavy tonnage. There is still trouble along the Lehigh River where the damage to bridges and right of way was very heavy, but the Central Railroad of New Jersey and

the Lehigh Valley are helping each other out and between them manage to move a fair tonnage. It will probably be quite a while before all the bridges along the river are replaced. In the Wyoming and Lackawanna regions the railroads are moving coal about as usual. Certain collieries, however, will not be able to get out a normal tonnage for weeks. The total February production of 3,741,253 tons is a good showing considering the short car supply and the interruptions to production and traffic from storms. It compares with 4,121,594 tons in February, 1901, a decrease of 382,341 tons or about 10 per cent.

Interest just at present centers in the convention of representatives of the United Mine Workers at Shamokin, where the question is to strike or not to strike. The chief producing companies last week posted notices announcing a continuation of the 10 per cent advance in wages given after the 1900 strike, and a willingness to discuss any grievances with their employees. The delegates to the convention apparently are of various minds. Most of those from the Schuylkill Region seem to be opposed to a strike, those from the Wyoming and Lackawanna Regions are more outspoken and talk of striking unless the operators grant straight-out recognition to the Union, make uniform rates of wages for different mines in the same district and give an 8-hour day to all mine-helpers, firemen, engineers, mule drivers and workers in the breakers. The indications are, as wages are good and many miners have been idle more or less all winter from interruptions of production, that the radical element in the convention will have difficulty in forcing a strike, which at this season of the year is likely to have but one outcome—total defeat.

Trade in the Northwest, with the opening of navigation but a few weeks away has been slack except for a flurry of retail buying during the cold wave. In Chicago territory likewise, trade is light. There will be a considerable amount of coal left on the docks at the opening of Lake navigation. At lower lake points, in the line trade, farther east, and along the Atlantic seaboard, buying is now on a hand-to-mouth basis. For the season of the year the total business done is good. At New York Harbor, the steam sizes continue scarce and certain companies are short of broken. Prices are still: Broken, \$4; egg, \$3.25; stove and chestnut, \$4.50 f. o. b. New York Harbor shipping points.

## BITUMINOUS.

There is still a heavy demand for coal in the Atlantic seaboard bituminous trade. The supply of the lower grades now available, however, has reduced prices on Clearfield from \$3.25 and over to about \$2.75 f. o. b. New York Harbor shipping ports. Producers generally are complaining of short car supply. The contract season is not active yet. Producers are going ahead in a conservative way closing with their very old customers. The transportation question prevents any eagerness in seeking new business. There is a feeling in the trade that the Pennsylvania Railroad is holding back in this matter from a real lack of sufficient motive power; on the other hand, many men in the trade assert that the railroad is showing policy in its position.

The recent conference of miners and operators at Altoona failed to agree about wages for the coming year and adjourned to reach an agreement later. It is currently reported that the convention came very near being entirely harmonious and that only the stand taken by representatives of the Beech Creek operators prevented an agreement.

Trade in the far east is calling for a considerable tonnage and is receiving quite a lot of coal, principally from the Chesapeake Bay ports. Many concerns at Boston and beyond are reported to have but little coal in stock. Along Long Island Sound some coal is still in short supply, and consumers do not hesitate to fill in with lower grades when the better grades cannot be secured promptly. At New York Harbor points many consumers are short, but any one can get coal by paying the price, which now seems to be on a descending scale. Consumers in the all-rail trade are generally complaining of short supply and are not making much resistance to paying 5@10c. over last year's prices on new contracts.

Transportation from the mines to the tidewater shipping ports remains poor, but the railroads are promising better things before long both in car supply and transportation, something they have not done for months past. In the coastwise vessel market the supply of vessels is sufficient for all needs and freight rates are weaker. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island Sound, 80c.; Boston, Salem and Portland, 90c.; Portsmouth, \$1.

Birmingham. March 17.

(From Our Special Correspondent.)

There is yet a steady demand for coal, and the production is holding its own well. Work has been started on the new mines mentioned recently, and by summer it is believed the production, if there is demand,

can be increased 50 per cent. The railroads are still slow in furnishing cars with which to move the product.

Chicago. March 18.

(From Our Special Correspondent.)

On the whole, the situation in the wholesale coal trade, as regards anthracite, is better than it was a week ago. There is at last a plentiful supply of Hocking, though Pittsburg and West Virginia coals are still scarce. Blacksmith's coal is also scarce, at the same price as last week, \$3.50. Prices in general show no change, except that Illinois mine run is a trifle lower, the present quotations being \$1.75@2. Hocking remains at \$3.25 and Indiana block at \$2.75@2.85. Smokeless egg brings \$4; smokeless mine run, \$3.50; smokeless lump, \$3.90; West Virginia splint, \$3.50; Youghiogheny lump, \$3.40@3.50; Indiana semi-block, \$2.50; Clinton lump, \$2.25. The railroad situation is in general much better, though there is still delay that is attributed to floods and washouts along the lines handling coal. Dealers state that when these temporary troubles are over they expect to get forward a satisfactory supply in all grades; there is plenty of coal mined, apparently, the only difficulty being about getting it out. The sudden cold snap of March 16 sent the thermometer tumbling down nearly to the zero mark, after a week or two of balmy weather, and the continued cold weather will probably cause a considerably larger demand this week than last for coal.

There is no change in the anthracite situation, except a suddenly accelerated demand this week of transitory nature, due to the cold wave referred to above. The price remains at \$6 and no notable scarcity of any grade exists.

Cleveland. March 19.

(From Our Special Correspondent.)

The opening of the navigation season seems to be no more than two weeks away. This will come as a welcome relief to coal dealers in the Northwest and also to shippers, but is hardly desirable to the vessel owners. To the Northwesterners it promises an immediate relief from a shortage of coal; to the shippers a lower rate of freight than would have been obtained had the opening of navigation been postponed a month; while to the vessel owner it means a summer of hard work to keep the rates on a paying basis. However, the bear element is not using the early opening with any great vigor. They seem willing to begin the season with the same rate which prevailed a year ago, 30c. to the head of the lakes and 50c. to Milwaukee. Vessel owners are inclined to ask more. Nothing is likely to be done until after the meeting of the coal men here next week, at which the prices on lake coal will be fixed.

The members of the Longshoremen's Association and the managers of the coal docks are now in session fixing the rates at which the coal is to be loaded this summer. It is expected that aside from a slight reduction in the length of a working day the wages and conditions will be same as those which prevailed last year.

Pittsburg. March 20.

(From Our Special Correspondent.)

Coal.—The railroad rates for coal shipments to lake ports were adjusted here on Saturday at a meeting of the Ohio & Western Pennsylvania Railroad Traffic and the Eastern Ohio Coal Traffic associations. The only change from last year increases the rates from the Ohio mines to the lakes from 75 to 77c. a ton f. o. b. vessels. All other rates in effect last year were reaffirmed for the coming year. The rates for the Pittsburg District will be as follows: Lake coal, 73c. a ton, f. o. b. cars at lake ports; fuel rate, 80c. a ton at port; commercial rate, 90c.; Chicago rate, \$1.75 a ton. A meeting of the leading coal interests will be held in a short time to fix the prices of coal for the coming year. As the freight rates have not been disturbed it does not seem likely that any advance will be ordered.

The announcement that F. M. Osborne, former president of the Pittsburg Coal Company, has entered this market and purchased 1,000,000 tons of rail coal from the Monongahela River Consolidated Coal and Coke Company caused some surprise. The river combination has a number of mines equipped with tipples arranged to load coal for both river and rail shipment. Last year it shipped 1,800,000 tons of coal by rail. The Pittsburg Coal Company took the greatest portion of the rail coal. This year it is said F. M. Osborne secured the rail output by paying a higher price than was offered by the railroad coal combine. He is now forming a company at Cleveland to engage in the lake coal trade.

The Monongahela River Consolidated Coal and Coke Company has shipped to southern ports all the coal loaded with the exception of probably 3,000,000

bush., and this will likely get out before the end of the week. During the past week about 10,000,000 bush. were shipped. It is reported here to-day that lake navigation is open and shipments to lake ports will begin this week. The railroads announce that 2,000 additional cars will be put into the service for lake shipments. More cars, however, are needed as the present supply is about 40 per cent short of the requirements of the trade outside of the lake business.

**Connellsville Coke.**—Prices are firmer and it is reported that rates for standard Connellsville coke for the second half are to be advanced 25c. a ton. No official announcement to this effect has been made by the leading producer and the report, while generally believed, is not confirmed. The price for the first half remains at \$2.25 for furnace and \$2.75@ \$3 for foundry. Some stiff premiums are still being paid for prompt shipment. As high as \$3.25 a ton has been paid this week for furnace coke. Shipments this week are much better than last week and the production likely will be greater. The *Courier* gives the production in its last issue for the previous week at 214,549 tons. The shipments for the week aggregated 9,238 cars distributed as follows: To Pittsburg and river tripplis, 3,518 cars; to points west of Pittsburg, 4,314 cars; to points east of Connellsville, 1,406 cars. This was a decrease of 1,747 cars compared with the shipments of the preceding week.

**IRON TRADE REVIEW.**

**New York.** March 20.

Iron market conditions are practically unchanged. Business continues very heavy, the special feature just now being the pressure of small orders for structural material. Prices are unchanged, except for the increase in bars noted in our local reports. There are many reports of premiums paid for early deliveries, but these are always doubtful and difficult to locate. There are some reports also of American buying of pig iron in Great Britain, but no large import business can be located yet.

**Birmingham.** March 17.

(From Our Special Correspondent.)

Decidedly strong is the condition of the pig iron market. No. 2 foundry iron, the popular grade, sold during the past week in small lots at \$13 per ton, \$1 over the quoted figure, with early delivery stipulated. A number of orders for small lots at this advance of \$1 could be obtained by the furnacemen here if they desired to run the risk.

The Sloss-Sheffield Company has 2 furnaces under repairs, one in Birmingham and the other in the Sheffield District. The Republic Iron and Steel Company expects to get the new furnace at Thomas in blast next month, while the Tennessee Coal, Iron and Railroad Company has one or two furnaces under repairs.

Shipments of pig iron, cast-iron pipe, steel and kindred metals and products are steady and heavy. During the past week the report of the Southern Iron Committee of the shipments of metals from the Southern field during the month of February, 1902, were given in detail as follows:

District.	Pig Iron.	Cast Iron Pipe.	Total.
Anniston	16,749	2,849	19,598
Birmingham	76,953	5,753	82,706
Chattanooga	16,559	2,153	18,712
Nashville	8,019	.....	8,019
Sheffield	18,238	.....	18,238
Middlesboro	1,646	.....	1,646
Totals	138,164	10,755	148,919

Of the pig iron only 133 tons were exported, Birmingham furnishing 104 tons and Anniston 29 tons. The cast-iron pipe exportations amounted to 167 tons, of which Anniston shipped out 140 tons and 27 tons went from Birmingham. There were 8,835 tons of steel shipped from Ensley during last month, the largest month's shipment since the plant has been located there.

The quotations are firm, as stated above, though inclining upwards. The following figures are given: No. 1 foundry, \$12.50; No. 2 foundry, \$12; No. 3 foundry, \$11.50; No. 4 foundry, \$10.75@ \$11; gray forge, \$10.50@ \$10.75; No. 1 soft, \$12.50; No. 2 soft, \$12.

Several of the furnaces in this district have recently been breaking their records, and furnaces built for 175 and 200 tons are turning out between 200 and 225 tons, regularly.

There is an active demand in the finished iron and steel markets, and the plants furnishing this trade are busy. Good prices obtain for the product of the rolling mills. At the big steel plant at Ensley more than half of the open-hearth furnaces are in operation, and the production of steel is satisfactory. The various plants employing steel in their daily consumption are doing well.

Announcement is made of the settlement of all the litigation in which the Alabama Steel and Wire Company was interested. The sentence imposed on Messrs. E. T. and G. H. Schuler, majority stockholders in the company, of five days in jail on a charge of contempt

of court, it being alleged they destroyed books which were to be investigated by C. E. Robinson, who brought suit, has been remitted and all cases, including that asking for a receiver for the concern, have been withdrawn. It is stated that C. E. Robinson, the minority stockholder, has sold all of his interests. It is now announced that the company will add machinery to its plant for the manufacture of woven-wire fencing.

**Buffalo.** March 19.

(Special Report of Rogers, Brown & Co.)

The situation in the pig iron field at the present time is interesting from several points. Not the least of these is the absolute indifference of furnaces to taking on new business for any delivery. Most producers in this territory have sold their entire product for so many months to come that they seem anxious to avoid, if possible, making any further sales at present from the little tonnage remaining unsold for the last few months of the year. Every now and then a stray buyer, who has not covered for his entire requirements, comes to the front, and in seeking for a source of supply is sometimes obliged to canvass the whole market, often without obtaining the necessary tonnage. Odds and ends which at irregular intervals are offered for early shipment are snapped up as quickly as they are thrown on the market, the prices paid being in most cases much higher than open quotations for late delivery. We quote below on the cash basis, f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, \$18.25; No. 2, \$17.75; Southern soft No. 1, \$17.75; No. 2, \$17.25; Lake Superior charcoal, \$20.50.

**Chicago.** March 18.

(From Our Special Correspondent.)

In the pig iron market continued activity and the eagerness of buyers to secure the output of furnaces for the last five months of the year—everything for the first seven months being practically sold out—has resulted in a slight advance in prices for Northern, No. 1 being quoted to-day at \$18.50@ \$19, and No. 2 at \$18@ \$18.50. As regards Southern, No. 1 is quoted at \$16.15, and No. 2 at \$15.65, though there is such demand and such scarcity of supply that it is said \$2 more per ton than these prices have been paid on actual sales.

Coke is still scarce at \$5.50@ \$6 per ton, the only kind coming in being West Virginia coke. The railroad difficulty continues for iron and coke; there is a lack of sufficient means for handling the business and furnaces are running close up to their supply of coke. Pig iron producers foresee much trouble possible as a result of the prevalent buying for the future; the fluctuations of foundry trade conditions are likely to make many buyers desire to cancel their orders when the time comes for delivery.

**Cleveland.** March 19.

(From Our Special Correspondent.)

**Iron Ore.**—The longshoremen and the managers of the Lake Erie ore docks are in conference in this city for the purpose of fixing the wages at which the men shall work this summer. It is also the purpose to agree upon the winter schedule. The men have asked an advance in wages and also a reduction in the length of a working day to 10 hours. They will likely obtain the latter concession, but will return to work upon the same basis of wages as prevailed a year ago. The shippers and owners have not come to an agreement as to freights and the situation is becoming more complex with a possibility of a tie-up of the boats until May 1 unless the shippers agree to pay a universal rate of 80c. between Duluth and Ohio ports. A few sales of ore are still being made on the same list of prices as prevailed when the market was opened. The price now is \$4.25 for bessemer old range; \$3.25 for non-bessemer old range and bessemer Mesabi; and \$2.75 for non-bessemer Mesabi.

**Pig Iron.**—The situation has not been very greatly relieved during the week. Producers are still off of the market except for an occasional car-load and they are contending as to the price of these lots, some advising caution in making advances in prices with others disposed to make a squeeze and get all that is possible. Foundry grades are quoted nominally at \$17.50 for No. 1 and \$17 for No. 2 with no material on the market. Basic producers are off the market here. The nominal quotation is \$16 Valley furnace. Bessemer producers are not selling much material, having done nothing into the fourth quarter. The last sales were made at \$16 Valley furnace.

**Finished Material.**—The structural steel producers are about off the market for the remainder of the year and the jobbers are doing the business, with the mills refusing to make sales to any one who wishes to collect a stock. The jobbers are selling the material as fast as they can get it on their contracts. The mill price is still 1.70c. with the store prices ranging between 2¼ and 3c. The price of pipe has been advanced about 5 per cent during the week. The demand for bars is also brisk and has

resulted in the mills reaching a decision to hold up to the 1.60c., Pittsburg, basis on all orders after April 1, whereas many have been inclined to cut under that price heretofore on big orders. The sheet trade for the spring has started in and the demand is quite large. The prices remain as they have been from 3.45@3.60c. for No. 27, other prices being based upon these figures. The Plate Association has decided that there shall be no change for the present and the old quotation of 1.70c. prevails. The business is in keeping with the general activity and the supply is short. For billets and sheet bars the supply is not equal to the demand. Some of the independent producers are going abroad for their material but are in doubt as to whether the prices obtained, even on the large lots needed through a pooling of their orders, will permit them to import and yet make sheets at prevailing prices.

**Old Material.**—The jobbers are still having much difficulty in getting scrap and even a harder task to dispose of it at such prices as they believe ought to be given them. The contention is causing an unstable market.

**Philadelphia.** March 20.

(From Our Special Correspondent.)

**Pig Iron.**—A very unsettled condition exists. Inquiries for material are numerous and most of them are for impossible deliveries. Prices, it is claimed, have been secretly advanced by several makers, but there is no evidence at hand to-day that they have succeeded in booking orders at the fancy prices which have been quoted. It is simply impossible to obtain the inside facts as to selling prices for iron, but it is an easy matter to give rumors, which are abundant. Foundry iron, especially No. 1, is being wanted by several large consumers throughout the East. There is also quite an effort made to procure No. 2, but no success is reported up to present writing. There are wild rumors concerning forge iron and bessemer and the rumor that bessemer is to be advanced \$1 per ton next week cannot be verified. Foundry iron consumption is greater in all Eastern and Middle Pennsylvania mills. The drawbacks connected with recent storms have been overcome. Quotations may be given at No. 1 foundry, \$20; No. 2, \$19.25; forge, \$18; basic, \$18.50; bessemer, \$20.

**Billets.**—Billets are selling at \$32 at makers' mills and basic billets at \$35. Consumption is heavy and manufacturers are anxious.

**Skelp Iron.**—An advance has been made in skelp, the amount of which we are not permitted to know.

**Plate Iron.**—The only reason why big orders can not be reported to-day is that mill authorities are unable to meet the requirements of buyers as to deliveries. Quotations for universais are 1.80c.; flange, 1.90c.; fire box and marine material 2c.

**Structural Material.**—The most urgent inquiries to-day have brought out only a repetition of what has been said often before as to oversold conditions and urgent and unplaced requirements. The local requirements for office building work and the like are now appearing and a prominent builder states that in the aggregate they will be 50 per cent over last year at this time.

**Steel Rails.**—Parties interested in trolley line construction are in a very tight place and it is a question whether projected work will be tied up for want of material.

**Old Rails.**—One or two deals are on the point of going through, but prices are almost prohibitive. Iron rails are quoted as high as \$23 and some have been sold at that figure. Old steel rails are wanted and none are to be had.

**Scrap.**—Choice railroad scrap will bring \$23 and heavy melting steel will bring \$20. Choice heavy stuff is worth about \$15.

**Pittsburg.** March 19.

(From Our Special Correspondent.)

While no bessemer pig iron was sold during the week negotiations are pending for fourth quarter delivery which likely will be concluded within a week and may result in the sale of the major part of the production of the furnaces for the year. The United States Steel Corporation has covered its requirements for the third quarter, taking about 150,000 tons, and is in the market for a big tonnage for the balance of the year. It is almost impossible to obtain bessemer iron for delivery this side of July 1 at any price and there seems to be but little available for delivery in the third quarter. Sales of small lots for prompt shipment are reported at \$18, Valley furnaces. All furnaces are running full and there are no indications that operations will soon be interrupted through lack of coke or shortage of cars. Foundry and forge iron continue in heavy demand and a large tonnage was contracted for this week at much higher rates than have ruled at any time during the year.

The freight situation shows some improvement but the railroads do not seem to be able to take

care of the business offered. Inability to secure raw material resulted in the closing of the large plant operated by the McClintick-Marshall Construction Company at Rankin, near Pittsburg, on Monday. The plant is a new one, several of the departments having been in operation about six months, but not more than a third of the entire plant is built. The company has a number of important orders on its books for prompt delivery. Work on the big furnace plant of the Union Steel Company at Donora has been suspended on account of delay in getting the necessary material. The demand for structural material exceeds that of any other line and while no advance in price has been ordered, heavy premiums are paid for early deliveries. Some large contracts have been taken but a number of them will not be filled this year. The price of beams remains at 1.60c. but dealers are asking and readily obtain 3c. Manufacturers secure premiums of \$5 and more a ton for prompt shipment. The American Bridge Company has several large contracts in this district and has not yet arranged the wage scale with the International Association of Bridge and Structural Iron Workers. The workers ask 50c. an hour for an 8-hour workday and this rate to apply on all work within a radius of 75 miles of Pittsburg. The company offers 45c. an hour and a 9-hour day, the rate to rule on all work within a radius of 25 miles of Pittsburg. The present rate is 40c. an hour for an 8-hour day. The new scale will go into effect or May 1.

The eastern bar iron manufacturers have advanced prices \$2 a ton, making the rate at Pittsburg 1.80c. while the price of the Western Bar Iron Association remains at 1.70c. Steel bar manufacturers have sold nearly all of the product for the first half and have some large contracts for delivery in the second half. Bessemer steel billets continue scarce and are offered in limited quantities at \$32, delivered in Pittsburg. Sheets are weaker and prices have dropped slightly. A conference was held here during the week between officers of the American Sheet Steel Company and the Amalgamated Association of Iron, Steel and Tin Workers, and an agreement similar to the one entered into with the American Tin Plate Company was arranged. It provides for the continuous operation of the plants pending negotiations on the new wage scale and the usual shut down of the union mills on June 30 will be avoided. The agreement, however, must be ratified by the annual convention of the Amalgamated Association which will open in Wheeling on April 15.

**Pig Iron.**—Sales of gray forge this week aggregated 4,500 tons for delivery throughout the third and fourth quarters at \$17.50, Pittsburg. Several thousand tons of foundry No. 2 were sold at prices ranging from \$17.25 to \$18, Pittsburg and some sales were made at \$19 and \$20. Bessemer pig iron is quoted at \$16.50@17.25, Valley furnaces, but no large sales are recorded.

**Steel.**—Bessemer steel billets are held at \$32, delivered at Pittsburg, but no sales were made. A large lot of foreign sheet bars arrived in this district and the price is said to be lower than \$33. Steel bars are firm at 1.60c. and tank plate remains unchanged although in some instances more than 1.60c. is obtained.

**Sheets.**—The sheet market is a trifle weaker and sales of No. 28 gauge were made by the American Sheet Steel Company at 3 and 3.10c. Galvanized sheets are quoted in car-load lots at 70, 10 and 5 per cent off, and in less than car-load lots at 70 and 10 per cent off.

**Ferro-manganese.**—Domestic 80 per cent is still quoted at \$52.50 a ton and the foreign product at \$50.

**New York. March 21.**

**Pig Iron.**—Prompt delivery on Northern brands commands a large premium, we hear of over \$22 being paid for small lots. We quote for tidewater delivery: No. IX foundry, \$19@19.50; No. 2X, \$18.25@18.75; No. 2 plain, \$18@18.50; gray forge, \$17@17.50. For Southern iron on dock, New York, No. 1 foundry, \$16.25@16.75; No. 2, \$15.75@16.50; No. 3, \$15.25@15.75; No. 4, \$14.75@15.25; No. 1 soft, \$16.50@16.75; No. 2, \$15.75@16.25.

**Bar Iron and Steel.**—The market is still very active. We quote 1.70c. for common bars in large lots on dock; refined bars, 1.83c.; soft steel bars, 1.83c.

**Structural Material.**—There is no let up to demand and the market is very strong, with higher prices probable. We quote for large lots at tidewater as follows: Beams, 1.80@1.95c.; tees, 1.85c.; angles, 1.80c.

**Steel Rails.**—Reports of sales for 1903 delivery continue. There is a great deal of inquiry for girder rails. Standard sections are still quoted at \$28 at Eastern mills; light rails at \$30@33, according to weight.

**Plates.**—Demand is heavy and the market firm. A large eastern concern has advanced prices \$2 per ton.

We quote for tidewater delivery in car-loads: Tank, ¼-in. and heavier, 1.78@1.80c.; flange, 1.88@1.90c.; marine, 1.98@2c.; universal, 1.78@1.80c.

**CHEMICALS AND MINERALS**

(For further prices of chemicals, minerals and rare elements, see page 436.)

**New York. Mar. 20.**

**Heavy Chemicals.**—Sellers are better satisfied with transportation facilities, and are shipping in good quantity, as demand is urgent. Domestic high-test alkali for early delivery brings 80@85c. per 100 lbs., f. o. b. works, and for 1903 shipment, 75@80c. The foreign article continues quiet at 90@92½c. per 100 lbs. in New York. Domestic high-test caustic soda is quoted at \$1.95 up per 100 lbs., f. o. b. works for prompt delivery, and \$1.90 for 1903 shipment. Bicarb soda is unchanged at \$1 per 100 lbs., for ordinary, f. o. b. works, and \$3 up per 100 lbs. for the finer grades. Sal soda for spring delivery meets with an improved demand at 55c. per 100 lbs. f. o. b. works. Foreign sal soda is moving quietly at 67½c. per 100 lbs., in New York. Bleaching powder shows further forward contracts at \$1.75@1.80 per 100 lbs., according to make and seller, while prompt business is done at \$1.80 for prime Liverpool, and \$1.70@1.75 for Continental brands. Chlorate of potash is erratic, some holders asking a fractional advance on market quotations, which are \$8.25@8.50 per 100 lbs. Domestic contracts are still quoted f. o. b. works, at \$7.75 per 100 lbs., and some new business is reported at this figure, but it is small.

**Acids.**—Contract deliveries are freer, though consumption is only moderate. Export business in blue vitriol is reported on basis of \$4 per 100 lbs., c. i. f. In February the exports of blue vitriol from New York totaled 4,352,462 lbs., valued at \$179,404, or \$4.12 per 100 lbs. In February last year the exports were 4,220,602 lbs., which is 132,260 lbs. less than this year. In the first two months of 1902 the exports were 5,916,756 lbs., against 7,645,287 lbs. last year, showing a falling off of 1,728,531 lbs., or 23 per cent, due principally to the curtailed demand in Italy.

Quotations are per 100 lbs. as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity.

Acetic, com'l 28%.....	\$1.80	Oxalic, com'l.....	\$4.75@5.00
Blue Vitriol.....	4.37½@4.50	Sulphuric, 50 deg., bulk	14.00@16.00
Muriatic, 18 deg.....	1.50	Sulphuric, 60 deg.....	1.00
Muriatic, 20 deg.....	1.62½	Sulphuric, 60 deg., bulk	18.00@20.00
Muriatic, 22 deg.....	1.75	Sulphuric, 66 deg.....	1.20
Nitric, 36 deg.....	4.00	Sulphuric, 68 deg., bulk	21.00@23.00
Nitric, 38 deg.....	4.25		
Nitric, 40 deg.....	4.50		
Nitric, 42 deg.....	4.87½		

**Brimstone.**—Arrivals at New York this week were 3,000 tons, most of which will be delivered on contract. Trade is generally quiet, though prices for shipment are easier at \$22.50@22.75 per ton for best unmixed seconds. Spot seconds are offered at \$23.25@23.50. Best thirds are \$2.50 per ton under seconds.

**Pyrites.**—Trade continues good, and prices are firm. Quotations are f. o. b.: Mineral City, Va., lump ore, \$5 per ton, and fines, 10c. per unit; Charlemont, Mass., lump, \$5, and fines, \$4.75. Spanish pyrites 12@13c. per unit, New York and other Atlantic ports. Spanish pyrites contain from 40 to 51 per cent of sulphur; American, from 42 to 44 per cent.

**Sulphate of Ammonia.**—The February shipments from Great Britain to the United States are estimated at 682 tons, showing a heavy falling off as compared with January. Prices are easier, and for arrivals \$2.87½ per 100 lbs. is asked for 24@25 per cent liquor, while spot is obtainable at \$2.90.

**Nitrate of Soda.**—The market continues firm at \$2.30 per 100 lbs. for spot, \$2.25 to arrive, and \$2.02½@2.10 for shipments, according to position.

The statistical position of nitrate of soda in Europe in the first two months this year, compare with those of 1901, as follows, in long tons:

	1901.	1902.	Changes.
Exports to Europe.....	168,491	167,331	D. 1,160
Imports.....	168,350	184,140	I. 15,790
Deliveries.....	198,630	197,380	D. 1,250
Loadings for Europe Mar. 1.	36,825	97,907	I. 61,082
Visible supply, May 1.....	756,870	581,500	D. 175,370
Price at Liverpool,			
March 1....	£8 15s.	£10 12s. 6d.	I. £1 17s 6d

The important changes noted this year are an increase of nearly 9 per cent in imports, a decrease of 23 per cent in the visible supply on March 1, and an increase of fully 20 per cent in prices.

A report is current that the Agricultural Co-operative Society of the Duchy of Hesse, Germany, an important consumer of nitrate of soda is to produce its own supplies from property recently purchased for it in Chile by the Hessian Ministry of Agriculture.

**Phosphates.**—"Nothing new," say sales agents. At mines production is forging ahead, and shipments are being made as quickly as the car supply will permit.

A charter has been taken from Tampa to Helsingborg, Sweden, at 16s. 6d. (\$3.96), April sailing.

The American Agricultural Chemical Company, which recently purchased the Peace River Phosphate Company in Florida, has just declared a semi-annual preferred dividend of 3 per cent.

We quote phosphate prices below:

Phosphates.	Per ton F. o. b.	C. i. f. Un. Kingdom or European Ports.	
		Unit.	Long ton.
*Fla. hard rock (77@80%)....	\$7.50	6¼@7d	\$9.75@10.92
*Fla. land pb. (68@73%)....	3.00@3.25	4¾@5d	6.05@ 7.00
*Fla. Peace Riv. (58@63%)....	2.25@2.50	4¾@5d	5.70@ 6.00
†Tenn. (78@80%) export.....	3.50	.....	.....
†Tenn., 78% domestic.....	3.00@3.25	.....	.....
†Tenn., 75% domestic.....	2.75@3.00	.....	.....
†Tenn., 73@74% domestic.....	2.40	.....	.....
†Tenn., 70@72% domestic.....	2.10@2.25	.....	.....
‡So. Car. land rock.....	3.25	4½@5d	5.67@ 6.30
‡So. Car. river rock.....	2.75@3.00	.....	.....
Algerian, rock (63@70%)....	.....	6@6¼d	8.04@ 8.70
Algerian, rock (58@63%)....	.....	5@5¼d	6.00@ 6.30
Tunis, Gafsa (58@63%)....	.....	5@5¼d	6.00@ 6.30

\*Fernandina, Brunswick or Savannah. †Mt. Pleasant. ‡On vessels Ashley River.

**Liverpool. Mar. 5.**

(Special Report of Joseph P. Brunner & Co.)

The export business in heavy chemicals is still sluggish, but quotations are without quotable change.

Soda ash is in fair demand, at usual varying prices as to market. For tierces the nearest spot range may be called about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton net cash. Bags, 5s. per ton under price for tierces. Soda crystals are steady at generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for certain export markets. Caustic soda is quiet, but values are without change, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10, 5s.; 76 per cent, £10 10s. per ton, net cash. Bleaching powder is in limited request at nominally £6 15s.@£6 17s. 6d. per ton net cash for hardwood packages, with special terms for Continental and a few other export quarters. Chlorate of potash receives little attention from buyers, but makers still quote from 3d.@3¼d. per lb. net cash, as to quantity and market. Bicarb. soda keeps steady at £6 15s. per ton, less 2½ per cent for the finest quality in 1 cwt. kegs, with usual allowances for larger packages; also special terms for a few favored markets. Sulphate of ammonia is quiet, but steady at £11 12s. 6d.@£11 15s. per ton, less 2½ per cent for good gray, 24@25 per cent in double bags f. o. b. here. Nitrate of soda is selling to a moderate extent on spot at £10 10s.@£10 15s. per ton, less 2½ per cent for double bags f. o. b. here, as to quality and quantity.

**METAL MARKET.**

**New York. Mar. 20.**

**GOLD AND SILVER.**

**Gold and Silver Exports and Imports.**

At all United States Ports in February and Year.

Metal	February.		Year.	
	1901.	1902.	1901.	1902.
Gold.				
Exports....	\$416,812	\$3,617,287	\$8,637,971	\$10,590,962
Imports....	1,859,274	1,684,893	6,124,900	3,969,660
Excess. I.	\$1,442,462	E. \$6,832,394	E. \$2,513,071	E. \$7,501,282
Silver.				
Exports....	\$4,579,249	\$3,924,183	\$9,369,488	\$8,433,388
Imports....	2,189,489	2,005,593	5,378,907	4,113,274
Excess. E.	\$2,389,760	E. \$1,918,590	E. \$3,990,581	E. \$4,320,112

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

**Gold and Silver Exports and Imports, New York.**

For the week ending March 20, 1902, and for years from January 1, 1902, 1901 and 1900.

Period.	Gold.		Silver.		Total Excess Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week ...	\$65,507	\$5,045	\$81,575	\$48,024	E. \$94,013
1902....	18,800,727	787,083	8,744,339	303,168	E. 21,454,815
1901....	9,150,985	659,215	8,535,794	863,000	E. 16,159,144
1900....	2,920,202	1,042,966	9,087,242	987,272	E. 9,927,306

Of the gold exported \$60,000 went to South America; the silver was destined chiefly to London. Imports were largely from Central and South America and West Indies.

Financial Notes of the Week.

Business generally is somewhat quieter, though no special declines are noted. The speculative markets have been uneven. Money is somewhat harder, and there is some tendency to contract loans.

Exports of merchandise from the United States in February were valued by the Bureau of Statistics of the Treasury Department at \$101,522,718, the lowest figure reported in any month since July, 1899.

Table with columns for 1901 and 1902, listing Exports, Imports, Excess exports, and Total apparent balance.

The statement of the New York banks, including the 63 banks represented in the Clearing House, for the week ending March 15, gives the following totals, comparison being made with the corresponding weeks of 1901 and 1900.

Table comparing 1900, 1901, and 1902 for Loans and discounts, Deposits, Circulation, Specie, and Legal tenders.

Changes for the week, this year, were an increase of \$161,300 in circulation; decreases of \$14,372,000 in loans and discounts, \$21,291,700 in deposits, \$5,338,600 in specie, \$831,100 in legal tenders, and \$845,525 in surplus reserve.

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

Table showing specie holdings for Gold and Silver in 1901 and 1902 for various countries including N.Y., England, France, Germany, Spain, Netherlands, Belgium, Italy, and Russia.

The returns of the Associated Banks of New York are of date March 15 and the other March 13 as reported by the Commercial and Financial Chronicle cable. The New York banks do not report silver separately, but specie carried is chiefly gold.

Silver has shown no animation. While demand has not been large, sellers have not been pressing. The tendency is rather downward, unless Government orders should come in to support the price.

The United States Assay Office in New York reports receipts of 79,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to March 6 are reported by Messrs. Pixley & Abell's circular as follows:

Table showing silver shipments for 1901 and 1902 to India, China, and The Straits.

Arrivals for the week, this year, were £99,000 in bar silver from New York, and £37,000 from Australia; total, £136,000. Shipments were £180,265 in bar silver to Bombay, and £25,000 to Calcutta; total, £205,265.

Indian exchange has been steady, though the demand for Council bills in London has been lighter. The average price has been the same, however, 16.03d. per rupee. Very little silver is being bought now for Indian account. The India Council has been offering £1,000,000 in sterling bills in London.

Prices of Foreign Coins.

Table listing prices for Mexican dollars, Peruvian soles, Victorian sovereigns, Twenty francs, and Spanish 25 pesetas.

OTHER METALS.

Daily Prices of Metals in New York.

Table showing daily prices for Silver, Copper, and Spelter from March 14 to 20, 1902, including Sterling Exchange, Lake, Electrolytic, and London prices.

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

Copper has again ruled very quiet indeed, and nothing of special interest has transpired. Transactions seem to be few and far between in spite of the fact that it is reported that manufacturers are very busy indeed, and exports continue on a large scale.

The foreign market, which closed last week at £54, opened on Monday at £53 10s., but declined during the week, and the closing quotations are cabled as £52 10s. @ £52 12s. 6d. for spot, £52 5s. @ £52 7s. 6d. for three months.

Statistics for the first half of March show an increase in the visible supplies of 1,400 tons.

Refined and manufactured sorts we quote: English tough, £56 10s. @ £57; best selected, £56 10s. @ £57; strong sheets, £67 @ £68; India sheets, £66 @ £67; yellow metal, 6d. @ 6½d.

Exports of copper from New York and Baltimore in the week ending March 19, are reported by our special correspondents as follows: To Great Britain, 2,726 tons; Germany, 815; Holland, 1,231; France, 2,005; Italy, 155; Belgium, 462; Austria, 356; Brazil, 8; total, 7,758 tons. Imports were 802 tons from London, and 264 tons from Mexico.

Copper production, as reported by Mr. John Stanton, who acts as statistician for the producing companies—was as follows for February and the two months ending February 28, stated in long tons of 2,240 lbs. of fine copper:

Table showing copper production for February and two months for U.S. reporting mines, U.S. outside sources, and Total United States.

For the two months the United States production decreased 4,493 tons, while the foreign reporting mines increased 2,600 tons. United States exports increased 15,021 tons.

Chilean Copper Market.—Messrs. Jackson Brothers report from Valparaiso, Chile, that sales of bar copper during February amounted to 31,608 quintals (1,434 long tons) at from \$37 to \$40, Chilean, per quintal. Charters for copper from Chile show an increase of 390 tons over last year. Considerable sales of copper regulus were made at \$16.20 @ \$16.60, Chilean, per quintal of 50 per cent copper. No sales of ore are reported.

Tin.—While at the beginning of the week the market ruled rather quiet, there has been considerable buying during the last few days. There is no doubt that consumption is better than it has been for a long time past. At the close we quote spot tin at 26¼c.; March, 26c.; April, 25¼c.; May, 25¼c.; June, 25¼c.

The foreign market, which closed last week at £114 5s., opened on Monday at £114, advanced steadily, and the closing quotations are cabled as £116 7s. 6d. @ £116 10s. for spot, £114 @ £114 2s. 6d. for three months.

Lead has been in good demand for all purposes. The ruling quotations are 4 @ 4.05c. St. Louis, 4.05 @ 4.10c. New York.

The foreign market is somewhat firmer, Spanish lead being quoted at £11 10s. @ £11 11s. 3d.; English lead, £11 12s. 6d. @ £11 13s. 9d.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is unchanged. Missouri metal is selling at 4 @ 4.02½c., while chemical lead brings 4.05c. Business is good.

Spelter is quiet but stiffening. We quote the market at about 4.12½c. St. Louis, 4.27½c. New York.

The foreign market is easy, good ordinaries being quoted at £17 12s. 6d., specials at £17 17s. 6d.

St. Louis Spelter Market.—The John Wahl Com-

mission Company telegraphs us as follows: Spelter continues firm at 4.10 @ 4.12½c. here.

Antimony is unchanged. We quote Cookson's at 9¼ @ 10c.; Hallett's, 8 @ 8¼c.; Hungarian, Italian, Japanese and United States Star at 7¼c.

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

The total production of nickel in the United States in the year 1901 was 8,663,614 lbs., this quantity including nickel in salts—mainly oxide—as well as in metallic form. Of this production only 6,700 lbs. came from domestic ores, the balance of 8,656,914 lbs. being obtained from foreign ores or mattes, chiefly from Canada. The production in 1900 was 7,722,835 lbs., so that last year showed an increase of 940,779 lbs., or 12.2 per cent.

Platinum.—Consumption continues good. Ingot platinum in large lots brings \$19.50 per oz., in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 82c. per gram.

Quicksilver.—The New York price continues \$48 per flask for large lots, with a slightly higher figure for small orders. In San Francisco quotations are firm at \$47.50 @ \$48 for domestic orders, and \$44 for export. The London price is £8 15s. per flask, with the same figure quoted from second hands.

Quicksilver receipts at San Francisco in February were 1,536 flasks. For the two months ending February 28, they were 3,287 flasks, against 4,104 flasks for the corresponding period in 1901, and 3,713 in 1900. These receipts do not include the shipments from mines direct to consumers. Shipments by water from San Francisco for the two months were: British Columbia, 3; Mexico, 610; Central America, 202; New York, 20; total, 835 flasks, against 856 flasks in 1901.

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

Table listing prices for Aluminum, Magnesium, Manganese, Mangan's Cop., Nickel-alum, Bismuth, Chromium, Copper, Ferro-Molyb'dum, Ferro-Titanium, and Ferro-Titanium.

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

Average Prices of Metals per lb., New York.

Table showing average prices for Tin, Lead, and Spelter from January to December 1901 and 1902.

Average Prices of Copper.

Table showing average prices for Copper (Electrolytic, Lake, Standard) from January to December 1901 and 1902.

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Table showing average prices for Silver from January to December 1901 and 1902.

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

STOCK QUOTATIONS.

NEW YORK.

Table of stock quotations for New York, listing companies and their prices for various dates from Mar. 13 to Mar. 19.

Coal and Industrial Stocks.

Table of coal and industrial stock quotations for New York, listing companies like Am. Agr. Chem. and Am. Car & Fdy.

PHILADELPHIA, PA. §

Table of stock quotations for Philadelphia, PA, listing companies like Am. Alkali and Am. Cement.

MEXICO.

Mar. 8.

Table of stock quotations for Mexico, listing companies like Durango and Ca. Min. de Penoles.

BOSTON, MASS.

Table of stock quotations for Boston, Mass., listing companies like Adventure Con. and Allouez.

Official Quotations Boston Stock Exchange. Total sales, 140,154 shares.

ST. LOUIS, MO. \*

Mar. 17.

Table of stock quotations for St. Louis, MO, listing companies like Am. Nettie and Catherine Lead.

SPOKANE, WASH. \*

Feb. 28.

Table of stock quotations for Spokane, Wash., listing companies like Black Tail and en Hur.

Total sales 33,700 shares. \* Reported by Hunner & Harris.

SALT LAKE CITY. \*

Mar. 15.

Table of stock quotations for Salt Lake City, listing companies like Ajax and Anchor.

\*By our Special Correspondent. Total number of shares sold, 474,825.

STOCK QUOTATIONS.

COLORADO SPRINGS, COLO.

LONDON.

Mar. 8.

Table of stock quotations for Colorado Springs, Colo., listing companies like Acacia, Alamo, Anacoanda, etc., with columns for par value, high/low prices for various dates, and sales.

Table of stock quotations for London, listing companies like Alasks-Treadwell, Anacoanda, C. Chile, etc., with columns for authorized capital, par value, last dividend, and quotations.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. \*Ex-dividend.

PARIS.

Mar. 3.

Table of stock quotations for Paris, listing companies like Acieries de Creusot, Anzin, Boleo, etc., with columns for country, product, capital stock, par value, latest dividends, and prices.

TORONTO, ONT.

Table of stock quotations for Toronto, Ont., listing companies like Ontario, British Columbia, Cariboo M.K., etc., with columns for par value, high/low prices, and sales.

Colorado Springs (By Telegraph.)

Table of stock quotations for Colorado Springs (By Telegraph), listing companies like Acacia, Alamo, Anacoanda, etc., with columns for par value, high/low prices for various dates, and sales.

MONTREAL, CANADA.

Mar. 17.

Table of stock quotations for Montreal, Canada, listing companies like Big Three, California, Can. Gold Fields, etc., with columns for par value, high/low prices, and sales.

Total sales, 12,355 shares. †Ex-dividend.

CHEMICALS, MINERALS, RARE EARTHS, ETC. CURRENT WHOLESALE PRICES.

Abrasive—		Cust. Meas.	Price.	Barium—		Cust. Meas.	Price	Graphite—Am. f.o.b. Provi-		Cust. Meas.	Price	Paints and Colors—		Cust. Meas.	Price
Carborundum, f.o.b. Niagara Falls, Powd., F. FF. FFF.	lb.		\$0.08	Oxide, Am. hyd. cryst.	lb.		\$0.02 <sup>3</sup> / <sub>4</sub>	dence, R. I. lump.	sh. ton		\$8.00	Metallic, brown.	sh. ton		\$19.00
Grains.	"		.10	Sulphate (Blanc Fixe).	"		.02	Pulverized.	"		30.00	Red.	"		16.00
Corundum, N. C.	"		.07@.10	<b>Barytes—</b>				German, som. pulv.	lb.		.01 <sup>1</sup> / <sub>4</sub> @.01 <sup>1</sup> / <sub>2</sub>	Ocher, Am. common.	"		9.25@10.00
Chester, Mass.	"		.04 <sup>1</sup> / <sub>2</sub> @.05	Am. Crude, No. 1.	sh. ton		9.00	Best pulverized.	"		.01 <sup>1</sup> / <sub>2</sub> @.02	Best.	"		21.25@25.00
Barry's Bay, Ont.	"		.07 <sup>1</sup> / <sub>2</sub> @.09 <sup>1</sup> / <sub>2</sub>	Crude, No. 2.	"		8.00	Ceylon, common pulv.	"		.02 <sup>3</sup> / <sub>4</sub> @.03 <sup>1</sup> / <sub>2</sub>	Dutch, washed.	lb.		.04 <sup>1</sup> / <sub>2</sub>
Crushed Steel, f.o.b. Pittsburg.	"		.05 <sup>1</sup> / <sub>2</sub>	Crude, No. 3.	"		7.75	Best pulverized.	"		.04@.08	French, washed.	"		.01 <sup>1</sup> / <sub>2</sub> @.01 <sup>1</sup> / <sub>2</sub>
Emery, Turkish flour, in kegs.	"		.03 <sup>1</sup> / <sub>2</sub>	German, gray.	"		14.50	Italian, pulv.	"		.01 <sup>1</sup> / <sub>4</sub>	Orange mineral, Am.	"		.07 <sup>1</sup> / <sub>4</sub> @.07 <sup>1</sup> / <sub>2</sub>
Grains, in kegs.	"		.05@.05 <sup>1</sup> / <sub>2</sub>	Snow white.	"		17.00	<b>Gypsum—Ground.</b>	sh. ton		8.00@8.50	Foreign, as to make.	"		.07 <sup>1</sup> / <sub>4</sub> @.11 <sup>1</sup> / <sub>2</sub>
Naxos flour, in kegs.	"		.03 <sup>1</sup> / <sub>2</sub>	<b>Bauxite—Ga. or Ala. mines:</b>				Fertilizer.	"		7.00	Paris green, pure, bulk.	"		.11 <sup>1</sup> / <sub>4</sub> @.11 <sup>1</sup> / <sub>2</sub>
Grains, in kegs.	"		.05@.05 <sup>1</sup> / <sub>2</sub>	First grade.	lg. ton		5.50	Rock.	lg. ton		4.00	Red lead, American.	"		.05 <sup>1</sup> / <sub>4</sub> @.05 <sup>1</sup> / <sub>2</sub>
Chester flour, in kegs.	"		.03 <sup>1</sup> / <sub>2</sub>	Second grade.	"		4.75	English and French.	"		14.00@16.00	Foreign.	"		.06 <sup>3</sup> / <sub>4</sub> @.08
Grains, in kegs.	"		.05@.05 <sup>1</sup> / <sub>2</sub>	<b>Bismuth—Subnitrate.</b>	lb.		1.40	<b>Infusorial Earth—Ground.</b>				Turpentine, spirits.	gal.		.44 <sup>1</sup> / <sub>4</sub>
Peekskill, f.o.b. Easton, Pa., flour, in kegs.	"		.01 <sup>1</sup> / <sub>2</sub>	Subcarbonate.	"		1.65	American, best.	"		20.00	White lead, Am. dry.	lb.		.04 <sup>1</sup> / <sub>4</sub> @.04 <sup>1</sup> / <sub>2</sub>
Grains, in kegs.	"		.02 <sup>3</sup> / <sub>4</sub>	<b>Bitumen—"B"</b>	"		.03 <sup>1</sup> / <sub>4</sub>	French.	"		37.50	American, in oil.	"		.05 <sup>1</sup> / <sub>4</sub> @.05 <sup>1</sup> / <sub>2</sub>
Crude, ex-ship N. Y.: Ab-				"A"	"		.05	German.	"		40.00	Foreign, in oil.	"		.07 <sup>1</sup> / <sub>4</sub> @.09 <sup>1</sup> / <sub>2</sub>
bott (Turkey).	lg. ton		26.50@30.00	<b>Bone Ash.</b>	"		.02 <sup>3</sup> / <sub>4</sub> @.02 <sup>3</sup> / <sub>4</sub>	<b>Iodine—Crude.</b>	100 lbs.		2.45	Zinc, white, Am. ex dry.	"		.04 <sup>3</sup> / <sub>4</sub> @.04 <sup>3</sup> / <sub>4</sub>
Kuluk (Turkey).	"		22.00@24.00	<b>Bromine.</b>	"		.40	Oxide, pure copperas col.	"		.05@.10	American, red seal.	"		.06 <sup>1</sup> / <sub>2</sub>
Naxos (Greek) h. gr.	"		.26.00	<b>Cadmium—Metallic.</b>	"		1.40	Purple-brown.	"		.02	Green seal.	"		.07
Garnet, as per quality.	sh. ton		25.00@35.00	<b>Calcium—Acetate, gray.</b>	"		1.30	Venetian red.	"		.01@.01 <sup>1</sup> / <sub>2</sub>	Foreign, red seal, dry.	"		.05 <sup>1</sup> / <sub>4</sub> @.08
Pumice Stone, Am. powd.	lb.		.01 <sup>1</sup> / <sub>2</sub> @.02	" brown.	"		.90	Scale.	"		.01@.03	Green seal, dry.	"		.06 <sup>1</sup> / <sub>2</sub> @.09 <sup>1</sup> / <sub>2</sub>
Italian, powdered.	"		.01@.04	Carbide, ton lots f.o.b. Niagara Falls, N. Y., or Jersey City, N. J.	sh. ton		75.00	<b>Kaolin—(See Clay, China.)</b>				<b>Potash—</b>			
Lump, per quality.	"		.04@.40	Carbonate, ppt.	lb.		.05	<b>Kryolith—(See Cryolite.)</b>				Caustic, ordinary.	"		.04 <sup>3</sup> / <sub>4</sub> @.06
Rottenstone, ground.	"		.02 <sup>3</sup> / <sub>4</sub> @.04 <sup>1</sup> / <sub>2</sub>	Chloride, com'l.	100 lbs.		.75@.80	Nitrate, com'l.	"		.01 <sup>1</sup> / <sub>4</sub>	Elect. (90%).	"		.08 <sup>1</sup> / <sub>2</sub>
Lump, per quality.	"		.06@.20	Best.	"		1.00	True.	"		.04	<b>Potassium—</b>			
Rouge, per quality.	"		.10@.30	<b>Cement—</b>				Oxide, pure copperas col.	"		.05@.10	Bicarbonate cryst.	"		.03 <sup>1</sup> / <sub>4</sub>
Steel Emery, f.o.b. Pittsburg.	"		.07	Portland, Am., 400 lbs.	bbl.		1.70@1.90	Purple-brown.	"		.02	Powdered or gran.	"		.14
<b>Acids—</b>				Foreign.	"		1.65@2.25	Venetian red.	"		.01@.01 <sup>1</sup> / <sub>2</sub>	Bichromate, Am.	"		.08 <sup>1</sup> / <sub>4</sub> @.08 <sup>1</sup> / <sub>2</sub>
Boric, crystals.	"		.10 <sup>3</sup> / <sub>4</sub> @.11	"Rosendale," 300 lbs.	"		.75	Scale.	"		.01@.03	Scotch.	"		.08 <sup>1</sup> / <sub>4</sub> @.09
Powdered.	"		.11 <sup>1</sup> / <sub>4</sub> @.11 <sup>1</sup> / <sub>2</sub>	Slag cement, imported.	"		1.65	<b>Lime—Com., abt. 250 lbs.</b>	bbl.		.80	Carbonate, hydrated.	"		.04@.04 <sup>1</sup> / <sub>2</sub>
Carbonic, liquid gas.	"		.12 <sup>3</sup> / <sub>4</sub>	<b>Ceresine—</b>				Finishing.	"		.90	Calcined.	"		.03 <sup>1</sup> / <sub>2</sub> @.03 <sup>1</sup> / <sub>4</sub>
Chromic, crude.	"		.20	Orange and Yellow.	lb.		.12	<b>Magnesite—Greece.</b>				Crude (95%).	lg. ton		6.50@7.00
Hydrofluoric, 36%.	"		.06	White.	"		.13 <sup>1</sup> / <sub>4</sub>	Calcined.	sh. ton		14.00@15.00	Bricks.	M		170.00
48%.	"		.05	<b>Chalk—Lump, bulk.</b>	sh. ton		2.45	Am. Bricks, f.o.b. Pittsburg.	"		175.00	<b>Magnesium—</b>			
Best.	"		.25	Ppt. per quality.	lb.		.03 <sup>1</sup> / <sub>4</sub> @.06	Carbonate, light, fine pd.	lb.		.05	Carbonate, light, fine pd.	lb.		.05
Sulphurous, liquid anhy.	"		.06	<b>Chlorine—Liquid.</b>	"		.30	Blocks.	"		.07@.03	Chloride, com'l.	"		.01 <sup>1</sup> / <sub>4</sub>
<b>Alcohol—Grain.</b>	gal.		2.51	Water.	"		.10	Fused.	"		.20	Nitrate.	"		.80
Refined wood, 95@97%.	"		.60@.65	<b>Chrome Ore—</b>				Nitrate.	"		.80	Sulphate.	100 lbs.		.75@.95
Purified.	"		1.20@1.50	(50% ch.) ex-ship N. Y.	lg. ton		24.75	<b>Manganese—Powdered,</b>				70@75% bin.	lb.		.01 <sup>1</sup> / <sub>4</sub> @.01 <sup>1</sup> / <sub>2</sub>
<b>Alum—Lump.</b>	100 lbs.		1.75	Sand, f.o.b. Baltimore.	"		35.00	Crude, pow'd.				75@85% bin.	"		.01 <sup>1</sup> / <sub>4</sub> @.02 <sup>1</sup> / <sub>4</sub>
Ground.	"		1.80	Bricks, f.o.b. Pittsburg.	M		175.00	85@90% bin.	"		.02 <sup>1</sup> / <sub>4</sub> @.03 <sup>1</sup> / <sub>4</sub>	90@95% bin.	"		.03 <sup>1</sup> / <sub>4</sub> @.05 <sup>1</sup> / <sub>4</sub>
Powdered.	"		3.00	<b>Clay, China—Am. com., ex-</b>				Carbonate.	"		.16@.20	Chloride.	"		.04
Chrome, com'l.	"		2.75@3.00	dock, N. Y.	lg. ton		8.00	Ore, 50%, Foreign.	unit		20@.21	Domestic.	"		.30
<b>Aluminum—</b>				Am. best, ex-dock, N. Y.	"		9.00	Domestic.	"		.30	<b>Marble—Flour.</b>	sh. ton		6.00@7.00
Nitrate.	lb.		1.50	English, common.	"		12.00	<b>Mercury—Bichloride.</b>	lb.		.77	<b>Mica—N. Y. gr'nd, coarse.</b>	"		.03@.04
Oxide, com'l. common.	"		.06 <sup>1</sup> / <sub>2</sub>	Best grade.	"		17.00	Fine.	"		.04@.05	3x3 in.	"		.80
Best.	"		.20	Fire Clay, ordinary.	sh. ton		4.25	Sheets, N. C., 2x4 in.	"		.30	3x4 in.	"		1.50
Pure.	"		.80	Best.	"		6.00	4x4 in.	"		2.00	6x6 in.	"		3.00
Hydrated.	100 lbs.		2.60	Slip Clay.	"		5.00	<b>Mineral Wool—</b>				Slag, ordinary.	sh. ton		19.00
Sulphate, pure.	"		1.50@2.00	<b>Coal Tar Pitch.</b>	gal.		.08	Selected.	"		25.00	Rock, ordinary.	"		32.00
Com'l.	"		1.15@1.25	<b>Cobalt—Carbonate.</b>	lb.		1.75	Selected.	"		40.00	<b>Nickel—Oxide, No. 1.</b>	lb.		1.00
<b>Ammonia—</b>				Nitrate.	"		1.50	No. 2.	"		.60	No. 2.	"		.20
Aqua, 10°.	lb.		.08	Oxide—Black.	"		2.28@2.30	Sulphate.	"		.20@.21	<b>Oils—Black, reduced 29 gr.:</b>			
18°.	"		.03 <sup>1</sup> / <sub>4</sub>	Gray.	"		2.28@2.40	25@30, cold test.	gal.		.00 <sup>3</sup> / <sub>4</sub> @.10 <sup>1</sup> / <sub>4</sub>	15, cold test.	"		.10 <sup>3</sup> / <sub>4</sub> @.11 <sup>1</sup> / <sub>4</sub>
20°.	"		.03 <sup>1</sup> / <sub>4</sub>	Small, blue ordinary.	"		.06	Zero.	"		.11 <sup>1</sup> / <sub>4</sub> @.12 <sup>3</sup> / <sub>4</sub>	Summer.	"		.09 <sup>1</sup> / <sub>4</sub> @.09 <sup>3</sup> / <sub>4</sub>
26°.	"		.05 <sup>1</sup> / <sub>4</sub>	Best.	"		.20	Cylinder, dark steam ref.	"		.08 <sup>1</sup> / <sub>4</sub> @.10 <sup>1</sup> / <sub>4</sub>	Dark, filtered.	"		.11 <sup>1</sup> / <sub>4</sub> @.15 <sup>1</sup> / <sub>4</sub>
<b>Ammonium—</b>				<b>Copperas.</b>	100 lbs.		.30@.35	Light filtered.	"		.14 <sup>1</sup> / <sub>4</sub> @.17 <sup>1</sup> / <sub>4</sub>	Extra cold test.	"		.21 <sup>1</sup> / <sub>4</sub> @.26 <sup>1</sup> / <sub>4</sub>
Carbonate, lump.	"		.08 <sup>1</sup> / <sub>4</sub> @.08 <sup>1</sup> / <sub>2</sub>	<b>Copper—Carbonate.</b>	lb.		.18@.19	Gasoline, 86°@90°.	"		.14@.19	Naphtha, crude, 68°@72°.	bbl.		9.05
Powdered.	"		.09 <sup>1</sup> / <sub>4</sub> @.09 <sup>1</sup> / <sub>2</sub>	Chloride.	"		.25	"Stove".	gal.		.12	Linseed, domestic raw.	"		.62@.63
Muriate, grain.	"		.05 <sup>1</sup> / <sub>4</sub>	Nitrate, crystals.	"		.35	Bolled.	"		.65	Calcutta, raw.	"		.85
Lump.	"		.06 <sup>1</sup> / <sub>2</sub>	Oxide, com'l.	"		.19	Calcutta, raw.	"		.85	<b>Ozokerite.</b>	lb.		.11 <sup>1</sup> / <sub>2</sub>
Nitrate, white, pure (99%).	"		.12	<b>Cryolite.</b>	"		.06 <sup>1</sup> / <sub>4</sub>	<b>Paints and Colors—</b>				Chrome green, common.	"		.05
Phosphate, com'l.	"		.09	Blasting powder, A.	25 lb. keg		2.65	Pure.	"		.16	Yellow, common.	"		.10 <sup>1</sup> / <sub>4</sub>
Chem., pure.	"		.60	Blasting powder, B.	"		1.40	Best.	"		.25	Lampblack, com'l.	"		.04 <sup>1</sup> / <sub>2</sub>
<b>Antimony—Glass.</b>	"		.30@.40	"Rackarock," A.	lb.		.25	Refined.	"		.07	Litharge, Am. powd.	"		.04 <sup>1</sup> / <sub>4</sub> @.05 <sup>1</sup> / <sub>4</sub>
Needle, lump.	"		.05 <sup>1</sup> / <sub>4</sub> @.06	"Rackarock," B.	"		.18	English flake.	"		.08 <sup>1</sup> / <sub>4</sub> @.09	Yttrium—Nitrate.	lb.		40.00
Powdered, ordinary.	"		.05 <sup>1</sup> / <sub>4</sub> @.07 <sup>1</sup> / <sub>4</sub>	Judson R. R. powder.	"		.10	Glassmakers'.	"		.07 <sup>1</sup> / <sub>4</sub> @.07 <sup>1</sup> / <sub>2</sub>	Zirconium—Nitrate.	"		8.00
Oxide, com'l white, 95%.	"		.09 <sup>1</sup> / <sub>2</sub>	Dynamite (20% nitro-glycerine).	"		.13	<b>Paints and Colors—</b>				Chromite—Nitrate.	lb.		\$1.50
Com'l white, 99%.	"		.12	(30% nitro-glycerine).	"		.14	Chrome green, common.	"		.05	Calcium—Tungstate (Scheelite).	"		.80
Com'l gray.	"		.07	(40% nitro-glycerine).	"		.15	Pure.	"		.16	Cerium—Nitrate.	"		11.00
Sulphuret com'l.	"		.16	(50% nitro-glycerine).	"		.16 <sup>1</sup> / <sub>4</sub>	Yellow, common.	"		.10 <sup>1</sup> / <sub>4</sub>	Didymium—Nitrate.	"		35.00
<b>Arsenic—White.</b>	"		.08 <sup>1</sup> / <sub>4</sub> @.08 <sup>1</sup> / <sub>2</sub>	(60% nitro-glycerine).	"		.18	Best.	"		.25	Erbium—Nitrate.	"		40.00
Red.	"		.06 <sup>1</sup> / <sub>4</sub> @.07 <sup>1</sup> / <sub>4</sub>	(75% nitro-glycerine).	"		.21	Yellow, common.	"		.10 <sup>1</sup> / <sub>4</sub>	Glucinum—Nitrate.	"		20.00
<b>Asphaltum—</b>				Glycerine for nitro (32 2-10° Be.).	"		.12 <sup>3</sup> / <sub>4</sub> @.13	Best.	"		.25	Lanthanum—Nitrate.	"		38.00
Ventura, Cal.	sh. ton		32.00	<b>Feldspar—Ground.</b>	sh. ton		8.00@9.00	Lampblack, com'l.	"		.04 <sup>1</sup> / <sub>2</sub>	Lithium—Nitrate.	oz.		.60
Cuban.	lb.		.01 <sup>1</sup> / <sub>4</sub> @.03 <sup>1</sup> / <sub>4</sub>	<b>Flint Pebbles—Danish, Best.</b>	lg. ton		14.75	Refined.	"		.07	Sroutium—Nitrate.	lb.		.08 <sup>1</sup> / <sub>4</sub> @.07
Egyptian, crude.	"		.05 <sup>1</sup> / <sub>4</sub> @.06	French, Best.	"		11.75	Litharge, Am. powd.	"		.04 <sup>1</sup> / <sub>4</sub> @.05 <sup>1</sup> / <sub>4</sub>	Thorium—Nitrate 48@50%.	"		5.0