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THE refusal of the Department of the Treasury to furnish gold bars for export has excited considerable comment in financial circles, but it does not seem to have any particular significance. To the best of our knowledge, the United States is the only country that has ever placed on its statute book a provision authorizing its Treasury officials to pay out anything different than its own coin. By an act of Congress of May 26th, 1882, this was not only authorized, but was made compulsory. Its original object was to take away from exporters of gold bullion any motive for selecting the coin to be shipped, choosing those of full weight and leaving the lighter ones at home, and in this view it was a reasonable provision. Under the law the Treasury department has furnished gold bars for export at a small charge, 40 cents per \$100. As this is less than

the price at which they might be obtained from private assay offices, and as bars are the most convenient form for the shipment of gold bullion, besides not being subject to the loss in abrasion, like coin, all exchanges of gold for many years have been made in this form.

Under a provision in an act passed by the last Congress it was made optional with the Treasury department whether gold bars should be furnished for export or not, and by this authority all orders for them have been refused during the past fortnight, and the Secretary of the Treasury has announced that this policy will be continued. Applicants for gold in this form at the assay offices are now obliged to declare that it is not wanted for export.

The authorization to exchange gold bars for coin still continues, and the exercise of the discretion conferred by the recent act of Congress is left to the Secretary of the Treasury. In the present instance there is no reason to suppose that it has been exercised erroneously. The idea that it would cause more gold to be exported at this time than would otherwise be shipped, is absurd.

### PRODUCTION OF SPELTER IN EUROPE AND THE UNITED STATES IN 1890.

In another column we print Messrs. HENRY R. MERTON & Co.'s statistics of the production of spelter in the United States and Europe in 1890, issued under date of March 3, 1891. From them it appears that the total output of the zinc-producing countries of Europe and America was 843,265 long tons, against 329,890 long tons in 1889, being an increase of 13,375 long tons, or 14,980 tons of 2,000 pounds. More than half the increase occurred in the United States, where the output in 1890 was 7,500 short tons more than in 1889, although there was a somewhat increased product in all of the zinc-producing countries of the two continents, with the single exception of Great Britain, where there was a decrease of 1,860 short tons. The spelter output of the various countries was divided in about the following proportions: Rhine District and Belgium, 40 per cent.; Silesia, 26.5 per cent.; the United States, 17.5 per cent.; Great Britain, 8.5 per cent.; France and Spain, 5 per cent.; Austria, 2 per cent., and Poland, 1 per cent.

There were 14 producers in the Rhine District and Belgium; 11 in Silesia; 19 in the United States; 11 in Great Britain; 1 in France and 3 in Austria, which were the same numbers as in 1889, with the exception of the United States, where the Girard Zinc Company, of Kansas, which produced 70 tons (short) in 1890, produced nothing in 1889.

Our statement of the production of zinc in the United States in 1890, published January 3d, 1891, placed the output of the various works in this country at 68,000 short tons. Messrs. MERTON & Co.'s statistics put it at 67,220 short tons, but one quite important producer has been omitted.

We note that these statistics of the production of the American producers are not in some cases the same as those returned to us directly by the producers on the first of the year, although the total does not differ materially.

Unfortunately, some of our producers have been unwilling to allow us to publish their returns separately, but since this has now been done by Messrs. MERTON & Co., we trust that next year no further objection will be made to our publication of the details of production.

### MINING IN THE ROCKY MOUNTAIN STATES.

It is probable that the mining industry has never been prosecuted in the Rocky Mountain states at such profit as at the present time. The geology of the various mining districts is becoming better understood through the work of the geological surveys of the various states, and the studies of local engineers carrying on the investigations begun by the United States Geological Survey. Mining investments are being more intelligently made, and mining enterprises everywhere are being more systematically and more economically managed.

Mining operations which, from the days of the Comstock bonanzas until after the time of the discovery of the rich lead-carbonate ore bodies of Leadville, had been regarded in the light of purely speculative enterprises, are now becoming looked upon as legitimate business undertakings, and are being conducted as such. The fact, also, is becoming well understood and appreciated that with honest and intelligent management a good mining investment is safer and pays a larger interest on its capital than any other. The largely increased output of the gold, silver, lead and copper mines of the Western states, the increased dividends that are being paid, and the number of new companies that are now being incorporated are evidences of this in opinion.

The people in the West themselves also are looking at the mining industry and the development of mining property from a sounder and more business-like point of view. As was pointed out by a writer in the last number of the ENGINEERING AND MINING JOURNAL, the old ideas regarding the sale of mining property or the enlistment of capital in mining undertakings have experienced a change. Capitalists will not pay large amounts of money for undeveloped prospects simply because of their proximity to profitable mines, and their holders are realizing the force of this fact.

The method which is now more frequently being followed in the development of unexplored mineral ground is to undertake to place shares for working capital only. This system is clearly the most equitable on both sides. The original owners of a mining claim are able thereby to secure money for its exploration, and the subscribers to the shares offered are not asked to pay an exorbitant price for something of doubtful value, and consequently take smaller risks. It is the wild-cat and inflated schemes, in which so many people lose their money, and of which there are so many reminders in the West, which throw mining into disrepute. If it were not for these there would be no difficulty in enlisting capital in mining investments in the Western states, resulting in the further development of their wonderful mineral resources.

The magnitude of the mining interests of this region, and their rapid growth, are shown by the statistics, such as we have, of the production of its mines. From 1792 to 1873, inclusive, as estimated by Dr. R. W. RAYMOND, and subsequently by the Director of the United States Mint, the gold and silver mines of the United States have produced, in round numbers, over \$2,870,000,000, of which about \$1,875,000,000 has been gold and \$1,000,000,000 silver, both metals being calculated at their coinage value. By far the greatest portion of this wealth has come from the Rocky Mountain states. Prior to 1848 the production of gold in the entire country amounted to the comparatively insignificant sum of \$14,500,000. In that year the discovery of gold in California became known, and with the rush to the new fields and the considerable yield obtained from them, the production amounted to \$10,000,000; in the following year it increased to \$40,000,000, and since that time has been maintained at an annual rate varying from \$65,000,000, the maximum, in 1853, to \$30,000,000, the minimum, in 1883.

From 1792 to 1861 the total output of silver in this country is estimated to have been but \$6,500,000. The Comstock lode was discovered in 1859, and the annual production of silver increased rapidly thereafter. In 1860 it was \$2,000,000; in 1864, \$11,000,000, and in 1870, \$16,000,000. During the next decade important discoveries were made in several places in Utah, Nevada and Colorado, and in 1878 the total production of silver in the United States had increased to \$45,200,000, falling off in 1880, however, to \$39,200,000. But the Leadville mines, discovered in 1878, and commencing to produce largely in 1880, helped to swell the output again, and since then, with the development of the many new and rich mineral districts of the northwestern and southwestern states and territories, the annual production has been steadily increasing until, in 1890, the total value of the silver product of the country amounted to over \$70,000,000.

The production of the precious metals, however, by no means includes the entire amount of mineral wealth that has been derived from this section of the country.

Since 1882, nine of the Western States, Montana, Arizona, New Mexico, Colorado, California, Utah, Nevada, Wyoming and Idaho; have produced nearly 450,000 tons of copper, most of it coming from the two first named; since 1873 the same states have produced nearly 1,240,000 tons of lead, and California, since 1850, has produced nearly 1,570,000 flasks of quick-silver, valued at about \$70,500,000.

In addition to this, the production of coal and iron in these states has added largely to the wealth of the country, and their mining forms an important branch of the industry, while the annual output of other mineral products, borax, salt, asphaltum, sulphur, building stone, etc., amounts to a considerable value, which is constantly increasing, as greater attention is being paid to the development of these deposits.

#### ENGLISH AND AMERICAN BLAST-FURNACE PRACTICE.

The British ironmasters, during their visit to this country last summer, were exceedingly cautious in commending any of the features of American engineering practice which differed from their own, and especially was this the case in regard to our blast furnaces. The Edgar Thomson and the South Chicago furnaces are the especial pride of American furnacemen, on account of their excellent equipment and extraordinary record of production; but the Englishmen were apparently not impressed by them, and were rather disposed to criticise the way in which they were driven, as not being as good in the long run as the slower English method. It is interesting, now, to learn just the opinion which they formed concerning American blast-furnace practice.

At a meeting of the Cleveland Institution of Engineers, held last month, Mr. WILLIAM HAWDON, of the Newport iron works, read a paper on "American Blast-Furnace Practice," in which he made a comparison with the work done in the Cleveland district, England. His paper gives a good description of the Edgar Thomson furnaces, and his comparison of American with English practice is very fair, giving the American practice due credit for many points in which he believes it to be superior to the English, and *vice versa*; but balancing the favorable points against the unfavorable ones of more rapid wear and higher coke consumption of the American furnaces, he concluded that English practice was superior to that of America, with all its hard driving.

The American method of regulating the blast he considered better than

the English, and remarked that it seemed almost incredible that the Cleveland engineers—who imagined that they had, up till now, led the way in blast-furnace practice—could have allowed such a valuable arrangement of blast supply to pass without adoption, since it was not only a question of making more iron, but, by more regular working, a better quality, and at a smaller expenditure for fuel.

Regulation, he said, was probably a misnomer when speaking of pressure, for English makers who worked by pressure, and from one general main, did not "regulate" their furnaces at all. In an ordinary English plant of two or more furnaces, the blowing engines were all coupled to one general blast main. The consequence was that seldom, if ever, were two furnaces working with the same freedom, and the greatest volume of air escaped through the furnace, which was working with the greatest freedom, or already making most iron, thus causing it to produce more, and probably drive so hard as to run off its quality; whilst the furnace that was not working freely did not allow a sufficiently easy escape of blast through it, and that at the very time when the furnace required the blast to bring it back to proper working. The consequence was more or less irregularity of working.

The circumstances which brought about the large makes and good practice in America, in his opinion, were (1) rich ores, apparently easily smelted, small in mechanical condition, easily acted upon by the gases and fuel, and, being carefully mixed and selected, uniform in quality; (2) good strong coke, also uniform in quality; (3) high pressure of blast, about 10 pounds per square inch; (4) a temperature of blast similar to the British from regenerative stoves; (5) regular filling-up of the charge in the furnace; and (6) a healthy rivalry, which is joined in by the workmen, to beat the record.

Comparing American with English practice, Mr. HAWDON said that, instead of lasting only two and a quarter years, the linings of English hematite furnaces lasted about six years. The bells in English furnaces lasted eight to fifteen years; in America one was wanted every twelve or eighteen months. Thus the English makers were not in a position to experiment so readily on the lines of different furnaces, or to adopt all the latest improvements.

In England the great effort was to make as much as possible at as low a cost and with as little fuel as possible. The Americans in driving had overlooked the saving to be effected in fuel economy, and the English in economizing fuel had overlooked the economy that there was in greater makes up to a certain point. The frequent periods of depression deterred British makers from pressing their furnaces; they were not working as economically as they might, but they had beaten the American producers in coke consumption.

In the discussion which followed the reading of Mr. HAWDON's paper, the opinion was expressed by several gentlemen that, by improving the lines of American furnaces and reducing the quantity of the blast, a better result in economy would be obtained, and that the arrangement of water cooling in the boshes seemed to be simply preposterous. In regard to the method of blowing each furnace separately, it was remarked that a furnace should not be hanging, as it denoted something wrong somewhere, and that the simplicity of the common method of blowing was preferable.

From the discussion it is evident that the average English furnace man does not believe at all in the superiority of the American blast furnace. The argument that slower driving, however, would give greater economy seems especially absurd in view of the fact that the tendency to fast driving has now been the rule in America for nearly twenty years. The American furnaces were formerly driven as slowly, if not more slowly than the English, but the rate of driving has gradually been increased during the past twenty years, and is steadily becoming faster and faster. The economy of fuel has also increased steadily, as was well shown in Mr. GAYLEY's paper read at the New York meeting of the Iron and Steel Institute, showing the steady increase both in capacity and in economy since 1876. The American furnaces have been through all rates of driving from slow to fast. Ten years ago the Englishmen expressed their incredulity and amazement at the Americans' fast driving, but what was considered fast then is only moderate driving now. It would be as reasonable to expect the Americans to go back to a speed of 20 miles an hour for express trains as to expect them to go back to the time-honored English practice of slow driving of blast furnaces.

We must not expect, however, that, because the average Englishman believes in slow driving, English blast furnaces will continue to be driven slowly for all time to come. An American blast furnace has already been erected in England, and is now at work. It is at the Jarrow works of Palmer's Shipbuilding and Iron Company, and the latest English engineering journals describe it as in all respects a copy of one of the most successful of the Edgar Thomson furnaces. It is 76 feet 2 inches high, 20-foot bosh, and 11-foot hearth. The engine, a compound condensing, with 100-inch blast cylinders, is specially attached to the one furnace. It has bronze tuyeres, high pressure of blast 8 pounds to 9 pounds, and 64 coils of tubing, circulating water around the bosh, all these features being peculiar to American practice.

The *Iron and Coal Trades Review* says, concerning this furnace, that, although it has not yet been ascertained what amount of iron it can produce, there is no doubt that it will turn out considerably more than the ordinary English hematite furnace, since it is driven harder. A comment which will sound peculiar to American furnace men, however, is, that the new furnace will necessitate a different arrangement of shifts, since when the men leave off charging at the dinner hour the contents of the furnace go down so much that the men are unable to overtake it again and keep the furnace full.

We have frequently in these columns called attention to the fact that English and American practice in engineering in general are steadily becoming more alike. There will soon be no great difference in practice between the two countries except where local conditions make it necessary. The American blast furnace in England is a worthy successor to the American Bessemer Steel Works and the American Pullman car in that country. Each country is copying the best things of the other; America rapidly, England slowly, but none the less surely, and the two countries will soon be one in engineering practice as they are one in language.

## 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.

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

## Ore Supply for Virginia Furnaces.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to Mr. Edmund C. Pechin's article on the "Ore Supply for Virginia Furnaces, III.," in the issue of the *ENGINEERING AND MINING JOURNAL* of March 21, I wish to call attention to the fact that, while I believed the magnetic vein at Pittsville to extend to a great depth, at the same time in my report on the property, from which Mr. Pechin has quoted, I stated that the first step to be taken in the systematic development of this vein would be a careful exploitation by a series of bore holes. Last fall I had occasion to make an examination of the magnetites in Henry and Franklin Counties, Va., and in Stokes County, N. C., in the preparation of my report on "The Mineral Resources Along the Roanoke and Southern Railroad," a description of which I have promised to give in a paper before the next meeting of the American Institute of Mining Engineers. In connection with Mr. Pechin's articles this may be of interest as bearing at least on one of the future ore supplies for the Virginia furnaces.

H. B. C. NITZE.

BALTIMORE, Md., March 23, 1891.

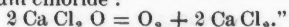
## A New Method for the Production of Pure Oxygen.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Under the above title there appeared in the *ENGINEERING AND MINING JOURNAL* of March 14 a communication from Mr. Werner Langguth, describing what he considers to be a new process for generating oxygen.

In point of fact this process has been known for over a quarter of a century as the Leidmann process, and is described in nearly all standard works on chemistry. I refer, for instance, to Vol. V. of the *Encyclopaedia Britannica*, ninth edition, page 480, where the following paragraph is to be found:

"When a small quantity of cobalt sesquioxide, or a few drops of a solution of a cobalt salt, is added to a clear concentrated aqueous solution of bleaching powder, which is then gently heated, oxygen is evolved with great regularity, and the bleaching powder is completely resolved into oxygen and calcium chloride:



The theoretical explanation is then given in detail.

BALTIMORE, March 20, 1891.

DR. W. SIMON.

## The Precipitation of Gold from Chloride Solution.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: It is not my intention or wish to steal any of Mr. Riotte's thunder with reference to who recommended and introduced the use of paraffine and sulphur to generate  $\text{H}_2\text{S}$  gas as a precipitant for gold from its solution, as made in the chlorination barrel.

Mr. R. P. Rothwell was the first to introduce it on a practical scale at Deloro, Ont., and to him is due the honor for this, as also for many other practical improvements connected with barrel chlorination on a large scale, and the writer got the benefit of his experience by being at that time in the chlorination department of those works.

If Mr. Riotte will read Mr. Langguth's article again he will see that we no longer use paraffine and sulphur to generate  $\text{H}_2\text{S}$  gas, having worked out a simpler, cheaper and more economical apparatus and application.

Perhaps Mr. Langguth should have used the word "adopted" instead of "introduced," which would have been the more correct term when looked at according to its literal meaning. This would, without doubt, have saved Mr. Riotte considerable worry and anxiety.

Apparently he has not read the article on barrel chlorination, published in the issue of the *ENGINEERING AND MINING JOURNAL* of February 7th, when he suggests the use of his "mixer" as the one thing necessary to make the process perfect. We think in our arrangement, as there described, we have a simpler and more perfect apparatus, as we have yet to hear of a charge of chlorinated ore being washed perfectly anywhere else with 120 gallons of wa-h water to the ton.

As far as his mixer is concerned, it undoubtedly is a good apparatus for the work it was designed to do; but I would suggest, as a simpler apparatus, and one less likely to get out of order, a machine designed on the plan of the Cook amalgamator, but of increased size, in connection with filter presses, as he proposes.

JOHN E. ROTHWELL.

DEADWOOD, S. Dak., March 13, 1891.

## MINERAL RESOURCES OF ALASKA.\*

By Ivan Petroff.

The Alaskan products ranking next in value to furs and fish are gold and silver, the first gold mines to yield returns being located toward the end of the year 1880 in the vicinity of the present town of Juneau. From year to year discoveries of gold and silver-bearing quartz have been made and located, and in many instances the mines were operated in a primitive and desultory manner. At present but three or four gold-producing quartz mines are known to ship bullion, among them the famous Treadwell or Paris mine, which supplies a mill with a capacity of 240 stamps. The output of this mine has been variously and vaguely stated at figures ranging from \$50,000 to more than \$100,000 per month, but as it has been possible to ascertain the total shipment of dust and bullion from Alaska, which does not now exceed \$700,000 per annum, it is evident that the yield of this mine must have been greatly exaggerated.

The surface mines of the Yukon region, though frequently reported as being located within British Columbia, have been definitely ascertained to be within the boundaries of Alaska. These mines have produced gold dust for a period of six or seven years, and averaged between \$40,000 and \$50,000 per annum until the season of 1890. In that year the output was nearly \$90,000, the gold being found in rather coarse dust and nuggets. The total value of the gold thus far exported from Alaska since its purchase approaches \$4,000,000, but it is safe to say that this sum does not exceed the amount expended in prospecting and in the purchase of mining and milling plants in southeastern Alaska, a state of affairs experienced in all mineral countries in the early stages of development. The output of silver in Alaska has been quite insignificant, not exceeding \$3,000 per annum.

Of other minerals only coal has thus far been prospected, and it has been discovered in various parts of the territory. The veins thus far located show only lignite coal, some of which is of the best quality. At the present writing only one of these coal veins is operated, and this vein is situated on Herendeen Bay, on the north side of the Alaskan peninsula. The product of this mine was tested for the first time during the summer of 1890, and although the surface yield did not prove very satisfactory in steam-making qualities, there is every prospect of better coal being secured as the deeper layers of the mineral are reached. This mine has the advantage of being accessible both from Behring Sea and the North Pacific Ocean, two deep bays being separated only by a narrow isthmus 13 miles in width, over which a railway will be built in the near future. Some veins of coal near Cape Lisburne, on the Arctic coast, are utilized annually by whale ships and revenue cutters to replenish their stock of fuel, but the veins cannot be said to be systematically worked. Another coal mine is being developed on Kuchekmak Gulf, at the mouth of Cook Inlet, but this deposit has not advanced beyond the prospecting stage, its nature being lignite, like all other veins previously mentioned.

Large deposits of copper, said to be of great richness, are known to exist in the interior of Alaska, but their location is such that the difficulties of transportation are almost insurmountable. This wealth will not probably be utilized until the far-distant future.

General deposits of cinnabar are also known to exist in the Kuskokwim region; but, though located on the banks of a river navigable by light-draught steamers, mining men have thus far declined to invest money in their development.

A mining enterprise was inaugurated five or six years ago on the banks of Fish River, which empties into Norton Sound, for the development of a deposit of silver-bearing galena ore of considerable richness; but the company met with a series of disasters, including the loss of several supply vessels, one of them with their whole operating force on board. Thus far the shipments of ore from this point have not reached more than \$13,000. At present operations are entirely suspended, and it is generally reported that the deposit is not found in one continuous vein or series of veins, but only in so-called pockets.

A line drawn from Cape Fairweather, on the main land, eastward and southward along the waters of Frederick Sound and Chatham Strait may be considered the southern boundary of the mineral region of southeastern Alaska; at least no deposits of precious metal in paying quantities are known to exist to the south of this line. The first mining camp met with after passing this line is situated on Holkham Bay, in the vicinity of the settlements of Schuk and Sumdum. The deposit consists of surface gold, which has been mined with moderate and varying success for a period of over ten years. From this point northward along the mainland the mountainous coast has been pretty thoroughly prospected, and a large number of discoveries located, though but few of them have advanced to the stage of actual operation. On Admiralty Island, which should more properly be designated an archipelago, a number of quartz veins, bearing both gold and silver, have been located, the most important of which are at Funter Bay and Salmon Creek. Veins of good quality coal, but not easily accessible, were discovered on this group of islands within a few years after the purchase of Alaska; but though the southeastern section of the territory annually imports great quantities of coal for British Columbia for the use of its shipping and numerous mining enterprises no capitalist has as yet attempted to develop our deposits.

Between the northern end of the Admiralty group and the mainland lies Douglas Island, the site of the first mineral discovery of magnitude in Alaska. Ten years ago the now famous Treadwell mine was located on this island, and since then a number of other locations have been made on the same extension. The operations at this point began with washing the surface gold contained in decomposed croppings of ledges, but it was soon discovered that the real wealth was hidden in the interior of the veins, which here assume almost the dimensions of a quarry of gold-bearing rock. On the eastern shore of Gastineaux Channel a large number of quartz veins have been located, and the town of Juneau has sprung up there with the gradual development of these mines. The principal mining districts in the immediate vicinity of Juneau, on the mainland, are Sheep Creek and Silver Bow Basin, and within a radius of 100 miles from the town twelve quartz mills have been established, with an aggregate capacity of 500 stamps, 240 of which are contained in the works of the Paris mine, which is reported to reduce 600 tons of ore per diem when

\* Abstract of a Census Report.

both steam and water power are employed. Of the remaining 260 stamps perhaps one-half are idle during the greater part of the year, and probably 10 have never been in active operation.

The timber of this region is inferior in quality, but is found in the greatest abundance all over the islands and on the coast of the mainland adjoining, and freely utilized in the operation of mines and other enterprises. Portions of Douglas Island have become almost denuded of forests.

The deep estuary known as the Lynn Canal, lying immediately north of the Admiralty group, has many glaciers and precipitous mountains, but at a few points on the mainland small settlements have sprung up in the vicinity of mineral deposits, but have not advanced beyond the prospective stage. The most important group of mineral locations in this section is found at Berner's Bay and Seward City.

In the Silver Bay district, within 12 miles of Sitka, a number of quartz lodes have been located and operated in rather a desultory manner for many years, but the shipments of bullion from these lodes have been small.

Midway between Lituya and Yakutat Bay a few miners are washing the auriferous sands of the beach, making fair wages during a few months of the year, and at Yakutat the beach sands have at times been utilized in a similar manner, but with no satisfactory result. Quartz veins have been discovered by isolated prospectors in the mountain ranges, but have not been developed.

On the north side of English Bay, near its entrance, the Russians at one time operated an extensive coal mine, traces of which are still to be seen in the shape of solid stone piers, a few dilapidated buildings and the frame of hoisting works, but it was abandoned because the steam-making qualities of the coal were not satisfactory. To the north of English Bay, across the Gulf of Kuchekmak, another deposit of coal is found, probably of a nature similar to that just described, toward the working of which some progress has been made, a building having been erected and a tunnel started, from which several hundred tons of coal have thus far been taken and used in trials as to its quality. Within view of the beach there are four distinct veins of coal, varying from three to six feet in thickness. As the mouth of the tunnel at this mine is within a few feet of tidewater, this coal could be mined and shipped at very little expense should the quality prove such as to warrant its use for steaming. The shores of Kuchekmak Gulf are heavily timbered, but further northward the spruce becomes more stunted, until it can scarcely be said to possess any commercial value.

Just beyond the Gulf of Kuchekmak, at Anchor Point, three miners were engaged in 1890 in washing the gravel cast up on the beach for gold, which is found in extremely fine particles of the kind known as flour gold. Operations, however, are confined to the open season of spring and summer, and even then a drought of unusual duration may interrupt production for weeks at a time. The gold thus far sent from these diggings does not exceed \$1,000 in amount, and to secure this insignificant result it was necessary to construct a ditch more than two miles in length.

From Anchor Point northward along the west coast of Cook Inlet is found a wide belt or level plateau, extending from the high mountain range on the extreme west to the seashore. This plateau is covered with mossy tundra and scattered groves of stunted spruce, and overlies a stratum of blue clay, under which is found sandstone, with narrow veins of coal. Gold has been found throughout the swampy soil of this immense surface, and a few light, flourey colors can be washed out from almost any panful of dirt picked at random. In one of the ravines at the northern end of the Kenai peninsula three miners have been at work for two seasons washing the surface gravel, but the result thus far has not been very satisfactory, the total yield amounting to between seven and eight hundred dollars.

Directly south from the center of the southern coast line of the Alaskan peninsula are the Shumagin Islands. On the island of Unga there is a coal vein of considerable extent, which was located soon after the acquisition of the territory, but after futile attempts to place the coal in the San Francisco market the claim fell into the hands of two men who settled down and confined themselves to taking out annually a small quantity for local consumption. On the same island the gold mine of the Apollo Gold and Silver Mining Company has been operated for several successive seasons, giving employment to a force of 25 or 30 men. No shipment of bullion from this mine has thus far been reported, but prospects are said to be promising for the future.

Directly north of this group is Portage Bay, which is separated from Herendeen Bay by an isthmus about thirteen miles in width, debouching into Behring Sea on the north side of the peninsula. Within a short distance of this isthmus a coal deposit has been discovered and is now in course of development under the auspices of the Alaska Commercial Company. There is no doubt that this deposit will become of great value in the near future, especially after the isthmus shall have been crossed by a proposed tramway, making the mine accessible from the Pacific ocean without entering Behring Sea.

Though the appearance of the gravelly banks of the Yukon River would indicate the presence of precious metals, it is not until Anvik is reached, at the mouth of the Koyukuk River, that actual operations in this line are met with. Three or four men who are now mining on this northern tributary of the Yukon report encouraging prospects, having secured between three and four thousand dollars' worth of gold dust within the last two seasons.

On the Tananah River, the principal tributary of the Yukon from the south, three camps of prospectors are now in existence, from which between seven and eight thousand dollars' worth of gold has been shipped within the last two years. The prospector in this country is beset by unusual difficulties and many almost insurmountable obstacles, and, in consequence, the development of the precious metals existing here will be exceedingly slow.

From the mountain range which lies between the Tananah River and the Upper-Yukon a number of small tributaries enter the main river, nearly all of which have been prospected with gratifying success during the last few years. Bar diggings are now being worked on most of these streams, the most prolific being the famous Forty-mile Creek, from which the greater part of the gold shipments of this district have been made. One hundred and fifty miners have been working here for six or seven years,

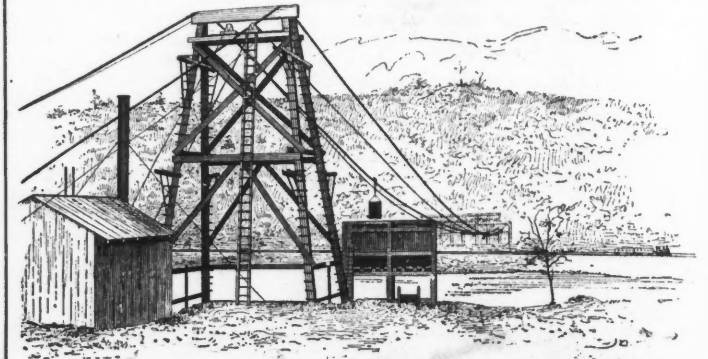
and have succeeded in washing out of the gravelly banks some \$50,000 or \$60,000 worth of gold per annum. During the season of 1890 this amount was probably increased by nearly one-half, through the discovery of new bars on what is known as Lady Franklin's Gulch. As the summer season is exceedingly short, the miners resort to the expedient of piling logs upon the bars in winter and setting fire to them, thus thawing the deposit sufficiently to permit of its being carried to the banks, ready for washing out in the spring. Without this expedient, probably the mining in this region would not be profitable.

At the head of Golovin Bay, on Fish River, a mining enterprise was inaugurated many years ago to develop deposits of silver-lead-bearing ore. Owing, perhaps, to both misfortune and mismanagement, the results of this enterprise thus far have not been gratifying, the total value of the ore shipped not exceeding \$13,000, a sum in no way commensurate with the expense incurred.

#### THE RAINEY BANK TRAMWAY.

The accompanying engraving illustrates a suspended wire-rope tramway, across the Youghiogheny River near Connellsville, recently erected for the Rainey Bank Coal & Coke Company. The coal mines at this place are located on the bluff on the west side of the river, and the contour of the ground there was such that there was no space available for the erection of the necessary number of coke ovens. The only outlet for the mines was on the opposite side of the river. A bridge across the stream would have been too expensive, and consequently the plan of a suspended wire-rope tramway was adopted as a cheaper and equally efficient method of transportation.

The requirements of the plant being too great for one cable, the tramway was installed with a double system. The two cables are anchored on one side of the river in one of the mine drifts and on the other in masonry, around which the cables are turned. The cables are



each two inches in diameter, the span being 1,000 feet. The cables are close together at the loading end and about 30 feet apart at the discharging end, allowing a free passage of the buckets in the middle.

The haulage rope is an endless steel wire-rope five-eighths of an inch in diameter. It passes around a grip-wheel of peculiar construction, keyed to the crank-shaft of the engine on the east side of the river; thence it passes over the sheaves in the tower, across the river, and around the sheave in the other tower. The buckets are two in number, each of 2½ tons capacity, 4 feet in diameter and 6 feet deep. They discharge automatically by a striking lever, the hinged bottoms returning to place by counterweights, and are held in position by strong hooks.

The tower on the west side of the river is 40 feet higher than that on the east side and the loaded buckets run down the incline by gravity. Buckets are loading and discharging at the same time and the engine is reversed for alternate trips.

The trip of each bucket is made in 30 seconds, and with the time occupied in loading and discharging, it is estimated that the total capacity of the tramway is 750 tons per day of 10 hours, at an expense not exceeding three cents per ton. The tramway was designed and erected by Mr. F. H. McDowell, of the Union Wire Rope Tramway Company, 117 Liberty street, New York.

**Magnetic Rocks.**—At the Royal Academy of Lyncei on December 18th, says the *Electrician*. Signors Sella and Oddone gave an account of some researches on the distribution of magnetism in certain regions on the Alps. They have found a number of magnetic foci, and record that the rocks which present distinct magnetic properties are magnetite, serpentine, diorite, melaphyre and syenite. A magnetic rock was observed by Signor Sella on Punta Giufetti, in the Monte Rosa group, and as it presented traces of fu-ion on its surface, as if it had been struck by lightning, it is suggested that this circumstance has endowed the rock with its magnetic properties.

**Electrical Transmission of Power.**—In the recent competition instituted by the Cataract Construction Company for the utilization of the power of Niagara Falls, there were fifteen different schemes presented, of which seven proposed electrical transmission of power, two hydraulic, and six pneumatic. Of the electrical schemes two advocated alternate-current transmission at 5,000 and 10,000 volts, and the remaining five continuous-current transmission at potentials varying from 1,600 to 4,500 volts. The fact that the number of electrical schemes proposed was less than the sum of the pneumatic and hydraulic plans, said Mr. Gisbert Kapp, in a recent lecture before the Society of Arts, London, showed that electrical engineers were scarcely prepared to deal with a problem of this magnitude. At present the limits of distance for the electric transmission of power at a reasonable cost are about four to five miles. Beyond the latter distance the economical voltage for 500 horse power is beyond the capacity of one machine. Practically, the extreme limit for direct currents is between 2,000 and 3,000 volts.

REPRESENTATIVE AMERICAN METALLURGISTS.

Edward Balbach, Sr.

The founder of the extensive smelting and refining works located on the Passaic River, in the city of Newark, N. J., which bear his name, was born in Carlsruhe, Baden, Germany, March 19th, 1804, and, after a long and prosperous business career, died, honored and respected, in Newark, October 14th, 1890, leaving to his son, Mr. Edward Balbach, Jr., who was associated with him, the extensive establishment which, rising from a small beginning, through his metallurgical skill, untiring energy and enterprise, had gradually developed into its present magnitude.

Mr. Balbach, being of a studious nature and with an especial fondness for chemistry, in which he was very proficient, was led to engage in the refining of metals in his native city. Although in a measure successful there, his active mind clearly foresaw the impossibility of increasing the business beyond certain limits, owing to the restriction of the government control. With this conviction, and imbued with republican principles, he visited this country in the year 1848 with a view of transplanting his business, as conducted, to the new world, where, as he well knew, no barrier existed to prevent those of foreign birth from attaining fame and success.

His observations led him to select for location of his works the city of Newark, N. J., which was at that time a place of scarcely 35,000 inhabitants, and in which, then as now, the manufacture of jewelry was a leading industry.

The waste or sweepings of these establishments, which were purchased

of the advantages and facilities presented, and shipped their product to the Newark furnaces for treatment.

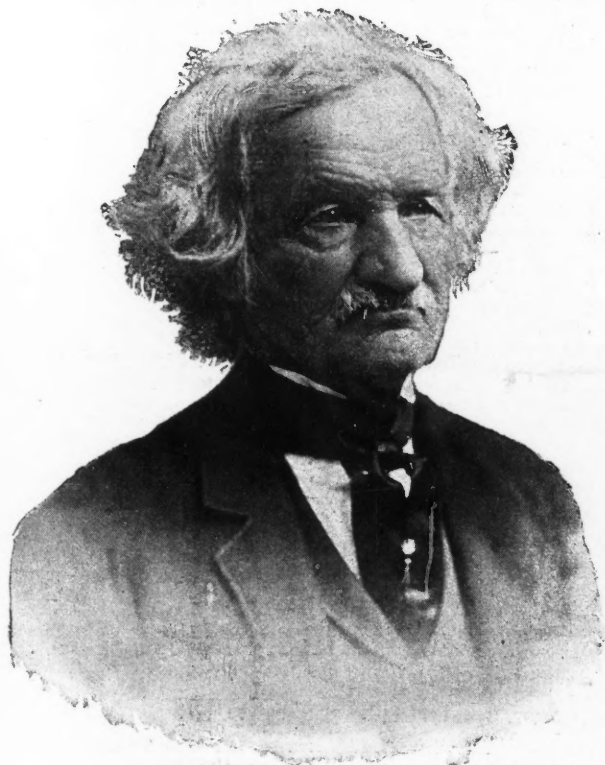
Continued success at the Newark works seemed now to be assured, and an era of prosperity was the reward of persistent and well-directed endeavor. The name of Balbach was a guarantee for reliability and accuracy throughout the mining districts, inspiring the confidence which it deserved.

Building after building, stack after stack, and furnace after furnace, with all modern appliances for the best treatment of every class of argentiferous and auriferous material, were added to keep pace with the constantly increasing demands on the capacity of the works until they developed into the vast agglomeration which they form at the present time.

With facilities of desilverizing 125 tons of lead, 100 tons of ore and a plant producing over 10 tons of copper by the electrolytic process daily, especially fitted-up buildings for the manufacture of blue vitriol and oxide of zinc, and the best appliances for the refinement of crude bars, the works have frequently been taxed to their utmost capacity, furnishing employment to from 400 to 500 men, day and night. Little could the founder of this great smelting works have foreseen the success which his natural endowments and untiring energy, aided by the inventive ability of his son and successor, made possible.

Mr. Balbach, Sr., was a man of singular simplicity of habits and unostentatious nature, devoted to his relatives, consisting of his son, two daughters and numerous grand and great-grand-children, of whom he was the revered head.

While not given to public display, he was charitable in a quiet way,



EDWARD BALBACH, SR.



EDWARD BALBACH, JR.

by speculators and sent to Europe for treatment, presented to him the prospects of a lucrative business venture.

Having returned to Europe, whither he was called by sad family news, he recrossed the ocean, and in the year 1850 laid the foundation for the immense works of the present day. The site finally selected for the small establishment with which he began, has since proved valuable as an investment, and, from its location, particularly adapted to the needs and requirements of a large smelting works and the demands made necessary by the changes in the metallurgical processes.

Skill and fair business methods soon secured for Mr. Balbach the confidence of the jewelry trade in this vicinity, and as his was the only establishment of this kind the enterprise proved to be a profitable and constantly increasing one; it soon extended far beyond the local limits, and gradually included all the principal productive points of the jewelry industry. The reputation thus acquired soon spread, and small shipments of ores found their way to the Newark establishment. Material of more or less refractory nature was then sent to the works, and was successfully treated. This was followed, in the year 1859, by the output of a lead mine discovered in Orange County, N. Y., which furnished considerable material for treatment. Subsequent to this, in 1860, the yield of an old lead mine in Pennsylvania went to the works. The fame of the Newark works now reached to remote parts of the United States, and even Mexico, resulting in larger shipments to them and increased activity.

With the increased production of lead at the works, it became evident to Mr. Balbach that the processes in vogue for desilverizing base bullion were costly and inadequate. The importance of securing an improved method led to a series of experiments by Mr. Edward Balbach, Jr., resulting in what is known as the Balbach desilverizing process, which is now in general use in the large refining works in the United States.

This important invention opened up new possibilities. A great advance in the handling of lead bullion had been made, and the smelters of the rapidly developing lead-mining centers were prompt in availing them-

and his death will be sincerely mourned by many whom his aid had befriended during his lifetime. Passing away at an age beyond the ordinary allotment of years accorded to mankind, he will be respectfully remembered by many as the Nestor of the gold and silver-lead smelting industry in this country, and for his wide range of knowledge in this field of metallurgy.

To his son, who has for many years been his business associate, and of late years the active member of the firm, he left a name exceeding in value any fortune which he could bequeath.

Edward Balbach, Jr.

The present owner of the extensive smelting and refining works situated in Newark, N. J., came to this country in 1849 when scarcely nine years of age. Entering the employ of his father in 1856 and following the bend of his natural inclinations for metallurgical investigation and experiment, he soon found ample opportunity to observe the necessity for improvement in certain crude and undeveloped processes, and the advantages which would result from more rational treatment.

In 1866 large shipments of base bullion, rich in silver and gold from the Nevada furnaces, found their way east and were treated by the method of cupelling the lead, which was a slow and expensive procedure. The want of a more thorough and practical method led Mr. Balbach to institute a series of tests which, resulting successfully, made it possible to handle this high-grade bullion to decided advantage. The patented method is now in general use and known as the Balbach desilverizing zinc process.

Mr. Balbach, having in the meanwhile been admitted as partner in his father's business, found that in order to perfect his invention, it was necessary to remove the still existing difficulty in the way of a proper separation of the zinc from the gold, silver and lead alloy.

The experiments tried in Europe by distilling this alloy in clay retorts,

as used in Germany for the distillation of metallic zinc from the ore, failed, the lead destroying the retorts, and had to be abandoned. The difficulties experienced appealed to Mr. Balbach's ingenuity, and he successfully met the requirements by the invention of the black-lead retort, patented May 21st, 1867, which is now in general use in the smelting establishments of the United States, as well as many prominent reduction works in Europe.

This invention was followed in the year 1873 by a patent for a water jacket, which is in general use for reverberatory and smelting furnaces of many descriptions, including blast furnaces for lead and copper and all lead-refining reverberatory furnaces.

These various improvements, the importance of which has been demonstrated, have secured to Mr. Balbach deserved recognition and prominence in the metallurgical profession. They have greatly assisted in the development and continued increase of his own works, and have resulted in substantial pecuniary benefit.

Personally, Mr. Balbach is of a genial disposition. He is active and indefatigable in the supervision of the establishment of which he is now the head, and is constantly devising improvements to maintain the established reputation of the oldest smelting and refining works in the United States.

#### A REVIEW OF THE CHEMICAL LITERATURE OF THE MINERAL WAXES.

Written for the Engineering and Mining Journal by Dr. Henry Wurtz.

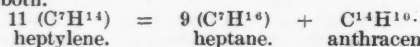
(Concluded from page 354.)

In 1858 appeared several communications to the scientific journals upon materials made up wholly or partially of mineral waxes, from Lake Baikal in Siberia and some points in and around the Caspian Sea. The Lake Baikal mineral, which Dana puts under ozocerite, was called *baikerite* by Hermann, who found in it 60% of a wax, inodorous, soluble in boiling alcohol, melting at 138° F. (59° C.); specific gravity = .9. He gives no analysis. The substance known by various names, such as *Neft-gil*, *Nachthadil*, *Nefidegil*, *Kir*, etc., from the island Tschelen or Tschelenkän, in the Caspian, and other localities in that region, was described by Von Baer, Fritzsche, Hermann and others (*Jour. für Prakt. Chem.*, LXXIII, 220 and 331; *Chem. Centralblatt*, 1858, 500 and 506; *Jahrbuch Min.*, 1858, 468). The specific gravity of the Caspian mineral = .956, and Dana regards it as nearest to his *zietrisikite*. Hermann found that it was largely insoluble in ether, and that it contained 66% of wax insoluble and 18% soluble in alcohol. No analyses appear.

In 1864 an announcement appeared of the existence of *hatchettine* at a coal mine at Wettin, by an inspector of mines named Wagner (*Neues Jahrbuch für Min.*, 1864, p. 687). His description tallies with *hatchettine*, or *urpethite*, or a proximate waxy mineral. No analysis. He says that it had been described before as *ozocerite*. In the same year Schubert described the *ozokerite* in the Carpathian Sandstones of Galicia (*Jahrbuch der Min.*, p. 854). No analyses.

In this same year, 1864, appeared an important paper, by J. Tuttschew, of Kiev, upon a variety of petroleum, supposed to be from Galicia (*Jour. für prakt. Chem.*, XCIII, 394). He seems to have here proved that this crude oil had an olefine composition, and that by distillation it was converted into paraffine compounds. Its specific gravity was .7536. Sodium boiled in it remained unchanged. Three analyses gave C: 85.05, 85.23, 85.04; mean 85.13. H: 14.06, 14.04, 14.10; mean 14.067. Means, computed to 100: C, 85.819; H, 14.181, differing from olefines by .105 (away from paraffines). The greater portion of this oil distilled over between 150° and 220° F., and five samples taken during the process gave C: 84.69, 84.98, 84.74, 84.67, 84.30; mean 84.676. H: 15.75, 15.32, 15.19, 15.43, 15.22; mean 15.382. Means, computed to 100: C, 84.627; H, 15.373. C<sup>11</sup>H<sup>24</sup> contains C, 84.615; H, 15.385.

Thorpe & Young have proved that by distillation under pressure, paraffines may split up into olefines and lower paraffines (*Jour. of Chem. Soc.* [2] IX., 342, and X., 802); thus *pentane* C<sup>5</sup>H<sup>12</sup> may split up into propane C<sup>3</sup>H<sup>8</sup> and ethylene C<sup>2</sup>H<sup>4</sup>. The reverse process, however, which must frequently occur in dry distillation of numerous carbohydrate bodies, under ordinary pressure—that is, the apparent hydrogenation of olefines and their derivatives, with production of paraffines—is not so easy and simple. In all probability it arises in all cases, not from an assumption of hydrogen, but from a splitting up into more and less carbonaceous compounds. Thus we find in the residuum in the still from an olefine-bearing petroleum, such highly unsaturated hydrocarbons as anthracene C<sup>14</sup>H<sup>10</sup>, phenanthrene (same composition), chrysene C<sup>18</sup>H<sup>12</sup>, pyrene C<sup>16</sup>H<sup>10</sup>, etc. The following theory may be off-red to account for the formation from heptylene during distillation of a rock oil, of heptane with a little anthracene, or phenanthrene, or both.



Similar equations could readily be formulated to explain the splitting up of any olefine into paraffine and other highly carbureted products which remain in the tarry and pitchy residua or still-bottoms.

In or about 1866 Watts' *Dictionary of Chemistry* appeared. The information it gives about ozocerite, however, must be called meagre and vague, and the few facts and analyses it cites have been already sufficiently set forth.

In 1871\* John Galletly gave an account of a solid hydrocarbon from the distillation of "Boghead coal," having density = .94 and melting at 176° F. (80° C.). He describes this as differing in many important respects from the paraffines, having "a harder ring," for example. It is not alterable by fractional crystallization, and is "evidently an individual substance, not a mixture of homologues like paraffines." It is "separated from the paraffines accompanying it in the crude oil by a considerable gap" (of 26° in m. p.) In composition he compares it with olefiant gas, and with the melene and cerotene of Brodie, adding an analysis of a Boghead paraffine by Anderson (already cited above) for comparison.

By distillation one-half of it becomes liquid, so that he could not determine its vapor density. It is partly carbonized by "melting over sulphuric acid," giving a material approaching plumbago in characters. It cannot be doubted that this body is a direct product of depolymerization of some constituent of the torbanite, some n (CnH2n) or olefine polymere.

	Galletly's hydrocarbon.	Olefiant gas.	Cerotene. Brodie.	Melene. Brodie.	Paraffine of 126° m. p. Anderson.
C.....	85.543	85.714	85.66	85.524	84.98
H.....	14.457	14.286	14.34	14.476	15.02
	100.000	100.000	100.00	100.000	100.00

In 1868 was published the last edition of *Dana's Mineralogy*, which comprises such a masterly series of steps in the classification of carbohydrate minerals. The reader will scarce expect here, however, a review of this great work. Dana does not attempt to determine whether the mineral waxes are olefines or paraffines.

In 1871 was published the eighteenth volume of the Cavendish Edition of *Gmelin's Handbook* (from Kraut's continuation after G.'s death, written in 1858), containing Paraffine and Ozocerite. But there is little of importance therein not already stated. We may note the interesting facts that *meteorites*, one from Kaba, another from the Cape of Good Hope, contained hydrocarbons presenting the characters of ozocerite.

In 1872 appeared the first Supplement to Watts' Dictionary. Some facts are given, on the authority of Fluckiger, regarding the wax of oil of roses, discovered by De Saussure in 1820, as already related. It is crystalline, melts at 90.5° F., begins to boil at 522° F., and boils freely at 527° F. It has the composition of an olefine CnH2n.

In 1873 was published the volume of Adolphe Wurtz's *Dictionnaire de Chimie* containing *Ozocerite*. "[Syn. *Cire fossile*, *paraffine native*] Mélanges d'hydrocarbures d'un poids moléculaire élevé, et d'une composition voisine de celle qui répond à la formule CnH2n." Of a composition near that which corresponds to the formula CnH2n. The article is signed F. & S. F. was Friedel, and S. either Salet or Schützenberger. The article headed *Paraffine*, signed G. S. (G. Schützenberger), states that paraffines are homologues of marsh gas, of formula CnH2n + 2.

The next citation will be from an article by my lamented friend, Prof. B. Silliman, in *Johnson's Universal Cyclopaedia*, Vol. IV., p. 1,328 (1878)—written possibly in 1876. "*Fossil Wax* (Ceresine). Under the so-called 'fossil wax' are several distinct universal hydrocarbons of the general formula CnH2n, belonging to the ethylene series, one especially of which (ozocerite) has lately assumed considerable economic importance," etc. In this article Silliman, doubtless using the term paraffine in the original sense of Reichenbach, that is, having *litt'e affinity*, classes the solid olefines and paraffines both under the general name *paraffine*. Indeed, it will become apparent, before the close of this article, if it has not already become so, that there are solid bodies, and classes of them, of the constitution CnH2n, which are quite as well entitled to the name paraffine (so far as its meaning goes) as the marsh-gas homologues.

About 1876 there appeared in a German journal an important article by Dr. List, mostly technical, which I have only seen in abstract in a *Scientific American Supplement* (No. 36, Sept. 2, 1876). For important information the reader must be referred thereto. Grades of pure white ozocerite are remarked on, as then produced by Otto, of Frankfort-on-the-Oder, exhibited in Vienna in 1875, which were so hard as not to be scratched by gypsum, and scarcely by the finger nail, and having a melting point above 181° F. The hardest commercial wax, Carnauba wax, melts at 185°.

The paper of Dr. J. Grabowsky (which was first published here, in the *American Chemist* for October, 1876, p. 123, and which was very widely copied throughout the world), "*On Galician Ozokerite and Ceresine*," says: "The composition of ozokerite is best expressed by the formula CnH2n."

In 1877 J. von Schröckinger announced the discovery, at the "Great Western Quicksilver Mine," Posepny, Lake County, Cal., of a mineral which he called *posepnyite*. It is associated with quartz and mercury, and has usually a light green color. G. W. Dietrich made analyses, which mostly show more or less oxygen; but one gives:

C.....	85.15	85.95
H.....	13.92	14.05
	99.07	100.00

This is evidently an olefine wax.

In December, 1878, there came into the hands of the writer of this, a sample of mineral wax from Utah—the first sample, so far as known, that reached the East from this region. A history of this has been given recently in this journal.† This first sample had the fusing point 151° F. (66° C.), and specific gravity = .934. It yielded to cold ether 12% of a soft, greasy wax of the color of burnt sienna, melting at 108° F., transparent when fu-ed, and which was regarded as approaching to Dana's *urpethite*. Boiling ether dissolved 37% more, melting at 153° F., and this second fraction was a waxy material, which was classed with Dana's *ozocerite*, though harder. The residuum from boiling ether, being about 52% of the original mass, was very dark brown and harder than beeswax. This melted at 130° F. (71° C.), and was looked upon as falling under Dana's species *zietrisikite*, though its fusing-point, while much above the ozocerite range, was lower than that of *zietrisikite*.‡

Samples of the new Utah waxes soon came into the hands of others, and, by reason of some very strangely exalted statements that had gone abroad of the phenomenal quantity of raw material that was attainable, much attention was attracted. Apparently some one found it important that these waxes should be proved to be *paraffine*. My statements were attacked and a controversy started, which continued actively for some months. Its echoes would seem to have scarcely yet died out. It may have arisen partly from the existence of varieties—which were, of course, to be expected, and to be found—among the Utah waxes, which would yield differing chemical results. Such varieties occur abundantly in all mineral-wax regions, even in depth in the same beds.

The object of the present writing is by no means to foment a revival of the said controversy, but to collect the facts needed to lead us nearer to the solution of certain important questions that touch more or less all mineral waxes: first of all, of course, their true composition and

\* *ENGINEERING AND MINING JOURNAL* of July 13th, 1889, pp. 25, 26. The original notice of the discovery is in the issue of January 25th, 1879, p. 55.

† Most of the facts here stated will be found in an article in the *Scientific American*, issue of February 22d, 1879; the only reference I have at hand at present.—H. W.

\* *Chemical News*, October 20th, 1871, p. 187.

chemical constitution and relations; next may properly follow genetic questions, as to their sources and their modes of origination, and so on. To proceed: In 1879, W. Ivison Macadam communicated to the British Association a long account of nests and nodules of ozocerite found in excavating for fortifications at Kinghorn-ness (*British Assoc'n Rep.*, Sheffield, 1879, p. 309; also *Chem. News*, September 26th, 1879, p. 149). It was found five feet inside a hard trap rock, no crack or fissure communicating with it, associated with calcite crystals. His method of analysis is obscurely stated, but he concluded that the material "consists of a member of the olefine (C<sup>2</sup> H<sup>4</sup>) series of compounds, the C and H being contained therein in almost exactly the necessary proportions to form an olefine." Density = .97; melted at 176° F.

We now come to some investigations which must bear in an important way upon the first of the questions above referred to. In 1880, or thereabouts, two Russian chemists, Beilstein and Kurbatow§—the former of special distinction—entered into the chemical examination of the Caspian rock oils, which have spouted forth in such absolute floods as to astonish mankind. They were surprised to find marked differences from the Pennsylvania oils, the only rock oils then well understood, and which were then, very inaccurately indeed (as it now turns out), assumed to be typical of all the rivers of oil that have of late years come up from the depths.

They commenced with the fraction that they distilled over between 175 and 185° F. (80° to 85 C.). In this they fully expected, theoretically, to find a large quantity of the valuable hydrocarbon heptane, C<sup>7</sup> H<sup>16</sup>, which averages 10% of the Pennsylvania oil, being what is known in the trade as "C Naphtha." This boils in the neighborhood of 200° F. Its composition is (O = 16, C = 12) exactly C, 84%; H, 16%.

Instead thereof these two chemists obtained

C.....	85.23	84.94
H.....	15.11	15.06
	100.34	100.00

They add "Die Analyse entspricht keineswegs der Formel C<sup>7</sup> H<sup>16</sup>, sondern nähert sich der Formel C<sub>n</sub>H<sub>2n</sub>." The analysis corresponds nohow with the formula of heptane, but approaches C<sub>n</sub>H<sub>2n</sub>. The natural conclusion was that the more volatile portion, at least, of the Caspian oils was not made up of marsh-gas homologues—alcohol radicals—like the American oils, but of olefant-gas homologues. As the latter are known to combine directly and readily with bromine, the next step was to dose their distillate with this potent reagent. Another surprise followed, no combination resulting.

Heat being applied, action took place, but the evolution of hydrobromic acid gas showed that even then there was no direct combination, such as expected, but really a substitution, just as with the marsh-gas homologues. Here then were liquid hydrocarbons which, while in one sense paraffines—that is, destitute of direct affinity for the halogens—yet had the composition of olefines. At first sight, a discovery of new modifications or "allotropes" of the olefine series. Yet, on further study, they did not turn out to be new. This kind of olefines—or one member of the series—had been years before obtained by the illustrious Berthelot in his famous method of hydrogenation, by the action of hydriodic acid on benzole. He himself at first took it for a marsh-gas homologue, the paraffine hexane. In 1877 Wreden and Znatowicz (*Annalen der Chemie und Pharmacie*, 187, 163) published investigations of these olefines-isomeres, which, from their mode of formation, by the hexahydrogenation of the benzoles, are called hexahydrobenzole homologues, or, by some, "additive benzoles." By some they are called naphthenes. In the original experiment of Berthelot C<sup>6</sup> H<sup>6</sup> + 6 HI = C<sup>6</sup> H<sup>12</sup> + I<sup>6</sup>.

Wreden obtained and investigated five of these olefine-isomeres:

Hexahydrobenzole.....	C <sup>6</sup> H <sup>6</sup> H <sup>6</sup>	Isomere of Hexylene.
" toluole.....	C <sup>7</sup> H <sup>8</sup> H <sup>6</sup>	" Heptylene.
" xylene.....	C <sup>8</sup> H <sup>10</sup> H <sup>6</sup>	" Octylene.
" cumole.....	C <sup>9</sup> H <sup>12</sup> H <sup>6</sup>	" Nonylene.
" cymole.....	C <sup>10</sup> H <sup>14</sup> H <sup>6</sup>	" Decylene.

He observed also the indifference of this series to the most powerful chemical agents, as in the case of the marsh-gas homologues, and presented a hypothesis to explain this by constructing them into "eine geschlossene Kette," a closed chain. This chain contains hexylene C<sup>6</sup> H<sup>12</sup> as its nucleus. It remains to be seen, however, whether there may not be found homologues of the series lower than hexylene.

This, however, is leading us too far at present. It is sufficient that, by following the above series far enough up, we must have paraffinoid olefines of any height of equivalent, as C<sup>20</sup> H<sup>34</sup> H<sup>6</sup> an isomere of tetramylene, C<sup>27</sup> H<sup>48</sup> H<sup>6</sup> an isomere of cerotene, C<sup>30</sup> H<sup>54</sup> H<sup>6</sup> an isomere of melene, and so on. The latter two products would no doubt be solid hydrocarbons, like the mineral waxes, and we should plainly get solid olefine mineral waxes which are paraffinoid in their nature, insensible to the action of bromine, sulphuric acid, etc., like the solid paraffines themselves.

Here is then a new question to be tested in the laboratory, whether the solid olefines, which mainly make up what we call the mineral waxes, do not wholly or partially belong to this paraffinoid series of olefine isomeres. A series which, in their direct mode of derivation from the "aromatic group," appear to break down the barriers or present a connecting link at least between this group and the alcohol derivatives or "fatty group." However this may be, reiterated and undeniable proofs have been already presented, not only that the mineral waxes are usually and probably always made up of bodies of olefine composition, but also that they are very often paraffinoid—so to express it—in their indifference to agents generally regarded as destructive to ordinary olefine homologues. Of course, however, there may be, especially among solid olefines, series of isomeres, or rather polymeres, other than these derivatives of benzole hydrogenation, that are able to resist such destructive agents.

In 1833 we find another paper from Beilstein, in conjunction with Wiegand (*Berichte der deut. chem. Ges.*, XVI, 1547), on the crude mineral wax (neft-gil) found on Tschelen Island in the Caspian, which they call "kaukasischen Ozokerit." This material has already been mentioned. B. and W. state that Petersen has previously investigated and analyzed the crude mineral (*An der Chemie und Pharm.*, 118, 82), under the name of Erdharz

von Baku, finding it to melt at 174° F. (79° C.) and to have density = .903; Petersen's analysis is here given, with recomputation:

	Petersen.	Recomputed by H. W.
C.....	82.1	85.79
H.....	13.6	14.21
O.....	2.6	14.236
Ash.....	1.6	
	99.9	100.00

indicating an olefine composition again. Petersen distilled it, obtaining 81% of oily distillate containing a solid wax melting at 129° F. (54° C.), and yielding:

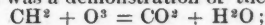
C.....	85.4	85.23
H.....	14.8	14.77
	100.2	100.00

some solid paraffine having been formed doubtless by destructive distillation.

Beilstein and Wiegand, correctly beginning with the proposition that distillation always alters such materials, used solvents altogether in their analysis. The raw substance is described as a black, sticky mass. They dissolved the whole first in boiling benzole. Alcohol then precipitated the solid hydrocarbon almost wholly, leaving oils, etc., in solution. Another method, which they prefer, is to wash with ether, which removes the oils and coloring matter, then boil with absolute acetic ether. On cooling, this deposits brilliant white crystals, of a constant boiling-point, which they appear to regard as a new substance and call *Lekene*, after the locality. In *vacuo* it distils unchanged, but at atmospheric pressure breaks up. It is very resistant to many agents. Thus, chromic acid at 100° C. is without action. Nitric acid heated with it for a week to 100° C. does not affect it. Bromine gives crystallizable substitution-products as with paraffines. Fuming sulphuric acid converts it into a black, crumbly mass, containing no sulphonic acid. Analysis gave:

C.....	85.23	85.16
H.....	14.72	14.57
	99.95	99.68

Apparently entertaining no doubt that "lekene" is of C<sub>n</sub>H<sub>2n</sub> constitution, and admitting that these analyses were not wholly decisive on this point, Beilstein and Wiegand resorted to another mode of determination, which recalls that used more than sixty years before by de Saussure for the roseleaf wax, as already related. The lekene hydrocarbon was oxidized by an acid solution of permanganate of potash of known strength, that is, containing a known amount of oxygen, or rather of oxidizing power, per volume, and the amount of carbon dioxide produced was measured. The result was a demonstration of the reaction



thus proving the C<sub>n</sub>H<sub>2n</sub> constitution.

In 1884 appeared in the *American Chemical Journal* (Vol. VI, p. 247; November) an article by Franklin S. Smith on Ozocerite from the clay fields of Mr. Otto Ernst, South Amboy, New Jersey. Analysis gave:

C.....	86.46	85.71
H.....	12.83	14.29

The second of these presents precisely the figures for an olefine. The analyst adds: "There is little doubt that the hydrocarbon belongs to the series C<sub>n</sub>H<sub>2n</sub>, as stated by Grabowsky" (of ozocerite, he means).

In 1887 appeared in the *Annales des Mines*, Vol. XI, pp. 147-170, Rateau's paper on the "Ozokerite at Borislav." This paper, more important in a mining and engineering than in a chemical way, has been copied all over the world. The ENGINEERING AND MINING JOURNAL has had several extracts from it. Rateau says, on chemical points: "Elle renferme environ 85.7 p. 100 de carbone et 14.3 p. 100 d'hydrogene et, par consequent peut être représentée par un symbole chimique de la forme C<sub>n</sub>H<sub>2n</sub>." Wagner dit qu'on peut admettre, en gros, la formule C<sup>30</sup> H<sup>60</sup>. He states that, by distillation, it gives 36% to 50% paraffine.

In 1888 appeared notices of a paper by Dollfus and Meunier (of which I have not been able to encounter the original) on "a new variety of earth-wax found near Kolomea, Galicia, very hard, of golden yellow color and fibrous, like crocidolite in aspect. Melts at 176° F. (80° C.), and is completely soluble in ether, which, on slow evaporation, yields colorless monoclinic needles. In boiling alcohol it is less soluble. It distils without residue. They attribute to it the formula C<sub>n</sub>H<sub>2n</sub>. This curious variety illustrates the wide range of properties presented by the olefine waxes, as well as their frequent and marked variations from paraffine waxes."

In 1888 Zaloziecki published an investigation upon Paraffine in Petroleum, upon which Mr. E. A. Partridge in the following year read to the Franklin Institute a most interesting and valuable commentary, which I must be satisfied, though with reluctance, only to refer to here.†

[This digest has spun out to a length so unexpected that I am forced to postpone to another occasion a summation and generalization of the large mass of facts it contains. I shall then, of course, bring forward a few results of my own in the same field. —H. WURTZ.]

**Manufacture of Alkali with Calcium Sulphhydrate.**—Mr. J. Leith, of St. Helens, recently described, before the Liverpool Section of the Society of Chemical Industry, a new process which had been patented by Mr. A. G. Haddeck and himself for the use of sulphhydrate of calcium in the manufacture of alkali. The process consists in making solutions of sulphate of soda and sulphhydrate of calcium, mixing these to form pearl-hardening and sulphhydrate of soda, which latter is converted by means of lime-kiln gas into bicarbonate of soda. The sulphhydrate of calcium employed in the process is made from Leblanc vat waste by passing through it the sulphuretted hydrogen evolved in this process. The sulphur contained in the vat waste is recovered as such by this process. One great advantage claimed is that the process is worked in the wet way, involving no furnace operations. This new process compares most favorably in the matter of cost with the two principal processes now worked.

† See issues of November 26th, 1837; June 9th, 1838, et. al.  
 \*\* I have myself a specimen, kindly presented me by Mr. Jacob Wallace, which strongly suggests the above. It came from 7.5 feet deep at Borislav. It is transparent, of sherry-wine color, very hard and very dry, without greasy feel. Sublimates with nacreous lustre. Its melting point is as high as 190° F. (83° C.). Its density I found '8374 and '837, mean = '93%. Both this and the above are unquestionably tetrakisites.—H. W.  
 † It will be found in full in the *American Gas-Light Journal* of July 1st, 1889, and in the *Oil, Paint and Drug Reporter* of June 9th, 1889.

§ *Berichte der Deutschen chem. Gesell.*, 1880, Vol. XIII, p. 1813.  
 ¶ Also, in abstract (very imperfect) in the *Jahresb. der Chemie für 1883*, p. 1764.

## NOTES ON SAFETY LAMPS.\*

By Herbert W. Hughes, F. G. S., A. R. S. M.

With the passage of the Coal Mines Act of 1887, practically prohibiting the use of the old, unbanded forms of safety lamps, it became necessary to select from the numerous new designs thrown on the market some lamp which gave good results under the conditions existing in mines. In the following paper is described a series of experiments with nine different types of lamps, which have been on trial for more than a year. No attempt is made to classify the lamps under the head of safety, so far as resistance to explosive currents of highest velocity is concerned. Only such lamps were selected for experiment as were well known to fulfill this condition under all ordinary circumstances. What has been done was to give lamps into the hands of the deputies, who noted their behavior in the presence of gas, their illuminating power as compared with one another, and the light they gave after burning for some hours under ground.

**Hepplewhite Gray.**—The report of the Royal Commission on Accidents in Mines first drew attention to the original form of this type. As the lamp then reported on so favorably is so different in construction to its modern representative the drawing accompanying the report referred to is reproduced (Fig. 1) with a view of clearly showing the successive developments which have taken place. Its chief peculiarity (and one in which it differs from all modern safety-lamps) is the admission of the feed air from the top, down four tubes, and then through an annular chamber, *b*, situated immediately above the oil vessel. It will be noticed that it is impossible for a current to rush down the inlet tubes, as they are protected by the projecting top of the lamp. The only gauze employed is that covering the outlet, *c*, and the annular inlet chamber.

The form of this lamp finally adopted may be described as follows:

In place of the four inlet tubes, three only are used, as will be seen from Fig. 4, which is a section on line *A B*, Fig. 3. The third tube is considerably broader than the others, and acts as a reflector. The shield plate, *a*, in the hood, is made of such a size as to completely cover the inlet holes. The height of the outlet cone must be such as to just reach to the level of the shield plate, when it then occupies a position intermediate between the two horizontal rings of holes, *b b'*, which are placed in the hood for the products of combustion to escape by. In the top crown of the lamp is put a circular row of holes of the same diameter as those in the shield rim; these being covered by a thin sheet-brass plate  $1\frac{1}{2}$  inches diameter. To stiffen the covering plate it is crimped in three places, the crimped parts touching the crown as shown at *c*. These improvements remove the defect of the light being suddenly extinguished from no apparent cause, which often occurred with some of the earlier forms. The same results are obtained with the form of hood shown in Fig. 5; here the outlet cone and inlet tubes are covered by a piece of brass bent into the shape illustrated. One hole,  $\frac{1}{2}$  inch in diameter, serves for the escape of the products of combustion, this being protected from direct currents by a piece of sheet brass crimped as before mentioned. This shape of hood scarcely appears of such a safe character as the former one, but a large number of lamps have been constructed to this design. Another improvement, which facilitates cleaning, is that the ring securing the glass in position is screwed onto the vertical plate forming the air-inlet chamber (*d*, Fig. 3) instead of to the frame of the lamp. It follows from this that, when the lower gauze ring is unscrewed, all the inside parts of the lamp at once fall out.

Fig. 2 shows a form very similar to the one just described except that the outlet holes in the crown and the crimped plate above are absent. The height of glass was increased, and gauze diminished in proportion. In the case of internal explosions, the glass of a lamp confines the gases there, and acts really like a cannon; and for this cause it was deemed advisable to keep to the standard height.

Heating of the inlet air seems to make a lamp burn better where carbonic-acid gas is present; so to obtain this result in the lamp under notice a thin copper cone (Fig. 6) is attached to the ring securing the glass in position. Being situated near the flame, this naturally gets hot, and so warms the inlet air which passes directly beneath it. It cannot definitely be said whether this device really accomplishes the purpose for which it is applied; its action is too delicate for direct observation.

In the lamp of latest design, the portion of oil vessel supporting wick tube has been lowered, but the wick tube itself has been lengthened, so that the flame is only slightly lower than in the old types. The breadth of the wick has been increased, and now stands at  $\frac{3}{8}$  inch full.

Under ordinary conditions this lamp undoubtedly gives more useful illumination than any other. Colliers require light to be thrown in all directions, especially upward, and hence naked lights are often used under conditions which may at any time become dangerous. They are not actually unsafe, but no one can say whether they may become so. It was stated at the inquiry on the Llanerch explosion, by several of the miners who gave evidence, that they preferred to take the risk of working with naked lights, as, in their opinion, if safety lamps were used, accidents from fall of roof and sides would more than compensate for the additional security obtained against explosions. All ordinary shielded lamps suffer from the great disadvantage of giving practically no illumination on the roof. Their shields are necessarily of larger diameter than the glass, and really act like a shade, preventing any light striking upward. The conical glass of the Hepplewhite-Gray performs just the contrary action, as it deflects the light toward the roof; and as the shield above is of smaller diameter than the lower part of the glass, nothing prevents the rays reaching the place where they are specially useful and desirable.

With respect to its power to detect small quantities of gas it is undoubtedly superior to all others.† All ordinary forms, with the inlet above the glass, will miss, say, four inches of gas lying immediately against the roof, except when they are tilted very much, and then there is great danger of their going out. Many lamps are now constructed to take air, if desirable, from the top, like the Gray, and then they will detect thin layers also; but even then they will not do it so rapidly. It is possible to

\* Abstract of a paper in Proceedings of the Federated Institution of Mining Engineers, Newcastle-upon-Tyne, March, 1891.

† As the Pieler lamp cannot be used in ordinary every-day working, it is not taken into consideration.

indication being given—that is to say, if it is done hurriedly. This is quite impossible with the Gray, as the flame immediately "spires" up.

Comparative tests have proved that this lamp showed gas to be present from 6 to 12 inches nearer the floor than any other. Practically this means that it detects smaller quantities. In comparison with the unbanded Davy or Clanny, it readily shows a cap on the flame, where those lamps fail to give the slightest indication.

Numerous experiments have proved the safety of this type in currents of high velocity. The risk of internal explosion passing outward is practically absent, owing to the small volume contained in the lamp, the regulation of the outlet of the products of combustion, and the conditions under which feed air is introduced. Theoretically, an internal explosion is impossible, as, owing to the admission being below the flame, any fire damp is burned as it arrives, and the inside of the lamp is filled entirely with the products of combustion. This, however, is not absolute some modern lamps into gas, and take them out again without any lute case, as the writer has observed, on one or two occasions, a series of very small explosions take place in the lamp after it has been put in an inflammable mixture and then withdrawn. With black damp the flame drops and fades away, but if any gas is present a slight "spring" of the flame is immediately noticed, and this takes place once or twice before light is lost.

**Mueseler.**—This type of lamp has deservedly been held in good repute for many years, and the report of the Mines Accidents Commission on the shielded variety was very favorable. As a detector of gas it ranks a very good second to the Gray; and it does so in a clear, delicate manner, the cap produced being very distinct.

Owing to the presence of a chimney in this lamp, when it is tilted the products of combustion pass outside the chimney and foul the inlet air, with the consequent result that the light is extinguished. This, in combination with the shield acting as a shade, makes the examination of the roof a matter of difficulty.

The Mueseler lamp, shown in Fig. 7, is one of the safest of all lamps, as it has been tested in explosive currents of 100 feet per second without failure. It differs from the ordinary forms of this type in having a gauze chimney instead of a metal one, and the diaphragm is conical instead of horizontal (*b*). Its safety is undoubtedly due to the double shield employed, the inner one of which is provided with a conical outlet; the exit of products of combustion is retarded, the upper part of the gauzes is kept in a bath of carbonic-acid gas, and in case of any internal explosion the light is immediately extinguished and the inlet air fouled. The arrows



in the figure show the direction taken by the supply of air and the products of combustion, and it will be seen that the gauzes are protected from all violent currents. There are ten holes in the inside shield and seven in the outer one, the latter being placed near the top. A gas-testing shutter (*a*) is placed above the horizontal inlet holes near the top of the glass, and when this is closed the feed air is compelled to enter through the holes in the outer shield near the top and pass downward, thin layers of gas near the roof being thereby easily detected.

This lamp does not burn well in "dampy" or slow currents, and great difficulty is experienced in lighting it, and, from the winding path pursued by the feed air, proper circulation does not take place until the lamp gets hot. The *A* type Mueseler, which is largely employed in South Wales, differs from the preceding one only in the absence of the inner shield. There is not so much difficulty in lighting this, and it burns better in impure currents.

**Morgan.**—Prominent attention was drawn to this lamp immediately after the report of the Accidents in Mines Commission was published. Experiments showed that it would not pass flame in explosive currents of the highest velocities.

An inner and outer shield are provided (Fig. 8), the latter having a series of five horizontal rows of circular holes punched through it, while the former is similarly supplied with six horizontal rows of slits. The openings in one shield are opposite the solid portion of the other. Three gauzes are used—an outer cylindrical one without a top, a middle one of the Clanny type, and an inner one, really built of two gauzes and a chimney.

This lamp detects gas well, burns well in a good current of air but badly in a "dampy" one, does not get hot (probably owing to its large internal volume), and stands a fair amount of tilting without the light being extinguished. After being in use several hours under ground, the light gets very defective. This lamp is composed of six parts, neglecting washers, and, being of complicated construction; it seems improbable that it will come into large use.

Its locking arrangement, however, possesses points of novelty. Two projections, one on the oil vessel and the other on the upper part of lamp, with vertical holes, are provided (*a* and *b*, Fig. 8), but the passage in the upper projection does not go completely through it. A small spring catch, *c*, is situated in the lower projection, and this will allow a cylinder, of equal diameter to the hole, to pass by, if the direction of motion be vertically upward. The lead plug employed (*d*) consists of a cylinder with a >-shaped piece cut out. To lock the lamp, the cylinder of lead is pushed in through the lower hole; it cannot go out at the top, as the covering prevents it, and it cannot be drawn back again, as the small spring catches under the >. This arrangement seems to be an improvement on the ordinary lead rivet, as time is saved.

**Marsaut.**—Results obtained in practical use have given this lamp an excellent reputation. As originally constructed, two rows of inlet holes were supplied, one at the bottom of the bonnet and the other in the horizontal flange forming the base of this part. The Accidents in Mines Commission recommended doing away with the holes at the base of the bonnet, and in most of the lamps now constructed in England this is car-



ried out. After an experience of some months the writer, over a year ago, expressed an opinion that the Marsaut lamp appeared to be the most suitable for the working miner; its construction was simple and strong, and it gave a reliable indication of gas and a good light.

Further experience has not materially altered that opinion, as, although the lamp finding most favor does not go by M. Marsaut's name, yet it is practically a lamp of this type, with an addition which increases its efficiency and lighting powers in the impure currents of return airways.

**Deflector.**—As complaints had been made of the difficulty in getting some of the other forms of lamps to burn brightly, a few of this type were obtained and placed in the hands of the miners. From the first, excellent reports were received. At the end of a shift, the light given was nearly as good as it was at the commencement. After burning a short time, and getting hot, the illuminating power sensibly increases, and no difficulty is experienced in lighting the lamp when all the parts are cold.

Fig. 9 illustrates the lamp, and it will be seen that the Marsaut is followed, so far as the arrangement of gauzes, shield, oil vessel, and glass are concerned. The distinctive difference, however, consists in the guiding of the inlet air; this is admitted through a row of holes in the horizontal flange supporting the shield, and is prevented impinging on the gauze by a vertical cylinder of brass, *a*, 1½ inches high, which acts as a guide and directs the ingoing current vertically upward. At a point about 1½ inches above the horizontal flange supporting the shield, an angle ring, *b*, is introduced, the horizontal part of which completely fills up the space between the outside gauze and the inside of the shield. The other flange projects downward close against the gauze, terminating just before reaching the vertical cylinder which proceeds from the horizontal flange forming the base of the shield. It will be noticed that the vertical cylinder (*a*) is not placed close to the gauze, but occupies an intermediate position between that part and the shield.

The inlet air after being directed upward meets this "deflector," and

and the supply of oil is better. Mr. Ashworth obtained a similar result by making the wick wider than the wick tube, and the tube broader than the wick.

A point to which little attention has been drawn is the material of which the oil vessel is constructed. In England this part is invariably made of brass, while on the Continent it is just as regularly made of iron. M. Marsaut's experiments proved that the lighting power is influenced by the material of which the lamps are constructed, and that a brass lamp only gave 70% of the luminous intensity of the same lamp in iron. The explanation of this seems to be the superior heat conductivity of the former—the lamp bottom gets very hot, and the oil goes into a gummy state. To get over this difficulty Mr. Ashworth casts the top of his oil vessels with a bad conductor of heat—tin.

**Conclusions.**—Owing to the large amount of useful light given by the Hepplewhite Gray, the way this is directed on to the roof, and the delicate indication of gas given by this lamp, it is preferred to all others for use by deputies, firemen and timberers. It requires, however, very careful handling; and the light is easily extinguished, even when gas is absent. Men are apt to get careless, and carry it about with the lower slide holes open, and when in that state if the current impinges suddenly on the lamp the light is lost. The later form (Fig. 3) is by no means so sensitive to this falling as the first varieties. The distribution of light on the roof is due to the truncated cone form of glass which is claimed to be stronger than a cylindrical one and to automatically accommodate itself to sudden changes of temperature. The rapidity with which gas is detected is a great point in their favor. It is not too much to say that with this lamp it is impossible to miss a small quantity, even when passing hurriedly from one place to another. This can easily be done with any of the other forms, as, unless there is an appreciable quantity of gas present, they require to be held a definite time in it before any indication is given.

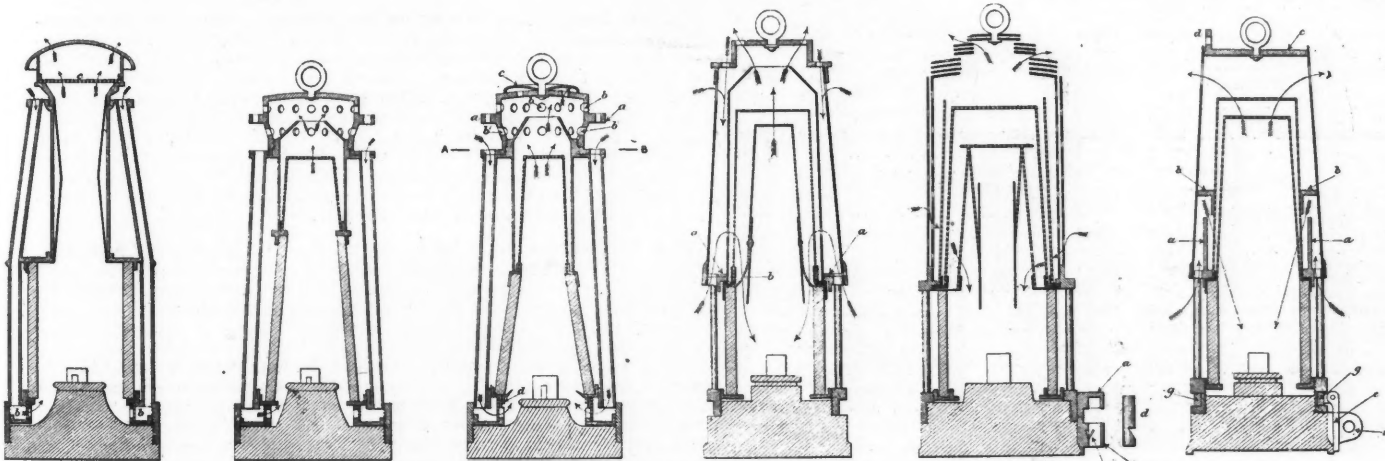


FIG. 1. GRAY.

FIG. 2. ASHWORTH HEPPLEWHITE-GRAY.

FIG. 3.

FIG. 7. ASHWORTH-MUESSELER.

FIG. 8. MORGAN.

FIG. 9. HOWAT DEFLECTOR.

Glass Brass   
Thin Sheet Metal Gauze

is thus thrown onto the flame. As the lamp gets hot more air is sucked in, and passed on to support combustion. This forms the explanation why such good illumination is obtained. In all ordinary lamps a rapid circulation is obtained as soon as the parts get hot, but no appliances are introduced to properly direct the inlet current, and, as a result, the greater part passes away at once with the products of combustion, only a portion going downward to supply the flame. In the "Deflector" every particle entering reaches the flame, and before doing so is heated by contact with the warm deflecting ring and gauzes.

To this heating of inlet air and proper directing of current is due the fact that this lamp will burn in an air containing such a quantity of carbonic-acid gas that all ordinary forms, even unbonneted ones, are immediately extinguished.

The lamp is supplied with a solid top, *c*, and the shield is secured by a lead rivet, *d*. This is an advantage, as the locking of the bonnet can be left to the last minute, and until the miner has satisfied himself that all the parts are in their proper position. The locking arrangement for the oil vessel, is performed by a hasp (*e*) dropping over a projecting boss (*f*), through which a hole is bored for the reception of a lead rivet. The hasp, *e*, is fixed to a loose collar, *g*, surrounding the oil vessel, and as this can easily be turned round, compensation for wear on screw of oil vessel is given, and the projection (*f*) and hasp (*e*) can always be brought exactly together.

As illuminants for these lamps, the mixture recommended by the Royal Commission on Accidents in Mines, consisting of two parts of vegetable oil to one part of best petroleum, has been used for a considerable time, and has given better results than vegetable oil alone, with one exception, viz., in the case of the Hepplewhite Gray. This lamp is so delicate that if that mixture be employed the flame has a tendency to "spire" in close, hot places, even when firedamp is absent.

The flat form of wick is used in all lamps experimented on, with the exception of the Morgan, and to this shape is due their superior illuminating power over the old unbonneted types. A further improvement, due to Mr. A. H. Stokes, has been lately introduced. The wick tube is guttered along one side, and the wick is supplied rather wider than the tube, so that it takes a corrugated form. A larger surface of flame is obtained,

For the ordinary miner, who requires something a little less delicate than the Gray, the "Deflector" lamp has yielded by far the best results. The light given in impure air is superior to that obtained from any other form, and it will continue to burn even where the unbonneted varieties will not. It gives as good an indication of gas as any other lamp experimented upon, with the exception of the Gray and Mueseler. After being in use for over a year there is not a miner at the pit who, if he had his choice, would not select this lamp in preference to any other, his reasons for this being—it burns brightly in slow and impure currents, gives a good light for a long time, and will stand a lot of knocking about.

**Production of Iron and Steel in France in 1890.**—The detailed figures of pig iron, finished iron, and steel output in France during 1890 have just been published, says the *Ironmonger*. They show that last year's production of pig iron attained the total of 1,970,160 tons—an increase of 247,780 tons upon 1889, and within 100,000 tons of the maximum of 1883. The total output of finished iron was 823,360 tons, which is 30,000 tons above the preceding year's total, but no less than 250,000 tons below the maximum of 1882. On the other hand, the output of steel was the largest ever attained. The total, 566,197 tons, exceeds that of 1889 by 37,000 tons, and that of 1888 by nearly 50,000 tons. This rise took place in spite of a fall of 10,000 tons, as compared with 1889, in the production of bars. There was an increase of 30,000 tons in rails, and of 19,000 in sheets, etc. The largest producing districts were: For pig-iron, Meurthe-et-Moselle, 1,083,705 tons, an increase of 140,000 tons; for finished iron, the Nord, 340,056 tons, an increase of 18,000 tons; and for steel the Nord and Pas-de-Calais, 142,000 tons, practically the same total as last year. There was an increase of 17,500 tons in the steel output of Meurthe-et-Moselle, which amounted to 61,988 tons. This rise represents the growth which is taking place in that district in the manufacture of steel upon the basic process from the native ironstone deposits. The same district is making by far the most rapid advances of any French metallurgical center as a producer of pig iron.

† Chesterfield and Derbyshire Institute of Engineers, Vol. XII., page 232.

## PRODUCTION OF SPELTER IN EUROPE AND UNITED STATES IN 1890.

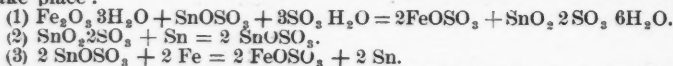
Statement of Henry R. Merton &amp; Co., London, England.

UNITED STATES.		RHINE DISTRICT AND BELGIUM.		
(Compiled by the American Metal pany, Limited, New York.)				
1890.	1889.	1890.	1889.	
Illinois:		Vieille Montagne	52,825	52,016
Matthiessen & Hegeler Zinc Co.	11,410	Stolberg Co.	14,855	14,631
Illinois Zinc Co.	6,722	Austro-Belge.	9,250	9,245
Collinsville Zinc Co.	3,348	G. Dumont & Frères.	8,350	8,863
		Rhein Nassau Co.	7,960	7,470
		L. de Lamiune.	6,760	6,693
		Escombrera Bleyberg	5,630	5,560
		Grillo.	5,490	5,353
Kansas:		Märk. Westf., Bergw., Ver.	5,485	5,805
Robert Lanyon & Co.	3,681	Nouvelle Montagne	5,350	5,090
Weir City Zinc Co.	2,792	Berzelius	5,175	4,910
W. & J. Lanyon.	2,321	Eschger Ghe-quière & Co.	4,065	4,303
Granby Mining and Smelting Co.	2,325	Société Prayon.	4,100	3,956
S. H. Lanyon & Bros.	2,023	Société de Boom.	2,295	750
The Girard Zinc Co.	63			
Sundries	180			
			137,630	134,648
		SILESIA.		
		Schlesische Actien-Gesellschaft	24,840	23,675
Missouri:		G. von Giesche's Erben.	18,550	18,206
Glendale Zinc Co.	4,610	Herzog von Ujest.	16,355	16,202
Rich Hill Zinc Works	2,615	Graf H. Henckel von Donnersmarck	11,670	11,392
Robert Lanyon & Co.	2,675	Graefin Schaffgotsch.	6,265	6,405
Empire Zinc Co.	2,132	Graf G. Henckel von Donnersmarck	4,090	3,943
		H. Roth.	1,750	1,660
		Wünsch.	1,880	1,907
		Vereinte Königs & Laurahütte	1,020	1,130
		Baron v. Horschitzsche Erben	830	963
		Fiscus	225	170
			87,475	85,653
		FRANCE AND SPAIN.		
		Asturienne	18,240	16,785
		Société du Midi		
			18,240	16,785
		TOTALS.		
		Rhine District and Belgium.	137,630	134,648
		Silesia.	87,475	85,483
		Gr. at Britain	29,145	30,306
		France and Spain.	18,240	16,785
		Poland.	3,620	3,026
		Austria.	7,135	6,330
			283,245	277,078
		United States.	60,020	52,812
		Tons.	343,265	329,890
		Average price of spelter ex ship London.	£23 5/-	£19 6 2
		Imports of spelter into England, according to the Board of Trade returns, tons.	56,205	56,842
				* Estimated.
		AUSTRIA.		
		Sagor	1,430	1,210
		Chih.	1,880	1,670
		Siersza-Niedzieliska	3,825	3,450
			7,135	6,330
		GREAT BRITAIN.		
		Vivian & Sons.	6,605	6,842
		English-Crown Spelter Co. (Ltd.)	4,945	4,981
		Dillwyn & Co.	3,930	4,540
		Swansea Vale Spelter Co.	1,515	2,161
		Villers Spelter Co.	1,890	2,180
		Pascoe, Grenfell & Sons.	1,160	1,272
		Nenthead & Tynedale Co.	1,530	1,507
		John Lysaght (Ltd.)	4,430	5,113
		Staffordshire Knot	350	1,100
		Min-ra Mines.	2,170	610
		H. Kenyon & Co.	500	500
			29,145	30,806
		POLAND.		
			3,620	3,026
		Total	60,020	52,812

## A NEW METHOD OF RECOVERING TIN FROM TINPLATE SCRAP.\*

By B. Schultze.

The solvent action of acid ferric salts upon metals is well known, but the property has not hitherto been utilized in the treatment of tinplate waste, for which purpose it answers perfectly. The solvent used may be either acid ferric sulphate, acid stannic sulphate, dilute sulphuric acid, or dilute hydrochloric acid, but in the two latter cases ferric hydrate, in the form of heavily rusted scrap iron, must be added. The tin, when dissolved, is precipitated by metallic iron, for which purpose, however, the solution must be perfectly neutral, and contain only protoxide salts, as the smallest excess of acid in the presence of persalts prevents the reaction. This condition is attained by passing the solution through a mixture of iron rust, metallic tin and metallic iron, when the following reactions take place:



The process, as practised, includes three principal operations: (1) The solution of the tin; (2) the precipitation of the tin; and (3) the treatment of the waste liquor. When acid ferric sulphate is used, the tinplate cuttings are placed in iron baskets and lowered into the solution contained in an open wooden vat. The tin covering is completely stripped off the iron in a very few hours. The basket is then lifted out, the contents washed in water and picked over by hand, to separate portions still covered with tin, while the remainder, which is clean malleable iron, is pressed into balls for the heating furnace. The partially stripped portions are either returned to the dissolving bath or put aside to rust, in order to obtain material for the neutralizing vat. When the solution is saturated, as evidenced by its no longer acting upon fresh tin-plate scrap, in which condition it contains mainly stannous and ferrous sulphates, probably a little stannic oxide and some free acid, it is passed to the neutralizing vat containing metallic tin and iron rust, where the excess of acid is neutralized, and the persalts are reduced as shown above. When an acid stannic solution is used, the method of proceeding is similar, the only difference being in the nature of the solvent. Instead of these solutions, dilute sulphuric or hydrochloric acid may be used in conjunction with ferric oxide or its hydrate, but with these the action is somewhat slower, from 6 to 24 hours being required to remove the tin completely.

The precipitation of the tin from the neutral stannous solution is effected by running it into vats containing clean metallic iron (scrap pre-

viously freed from tin). The reaction goes on slowly, the tin separating as gray metallic powder or in brilliant crystalline grains; but the reduction is complete, the exhausted solution showing not the slightest trace of tin. The precipitate, when washed and cleaned from iron by dilute sulphuric acid, is either melted or used for making tin salts. The green vitriol liquors from the precipitating vats are concentrated by allowing them to drop slowly over a large heap of cleaned iron scrap, which causes a rapid evaporation and a deposit of ferrous sulphate on the metal. This may be washed off and purified as commercial copperas by recrystallizing, or it may be used for forming the acid liquor for dissolving fresh quantities of tin. When the tin-plate cuttings are varnished the surface is cleaned by heating them with strong sulphuric acid at a temperature of 100°, which destroys the varnish in a very short time, leaving the tin surface exposed. When zinc is present it should first be removed by treatment with dilute sulphuric acid as long as hydrogen is evolved. The plant and materials required are both simple and inexpensive. From one to six hundredweight of chamber acid, worth from 25 cents to \$3, are consumed per hundredweight of tin obtained, worth \$22.50 to \$25, in addition to 25 to 40 hundredweight of iron, worth from \$9.25 to \$20. The amount of coal required is inconsiderable. Both tin and iron are obtained in the highest state of purity.

**Acid Proof Slabs for Glover Towers.**—In the manufacture of acid proof slabs for Glover towers, it is preferable to use materials rich in silica for stones which are to resist chemical actions, says *Thonind. Zeit.* If clay free from iron cannot be obtained, a suitable mixture is 25–30 parts of feldspar, an equal quantity of rich clay and 40–50 parts of quartz. The mass must not contract too much on firing. The following mixture may be advantageously used for glazing: 54 parts of quartz, 84 parts of feldspar, 35 parts of levigated chalk, and 36 parts of kaolin. The ingredients are moistened and well ground together before use.

**Peculiar Composition of a Boiler Incrustation.**—Dr. A. Christ communicates to *Zeitschrift für angewandte Chemie*, February 1st, 1891, the following analysis of the incrustation of a Corn wall boiler. The deposit had accumulated to a thickness of about 2 centimeters. In air-dried condition it appeared as a brown, fatty and in part readily combustible mass of the following composition: Ca O, 11.09%; Mg O, 9.79%; Fe<sub>2</sub>O<sub>3</sub>, 5.60%; Al<sub>2</sub>O<sub>3</sub>, 1.10%; Pb O, 0.98%; Cu, O, Si O<sub>2</sub>, 18%; S O<sub>2</sub>, 1.71%; fatty acids, 22.62%; neutral fats, 23.84%; H<sub>2</sub>O, 2.69%; chemically combined water and other organic substances, 5.22; total, 100.64. The peculiar composition of this formation is chiefly attributed to the use of lubricants consisting of animal or vegetable fats.

**New Application for Calcium Plumbate.**—G. Kassner in *Chem. Ind.* recommends calcium plumbate as a substitute for lead peroxide in paste for tipping matches, stating that as it offers many advantages. Firstly, he says, in it the lead peroxide is more intimately mixed and distributed, and is consequently more active than in the uncombined state; then the highly basic character of the lime comes into play, and, promoting combination with the acid products of combustion, reduces objectionable fumes; again, the cementing property of lime is evinced when moistened calcium plumbate is exposed to the air, so that a match paste containing it "sets" to a certain extent of its own accord, and so requires less of, and results in a saving in, the ordinary cementing materials employed. Finally, its cheapness is regarded as the greatest advantage, made as it is with utmost facility by merely heating a mixture of lime and lead oxide with free access of air.

**Insurable Interest of Stockholder in Corporation Property.**—Whenever there is a real interest to protect, and a person is so situated with respect to the subject of insurance that its destruction would or might reasonably be expected to impair the value of that interest, an insurance on such interest would not be a wager within the statute, whether the interest was an ownership in or a right to the possession of the property, or simply an advantage of a pecuniary character having a legal basis, but dependent upon the continued existence of the subject. The stockholder in a corporation has no legal title to the corporate assets of the property, nor any equitable title which he can convert into a legal title. The corporation itself is the legal owner and can deal with corporate property as owner, subject only to the restrictions of the charter. But stockholders in a corporation have equitable rights of a pecuniary nature, growing out of their situation as stockholders, which may be prejudiced by the destruction of the corporate property, and they therefore have an insurable interest in the property with which the profits of the corporation are earned.

*Riggs v. Commercial Mutual Ins. Co., Court of Appeals of New York, 25 N. E. Rep., 1,058.*

**Age of the Ohio River.**—An examination of the geological structure of the country through which the Ohio flows shows none but the extreme end of the valley to be of later age than the Carboniferous era, says Joseph H. James, in the *Popular Science Monthly* for April. Portions are, indeed, far older; but the area covered by these, though perhaps extensive enough to allow the development of some system of drainage, was never large enough to develop a stream of any great size. None of the tributaries of the river, either from the north or the south, flow through regions more recent than the Carboniferous, with the exception of the lower parts of the Ohio itself and of the Tennessee, which border on the Quarternary. The lowest formation in the valley is the Cincinnati, which is just touched at a single point, and only for a short distance, about twenty miles above the city. It may be stated, then, that since the close of Carboniferous time the river has flowed mainly in the same channel. The vast antiquity of the river is thus easily established, and the existence of the wide valley, with its broad bottom lands, is readily accounted for. The story of the river during the long period of pre-glacial time would be simple. For ages its waters were probably poured directly into the Gulf of Mexico, an arm of which extended northward into the continent at least as far as the present site of Cairo, Illinois. In later time the Mississippi-Missouri began the formation of a delta, which, gradually extending, has left the Ohio a tributary merely of the mighty "Father of Waters."

\* From *Iron*, March 13, 1891.

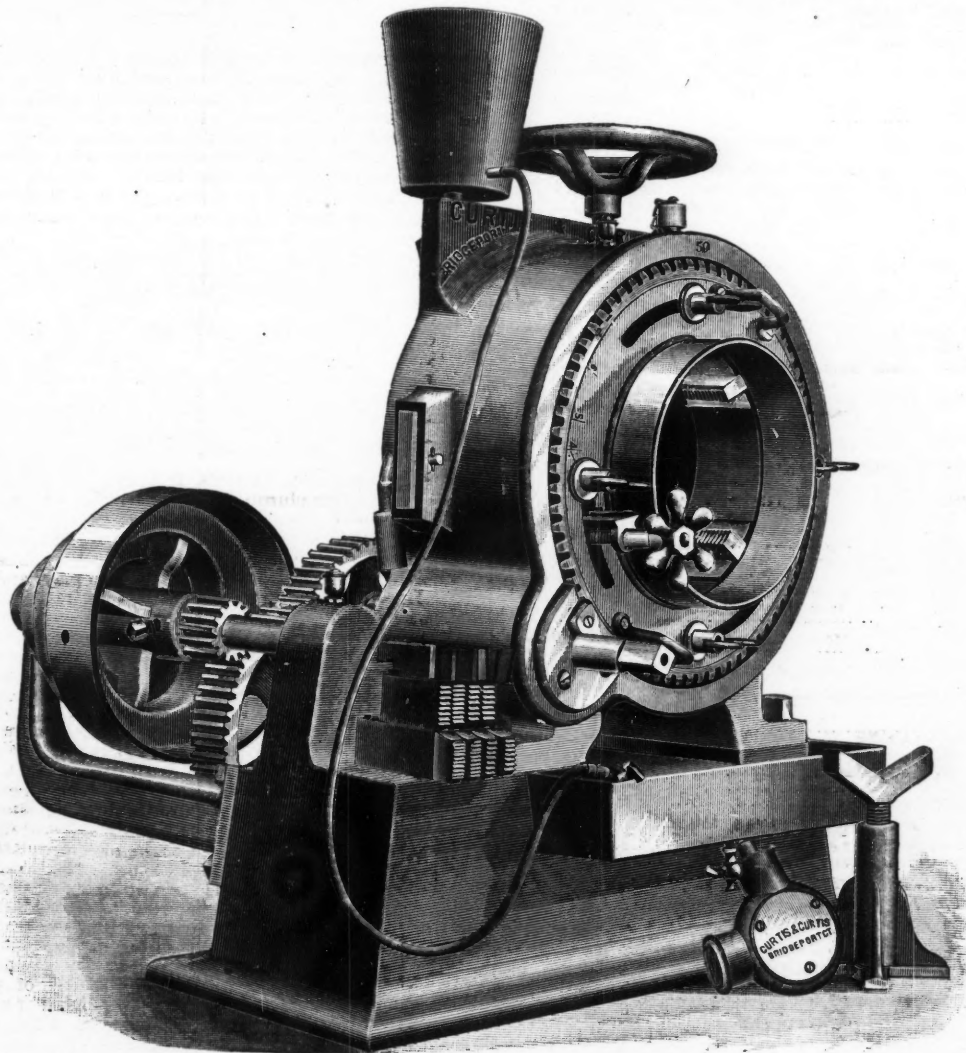
## CURTIS &amp; CURTIS' PIPE-CUTTING AND THREADING MACHINE.

The accompanying engraving illustrates a new pipe-cutting and threading machine, which has just been perfected and placed on the market by Messrs. Curtis & Curtis, of Bridgeport, Conn. The machine is adapted to be run either as a power machine in the shop, or it may be taken from its base and used as a hand machine on outside work. It cuts off and threads all sizes of wrought-iron pipe from 2½ inches to 8 inches, inclusive. The gearing is made so powerful that, according to the makers, one man can easily cut off and thread an 8-inch pipe. The design of the machine differs from that of many other pipe-cutting machines in that the pipe is held stationary, and the dies revolve around it. By this plan it is claimed that the work can be done with less power, and that the machine is less cumbersome and less expensive.

The dies are all made opening to avoid running back over the thread and are adjustable to any variation of the fittings. Only three sets of dies are used for the full range, thus avoiding changes of dies.

In operation, the pipe is put into the machine from the back, with the end to be threaded against the back of the dies, and clamped by the self-centering vise attached to the back of the shell. The dies are set to the

load of the unhardened bars was raised about 3%, and that of the hardened by about 6% by the cooling. The elongation of the unhardened bars was diminished 12%, and that of the hardened ones 14%. The contraction of area was also less in the bars tested cold. None of these changes are, however, permanent, as the bars completely recovered their original properties on attaining the ordinary temperature of the air. All the above tests were made in tension in the usual way. For gun steel, however, the resistance of the metal to shock is of more importance than its strength under a quiet tensile stress. A number of bars were accordingly prepared in sets of threes as before, and one bar of each set was cooled down to between 75° and 100° below zero, and tested by means of a falling weight, the other bars of each set being tested in the same way at the ordinary temperature. The experiments showed that cooling the bars much increased their brittleness. Thus on an average each unhardened bar required 5.9 blows to break it when cooled, as against 14.6 blows for specimens tested under ordinary conditions. With the hardened bars the reduction in strength was less, 12.57 blows being required as an average at the low temperature, and 14.4 at the ordinary temperature. As before, the metal regained its qualities as its temperature rose. Some further experiment



CURTIS &amp; CURTIS' PIPE-CUTTING AND THREADING MACHINE.

required size by turning the face plate to the graduation for the size of pipe to be threaded. As the large die-carrying gear is revolved, the lead screw causes it to recede into the shell, and thus feeds the dies into the pipe. When the thread is cut, the lead blocks shown at the side are thrown out of engagement with the lead screws, the dies draw back, and the pipe is taken out.

## THE PROPERTIES OF STEEL AT LOWTEMPERATURES.

The French government has recently carried out a number of experiments on gun steel at very low temperatures. Both hardened and unhardened specimens were subjected to a variety of tests at temperatures of between 75° and 100° below the zero of the Fahrenheit scale. The specimens were cooled by immersing them in a bath of solid carbonic acid and sulphuric ether. The first set of tests was simply intended to determine the expansion of the test bars per degree, and the results, though somewhat irregular, showed that the expansion per degree decreases with the temperature. A number of test bars were then prepared in sets of threes, two of each set being used as reference bars and tested at the temperature of the surrounding air, whilst the third was cooled down to between 75° and 100° below zero, and then tested with the following results. Both the hardened and unhardened bars, *Engineering* says, had their elastic limit raised by about 11% by being tested cold. The breaking

seemed to show that metal into which a great deal of work had been put, was less affected by a reduction in temperature, but this requires confirmation.

**The Condition of Miners in Hungary.**—The number of persons employed in the mines of Hungary is 35,533, of whom 29,830 are men, 5,000 boys from 12 to 16 years of age, and the remainder are women. The wages earned, according to the *Revue Industrielle*, are less in the mineral mines than in the coal mines, the average daily wage earned in coal mines being from 50 cents to 62½ cents, while in the mineral mines it is only 34 cents to 38 cents per day. In the mineral mines work is not usually carried on in the night, but in cases where it is done the day is divided into three shifts of eight hours each. In some newly started mines the hours of labor are from 6 A. M. to 6 P. M., with a stoppage of one, and sometimes two, hours for meals, while to others the number of hours is eight, two shifts being employed. In the coal mines work is usually carried on both night and day by means of a double shaft, each shift working twelve hours, with an allowance of two hours for meals. The miners are generally lodged in houses built by the mining companies, the rent for the smallest house being but \$5 per year. Several of the large companies also provide their workpeople with all the necessaries of life at cost price. Mutual-help societies also exist among the miners. Strikes are rare and, when such have occurred, as in 1875 1880, and 1887, have not been of long duration.

## OFFICIAL REPORTS.

## Allouez Mining Company's Annual Report.

The following is an abstract of the report of the director of the Allouez Mining Company for the year 1890.

RECEIPTS.	
1,407,823 pounds copper (product of eight months) @ 14 $\frac{1}{2}$ % cents.....	\$207,433.28
Assessment due February 29th, 1890.....	39,595.00
	\$247,428.28
EXPENDITURE.	
Expended January to April—four months.....	\$27,721.03
May to December—eight months.	
Running expenses at mine.....	\$183,645.81
Smelting.....	13,474.21
Freight.....	4,236.24
Brokerage.....	1,453.32
Insurance.....	308.43
Expenses.....	3,030.46
Storage.....	138.25
Interest.....	28.49
Net running expenses for eight months.....	\$206,317.61
Total running expenses for 1890.....	\$234,038.64
Construction account as per statement hereafter.....	19,615.81
Cost of exploration for Calumet & Hecla lode.....	4,175.95
Total expenditure.....	\$257,830.40
Excess of expenditure.....	\$10,402.12
The surplus from 1889 was.....	29,420.49
Leaving as net surplus, December 31st, 1890.....	\$19,018.37

The first four months of the year were occupied in getting the mine and machinery into condition for regular work, and the stamp mill started to work on May 1st. The labor troubles, delay in receiving the new compressor, and the destruction of one of the shafthouses by fire hindered work and increased expenses. The yield of the rock has also been unusually low, and the quantity of copper produced proportionately decreased.

The Calumet & Hecla lode was reached in December last, but was found to be of small size, and to carry very little copper. As this belt underlies almost the whole of the Allouez mining location, it would seem advisable—at a favorable opportunity—to sink on it and test its quality at a greater depth.

The financial statement shows the total assets to be \$110,141.45, of which sum \$7,521.48 is represented by cash and \$71,205.82 in copper on hand. The liabilities are \$91,123.08, distributed as follows: Agents' drafts, \$27,589.04; indebtedness at mine, \$20,604.28; accounts payable, \$6,929.76; loans, \$36,000.

Following is given a few of the heavier items of expense not elsewhere mentioned:

Sinking 234 feet @ \$11.15.....	\$2,713.90
Drifting 117.2 feet @ \$7.87 and 816.8 feet @ \$8.54.....	15,218.97
Stoping 431.1 fathoms @ \$5.12 and 7,554.3 fathoms @ \$5.50.....	44,441.75
Hoisting.....	14,734.53
Selecting and breaking.....	16,439.61
Railroad operation.....	4,917.47
General expense account.....	7,905.68
Stamp mill.....	42,077.49
Power drill expense.....	14,103.88
Mining captains, timbermen, and other labor.....	46,519.42

SUMMARY OF RESULTS.	
Tons of rock mined.....	124,406
Tons of rock hoisted.....	104,048
Tons of rock treated at mill.....	97,020
Refined copper per ton of rock mined.....	11 $\frac{1}{2}$ / <sub>100</sub> lbs.
Refined copper per ton of rock milled.....	14 $\frac{1}{2}$ / <sub>100</sub> lbs.
Total yield of mineral.....	1,927,820 lbs.
Total yield of refined copper.....	1,407,823 lbs.
Cost of mining, per ton of rock milled.....	\$0.9758
Cost of hoisting, per ton of rock milled.....	.1519
Cost of selecting and breaking, per ton of rock milled.....	.1697
Cost of general surface expenses (less rents) per ton of rock milled.....	.0874
Cost of transportation to mill, per ton of rock milled.....	.0507
Cost of stamping and separating, per ton of rock milled.....	.4336
Cost of expenses on mineral, per ton of rock milled.....	.0237
Total net working expenses, per ton of rock milled.....	1.8928
Total net working expenses, per ton of rock mined.....	1.4702
Cost of freight, smelting, and marketing product, including New York office expenses, per ton of rock milled.....	.2337
Gross value of product, per ton of rock milled.....	2.1380
Cost of copper marketed and all expenses paid, per pound.....	.1465

In the report of the agent, Fred. Smith, it is stated that No. 1 shaft has been extended by sinking and rising from 10th to 12th level, a distance of 171.4 feet. All drifting from this shaft has been to the south of it, the ground to the north having been worked out in years past. The several levels at both Nos. 1 and 2 shafts have been extended generally.

Openings and ground broken during the year were: Sinking shafts, 171.4 feet; sinking winze, 72 feet; drifting, 1,989.7 feet; stoping, 7,985.4 cubic fathoms. The average rock broken contained less copper than in years past. "I am hoping that some of our openings now progressing, notably the 10th and 12th levels, South No. 1 shaft, and 17th and 18th levels, South No. 2 shaft, will, in the near future, give us a better class of copper rock, and should, at the same time, the 18th level north meet with good stoping ground, as we have now every reason to expect, our position would be materially improved. The exploration for Calumet & Hecla lode on our property in the southeast corner of Sec. 31, commenced the past summer, was successful, in that after sinking through 42 feet of drift (mostly quicksand and bowlders) and through 12 feet of rock, then driving cross-cut west for 63 feet, we cut the lode. The width of it was about 2 feet, the rock firm and a well-defined conglomerate, but practically barren. A little fine copper can be seen in some places. Upon sinking on the lode about 8 feet, its width at the bottom was fully 3 feet, showing a tendency to increase in size with further depth. To more extensively explore this lode by sinking will require a small outfit of machinery. The work has been discontinued since January 1st. After the break-up it can be resumed under more favorable conditions.

A new Rand air compressor, with Corliss compound steam cylinders 20 inches x 36 inches and 30 inches x 36 inches, and air cylinders 18 inches x 36 inches, has been erected and put in commission the latter part of October. Attached to it has been placed a Bulkely condenser. For No. 2 hoisting works we have provided a set of large gear wheels to substitute

for the present friction-hoisting apparatus. In connection with hoisting drum for No. 2 shaft we shall run a counterbalance car down No. 3 shaft. To our rock-house outfit we have added a 17-inch x 24-inch Blake crusher; also put in 1,500 feet 8-inch steel lap-welded air pipe, extending from new compressor to 7th level in the mine. We have constructed a new reservoir and dam near the rock-house, and laid a line of pipe from it to No. 2 hoisting and compressor plant).

**Palladium Plating.**—Palladium, which is a whiter, lighter, and more fusible metal than platinum, has of recent years been much used to plate watch movements, says the *Electrician*. According to M. Pilet, four milligrammes (about one-seventeenth of a grain) of palladium is sufficient to coat the works of an ordinary-sized watch. M. Pilet recommends the following bath: Water, 2 liters; chloride of palladium, 10 grammes; phosphate of ammonia, 100 grammes; phosphate of soda, 500 grammes; benzoic acid, 5 grammes. This bath is suitable for all metals except zinc.

**Allotropic Forms of Metals.**—Writing on some curious properties of metals and alloys, Mr. W. C. Roberts-Austen, says the *Engineer*, remarks that the importance of the isomeric and allotropic states has been much neglected in the case of metals. Joule and Lyon Playfair showed, in 1846, that metals in different allotropic states possess different atomic volumes, and Matthiessen, in 1860, was led to the view that in certain cases where metals are alloyed they pass into allotropic states, probably the most important generalization which has yet been made in connection with the molecular constitution of alloys. Instances of allotropy in pure metals are: Bolley's lead, which oxidizes readily in air; Schütz-enberger's copper; Fritsche's tin, which falls to powder when exposed to an exceptionally cold winter; Gore's antimony; Graham's palladium and allotropic nickel. Joule has also proved that, when iron is released from its amalgam by distilling away the mercury, the metallic iron takes fire on exposure to air, and is therefore clearly different from ordinary iron.

**Ultra Vires Acts of Corporation Officers.**—A corporation, manufacturing and dealing in metal goods, intrusted the management of its business with its treasurer, who on its behalf, but without previous action of its board of directors, contracted with another company, engaged in manufacturing carbons for electric lighting, to sell all carbons manufactured by the latter company during five years. After such business had been carried on openly for more than a year without objection by any one interested in the metal corporation, its treasurer, to procure means to enable the carbon company to supply the increased demand for carbons, indorsed, in the name of his own company, a promissory note made by the carbon company, procured it to be discounted, and paid the proceeds to the latter company. The metal company was compelled to pay the note. It could not recover damages therefor from its treasurer, although the business in which the note was given was *ultra vires*, the directors and stockholders had so far acquiesced in it that it had become the business of the corporation.

*Holmes, Booth & Hayden v. Willard, Court of Appeals of New York, 25 N. E. Rep., 1,083.*

**Recovery of Uranium Residues.**—For the recovery of uranium residues, Lambe, according to the *Zeitschrift für Angewandte Chemie*, recommends the following modification of the Reichardt process: "The residues from titrations are collected together, and the clear liquid is decanted from time to time. When a sufficient quantity has been collected the pasty mass is either heated in the pot by introducing steam, or in an iron pan over an open fire. Soda crystals are then added until the precipitate appears chiefly dissolved. It is allowed to cool, mixed with a sufficiency of ammonia, and the phosphoric acid is precipitated with magnesia mixture. After standing for twelve hours the supernatant liquid is siphoned off, and the precipitate is washed with ammoniacal water. The alkaline liquids are neutralized either with hydrochloric or sulphuric acid, heated to expel carbonic acid, and the uranium is precipitated at a boiling heat with ammonia as uranium oxide. The precipitate is washed by decantation. A small quantity of some ammonium salt must be added to the last wash water, as the precipitate otherwise does not settle well. For obtaining uranium nitrate the precipitate is dissolved in excess of nitric acid and concentrated by evaporation."

## PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

The following is a list of the patents relating to mining, metallurgy and kindred subjects, issued by the United States Patent Office.

TUESDAY, MARCH 24th, 1891.	
448,570.	System of Pumping Natural Gas. Joseph N. Pew, Pittsburg, Pa.
448,675.	Manufacture of Artificial Stone. James L. Rowland, Troy, N. Y.
448,710.	Ore Rifle. George H. Chick, Kansas City, Mo.
448,731.	Grinding and Amalgamating Pan. William Roberts, Petersham, near Sydney, New South Wales, Assignor to himself and Howard Raymond Belden, same place.
448,762.	Ore Screen. Thomas J. Grier, Lead City (Dak. Ter.), S. D.
448,802.	Process of Refining Zinc. Joseph W. Richards, Philadelphia, Pa.
448,808.	Steam Boiler or other Furnace. Johann Gasteiger, Vienna, Austria-Hungary.
448,815.	Apparatus for Bending and Forging Steel. Samson Fox, Leeds, England, Assignor to the Fox Solid Pressed Steel Company, Chicago, Ill.
448,818.	Coal Sifter. Edwin W. Humphreys, Chicago, Ill.
448,829.	Coal Mining Machine. Horace B. Wyman, Dover, N. H.
448,853.	Feed Regulator for Roller Mills, etc. Charles A. Corey, Watertown, Wis.
448,859.	Air Compressor. Ebenezer Hill, South Norwalk, Conn.
448,876.	Balanced Valve for Steam Engines. Hobart Canfield, Morristown, N. J.
448,907.	Vacuum Engine. Lucien A. Brott, Groton, N. Y.
448,917.	Steam Engine. Frank M. Garland, New Haven, Conn.
448,918.	Spark Arrester for Smoke Pipes. William B. Hale and Robert E. Durning, Fort Worth, Texas; said Hale assignor to Benjamin C. Evans, same place.
448,928.	Stone Channeler. William P. Scates and James F. Woods, Knoxville, Tenn.
448,944.	Apparatus for Removing Gases from Molten Metal. William F. Durfee and Noel B. Wittman, Birdsborough, Pa.
448,945.	Vacuum Casting Apparatus. William F. Durfee and Noel B. Wittman, Birdsborough, Pa.
448,947.	Method of and Apparatus for Generating Steam. Edward Fales, Boston, Mass.
448,961.	Ore Concentrator. Gottlieb D. Husemann, St. Louis, Mo.
448,983.	Steam Boiler. Wallace A. Morse, St. Louis, Mo., Assignor of one-half to John O'Brien, same place.
449,013.	Rolls for Rolling Girder Rails. Henry W. Thomas, Danville, Pa., Assignor to the North Branch Steel Company, same place.
449,066.	Vacuum Pump. Albert Berrenberg, Boston, Mass., Assignor by mesne assignments to the Berrenberg Manufacturing Company, of New York.
449,096.	Ore Crusher and sizer. William L. Ireland and Philip R. Stanhope, Du mont, O.

## PERSONALS.

Mr. J. P. Edwards has been appointed by Governor Winans as Commissioner of Mineral Statistics of the State of Michigan, vice Prof. C. D. Lawton.

Mr. R. P. Benedict, who has been connected with the Colorado Ore Sampling Company, of Denver, Colo., has accepted a position in the Chicago office of the Pennsylvania Salt Manufacturing Company, of Philadelphia, Pa.

Mr. Edward Halse, A. R. S. M. of London, England, passed through New York last week on his way to Mexico, where he goes to examine some silver, antimony, and manganese properties in Sonora and Sinaloa for English capitalists.

Mr. Charles Weisle, of Park City, Utah, has gone to the Trausvaal to take charge of underground operations for an English company, to whom he was recommended by Messrs. Fraser & Chalmers as an eminently practical man. Mr. Weisle was with Mr. C. D. F. Ilawley, M. E., at the silver mines in Mantchooria for two years, having returned from there only about a year ago.

The will of the late Senator Hearst has been filed for probate by his widow, Phebe M. Hearst, who is made sole executrix. The will states that Senator Hearst recognized that his wife is legally entitled to one-half his entire estate, it all being community property; and he also bequeathes to her absolutely the remaining one-half. Provision is made that if Mrs. Hearst marries again one-half of the estate reverts to her son, William R. Hearst.

## OBITUARY.

Wistar Morris, head of the iron firm of Morris, Tasker & Co., Philadelphia, and one of the directors of the Pennsylvania Railroad Company, died on the 23d inst.

Mr. Joseph Treweek, assistant superintendent of the Homestake Mining Company, died in Salt Lake City on the 18th inst. He had been suffering from asthma for some time, and about three weeks ago left his home in Lead City, South Dakota, with his family, for California, in hopes that he would be benefited by a change in climate. He rapidly grew worse on the journey, however, and was unable to proceed further than Salt Lake. Mr. Treweek had been a resident of Lead City, South Dakota, for the past eight years. Prior to that he had lived for twelve years on the Comstock Lode, where he was connected with some of the most important companies. He was considered a capable mining man.

## SOCIETIES.

The American Society of Mechanical Engineers held a reunion on the 26th inst. at its clubhouse, 12 West Thirty-first street. Prof. F. R. Hutton by means of a stereopticon, traced the development of the traction engine from its invention in 1804 to its exemplification in the improved locomotive engine of 1890. A humorous paper, entitled "Personal Reminiscences of Railroad People," was read by Angus Sinclair, and short addresses were made by J. F. Holloway and others.

## INDUSTRIAL NOTES.

The Vulcan Iron Works, in Richmond, Va., which shut down last week, resumed operations on the 23d inst., the men having agreed to accept monthly instead of semi-monthly payments as heretofore.

The American Ore Machinery Company, of 1 Broadway, informs us that it is receiving a gratifying number of orders for the Nord pulverizers for grinding phosphates, cements, etc., which it is now introducing.

The Great Western Canal Construction Company, Chicago, has been organized to construct an irrigating canal in Brighton County, Idaho, with a capital stock of \$250,000. The incorporators are S. L. Baker, J. P. Mallette and Marshall F. Holmes.

The World's Fair architects submit a plan whereby it is proposed to construct the buildings principally of wood and staff. Staff is the French name for a comparatively inexpensive building material, consisting chiefly of a composition of cement and gypsum.

A. Whitney & Sons, manufacturers of car wheels, it is stated, are in temporary financial embarrassment and have called a meeting of creditors to arrange for an extension to enable them to continue business. The firm is composed of John R. Whitney and James S. Whitney.

The Inter-Continental Railway Commission has about completed arrangements for sending three surveying parties to South and Central America to begin work in determining the route of the proposed road to the Latin-American States. Work will commence in Guatemala.

The Secretary of the Navy has signed a contract with the United States Projectile Company for shells for four, five and six-inch rifled guns, at prices aggregating \$125,504. The deliveries of the

shells are to begin August 6th next, and are to be completed within four months thereafter.

The Keystone Manufacturing Company filed application for a charter in Pittsburg, Pa., on the 24th inst. The company propose to manufacture iron and steel products. The stockholders are T. H. Adams, C. E. Dickson, Grant McCargo, J. M. Craig and S. M. Willock.

The A. W. Cadman Manufacturing Company filed application for charter in Pittsburg, Pa., on the 24th inst., the purpose of the company being the manufacture of iron and steel. The stockholders are A. W. Cadman, A. M. Patton, W. J. McDermott, J. G. Taylor and Frank G. Lenz.

The Damascus Steel Company, of Portsmouth, O., has decided to locate works in Denver, Colo., a new organization having been formed between the company and several capitalists of the latter city. This company manufactures steel tools. Its new works will cost in the neighborhood of \$250,000, and will employ several hundred men.

The Reading Iron Company has notified its 2,000 employes that owing to the continued depression in the iron trade a slight reduction in wages will be made on April 1. It is stated that the employes will accept the reduction, as a restoration of the old scale of wages is promised by the company with improved business.

The Oil Well Supply Company filed application for charter in Pittsburg, Pa., on the 24th inst. The stockholders are John Eaton, of Pittsburg; E. H. Cole, Brooklyn, N. Y.; E. G. Burnham, Bridgeport, Conn.; Ezra T. Homes, Olean, N. Y.; Kenton Chickering, Oil City, Pa., and Kenton Saulnier, Bradford, Pa. The object of the company is the manufacture of iron and steel products.

The employes of the Pennsylvania Construction Shops, at Uniontown, Pa., on the 21st inst. notified the superintendent that they would not return to work until they received their wages, which are said to be five weeks overdue. The company's representatives explain that the men are engaged exclusively on two large contracts, on which payment has not been received lately.

The Milwaukee Bridge and Iron Works, of which Messrs. Keepers and Riddell are said to be the principal stockholders, made an assignment on the 22d inst. The bond of Hamilton Townsend, the assignee, was fixed at \$200,000. The liabilities of the company are reported at about \$200,000. The assets are not given, but it is said that they will exceed the liabilities. Slow collections are said to be the cause of the failure.

The Chattanooga Tradesman's report of new industries established in the Southern States during the first three months of 1891 shows a total of 853, against 837 in the corresponding period of 1890, and 612 in the corresponding period of 1889. During the three months 93 new railroad companies were incorporated—13 in Virginia, 13 in North Carolina, 12 in Georgia, 10 in Alabama, 7 each in West Virginia, Texas, and South Carolina, 11 in Tennessee, and balance in other States.

The Bureau of Navigation of the Navy Department has taken the preliminary steps towards the establishment of the Naval War College. Plans have been drawn for the necessary buildings, and the money to pay for their construction, recently appropriated by Congress, is now at the disposal of the Navy Department. The purpose is to provide suitable lecture rooms and apparatus for demonstration. The college will be located on Coaster's Island, near Newport.

The United States Power Syndicate, Limited, with a capital of £50,000 in shares of £10 each, has been organized in London to acquire the sole rights of manufacture and sale in the United States of Priestman's and Hume's patents, relating to hydrocarbon engines, and to carry on the business of mechanical engineers, iron founders, and makers of and dealers in electric machines for motive power and lighting.

Representatives of the cut-nail mills of the Wheeling district held a meeting at Wheeling, W. Va., last week for the purpose of forming a combination to put up the price. Nothing definite was agreed on, and it is thought that the coming season will run at the same prices. The district represented includes Columbus, Ironton and other Ohio towns, Indiana, Illinois, Kentucky and West Virginia.

The engineers in charge of selecting the route of the northern terminus of the Delaware and Chincoteague Ship Canal have decided to recommend a course starting at White Oak Point, on Rehoboth Bay and running in nearly a northeasterly direction through the farms of Messrs. Lynch, Dodd, Holland and Wolfe, entering Lewes Creek, about one mile east of Lewes, Del. The course then follows the creek in a northerly direction and secures an outlet into the Delaware Bay, opposite Lewes. This route is the most direct from Rehoboth Bay, and will probably cost \$100,000 less than would the Broadkill terminus.

At the Washington Navy Department, D. C., bids were opened on the 25th inst. for the purchase of eight naval vessels which were condemned some time ago and ordered to be sold. The highest bidders were as follows: H. H. Ives, Brooklyn, for the "Junata," \$15,800; Lewis Luckenback,

Brooklyn, for the "Quinnebaug," \$18,000; Matthew Gill, Philadelphia, for the "Pilgrim," \$1,130; A. V. Kaiser, Philadelphia, for the "Saugus," \$15,140, and for the "Rescue," \$900; Edward J. Butler, Massachusetts, for the "Brooklyn," \$13,128; G. L. Snow, of Maize, for the "Ossipee," \$15,315. No bids were received for the "Speedwell."

The stockholders of the Standard Iron Company, of Norristown, Pa., received notice from the treasurer on the 21st inst. that, under the decree of the court, 33% of their capital stock would be repaid to them on application. The company was organized about nine years ago with a fully paid capital of \$750,000, and was in operation for less than a month. About two months ago application was made to the court for an order dissolving the company. Such a decree has now been made pursuant to a statement filed by a committee of three stockholders appointed to make a distribution. It is presumed that another and final distribution of about 20% can be made after the sale of the company's real estate.

Professor John P. Barrett, chief of the electrical department of the World's Fair Commission, has made the following classification for his department, the same having been ratified by Director General Davis: Apparatus to illustrate the phenomena and laws of electricity and magnetism; apparatus for electrical measurement; electric batteries, primary and secondary; machines and appliances for producing electrical currents by mechanical power—dynamical electricity; commercial transmission and regulation of the electrical current; electric motors; application of electric motors; lighting by electricity—the arc system; heating by electricity; electro-metallurgy and electro-chemistry; electric welding, stamping, tempering, brazing, etc.; electric telegraph and electric signals; the telephone and its appliances; the phonograph; electricity in surgery and therapeutics; miscellaneous applications of electricity; history and statistics of electrical invention; progress and development in electrical science; and construction, as illustrated by patent models of various countries.

## SOUTHERN INDUSTRIAL NOTES.

(From our Special Correspondent.)

The Lone Star iron furnace, at Jefferson, Tex., went into blast on the 15th inst. It is one of the largest furnaces in the State, and has been in the process of construction for the past two years.

The Mary Pratt Furnace Company was recently dissolved in the Chancery Court at Birmingham, Ala., by Judge Sharpe, who appointed Z. L. Nabors, secretary of the old company, as receiver.

The Adams Direct Process Steel Company has been organized for the purpose of manufacturing steel in Virginia by the Adams process. J. D. Weeks, of Buchanan, is president; E. C. Pechin, of Roanoke, is vice-president, and J. C. Schultz, of Buchanan, is secretary. This company has the exclusive right to the Adams process in Virginia.

The Newport Development Company, of Newport, Tenn., has recently been organized for the purpose of developing that town, establishing factories, etc. J. W. McSween, of Newport, has been elected secretary. A canal 1,700 feet long is being cut, which, it is estimated, will furnish 900 horse power for factories. The company will give free sites and power to manufacturing industries.

The Corporate Town Company, of Knoxville, Tenn., has been organized with a capital stock of \$10,000,000. This is one of the largest incorporated enterprises which has been organized in the South. It has for its object the founding of a manufacturing city in the high lands of East Tennessee, where iron, coal, cotton, timber, and other mineral and agricultural resources abound. Street railways, gasworks, furnaces, electric lights, etc., will be built. It is intended to pattern after the Middlesboro Town Company. The president of this enterprise is Hon. Robt. P. Porter, Superintendent of Census, and Ex-Congressman McCombs, of Maryland, vice-president. The directors are United States Senators John G. Carlisle, of Kentucky; Isham G. Harris, of Tennessee; H. C. Hansburg, of North Dakota; ex-Representative Benj. Butterworth, of Ohio; Augustin Davis, of Chicago; Judge Love, of Tennessee; S. M. Johnson, of Knoxville, and B. A. Jenkins, president of the National Bank of Knoxville. The latter gentleman is treasurer of the company. The management guarantee an economical and business-like administration of the organization. The minimum capital required to be paid in was secured upon the organization of the company—\$200,000. The par value of the shares is \$100.

## MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office. No charge will be made for these services.

We also offer our services to foreign correspond-

ents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

#### GOODS WANTED AT HOME.

- 2,131. Stone-channeler. Illinois.  
 2,132. A lathe machine. North Carolina.  
 2,133. Latest and best heavy upsetting and forging machine for making car pins; that is, for couplings. Alabama.  
 2,134. A set of the very best French hurr stones for flour, 36 inches across the face, top stone or runner 16 or 17 inches through the eye and 14 at rim; bed stone 12 inches thick. State net cash price. North Carolina.  
 2,135. A second-hand horizontal boring mill suitable for boring cylinders, hoxes, etc. Pennsylvania.  
 2,136. A second-hand power pipe machine to cut pipe and nipples from 2½ to 4 or 5 inches. Pennsylvania.  
 2,137. A second-hand light steam hammer. Pennsylvania.  
 2,138. One 20 and two 60-H. P. boilers; also a 75 H. P. engine, shafting, hangers, pulleys and a general line of machinery. Virginia.  
 2,139. A light boring machine for boring in wood, either horizontal or upright. Tennessee.  
 2,142. There is a demand for vanadium ores by a manufacturer in New York City, who would make from 200 to 500 ounces of vanadium salts every week. New York.  
 2,143. Jail and jailor's residence. Eight steel and wire cages and corridors of same material. Cost not to exceed \$10,000. Georgia.  
 2,144. A good second-hand tramroad locomotive of about 8 or 10 tons weight for a wooden road. North Carolina.  
 2,145. A full line of machinery for planing mill and sash and blind factory. North Carolina.  
 2,146. One or two second-hand turbines, 24 to 42 inches. State maker, price and details. New York.  
 2,147. A portable electric motor producing power. Ohio.  
 2,148. Eighty-five tons second-hand rails, 16 lb. to yard; also light locomotive for logging purposes. Both must be in good condition and low for cash. North Carolina.  
 2,149. Brick machines. South Carolina.  
 2,150. Lathes. South Carolina.  
 2,151. Barbed and plain wire. South Carolina.  
 2,152. Fine polishing machinery and card board, best quality. North Carolina.

#### AMERICAN GOODS WANTED ABROAD.

- 2,140. Estimates on an iron skeleton tower with staircase 30 feet high, at which height is to be placed one iron rectangular tank to contain 10,000 gallons of water, width equal to height of tank, length double the size; the tower to sustain on each side one windmill that is to put in motion one pump each, for raising water to tank from canal (level of water 10 feet below and close to ground, where the tower is to be situated); capacity of each pump not less than 500 gallons water an hour. The pumps to be so arranged as to be easily disconnected, and to be connected to horse-power motion, that exists here, whenever there should be lack of wind. Tank covered with corrugated iron roof, and placed on an incline of about 2 inches for easily cleaning out, with valve or cock and cleaning-out tube 3 inches. Windmills, with brakes, to be easily stopped. Outlet of water from tank, 2-inch valve or cock, with 700 feet 2-inch wrought-iron piping and 1,000 feet 1½-inch wrought-iron piping for conducting water, with sufficient number of elbows, tees, unions and flanges where required. Overflow pipe on tank. Separate costs of tower, tank, piping, windmills and pumps to be included in estimates, which are to be accompanied by a complete sketch or drawing of whole plant, with exact sizes of thickness or diameter of iron employed in tower, tank, etc. The tank will come in plates to be riveted here. Estimates to also contain shipping expenses, freights to Callao, and marine insurance. Peru.  
 2,141. A complete electric-light plant of 300 incandescent lights of 20 candles, 10 of 40 candles, and 1 of 100 candles, for a small town. Peru.  
 2,153. Portable assayer's outfit for the determination of valuable metals. Blow pipes, solvents, etc., of simplest character. Key written in English. South America.  
 2,154. Cost, with all particulars as to freight and duties, f. o. b. vessel, of a reliable water motor, or other machine that will work from a small mountain stream (constant supply from a spring), say 1 or 2 horse power, to be used for chaff cutting, corn grinding or, may be, to work a dynamo and light up a farm homestead. The water can be brought in an open sluice or with a head of pressure in pipes of say 60 or 80 pounds square inch. Australia.

#### GENERAL MINING NEWS.

**PHOSPHATE DEVELOPMENT AND FINANCE COMPANY, LIMITED.**—This company, having a capital stock of £15,000, in £1 shares, has been registered in London, England. Its object is to acquire phosphate or other mines and mining rights in the United States and elsewhere. The board of directors is constituted as follows: Capt. John Evans-Freke Alymer, George Herbert Dixon, Godfrey Charles Lomer and Henry Thomas Wills Safe.

#### ARIZONA.

##### PINAL COUNTY.

**MAMMOTH GOLD MINES, LIMITED.**—The stamp mill ran for 18 days in February, producing bullion to the amount of \$20,000, but was idle during the last week of the month on account of an accident to the engine. This has been repaired, however, and operations were resumed on the 6th inst. The vein has been struck at a depth of 50 feet below the 300-foot level, and a crosscut shows the ore body to be 35 feet in width. The ore is of the same high grade as that which is being stoped above the 300-foot level, on which the mill is now running.

#### CALIFORNIA.

(From our Special Correspondent.)

##### SAN FRANCISCO, March 19.

The bills to regulate the conduct of mining companies, and restricting speculation on the stock exchanges, already referred to in the *ENGINEERING AND MINING JOURNAL*, have failed to pass the State Legislature, as was to be expected.

##### MENDOCINO COUNTY.

(From our Special Correspondent.)

**MOUNT VERNON COAL MINING COMPANY.**—The controlling interest in this company, which owns the mines situated near Round Valley, is held by John Mackey and J. L. Flood. Owing to the failure of the minority shareholders to pay their proportion of the \$25,000 expended in prospecting, orders have been given to shut down the mines. At one time the scheme was mooted of building a railroad into the district, but the country is rough and broken, in the heart of the Coast Range, and the question of cheap transportation to San Francisco has been an important feature in arriving at the decision to close down the mines for the present.

##### NEVADA COUNTY.

**NORTH BANNER CONSOLIDATED TUNNEL COMPANY.**—This company recently declared dividend No. 1, of five cents a share, aggregating \$5,000. It is said that the management expects to be able to declare dividends regularly after this. The mine is looking wells. Geo. Fletcher is the principal owner and manager of the property. John Skewes is the superintendent. At a recent meeting of the directors T. J. Mitchell was elected secretary of the company, to succeed M. J. Farrell, resigned.

#### COLORADO.

Mineral surveys approved by the U. S. Surveyor General of Colorado during the week ending March 21st, 1891:

Survey number, 6,658; land district, Garfield; name of claim, Freighter and Geneva; 6,733, Central City, Buffalo Placer; A. & B. 6,724, Central City, Pocahontas lode and Pocahontas mill site; 6,748, Gunnison, Ben Ezra, Bill Yankee, Stella Williams and Last Chance lodes; 6,620, Leadville, Third Street, Gold Bug and Ludington lodes; 6,808, Leadville, Crown Point Tunnel, Crown Point, Savage and Belcher lodes; 6,828, Garfield, Silver City and Boston lodes; 6,844, Garfield, Roht. Lincoln lode; 6,647, Durango, Grip.

Amended survey: 2,540, Durango, Dayton lode.

It has been decided to abandon the proposed exhibition mine in Chicago during the World's Fair, owing to the changing of the site from the lake front to Jackson Park. Mr. Gillespie, one of the projectors of the scheme, gives these reasons for the sudden change: "We intended to make the investment yield at least sufficient revenue to reimburse those who were interested in it. If the site had been the lake front, we should have had an almost permanent exhibit. It would be so situated that after the Fair was over we could still depend on a certain income daily from people who desired to view what to them would be a novelty. But Jackson Park is so far removed from the centre of population that it was not feasible to depend upon this."

##### CONEJOS COUNTY.

**MAMMOTH.**—It is reported that a good body of ore has been uncovered in this mine since the first of the year, and that shipments will be commenced shortly. An ore chute, discovered last autumn, has been opened for a distance of 300 feet, the ore streak being of an average of 18 inches and of good grade. The streak is found to widen as depth is gained. The property was bought by a Denver syndicate in 1888 and since has been operated under the direction of Mr. John N. Palmer. The vein is now opened by a tunnel 650 feet in length.

##### CUSTER COUNTY.

**JULY BIRD MINING COMPANY.**—It is reported that arrangements are being made for a resumption of work by this company in its property, which was formerly one of the large producers of the Silver Cliff district.

##### EAGLE COUNTY.

**BELDEN.**—This property, formerly one of the large producers of Red Cliff, has been leased to A.

A. McDonald and W. F. Huntington, and operations have been resumed. The property has been idle since the early days of the camp. After striking the sulphide ore bodies work was suspended. The new operators have secured a two years' lease on the property and will thoroughly explore it.

**IRON MASK MINING COMPANY.**—This company, which is now operating under the management of Mr. A. Helm, is reported to have shipped enough ore in the past month to clear all the indebtedness contracted under former management, pay off all the current month's expenses and leave a balance of some \$1,500. Development is progressing in all parts of the mine, new ore bodies have been opened in the carbonate, and marked improvement is noted in the sulphide ore deposits, and there is no doubt now that the mine is being put in shape for an energetic attack on the extensive ore reserves which have been blocked out and standing for several years during pending negotiations for the sale of the property. Twenty-six men are employed at present, and the force will be gradually increased as the new facilities for ore production are perfected, until the full quota of miners as formerly employed will be at work again. Underground workings are being changed to cheapen the cost of production, and give direct communication with bodies of ore which have been hitherto worked by winzes, etc.

#### LAKE COUNTY.

**IRON SILVER MINING COMPANY.**—This company has resumed work in the Moyer mine, which has been closed down for a short time, with a large force of men, and ore shipments have been commenced again.

**SILVER CORD COMBINATION MINING COMPANY.**—Over 1,300 feet of the new crosscut tunnel is now completed, and with the aid of the power drills the work is progressing rapidly. But little else is being done in the property at the present time, with the exception that several sets of lessees are prospecting in the upper slopes of the old workings.

**SMUGGLER MINING COMPANY.**—Some lessees working on the south end of this company's property are taking out about eight tons of lead carbonate ore of fair grade daily. On the north end, in working from the main incline of the Silver Cord Company, a good body of oxidized ore has recently been uncovered. It is found well down in the blue limestone, which is, at this point, 250 feet thick, and is thought to be a portion of the Ruby Channel ore chute. The ore is of good grade, and the strike, having been made in a block of virgin ground, is considered promising.

**WOLCOTT MINING COMPANY.**—Shipments have been resumed from the Lucy B. Hussey mine, operated under lease by Major A. V. Bohn and others, a new contract having been made to supply 70 tons of argentiferous iron ore daily. An immense body of ore of this character is said to have been opened in the property.

#### OURAY COUNTY.

**NEW GUSTON MINING COMPANY, LIMITED.**—The output of this company for February was 640 tons, of which 300 tons were shipped. The approximate value of the output was \$56,650; mine expenses, \$10,850.

**YANKEE GIRL MINES, LIMITED.**—The production of these mines during February was 600 tons of ore, of which 220 tons were shipped. The value of the output is estimated at \$72,300, and expenses \$15,400.

#### SAN JUAN COUNTY.

**NORTH STAR.**—An important strike of rich ore is reported in this mine, located on King Solomon Mountain. In running a crosscut north from the fourth level, at a distance of 35 feet, a strong streak of galena ore, with gray copper, 18 inches in thickness, was cut. Average samples are said to have assayed 950 ounces silver per ton.

**SAN BERNARDO SILVER MINES, LIMITED.**—At the statutory meeting of the shareholders of this company on the 9th inst. it was stated that the accidents to the machinery at the mine, which had delayed operations, had been repaired, that the dressing works were finally running satisfactorily, and that the prospects that the company would soon be placed upon a dividend-paying basis were now very good. Up to the first of February tunnel No. 5 had been driven 671 feet into the mountain, in the last 140 feet of which there had been ore continuously, the pay streak averaging two feet in width. Some good galena ore is also being opened in a drift above this level, and it is expected that the same body will soon be cut by tunnel No. 4. The stopes and drifts above the latter are looking very well, and showing a fair quantity of high-grade ore. Ore has also been uncovered for a distance of 60 feet by drifts run at a depth of 50 feet from a new shaft sunk about 250 feet from the mouth of tunnel No. 4. The company has leased the San Juan mine, located on the opposite side of the gulch from the San Bernardo, and supposed to be on the same vein. The San Bernardo Silver Mines, limited, was organized Nov. 12, 1890, when it took over the assets and liabilities of the San Bernardo syndicate, which had been developing the property for some months. The syndicate had erected a tramway, concentrating mill of 50 tons daily capacity, and all the necessary buildings for the operation of the mine.

GEORGIA.

CHEROKEE COUNTY.

(From our Special Correspondent.)

It is stated that a trade has just been closed for 3,000 acres of the consolidated gold properties along the Etowah River in this and Dawson counties. R. F. Looney, of Memphis, Tenn., and associates are the purchasers.

MURRAY COUNTY.

(From our Special Correspondent.)

COHUTTA TALC COMPANY.—Application has been made by Wm. C. Tilton, John G. Gould, and Henry G. Granger for the incorporation of this company. The capital stock is to be \$1,000,000, with the privilege of increasing it to \$2,000,000. Its object is the development of the mineral resources located along the line of the Georgia Northern Railroad. The organizers of the company are also the promoters of this railroad. The length of the road will be about 55 miles, and will run from Dalton, via Spring Place, to Ball Ground in Cherokee County. It will tap the Cherokee & Pickens County marble belt.

IDAHO.

ELMORE COUNTY.

ELMORE GOLD COMPANY, LIMITED.—The Elmore mine is one of the oldest and best producers in the camp, being owned by a London syndicate. During January and February the mine was worked through the old shaft, and the ore reduced in the mill making quite a nice run, after which the shaft was abandoned because it was too old and crooked, and the expense of handling the ore was deemed excessive. A new shaft at a point 600 feet east of the old and 400 north of the lode was started to tap the lode at a depth of 650 feet. This shaft is now down about 500 feet, and is being pushed to completion as fast as possible. There is a fine hoist over the shaft, and also a big steam engine to operate the Cornish pump. In the old workings through the old shaft the vein is six feet wide at the bottom, carrying ore that mills about \$20. Such rock pays well in the 50-stamp gold mill owned by the company. The Vishnu mine adjoins the Elmore on the northeast so close to the new shaft as to be worked through the Elmore shaft. The Vishnu was purchased by an English syndicate last winter, and since then active work has been going on by running a cross-cut from the Elmore shaft to tap the ledge at a distance of 450 feet, where rich ore was tapped, and has been drifted on quite a distance. The Elmore mill began reducing this ore early in December with good results.

KANSAS.

A special report shows that during the week ending March 21st the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 2,756,210; zinc ore, pounds sold, 907,900; lead ore, pounds sold, 80,000. Sales aggregated a total value of \$11,200.

KENTUCKY.

COAL.

A dispatch from Louisville, Ky., says that the 2,000 coal miners employed in the Laurel-Jellico districts are to strike May 1st. They ask pay on coal before it is screened, and eight hours per day. The operators have decided not to allow the demand.

MARYLAND.

COAL.

CONSOLIDATED COAL COMPANY.—Concerning the fire in the Hoffman, one of this company's mines, the Cumberland (Md.) News furnishes the following information: It originated near the bottom of the slope, 1-6 miles from the mine's mouth and 600 feet below the surface, where a pump boiler is located. A long passageway formed by coal walls, which served as an escape for the boiler smoke, was ignited for a distance of 200 feet. The pumps at the boiler were being used to extinguish the flames when a rush of water from another section of the mine rendered them useless. The fire was then sealed up until such time as the water should rise and put it out. To expedite the flooding a large stream of water has been turned in. It is now well under control, and it is thought will be extinguished in a few days. Meanwhile work will be continued in other portions of the mine.

MICHIGAN.

COPPER.

A Lake Superior exchange states that J. H. Darling, of Duluth, was at Portage Lake last week setting posts on the new harbor lines. These new lines favor greatly the Franklin and Atlantic mines and please the Quincy people. It has been estimated that this arrangement gives the Atlantic mine sand room for ten years.

CENTENNIAL MINING COMPANY.—This company makes its first report to stockholders, covering operations from December 1st, 1883, to December 31st, 1890. The following figures are given:

CASH ACCOUNT.

[December 1st, 1888, to December 31st, 1890.]	
Cash received from capital stock paid in.....	\$400,000.00
Cash received from interest.....	8,813.16
	\$408,813.16

<i>Contra—</i>	
Cash paid mine agent's drafts.....	\$199,141.73
Insurance.....	3,289.31
Expense.....	10,532.17
Cash on hand December 31st, 1890.....	195,849.95
	\$408,813.16

FINANCIAL STATEMENT, DEC. 31, 1890.

<i>Assets:</i>	
Cash, bills receivable and loans at Boston....	\$195,849.95
Interest on loans.....	7,550.20
Cash, supplies and fuel at mine.....	9,446.22
	\$212,846.37
<i>Liabilities:</i>	
Drafts outstanding at Boston.....	\$11,374.88
Balance due merchants at mine.....	3,655.86
men.....	6,725.25
	21,755.99

Balance assets over liabilities.....	\$191,090.38
Valuation of machinery, tools and buildings, not included in above.....	55,364.54
Expended for new machinery since Dec. 1, 1888.....	12,323.78

The mine agent's account shows total mining expenses of 1889, \$83,759.62; 1890, \$115,368.10; total, \$199,127.72; supplies, fuel, new machinery, etc., \$21,770; total, \$220,897.72. *Contra—*Drafts drawn on treasurer, \$210,516.61; balance due merchants, \$3,655.86; balance due men, \$6,725.25; total, \$220,897.72. Captain Vivian gives an interesting summary of operations at the mine since the same were begun in December, 1888. He says:

Pumping water from the old mine was started Dec. 28, 1888, and the bottom of No. 3 shaft was reached on the 8th of March, 1889. Sinking was begun in this shaft on the 1st of April, and is now 2,000 feet below the surface. The size of the shaft is 21 x 7 feet. The average sinking per month was 75 feet. The lode in this opening is from 3 to 7½ feet in width, and has shown in some places some rich copper rock, but, on the whole, will not pay to work. It was expected, when this shaft was started, that it would have to be sunk at least 3,500 feet before reaching anything of value. No. 4 shaft has been sunk 300 feet, and is now at the 10th level. The lode at this point is large, but is not showing copper in paying quantities. The 10th level has been opened south of this shaft 173 feet, most of which will pay to take out. The ninth level has been opened south and connected with No. 3 shaft a distance of 660 feet. The lode for at least 500 feet is showing considerable copper, and to all appearance a large amount of it will pay to remove by stopes. To prove the value of the northern portion of the property, explorations were started 1,500 feet north of No. 4 shaft in September, 1889, which resulted in finding the lode from seven to nine feet in width, and showing some very rich copper rock. We at once started to sink No. 6 shaft at this point, which is now 30 feet below the third level, and 487 feet from the surface. The lode from the surface to within 30 feet of the second level showed on the whole quite well in copper, and in some places it was very rich; but, owing to the productive ground dipping rapidly to the north, which often occurs on this lode, the lode in the shaft has been very lean for the last 185 feet sunk. The third level at this shaft has been opened north 37 feet without finding anything of value; however, it seems that we must soon reach the run of productive ground that is in the levels above. The second level has been opened south 110 feet. With the exception of a few feet near the shaft, the lode in this opening is rather lean. This level has been opened north 150 feet. The lode exposed at this point is showing quite well in copper. In some cases it is from 10 to 12 feet in width, and productive throughout, and will doubtless pay well to take out. The first level has been opened south 15 feet and north 300 feet, which has laid open some good stopping ground. In some places it is quite rich. Some time in the near future we intend to cross-cut east from No. 6 shaft to the Osceola amygdaloid, which may be very valuable in this part of the property. In the openings made on this lode in the southern part of our territory some fair copper ground was met with, but the most northern of these openings are the richest; consequently we intend to test this lode still farther north, and our chances for getting a good-paying mine in that part of the property (Osceola amygdaloid lode) are very good indeed.

This property is not a producer, hence the absence of costs, etc., in the company's annual report.

FRANKLIN MINING COMPANY.—The annual report of this company for 1890 shows that the mine produced 6,803,155 pounds of mineral, which yielded 82.87%, or 5,638,112 pounds of refined copper. This summary of the year's business is given:

5,638,112 pounds sold and on hand.....	\$805,987.76
Interest.....	1,682.88
Silver.....	3,700.34
Total receipts.....	\$811,370.98
Running expenses at mine, including construction account.....	\$357,106.84
All other expenses, smelting, freight, insurance, etc.....	80,651.65
	\$437,758.49
Income of the year.....	\$373,612.49

CASH ACCOUNT FOR THE YEAR.

Cash on hand January 1st, 1890.....	\$132,968.00
Received from sales of copper (2,529,542 pounds, at 14.797 cents).....	374,309.51
Sales of silver.....	3,700.34
Interest.....	1,682.88
Loans.....	45,000.00
	\$557,680.73

<i>Contra:</i>	
Dividend January 1st, 1890.....	\$80,000.00
Mine agent's drafts.....	347,501.43
Insurance.....	1,202.05
Storage.....	388.00
Smelting.....	43,592.26
Freight.....	9,600.30
Expense, brokerage, taxes.....	12,417.31
Interest.....	163.20
Cash on hand December 31st, 1890.....	62,816.28
	\$557,680.73

Assets, December 31st, 1890, \$752,128.96; liabilities, \$101,210.42; surplus, \$650,918.54. The report gives these statistics: Total amount of rock hoisted, 188,355 tons; rock stamped, 144,393 tons; pounds of mineral in ton of rock stamped, 47.11; percentage of mineral in ton of rock stamped, 2.355.

HURON MINING COMPANY.—This company makes a report covering the year 1887 to 1891, inclusive, it being the first full report rendered its stockholders during that time. In the following the chief items are given:

ASSETS AND LIABILITIES DECEMBER 31ST, 1890.	
<i>Assets.</i>	
Cash on hand and accounts receivable.....	\$13,722.02
906,250 pounds copper at 11 cents.....	126,875.80
Supplies at mine.....	40,449.37
Rock broken in mine, ready for hoisting, say 39,338 tons, valued at.....	40,000.00
	\$221,046.39
<i>Liabilities.</i>	
Drafts outstanding.....	\$25,784.94
Loans and bills payable.....	158,025.28
Liabilities at mine.....	32,336.70
Due for smelting, freight, etc.....	4,037.42
	220,184.34
Balance.....	\$862.05
Value of machinery, buildings, etc., exclusive of the mine.....	161,559.30

The production of mineral for the year 1890 was 2,144,433 pounds, which, at 80.90% gave 1,736,777 pounds of refined copper, or 482,606 pounds; less than in 1889, due to the inadequacy of the hoisting power to supply the stamp mill with rock, whereby 11,339 tons less were stamped. The cost of ingot was 23.3 cents per pound. The highest price obtained during the year was 17 cents, lowest 13 cents, average 14.864 cents per pound. The cash account for the year 1890 is as follows:

Cash on hand January 1st, 1890.....	\$3,459.16
Received from sales of copper, 1,375,000 pounds, at 14.634 cents.....	204,386.50
Received from loans.....	387,430.00
Received from assessment, July 7.....	200,000.00
Received from mine account.....	11,991.86
Received from interest.....	1,245.33
	\$811,512.25
<i>Contra—</i>	
Cash paid loans.....	\$483,810.33
Mine agent's drafts.....	280,797.61
Smelting, freight, brokerage.....	23,767.65
Interest, expense, insurance, storage.....	19,790.24
Cash on hand Dec. 31, 1890.....	3,347.02
	\$811,512.85

Total expenses for the year were \$320,820.12, which includes mining, sinking of shafts and winzes, drifting, cross cutting, stoping, supplies and fuel, stamping, construction, pumping, smelting, freight and all other expenditures of all kinds.

The production of mineral for 1889 was 2,757,841 pounds, yielding 80.479%, or 2,219,473 pounds of refined copper, and the cost of ingot per pound was 16.8 cents; the highest price obtained was 16½ cents, lowest 10½ cents; average, 12.829 cents per pound. The cash account for the year 1889 was as follows:

Cash on hand, January 1st, 1889.....	\$2,695.14
Received from sale of silver.....	155.51
Received from sales of copper, 1,900,981 pounds, at 12.829 cents.....	242,769.51
Received from loans.....	545,338.04
	\$811,958.60
<i>Contra:</i>	
Cash paid loans.....	\$476,043.85
Mine agent's drafts.....	265,561.81
Smelting, freight, etc.....	32,290.61
Interest, etc.....	11,065.17
Cash on hand, December 31st, 1889.....	6,458.16
	\$791,958.60

Total expenses for 1889 were \$319,640.43, which includes everything, as in the 1890 statement above given.

The production of mineral in 1888 was 2,881,517 pounds, which yielded 82.427% or 2,375,147 pounds of refined copper, and the ingot cost was 14.3 cents per pound; the highest price obtained was 18 cents, lowest 13 cents, average 14.918 cents per pound. The cash account for the year was as follows:

Cash on hand January 1st, 1888.....	\$3,268.47
Received from sales of copper, 2,414,169 pounds at 14.918 cents.....	360,144.87
Received from loans.....	760,026.91
Notes receivable.....	900.00
	\$1,124,340.25

*Contra:*

Cash paid loans.....	\$749,789.74
Mine agent's drafts.....	310,558.01
Smelting, freight, etc.....	45,378.18
Interest, etc.....	15,919.78
Cash on hand December 31st, 1888.....	2,695.14
	\$1,124,340.25

Total expenses for 1888 were \$345,472.36. The production of mineral in 1887 was 1,863,235 pounds, which yielded 79.556% or 1,484,103 pounds of refined copper, and the ingot cost, including construction, was 18.3 per pound; the highest price obtained was 17.65 cents; lowest, 9.85 cents; average, 12.13 cents per pound. The cash account for the year was as follows:

Cash on hand Jan. 1, 1887.....	\$1,159.69
Received from sales of copper (1,460,075 pounds, at 12.13 cents).....	177,118.29
Sales of silver.....	160.10
Interest.....	229.06
Loans.....	761,168.26
Assessment.....	72,570.00
Notes receivable.....	450.00
	\$1,012,855.40

*Contra:*

Cash paid loans.....	\$732,654.77
Mine agent's drafts.....	213,978.15
Smelting, freight, etc.....	41,330.10
Interest, etc.....	21,623.91
Cash on hand Dec. 31, 1887.....	3,268.47
	\$1,012,855.40

Total expenses for 1887 were \$268,273.

COMPARATIVE RESULTS.

Product.	1890	1889	1888
Mineral, lbs.....	2,144,433	2,757,841	2,881,517
Fine copper, lbs.....	1,736,777	2,219,475	2,375,147
Per cent.....	80.99	80.479	82.427
Copper sold lbs.....	1,375,000	1,900,081	2,414,169
Average price, cts.....	14.764	12.8.9	14.919
Received.....	\$204,386	\$243,770	\$360,145
Total expenses.....	\$20,830	\$19,640	\$45,472
Cash on hand Dec. 31.....	3,347	6,459	2,695

MASS.—This mine has been bid in by Capt. John Chenworth, trustee, for \$3,900. This is expected to clear up legal complications.

PEWABIC.—Inquiry at the office of Mason & Smith and the Quincy Mining Company, 56 Broadway, did not elicit any new information concerning this property. Mr. Smith stated that litigation was still complicated, and that it will be some time before the owners can hope to have matters so straightened that courts can issue a title. In the meantime the property remains in the hands of special master, Peter White.

STONE.

BUTLER BROWNSTONE COMPANY.—This company has been organized at Marquette by Thomas Butler, of Au Train; Charles Johnston, of Rock River; C. H. Schaffer, George Barnes, F. M. Moore and George Barnes, trustee, of Marquette, for the purpose of working a 94-acre tract of stone deposits, located on Rock River, in Alger County. The capital stock is \$500,000, divided into 20,000 shares.

IRON.

MARQUETTE RANGE.

SCHLESINGER SYNDICATE.—The East Negaunee group of mines belonging to this syndicate passed through the throes of an incipient strike last week. The miners were incited into believing that they were not to receive their monthly pay on the 17th inst. After a two days' idleness and a consequent loss of \$2,400 in wages, the men on the date promised were paid and returned to work.

MENOMINEE RANGE.

The sale of the Escanaba, Iron Mountain & Western Railroad and the Chapin iron mine has been completed. They were bought by Eastern capitalists. M. A. Hanna, of Cleveland, becomes president of the Chapin Mine Company, and George Henry Kent, of New York, secretary and treasurer. The capital stock of the mine is \$3,000,000. The new directors of the railroad are Francis Lynde Stetson, president; George H. Kent, Leslie Ryan, and Byron L. Smith. The real purchasers of the road are said to be Messrs. Stetson, Twombly and Kent.

PENN IRON COMPANY.—This company has leased from the Lumberman's Mining Company the property once wrought as the Stephenson mine. The property, which joins the Norway, is to be used for an extension of tracks, etc.

MONTANA.

LEWIS AND CLARKE COUNTY.

ELKHORN MINING COMPANY, LIMITED.—Bullion shipped by this company for week ending March 7th was \$8,000. During the month of February the mill worked 28 days and crushed 940 tons of ore, producing bullion amounting to \$35,735. In addition there were produced 240 tons of smelting ore, valued at \$14,000, making total product for the month \$49,735; operating expenses amounted to \$20,235. The directors of the company have just declared an interim dividend of £20,000, or 2s. per share, for the three months ending February 28th, a total for the first year's working of the company of £65,000, or 6s. 6d. per share. This is 32½% on the capital stock of the company for the year. A balance of about £8,500 is carried forward. A cable dispatch from the mine to the London office of the company states that a new ledge, two feet in width, has been cut by the diamond drill, the ore assaying 90 ounces silver per ton.

SILVER BOW COUNTY.

ANACONDA MINING COMPANY.—The mine has been closed down through a disagreement with the Montana Union Railway over traffic rates for hauling ore, fuel, and supplies between the mines and smelting works. Superintendent Burns issued an order shutting down all train service on Thursday evening, the 19th inst. In turn the Anaconda shut down all of its mines, closing at noon Saturday. The smelters will run out what ore they have on hand, and will then follow suit. It is understood that the great works will remain inoperative until this matter has been definitely and satisfactorily settled. In the meantime about 4,000 men suffer enforced idleness. The railroad claims that the company owes it over \$70,000, owing to an increase in the rates of transportation imposed in order to meet expenses. The company disputed this claim.

BOSTON & MONTANA CONSOLIDATED COPPER AND SILVER MINING COMPANY.—It is officially reported that the February output of this company was 1,975,000 pounds of copper, against 2,175,000 pounds for January, 2,150,000 pounds for December and 2,150,000 for November. The report states that the comparatively small product for February was owing to repairs of some of the furnaces, and sickness, which reduced the working force at the smelter, so that it ran its full capacity only a portion of the month.

MISSOURI.

JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, March 23.

The weather of the past week was very favorable for mining operations and almost all of the mines worked full time, giving a large output. The price of zinc ore remained unchanged and ruled at \$23.50 per ton. Lead still holds in the same notch of \$24.50 per thousand. Many strangers are coming to Joplin to investigate the lead and zinc belt with a view of investment and with the opening up of April every one predicts lively times.

Following are the sales from the different camps as far as reported:

Joplin mines, 1,206,360 pounds zinc ore and 186,750 lead; value, \$19,652.50.

Webb City mines, 823,960 pounds zinc ore and 34,290 lead; value, \$10,521.60.

Carterville mines, 1,391,810 pounds zinc ore and 160,990 lead; value, \$20,300.

Zincite mines, 295,508 pounds zinc ore and 1,370 lead; value, \$3,580.56.

Lehigh mines, 99,000 pounds zinc ore; value, \$1,262.25.

Galena (Kan.) mines, 907,900 pounds zinc ore and 80,000 lead; value, \$11,200.

Districts, total value, \$66,516.91.

Aurora (Lawrence County) mines, 160,000 pounds zinc ore, 360,000 pounds silicate and 192,000 pounds lead; value, 8,464.

Pierce City mines, 46,200 pounds zinc ore; value, \$508.

Lead and zinc belts, total value, \$75,488.91. Prof. E. O. Bartlett, the inventor of the Lewis-Bartlett process for the manufacture of white lead from the fumes from the lead smelter and general manager of the Picher Lead Company of Joplin, has received the nomination for Mayor of this city on the democratic ticket.

The mineral resources of Sarcoux, one of the oldest towns in this county, have as yet had but little development. Your correspondent recently made a personal examination of the district. On Mr. S. M. Hood's land a company from Ohio is sinking a shaft, which is now 30 feet deep, showing a formation of chert intermingled with seams of slate and shale, which contains some small cubes of lead. It does not seem, however, that depth enough has been reached to prove up the ore bearing formation. On Mr. J. P. Boyd's land some prospecting work has been done, and has proved up some lead and zinc ore. On J. M. Rice's land some prospecting is being done with very favorable indications. On Mr. H. Hubbard's land several surface openings have been made, and arrangements are now being completed to more thoroughly prospect the land by sinking drill-holes. Nothing but a little surface prospecting has yet been done in this district; but this has proved the identity of lead and zinc ore deposits with those of the rest of the region, and warrants some systematic development. The district is located directly in the line of the great lead and zinc belt from Lehigh on the northwest to Granby on the southeast. The geological conditions and formation are the same as in the well developed districts to the northwest and southeast. The surface croppings of the chert and limestone are of the same character as are found elsewhere, and the topographical appearance of the entire district indicates mineral bearing lands.

MINNESOTA.

SOUDAN, Minn., March 24.

(From our Special Correspondent.)

MESABA RANGE.

BIWABIC COMPANY.—This company is exploring about two miles west of the Mallman. One crew of test pitters is at work. Several pits have been ledged in mixed ore and jasper, but much trouble is experienced from water.

MALLMAN.—The east shaft has now been sunk 82 feet and at the bottom a cross-cutting drift is in 77 feet. The entire drift is in ore, and the hanging wall has not yet been reached. There is considerable water here.

Moss.—The shaft which this company has been sinking was abandoned at a depth of 35 feet. Another shaft has been started further to the westward.

MESABA SYNDICATE.—The explorations of this company were discontinued for a short time, owing to some disagreement among the management. Work was resumed again on the 9th inst.

MYRNA IRON COMPANY.—This company is doing a little test pitting. Progress is greatly hindered by water.

STONE IRON COMPANY.—The recent find by this company is being opened up as rapidly as possible. A shaft is now being sunk in the hanging wall with the intention of cross-cutting when the ore is reached.

VERMILION RANGE.

A diamond drill is to be started by Messrs. Conkey & Warren on Section 33-64-9 as soon as crews can be obtained.

FINK.—The diamond drill in operation on this property, Sections 15-62-14, is reported to be drilling in ore.

MINNESOTA IRON COMPANY.—The stock-pile docks at No. 5 is being extended, as the output has been greater than can be accommodated by the present dock. Ore has been struck recently by a diamond drill a short distance north of the Armstrong vein. Assistant manager S. T. Pope has resigned in order to take the general management of the South Chicago Cable Company. No successor has yet been appointed.

NEVADA.

SAN FRANCISCO, March 19.

ELKO COUNTY.

(From our Special Correspondent.)

BELLE ISLE MINING COMPANY.—A recent shipment of 10 tons of ore to Salt Lake City averaged \$630 per ton. A shipment of 15 tons of the same class of ore is now being made to the Selby works.

EUREKA COUNTY.

CORTEZ MINES, LIMITED.—The production of these mines during February is officially stated to have been 47,163 ounces silver. The expenses were \$14,250. There were 863 tons of ore crushed and \$3,500 spent in new development work.

HUMBOLDT COUNTY.

CLARK.—At this mine, on Eugene Mountain, the shaft is down 240 feet, and the vein is from 14 to 20 inches wide. It is stated that the ore from above the 170 level carries \$300 in gold to the ton. Frank Clark, the owner of the mine, on several occasions has worked a few tons of ore at his water mill on the Humboldt River, at St. Mary's, and cleaned up a few thousand dollars, enough to pay running expenses. It is now reported that he will build a mill at the mine this summer. Good judges claim that there is over \$100,000 worth of ore in sight in the mine.

STOREY COUNTY—COMSTOCK LODGE.

(From our Special Correspondent.)

With every assurance of a busy milling season on the Comstock, Virginia City is booming just now. The Morgan mill, after having for many months been practically shut down, will soon be started again on Consolidated California & Virginia ore. Extensive alterations in the batteries have been made and the railroad track has been elevated so that the ore may be dumped into the bin. With 40 stamps at the Morgan mill and 60 at the Eureka dropping on Consolidated California & Virginia ore, the bullion output of the Bonanza mine should be largely increased. The crushing capacity of the two mills is about 3½ tons to the stamp per 24 hours, which is equivalent to 350 tons per day.

The Vivian mill has also been put in first class repair, and if put to work on Overman ore the Brunswick mill, of 76 stamps, will be left to crush ore from the Yellow Jacket and other of the South End mines. The amount of ore extracted from the Comstock mines last week, and the battery assay values, were as follows:

Mine.	Tons of ore.	Assay value.	
		March 14.	March 7.
Con. Cal. & Virginia.....	1,535	29.20	29.60
Chollar.....	542	16.92	17.50
Overman.....	330	19.18	12.34
Savage.....	440	17.20	17.00
Yellow Jacket.....	280	18.00	....

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—No official news of any new discoveries in this mine has yet been received. The only news of importance is in regard to an increase in milling charges. The contract rate charged by the Comstock Mill and Mining Company for the reduction of ore from this mine was \$7 per ton until the grade of the ore fell so low that the milling company voluntarily reduced the charge to \$5 per ton. The officers of the company say that at this figure, including freight, there is no profit in working the ore, and as the average assay has risen from \$16 to nearly \$30 per ton, the original charge of \$7 per ton will henceforward again be made. The statement that the mill company made



no profit at treating the ore at \$5 per ton will, of course, deceive nobody.

**CHOLLAR MINING COMPANY.**—At the annual meeting of this company held on the 18th inst., no changes were made among the officers or directors. The report showed that during the year the mine had produced bullion of the gross value of \$320,635, of which \$95,697 was gold and \$224,938 silver. The discount on the silver was \$40,307, leaving net cash proceeds of \$280,328. The cost of milling was \$163,653, leaving net earnings of \$116,675. The total receipts amounted to \$369,592, including a balance from last report of \$20,498.82 and an overdraft March 1, 1891, of \$60,553.88. The total disbursements, including milling, were \$369,592. Average yield of the ore per ton was \$13.71. During February 2,150 tons of ore of assay value of \$18.58 per ton were worked. The gross yield was \$25,576, or \$11.90 per ton, and net proceeds \$10,526, or \$4.90 per ton.

**CROWN POINT MINING COMPANY.**—The surface of the water on Saturday, March 14th, was 52 feet (vertically) below the floor of the 1,600-foot level station, nine feet having been gained during the week.

**HALE & NORCROSS MINING COMPANY.**—The annual meeting of this corporation was held last week, when the following officers and directors were re-elected; there being 108,000 shares of stocks voted: H. M. Levy, president; A. K. P. Harmon, vice president; J. Marks, C. S. Wheeler, J. B. Low, Morris Hoeflich and C. P. Egan, trustees; A. B. Thompson was reappointed secretary, and R. P. Keating, superintendent. The financial statement of the secretary showed the receipts of the company during the fiscal year just ended to have been as follows: Bullion, \$279,223.44; three assessments, \$166,519.52; miscellaneous sales, \$19,917.41; certificate tax, \$174.40; overdraft, March 1st, \$768.98; total, \$466,603.75. The indebtedness of the company on the 1st of March amounted to \$14,578.93; being an overdraft at the bank for \$768.98, and \$13,810 due to the Sutor Tunnel Company for back royalties due on ore extracted from the mine. An assessment of 50 cents per share was levied on the stock on the 18th inst.

**POTOSI SILVER MINING COMPANY.**—The east crosscut from the 1,330 level of the winze station is cutting stringers of quartz and bunches of ore. Other crosscuts will be sent east from north and south drifts from the winze station.

**NORTH CAROLINA.**

**GRANVILLE COUNTY.**

A company has been organized to develop the titanium deposits of Mr. J. B. Hunter, which are located near Oxford, in this county, and will commence operations as soon as the weather will permit. An analysis of a sample from this deposit has recently been made by Dr. D. F. Tuttle, of the United States Mint at Philadelphia, with the following results: Titanic oxide, 41.50%; iron protoxide, 28.01%; iron peroxide, 26.70%; manganese oxide, 4.00%.

**OHIO.**

**OIL.**

The Standard and Manhattan Oil companies, it is said, have begun a war in the Findlay (O.) field in shipping fuel oil to manufacturers. In order to crush out the Manhattan the Standard has cut the price of fuel oil to 20 cents a barrel, delivered anywhere. The price to producers remains at 30 cents.

**PENNSYLVANIA.**

**COAL.**

The seven-year-old litigation over the attempt of the Commonwealth to escheat coal lands in Elk and Jefferson counties, as the property of the New York, Lake Erie & Western Railroad Company, was terminated on the 23d inst. by the Supreme Court affirming the judgment of the Jefferson County Common Pleas, which held, as a matter of law, that the ownership of the lands by a corporation known as the Northwestern Mining and Exchange Company, whose capital stock was owned by the railroad company, was not an evasion of the act of April 26th, 1855, forbidding the ownership of land in the State by foreign corporations. Justices Sterrett and Clark dissented.

An exchange states that the suit begun some months ago by Andrew J. Baldwin and John H. Miller, stockholders of the Patterson Coal Company, which employs 1,500 men and boys, against Herbert Hostetter, of Pittsburg, Nathaniel Taylor and Marion F. Scaife, officers and directors of the company, is said to be about ready for court. The litigation involves the control of 2,700 acres of Columbia County coal lands, the regularity of a \$1,073,335 mortgage thereon, and the legality of transfer of nearly \$400,000 in bonds on the part of majority stockholders.

Mallory & Co., operators of the Fairmount and Abbott collieries at Pittston, have filed charges with the Interstate Commission against the Rome, Watertown & Ogdensburg Railroad, in New York State, alleging that the defendant is discriminating against them in coal rates. The complaint claims that the R., W. & O., in connection with the Lehigh Valley, makes a "joint anthracite tariff rate" from the mines to parts on the former road. The Lehigh rendered its bill according to this rate, but the R., W. & O. charged local rates on that part of the road used. This overcharge was so great as to finally drive Mallory & Co.'s customers at Lafargeville and adjoining towns out of busi-

ness, as they were unable to give as low prices as competitors. On 188 tons of coal so shipped the net overcharge amounted to \$350.89.

**PHILADELPHIA & READING COAL COMPANY.**—This company which is said to control 90% of the anthracite coal lands in the Schuylkill region has just secured by a 20-year contract an additional tract of 3,000 acres, capable of producing a tonnage of 15,000,000. A minimum tonnage of 500,000 tons a year is guaranteed to the Reading. The first breaker and colliery, with a capacity of 1,000 tons a day, is completed; and a new line of railroad, starting from Mount Carmel, on the Reading Railroad, to reach the mines will be constructed at once. This large additional competitive tonnage is secured to the Reading, it is said, without the expenditure of a dollar on its part, the expense of constructing the new branch railroad being borne by the owners of the coal lands who will operate the collieries, the Reading allowing the new road a fair proportion of the through rate. This contract, which is in all respects mutually advantageous, will undoubtedly add largely to the Reading's business.

**LEHIGH COAL AND NAVIGATION COMPANY.**—This company has transferred to the Panther Valley Water Company 6,115 acres of land located in Nesquehoning valley, Carbon County. It will be used for the water privileges it affords.

**OIL.**

**CREW-LEVICK COMPANY.**—Advices from War ren state that extensive oil interests have been consolidated under this company. Among those interested are the Muir Oil Company, Glade Filtering Works and the Reidelsperger Bros. The new company is said to own 450 wells in Tioga oil fields. The Glade refineries have a capacity of 1,500 barrels, while the Muir Company has in addition large refineries at Chester.

**SOUTH DAKOTA.**

**PENNINGTON COUNTY.**

(From our Special Correspondent.)

Three prospectors, who have been exploring near the Etta tin mines, uncovered a body of gold-bearing ore which, according to the assays of samples, runs over \$50 per ton. As gold prospects are very scarce in this district this is considered a very important find, and the town of Hill City is wild with excitement. Parties are leaving every day for the scene of the new gold find.

**UTAH.**

**BEAVER COUNTY.**

**HORN SILVER MINING COMPANY.**—Upon inquiry at the office of this company, 56 Broadway, a reporter of the ENGINEERING AND MINING JOURNAL learned that a new body of ore has been discovered in the mine that assays 30 ounces of silver and 50% lead. That the breast of ore exposed by the present working is 30 feet across. The discovery was made in the southwest corner of the property from a new shaft, which is being sunk 150 feet from a second shaft which caved in some time ago. At the 100 foot level a drift is being run towards this caved shaft for the purpose of securing ventilation. When this was in a distance of 60 feet it encountered the ore body referred to.

**JUAB COUNTY.**

**CENTENNIAL-EUREKA MINING COMPANY.**—The output of this company has been contracted to the Hanauer smelter, at Salt Lake City, for six months. The contract is, to a certain extent, optional, no limit being placed on shipments from the mine. There are at present stored in the bins from 700 to 800 tons of ore, which is estimated to assay \$500 per ton. A new hoisting engine is now being erected at the mine and a very large output can be made if the management desires.

**EUREKA HILL MINING COMPANY.**—It is reported that this company will increase its output to 200 tons per day. This company is a close corporation which does not publish its dividends, but it is stated that these are being paid at a very large rate at present.

**SALT LAKE COUNTY.**

**OLD TELEGRAPH MINING COMPANY.**—This company has contracted to furnish the Germania Lead Works at Salt Lake City 600 tons of first-class ore per month during the present year. This leaves the company with its second-class ore and the surplus of first-class ore over the contract amount for sale in the open market. The mine is now said to be producing better ore than for many years, and the ore improves as depth is attained.

**SUMMIT COUNTY.**

**MASSACHUSETTS MINING COMPANY.**—Mr. M. R. Evans, of Salt Lake City, representing a syndicate of Salt Lake and Park City capitalists, has closed negotiations with the principal shareholders in this company whereby he secures two-thirds of its capital stock, and operations in the mine, which has been idle for some time, will be immediately resumed. The shaft, which is now down 600 feet, will be sunk to a depth of 1,000 feet, when a drift to the vein will be driven. All the machinery necessary for this purpose is on the ground, and as soon as it can be reset the work of sinking will be commenced. Mr. W. M. Curtis, late superintendent of the Anchor Mining Company, who had charge of the Massachusetts when last worked, will again direct its operations.

**VIRGINIA.**

**COAL.**

**POCAHONTAS COAL COMPANY.**—Mr. G. A. Shirey, shipping agent, is reported as having said that this company shipped 186,000 tons of coal during January—the largest monthly output in its history. In February, 186,000 tons were shipped.

**VIRGINIA COAL AND IRON COMPANY.**—This company very unexpectedly made a temporary suspension of its operations in the coal regions recently on account of the bad weather and the lack of railroad facilities. A branch road to the mining property has been let on contract by the Louisville & Nashville Railroad Company, and will be built as early as possible.

**FOREIGN MINING NEWS.**

**AUSTRIA.**

During the past year (1890) 1,220 persons were employed in the mercury mines in Carniola, and the output of mercury amounted to 73,395 tons, of which the value was \$340,000. Of the total amount 92.6% was produced by the state mines in Idria, and the remainder by the St. Anna mines. Of metallic mercury there was an output of 528 tons in Idria.

**BELGIUM.**

A general strike has taken place among the men employed in the collieries and steel works owned by the Cockerills at Brussels. The managers have applied to the authorities at Liege for a force of gendarmes to suppress any outbreaks.

**CANADA.**

**PROVINCE OF ONTARIO.**

**BLACK FOX.**—This mine is located on the line of the Canadian Pacific Railroad, about six and one-half miles east of Tache station. The vein, which runs east and west, passes through the Jumbo and Black Fox locations, and, where exposed, is 30 ft. in width, with every appearance of its continuing downward. The walls are well bed and run with the formation, which is Huronian green trap, dipping from 10° to 20° to the north. Previous to the discovery of the Black Fox and Jumbo all the veins found ran in a northerly and southerly direction and they all appear to be intercepted by this lode. The gangue of the vein consists of very fine grained quartz. It is said that a party of English capitalists is at present negotiating for this property.

**PROVINCE OF QUEBEC.**

**EXCELSIOR COPPER COMPANY.**—For two years this company has been working the well known Harvey Hill mine in Megantic County, and appears, from the account of the meeting published, to have met with no better success than its predecessor. The capitalization, £450,000, was out of proportion to the value of the mine to be worked, and the real—not prospectus—profits to accrue therefrom. The shareholders now do not seem to have much confidence, and the response to the call for £20,000 last April was so small that all subscriptions were returned. It is now proposed to reconstruct the company by imposing on the shareholders a payment in proportion to their several holdings. Two years' work has hitherto resulted in the mining of only 87 tons, and, it is said, that there are no reasons why any sudden change for the better should take place.

**GERMANY.**

Important extensions of the workings in the royal coal mines of the Saarbrück district have already been begun, and will be carried out in the years 1891 and 1892. Eight different sets of workings are to be provided with the newest machinery for increasing the output. In this district complete plants for draining five of the mines, chiefly at deep levels, are being laid down. Several new sets of ventilating machinery are being erected. Electric lighting is to be brought into operation in many cases in the higher levels.

**SOUTH AMERICA.**

**PERU.**

Oilmen are taking a good deal of interest in the recently published reports of the growth in the exportation of petroleum from Peru. In the last six months the case oil trade along the west coast of South America has passed pretty generally out of American hands, and has gone to the Peruvian establishments, which have been turning out oil of about 130° test. The principal company in Peru has had a special steamer, the "Ewo," running up and down the coast for some months, carrying oil to the various ports. Recently it has also chartered another steamer, the "Limari," and put it into service in the same trade.

**SUMATRA.**

The Dutch Indian Government, according to *Industries*, has finally decided to work the extensive Ombilien coalfields in Sumatra itself, and not by granting a concession to private enterprise. It will also construct a railway from the coalfields to the nearest point on the coast for the transport of the output.

**MEETINGS.**

Century Mining and Milling Company, at Room 58, Railroad Building, Denver, Colo., April 1st, at 10 A. M.

Centennial Mining Company, at the office of the company, in Boston, Mass., April 8th, at 12

o'clock noon. Transfer books close April 2d and reopen April 9th.

Phoenix Mining Company, of New York, at No. 35 Pine street, New York, April 17th, at 12 o'clock noon, to determine whether the capital stock of this company shall be increased to the amount of \$600,000 in shares, par value of \$1 each.

Victoria Tunnel Company, at No. 40 Wall street, New York City, April 17th, at 12 o'clock noon.

**DIVIDENDS.**

Horn Silver Mining Company, dividend No. 21, of 12½ cents per share, \$50,000, payable March 31 at the office of the company, No. 56 Broadway, New York City.

Little Rule Mining Company, dividend No. 13, of 2 cents per share, \$10,000, payable March 31st, at the office of the company, in Denver, Colo.

Napa Consolidated Quicksilver Mining Company, dividend No. 40, of 10 cents per share, \$10,000, payable April 1st, at the office of the company, No. 86 State street, Boston, Mass.

Rialto Mining and Milling Company, dividend No. 1, of 1 cent. per share, \$3,000, payable April 1st, at the office of H. S. Morris, 1637 Champa street, Denver, Colo. Transfer-books close March 27 and reopen April 2d.

**ASSESSMENTS.**

COMPANY.	No.	When levied.	D't'ng't in office.	Day of sale.	Amn't per share.
Alliance, Utah.....	12	Feb. 24	Mar. 31	Apr. 20	.10
Belcher, Nev.....	41	Feb. 17	Mar. 24	Apr. 13	.50
Best & Belcher, Nev.....	48	Feb. 17	Mar. 25	Apr. 15	.25
Big Hole Placer, Ut.....	Mar. 10	Apl. 22	May 12	.01	
Confidence, Nev.....	18	Feb. 12	Mar. 16	Apr. 9	.75
Con. St. Gothard, Cal.....	2	Feb. 12	Mar. 31	Apr. 20	.15
Crocker.....	16	Feb. 16	Mar. 20	Apr. 13	.10
Crown Point, Nev.....	34	Feb. 19	Mar. 26	Apr. 16	.50
Gould & Curry, Nev.....	66	Feb. 3	Mar. 11	Apr. 7	.30
Head Center.....	2	Jan. 19	Feb. 19	Mar. 25	.05
Lady Washington.....	8	Mar. 3	Apr. 7	Apr. 28	.20
Martin White, Cal.....	25	Feb. 2	Mar. 6	Mar. 30	.50
Mexican, Nev.....	42	Mar. 9	Apr. 14	May 5	.25
Northern Spy, Utah.....	1	Mar. 6	Apr. 13	May 4	.20
Nevada Queen, Nev.....	7	Mar. 4	Apr. 10	Apr. 30	.15
Savage, Nev.....	7	Feb. 13	Mar. 18	Apr. 7	.50
Silver King, Ariz.....	5	Feb. 21	Mar. 30	Apr. 28	.20
Wood River, Id.....	1	Jan. 31	Mar. 9	Apr. 6	.00½

**MINING STOCKS.**

For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 351 and 352.

NEW YORK, Friday Evening, March 27.

During the week under review the mining stock market lost many of the speculative tendencies so manifest last week. These have given place to a firmer tone that bespeaks an era of activity. In fact there are many indications of an "old time market." Values on the whole have undergone the expected though slight reaction, while the sales of the week will compare in number of sales very favorably with those of last week. The absence of the decided speculative element is manifest in the marked decline in the number of sales and reaction in the price of the Comstocks. With one or two exceptions this factor of the market has been even more quiet than was expected. This general slump proves that speculators are becoming cautious, and that investors are profiting by the warning concerning Comstock mine and mill management set forth in previous issues of the ENGINEERING AND MINING JOURNAL. But the ground lost by the Comstocks is more than secured to the general market by the encouraging front presented by other and more conservative stocks. The values of these have been well maintained. Sales have been heavier than usual, and a wide inquiry which is coming in from all parts of the country indicates an active future.

The Sutter Creek Mining Company, the affairs of which were recently turned over to the Belmont Gold Mining Company—as noted in our columns at the time—has been struck from the active list of the Consolidated Exchange.

The total sales for the week aggregated 178,738 shares, of which 11,593 shares were of dividend-paying stocks. The Exchange enjoyed a holiday on Friday, the 27th, in observance of Good Friday. In consequence the volume of business was reduced one-sixth. The sales for the corresponding week of last year were 111,238.

A summary of the transactions in the Comstocks is given as follows: 100 shares of Argenta, which received its last quotation in November of 75c., sold on Wednesday at 15c. Consolidated California & Virginia was remarkably quiet during the period under review, as compared with the previous week. Only 500 shares changed hands. As will be remembered, it reached its highest figure on March 17th, selling at \$14.33, from which price it rapidly declined to and closed at \$10.75. It opened the week on Monday at \$10.33; regaining its lost ground in a measure, it closed on Wednesday at \$11.13. The stock cannot be considered to have been a feature of this week's market.

Two small lots of Hale & Norcross sold at \$2.25 and \$2.45, as against \$2.20 of two weeks ago. North Belle Isle was in the market on Saturday to the extent of 158 shares at 90c. The last quotation which this stock received was 40c. on January 17th. Ophir sold on Saturday at \$5.50. This is a decline of \$1.25 from its last sales, which occurred on March 17th. Its holders very wisely pulled the stock out of the market after having made sales of 100 shares. Savage was another stock very lightly dealt in; 100 shares sold on Tuesday at \$2.70, as against \$2.50 of last week. Yellow Jacket is to be credited with a 100-share sale at \$3; a net loss of \$1. Three hundred shares of Alta changed hands in two sales at 90c. Its previous quotation was 95c. Best & Belcher suffered a marked reaction during the week, opening at \$7.53, as against a closing price of \$8.75 last week. One subsequent sale brought it to \$3.50, its closing quotation. Bullion was last quoted on Feb. 28th, at \$2.40. It opened the week at \$3.70, dropped to \$2.40 on Tuesday, and recovered and closed at \$3.60 the day following. It experienced sales of 500 shares. Chollar sold 100 shares at \$2.85 on Tuesday, a net loss of 45c. The Comstock Tunnel bonds and scrip were decidedly the features of the market. The former was remarkably active, and on values somewhat lower than those of the previous week. It opened at 31c., experiencing its ups and downs between the quotations of 29c. and 40c., closing on Thursday at 32c.; 65,450 shares were exchanged in the transactions. The bonds maintained a fairly uniform price; 40 was the quotation early in the week, the closing 41; 18,000 shares changed hands. The scrip opened on Monday at 40, as against 45 of the previous week's closing. It remained quiet during the middle portion of the week, closing today at 44. Occidental led a remarkably active career on very small sales. Up to Wednesday the average price was \$1.15; on this date it rose to \$1.25, a figure at which it closed. It experienced sales of 1,100 shares. Potosi sold 200 shares on Wednesday at \$5, a decline of 50c. Scorpion opened the week at 40c., rising to 45c. on Tuesday and Wednesday, as against 55c. of the previous week's closing. Its sales were light. Utah, in transactions of 400 shares, sold at the uniform figure of \$1.20. This is to be compared with \$1 of the week previous. There seemed to be a mania for 100-share sales in the Comstocks. Of these the addition to those we have already noted, we credit Exchequer with a sale of \$1.25 on Tuesday; Mexican at \$4.30 on Wednesday, as against \$4 in the previous week; Oriental & Miller, on Wednesday, at 3c., a loss of 2c., and Overman at \$2.75 on Tuesday, a gain of \$1. Julia experienced one sale of 200 shares on Tuesday at 37c., a gain of 10c. Silver Hill is to be credited a 200-share transaction on Tuesday at 35c.

Of the California stocks we note: Bodie entered the market on Tuesday after a month's absence, selling at \$2.25, as against \$1.10 its last previous quotation. The figure was evidently too high, and on a small sale to-day it dropped to \$1.20. Bulwer on light sales lost 2c. selling at 38c. Plymouth which sold on March 5th at \$2 entered the market on Monday at \$1.80; sales, 100 shares. Standard displayed a slight rising tendency; the quotation being \$1.45 and \$1.55 on light sales, as against \$1.40 of last week. Astoria had no difficulty in maintaining its last week's quotation of 1c. on sales of 6,000 shares. Belmont was in much less quest than it has been at any time since it was listed. Its price was well maintained. It closed at 41c., as against 40c. of the previous week.

Brunswick, that stock of many ups and downs, this week "went into a decline." It opened at 2c. and shot down to 9c.; recovering to and closing at 10c., as against 13c. of last week. Sales were moderately active.

Middle Bar enjoyed an exceptionally active career. It sold 57,100 shares at prices ranging from 1c. to 4c. Its closing may be given as 4c., as against 3c. of last week.

Syndicate is to be credited with a marked rise. It was traded in to the extent of 1,000 shares on Saturday only, selling as high as 20c., as against 10c. of last week.

The sales in Colorado stock were confined during the week to the dividend-paying properties exclusively, and Chrysolite sold on Saturday at 20@25c., to the extent of 600 shares. Freeland entered the market yesterday at 10c., as against 18c. of last week. Leadville Consolidated to-day sold 1,000 shares at 10c., a loss of 2c. Little Chief was moderately active on small sales, opening at 34c., and closing at 36c., a net gain for the week of 4c., on sales of 3,100 shares. Small Hopes experienced a 100 share sale to-day at 75c.; its last quotation was on February 6th at 87c.

We note several sales of South Dakota stocks: Caledonia was in the market to-day with 400 shares, at the maximum and minimum quotations of 75c. and 85c. It was last quoted on March 19th at 60c. Iron Hill sold 200 shares at 30c. Its last quotation on February 6th was 40c. Father de Smet, which has been out of the market since December, was quite active. The stock has been generally inquired for during the past three months, bids running as high as 25c. There is evidently a movement on the part of insiders to gather in as much as possible of this stock. It brought out 1,300 shares at 27c., 31c., 40c. and 41c.; 40c. being the closing.

Of the copper stocks one solitary transaction is

to be noted, being that of Calumet & Hecla on Saturday, at \$260.50. It was quoted in Boston to-day at \$261; 20 shares were traded in.

Of the Montana stocks, Alice sold 700 shares at \$1.70@1.75 on Saturday. Granite Mountain entered the market on Saturday for the first time in this year in the form of a "job lot" of 40 shares. Its opening quotation was \$25.50, from which figure it dropped to \$24.75 on Monday.

Horn Silver, which closed last week at \$3.25, suffered a marked decline on Tuesday, the first ex-dividend sales having taken place on that date. The quotation was \$3.10. Wednesday it dropped to \$2.88, recovering to-day its opening quotation. If the reader will consult our mining news columns he will learn a point of much interest concerning this property.

El Cristo, of South America, sold at 45@50c., as against 40c. of last week. Mutual Mining and Smelting maintained its usual quotations of \$1.45 @ \$1.50 on sales of 1,400 shares. San Sebastian sold 800 shares at 80c. Holyoke, of Idaho, 100 shares at 3c.

Phoenix, of Arizona was very active during the week. It opened at 34c., rose as high as 45c. on Wednesday, closing at 44c. to-day, against 37c. of last week. The sales amounted to 4,200 shares. We understand that negotiations are pending by this company to increase the milling plant to 90 stamps and put in water power upon terms exceedingly advantageous to the stockholders. A meeting will be held April 17th at the office of the company, for the purpose of increasing the capital stock from \$500,000 to \$600,000. This additional stock will be used for the purpose of securing the adjoining claims.

Silver King figuratively speaking has "gone to the dogs." It is encumbered with the 20 cent assessment, in the face of which it closed last week at 7c. Transactions during the present week have been at 40c. Its sales amounted to 1,400 shares, assessment still unpaid.

Boston. March 26.

(From our Special Correspondent.)

There is a decidedly better feeling prevailing in the market for copper stocks, and it now looks as if bottom prices have been made, and that more activity and a higher range of values were among the probabilities of the near future.

The copper stocks have always been favorites for speculative purposes in this market, and the prospect of increasing activity is hailed with pleasure by both brokers and clients.

Allouez has been in good request this week, and advanced from \$2½ to \$3½.

Atlantic started at \$15, and on good buying orders and small sales advanced to \$16½ to-day.

There was a better demand for Boston & Montana, which advanced to \$43, a gain of \$1½ for the week.

Butte & Boston, after selling down to \$14 early in the week, started up to-day with the tide, and sold at \$15.

Calumet & Hecla has been very strong all the week at \$260, with an occasional sale at \$260½.

There was some disposition to sell Centennial on the report of the directors, which was not considered very favorable, and sales were made at \$15½, but the better feeling prevailed, and to-day it sold up to \$16½.

Kearsarge also felt the influence of the higher market and sold up to \$14, with a reaction to \$13½, a net gain of \$2¼ for the week.

Franklin, on the good showing in its annual report just issued, notwithstanding the recent fire, which depressed the price to \$14½, was very strong, and shows an advance to \$17½, with a small lot at \$18. The loss by the recent fire is fully covered by insurance.

Osceola sold up to \$38, a gain of \$2½ for the week.

Quincy sold at \$98½@99, the same as last week. The hearing in the Pewabic suit has been postponed to April 2.

Tamarack sold to-day at \$145½; first sale for the week.

Santa Fe was quite active early in the week at 50@60c.

National sold to-day for the first time this month at \$2½.

Arnold sold at 60c., and Bonanza at 50c. Huron, which sold on February 12th at \$3¼, sold down to \$1½ on the report of the directors for the four years passed, which does not make a very good showing.

3 P. M.—The market closed steady and prices firm.

San Francisco. March 19.

(From our Special Correspondent.)

The mining stock market has been livelier during the past week than for a very long time, and it has seemed, judging from the large sales and the rapid advance in values, as if the booming time of 1886 was about to be repeated. The following sales were made in the San Francisco Board, regular sessions, during the week: Thursday, 12th, 68,745 shares; Friday, 13th, 47,000 shares; Saturday, 14th, 16,150 shares; Monday, 16th, 60,305 shares; Tuesday, 17th, 60,995 shares; Wednesday, 18th, 52,325 shares. Equally large sales were made between sessions. What percentage of these

transactions were bona fide and what were "wash" sales is matter of doubt however.

Consolidated California & Virginia, that led the advance in prices last week, has surrendered the lead to Best & Belcher, that stock astonishing everyone by selling for \$4.70 on Saturday last, and climbing to \$6.87 1/2 on Monday, \$7.12 1/2 on Tuesday, and touching the \$8.62 1/2 point yesterday. The mine has never paid a dividend but has swallowed up over \$2,250,000 in assessments, and as the news from the mine tells of no ore development it is a foregone conclusion that the stock is being carefully manipulated.

Consolidated California & Virginia seems to have reached its resting point, for the present at all events, and has fluctuated each day during the current week between \$11.25 and \$13.62 1/2; the tendency being, however, to hover around the former rather than the latter figures. The slight decline in the battery assays this week, and the advance in the cost of reduction, with the absence of anything especially new from the mine, are the reasons assigned for the stoppage in the advance which was so marked last week. Nevertheless, with the stamps at the Morgan & Eureka mills dropping on Consolidated California & Virginia ore, and the promise of a double hullion product, the opinion on the street is that the bonanza stock is likely to rise to higher figures than any quoted so far.

Potosi, Bullion and Chollar, the group of stocks that act and re-act sympathetically upon each other, have, while participating in the general advance, been comparatively steady. Potosi has fluctuated considerably, but every day so far has recovered to \$6, which figure in the present condition of the market appears to be the standard. A week ago Bullion sold for \$2.15, and the highest point touched since was during the excitement on Monday, when considerable sales were made at \$2.80. Chollar has shown up somewhat better. A week ago the ruling price was \$2.55, and yesterday it was quoted at \$3.40.

The North End stocks have made the greatest advances with the one exception noted. Ophir closed on Saturday at \$4.60, sold to \$5.75 on Monday and was ruling yesterday at \$6.62 1/2. Mexican closed last week at \$3.10 and was ruling yesterday at \$4.55.

Sales of large blocks of the low-priced stocks have been made during the week at relatively larger advances than in the more important of the Comstocks. A week ago Consolidated Imperial sold for 15c, and was ruling yesterday at 30c., an advance of just 100%.

Advantage is being taken of the opportunity afforded by the enhanced values of stocks to bring out all the practically defunct concerns that have not been heard from for a long time. Among the number are the East Best & Belcher and the North Gould & Curry, which have not done any work for a long time. Their claims are located some 1,200 feet east of the Consolidated California & Virginia mine, and as no mineral has been found in drifts run east of the latter, their value is considered extremely doubtful. East Best & Belcher, however, has been selling this week for 50c. and North Gould & Curry for 55c. per share.

Denver.

Prices and sales for the week ending March 21st, 1891:

Table with columns: Company, Open ing., H., L., Clos. ing., Sales. Lists various mining companies like Alleghany, Amity, Bangkok-C-B, etc.

Total. 270,000. Buyer 30. †Buyer 60. a Asked. b Bid.

In Aspen, Mollie Gibson shares have risen to \$2 during the week and this price has been refused for several large lots. At \$2 these shares are selling at par, representing a market value of the mine of \$2,000,000.

Salt Lake City.

PRICES AND SALES FOR THE WEEK ENDING MARCH 21, 1891.

Table with columns: Name and Location of Company, Open ing., High est., Low est., Clos. ing., Sales. Lists companies like Alice, Mont, Alliance, Utah, etc.

Lake Superior Iron Stocks.

(Special Report by A. M. Heimer, Milwaukee, Wis.)

Table with columns: Name, Price, Location. Lists iron stocks like Ashland, Cleveland, Vermillion P. & I., etc.

St. Louis. March 25.

(From our Special Correspondent.)

The St. Louis mining market has but little business to show for the past week. Trading was not carried on as actively as it has been of late, and the business, such as it was, was divided between two or three stocks only.

Despite the encouraging reports from the Granite Mountain the stock is hid below the opening price, although the tendency among some few has been to not allow the stock to depreciate below par (\$25). During the week 40 shares were sold at \$24.75 @ \$25. The opening quotation was \$24.75, but soon advanced to \$25, where it remained most of the week. On Tuesday the stock fell to the closing quotation, \$24.50. Though the company was in receipt of a very encouraging report from Superintendent Weir, it had little effect on the market. The weekly shipments of the property amounted to 39 bars, containing 51,800 ounces of silver and 100 ounces of gold.

Breen was in high favor this week and sold briskly at advancing prices. Opening at 63 3/4 c., it rose steadily till 80c., when it suffered a reaction and declined until 70c. was reached, at which figure it closed. During the week 10,700 shares changed hands, of which all but 2,000 shares were sold at or above 70c. There is no apparent reason for the improvement.

Elizabeth was another stock which improved by the week's business and had a strong advance on a firm market.

The stock opened at \$1.90 and soon fell to \$1.85; regaining its opening quotation it steadily advanced to \$1.95 to \$2, and then to \$2.05, but could not long remain at the latter figure, declining soon afterward to the closing price, \$2. The advance is due to the encouraging news from the mine. The total sales amounted to 2,450 shares.

Central Silver opened at 5c. and closed at 6c. The business for the week was only fair and fell off greatly toward the latter part. Total sales aggregate 4,700 shares, of which amount only 100 sold at 6c. and 1,400 sold at 4 1/2 c.

Silver Age was one of the stocks to fall off in price, and is now quoted at 7 1/2 c. below the opening bid. On the opening call the stock was hid at \$1.97 1/2, and later on advanced to \$2.25, when 200 shares were sold. From then on the stock rapidly declined, falling first to \$2, then to \$1.95, and then to the closing price, \$1.90.

Gold King had a sale this week of 700 shares at 10c., but the market is very quiet and the stock is in small demand.

Montrose opened at 77 1/2 c. and closed at 80c. Sales amounted to 300 shares at 82 1/2 c.

Little Albert astonished the exchange by coming into very strong demand. Until lately the stock has been little sought after and for the greater part of the week it stood inactive at 5c. On Monday there was a change in the market and the stock was forced into prominence by a sale of 5,000 shares at 8c. This was followed Tuesday by a sale of 7,700 shares at 7c. @ 9c. The market closes firm at 8 1/2 c.

American & Nettie had a sale of 100 shares at

23 1/2 c. This stock opened at 27 1/2 c. and closed at 22 1/2 c.

Bimetallic opened at \$31.25 and closed at \$31.75; no sales.

Adams remains firm at \$1.67 1/2, with no sales. Yuma advanced from 53 1/2 c. to 57 1/2 c. Reports from the mine are encouraging, but no sales were made.

PIPE LINE CERTIFICATES.

(Specially Reported by Messrs. Watson & Gibson.)

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

Table with columns: Opening, Highest, Lowest, Closing, Sales. Lists dates from Mar. 21 to 27.

Total sales in barrels. 71,000

NEW YORK STOCK EXCHANGE.

Table with columns: Opening, Highest, Lowest, Closing, Sales. Lists dates from Mar. 21 to 27.

Total sales in barrels. 14,000

\* Holiday.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 27. STATEMENT of shipments of anthracite coal (approximated) for the ten days ending March 21st, 1891, compared with corresponding period last year.

Table with columns: Regions, Mar. 21, 1891, Mar. 22, 1890, Difference. Lists Wyoming Region, Lehigh Region, etc.

PRODUCTION OF BITUMINOUS COAL for week ending March 21st and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

Table with columns: Week, 1891, Year, 1890. Lists Phila. & Erie R.R., Cumberland, Md., etc.

\* Estimated † Week ending March 14th.

WESTERN SHIPMENTS.

Table with columns: Shipments, 1891, 1890. Lists Pittsburg, Pa., Westmoreland, Pa., etc.

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending March 21st, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 34,040 tons; year, 737,157 tons; c. r. corresponding date in 1890-1, 291,579.

Anthracite.

The sales agents held a meeting on the 23d inst. at which spring prices were fixed. The trade outside the "inner circle" had been led to believe that nothing of the nature of a spring price would be named until the 31st inst., and had ordered its action accordingly. There is said to be a good and sufficient reason for this somewhat precipitous action, namely, that a certain large corporation threw a large supply of coal on the market at a figure considerably under the pool schedule, claiming it to be stock coal, and in consequence that no compact was violated in so doing. Under these circumstances a new schedule was called for, and one was had. These spring prices have supplanted the interest of last week in the decision of the Interstate Commerce Commission in the case of Cox & Bros. There seems to be a wide diversity of opinion concerning them. Some say they are too high, others that they are low enough; but all are unanimous on one point, viz., that there is not much money in coal at that price, and that the chronic rate-cutter will be the loser if he shows his teeth. They are to rule during the month of April, and are given as follows: Free burning, tide water, f.o.b. broken, \$3.50; egg, \$3.60; stove, \$3.75; chestnut, \$3.50. Lehigh coals: Packer and Spring Mountain, Highland, Logan, Wyoming, Free Burning, for broken, \$3.75, \$4.15, \$3.50, \$3.50, respectively; egg, \$3.75, \$3.75, \$3.60, \$3.60, respectively; stove, \$3.75; chestnut, \$3.50; pea, \$3, \$3.25, \$3, \$3, respectively; huckwheat, \$2, Reading coals; Hard white ash, free white

ash, Lyken's Valley, broken, \$3.75, \$3.65, \$4.50, respectively; hard white ash, free white ash, Shamokin, Schuylkill red ash, North Franklin, Lorbey, Lyken's Valley, egg, \$3.75, \$3.65, \$3.85, \$3.85, \$3.75, \$4.75, respectively; stove, \$3.75, \$3.75, \$4, \$4, \$3.75, \$4, \$5, respectively; chestnut, \$3.50, \$3.50, \$3.65, \$3.65, \$4.25, respectively.

These prices are considerably above the spring prices of last year and below those of previous years. We make a comparison in the following table, free burning coals, f. o. b. net:

	1891.	1890.	1889.	1888.
Broken.....	\$3.50	\$3.75	\$3.60	\$3.00
Egg.....	3.60	3.35	3.75	3.85
Stove.....	3.75	3.50	4.00	4.15
Chestnut.....	3.50	3.25	3.75	3.10

It was hoped by many that these prices would be made sufficiently low to stimulate present buying. The trade evidently expected prices as low as those of last year, and having been disappointed, is hoping for them during the month of May. Consequently buyers are not in the market except for present needs. It will not require a very extensive retrospective glance or consideration of ruling conditions to realize that the spring trade in hard coal is gradually undergoing a change. Under former conditions, spring prices, so called, were made in order to induce those having storage room and money or credit to buy coal to avail themselves of early prices and lay on stocks for future use, and so enable the colliers to operate when there was no immediate demand for the product. This speculative inducement to the buyer is less regarded, from the fact that rail shipments have become so universal that stocks of coal are now carried in first hands. Hence we everywhere meet the hand-to-mouth policy.

On the other hand, that element of the trade which deprecates the fact that spring prices are not as high as they have been in previous years should not forget that a powerful factor which is at work has commenced in recent years to manifest itself very strongly, namely, the displacement of anthracite steam sizes by bituminous. Figures published in these columns from time to time have shown the enormous rate at which the former is being crowded out by the latter. The reasons are many and are not hard to determine. Principal among them is the fact that the bituminous supply has been less interrupted, and is practically of one size and quality. Its superior steam-generating qualities are generally conceded.

In consideration of these and other conditions it would seem that the sales agents showed their wisdom in the prices fixed. A month added to the consuming season will surely disclose to all parties the future of the trade, and at the opening of May a price that is demanded can and will be fixed. The sales agents at their meeting lined up on the subject of restricted outputs with commendable grace. Most of those who had exceeded their percentages during the first half of the month very meekly agreed to work on half or third time during the balance, and all that the April output must be restricted to 2,000,000 tons. Those acquainted with the wholesale coal trade know how difficult it is for the individuals in control of it to control themselves. At each meeting, however, additional progress is reported and fresh courage imbued. It is believed that by the time the summer market is in full swing there will not be a great deal to fear from over-production.

Concerning the decision in the case of Coxe Brothers & Co. vs. the Lehigh Valley Railroad Company, which was fully reported in these columns last week, there have been no new developments. There is a manifest disposition on the part of all other companies to urge the Lehigh to a fight. If it is decided to contest the decision, the actual effect on the trade will, of course, be delayed until a final settlement is reached. In the meantime, that feeling of uncertainty which has existed in the trade for some time will continue unchanged. No action will be taken until April 20th.

The output for the year on March 21st was 7,356,799, an increase of 1,694,762 tons over the previous year, and within 143,201 tons of the total fixed for the period, with a week yet to hear from. The increase for the week over the corresponding period of last year was 100,281 tons, against an increase of 142,644, as compared with the week ending March 14th.

The retail trade of the local market is so closely allied to and controlled by the general situation that very little in addition to the preceding can be said concerning it. The month with its coal consuming winds has been hardly as March like as was anticipated. Possibly expectations were placed too high, as a fair consumption is reported. Prices, it is said, are being well maintained among retailers.

#### Bituminous.

The soft coal market is much more definite in its tendencies than it has been since the railroads announced that an advance in tolls would go into effect April 1st. As predicted, this feeling of stability came with the official announcement of the railroad rates. All elements of the trade are beginning to take their bearings and are realizing that there is something tangible upon which to base their operations. This belief, however, is not yet acting upon the market to any marked degree, the waiting policy so long practised being the rule. Nevertheless, the trade has reached that point where every

little helps, and encouragement is felt. The new rates all show more or less of an advance, both to points on and off the companies' lines. From the very complicated schedules we note the following changes of general interest: On the Pennsylvania Railroad to Philadelphia for reshipment, an advance of 20c., to New York 15c. Rates from the mines to Philadelphia for local delivery remain unchanged, presumably because the railroad controls this market. On the Baltimore & Ohio to Baltimore for reshipment the advance is 20c. The advance to Norfolk and Newport News is 10c.

Contracts, few in number, are being taken, and at seaboard prices. The contracting period this year is much behind that of last. The delayed contracts are sure to be made in time, and it is believed that the great majority of buyers who have been holding off will soon find their way into the market; not, however, until they have settled to their own satisfaction that prices are not to be lower than those fixed by the Seaboard Association. There is afloat the usual spring rumor of rate cutting, said to come principally from the East. Investigation has proved that there is but little ground on which to base these statements. In fact, the parties to the Seaboard Association's agreement seem to be living up to their promises. Eastern buyers are showing more than their usual conservatism by covering their contracts with vessel owners.

It is reported that ocean-freight contracts will not be any higher than those of last season. Just at the present time there seems to be a dearth of tonnage, and rates have taken a bound. We quote: From Philadelphia to Sound ports, \$1; to eastern ports, \$1.10. From Baltimore to Sound ports, \$1.05@ \$1.10; to eastern ports, \$1.15@ \$1.20. Fleets are reported on their way to lower ports. The local market is very quiet. Prices are no better than they were last year; \$3.35@ \$3.40 alongside in the harbor, with 5c. off on large contracts, are the figures quoted.

The threatened labor troubles are just at present agitating the public mind. The operators of the Cumberland district are congratulating themselves over the fact that their miners refuse to take any part in the labor meeting held in Cumberland on the 18th inst., a notice of which appeared in our issue of the 21st inst. They claim that their men are well cared for and are contented. The Clearfield contingent, which was present at the meeting, held a secret session at the same time and place, the results of which have not been learned by the public.

The coke strike seems to be weakening. It is claimed to be in the hands of the iron men, and that this class, in consideration of a stagnant iron market, is in no particular hurry to bring it to an end, except on its own terms. The Connellsville *Courier* thinks there has been manifest a break and advises the strikers to "come down gracefully." The production of coke for the week ending the 21st was 10,000 tons. This week the estimated output was about 12,000. The price is nominally quoted at \$2@ \$3.

#### NOTES OF THE WEEK.

Navigation opened for the season on the Schuylkill Canal March 23d. The canal is said to be in good condition for the season's coal traffic.

A circular signed by Samuel Gompers, President of the American Federation of Labor, has been addressed to the trade and labor unions of America, and urges the necessity of immediate action in the collection and contribution of funds for the 150,000 coal miners whose struggle for an eight-hour day is to begin May 1.

The last regular meeting of the Retail Coal Exchange was held on Friday last. It was announced that the retail trade of the upper west side of the city had organized a grievance committee, whose duty it is to settle all local grievances without being compelled to wait for a meeting of the Exchange. Action was taken to organize a committee having similar jurisdiction on the upper east side. A resolution was also adopted appointing a committee whose duty it should be to arrange for the annual excursion of the Exchange.

The Philadelphia *Inquirer* is authority for the statement that the individual coal operators of the Lehigh, Schuylkill, and Wyoming regions are arranging to hold a general convention some time next month for the purpose of discussing the affairs of the trade from their standpoint, particularly in the light of the new state of affairs brought about by the Coxe decision. Diligent inquiry among this faction of the trade having headquarters in this city failed to elicit any definite information concerning this proposed gathering, although the prevailing opinion was that such a meeting would be held.

It is announced that a sliding scale has been adopted in the Connellsville coke region, and that in consequence the strike has been in a measure broken, and is likely to be ended entirely. It has already resulted in resumption of work at 10 of the 17 plants of the Frick Company. The scale is based on \$1.75 coke, the workmen being paid more than half of every 10 cents additional that may from time to time be added to the price of coke. Among the works in partial operation are the Morewood, West Redstone, and Jimtown, three of the largest plants of the Frick company. The mutual works of the United Coal and Coke Com-

pany started in full, as did the Coalbrook works of the McClure company. The first shipment of coke made by these companies since the strike left the region on the 26th inst. The McClure Coke Company, at Scottsdale, Pa., has posted notices at all its plants that it desires its men to return to work at what is understood to be equivalent to a 7% reduction, with the assurance that mining will not fall lower than \$1 per 100 bushels. They offer a sliding scale, and state that if coke increases to \$2.15 they will pay their men the old rates.

The trustees of the bondholders of 1844 of the Chesapeake & Ohio Canal are making their final arrangements for having the canal in operation by May 1st, as required by the order of court. The trustees are Messrs. John K. Cowen, Bradley S. Johnson, Hugh L. Bond, Jr., H. H. Keedy, of Hagerstown, and Jos. Bryan, of Richmond. All the trustees except Mr. Bryan were present at a meeting held in the Baltimore & Ohio Central Building on the 19th inst. to pass on the bids received for repairing the canal and to consider other matters looking to its restoration and operation. General Manager Henry C. Winship was authorized to make contracts with the various bidders, the work to be done by sections. The trustees also adopted a form of guarantee which they will give to owners of boats to insure them an opportunity of earning with their boats the amounts expended in putting them in repair. The contracts will require that the work be completed by May 1st on the part of the canal between Williamsport and Cumberland. On the rest of the canal the work is to be completed by May 1st if possible, or as soon thereafter as can be, and not later than three months from the date of the contract in any case. The work will be in charge of Chief Engineer H. D. Whitcomb, who has been engaged all the winter in conducting the necessary engineering work and making complete specifications and estimates. The estimated cost of the work under the bids is \$250,000. The operation of the canal will give the Cumberland district an additional outlet, although under the management proposed—that of the 1844 bondholders—it will doubtless pool issues with the Baltimore & Ohio Railroad Company. The Washington & Cumberland Railroad Company is seeking through the courts to condemn the bed of this canal with a view of constructing a railroad thereon. The canal owners have met a second obstacle in the nature of two judgments amounting to \$33,000, with interest, in favor of the estate of Samuel D. Brady. These judgments were rendered in 1844 prior to the Assembly act, under which the 1844 bonds were issued. As they are prior liens the attorneys for the plaintiff complain that they must be met by a settlement, or a court sale of the canal.

Boston, March 26.

(From our Special Correspondent.)

The action of the sales agents in adjusting the new prices at the meeting in New York on Monday last was a surprise to coal men in this vicinity. It was deemed a certainty that the new prices would not be made until the end of the month, and their announcement on Monday was wholly unexpected. The new spring prices have rather capsize those of the trade who were handling their transactions with a surety that no change would be made until April 1. The demand continues small, and the market is unsettled. The new prices, which are a little in advance of those which prevailed last spring, are not taken to kindly by the buyers, who are slow to believe that they are permanent figures. Dealers anticipate good demand when the market straightens itself, and claim that with the curtailed production prices will be maintained.

The bituminous situation remains easy. The question of contract occupies the attention of agents; they are all out in open competition for what is going, but this is very little, as buyers are not willing to deal in the present market. It is expected that April 1st will bring them out, and in all probability none of the large contracts will be awarded until then. Most of the gas companies have fair supplies, and they propose to use up their old stocks before making any purchases. Freights are easy. The dull condition of the market forced a decline. From New York, 55c@ 60c. is quoted; from Baltimore, \$1@ \$1.10, and from Philadelphia, 90c@ \$1. Several large vessels have been contracted for this port at figures considerably lower than these.

The demand for coal at retail is good, and the conditions are favorable to its continuance for a while.

The receipts of coal at this port for the week ending March 21st were 27,875 tons of anthracite and 39,327 tons of bituminous, against 21,906 tons of anthracite and 12,681 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 234,275 tons of anthracite and 279,486 tons of bituminous, against 182,325 tons of anthracite and 198,083 tons of bituminous for the same period last year.

Buffalo, March 26.

(From our Special Correspondent.)

The following is from the advance sheets of the annual statement of the "Commerce of Buffalo," compiled by Mr. William Thurston, the secretary of the Merchants' Exchange. It contains a summary of the coal trade of the port of Buffalo for 1890, with comparisons of preceding years: The anthracite and bituminous coal trade of this

city for the past three years is shown by the following figures:

IMPORTS BY CANAL.			
	1888.	1889.	1890.
	Tons.	Tons.	Tons.
Anthracite	149,474	109,885	41,266
EXPORTS BY CANAL.			
Bituminous	7,452	11,673	25,872
IMPORTS BY LAKE.			
Bituminous			
EXPORTS BY LAKE.			
Anthracite	2,541,905	2,151,670	2,152,810
Blossburg*	5,000	5,000	5,000
IMPORTS BY RAILROADS.			
Anthracite*	4,339,541	4,237,685	4,308,424
Bituminous	1,892,823	2,198,327	2,344,467
Blossburg*	22,500	22,500	25,000
RECAPITULATION.			
Total imports anthracite	1,549,015	1,338,570	4,349,690
Total imports bituminous	1,892,823	2,198,327	2,344,467
Total imports Blossburg	22,500	22,500	25,000
Total exports bituminous	7,452	11,673	25,872
Total exports anthracite	2,541,905	2,151,670	2,152,810
Total exports Blossburg	5,000	5,000	5,000

The following were the circular wholesale prices of anthracite coal during 1890 per gross ton:

FREE ON BOARD VESSELS.			
	Grate.	Egg.	Stove. Chestnut.
April 14	\$4.50	\$4.55	\$4.55
July 1 to close	4.55	4.80	4.80
ON CARS AT BUFFALO OR SUSPENSION BRIDGE.			
	Grate.	Egg.	Stove. Chestnut.
Jan. 1	\$4.50	\$4.75	\$4.75
Oct. 1 to Dec. 31	4.75	5.00	5.00

The retail prices of anthracite per 2,000 pounds, delivered in the city limits, during the year, were as follows:

	Grate.	Egg.	Stove.	Nut.	Pea.	Bloss-
January 1st	\$5.00	\$5.00	\$5.25	\$5.25	\$3.75	\$4.00
May 1st	4.50	4.75	4.75	4.75	3.75	4.00
October 1st to December 31st	4.75	5.00	5.00	5.00	3.75	4.00

The range of prices during 1890 for bituminous, delivered to manufacturing, gas works, propeller lines, etc., was from \$2.10 to \$2.60 per net ton, in ear lots, according to description; the price at retail, for family use, was \$6 per net ton, delivered.

About 300,000 tons of anthracite and 3,000 tons of bituminous coal were consumed by families in this city during 1890.

The shipping docks and coal pockets at this port are:

Name.	Av shipping cap'y daily, tons.	Av. cap'y of pockets, tons.
Western New York & Penna. R.R.	2,500	3,000
Del. & Hudson Canal Co.	3,500	5,000
Delaware, Lackawanna & Western R. R.	3,000	4,000
J. Langdon & Co. (with Reading docks)	6,000	12,000
Lehigh docks, Nos. 1 & 2	6,000	12,000
Erie docks (N. Y., L. E. & W. R.)	2,500	3,000
Pennsylvania Coal Co.	3,000	3,300
Reading docks	7,000	6,500
Totals	27,500	36,800

Outside the city limits at Cheektowaga is the stocking coal-trestle of the Delaware, Lackawanna & Western, with a capacity of over 100,000 tons storage. Also, at the same place the Lehigh has its trestles and stocking plant of 175,000 tons, storage capacity, with a shipping capacity of 3,000 tons daily; and has nearly completed a transfer trestle for loading box cars, with a capacity of 100 cars daily. And at the same point the Erie has a stocking plant, with average daily capacity of 1,000 tons and storage capacity of 100,000 tons. The Reading has a 160 pocket trestle at Cheektowaga 1,000 feet long, with a storage capacity of 350,000 tons and a daily shipping capacity of 5,000 tons. The structure is covered with an iron roof; four Brown hoists are in operation. This company has also, at the foot of George street, in this city, a large trestle and pocket for the convenience of the retail trade, and in connection with their docks, with a capacity of 2,000 tons.

The Buffalo, Rochester & Pittsburg have terminals on Ganson and Michigan streets, fronting on the Blackwell Canal, with a water frontage of 1,100 feet; also a town delivery yard, with a hoisting plant for loading and coaling vessels.

The distribution of exports of coal by lake from this port during the year 1890, as ascertained by an examination of the daily reported list of departures, was as follows:

Chicago 936,330 net tons, Milwaukee 415,945, Toledo 111,050, Racine 32,800, Green Bay 16,890, Superior 188,050, Saginaw 11,840, Kenosha 5,750, Manitowoc 5,790, Menominee 600, Serpent River 55, Dover 250, Ludington 1,150, Perry Sound 230, Kincardine 1,100, Detroit 32,520, Ashland 11,250, Washburn 8,300, Duluth 131,400, Gladstone 29,610, Hancock 2,800, Escanaba 3,060, Houghton 3,110, Alpena 900, Au Sable 250, Muskoka 20, Windsor 3,300, Huron (Ohio) 290, St. Clair 1,820, Port Burwell 35, Port Stanley 50, Lake Linden 550, Bay City 6,610, Fort William 6,350, Marquette 16,300, Ontonagon 100, Port Rowan 30, Cheboygan 1,630, Amherstburg 750, Owen Sound 500, Gore Bay 305, Marine City 1,220, Sarnia 430, St. Ignace 400, Charlevoix 100, Wallaceburg 200, Port Arthur 2,670, Michigan City 1,150, Sandusky 1,150, Port Colborne 638, Sault Ste. Marie 7,120, Sheboygan 2,890, Oscoda 580, Port Huron 3,290. Vessels from Tonawanda not reported at the Custom House 157,307.

Lake freights on coal from Buffalo to Chicago and other ports: The highest and lowest rate, season 1890, Buffalo to Chicago, 40c. @ \$1; average, 61c.

To Milwaukee, 40c @ 75c.; average 53c. To Lake Superior ports, 35c @ 75c.; average, 40c. To Toledo, 30c @ 40c.; average, 31c., and to Detroit, 30c @ 40c.; average, 31c. per net ton. The freight to Pt. Arthur was 45c. per net ton, and to Gladstone from 40c. to 75c. per net ton.

There is no doubt that the price of bituminous coal will advance April 1st, for the reason that railroad transportation rates from the mines will be raised on that day to \$1.15 to Buffalo, \$1.20 to International Bridge and \$1.30 to Suspension Bridge. The Delaware, Lackawanna & Western Railroad is in the arrangement this year for the first time. The rates named will apply to all the coal traffic over the N. Y., L. E. & W., the B., R. & P., and the W., N. Y. & P. roads from Allegheny points.

The "Australasia" is being loaded with soft coal at Toledo, at the Ohio Central Dock, for Duluth and Superior.

Harbor movements here are confined to the shifting of vessels for repairs. A few propellers are having their machinery overhauled. It is expected that three-fourths of the Buffalo vesselmen will agree not to send their craft out until May 15th, and it is hoped that the balance of the owners will follow the same course of action.

The Consumers' Gas Company, of Toronto, will receive tenders until noon of April 10th for 24,000 net tons of Westmoreland or Youghiogheny bituminous lump coal, screened, to be delivered in about equal monthly quantities between May 1st and November 30th next by vessels at wharf, ex harbor dues, or at Suspension or International Bridge; also for 5,000 net tons of grate size anthracite on same conditions, etc.

**Chicago.** March 25.

(From our Special Correspondent.)  
March has proved to be a very satisfactory month to the coal merchants of this city, and the amount of business done was larger than in any other month of the winter. The demand has been steady, and has put stocks in a very satisfactory condition for the coming season. Indeed, very little old stock will have to be carried over, and some of the docks are about cleared. The activity developed was as unexpected as it was welcome. While the anthracite trade has fallen off very much this week, on account of the weather moderating, the bituminous trade still continues fairly active, and as good as can be expected.

There is some talk among our Exchange members of trying to have the city license coal merchants in the retail city trade. It appears that a great many go into the retail trade during the winter months in a small way, and then follow some other business during the balance of the year. This small but numerous competition injures the regular merchants very much, and it is believed a license fee would stop most of this class from engaging in the business. The exchange will give up its hall on May 1, and will thereafter hold its regular meetings in the G. A. R. hall, in the Honore Building, on Dearborn street. This will save it considerable money, as it hold but one regular meeting each month. Stocks of coke are entirely exhausted, and what coke is in the market comes from the small operators and the Virginia fields.

Prices of anthracite per ton of 2,000 pounds, f.o.b. Chicago, are: Lehigh lump, \$6.75; large egg, \$5; small egg, range, and chestnut, \$5.25. Retail prices per ton are: Large egg, \$6.25; small egg, range, and chestnut, \$6.50.

Prices of bituminous per ton of 2,000 pounds, f.o.b. Chicago, are: Pittsburg, \$3.30; Hocking Valley, \$3; Youghiogheny, \$3.40; Indiana block, \$2.40 @ \$2.60; Illinois block, \$2 @ \$2.20.

**Pittsburg.** March 26.

(From our Special Correspondent.)  
Coal.—The market continues active, with a good demand for local and other purposes. The mines along the Monongahela Valley are all in operation; coal is being shipped as fast as mined. The number of mines at work is: First pool, 1,500; second pool, 2,500; third, 1,550; fourth, 3,000; total, 8,550. When the pits are all fully manned they require 12,000 men. Coal shipped during March, this year, has been 4,263,000 bushels; for March, 1890, 13,214,000; deficiency, 8,951,000. Prices: Pittsburg coal on river, \$4.50 @ \$5 per 100 bushels; railroad coal, \$5 @ \$5.50.

Connellsville Coke.—The strike is still on, but shows signs of weakening. Since our last the non-union works have made large gains; there are now over 2,000 ovens in operation, and more making ready to start. The present production of the year exceeds 12,000 tons per week—a large gain. W. I. Rainey has over 1,000 ovens in full operation, having fired 65 new ones since last week. The shipments have been: Pittsburg, none; west, 480 cars; east, 144; total, 584; week's increase, 294, while the prices are still quoted. Sales are reported, to furnacemen that have contracts to fill, at \$2 @ \$3 per ton. Freight to all points scarce; there are plenty of idle cars now.

**FREIGHTS.**

From Philadelphia to: Boston, \* 75c. @ \$1; Gloucester, \* \$1; Lynn, 95c.; New Bedford, 75c.; New York, † 90c.; Newburyport, 75c. @ 85c.; Norfolk, 55c.; Providence, 75c.; Richmond, 60c.; Washington, D. C., 75c.

\* And discharging.  
† Alongside.

**METAL MARKET.**

NEW YORK, Friday Evening, March 27.  
Prices of silver per ounce troy.

Mar.	Sterling Exch'ge.	London Price.	N. Y. Cts.	Mar.	Sterling Exch'ge.	London Price.	N. Y. Cts.
21	4.88 1/4	45 3-16	98 3/4	25	4.88	44 1/2	97 1/2
23	4.88 1/4	45 1-16	98 1/2	26	4.88	44 1/2	97 1/2
24	4.88 1/4	44 1/4	97 3/4	27	4.88	44 1/2	97 3/4

Council bills were allotted at a decline of 5-32 this week. Owing to weaker Indian exchange demand for silver fell off in London, causing lower prices here in sympathy. The fact that the Government bought sparingly, having nearly completed a month's purchases, has also tended to depress quotations.

The United States Assay Office at New York reports total receipts of silver for the week to be 89,000 ounces.

**Silver Bullion Certificates.**

	H.	L.	Sales.
March 21	99	98 3/4	100,000
March 23	99	98	106,000
March 24	98 3/4	98	30,000
March 25	98	97 3/4	25,000
March 26	98	98	25,000
* March 27			
Total sales			321,000

\* Holiday.

**Domestic and Foreign Coin.**

The following are the latest market quotations for American and other coin:

	Bid.	Asked.
Trade dollars	\$ .76	\$ .79
Mexican dollars	.76 1/2	.77 1/2
Peruvian soles and Chilean pesos	.73 1/2	.75
English silver	4.86	4.88
Five francs	.94	.95
Victoria sovereigns	4.86	4.89
Twenty francs	3.25	3.28
Twenty marks	4.74	4.78
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.80	4.85
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.90
Ten guilders	3.96	4.00
Bar silver	.97 1/2	.98 1/2

**Foreign Bank Statements.**

The governors of the Bank of England at their weekly meeting on Thursday made no change in its minimum rate for discount, which remains at 3%. In the week the bank lost £286,000 bullion, and the proportion of reserve to liabilities was lowered from 38-15% to 34-74%, against a reduction from 51-48% to 46-10% in the corresponding week last year, when its discount rate was 4%. On the 26th inst. the bank lost £305,000 bullion on balance.

Copper.—We are at last able to report a decidedly firmer market for all grades of copper. The second-hand offers of Lake copper have almost entirely disappeared, and it is questionable if anything can be obtained below 14c., at which price the Lake companies remain sellers. Arizona copper is exceedingly scarce. We hear that pig copper is almost unobtainable for spot or near delivery, as large quantities have lately been shipped for export. Arizona ingot copper is held for 12c @ 13c. Casting copper is also firmer. Small consumers have lately been able to purchase at about 11 1/2c, but later on at this price pretty heavy transactions took place in the different brands, and now a firmer tendency prevails and we hardly think that anything is obtainable now below 11 1/2c @ 11 1/4c. The deliveries for the past week have been rather heavier than during the last few months.

After the appearance of our last issue telegraphic news was received from Butte City that the Anaconda mine and the Anaconda smelters had been shut down completely. The cause of this radical measure is said to be some difficulties which arose with the Montana Union Railroad, which tried to raise the freight on the ores from Butte to the Anaconda smelters. The distance is only about 30 miles, but the working of this railroad is rather expensive on account of the steep grades which the heavy trains have to overcome, and it is claimed that the rates hitherto in use have not been remunerative to the company. The news received during the week confirms the above, and it is difficult to say whether a speedy settlement will be arrived at.

The London market was very firm during the week, and strong buying influenced prices rather favorably. Chili bars, which we left last week at £52 advanced to £53 cash, and are closing £52 15s. @ £52 17s. 6d. cash, and £52 17s. 6d. @ £53, three months. A great scarcity of cash bonds is reported, which accounts for the small difference now existing between spot and three-months copper.

In refined sorts business was lively, and we quote: English tough, £54 10s. @ £54 15s.; best selected, £56 15s. @ £57; strong sheets, £62 @ £62 10s.; India sheets, £59 @ £59 10s.; yellow metal sheets, 5 1/2d.

Furnace Material is rather difficult of sale, smelters being rather well stocked, and in consequence values are somewhat irregular. Good mattes have been obtainable at 10s. down to 9s. 9d.

The exports of copper during the past week were as follows:

To	Copper Matte.	Lbs.	
By S. S. Cific.....	4,161 bags	432,629	\$30,000
To Liverpool—	Copper	Lbs.	
By S. S. Cific.....	18 casks.	22,500	\$3,500
"    Wisconsin.....	100 casks.	125,000	17,500
To Hamburg—	Copper	Lbs.	
By S. S. Ruzia.....	35 pkgs. old.	39,483	\$4,044
To Bordeaux—	Copper	Lbs.	
By S. S. Chateau Yquen..	110 bars.	54,044	\$1,425

**Tin.**—The market has been very firm and a large business has been doing at gradually hardening prices. Although several steamers have arrived spot remains scarce and is rather sought for. We quote: Spot and March, 20'45c.; April, 20'40c.; May, 20'30c.; June, 20'30c. The foreign markets also are much firmer and prices have hardened somewhat. London closes for Straits or Malacca tin at £90 10s. @ £90 12s. 6d. spot, and £90 17s. 6d. @ £91 three months. For Australian tin a premium of 7s. 6d to 10s. is obtainable.

**Lead.**—Lead has been rather strong and lively. Consumers have bought very freely, and pretty heavy transactions have taken place. Stocks appear to be small everywhere, and with the demand at this time of the season becoming larger, it may reasonably be expected that prices will be higher. We quote 4'40c. for near deliveries, but future deliveries are rather firmer and not obtainable below 4'45c. @ 4'50c.

The London market has been steady at £12 12s. 6d. for Spanish and £12 15s. for English.

**Chicago Lead Market.**—Messrs. Everett & Post telegraph us as follows: "The market has been very steady during the past week. There has been a moderate demand from consumers, who have paid 4'15c. for supplies needed. Offerings at the moment are light, and the closing is somewhat firmer. The quotations are 4'15c. for spot lead and 4'20c. for April.

**St. Louis Lead Market.**—Messrs. John Wahl & Co. telegraph us as follows: "Lead firmer and a shade high; 4'12½c. has been paid for a few special lots. Offerings are moderate, and the demand is slightly improving."

**Spelter.**—Spelter continues quiet but rather firm, and a fair consuming business is constantly being done. We have no change to report, and the quotation still stands about 5'12½c. @ 5'15c.

The London market is somewhat easier, and we quote £23 10s. for ordinaries and £23 15s. for specials.

**Antimony.**—Antimony is quiet and steady, and we quote: Cookson's, 17½c. @ 17½c.; L. X., 16½c. @ 16½c.; Hallett's, 15½c. @ 16.

**Quicksilver.**—The market here shows no change. Business of hardly more than a nominal character has been done. We quote \$43, with a weaker market than at the time of our last report. The price in London has picked up a little, and quicksilver is changing hands in a limited way at £8 5s.

## IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 27.

Reports from some of the western cities indicate somewhat increased activity in the iron trade, with a slight rise in values, but in New York the situation remains unchanged both in respect to prices and the volume of business doing. All buying is of the same hand-to-mouth character which has been a prominent feature in the market since the 1st of December. On the whole, business is considered to have been rather better during the past six weeks than in the six weeks preceding; but notwithstanding the encouraging statements of some dealers, in general the market cannot be characterized as otherwise than dull, and it shows few signs of important improvement.

Prices continue firm, and there are no reports of any concessions being made. This feeling is of course due to the less pressure to sell, since the reduction in stocks of iron has become pronounced; and the market is in a measure relieved of that incubus hanging over it. The coke strike still continues, although late dispatches from the Connellsville region indicate that it is weakening, and that an early settlement may be effected. That this has had no more influence is an evidence of the overstocked condition in which the iron market has been.

**American Pig Iron.**—Dealers report somewhat more inquiry, but no increase in orders, and the market is inactive. Prices are held firmly, and no shading on any brands is reported. The scarcity of No. 1 Southern iron is still pronounced, and dealers are unable to fill orders. No. 2 Southern iron is offering rather more freely. We quote prices unchanged from last week: Northern No. 1 X, \$17.50 @ \$18; Northern No. 2 X, \$16.50 @ \$17; Southern No. 1 X, \$17.50 @ \$18; Southern No. 2 X, \$16.50 @ \$17.

**Scotch Pig Iron.**—The demand, which was quite active last week, has fallen off considerably, and few inquiries have been made. We quote: Coltness, \$24.50; Summerlee, \$23.50; Dalmington, \$22; Carnbroe, \$21.

**Spiegeleisen and Ferro-manganese.**—There has been but little doing, and few sales of any consequence are noted. Prices of ferro-manganese, however, are a little firmer, on account of the rise abroad. We quote, nominally: 20% spiegeleisen, \$28.50 @ \$29; 80% ferro-manganese, \$63.50 @ \$64.50.

**Steel Rails.**—One transaction, amounting to

12,000 tons, has been reported during the week, but this has been the only one of any importance. In general the market has been stagnant. The railways will hardly be able to hold off much longer, however, and there promises to be increased activity shortly. The rolling mills are holding the price of rails firmly at \$30 at the mills.

**Rail Fastenings.**—Trade continues to be dull, as could hardly otherwise be expected, while no rails are moving. Dealers report somewhat more inquiries, but these have not yet, however, resulted in sales. Prices remain unchanged, and are fairly firm. We quote: Spikes, 2c.; angle plates, 1'70 @ 1'80c.; bolts and square nuts, 2'65c.; hexagonal nuts, 2'85c.; complete joint, iron and steel, according to weight.

**Tubes and Pipe.**—Business continues in its ordinary course and is fairly good. We quote discounts on carload lots as follows: 47½% on butt, black; 40% on galvanized; 60% on lap, black; 47½% on lap, galvanized; boiler tubes: 50% on all sizes; casing, all sizes, 50%.

**Structural Iron and Steel.**—There is little activity in this market at present, and few new orders of importance are reported. There is sharp bidding among dealers, and prices are being shaded considerably. We quote nominally: Universal plates, \$2.20; bridge plates, \$2.15; angles, \$2.20; beams, \$3.10.

**Merchant Steel.**—Business is of a routine nature and continues to be fairly good. No increased activity is noted, and prices remain unchanged. We quote as follows: Best English tool, 15c. net; American tool steel, 7 @ 8c.; special grades, 13 @ 20c.; crucible machinery steel, 5c.; crucible spring, 3½c.; open-hearth machinery, 2'60c.; open-hearth spring, 2'60c.; tire steel, 2'60c.; toe calks, 2'60c.; flat file, 4½c.; mill file, 4½c.; taper file, 7c.; first quality sheet, 10c.; second quality sheet, 8c.

**Old Rails.**—No transactions have been reported, and but few inquiries. Buyers' and sellers' views seem to be far apart. We quote, nominally, \$22 @ \$23 for tees and \$25 for doubles.

**Wrought-Iron Scrap.**—The market shows no life whatever. We quote \$21 @ \$22 at yards.

Chicago, March 25.

(From our Special Correspondent.)

The iron market continues rather inactive this week. Some branches show considerable business done, but the trade as a whole shows only a fair volume of business. Store orders have been good, but the mills, as a rule, have done but very little. Prices remain unchanged, although some of the mills report a much stronger feeling.

**Pig Iron.**—A fair volume of business has been done in both Northern and Southern brands. Some large orders are reported to be in the market, but so far as can be learned have not been given out yet. Business has been confined, with some few exceptions, to small lots for present use. Consumers do not feel disposed to grant the prices asked and seem to be willing to take their chances on a lower market later in the Spring.

Prices are being maintained, and some dealers claim to be getting a slight advance over last week. The coke stocks of the Illinois Steel Company have been exhausted, and they are now rapidly blowing out their furnaces.

Prices remain unchanged, and are quoted, per gross ton f. o. b. Chicago:

Lake Superior charcoal, \$18 @ \$18.50; Lake Superior coke, No. 1, \$16; No. 2, \$15.50; No. 3, \$15; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$17; American Scotch, \$18.50 @ \$19; Southern coke, Foundry No. 1, \$16.25; No. 2, \$15.75; No. 3, \$15.25; Southern coke, soft, No. 1, \$15.75; No. 2, \$14.75; Ohio silveries, No. 1, \$18; No. 2, \$17; Ohio strong softeners, No. 1, \$18.25; No. 2, \$17.50; Tennessee Charcoal, No. 1, \$18; No. 2, \$17.50; Southern Standard Car Wheel, \$21 @ \$23.

**Structural Iron.**—Trade continues good and the volume of business in sight is remarkable for this season of the year. Contracts, aggregating nearly 10,000 tons, will be closed this week and inquiries for other business continue to be received. A fair proportion of this business is being received from Milwaukee, St. Paul and Omaha. Prices are firm and an advance is not at all unlikely. Prices for car lots f. o. b. Chicago are: Angles, \$2.25 @ \$2.35; tees, \$2.75 @ \$2.85; universal plates, \$2.40 @ \$2.50; sheared plates, \$2.40 @ \$2.50; beams and channels, \$3.20.

**Plates.**—But little business is reported in plates. A general dullness and inactivity is reported. Orders are small and inquiries few. Mills report a stronger feeling, but business does not seem to justify it. Prices remain unchanged: Steel sheets, 10 to 14, \$2.70 @ \$2.80; iron sheets, 10 to 14, \$2.60 @ \$2.80; tank iron or steel, \$2.50 @ \$2.70; shell iron or steel, \$3.20 @ \$3.40; firebox steel, \$4.50 @ \$5.75; flange steel, \$3.25 @ \$3.40; boiler rivets, \$4.10 @ \$4.25.

**Merchant Steel.**—Mill orders have been very light this week. Store orders have picked up a little, but are still very light. Orders are for present use only. Prices remain unchanged at: Tool steel, \$6.75 @ \$7; tire steel, \$2.40 @ \$2.60; toe calk, \$2.60 @ \$2.75; Bessemer machinery, \$2.20 @ \$2.30; open-hearth machinery, \$2.60 @ \$2.75; open-hearth spring, \$2.75 @ \$3; crucible spring, \$3.75 @ \$4.

**Steel Rails.**—Some large orders have been bid on this week, but none has been placed yet. Business has been fair in small orders, and inquiries continue to be received in good numbers.

Prices are firm at \$31.50 @ \$32.50 per ton f. o. b. Chicago. Splice bars remain at \$1.95 @ \$2, and spikes at \$2 @ \$2.10 per hundred pounds.

**Galvanized Sheet Iron.**—Trade has only been fair in store orders this week. Mill orders have also fallen off somewhat, but they report to be still back on their orders. Prices on some good-sized contracts are being asked for, but some hesitancy is shown in closing them on the part of buyers. Discounts remain unchanged at 67% off on Juniata and 65% and 5% off on charcoal. Jobbing lots are quoted according to quantity.

**Black Sheet Iron.**—No particular improvement is to be noted in black sheets this week. Some small orders are being received, but the larger manufacturers are buying very little as yet. Prices remain at \$2.90 @ \$3 for No. 27, f. o. b. Chicago.

**Bar Iron.**—Store trade continues only fair. Mill orders continue small, and not in good numbers. Prices look a little weak. Local mills quote \$1.70, half extra, f. o. b.; Chicago and Valley mills, \$1.60 @ \$1.65 f. o. b. mills.

**Nails.**—Nails have been in fair demand this week, and trade in steel cut has been quite good. Mill orders have been good, and store trade fair. Quotations are: Steel wire nails at \$2.20 @ \$2.30; steel cut nails, \$1.75 @ \$1.85 car loads; f. o. b. Chicago.

**Tubes.**—A fair amount of business is reported in the smaller sizes. Boiler tubes are very quiet. Discounts remain at: Two inches and larger, 50%; and 45% for inch and three-quarters and smaller.

**Scrap.**—The scrap market is exceedingly dull this week and very little business can be reported. Prices are weaker in many grades. The lower priced materials are in somewhat better demand than the higher grades. Dealer and consumer cannot agree as to the prices and few sales are made. Quotations per net ton f. o. b. Chicago are: No. 1 railroad, \$19.25; No. 1 forge, \$19; No. 1 mill, \$14.50; fish-plates, \$21 @ 21.50; axles, \$24 @ \$24.50; horse shoes, \$19; pipes and flues, \$13 @ \$13.50; cast borings, \$8 @ 8.50; wrought turnings, \$11; axle turnings, \$13; machinery castings, \$12; stove plates, \$8; mixed steel, \$11.25; coil steel, \$15.50; leaf steel, \$16.25; tires, \$17 @ \$17.50.

**Old Rails and Wheels.**—No change is to be reported. The market continues dull and little business is reported. Prices quoted are: old steel rails, \$14.50 @ \$18.50; old iron rails, \$23; old wheels, \$17.

Louisville, March 21.

(Special Report by Hall Bros. & Co.)

There has been but little business in the local market. Stocks of coke iron have been reduced very materially during the past week, which tends to make firm prices, and furnaces do not seem in want of orders and shipments of iron are very much behind on account of inability of furnaces to keep up on certain grades. Some markets east report active inquiry at full prices. It would seem that the market in general is firm. Money matters are still stringent and as a result one Southern furnace has assigned during the past week. The market may continue to improve; in some special cases 50 cents' advance has been obtained for small lots. We continue to quote a quiet market at current figures. We quote prices:

**Hot Blast Foundry Irons.**—Southern coke, No. 1, \$14.25 @ \$14.50; No. 2, \$13.75 @ \$14; No. 3, \$13.25 @ \$13.50. Southern charcoal, No. 1, \$16.50 @ \$17; No. 2, \$16 @ \$16.50. Missouri charcoal, No. 1, \$17.50 @ \$18; No. 2, \$17 @ \$17.50.

**Forge Irons.**—Neutral coke, \$12.50 @ \$13; cold short, \$12.50 @ \$13; mottled, \$12 @ \$12.25.

**Car Wheel and Malleable Irons.**—Southern, standard brands, \$21 @ \$22; other brands, \$17.50 @ \$18. Lake Superior, \$21.50 @ \$22.50.

Philadelphia, March 26.

(From our Special Correspondent.)

**Pig Iron.**—There is very little to note in the iron market, and there is no change in prices. The curtailment in production has put the market in a better shape than it would otherwise have been. Quotations for No. 1 foundry are \$17.50 @ \$18; No. 2, \$16.50 @ \$17, and forge iron, \$14.50 @ \$15. Special brands of all kinds rule about 25 cents per ton higher, and inferior brands are occasionally sold at something below the minimum figures.

**Foreign Material.**—A few inquiries have just been received for spiegel, under rumors of an advancing tendency, but no large transactions have taken place.

**Steel Billets.**—The selling price is \$28.75, and for nail slabs \$28.25 has been taken.

**Bar Iron.**—There are rumors to-day that bar iron orders have been taken away under price, but no one knows what the actual figures were. It is said that \$1.60 has been taken. There are a good many buyers who are ready to place their orders at such figures, if iron can be had.

**Muck Bars.**—If makers of good muck bars would take \$26.50 they could sell all they could deliver within the next two months. There is an inclination among a good many large buyers to trifle no longer with the market.

**Skep Iron.**—Notwithstanding the fact that very little business has been done in skep iron for some time past, manufacturers are not inclined to shade their figures below \$1.75 and \$1.85.

**Wrought-Iron Pipe.**—The cutting of prices has gone on to such a limit that buyers think there will be a revision of discounts before long, especially as there is not much business in sight.

**Plate and Tank Iron.**—Manufacturers are all quite anxious for new business. The usual run of small orders is going on. A great deal of engineering work is about ready for material, but orders are surprisingly backward. Steel bridge plate has sold at \$2.10, from which quotations of other kinds can be inferred.

**Sheet Iron.**—This branch of the iron trade is in a rather unsatisfactory condition, but manufacturers think the improvement going on in retail lots points to an improving tendency in large lots.

**Structural Iron.**—Brokers who are figuring with buyers expect to bring a good deal of business to a point early in April. Angles are quoted at \$2@2.10; tees, \$2.50; beams and channels, \$3.10.

**Steel Rails.**—Makers think that they have the best of the argument from every point of view, and that there will be an excellent demand before long. Quotations are \$30@31.

**Old Rails.**—Quotations at tide water points \$23@23.50.

**Scrap.**—No. 1 Railroad brings \$23.

**Pittsburg.**

March 26.

From our Special Correspondent.)

**Raw Iron and Steel.**—A combination of circumstances has succeeded in making the iron market the present week one of the duldest we have experienced for a long time. There are various causes, the principal one being a want of confidence in the present and future of the market. As usual on such occasions there is a wide difference of opinion concerning the next three months. There are dealers that predict a lower range of values in the near future, and there are others again who are very confident that prices have touched the lowest point. One thing is evident: the volume of trade is small compared with that of preceding weeks. The valley furnacemen, who have been holding up prices stiffly for some time, are beginning to show signs of weakening. In fact, trade could not well be in a less satisfactory condition.

The coke strike has been the means of curtailing the output of iron, and to that extent it has been helpful to the general trade. It seems singular that it has not affected prices more, but consumers refuse to get excited on the subject, believing that at current rates they are not likely to want for iron.

Bessemer sales show a decline from last week's transactions. Grey forge, standard brands, maintain prices, while the lower grades can be obtained at low figures. Blooms and billets are a shade firmer, but no higher. Ferro-manganese at the seaboard commands last week's figures. Muck bar, April and May delivery, sold at figures current last week. New steel rails, no sales; rail works shut down for want of orders. Skelp iron, narrow and wide grooved, lower; sheared, a shade higher. Steel wire rods, declined. Bloom and billet ends can be purchased below last week's prices. Scrap material steady, not very active. Spiegel, prices maintained.

**Coke Smelted Lake and Native Ore.**

2,000 Tons Bessemer, Wheeling, Delivery.....	\$16.50 cash.
1,500 Tons Bessemer.....	16.50 cash.
1,000 Tons Grey Forge.....	14.50 cash.
1,000 Tons Grey Forge, City Furnace.....	14.75 cash.
1,000 Tons Grey Forge.....	14.35 cash.
1,000 Tons Grey Forge.....	14.25 cash.
1,200 Tons Bessemer.....	16.25 cash.
1,000 Tons Bessemer.....	16.25 cash.
750 Tons Bessemer.....	16.50 cash.
500 Tons Grey Forge.....	14.50 cash.
500 Tons Grey Forge.....	14.25 cash.
150 Tons Silvery.....	16.00 cash.
200 Tons Off Bessemer.....	15.75 cash.
100 Tons White Iron.....	14.00 cash.
100 Tons No. 1 Foundry.....	16.30 cash.
100 Tons No. 2 Foundry.....	15.50 cash.
100 Tons No. 3 Foundry.....	15.25 cash.

**Charcoal.**

150 Tons No. 2 Foundry.....	\$22.50 cash.
100 Tons No. 2 Foundry.....	22.00 cash.
100 Tons No. 3 Foundry.....	23.50 cash.
100 Tons Cold Blast.....	26.00 cash.

**Muck Bar.**

800 Tons Neutral, April, May.....	27.60 cash.
600 Tons Neutral, March, April.....	27.50 cash.
500 Tons Neutral.....	26.15 cash.
300 Tons Neutral.....	27.25 cash.

**Steel Slabs and Billets.**

900 Tons Billets.....	26.00 cash.
600 Tons Billets and Slabs.....	26.00 cash.
300 Tons Steel Slabs.....	26.00 cash.

**Steel Wire Rods.**

600 Tons American fives.....	37.00 cash.
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**Ferro-Manganese.**

150 Tons 80%, Jersey City.....	60.35 cash.
75 Tons 80%, Baltimore.....	65.25 cash.

**Skelp Iron.**

600 Tons Wide Grooved.....	1.70 4 m.
400 Tons Sheared Iron.....	1.95 4 m.
300 Tons Narrow Grooved.....	1.67 1/4 4 m.

**Bloom and Billet Ends.**

780 Tons Bloom and Billet Ends.....	17.00 cash.
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**Old Iron and Steel Rails.**

600 Tons American T's.....	25.00 cash.
700 Tons Old Steel Rails.....	17.75 cash.
400 Tons American T's.....	25.25 cash.

**Scrap Material.**

200 Tons No. 1 W. Scrap, Net.....	20.05 cash.
150 Tons No. 1 W. Scrap, Net.....	21.00 cash.
100 Tons Iron Axles, Net.....	23.00 cash.
100 Tons Leaf Steel, Net.....	21.00 cash.

**CHEMICALS AND MINERALS.**

NEW YORK, Friday Evening, March 27.

The market shows rather a falling off as compared with the preceding week, the buyers of the large manufacturers not having placed their orders as freely as was expected. Notwithstanding this fact, however, stocks of heavy chemicals are not very large. Fifty-eight per cent. alkali forms an exception to this generalization. Of this article the arrivals have been quite large and the demand corresponding, so that the week closes with very small stocks. The arrivals of sal soda have been very large, with almost no demand, and the market closes much weaker in consequence.

The business in fertilizers has been about the same as heretofore. Nitrate of soda is held at the usual high figures. During the week it has experienced no advance, and nothing but a jobbing business has been done. Dealing in brimstone has been of a different character. Larger lots have changed hands. This has not had the tendency to advance values, however, and the market closes quite a little weaker than it did last Friday.

Caustic Soda, 60%.—The arrivals have continued large, and the temporary rise which we noted in our last report does not seem to have been well maintained. The stocks are not over-large. Spot is changing hands at from 3'30c. to 3'35c., while for April and May shipments no better than 3'40c. could probably be done. 74%.—This grade has continued to come in freely, so that quite large stocks have been allowed to accumulate. As a consequence, the market is much lower. Sales have been made at from 3'02 1/2c. to 3'10c. Business has been dull. 77%.—The market in this grade may be said to be bare, notwithstanding the recent large arrivals; business for future delivery has been quite large. We quote 3'10@3'12c.

Alkali, 48%.—Business has been fairly active. The demand has continued to be encouraging, and notwithstanding the large arrivals the market closes much firmer than at the time of our last report, the quotation being 1'57 1/2@1'60c. A little business for future shipment has been done. 58%.—Trading in this grade has been very active. The arrivals have been large, though the stocks now are small. Contracts for future shipment have been quite extensively made without affecting the price very materially. The market closed at 1'50@1'52 1/2c.

Caustic Soda Ash, 48%.—There is no new feature to report in this market. The arrivals have been very limited, and the demand almost nil, so that a quotation would be merely nominal.

Carbonated Soda Ash, 48%.—Quite a good deal has arrived, most of which went into second hands immediately. The demand has been moderate, some spot business of a jobbing nature is reported, and contracts for shipment have been made. We quote 1'57 1/2@1'62 1/2c. The arrivals of high-test have been quite extensive, and, as the demand has been good throughout the week, stocks are small. Most of the business transacted has been at 1'55 @1'60c.

Sal Soda.—This article has continued to come in very freely. As the stocks here at the beginning of the week were already quite large, the market is rather overhurdled. Sales have been made at from 1'02 1/2c. to 1'05c. Business in domestic has left no cause for complaint, and the manufacturers seem well satisfied with the outlook. Orders have been freely placed at from 1c. to 1'05c.

Bleaching Powder.—The stiffening of the market due to the increased demands of manufacturers abroad is well maintained, and, while business has not been active in any sense of the word, values remain almost as quoted in our last report—1'07 1/2@1'15c. Arrivals have been quite extensive.

Acids.—The causes which have tended to stiffen values continue as heretofore, while the demands of manufacturers remain the same—in some cases even showing a tendency toward an increase. Business has not been as good as during the previous fortnight, a reaction having set in. The belief that brimstone will be obtained at a much lower figure than now in the near future has contributed toward this result. The report of an alleged better understanding among manufacturers does not seem to have much foundation in fact. Orders for acetic in a jobbing way are being filled at our last quotations. The demand for nitrate and muriatic is fair, but hardly forms a feature in the market.

We quote acid per 100 pounds in New York and vicinity: Acetic, \$1.55@2; muriatic, 18", 80c.@\$1; muriatic, 20", 90c.@\$1.10; muriatic, 22", \$1@1.20; nitric, 40", could probably not be touched for less than \$4.50, and from that upward, according to quantity, etc.; nitric, 42", \$4.50@5; sulphuric, 60", 95c.@\$1.15; sulphuric, 66", \$1.12 1/2@1.175.

Fertilizers.—The demand has not been quite as good as heretofore noted. North Carolina phosphate rock has been changing hands freely, although the business consists in filling large contracts. The sulphate of ammonia has met with a very good demand. Arrivals have been quite large, most of which has gone into second hands, so that at this writing gas liquor both for spot and to arrive is held firmly at 3'25c. Bone sulphate has been in fair demand, and stocks are a little larger than they were. We quote 3'15@3'20c. High grade blood is held firmly at from \$2 to \$2.05; low-grade selling about 10c. less. Bone black, potash salts and tanpage have all been in fair demand at our last quotations.

Nitrate of Soda.—Business has not been as active as heretofore. No new arrivals have been recorded. The impression generally prevails that nothing has as yet been shipped from Chili, but the tone of the market is not quite as firm as it was. Business has been confined to the sale of small lots at 2'30c. for both spot and January sailing.

Brimstone.—The local stock is very small. The demand, however, does not seem to have been as imperative as heretofore, and the feeling that present high prices will not be maintained much longer, leaves this market rather weaker than at the time of our last report. We quote spot \$37, with the future price \$35.50. To arrive has been sold at \$35. This quotation is for best unmixed seconds; thirds are selling from \$1 to \$1.50 less.

Muriate of Potash.—The demand continues quite imperative, with a market almost bare of spot. Arrivals are coming in more freely, however, so that it is expected the market will soon be much easier. The sales during the week aggregated several hundred tons, with arrivals of 400 tons. The additional cost due to shipment through the ice has been taken off. We quote 1'77 1/2c. for New York, 1'80c. for Philadelphia and Baltimore, 1'82 1/2c. for Southern ports and 1'85c. for Gulf ports.

**Liverpool.**

March 18.

Our market for heavy chemicals is rather quiet at the moment, and with uniform prices the position is very monotonous.

Soda Ash is scarce for special brands, but inquiries are not numerous. Minimum quotations are as follows: Caustic Ash 48%, £5 2s. 6d. per ton; 58%, £6 4s. per ton; Carbonate Ash 48%, £5 7s. 6d. per ton; 58%, £6 10s. per ton. Special brands are held for a premium over these prices.

Soda Crystals in fair request at £3 7s. 6d. per ton to \$3 10s. per ton, less 2 1/2%.

Caustic Soda is in moderate demand, but no large business passing. We quote: 60%, £9 15s. per ton; 70%, £11 per ton; 74%, £12 per ton; 76%, £12 12s. 6d. per ton and upward, net cash. A reduction of 5% per ton is allowed for not less than 500-ton lots, or contracts extending over six months or to the end of the year. There are second-hand parcels of 60% and 70% offering for prompt delivery at about 2s. 6d. @ 3s. per ton under "Union" quotations.

Bleaching Powder is dull at £7 per ton, net cash. Chlorate of Potash is inactive at 5 1/2d. per lb. less 5% is nearest value, while possibly a little more may be had in second hands at a shade less.

Bicarb. Soda is firm at \$7 per ton and upward less 2 1/2% for one-cwt. kegs according to brand and quantity, with usual allowances for larger packages.

Sulphate of Ammonia has been excited of late in sympathy with nitrate of soda. £11, 10s. per ton is nearest value to-day for good grey, 24% in single bags f. o. b. Liverpool, while an advance on this figure has been paid for forward delivery. For 25% in double bags £11 15s. to £12 are about quotations. The tone is not so strong at the close.

**BUILDING MATERIAL MARKET.**

NEW YORK, Friday Evening, March 27.

Stocks show no sign of diminution. The demand is larger than it has been, while the quantities coming in have been in proportion. Some dealers think that the present very low price of brick will be an incentive for future large building operations. As a matter of fact, both Haverstraws and pale are selling at figures much lower than is usual at this season of the year.

Bricks.—Almost every grade has been coming in freely. Haverstraws are selling at from \$5 to \$5.75 per M. Some very choice lots under call have changed hands at \$6, but the arrivals are altogether too large for the maintenance of higher values. The call for pale has been almost nil, so that holders are offering freely at \$2, with no buyer. Jerseys are held at \$4.25@4.50, and are languishing at that.

Lime.—The arrivals in some grades have been very materially curtailed, so that at present the supply is small. This condition of affairs has made itself felt in the tone of the market. Rockland is held firmly at from 90c. to \$1. The kilns have been shut down to a large extent, so that in the East, it is said, they are not running at more than one-eighth capacity. Notwithstanding this condition of affairs the sales for the first two months of this year have been larger than during the same period of 1890. Owners of State lime kilns seem reluctant in sending lime to market, so that very little is doing.

Cement.—Trade for the past month up to a week ago was very encouraging, but business during the period under review has not been as good. If this condition of affairs continues there is a probability that production will be very much curtailed by some of the manufacturers. The idea prevails among consumers that as soon as navigation opens, quantities of cement will be thrown on the market at prices much below present quotations, and as a consequence nothing but pressing needs are being filled. We quote 80c.@\$1.

**NOTES OF THE WEEK.**

At an auction sale held this week on the Real Estate Exchange three shares of Rose Brick Company sold at \$285, one share of Montrose Point Brick Company at \$35, and three certificates of membership in the Building Materials Exchange of New York City at \$67.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last), DIVIDENDS (Total paid, Date & amount of last), and NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last).

Y. Gold, S. Silver, L. Lead, C. Copper. \* Non-assessable. † This company, as the Western, up to December 10th, 1881, paid \$1,400,000. ‡ Non-assessable for three years. § The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. ¶ Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia \$1,000,000. \*\* Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid \$1,350,000 in dividends.



NEW YORK MINING STOCKS QUOTATIONS.
NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stocks Quotations, listing companies like Adams, Alice, Argenta, etc., with columns for dates (March 21-27) and sales.

\*Ex dividend. †Dealt at 14 the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. ¶Good Friday. Ⓛ-dividend shares sold, 11,538. Non-dividend shares sold, 167,145. Total, New York, 178,683.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations, listing companies like Atlantic, Bodie, Bouanza Development, etc., with columns for dates (March 20-26) and sales.

Boston: Dividend shares sold, 6,033. Non-dividend shares sold, 15,550. Total Boston, 21,603.

COAL STOCKS.

Table of Coal Stocks, listing companies like American Coal, Cambria Iron, Cameron Coal & I. Co., etc., with columns for dates (March 21-27) and sales.

\*Holiday. \*\*Sales in New York, 5,600; in Philadelphia, 11,168. Total sales, 64,658.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, listing companies like Alpha, Alta, Belcher, etc., with columns for dates (March 20-26) and sales.

STOCK MARKET QUOTATIONS.

Baltimore, Md.

Table with columns: COMPANY, Bid, Asked. Lists various coal and iron companies like Atlantic Coal, Balt. & N. C., etc.

Birmingham, Ala. March 25.

Table with columns: COMPANY, Bid, Asked. Lists various Alabama coal and iron companies like Ala. Coal & I. Co., Ala. Con. C. & C. Co., etc.

Pittsburg, Pa. March 23.

Table with columns: COMPANY, B, A, Closing. Lists various Pennsylvania gas and coal companies like Allegheny Gas Co., Bridgewater Gas Co., etc.

St. Louis.

Prices at which sales were made for week ending March 25, 1891.

CLOSING PRICES.

Table with columns: COMPANY, H, L. Lists various St. Louis companies like Adams, American & Nettie, etc.

Table listing various stocks and bonds with prices, including Old Colony, Pat Murphy, Puzzle, etc.

Trust Stocks. March 27.

The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange:

Table listing various trust stocks and bonds with prices, including Am. Cotton Oil, Sugar Refineries, etc.

Trust Receipts.

Table listing various trust receipts with sales and prices, including American Cotton Oil, National Lead, etc.

Foreign Quotations.

Table listing various foreign commodities and their prices, including London, Paris, Ammoniates, Blood, etc.

CURRENT PRICES.

Those quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Table listing various chemicals and minerals with prices, including Acid, Carbonic, Chromic, etc.

Table listing various minerals and chemicals with prices, including Ammoniates, Blood, Concentrated tankage, Bones, etc.

Table listing various minerals and chemicals with prices, including Sulphate, Yellow Prussiate, Red Prussiate, etc.

THE RARER METALS.

Table listing various rare metals and their prices, including Aluminum, Arsenic, Barium, etc.

BUILDING MATERIAL.

Table listing various building materials and their prices, including Bricks, Jersey, Up Rivers, etc.