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## CONTENTS.

PAGE.	PAGE.
Profits and Honest Enterprises are what Help Mining..... 437	Measuring Strains in Bridges..... 444
The Effect of the Lead Ore Tariff..... 437	Compound Metallic Tubes..... 444
What is the Cost of Producing Gold and Silver?..... 437	Actions on Contract..... 444
The South Carolina Phosphate Trouble..... 438	*Representative Men in the Mining Industry..... 445
New Publications..... 439	Wages on the Continent..... 445
Where is there a Market for Onyx?..... 439	Russian Mintage in 1890..... 445
The New Comstock Deal..... 439	The Chlorination of Gold Ores..... 446
The Redemption of Egypt..... 439	Preparation of Oxygen from the Air..... 446
Responsibility of Carriers of Goods..... 441	Coal in Michigan..... 446
Loss of Carbon in Rusted Pig Iron..... 441	The Jeareville, Pa., Mine Disaster..... 447
Utah Ozokerite..... 441	*The Hyatt Sectional Washing Filter..... 447
Time of Exposure in Photography..... 441	Measure of Damage in Breach of Contract..... 447
*Notes on the British Alkali Trade..... 442	Notes on the Dan River Coal Basin, in North Carolina..... 448
New Process of Firing Porcelain..... 442	Official Reports..... 448
Salt in Germany..... 442	Patents Granted..... 448
The Russell Process at the Marsac Mill and Amalgamation at the Ontario..... 444	Personals..... 449
Canadian Petroleum..... 444	Obituary..... 449
The Bourdoncle Briquet for Igniting Safety Fuses..... 444	Societies..... 449
	Industrial Notes..... 449
	Machinery and Supplies Wanted..... 449

\* Illustrated.

<b>MINING NEWS:</b>	Germany..... 454	Coal Stocks..... 461	<b>METALS..... 457</b>
Alaska..... 450	Mexico..... 454	New York..... 461	
California..... 450		San Francisco..... 461	
Colorado..... 450	<b>DIVIDENDS..... 454</b>	Baltimore..... 462	<b>IRON:</b>
Idaho..... 451	<b>MEETINGS..... 454</b>	Birmingham..... 462	New York..... 457
Kansas..... 451	<b>ASSESSMENTS..... 454</b>	London..... 462	Chicago..... 458
Michigan..... 451		Paris..... 462	Louisville..... 458
Minnesota..... 451	<b>MINING STOCK</b>	Pittsburg..... 462	Philadelphia..... 458
Missouri..... 451	<b>MARKETS:</b>	St. Louis..... 462	Pittsburg..... 458
Montana..... 451	New York..... 454	Trust Stocks..... 462	
Nevada..... 452	Boston..... 454		<b>CHEMICALS AND MINERALS..... 458</b>
Oregon..... 452	St. Louis..... 454		
Ohio..... 452	Denver..... 455	<b>MARKETS:</b>	<b>BUILDING MATERIAL MARKET..... 450</b>
Pennsylvania..... 453	San Francisco..... 455	<b>COAL:</b>	
South Dakota..... 453	Lake Superior..... 455	New York..... 455	<b>CURRENT PRICES</b>
Texas..... 453	Salt Lake..... 455	Boston..... 455	Chemicals..... 462
Utah..... 453	Pipe Line..... 455	Buffalo..... 456	Minerals..... 462
Washington..... 453		Chicago..... 456	Rarer Metals..... 462
Wyoming..... 453	<b>MINING STOCK TABLES:</b>	Pittsburg..... 457	Building Mat'l..... 462
<b>FOREIGN:</b>	Boston..... 461	<b>FREIGHTS..... 457</b>	<b>ADV. INDEX..... XX1</b>
Canada..... 453			

## PROFITS AND HONEST ENTERPRISES ARE WHAT HELP MINING.

The past winter has been exceptionally severe in the San Juan Mountains of Colorado. An unusual number of lives have been lost, and mining operations have been much interfered with. Practically no ore shipments of consequence have been made since the middle of February, and accumulations of ore at many of the mines have become so great, occupying all available room, that of late it has been possible to do little more than exploration and development work.

The two famous mines of the Red Mountain district owned by English companies are out this month, however, with their usual quarterly dividends from earnings in December and January alone, and the new company, the American Belle, organized only four months ago, makes its first return to its shareholders.

The success of these companies has done much to restore the confidence of English financial circles in American silver-mining investments, as was shown by the great number of applications for American Belle shares upon the organization of that company. It is to be hoped

that the good results obtained from these ventures will not lead English investors to embark in worthless undertakings, and that reckless mine promoters will not take advantage of this change in feeling to further wild-cat schemes.

The local press of the Western states should be more ready to tell the truth about the mining enterprises of the districts that it represents, than as a rule it is. There is a false idea which obtains there which seems to make it impossible to publish anything concerning local mining interests except what is good. Yet there is nothing which hurts the mining interests of any district more than the consumption of foolish or dishonest enterprises, in which people lose money. For every dollar which is obtained through them, many are lost to the district. In mining, as in every branch of industry, in the long run, strict honesty is the best business policy.

## THE EFFECT OF THE LEAD ORE TARIFF.

The advocates of the tariff on lead ore argue that since the importation of Mexican lead ores is being continued upon an extensive scale the high charges for smelting dry ores, which are still prevailing, are not due to the McKinley bill, but to something else. Ideas are decidedly vague as to what that "something else" may be. Two months ago it was asserted that it was a combination of the smelting companies, but, as time has passed and this has not materialized, no further explanation has been offered.

It is quite true that importations of Mexican lead ore have not ceased or even been measurably restricted; the reason for this, however, is that there is not enough high-grade lead ore produced in this country to smelt our own refractory silver-bearing ores, and consequently the lead-smelting companies are obliged to bring in Mexican ore regardless of the additional cost imposed by the tariff, in order to keep their furnaces in blast.

It is not the smelting companies, however, that are vitally affected by this tariff. They buy ores from the miners, reduce them, and sell the bullion to the refiners, charging the miners a certain amount per ton of ore, which covers the cost of the operation, including interest on the capital which they have invested in the business. If the cost of smelting is increased by the tariff tax, the charge to the miner is made enough higher to cover it.

With the supply of domestic lead ore by no means equal to the demand, none of this burden can be placed on ore of that character, and it all falls, consequently, on the producers of silicious and refractory ores.

Although the ore market in the lead-smelting centers of the west is now in far easier condition than three months ago, and many mines that were closed down then have resumed shipments, it is a fact, easily ascertained, that smelting charges on dry ores are much higher than they were a year ago, and they will probably be maintained at present rates, with possibility of a further advance.

Just at present there is no pronounced scarcity of lead ore, although we have not heard that the smelters of Denver, Pueblo, or Salt Lake were offered any more than was needed. It must be remembered that with the chief sources of lead ore in Colorado and Utah communication is maintained throughout the winter, while many of the districts producing dry ore are cut off. As soon as the blockade is lifted and the stocks of dry ores which are known to be accumulating begin to be moved, it is likely that the supply of lead ore will again be found insufficient.

The sole reason for this tariff on lead ore was to put money into the pockets of the Henriett & Maid, May-Mazepa, and a few other mining companies, and the owners of the mines producing ore with a little lead were deceived in thinking that they were to be benefited.

## WHAT IS THE COST OF PRODUCING GOLD AND SILVER?

The actual cost of production of the precious metals varies so greatly at different mines and works that it would be impossible to arrive at any absolutely accurate average. That one of our great gold or silver mines, when in bonanza, earns enormous profits, merely means that the cost of production is but a small part of the market value of the metal produced. But the mirage of the widely known, if not long, list of millions accumulated by fortunate owners of gold and silver bonanzas, induces the investment of millions in the opening and working of prospective bonanzas that never materialize, and encourages and supports the lonely prospector in his wearisome waiting for the fortune that he scarcely ever gets.

It is the spirit of the gambler that controls in great measure the investments in precious metal mines, and, as in the case of lottery gambling, it is usually men with small means who take the greatest risks and invest in the aggregate the most money. So far as this class of investment goes there can be no doubt that it is on the whole unprofitable, or, in other words, that the gold and silver obtained by it cost much more than they are worth in the market.

When we consider the enormous amounts of money actually invested in unprofitable mines and mills, some of which investment is strictly legitimate and honest, while some of it has been made in salted mines or on false representations, it is easy to recognize the heavy offset to the great

profits of the few large producers, the prizes in this lottery, and which, as we believe, brings the average cost of all the gold produced to more than \$20.67 per ounce troy, and that of silver to more than, let us say, \$1 per ounce troy.

In gold and silver mining, as in buying lottery tickets or in playing on the gaming table, it is the chance of winning a prize that induces people to pay out their money in what is, on the average, an unprofitable investment. Moreover, the money invested in mining comes back to some of the investors or to the promoters and inducers of investment in many other forms, such as through the furnishing, at large profit, of supplies to the miners, or in the advance in the value of property in the vicinity, or in building up a town or in some other way that cannot be directly credited to the mine. It is, however, quite certain that while gold and silver mining, as a whole, may have been unprofitable, they have created an empire and added enormously to the wealth and prosperity of the country, and they constitute an industry which deserves and should receive every consideration which the laws of the country can afford.

If the question be asked: Is gold and silver mining on the average necessarily unprofitable, we would unhesitatingly say no. With the exercise of the ordinary care and prudence, which are essential in making any other investment profitable gold and silver mining become one of the most profitable industries in which capital can invest; but, unfortunately, a majority of those who do invest in it do so as they buy lottery tickets or make bets on horse-races, without any knowledge to justify the investment. The wonder, therefore, is, not that, on the whole, the actual expenditures in producing gold and silver are greater than the value of the metal produced, but that the industry has survived the foolishness and dishonesty which have so generally characterized investments in it.

#### THE SOUTH CAROLINA PHOSPHATE TROUBLE.

The phosphate industry in South Carolina has been in a very unsettled condition for some time past, and since the first of last month mining in the river deposits has been practically suspended, reducing the production of phosphate rock in this region by about one-half. The cause of this trouble, which is not generally understood, is the controversy between the State and the Coosaw Mining Company, which has been the chief producer of phosphate rock in this region, regarding the possession of the Coosaw River, which is the most important source of the river rock in the South Carolina deposits.

Phosphate rock was first mined in South Carolina to any considerable extent, in 1867. In 1870 the state legislature granted a corporation known as the River and Marine Company the privilege to mine rock in the navigable waters of the state for the period of twenty-one years, the state receiving nothing for this valuable franchise, and from the original grantees the Coosaw Mining Company obtained the exclusive right to mine in the Coosaw River. In 1876 the state legislature confirmed this right to the Coosaw Mining Company for the period of twenty-one years, with the condition that a fixed royalty of \$1 per ton of rock mined should be paid.

Since that time the company has prosecuted its operations at much profit. The total royalty received by the state of South Carolina from its phosphate deposits has amounted to more than \$2,000,000, and of this the Coosaw Mining Company is said to have paid over one-half. In 1890 the output of the company is said to have been, in round numbers, 107,000 tons of rock, valued at about \$750,000.

The period of twenty-one years for which the Coosaw grant was made ending on March 1, 1891, Governor TILMAN, in a message to the state legislature last winter, recommended that in view of the expiration of all private rights in the river phosphate deposits, the state should take steps to derive an increased income from them, and should establish a commission to take charge of the industry. Accordingly the legislature in February passed an act providing for a commission to consist of the governor, the attorney-general and controller-general of the state and two citizens to be appointed by the governor, and providing that a royalty not to exceed \$2 per ton of rock should be exacted. This royalty seems to us to be excessive, and likely to injure this important industry.

With the royalty at the old rate of \$1 per ton the river mining phosphate companies of South Carolina have been able to load phosphate rock on board vessels at Charleston at a cost of about \$3.50 per ton. The Peace River producers, of Florida, can load vessels at Tampa at a cost of \$2.50 per ton. In quality the Peace River phosphate compares more than favorably with that of the Coosaw. While the latter contains, on an average, from 58 per cent. to 60 per cent. phosphoric acid, the former averages 63 per cent., and is equally good in other respects.

Up to the present time the river rock of South Carolina has held the first place among American phosphates in the market for fertilizers. The farmers who use it are proverbially conservative, and with the situation of affairs unchanged it would have been a slow and difficult thing for even the superior phosphates of Florida to find an important place.

With the present trouble in South Carolina, however, and the almost entire restriction in the production of river rock, there is a gap made in

the market which rival producers will be not slow to take advantage of. They will have an opportunity to show the merit of the Florida rock, and thus will be able to take a competitive position which cannot fail to result in the injury of the South Carolina industry.

It is true that the government of Florida is endeavoring to impose a tax of \$1 per ton on the river mining industry of that state, claiming the right through ownership of the navigable rivers, a right which the companies are now contesting. Even in case the state should win, however, the Florida producers still have advantage over those of South Carolina, with the higher royalty which they are now called upon to pay. It would appear that the State of South Carolina, in endeavoring to increase its income, had passed a law, the result of which will be the reverse.

The bill which recently became a law in South Carolina was strenuously opposed by the Coosaw Mining Company, which claimed that its grant of the river, as confirmed by the act of the legislature in 1876, was not limited to the term of twenty-one years, but was perpetual as long as the company should make true returns. The act of 1876, it is stated, was drawn by the attorney of the company, and so worded as to give some color to this claim.

On March 2d, the State Phosphate Commission took possession of the Coosaw River territory, and made preparations to lease it to all who applied for a license, but the Coosaw company filed protest and on March 6th was granted a temporary injunction by Judge SIMONTON, of the United States Court, whereby the State Phosphate Commission is enjoined from entering upon, or otherwise interfering with, that part of the Coosaw River previously occupied by the company. There the matter rests for the present. It is stated that the company intends to refrain from dredging in the river and to prevent others from doing so until the case has been settled by the courts. The output of river rock in South Carolina has consequently been reduced to about one-half. As this portion of the product has been almost entirely shipped abroad, this restriction in production has had no effect upon the home markets. The result of this litigation will be awaited with much interest.

#### NEW PUBLICATIONS.

THE ENGINEERS' SKETCHBOOK of mechanical movements, devices, appliances, contrivances and details employed in the design and construction of machinery. With nearly two thousand illustrations, descriptive notes and memoranda. By Thomas Walter Barber, Engineer. Second edition. E. & F. N. Spon, London and New York. 243 pages. Price \$3.00.

For a constructing engineer, designer, inventor or draftsman this will prove a most useful work. Its scope is expressed in its title, and it may be truly said of it, that it fills "a long felt want." As the author states there is no other work in existence which has the same purpose, viz.: to provide, side by side, suggestive sketches of the various methods in use of accomplishing any particular mechanical movement or work, in a form easily referred to and devoid of needless detail and elaboration. A sketch properly executed is to a practical man worth a folio of description. In the work of designing, the draftsman has mainly to rely upon his memory for inspiration, and for lack of an idea has frequently to wade through numerous volumes. With this book at his hand he may in a moment, out of its 2,000 sketches, find one just suited to his purpose. The sketches are of course small, but they are well drawn, and sufficiently clear to be understood at a glance. The sketches all appear on the right-hand pages, and the descriptive titles or notes, numbered to correspond with the sketches, are on the left-hand pages. The classification is very good, and there is a good index. The book is English of course, and if we have any fault to find with it, it is that it does not illustrate those details of construction which are peculiar to this country. This might be corrected by an American supplement.

THE STEAM ENGINE. A Treatise on Steam Engines and Boilers, with examples of recent design and construction. By Daniel Kinnear Clark. 1,500 pages. 1,300 diagrams and folding plates drawn to scale. Blackie & Son. London and New York. Published in 12 parts, paper, at \$1 each; also in 4 volumes, cloth, at \$4 each.

The name of Daniel Kinnear Clark is as familiar to American engineers as to English, through his "Manual of Rules, Tables and Data," and his frequent contributions to engineering periodicals. It is sufficient commendation of his comprehensive treatise on the Steam Engine, just published, to say that it amply sustains his reputation as an author. It is written in the same clear and accurate style that characterizes his other works, and, as the bulk of the work and the numerous diagrams and plates indicate, he has not, like many other writers on the steam engine, sacrificed clearness to brevity. The work is eminently a practical one, devoting little space to refined theory and difficult mathematics, but bustling with experimental facts, data, tables and details of construction. Altogether it is the most satisfactory general treatise on the steam engine which has appeared in the English language. In the copious index the word "thermodynamics" does not appear, and all that this word implies is omitted from the work. Hence the book is not one for the student of the mathematical theory of heat-engines, but on this account it will be more acceptable to the great majority of readers.

The work is divided into four main sections: I. The principles and performance of steam boilers. II. The principles and performance of steam engines. III. The construction of steam boilers. IV. The construction of steam engines. In the first section are treated the properties of steam, combustion, systematic trials of fuel and of boilers, smoke prevention, proportions of boilers, furnaces, chimneys, etc. The second section treats of work of steam in the cylinder, testing of engines by thermal analysis, frictional resistance of engines, principles of compound engines, effect of clearance, compression, etc., with rules, tables, and general deductions.

The third section treats of the elements of strength of steam boilers,



and describes in detail the construction of the leading varieties of boilers. The fourth section, which includes about one-half of the whole work, treats of the slide-valve and other valves, valve-gear governors, and of various types of engines, including stationary engines for general purposes, engines of great power for large mills, pumping engines, other engines for special purposes, as blowing engines and rolling-mill engines, portable, multiple-compound, locomotive, tramway, and marine engines.

The boilers and engines described and illustrated are chiefly English, of course, but considerable space is given to American practice. We notice particularly the American types of water-tube sectional boilers, and the Porter-Allen, Wheelock-Corliss, Armington-Sims and other American stationary engines; also the Leavitt and the Worthington pumping engines and American locomotives.

One of the best features of the book is that it is thoroughly modern. No space is given to boilers and engines of discarded types, but it is entirely devoted to the best and most recent practice. The price at which the book is published is remarkably low, considering the vast amount of information it contains, and at this price no student of steam-engineering can afford to be without it.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and that of book buyers, give the *r-tail price*!—These notices do not supersede review in another page of the Journal.]

*A Woman's Trip to Alaska*, being an account of a voyage through the inland seas of the Sitkan Archipelago in 1890 by Septima M. Collis (Mrs. General C. H. T. Collis), author of "A Woman's War Record." Illustrated by American Bank Note Company, New York. 194 pages. Cassell Publishing Company, New York 1890. Price, \$2.50.

*Brickmakers Manual*. By R. B. Morrison. Compiled and arranged with additions by J. A. Reep. An illustrated handbook for ready reference. 191 pages. Published by T. A. Randall & Co., Indianapolis.

*Railroad Map of Pennsylvania*. Published by the Department of Internal Affairs of Pennsylvania. Drawn and compiled by J. Sutton Wall. Scale, six miles to one inch.

*Rivista del servizio minerario nel 1890*. Ministero di agricoltura industria e commercio. Illustrated. 440 pages. Firenze, 1890.

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.

Where is there a Market for Onyx?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have some very fine onyx quarries, but know nothing in regard to the price nor the extent of the uses of the mineral, which, perhaps, some of your readers may be able to give me. I desire, especially, full particulars in regard to the value of the mineral and where there is a market for it.

J. B. SHOENFELDT.

WATERLOO, N. Y., March 29, 1891.

The New Comstock Deal.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: To those of your readers who are not familiar with California mining-stock manipulation an illustration thereof will be interesting.

I have arranged the fluctuations of the stock of the Con. California & Virginia with the gradual decrease and increase of the pulp assays, and the reader can make his own deductions:

	Battery assays.	Price of stocks.
1890.		
November 1.....	\$19.30	\$1.45@ \$4.20
" 8.....	19.10	4.45@ 4.25
" 15.....	17.41	4.15@ 3.80
" 22.....	17.50	3.70@ 3.65
" 29.....	18.81	3.90@ 3.50
December 6.....	19.50	3.35@ 3.20
" 13.....	19.37	3.10@ 2.80
" 20.....	19.28	2.90@ 2.65
" 27.....	18.10	2.60@ 2.60
1891.		
January 3.....	17.90	2.30@ 2.50
" 10.....	18.50	3.10@ 3.50
" 17.....	18.10	4.20@ 4.10
" 24.....	19.25	3.70@ 3.85
" 31.....	21.40	4.00@ 4.85
February 7.....	22.50	5.00@ 4.80
" 14.....	25.50	4.90@ 4.75
" 21.....	26.50	4.70@ 5.50
" 28.....	28.25	6.00@ 6.50

The sliding scale by which the pulp value runs down and the value of the stock follows it, can here be seen. At no time in the manipulation of these battery or pulp assays has the true value of the ore mined been made known to the stockholders of this company.

No car assays are given. *It takes very little sand to reduce a pulp assay*, and the scientific rascality practiced on the Comstock never hesitates at so small a thing as that.

No owner in the mine can be made to believe that this manipulation, as shown in the tabulated statement, was not in the interest of those who wanted to freeze out weak holders and gobble their shares. At any rate that was what was done, and if it were clean-handed it is a new experience in California mining-stock manipulation.

Now that they have shaken out weak holders, they advance the pulp assays, advance the stock, and are sitting back in their dens waiting for the flies to again become entangled in the web so skillfully spun to catch them.

The reports from the 1,600 level of the Consolidated California & Virginia for the week ending February 14th mention that the ore cut on that level assays "about" \$32.50 per ton. It is a source of a little satisfaction that the millmen are at least approximating this in their pulp assays, though "about" \$32.50 may be \$35 and even more. There is no honest reason for not giving the average car assays of the ore before going to mill.

J. H. TINGMAN,

Secretary Mining Stock Association.

SAN FRANCISCO, Feb. 24, 1891.

[This letter, more than six weeks old, was, unfortunately, belated. Its point is just as pertinent now, however, as when it was written.—Ed. E. & M. J.]

THE REDEMPTION OF EGYPT.

By our Special Contributor.

The tourist in Egypt may take his choice of half a dozen distinct, yet equally fascinating fields of observation and study. I say he *may*, not *must*; for, as a matter of fact, the average tourist does not choose at all, but allows himself to be attracted, amused and superficially instructed in all these departments. He basks in the sun along the Nile; rides on a camel once, and on a donkey often; curiously inspects the *fellaheen*, the *Bishareen*, the Nubians, the Copts, and the other innumerable elements of the motley population; contemplates pyramids, sphinxes, obelisks, temples and tombs; vainly strives to get into his head, and to keep there, the names, functions and head-dresses of the gods, the dynasties, dates and *cartouches* of the kings, and the differences between merely ancient, more ancient and most ancient, on a scale of which the modern end antedates everything that can be called modern. He scrutinizes scarabs, and learns to think that he knows a genuine antique; he interviews the mummies of Rameses II. and Seti I., and the sister-in-law of Solomon, and the rest, and draws profound conclusions from the fact that the Pharaoh of the Exodus is not among them, having been doubtless drowned in the Red Sea; he admires or condemns (in either case with good reason) the character of ancient art. Or he visits the Coptic churches, and the new and old mosques of Cairo, bends with mute admiration over the unique collection of illuminated Korans in the Khedivial library, and ponders the strange secret power of that conquering creed which has made Egypt a palimpsest, writing upon it a new inscription devoid of all relationship to the underlying accumulated lore of fifty centuries—not an idea, not an architectural detail, not a custom or habit borrowed from the immemorial past: only the stones of pyramids and tombs stolen to build mosques and palaces withal. Or he traverses again and again the streets and bazars of Cairo; learns how to beat down the Arab merchant from five prices to three, and buys at the latter rate to the entire satisfaction of both parties; listens to native singers and orchestras, and wonders what the tune is; walks in the wonderful garden of the Ezbekiyah, in the heart of the city, or drives under the acacias beyond the beautiful Nile bridge to the park of the Ghezireh; or lounges on the terrace in front of Sheppard's Hotel and lets the endless kaleidoscopic, cosmopolitan procession of all types and races charm his lazy eye.

Or, finally (to skip many other things in which the tourist may and does, idly or zealously, engage), he may interest himself in the present condition of Egypt, and the measures now in progress, chiefly under English influence and English direction, for the reform of its social conditions, and the development of its natural resources. Here, also, he will find a great diversity of subjects of attention. The adjustment of equitable taxation and the distribution of revenue; the improvement of educational systems, whether through governmental agencies or through the excellent work of the schools of the missionaries; the reform of the courts and the gradual introduction of that amazing novelty, justice for the *fellaheen* peasantry; the perfection of police protection for life and property; the advance in sanitary legislation and in hospital practice—all these things, in which (it may be said without disparagement of the distinguished services rendered by men of other nations) English advisers and administrators have taken a leading part, combine to make up a record of progress for Egypt, during the last decade, which is perhaps unparalleled in the world.

Progress is to be measured, of course, relatively, and not by the absolute position attained, without reference to the position from which the start was made. And in estimating the vast achievements of recent years in the regeneration of Egypt, one must not be warped in judgment by the consideration of the yet greater tasks that lie in the future. Fully appreciating how much remains to be done, I am nevertheless bound to say that I think the worst is over, and that future progress can be made with accelerated speed and increased ease, if the good work hitherto accomplished be permitted to continue and be not thwarted by international jealousies or meddling diplomacy.

On this side, no doubt, the situation has its difficulties. It is hard to explain—at least, the explanation must be a narrative rather than a logical argument—the exact theory upon which England is at this moment "occupying," and to so large an extent governing, Egypt. The necessity of protecting her ownership in the Suez Canal, as the indispensable line of communication with her Indian Empire; the responsibilities jointly incurred with France to support the government of Tewfik Pasha, after having forced the removal of his father; the withdrawal of France from that engagement; the declination of Italy to take a hand in the business; the operations, wise and unwise, brilliant and disastrous, which the names of Alexandria, Tel-el-Kebir and Khartoum freshly recall, go to form a series of impulses in obedience to which the English government has advanced step by step, not knowing precisely whither, but feeling that the one impossible direction was backward. The result is the "Army of Occupation," and a considerable number of Englishmen holding important positions under the Khedive.

But however these men got here, and whatever the grounds on which they stay, it is certainly to be hoped that they will not go. With conspicuous ability, tact and honesty, they have half-completed a stupendous reconstruction of national prosperity. If their hands should now be removed, there is no certainty that the whole structure would not tumble again into the old confusion of stately ruins and sickening rubbish.

I am inclined to think that the intelligent representatives of other nations appreciate both the importance and the excellence of this work, and while they may jealously watch against any attendant aggrandizement of British power, will not seriously object to the continuance of the process which is, in commercial and in other ways, so great a benefit to them all. The chief dangers appear to be these two: first, that the Egyptian occupation may be made some day a party question in Parliament, and may be settled without due regard to the welfare of Egypt; secondly, that with increasing prosperity and security, the Khedive himself may grow restive under English tutelage, and demand that Egypt shall be left to govern itself. Or, both these things might happen at once, and the demand of the Khedive might be made, with great logical force, the basis of a party policy in Parliament.

Neither of these dangers appears to be immediately threatening. Eng-



lish parties are absorbed in more exciting domestic issues, and seem by common consent to feel that England cannot, honorably or safely, retire from her position in Egypt. That position is anomalous, perhaps, but anomalies, fortunately, do not trouble the British mind. On the other hand, the Khedive, who is said to be a very intelligent and sensible man, cannot fail to realize that he is better off, and that his country is better off, under the present condition of affairs, than if English control were withdrawn, and he were left to struggle with the now half-subdued and sullenly-waiting influence of the corrupt old Pashas. To these considerations, affecting the internal government of the country, must be added the threatening situation on the southern frontier, where the fanatical horde of the "Dervishes," under the Kaliph-successor of the deceased Madhi, still ravage the Soudan, declare their mission of conquering the world, make periodical raids upon the outposts of civilization, and keep the commerce of half the continent paralysed. In that direction, I venture to say, there will be no stable peace and prosperity for Egypt until the frontier has been rectified by the permanent occupation of Khartoum. How this will come about, or when, I do not undertake to say. If the Dervishes were capable of establishing a regular government, making and keeping treaties, and protecting peaceful commerce, it might not be necessary to recover from them the commanding points they have occupied. But while they continue what they are, they are intolerable neighbors; and whoever has witnessed, as I have recently done, the decay of business on the Upper Nile, from Assiout to Wady Halfa, where formerly the caravans from the Soudan brought a prosperous trade, must realize that this state of things cannot last without permanently diverting into some other channel an important source of national wealth. And England having dictated the abandonment of the Soudan, it may naturally be supposed that the Egyptian government itself would not willingly have England withdraw its aid until the resulting difficulties have been settled somehow. In other words, that distinctly English piece of business is yet unfinished.

There is, therefore, reason to expect, as well as to desire, the continuance of the present conditions of administration in Egypt. But the political bearings of the situation, whatever they may be, are transient and insignificant, compared with the internal improvements which it permits.

As an interesting example of this kind, the irrigation works and their management may be selected. The following statements, based partly upon personal observation and inquiry, partly upon the published reports of the department and the information kindly furnished to me by Sir Colin Scott-Moncrieff, Under Secretary of State, and G. Liernur Bey, Director of the Barrage, may serve to convey to the general reader some notion of this great enterprise.

It is fashionable to extol the skill of the ancients; and the former systems of irrigation in Egypt have been often represented as surpassing in magnitude and perfection all that modern engineering could achieve. Similar tales are told of the wonderful extent of irrigation works in India. But in both cases, as in so many others, antiquity has been overpraised. As to the extent of ancient systems of canals, reservoirs, etc., it has often been assumed that the ruins which yet remain are those of works which were all in use at the same time: whereas, in India, for example, the innumerable old reservoirs prove on examination to be "silted up" with the deposit from the water which they once contained, and it must be inferred, therefore, that they are so numerous simply because they were not cleaned annually, as they should have been, and therefore had to be abandoned, one after another, while new ones were built to take their place. No doubt the same thing is true to some extent of the numerous ancient canals and basins reported to have existed (though in this case no longer traceable) in Egypt. But, quite apart from the question of its extent, the irrigation of the Pharaohs was in all probability scientifically imperfect also. It seems to have been in method what Egyptian irrigation has been in modern times—namely, not strictly irrigation at all, but only overflow. The following compact and clear description of it I quote from an admirable article by Sir Colin Scott-Moncrieff published in the *Nineteenth Century* for February, 1885, to which I am indebted for other particulars also:

"From the earliest time the valley of the Nile has been divided by earthen embankments into a succession of great flats, measuring occasionally as much as 100,000 acres. The rising flood is diverted by a series of short canals into these flats, where the water stands two or three feet deep, until it has soaked the soil, and deposited its rich alluvial mud. By this time the Nile has subsided. The drying mud is rudely ploughed and sown, and, four or five months after, the crop is reaped. No rain has fallen on it, but the soil has been sufficiently saturated to require no further watering. A rich crop is produced, but, by this system, only one crop in the year; and, during the summer months, when, from its latitude and temperature one might expect Egypt to be yielding sub-tropical fruits, the empty fields lie baked and parched."

The lowest stage of water in the Nile occurs about the beginning of June. The highest stage is usually in October. It is, therefore, chiefly between October and June, or practically in the winter, that the single crop must be gathered. Meanwhile, the Nile, having once sunk below the level at which it can enter the irrigating canals and flood the basins, might carry still, through a thirsty land, to the Mediterranean, a large body of water, entirely unavailable, except so far as the pumps, water-wheels, hand-lifts and Archimedean screws employed along its banks might rescue and utilize a portion, as it passed. But these appliances could benefit only the immediate neighborhood of the river itself.

Early in the present century, the genius of Mohammed Ali devised the first measure of improvement on the ancient system. Having introduced into the country the cultivation of cotton and other new crops, he deepened the canals of the Delta, so that the low as well as the high Nile might supply them with water, and thus enabled the people of that region to obtain by means of artificial elevation from the canals the means of irrigation after the inundation had subsided, and when the cotton crop most needed it. This was the beginning of "perennial irrigation," or (as compared with the method of simple overflow) irrigation proper, under which several crops a year could be obtained from the fertile soil.

The immediate result was a vast increase in the productiveness of the Delta, and the consequent wealth realized by *somebody* in Egypt reached its climax at the time of our American war, when Egyptian cotton found an unlimited and highly profitable market. But the new system was neither thoroughly understood, nor intelligently applied, nor fairly administered. Canals were cut indiscriminately for the benefit of the rich,

and without due regard to their effect, either upon the regimen of the river or upon the equitable distribution of water at the critical season of low Nile. Although there was doubtless at the dryest season water enough for all, the steam pump of the Pasha might wastefully deluge his fruitful acres, while the *shadoof* (hand-lift) of the poor *fellah*, further down the canal, went dry. As an inevitable consequence, the latter, not being sure of water for his crop, dared not incur the expense of planting, and surely drifted toward the position of a mere laborer on the lands of another. The extinction of the class of small proprietors, which was thus threatened, would have been from every point of view a calamity, and has been checked none too soon.

But other evils had been incurred, through ignorance and maladministration, particularly under the successors of the great Viceroy. The perpetual watering of the fields without provision for their drainage produced a progressive saturation with the salts dissolved from the sub-soil or carried in the low Nile; and in many places an efflorescence of such salts, fatal to vegetation, appeared on the surface. Western Americans will understand what was happening when I say that, for want of drainage, the fertile land of the Delta and the Fayoum was becoming "alkalied." This was one source of the complaint which began to be heard, that the soil was losing its fertility. Another was the reckless sacrifice, under the new high-pressure system, of the old, annual, re-fertilizing overflow.

Worst of all, the badly aligned and unnecessarily multiplied canals became choked every year with the deposit of the Nile, so much needed elsewhere, and had to be cleaned out. Sir Colin says, in the article already quoted, that an army of 60,000 peasants was employed for about half of every year in effecting the necessary clearances. These men were the victims of the *corvée*, or draft, an institution which seems to have survived in Egypt through all the changes of centuries. As the pyramids had been built, so, 6,000 years later, the canals were cleaned, by forced labor.

Theoretically, as has often been observed, the *corvée* may be defended. If the maintenance of the basins, canals and other works of public utility be necessary to the country, it is fair enough that the inhabitants, who cannot pay for the work in any other way, should contribute their labor to the general good. The principle of the thing is the same as that of the rural "road tax," familiar to us in America. But we know well enough, on the other hand, that the road-tax system does not make good roads; and in Egypt the *corvée*, being immeasurably more extensive and more corruptly administered, has been an almost unmitigated curse, for the rich and powerful have escaped its obligation altogether, while the poor and helpless have done double duty under it. The peasant has been dragged away from his own work to labor at his own cost and charges for food, even on the public works from which, after all, he got little or no benefit. The unwilling laborers thus secured have been, of course, shifty, ineffective and unreliable, and the whole system has been as wasteful as it was iniquitous. I am happy to say that the *corvée*, thanks to the persistent pressure of English officials, has been gradually reduced year by year and is now to be abolished altogether and replaced by paid labor, the expense of which will be met by a moderate tax upon the land actually benefited.

From the causes above enumerated, Egypt was really in danger of irreparable ruin, when the English took the problem of irrigation in hand. Fortunately, the right men were available—men trained in the Indian service; familiar with scientific irrigation under greater difficulties than were here to be encountered; certain of means and results; active, vigilant, incorruptible, and skilled in dealing with alien races. These men, Moncrieff, Western, Ross, Willcocks and Reid, with their coadjutors and subordinates of various nationalities, have already revolutionized the irrigation of Lower Egypt, and greatly improved the industrial conditions of the whole Nile valley and the Fayoum.

The most important thing they have accomplished has been the enforcement of justice and economy in the distribution of water. Next to this may come the improvement in countless local details of the distributing system, and the reduction of the *sharaki* (i. e., the area of land not reached by the means of irrigation). As most impressive, though, I venture to say, not most meritorious, may be named the remarkable engineering feat of the reconstruction of the Barrage. I place this last in order, not by way of disparagement, but to emphasize my conviction that skillful engineering alone would not have saved Egypt, and that the wise and honest administration which has won the confidence, dissipated the fatalistic despair and revived the energy of the Egyptian *fellah*, is entitled to recognition as a prime factor in the new life of this old land.

The Barrage, like the perennial irrigation, or rather, as a part of the perennial irrigation, was contemplated by the great Mohammed Ali. It is a gigantic weir, crossing both branches of the Nile, about 12 miles below Cairo, and intended to hold back the water of low Nile, so that it may be diverted into three great distributing-canals, watering respectively the eastern, western and middle Delta. For each of these canals as well as for the main stream, locks are provided to transfer boats from one level to the other. In structure, the Barrage itself is a bridge (or rather two bridges, with an interval of solid land between) of masonry arches, under which the river passes freely when the gates are open, but which can be converted into a dam of any desired height by closing the gates. There are 132 arches, each of 16 feet span; 71 being required for the Damietta branch (600 yards) and 61 for the Rosetta branch (500 yards). A wide causeway, freely used as a high road, is formed by the top of the structure, which is, moreover, picturesquely completed by castellated terminal towers at the end of each division.

The history of this work is interesting and characteristic of Egypt. It was designed by a French engineer, Mougel Bey, begun in 1847 and finished, I believe, in 1862. The plan was not bad, and the materials employed were of good quality; but the actual execution of the work seems to have been careless and dishonest, particularly at the most critical point of all, namely, the foundation. Poor Mougel Bey was deceived in this regard by his own subordinates; and the jealous intrigues of rival engineers, as well as the meddling of ignorant superiors, seem also to have played a part in the criminal plot. At all events, when the Barrage came to be formally inaugurated, it broke down in a spectacular way, and was condemned and abandoned with an unqualified positiveness which indicated that its failure was, to somebody in power, not matter for regret. No doubt the Nile had dug out and carried off a good deal of the badly-laid concrete of the pier foundations, and the piers thus weakened



could not be expected to stand great pressure. Moreover, Mougel Bey's ingenious gates, after a pattern which has worked well, I am told, in river weirs elsewhere, were doubtless too delicate for Nile conditions and Egyptian hands. One of them stuck fast, and could not be raised by the appointed means (the flotation of an air-chamber). Some military Pasha, it is said, ordered it to be started by exploding gun powder under it. The gate came up; so did a part of the foundation; and several arches of the Barrage settled perceptibly in consequence. After such reckless experiments, the whole thing was hastily condemned, and remained for over 20 years useless, except as a bridge, and an object of interest to tourists. It was a beautiful sight, with its towers and long perspective of arches; there was a fine old palace garden on the point of land between the two branches of the Nile; the sail from Cairo, or the trip by rail, was easily made; and, altogether, an agreeable day's excursion could be got out of it.

Meanwhile the needs and perils of agriculture in the Delta called for some remedy; the Egyptian government had neither the courage nor the means to attempt another Barrage; and the only alternative scheme proposed was a vast system of steam pumps, the mere maintenance and operation of which, in this country without fuel, would have cost some two hundred and fifty thousand pounds annually. A beginning in this direction had indeed been made, in the execution of a contract with a foreign company, which is still pumping water at considerable cost to the government; but, fortunately, before further steps had been taken, Moncrieff was called to study the problem. He examined the despised Barrage, carefully noted all its cracks and leakages and weak points; satisfied himself that it was not getting worse, but on the whole, holding its own, after a crippled fashion, and proceeded cautiously to try to make it good for something. It was a brave thing for an engineer to do: for success could be but relative, and failure would be unjustly exaggerated by hostile critics.

But the first season of this experiment resulted in so great a benefit to the cultivators that the admiration even of unfriendly judges was freely expressed. By vigilance and prudence, the supposed ruin of the Barrage was made to hold up seven feet three inches of head, so that the canals below were filled even at the lowest stage. The consumption of coal for steam pumps fell off enormously, to the disgust of merchants, railway companies and steam-pump monopolists, but to the great relief of poor farmers and the benefit of the country generally.

This led to the grant of a special appropriation of one million pounds for the improvements of irrigation works. The expenditure of this sum has been made during the past five years by Col. Sir Colin Scott-Moncrieff and his assistants. The Barrage has been pretty thoroughly repaired, and may now be considered to be as sound and strong as it could be made under the conditions. The operation has not involved any novel or startling feats of engineering, yet many famous engineering enterprises have been executed with less exercise of anxious vigilance, ingenuity and judgment. It would have been far simpler to build a new Barrage than to put in new foundations, gates and protecting walls, for this old one. There was the constant peril that the structure under repair might tumble on the heads of the workmen digging at its base; and there was the old difficulty in securing from native laborers and foremen the thorough execution of details.

During the season when work could be carried on, the whole Nile was made to pass through one branch and one-half of the other, while the remainder of its natural channel was inclosed in a great coffer-dam, which being pumped out, the bed of the stream was laid bare. Sometimes six thousand men were working at once in this place, excavating, stone-laying and putting down the cement floors (wide rather than deep) which constitute the best protection against the scour of the current.

Poor Mougel Bey died only a few weeks ago, in old age (nearly 90), obscurity and poverty, but not at last in disgrace; for he lived long enough to see his reputation as an engineer redeemed from unmerited obloquy, the merits of his plan cordially acknowledged, and the beneficial results it contemplated measurably secured by the English engineers, who thus repaired after twenty years the wrong inflicted upon him by French jealousy and Egyptian stupidity. And the magnanimity of his English successors did not stop here; for Scott-Moncrieff obtained for him a pension of £500 a year, which enabled him to pass his last days in physical comfort.

It is impossible to give here even a general account of the multiplied difficulties of this work. I may return to this subject again, with greater leisure, though I could add but little to the excellent treatise by Mr. Willcocks on "Egyptian Irrigation," published two or three years ago. Suffice it to say that the Barrage has now been finished, and that the low Nile now approaching will witness its full efficiency. What that will be, remains to be exactly measured by experience. The permanence of the work itself is scarcely a matter of calculation. It must be microscopically watched, day and night; the smallest incipient cracks and the signs of the digging of the Nile under the floors must be detected and remedied, and the strain upon the structure must be closely observed. To show what small matters may here be of importance, I may quote a few words from the report of Mr. Reid, director of the work in 1889, who says, speaking of the condition of a part of the old floor:

"The usual evidences of careless treatment were found in the existence of deep holes and furrows cut by chains, which, having fallen, had been allowed to remain on the floor. . . . The scour will at times be very heavy, and if a chain be allowed to vibrate on the floor it will bore a hole in a single month deep enough to seriously affect the safety of the bridge."

The useful effect of the Barrage and its connected canals can only be secured, as I have already said, by a scientific and impartial distribution of water. This requires the enforcement of rotation in the use of the water, and hence of rotation in the planting of crops by the individual consumers. That is, a proprietor intending to plant so many acres with cotton must do his planting at a certain time (fixed for him by the government inspector together with a district or village council of proprietor), and if he obeys this rule must be assured in return that at certain later periods, when his crop will need watering, it will be, without fail, sufficiently watered. It is easy to see that if all planted at once all would need water at once, and there would be days and weeks when the low Nile supply would not suffice, and other days and weeks when it would go by unused. The full economy of distribution will be reached when every drop of the low Nile is utilized for irrigation, and none of it gets to the sea. This is now already almost the case.

Then there is still room for progressive improvement in the canal system, which shall secure the maximum irrigable area while reducing to a minimum the annual deposit of silt and the labor of clearance. And there are yet to be improved methods of dealing with the high Nile and its fertilizing flood, so as to secure not only the beneficial deposit, but also, by means of proper drainage, the "washing" of the land, and the removal of the injurious salts which would otherwise accumulate. Finally, there are all the interesting questions connected with Upper Egypt and the Fayoum, and among them those which relate to the creation of great reservoirs by means of which a part of the surplus of high Nile may be stored for the reinforcement of low Nile. Concerning these latter, one of which is the scheme of Mr. Cope Whitehouse, I may say something at another time. For the present, I trust the imperfect sketch I have given will convince the reader—as the study of the able annual reports of the Public Works Ministry and the personal inspection of the ground would certainly convince him—that a wonderful transformation is here in progress, under wise, skillful and patient management.

It was a pleasure to find as the present resident Director at the Barrage, an American engineer, Mr. G. Liernur Bey, whose courteous reception of our party, and clear and intelligent explanation of the works, greatly facilitated our comprehension of the conditions involved and of the creditable success achieved. The critical task of watching and maintaining the Barrage devolves immediately upon Mr. Liernur, while the general direction of irrigation is in the hands of Lieutenant-Colonel Ross, the Inspector-General, and his district inspectors, all under the control of Sir Colin Scott-Moncrieff, Under Secretary of State.

**Responsibility of Carriers of Goods.**—Where a railroad company receives freight to be forwarded to a point not on its line, the fact that it requires from the shipper a guaranty of payment of through freight is not conclusive that it undertakes the responsibility of delivering goods at the point of destination. *Illinois Central Railway Company v. Kerr*, *Supreme Court of Mississippi*, 8 South. Rep., 330.

**The Loss of Carbon in Rusted Pig Iron.**—Mr. J. G. Donald, in the *Chemical News*, states that he was recently engaged in determining the graphite and carbon in two samples of pig iron. The drillings weighed off for treatment with copper and ammonium chloride were brushed into beakers which were wet, having been rinsed with distilled water. At this point, and before the solvent had been added, he was called away. On returning to the work, after the lapse of nearly a week, the drillings in the beakers were found to be much rusted. The idea occurred to him that it would be interesting to learn to what extent there had been loss of carbon through the rusting of the drillings. To this end a determination of carbon in the rusted portions as well as in the original samples was made with the following results for total carbon: Rusted drillings No. 1, 1.941%; No. 2, 1.332%. Original sample No. 1, 2.282%; No. 2, 2.132%. The combined carbon in each of the samples was found to be as follows: No. 1, 0.378%; No. 2, 0.336%. It will thus be seen that in the case of No. 2 the rusting has caused a disappearance of a portion of the graphite. No. 2 was much finer than No. 1, and to this fact is doubtless due, in part at least, the greater loss of carbon in No. 2.

**Utah Ozokerite.**—A. N. Searl, in *Journal of the Franklin Institute* thus describes Utah ozokerite (see ENGINEERING AND MINING JOURNAL, July, 1889), which he states has not been fully investigated, the results so far obtained being somewhat conflicting. The material is of a dark brown color, waxlike in consistency, with a foliated structure; crystals of gypsum were found with it. It melts at 53°–55 C., the specific gravity being 0.9285; it is soluble in warm benzene, ether and carbon bisulphide, giving a fluorescent solution. On boiling with absolute alcohol a pure white, solid hydrocarbon separated out in pearly scales; on combustion it was shown to consist of carbon, 85.44%; hydrogen, 14.45%. On melting it became yellowish, of waxy consistency, with specific gravity 0.9708, was soluble in all solvents for ozokerite, and further in hot alcohol and hot acetone. Experiments showed that it was little acted on by strong sulphuric acid or bromine, and was thus evidently a paraffine. The molecular weight by Raoult's method was 256. Experiments with the ozokerite showed that it contained very few olefines, and was not readily acted on by reagents; the melting point and percentage composition pointed to a formula of  $C_{22}H_{42}$ ; the molecular weight by the Raoult method would give about  $C_{18}H_{38}$ , the true formula probably lying between these two.

**Time of Exposure in Photography.**—A new method has been devised and patented in England for ascertaining the requisite time of exposure in photography. An instrument for measuring the relative intensity of the photographically active rays reflected from any landscape or other object by observing the time required for the light from a phosphorescent compound to fade from its maximum intensity to the intensity of the light reflected from the object, is employed. It consists of an opaque tube with an eye-piece at one end, whilst at the other is a plate of glass, part of which is coated with Balmain's paint, or some similar phosphorescent substance emitting only rays which act upon an ordinary photographic plate. The paint must either be opaque or must be made opaque by means of a backing. Behind this glass is a piece of ground glass, and there may also be a piece of blue glass cutting off from the light reflected from the object all rays except those which act on a photographic plate. The frame carrying these glasses is hinged, so that it can be turned back in order to expose the phosphorescent substance to light. When a measurement is to be made the frame is turned back and the phosphorescent surface is exposed to daylight or to the light from burning magnesium for a time sufficient to excite the maximum luminosity. It is then put back in position and the apparatus is at once directed toward the object to be photographed. The light reflected from this object passes through the unobstructed portion of the ground glass and blue glass, and at first appears dark as compared with the light from the phosphorescent surface. The brightness of the latter, however, gradually fades, until the two lights are equal in intensity. The time required for this to take place is observed, and, with this datum and a series of tables supplied with the instrument, the exposure necessary to obtain a good photograph of the object in question is ascertained.



NOTES ON THE BRITISH ALKALI TRADE.\*-I.

Written for the Engineering and Mining Journal.

THE MANUFACTURE OF SULPHURIC ACID.

In a first article on the birth and development of the British alkali trade, I traced the history of sulphuric acid making from the time of Geber and contemporary alchemists in the eighth century, A. D., onward to the introduction of steam into the lead chambers, in Glasgow district, about the year 1814. (See ENGINEERING AND MINING JOURNAL, September 13th, 1890, p. 308.)

About the year 1815 sulphuric-acid chambers were erected at Bill Quay, on the Tyne, and in 1824 Losh erected two acid chambers at Walker, which had the following dimensions: 25 feet long by 10 feet wide by 10 feet high. In the following year he erected two more of larger dimensions.

From 1823, when James Muspratt commenced the manufacture of alkali by Leblanc's process on a large scale, for the next 10 or 11 years several large alkali works were erected. The sulphur for the sulphuric acid used in these works was all brought from Sicily. About the year 1822 the price of sulphur (according to Clapham) was £7 per ton (the duty of £15 per ton then levied being remitted to chemical manufacturers).

In 1825 the duty of £15 was reduced to 10s. per ton; the price of sulphur, delivered in the Tyne, thus became about £6 to £8 per ton, at which price it continued until 1838, when the Neapolitan Government entered into an agreement with Taix & Company, of Marseilles, by which this firm had a monopoly of the sale of all the sulphur produced in Sicily. The effect of this monopoly was to raise the price of sulphur immediately to about £14 per ton, thus causing great consternation and stoppage for a time among alkali manufacturers. The stoppages were for a time only, as experiments had before this been tried on the use of iron pyrites as a source of sulphur for acid making. Hills, in England, and Perret, in France, were prominent among those who first used pyrites for this purpose. According to Mr. Brereton Todd † (H. M. Inspector of Alkali Works), the way of lighting the pyrites kilns from the top, as practiced now, was accidentally discovered by a workman of his father's in Cornwall.

We find that pyrites was used on a large scale for the manufacture of sulphuric acid in 1839, by Thos. Farmer in London and by Jas. Muspratt in the Liverpool district; and in the following year it was used by two alkali makers on the Tyne. The first pyrites used in England, on a considerable scale, was the Wicklow (Irish) and Welsh.

The greater part of the Wicklow pyrites contains only 30% to 35% of sulphur, though a small quantity of richer ore, from the valley of the river Avoca, contains 38% to 44%. The alkali makers of Lancashire soon adopted the use of Irish pyrites; but on the Tyne the general use of pyrites seems to have come later, for we find that in 1852 as much as 7,580 tons of sulphur were consumed, none being used in Lancashire.

In his interesting address, ‡ already referred to, Mr. E. K. Muspratt says: "Many difficulties were met with in the use of pyrites, and when the price of sulphur fell to £5 per ton, it was a disputed point among alkali makers whether at that price it was not more economical than Irish pyrites at about 25 shillings per ton. Sulphur could be readily burnt on an iron plate, and although the admission of the necessary quantity of air to support combustion without admitting at the same time an excess, presented some difficulties, this was comparatively easily regulated. With Irish pyrites, however, containing only about 32% of sulphur combined with iron, sufficient air had to be admitted not only to burn the sulphur, but also to oxidize the iron; and, as a consequence, the constitution of the gases entering the chamber was very irregular, and much larger chamber space was required than was necessary when using sulphur."

In time pyrites of higher strength was imported from abroad; in 1856 Spanish pyrites was first used on the Tyne; in 1858, Belgian; in 1859 we find that pyrites from Spain and Portugal was burned on a large scale by alkali makers, and in 1861, Westphalian and Norwegian pyrites were imported to the Tyne.

The following analyses show the composition of the chief varieties of pyrites which have been used in the manufacture of sulphuric acid:

	Irish.		Westphalian.		Spanish.	
	J. Pattinson. (Brit. Assoc'n, 1863.)	R. C. Clapham. (Chem. Tech. III., p. 14.)	son. (Loco citato.)	R. C. Clapham. (Loco citato.)	son. (Loco citato.)	J. Pattinson. (Loco citato.)
Sulphur.....	44.2%	38.737%	45.60%	47.30%	49.30%	49.30%
Iron.....	40.52	36.068	38.52	41.92	41.41	41.41
Copper.....	.90	2.566	.64	1.52	.66	.66
Lead.....	1.50	1.809	trace	trace	trace	trace
Zinc.....	3.51	.....	6.00	.22	trace	trace
Thallium.....	.....	.....	.....	.....	.....	.....
Arsenic.....	.33	.395	trace	.33	.31	.31
Lime.....	.24	.....	.11	.....	.14	.14
Insoluble.....	8.80	19.713	8.70	3.40	2.00	2.00
Moisture.....	.09	.....	.36	.56	.05	.05
Oxygen, as Fe <sub>2</sub> O <sub>3</sub> .....	.25	.....	.37	.....	.25	.25
	100.34	99.348	100.30	99.66	99.93	99.93

\* Average of 4 analyses, Richardson & Watts.

Mr. J. McCulloch (of Messrs. Tennants'), in a paper read before the Tyne Chemical Society in December, 1872, gives Mason's (Pomaron or San Domingo), Tharsis, Norwegian and Belgian ores as amongst the most suitable for the manufacture of sulphuric acid. He had burned ores of the following composition: §

	First Norwegian.	Second Norwegian.	Mason's.	Belgian.
Sulphur.....	46.15%	38.17%	49.80%	45.90%
Iron.....	44.20	32.80	42.88	38.52
Copper.....	1.20	1.10	2.26	Nil.
Zinc.....	2.10	2.32	.10	6.00
Arsenic.....	Nil.	Trace.	.28	Trace.
Lime carbonate.....	2.55	11.90	.18	.11
" sulphate.....	Trace.	Nil.	Nil.	Nil.
Magnesia carbonate.....	.....	1.80	.....	.....
Insoluble.....	3.20	12.20	2.94	9.00
Moisture.....	.40	.25	.95	.36
	99.80	99.82	99.39	99.59

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† See Lunge's "Sulphuric Acid and Alkali," Vol. I, p. 82.

‡ J.L. Soc. Chem. Ind., 1836, p. 403.

§ See Chemical News, March, 1873, p. 125.

The burnt pyrites from the above qualities contained on an average the following amount of total sulphur: First Norwegian, 3.5%; second Norwegian, 7.5%; Mason's, 3.5%; Belgian, 2.5%.

"It will be seen," adds Mr. McCulloch, "that the second quality of Norwegian contains a large quantity of carbonate of lime, which militates very much against the burning of the ore. The sulphur combines with the lime, forming sulphate of lime, which, of course, remains in the pyrites cinders, instead of going to form sulphuric acid in the chambers. The manufacturer would best study his interests by selecting those ores containing the least quantity of lime compounds."

By far the greatest bulk of all the pyrites burned in Great Britain now is from Spain and Portugal, the three chief companies being the Tharsis and the Rio Tinto (which ship from Huelva), and Mason & Barry, which owns the San Domingo and other mines, and ship from Pomaron. The shares in the Tharsis Sulphur and Copper Company, Limited, are held largely by alkali makers, and the directorate in 1879 contained the names of such well known manufacturers as C. Tennant (chairman), H. Gaskell, W. W. Pattinson, J. Williamson and D. Gamble. This company paid dividends from 1872 to 1877, varying from 40% to 17½%, and the dividend for the last two half years (1889-90) was 20%.

The following table, showing the imports of pyrites at periods of about five years, is chiefly taken from the paper read by Mr. E. K. Muspratt, Hon. Secretary of the Alkali Manufacturers' Association:

IMPORTS OF PYRITES INTO THE UNITED KINGDOM.

Year.	Mersey.	Tyne.	United Kingdom.
	Tons.	Tons.	Tons.
1859	26,641	.....	.....
1865	68,230	.....	.....
1870	145,705	130,686	411,512
1875	210,885	117,988	545,428
1880	280,326	219,069	658,047
1884	225,350	101,039	563,073
1889	222,791*	94,628†	.....

\*From Alkali Inspectors' Reports, District No. 3 and Sub District.

†From Alkali Inspectors' Report, District No. 2.

PRICES OBTAINED IN THE LIVERPOOL DISTRICT FOR PYRITES FROM JANUARY 1ST, 1861,\* WHEN SOLD FOR SULPHUR ONLY. (BURNT ORE TO BE RETURNED FOR COPPER EXTRACTION.)

Year.	Price per unit.	Allowance per unit of sulphur.	Net cost to alkali works per unit of sulphur.	Year.	Price per unit.	Allowance per unit of sulphur.	Net cost to alkali works per unit of sulphur.
1862.....	9'62½	—	9'62½	1871.....	8	¾	7¼
1863.....	8	—	8	1872.....	9	1½	7½
1865.....	9	—	9	1873.....	6	½	5½
January, 1866.....	9½	—	9½	1874.....	5	½	4½
March, 1866.....	11'02	—	11'02	1875.....	6	½	5½
January, 1868.....	10'04	—	10'04	1876.....	6	½	5½
June, 1868.....	9½	—	9½	1877.....	5	½	4½
October, 1868.....	9½	—	9½	January, 1879 to 1884.....	6	¾	5¾
January, 1869.....	7	—	7	Decbr., 1884 to 1885.....	6	¾	5¾
June, 1869.....	8	—	8	1885 to 1887.....	4½	1 to 1½	3 to 3½

\*Vide E. K. Muspratt, address to Soc. Chem. Ind. 1886. J.L. p. 405.

†Tharsis Company formed.

‡Id allowance was made this year on some small parcels charged by Masons at 7d.

§1872. Small lot of pyrites sold also at 10d.

¶First appearance of Rio Tinto Company.

||1879-1881. Combination of pyrites companies.

¶Combination had ceased.

To an outsider it may be necessary to point out that the price of pyrites is stated per unit of sulphur; thus, suppose the pyrites on analysis shows 48% sulphur and the price is three pence per unit per ton: 48 × 3 = 144 pence = 12 shillings per ton of pyrites. The combination of pyrites companies ceased about the end of 1883 by the Tharsis Company breaking away from the others and reducing its price from six pence to three pence per unit of sulphur. This was only some six months after Mr. Chance had read a paper describing his success with the Schaffner and Helbig process, and the reduction in price of sulphur stopped the attempts to recover this material from tank water by that process.

I must now describe the pyrites kiln or burner. The form first used in England for the Irish and Welsh pyrites, burned in the early days, was much deeper than at present. Such poor ores contained only about 40% of sulphur, often less, hence a deep kiln was advantageous; but, with the rich Spanish and Portuguese ores now used, it is not customary to have a depth of more than 2 feet 6 inches, i. e., from the bottom of the charging door to the grate, and the writer knows of at least one works where the grate is as shallow as 1 foot 2 inches. From 1 foot 6 inches to 2 feet may be considered an average depth for the modern pyrites burners for stone containing 48% to 50% sulphur. When rich ores were used in a deep kiln, the heat of combustion was found to be so great that "scars" were formed by the ore fluxing. These "scars" have been shown by Scheurer, Kestner and Rosenstiehl (Bull. soc. chim., 1868) to consist largely of iron monosulphide (FeS.) On the other hand, if a poor pyrites is used in a shallow kiln enough heat is not generated by the combustion and a badly burnt ore is the result. Sets of burners are usually built with 10 to 12 burners in a row and with two rows back to back.

In some cases, however, one sees single rows; and, occasionally, a form of burner, which is charged at the front and has the burnt ore withdrawn at the back; this form is necessarily built in single rows.

The accompanying drawing shows a sectional elevation of a pyrites burner, and an elevation of an improved front of the newest type made by Messrs. Robert Dalglish & Co., of St. Helens, Lancashire. This pattern of front is of the usual size, 6 feet 6 inches high by 5 feet wide. The doors are all made to slide (not hinged), all surfaces being planed, and the new-poking holes are a special feature. As the doors lie on a slant, a tight fit is assured by their own gravity, and no putty is required, as in the old forms.

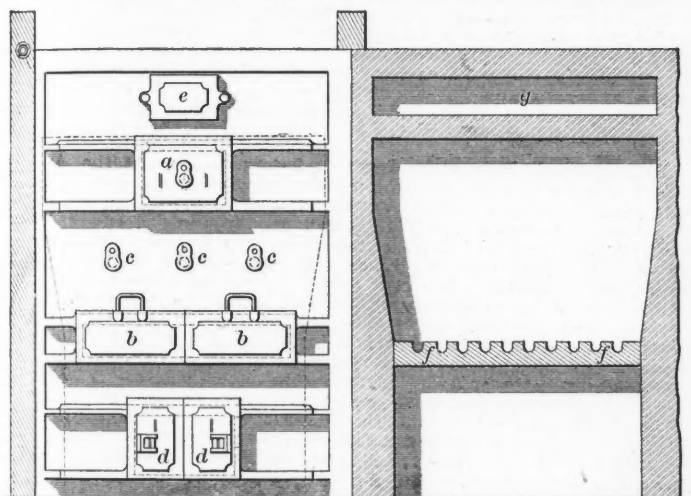
a is the working door, fitted with peep-hole and slide; b b are the doors



for grate; *c c c* are the poking holes; *d d* cover the door for withdrawing the burnt stone; the door *e* is only used for flue cleaning, and is bolted to the front plate; *f f* show the cast-iron bearing bar, with grooves in which the grate bars are made to rotate; *g* is the flue along which the burner gas is conveyed. An end view of two sets of burners, placed back to back, would show double arches sprung from the front walls right across, the spaces between the two arches, on either side of the central division wall, being the flues into which the gas is drawn through an opening left above the center of the combustion chamber; this hole is usually provided with a damper, worked by a handle in front.

The gas flues lead into a general stack of firebrick, which in turn leads into the Glover tower. In the stack the arrangement for "potting" the nitre is placed. The burner given in our drawing has a depth of 1 foot 9 inches. Dr. Lunge considers, as a result of long experience, that a grate furnace of 4 feet 6 inches by 5 feet 8 inches and a depth of pyrites of 2 feet 3 inches is very favorable for burning 7 cwt. charges of 48% Spanish ore per 24 hours. (See "Sulphuric Acid and Alkali," Vol. I., p. 166.)

In burning pyrites the accumulation of "smalls" presented difficulties which have been to a large extent overcome by experience and by the invention of modern kilns specially suited for burning "dust" or "smalls." In some works the smalls were ground in a pug-mill, moistened and made into cakes with the addition of a little clay. These "balls" were burned along with lump pyrites in ordinary stone burners. Several forms of burners for pyrites smalls were invented on the European continent and in Britain; but the one which solved the problem was that invented by



FRONT ELEVATION. SECTIONAL ELEVATION.  
Scale, 1/8 inch = 1 foot.

Juhel, the manager at Maletra's works at Rouen. Other firms, out of France, erected this form of burner. Its principle consists in a series of shelves made of fire-clay slabs; the top shelf receives the charge of green pyrites, which is spread by the workman. When once the burners are heated up, the heat of combustion of the pyrites itself is quite ample to raise the upper shelves to a bright red or yellow temperature. The charge in time is raked forward and falls through an open space to the second shelf, where it is once more spread. The second shelf has an open space at the back, down which in time the charge is let fall to the third shelf; and so on. Maletra's burner, in time, became largely adopted in Germany, where it was improved by Schaffner, at the Anssig works; this form is now by far the most popular modification of the Maletra invention, and there is probably more small pyrites burned by it than by all the other forms of dust burner put together. Schaffner's burner has a hopper at the top, through which the charge is admitted to the top shelf; it has a series of seven shelves made of fire-clay slabs, and at the bottom is a recess with door for withdrawing the burnt dust. The charge on the shelves is worked by men, with chisels or rakes through doors, each shelf having a separate door. The doors slide on planed faces, and are suspended at an angle so as to make a tight fit by their own gravity. At the large works of the Newcastle Chemical Company, Limited, the ordinary form of stone burner has been entirely superseded by this shelf kiln. There, about 30,000 tons of dust pyrites, containing about 50% of sulphur, are burned annually in 129 of the Schaffner Dust Burners.\*

In works where sulphureted hydrogen is obtained from alkali (or other) waste (as obtained by Chance's process, etc.), and burned for sulphuric acid making, the gas is forced from a gas-holder to ordinary pyrites burners.

Here it streams in, from a pipe provided with a tap, being ignited as it enters the burners. The inlet of gas can be regulated by the tap, and that of air by the slides and holes in the burner doors. The flame is allowed to play on the surface of burned pyrites with which the burner is filled. This stone is heated red hot, and the heat generated by the reaction  $H_2S + O_2 = SO_2 + H_2O$ ; has been proved amply sufficient to work a Glover tower.

The oxides of nitrogen, necessary for the chamber reactions in the manufacture of sulphuric acid, are in England supplied from the decomposition of nitrate of soda by sulphuric acid. This reaction is represented by the equation



and the decomposition takes place in a cast iron nitre-pot. Formerly small cast-iron pots were used; these have now been displaced in every modern works by larger pots. The modern ones are dish-shaped in section, with a spout at one end for running off the spent batch (molten nixon). Seen in plan, they are oblong in shape, but rounded at the corners. An average size is 3 feet long x 1 foot 11 inches wide x 1 foot 3 inches

deep, the metal is cast 2 inches thick, the spout is about 1 foot 4 inches long, weight about 6 cwt.

The molten nixon, or nitre-cake (acid sodium sulphate) is run out on an iron tray; it is then broken up and decomposed with salt, forming sulphate of soda in the decomposing furnace. The nitre-pot is placed in the main flue of a set of burners, and stands on a cast-iron saucer, made a little wider than the pot to catch any boilings over. It is advisable to have two of these nitre-pots in the flue from each set of burners, so that one may be in use while the other is being replaced, in cases of accident or breakage. The nitrate of soda used should contain at least 95% of sodium nitrate; it is imported from Chili and the south of Peru, where it is prepared from the deposits of *caliche*. The following analyses may be considered as showing the average composition of nitrate of soda as "potted," and of the residual nitre-cake, or nixon.

Nitrate of soda, as used in sulphuric acid works: Sodium nitrate, 96.08%; sodium chloride, 1.09%; sodium sulphate, .14%; silica, etc., .14%; moisture, 2.55%; total, 100.00%.

Nitre-cake (nixon) as run from pot: Sodium sulphate, 76.01%; sodium chloride, .07%; free sulphuric acid, 22.26%; iron oxide and alumina, 1.05%; silica, .20%; calcium sulphate, .17%; moisture, .62%; total, 100.38%.

The price of nitrate of soda has varied during the past eight years from £12 10s. in 1883 to £9 per ton in 1886, and at the present time the chemical quality may be had at about the latter figure.

In my introductory article it was mentioned that Dr. Roebuck, in 1746, was the first to use lead chambers for the manufacture of sulphuric acid; and though vessels constructed of fire bricks, slate, glass, etc., have been proposed, none of them has succeeded even in a slight degree. Sheet lead, therefore, is by far the most suitable material for the construction of sulphuric-acid chambers; and lead has this advantage, that after the sheet has become holed with age, it can be melted up and the "pigs" of lead thus recovered bring a big price. Sulphuric-acid chambers are generally built at a height of 20 feet, more or less, from the ground. The first reason for this is that any leakage may be detected and loss of acid prevented by immediate repairing.

Secondly, the space underneath can be utilized as a dry place for storing timber or other materials. In many works the space is used as the burner house, and contains not only the kilns, but in some cases the steam boilers, etc.

(To be continued.)

**New Process of Firing Porcelain.**—The large porcelain factories at Limoges have been for a long time studying the question of reducing the price of fuel, the existence of the famous industry being threatened by the excessive cost of firing china. While in Bohemia this is not more than \$2 per ton, and in England \$2.60, at Limoges the cost was \$6.90. In order to compete against this immense advantage, wages were reduced to the lowest minimum, and still the manufacturers, in many cases, lost money. The coal that is employed is necessarily costly, as a smokeless, long-flame variety is required. Many of the factories burn wood only, as that produces a purer white than the very best kinds of coal. Wood, however, is dearer than coal, and is consequently only used in firing the muffles and in the finest grades of porcelain. Under these circumstances one of the most progressive houses in Limoges was induced to employ petroleum or residuum oil as a fuel. To accomplish this an American firm using the Wright burner was requested to come and make a trial with the fuel. The results were far better than anticipated. No gases or smoke in any way discolored the china, which came from the kiln much whiter and in better condition than when it is fired with the best of wood. In the muffles there was a most decided advantage. The delicate colors, which show at once the presence of the slightest quantity of gas, were perfect. This new discovery, according to a recent Consular report, promises to revolutionize the whole porcelain industry. It is estimated that by employing these oils there will be a reduction of about 15% or 20% in the making of china. The only question now is the present classification of residuum oils, as the present duty on petroleum (120 francs per ton) is prohibitive; but strong pressures are being brought to bear on the government now to have fuel oils classified as fuel, which pays only 1.30 francs per ton.

**Salt in Germany.**—A recent official report contains the following information concerning the salt industry in the German Empire: In the fiscal year 1889-90 there were in operation 14 salt-producing mines, 64 salt-works producing evaporated salt, and 14 factories producing salt as a secondary product. Of rocksalt of all kinds 500,000 tons were produced, which was much more than in the preceding years (in 1888-89, only 388,529 tons; in 1887-88, 386,329 tons). On the other hand, the production of evaporated salt (486,281 tons) was materially less than in the preceding year (510,902 tons). With the beginning of the fiscal year 1889-90, in consequence of a trust formed by proprietors of saltworks, the wholesale prices of evaporated salt rose considerably. The importation of salt (chiefly English evaporated salt) into the German Customs territory amounted to 26,825 tons (28,057 tons in the preceding year and 26,112 tons in 1887-88), and was small as compared with the export from the German Customs territory, which in the past year amounted to 192,258 tons (134,171 tons in 1888-89, and 125,748 tons in 1887-88). Of domestic and foreign salt together, 364,667 tons (1888-89, 371,869 tons; 1887-88, 360,341 tons) were placed upon the open market after payment of tax for use as table salt, which was 7.5 kilogrammes per head of population; 432,216 tons paid no tax, as being intended for cattle and for industrial purposes (1888-89, 390,812 tons; 1887-88, 388,085 tons), or 8.8 kilogrammes per head of population. The use of salt for industrial purposes increased materially as compared with the preceding year, especially in soda and Glauber's salts factories (251,450 tons, as compared with 207,417 tons in 1888-89 and 220,810 tons in 1887-88), in chemical and color works (29,796 tons, as compared with 21,294 tons in 1888-89 and 21,100 tons in 1887-88), in the leather industry (16,705 tons, as compared with 14,335 tons in 1888-89 and 12,232 tons in 1887-88), and in the metal-ware industry (15,119 tons, as compared with 10,438 tons in 1888-89 and 8,825 tons in 1887-88). On the other hand, the use of salt for feeding cattle decreased (100,727 tons, as compared with 119,440 tons in 1888-89 and 108,498 tons in 1887-88), which was due to the good quality of the cattle food harvested in 1889.

\* See *Jl. Soc. Chem. Ind.* 1884, p. 396.



THE RUSSELL PROCESS AT THE MARSAC MILL AND AMALGAMATION AT THE ONTARIO.

Written for the Engineering and Mining Journal by W. A. Wilson.

The Russell process has now entered upon its second year of service in treating all the ore of the Daly Mining Company at the Marsac mill, Park City, Utah. The mill of the Ontario Silver Mining Company is located in the same camp, and has used the amalgamation process continuously since it started in January, 1877. From its long experience with amalgamation—14 years—the Ontario obtains as good results as are possible with its character of ore. As the cost of labor, fuel, and supplies in general is the same for the two mills, a comparison of the processes are of practical value in determining their efficiency and economy in beneficiating the ore. The properties of the two companies adjoin and are on the same vein.

In Table I. is given the comparative fineness and baseness of the product for 1890 as shipped from the Ontario and Marsac mills, the product of the Ontario being bars of bullion and that of the Marsac dried sulphides.

	Ontario.	Marsac.
Fineness of product, silver, thousandths.....	410	305
Fineness of product, gold, thousandths.....	26	23
Baseness of product, copper, thousandths.....	560	116

The figures given for the Marsac represent the average of the total product from the wash water and leaching solutions. The wash water product amounts to 13% of the whole and assays per ton, dry, 3,220 ounces of silver, and \$41.34 gold. The product from the leaching solutions, containing 87% assays per ton 12,000 ounces silver and \$186 gold. A higher grade of sulphides could have been produced by the use of soda ash, by which all lead and lime in the solutions are precipitated by themselves. The amount used would have been about 2½ pounds per ton of ore, at a cost of eight cents. By its use not only would the grade of the product have been improved, but it would also have obviated the use of more costly chemicals for the precipitation. Its only disadvantage is the additional labor required. A course of experiments is now under way to determine its utility.

The large amount (13%) of silver produced as wash-water precipitate is caused by precipitating the weak hyposulphite solution in the same vats with the wash water. It will be noticed that the extraction of gold is greater from the Marsac than from the Ontario ore, although the raw ore assays nearly the same.

In Table II. is given the comparison of the Ontario and Marsac for the year 1890 as to amount of water, chemicals, iron, and power used, and the cost of marketing the product:

	Ontario.	Marsac.
Water used per ton, cubic feet.....	400	26
Chemicals and quicksilver, per ton.....	\$1.10	\$0.64
Wrought and cast iron consumed per ton, pounds.....	5.5	0.05
Power for driving pans and handling solutions, H. P.....	108	1
<i>Cost of Marketing Product.</i>		
Net cost of marketing product per ounce of silver produced.....	3.38	3.53
Net price obtained per ounce for gold.....	\$0.00	\$20.00

The figures for this year are the same, except in the case of chemicals, which are given below. The cost of marketing the Marsac product is a little greater than for that of the Ontario. The figures given on consumption of iron represent the amount actually consumed, *i. e.*, the amount purchased less the amount sold as scraps to foundries and smelters. The power given in the table does not include the steam now used for heating the leaching solutions, which were used cold during 1890; nor the power for pressing and pulverizing the product. The amount of fuel used for drying the product is estimated the same as that used for retorting amalgam and melting bullion at the Ontario. The amount of water given for the Marsac includes that used for sluicing out tailings, which is about 16 cubic feet per ton.

Table III. gives comparative figures, between amalgamation at the Ontario and the Russell process at the Marsac for the last two months of 1891—using hot solutions. Coarser crushing could probably be adopted at the Marsac without decreasing the extraction percentage. Little, however, would be gained by the change, as the capacity of the mill would still be limited by the capacity of the driers, which are already being run to their limit.

The Stetefeldt furnace, with a slightly increased draft, could probably treat 125 tons per day.

	Ontario.	Marsac.
Weight of ore treated per week, tons.....	531	503
Fineness of crushing, mesh of screen.....	26	20
Rate of roasting per furnace per day, tons.....	35.9	68.3
Per cent. of salt used in roasting.....	13.8	9.0
Weight of each charge to pans and vats, tons.....	13	72.0
Temperature in pans and vats.....	160° F.	81° F.
Labor on pans, vats and product shipment.....	\$0.445	\$0.335
Chemicals and quicksilver in use.....	\$14,600.	\$385.
Silver extraction in mill, per cent.....	91.9	92.2

The fuel used per ton in roasting was 153 cords of wood at the Ontario, and 087 tons coal at the Marsac. While wood was used at the Marsac the amount consumed was about 114 cords as against 153 cords at the Ontario.

The temperatures represent that in the amalgamation pans and that of the solution running out of the ore vats. Of course, the amount of water to be heated for amalgamation is much less than the amount of solutions for leaching. It is not always necessary, however, to heat the leaching solutions.

The chemicals and quicksilver represent the cost of what is actually in use at any given time; but do not include the supply in store. For the Ontario the amount—\$14,600—is the actual value of the quicksilver in circulation, and for the Marsac—\$385—is the actual value of the hyposulphite, bluestone, caustic soda, sulphur and soda ash dissolved in the leaching solutions.

The amount and cost of chemicals now used per ton of ore treated at

the Marsac, the prices given being the average cost per pound laid down at the mill, is as follows:

4.0 pounds bluestone	at 7.4 cents	= 29.60 cents.
1.5 " hyposulphite	" 3.7 "	= 5.55 "
4.5 " caustic	" 4.9 "	= 22.05 "
3.0 " sulphur	" 2.8 "	= 8.40 "
2.5 " soda ash	" 3.2 "	= 8.00 "
15.5 "	Total cost per ton	= 73.60

As to mill extraction, the percentage of the Marsac exceeded that at the Ontario every week in January and February except one, and averaged about 3% better.

In the case of most ores, a comparison between amalgamation and the Russell process would probably be much more in favor of the latter, as there are but few mills in which as good work is done as at the Ontario. In the nineteen points of comparison given above, amalgamation exceeds the Russell process only in fineness of product and the price obtained for it. On an ore carrying 35 ounces silver this difference in price amounts to about 5 cents per ton of ore treated, while the total savings on all the points in which the Russell process exceeds amalgamation would amount to several dollars per ton.

**Canadian Petroleum.**—There was an increased production of petroleum in Canada, according to the report of the Inland Revenue Department for the 12 months ending December 31st, 1890, as compared with the two previous years. The 1890 inspection shows a total of 236,768 barrels of 45 gallons each, and 44,196 cases of 20 gallons each. In 1889 the total number of barrels inspected was 220,960, and cases, 38,344; while in 1888 the number in each case was still less, there having been 217,587 barrels, and 23,928 cases inspected.

**The Bourdoncle Briquet for Igniting Safety-Fuses.**—At the Aubin collieries, in the Aveyron (France), the Bourdoncle *briquet* has been in use during the last six months, says the *Colliery Engineer*, for the ignition of safety-fuse in fiery workings, such as those which exist in that locality. This *briquet* is the well-known device for lighting pipes, cigars and cigarettes by compressed air, and which may be seen in most tobacco-shop windows. Its form has been modified by Bourdoncle, of Decazeville, for the use of miners in blasting operations. It consists of a metal cylinder, in which moves a well-fitting piston, the rod of which carries a cross-piece to give a firm hold for the hand. The end of the fuse is passed through an india-rubber ring into one end of the cylinder. A quick and strong thrust is then given to the piston, whereby the air in the cylinder is compressed and heated, and the core of the fuse ignited. It is said that after a little practice, the fuse is always ignited by the first thrust. The sparks from the combustion of the first inch of the fuse are thrown out inside the cylinder, and so are cut off from contact with the surrounding atmosphere.

**Measuring Strains in Bridges.**—M. Le Chatelier describes in a recent number of the *Annals des Ponts et Chaussées* a method which he had adopted for measuring the strains in the members of an iron or steel bridge. For this purpose a bracket carrying a lathe center is attached by small screws to the member the strain in which is to be measured. At another point of this bar a second bracket is fixed, in which slides a short steel rod pointed at both ends like a lathe center. Attached to the same bracket is a water chamber closed by a flexible diaphragm of German silver and connected to a fine open tube, in which the water, on being expelled from the chamber, flows and serves to measure on a highly magnified scale any motion of the diaphragm. One end of the double center rod presses against this diaphragm, and a bar is supported on the other center point of this rod, and on that of the fixed bracket afore mentioned. Any extension of the bridge member, therefore, causes a motion of the diaphragm and a fall of the water in the fine tube. Successful measurements are said to have been made on this system when the fixed points between which the extension was taken were only eight inches apart.

**Compound Metallic Tubes.**—A new process for the manufacture of compound metallic tubes, *i. e.* tubes of one metal, covered or lined, or both, with another metal, invented by George H. Everson, of Pittsburg, Pa., is thus described by the *American Machinist*: To line a tube a hard mandrel is taken, the diameter of which is the same as desired for the inside of the lining of the tube when finished. The metal lining is then placed around the mandrel, and rolled through or between hard surfaced rolls, until the lining is reduced to the desired thickness. Then the tube that is to be lined is slipped over the lining, and the rolling process continued until the tube is rolled tightly on to the lining, and reduced to the outside diameter desired, after which the mandrel is removed, and the tube cleaned. If it is desired to cover the tube as well as line it, the mandrel is left inside the lining, the metal cover is slipped over the tube, and the rolling process continued, until the metal cover is rolled down tightly upon the outside of the tube, and the thickness of the covering desired is obtained, after which the mandrel is removed, and the compound tube finished in the ordinary manner.

**Actions on Contract.**—A written contract provided that, in consideration of \$800, as well as for the services rendered, S. agreed to pay plaintiff a commission of 10 per centum of the cash that might be received for a certain mine, on a sale thereof, and also to deliver to plaintiff "all certificates of shares of stock that they may be received in payment for the said . . . mine, over and above the amount of such shares, at the price at which I may accept the same, as will make the net price received by me for the said mine, \$235,000." In an action against S. and other persons the complaint alleged that the mine had been sold by S. for \$200,000 in cash and \$800,000 in stock, and averred that plaintiff was entitled to recover from defendants his portion of both cash and stocks. The complaint showed that the consideration from plaintiff for the contract was about \$1,300, but did not set forth any of the negotiations of the understanding of the parties as to the agreement. A demurrer to the complaint would be sustained, as the meaning of the agreement did not sufficiently appear. *Spies v. Seymour, Circuit Court of the United States, District of Colorado, 44 Fed. Rep., 326.*



## REPRESENTATIVE MEN IN THE MINING INDUSTRY.

E. S. Robinson.

A man who has been identified with the mining interests of this country for nearly two scores of years, engaged in copper mining in Michigan, silver mining in Nevada and New Mexico, and silver-lead mining in Colorado, during this time directing the operations of some of the most important mining companies of the United States, may well be selected as a representative of this great industry. This has been the experience of Capt. S. S. Robinson, now manager of the Isle Royale Land Corporation, Limited, and the Wendigo Copper Co., Limited, of Isle Royale, Mich.

Captain Robinson, coming from old Puritan stock, was born in New Hampshire in January, 1824. He was brought up as a farmer boy, and learned the rudiments of reading, writing, and arithmetic in the school of his native town. Forty months of this kind of training, followed by three months in a little country academy, completed his school education, and he was then turned up in the world to make his own way.

He first directed his attention to granite stone-working, the hardest but then about the best-paid labor in New England. From this he found employment, in 1847, in railway building, which was then being undertaken in the Eastern States on a considerable scale, the country having recovered from the paralyzing effects of the panic of 1847. This and other work kept him in the East until 1853.

The latter year marks his first connection with the metal-mining industry of this country. Having become associated with the American Mining Company, of which Gen. Francis E. Phelps was president, he was

neers, went thither. There he became connected with the Iron-Silver and Dunkin mining companies, which were at that time two of the most important of the district. He remained in Leadville for two years, operating these mines with much success, and then went to Georgetown, N. M., with the Mimbres Consolidated Mining Company, with which he was connected for four years.

In 1884, he resigned from the Mimbres company and took a much-needed vacation, spending that year and the succeeding in traveling in the East and West, doing some mining and other work of desultory nature.

In 1886, Captain Robinson again became the general manager of the Iron-Silver Mining Company, of Leadville, and for three years directed its affairs with the same success that he had seven years before. The old Iron and Stone mines had been worked out, but he carried on the difficult work in the McKeon, which had been commenced by Mr. Jacob Houghton, a former manager of the company, and also did work of great importance in opening the Moyer and Stevens mines in unemployed portions of the company's territory.

In 1889, Captain Robinson, being 65 years of age, found that his health was becoming impaired by residence in Leadville at such a high altitude—10,500 feet above the level of the sea—and resigned his position with the Iron-Silver company. He shortly afterward became connected with the Isle Royale Land Corporation, Limited, an English company, which had acquired about 85,000 acres of land, covering most of the outcrop of the copper-bearing formation of Isle Royale, in Lake Superior, and went thither to undertake the improvement and development of its property. In 1890, the Wendigo Copper Company, Limited, an offshoot from the land company, was organized, and he became its manager, and is now



S. S. ROBINSON.

sent into the forests of Ontonagon county, Michigan, to open some copper mines, these being among the first opened in this district. After two years of discouraging work, however, the mines under Captain Robinson's charge proved to be too poor, and, abandoning the work, he went to lower Michigan and took the management of a large lumber establishment, a position which he held until 1857, when the panic of 1857-58 broke up the business, and he emigrated to the prairies of Minnesota.

In 1860 Captain Robinson was called to take charge of the Quincy mine at Hancock, Mich. This famous mine had been opened less than five years previously, and he was consequently one of its first superintendents. By 1860 the property had been developed so that its success was assured; and in a year or two after, under Captain Robinson's management, it commenced the payment of dividends, the first, of \$60,000, being declared in July, 1862. Captain Robinson performed arduous labor for the Quincy Mining Company, and was rewarded by the results which followed his efforts. The mine was developed at comparatively small expense; from 1860 to 1866, under his management, it paid \$700,000 in dividends, and to this date has made a total of \$5,770,000.

After six years' service with the Quincy Mining Company, Captain Robinson felt a desire for a rest and a change, which resulted in his going to Nevada, where he spent one year in managing a small silver mine. After that he spent a short season in California, when returning to the East he became connected with the Scoville Brass Company, of Waterbury, Conn., as an assistant, being engaged principally in rebuilding, enlarging, and improving that company's manufacturing plant.

In 1871, he became associated with the Detroit Bridge & Iron Company, and removed to St. Joseph, Mo., to take charge of the construction of an iron bridge across the Missouri River at that place, a work which was not completed until 1873.

In 1878, when the uncovering of the lead-carbonate bonanzas of Leadville was exciting the country, Captain Robinson, like many other engi-

neers, went thither. There he became connected with the Iron-Silver and Dunkin mining companies, which were at that time two of the most important of the district. He remained in Leadville for two years, operating these mines with much success, and then went to Georgetown, N. M., with the Mimbres Consolidated Mining Company, with which he was connected for four years.

The mines with which Captain Robinson has been connected have paid many millions of dollars under his management, and their success has largely been due to his individual efforts. He, himself, is one of the most modest of men, and gives much of the credit that he has won to those who have held subordinate positions under him. He has shown his own executive ability best, however, by his success in selecting such efficient subordinates as have served under him, many of whom have since become noted in the mining industry. Captain Robinson, who is a man of excellent judgment and ever ready to receive reasonable and timely advice from others, has made remarkably few mistakes during his long career. He is noted for his sense of justice and probity of character, and wherever he has lived there has been no man more universally esteemed and respected than S. S. Robinson.

**Wages of Miners on the Continent.**—According to comparisons made at the Paris Miners' Congress, Belgian miners at present receive the poorest pay, their average wages being but 50 cents daily, while French miners receive about 75 cents, and the Germans from 75 cents to \$1. This has been the case with the Germans, however, only since their strike in 1889.

**Russian Mintage in 1890.**—The Russian *Journal du Ministère des Finances* states that in 1890 there were struck at the St. Petersburg Mint gold coins to the value of 28,150,090 roubles, silver coins of the value of 91,760 roubles, coins part silver (five-tenths standard) to the value of 2,000,003 roubles, and copper money to the value of 130,003 roubles. The mintage for the last five years has been as follows: In 1886, 20,916,041 roubles; 1887, 28,165,544 roubles; 1888, 28,117,129 roubles; 1889, 26,094,785 roubles, and in 1890, 30,371,856 roubles.

## THE CHLORINATION OF GOLD ORES.

Written for the Engineering and Mining Journal by J. H. Burfeind, Juneau, Alaska.

The articles pertaining to the Plattner process, appearing lately in the *ENGINEERING AND MINING JOURNAL*, have been very interesting to me. I am, however, surprised to find that all the late "improvements" refer to the precipitation and collection of the gold, as this part of the process has never given me any trouble.

Among the offered precipitants I find none equal to  $\text{FeSO}_4$  for general use. Its preparation is simple, requiring no machinery whatever; the material is cheap and always at hand; its cost is less than any of the others offered to replace it; its application is simple and its action entirely satisfactory.

The only other precipitant which at present deserves any notice is  $\text{H}_2\text{S}$ . It is cheap and offers the advantages that the sulphide of gold precipitated by it settles more rapidly than the metallic precipitate thrown down by  $\text{FeSO}_4$ , and thus by its use time is saved; but appliances are necessary for its preparation and application which must be frequently renewed and are likely to be out of order just when wanted. Its use is very unpleasant and it may be dangerous if proper care is not taken. It is said against  $\text{FeSO}_4$  that it precipitates arsenic, etc. Does  $\text{H}_2\text{S}$  do this less?

The main objection I have to the use of  $\text{H}_2\text{S}$  is that it precipitates copper, as this element is rarely absent. The separation of these sulphides is always a difficult job. The method given by Mr. Langguth is a delicate one; but, while I have no doubt that it will give satisfactory results in the laboratory, I doubt very much that the most expert will get satisfactory results where a large amount of material has to be treated.  $\text{HCl}$  and  $\text{HNO}_3$  will react even in dilute solutions, and the chlorine evolved attacks more or less all known compounds of gold. I prefer to use methods which do not require such delicate and dangerous separations.

The above indicates my views on the precipitants offered. I will now give an outline of the Plattner process as it is used by the Alaska Treadwell Gold Mining Company at Douglas Island, Alaska. These works turn out more gold than any other in the United States. The company, having been only too willing to improve the method in use, has tried a good many so-called improvements, which have cost thousands of dollars, and by their use many more thousands have been wasted. The method at present gives better results than were obtained when other appliances were used, and may on that account be of special interest.

The works have been in active operation about seven years. The material treated is the sulphurets collected by the Frue vanners in the company's stamp mill. They contain on an average over 40% sulphur, mostly in iron pyrites, although of late a good deal of copper pyrites has made its appearance. The gangue is quartzose, with from 2% to 5% calcite. On account of the latter mineral it has been found necessary to roast with salt, which was at first done in Brückner furnaces. The results with these were very bad, however, for although a good roast could be obtained in them the amount of fuel necessary was simply enormous, and the loss from dusting and volatilization was also large.

The first improvement made was to replace the Brückner with the automatic Spence furnace. The latter did not answer at all until changed from a muffle to a reverberatory. Six of them were built at a large expense. The cost of roasting in them was less than half that in the Brückner, but their capacity was small and the amount of fuel necessary large. An old-style reverberatory was also added. The results obtained in it were so satisfactory that the company decided to use them entirely. The six double Spence furnaces were thrown out, and now the works treat nearly twice the amount of material with only four reverberatories.

The reverberatories in use were built after the plan of Mr. H. Stansfield, and are particularly adapted for the material in question, and deserve to be investigated by every one who has similar material to handle. The company found such a difference that Mr. Stansfield had to remodel the one first built. These four furnaces, 13 feet by 65 feet inside measurement, handle about 20 tons of sulphurets daily, at a cost decidedly less than could be done with the Spence. Thus it appears that the much-abused old reverberatory furnace will, under circumstances, be preferable to all the late improvements. I do not intend to go into the details of roasting now, however, as I hope to do so at another time.

After the roasted ore is removed from the pit under the furnace, it is spread on the cooling floor, allowed to cool somewhat, then wetted sufficiently and sifted carefully into vats, each holding about  $4\frac{1}{2}$  tons, and the gas is put on. On an average four hours are sufficient for the gas to permeate the material; the gas is then taken off and the vat allowed to stand about 30 hours, although 20 hours will do just as well. The evening previous to the morning when the vat is to be leached, any extra amount of gas on hand from the day's supply is put into the vat. This is, as a rule, unnecessary, but has two advantages—it assures against insufficient gassing; and the extra gas, being forced the next morning by the leaching water into another vat ready for gassing, is not lost.

The leaching usually requires 12 hours. The tailings are sampled and assayed and if found sufficiently low in gold are sluiced into the bay. For convenience and safety (breaking of filters etc.) the solution is run into intermediate tanks and from them into the precipitating vats in which is already placed the necessary amount of precipitant,  $\text{FeSO}_4$ . The precipitation is complete when the vat is full or all the solution run in. It is then stirred briskly for a few moments and left to settle for from 18 to 24 hours. The supernatant liquor is then drawn off and allowed to go to a large filter. Careful tests made show that the gold still in suspension when the waste liquor is drawn, amounts to from 23 to 25 cents per ton of material treated, and that this is entirely saved in the filter mentioned. There is therefore not the slightest loss of gold which was in solution. If from any accident some more gold should be in suspension, no loss can occur.

For the sake of convenience a clean-up is made twice a month as, if made only once a month, the amount of gold is rather too much for one man to handle. The drying and melting, say, of \$12,000 can easily be done by one man in one day. When a clean-up is made, all the gold is washed into a small tub, in which it is left to settle over night; the supernatant liquor is then drawn off and returned to one of the precipitating vats. The gold in the small tub is filled directly into the iron drying-pan. There is no filtering of any kind, whereby time, labor, and cost of filters

are saved and accidental losses avoided. The dried gold is melted into bars with a little borax.

From the above it will be seen that the company is using the bulky, time-robbing, simple, old method in its most antiquated form, for the reason that it gives the best results, commercially speaking. Personally, I am in favor of Mr. John E. Rothwell's barrels, and on certain material they must be used; but when a material is to be treated, which gasses and leaches quickly, and needs but one handling with chlorine, I must select the vat. It is true that the barrel saves time, labor, and bulky vats, but those advantages will be dearly paid for by first cost, motive power, and wear and tear. A chlorination vat holding about  $4\frac{1}{2}$  tons of roasted material costs \$50, and lasts fully three years without any repairs. The filter in it costs only the price of a few gunny sacks, will last six months, and needs no attention whatever during that time. The other vats will last a lifetime, although a hoop may be needed occasionally. There is not a piece of machinery in the works, an advantage that is fully understood only by a practical chlorinating man.

The preparation of the precipitant ( $\text{FeSO}_4$ ), and keeping it in order, are usually attended to by some workingman at odd leisure moments. Its only cost is the sulphuric acid and old scrap iron, which can be had, as a rule, for the taking. The operator can attend to the precipitating, stirring, drawing off of waste liquor, clean-ups and drying by himself, even if 50 tons daily are treated, whereby mistakes and losses through them are avoided.

Now, what has been offered to replace or improve this simple and inexpensive method? Nothing that cheapens or simplifies it or which gives more certain results. To the contrary, we are asked to accept as improvements modifications of it by which the cost is increased, by which delicate and dangerous operations are added; in fact, expensive complications, which give uncertain results, are offered as improvements. Leaving out the Rothwell barrel, I see no improvement offered. The fact that so few are found who adopt the new improvements leads me to think that the majority are of my opinion, although it is hardly necessary to mention, of course, that, according to circumstances, appliances and arrangements of works will vary.

I have seen it mentioned that some patentee produces chlorine without the aid of sulphuric acid; whether this is an improvement or a money-making scheme I am unable to say. Where high freights forbid the use of the acid, bromine may be cheaper. I have already pointed out that it is as effective as chlorine and there is no more convenient agent if barrels are used.

The real, not "imaginary," difficulty which is universally met, and not "easily overcome," is the roasting of the material. A good many—I may say most—of the ores now treated by chlorination are roasted with salt. While able and intelligent operators have succeeded in reducing the loss of gold, which occurs by volatilization very largely when salt is used in roasting, it is still very large and occasionally will increase to an alarming extent without an apparent cause. The loss thus incurred aggregates an enormous amount annually, and is often the reason why well-arranged and well-conducted works prove financial failures. Many remedies are offered, but all fail. Men like Küstel, Aaron, and Christie have thrown much light on the subject, but none of them has been able to avoid this loss, although it has been reduced very materially. Here we need improvements. If any gold is left in the tailings, the cause is in the roasting; if any goes up the chimney, improper roasting is the cause. We have therefore yet to learn how to roast. Here I may be allowed to state that the general opinion given, which seems to be accepted as true, that the ore must be roasted "dead," in fact cannot be roasted too "dead," is erroneous when salt is used. This I found out several years ago, but it being so contrary to all authorities known to me that I felt somewhat timid in saying so. After results obtained had substantiated my view, I mentioned it to one of the few chlorinating men who have made a financial success of chlorination, and he told me that this was known to him. I think that this knowledge has aided largely to his success, as he has successfully treated material which other able operators refused to treat.

At some other time I will give the details which, in my opinion, permit me to make such a statement. As the loss of gold in roasting with salt is at present so large, I have no doubt a good many have tried to avoid its use, and will like to learn the results obtained.

**Preparation of Oxygen from the Air.**—E. Peitz has patented in Germany a new process for obtaining oxygen from the atmosphere, which seems to possess certain advantages over the older processes, says *Industries*, and which, like Kassner's method (see *ENGINEERING AND MINING JOURNAL*, vol. L, p. 647), is based on the employment of lead oxide for this purpose. Lead oxide and chalk are heated together in a current of air, when carbonic acid is given off and the following reaction takes place:  $2\text{CaO} + \text{PbO} + \text{O} = \text{Ca}_2\text{PbO}_4$ . When cooled to a dull-red heat carbonic acid is led over the mass at such a rate as to re-form calcium carbonate and evolve pure oxygen gas, thus:  $\text{Ca}_2\text{PbO}_4 + 2\text{CO}_2 = 2\text{CaCO}_3 + \text{PbO} + \text{O}$ . The mixture in the retort can be reconverted into calcium plumbate by reheating in a current of air to a bright redness.

**Coal in Michigan.**—There are now three leading points in Michigan where coal is mined in quantities sufficient to make the industry a paying one, says the *Colliery Engineer*. These are Jackson, Owosso, and Sebewaing, and of the three, Sebewaing promises to become the most important, although the largest establishment at present is that of the Standard Mining Company, located one mile from Jackson. The coal bed at this point varies from three to four feet in thickness, while the Sebewaing bed will average over four feet in thickness. The quality of the Sebewaing coal is said, too, to be much better than the product of the Jackson county mines. The coal field of Michigan is detached from that of any other state. Its area is embraced principally by the counties of Saginaw, Shiawassee, Clinton, Ionia, Montcalm, Gratiot, Isabella, and Midland. Large areas also of Huron, Tuscola, Genesee, Ingham, Eaton, and Bay counties are underlain by the coal formation, making in all 14 counties, in addition to small portions of Livingston and Jackson counties, and probably several counties to the north, which are also underlain by the coal formation.



## THE JEANESVILLE, PA., MINE DISASTER.

The survival of four miners after an imprisonment underground for eighteen days, is one of the most remarkable happenings in the records of coal-mining disasters. We have already published an account of the accident which occurred at the No. 1 colliery of Messrs. Haydon & Co., at Jeanesville, in the Hazleton region, Pa., in February last, but further details are of interest.

On February 5th a miner named Boyle fired a shot in his breast that blew through into abandoned workings at a higher level in the same vein. It was supposed from the measurements made from the maps that there was a pillar of 20 or 25 yards of solid coal between the breast and the workings, which were full of water, and that the face of the breast was going toward the solid coal. The map was wrong, however, and, instead of this pillar, there was only a few feet of coal between the old workings and Boyle's breast. Relying on the correctness of the surveys, Superintendent MacFarlane, of that colliery, had no reason to doubt the accuracy of the map or, of course, he would not have allowed a breast opened at the fatal point.

When the shot was fired by Boyle the water rushed through with stupendous force and overtook 17 men who were unable to reach the bottom of the slope before retreat to that avenue of escape was cut off. It was naturally supposed by most at the time that all of these men had perished, but Inspector Lewis, Superintendent MacFarlane and one or two others had a faint hope that some of them would be found alive in high points in the mine if the water could be pumped out quickly enough.

Every effort was made to get the water out as rapidly as possible, and after two weeks of constant pumping it was lowered sufficiently to allow a searching party to enter the mine. Up to February 23d, 13 bodies were recovered. Nine showed undoubted evidence of death by drowning, while four had been suffocated by black-damp after gaining a point above where the highest water reached. There still remained four men unaccounted for, and as they were not found along the gangway or at any point reached by the water, not a moment's time was lost in prosecuting the search for them with a view of solving the problem of their fate.

The exploring party of four men, led by Joseph Kelshaw, foreman of No. 4 colliery, went up a breast pitching 50 degrees for a distance of about seventy or eighty feet, although the black-damp became so strong that the approach was dangerous. They found fresh marks, such as foot-prints, and then were startled by hearing a groan, which sounded like a voice from a sepulchre. Again it was heard, a little louder than before. Some one shouted "Hello!" and "Hello!" was answered in return.

"Who is there?" was called.

"Me, Joe Metuskowitz," again came from somewhere ahead of them.

Onward the rescuing party went, and found a man lying in a cross-heading upon his face. The air was very bad and three of the men were kept busy brushing away the black-damp. The little chamber, where life had been found in the midst of death, smelled so badly that the rescuers were almost smothered, and it was a mystery to the rescuers how the men could live in that air.

The four men, Wasel Franko, John Burno, John Tomaskusky, and Joe Metuskowitz, were gently taken by their rescuers and carried to the bottom of the slope. They could scarcely speak. The man who first answered the rescuers was the only one who had strength enough to utter two or three words at a time, but even he, when he was brought face to face with the rescuers, was too famished to utter a sound. When the men were removed they were wrapped in warm blankets and a few mouthfuls of brandy and milk were given to each. At intervals this small dose was repeated, and, under the direction of skilled physicians, they were finally removed, and, with careful nursing of several weeks, recovered from the effects of their long imprisonment.

When found, the men were living in an atmosphere of the most nauseating character, and it is a miracle that that alone did not kill them, so weakened as they were by starvation. None but men of the most extraordinary physical development could have survived the terrible ordeal through which they passed.

We take from a recent issue of the Hazleton *Plain Speaker* the following statement of Joe Metuskowitz, one of the imprisoned men, concerning their experience:

"The first that Tomaskusky and I knew of the flood, was a big rush of wind up the breast which blocked our cars. We thought that something was wrong and ran down toward the gangway. At the second heading we were stopped by the water that was coming up so fast. We then turned and ran up to the top of the breast. Here we met the other two men, Franko and Burno. We knew at once that we were held fast by the water, but I thought as I was the tallest I might wade through. I took a powder keg, knocked the ends out and then placed it over my head, pushing my coat that I took off my back, around it so as to keep the water out. I started to wade in, but the water got too deep and I had to return.

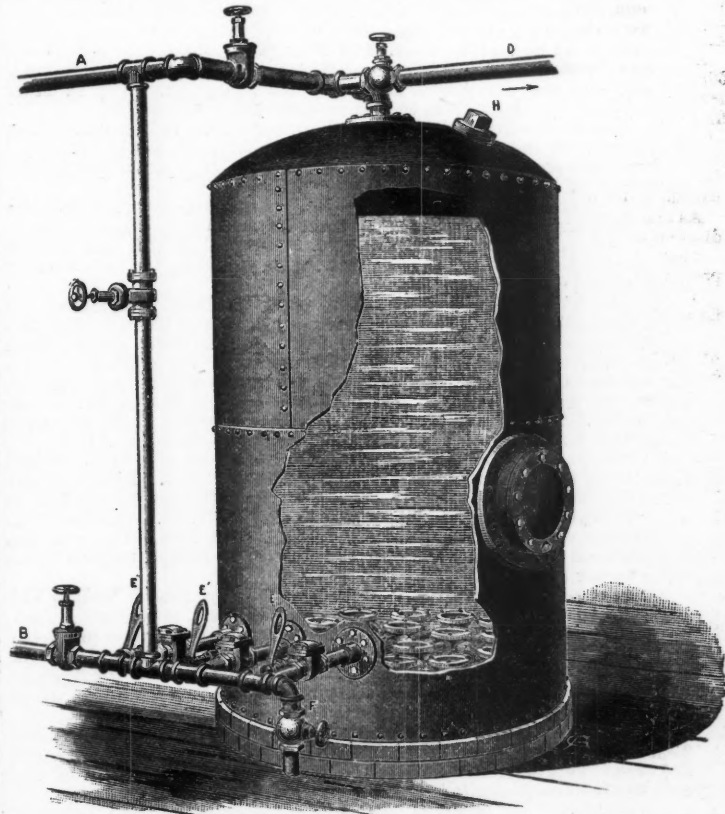
"Our first meal was made from one piece of bread and a dinner-can of boiled water. We then had two pieces of bread left, each five inches by three inches in size. We put the fire out as soon as the water boiled because the smoke was choking us. We all began to get very cold, so we went to work pulling down coal with our hands to keep warm. We did this for a long time. Then we crawled into the little cross-heading and went to sleep. How long we slept I do not know, but when we got awake it seemed a long time. We crawled down the man-way to look at the water and found it had gone down a foot from where it was at first. We all thanked the Lord and hoped we would be saved. We made many trips down to see if the water was going down and always could see that it was going down some. When we got hungry again we boiled some water, and when the water was boiling we put some bread into it as before. When the water was boiled we each drank out of the can until it was all gone and then we went to sleep again. Our sleeping place was in a blind heading, and there I found 15 sheets of mining paper in a box. I gave each man three sheets, two to place under him and one to put over him to keep the cold away. These sheets were about 44 inches by 22. The extra sheets we used as a curtain across the heading to keep off the draft. When we lay down to sleep we got together so as to keep as warm as possible, and the best way we knew was to lie on our backs and keep the head and body of some one of the others between our legs. We changed this position often, and in this way we kept warm. The water we used

was in the man-way of the next breast, and pretty soon we got so weak that we could not go for it any more. Then we used a little of our own water, but we could not use it much, so Tomaskusky and I crawled to the water again and brought back two dinner-cans and one bottle-full. This lasted us a long time, and when it was all gone we got no more till we were rescued. We must have been two days without water when we were found.

"In building our fires to boil the water we used up a powder keg and part of a slab which was about four feet long. We lost the use of our legs first, our feet were swollen and sore, and toward the last we could do nothing but lie down to die. I was strong enough to know that without water we would all soon die, and as we could not go after it anywhere we prayed hard and often for relief. We went to sleep, and when I awoke I heard a noise made by the men who were searching for us. I thought first that it was some of my friends from Dutchtown who had come to visit me, and were knocking at the door. It was then that I must have said 'hello.' I made an effort to go to the door, as I thought, but could not move. We were in the dark most of the time, only using the light when we went for water. We had plenty of matches, and had one left when we were found. We also had one lamp-full of oil left."

## THE HYATT SECTIONAL WASHING FILTER.

In the accompanying engraving is illustrated one of the latest and most improved forms of the water filters used in the well-known system of filtration of the Hyatt Pure Water Company, of 18 Cortlandt street, New York, which has been employed for many years with successful re-



sults in city water-works, factories, and other places where it is necessary to purify turbid water. This one is known as the sectional washing filter. It differs from the ordinary type of apparatus in the device for washing the filter bed, consisting of sand and comminuted coke, in sections.

Turbid water frequently carries large quantities of tenacious sediment, which, when arrested by a bed of sand, forms a semi-solid mass. It is claimed that this can be broken more quickly by a powerful jet of water impinging first on one part and then on another part of the bed, as is done in the Hyatt filter, than in any other manner, and that by the ease with which this operation can be accomplished the effectiveness of the apparatus is greatly increased.

The same volume and pressure of water striking the whole under-surface of a filter bed is comparatively ineffective where the silt and sand have formed a compact mass. The result is that only a portion of the filth is worked out, more frequent efforts to wash are necessary, the capacity of the filter is lessened, and the quality of the filtrate reduced.

In the Hyatt filter the water, after passing through the filter bed, goes out through a system of cone valves at the bottom, which are so constructed as to prevent the filtering material from escaping, and at the same time allowing the water to flow freely to the outlet pipe, whence it goes for consumption.

The filter bed is washed by turning the water from the inlet pipe to the outlet pipe by a series of valves, so that it passes up through the cone-valve system and through the filtering material, agitating and loosening the same, and washing out the impurities that have collected.

**Measure of Damage in Breach of Contract.**—Upon breach of an entire contract to sell plaintiff, at a fixed price, enough coal to keep his coking ovens running at full capacity for six months, the measure of damages is the profits plaintiff would have made in manufacturing the coal into coke. *Imperial Coal and Coke Company v. Port Royal Coal and Coke Company, Supreme Court of Pennsylvania, 20 At. Rep., 937.*



## NOTES ON THE DAN RIVER COAL BASIN, IN NORTH CAROLINA.

Written for the Engineering and Mining Journal by H. B. C. NITZE, E. M.

Although this field has been before described by such able gentlemen as Professor Emmons, in 1853, and Professor Kerr, in 1875, I have thought that the present development of the South and its mineral resources might warrant a repetition, especially inasmuch as additional prospecting has been carried on here since the last examination of this field by Dr. H. M. Chance, several years ago, for the North Carolina Geological Survey. The following is an abstract from my recent report on the "Mineral Resources along the Route of the Roanoke & Southern Railroad."

The deposit is a long canoe-shaped one, extending from a point about two miles east of Germanton, in the extreme southern part of Stokes county, N. C., in a northeasterly direction through the southeastern corner of the county and the northwestern corner of Rockingham county, through Leaksville, about 10 miles beyond the Virginia line. The total length of the basin is between 35 and 40 miles, the average width being about three miles.

The Dan River Basin belongs to the Triassic formation, contemporaneous with the Richmond and Deep River basins, surrounded on all sides by the Archean.

As yet the northwestern outcrop of the coal has not been found, other than the accompanying shales and slates. The southeastern outcrop of the coal has been traced more or less throughout its entire extent, and my examinations were confined to the same for a distance of about four miles around Walnut Cove.

A great number of test-pits and small openings (possibly as many as 50) have been made along this part of the outcrop by Mr. H. B. Robson. Many of them are very superficial, and many have either fallen in or are filled with water, still all of them show an undoubted outcropping of coal. In most cases I found it to be soft and decomposed, sometimes very shaly, and in all instances high in sulphur. Even at 10 to 20 feet underground it did not, with few exceptions, show any hardening qualities; in other words, it did not show up as well as an outcrop of coal should.

As many as seven or eight seams of carbonaceous matter have been discovered, but the majority of these are of unworkable thickness.

There may possibly be three workable seams, though probably only one, providing, of course, the quality is ever found.

The highest seam (which I will call No. 1) has a fire-clay roof and slate floor, showing up in one place about three (3) feet of very impure coal.

The best seam, in regard to size, (No. 2) lies below this, and has an average thickness of from  $4\frac{1}{2}$  to  $5\frac{1}{2}$  feet. This would be the best working seam if good coal were discovered.

Some 40 to 70 feet below this is a third seam (No. 3), showing a thickness from two to three feet. The underlying or bed rock of this coal basin is a hard, tough conglomerate, resembling millstone grit, above which a layer of silicified trunks of coniferous trees points to the existence of an ancient forest. The intervening strata are shales and hard sandstones, none of any great thickness. The remarkable absence of fire-clay, excepting one instance (as the roof of seam No. 1), is noticeable. The only fossil found is a slender, cylindrical, finger-shaped object, probably a root.

On the Roanoke & Southern Railroad, about one mile from Walnut Cove, there is a slope about 50 feet long on seam No. 2. Levels are run off at this depth on the strike, 50 feet each way, the one to day light in order to drain the opening. The dip measured  $30^{\circ}$  N. W. The thickness of the seam was 4 feet 9 inches, with a hard slate roof. The coal was very soft and decomposed and high in sulphur; it seemed to grow somewhat harder farther in.

About one-half mile above the junction of the Cape Fear & Yadkin Valley Railroad with the Roanoke & Southern Railroad, on the latter road, are some three or four openings. The upper ones show a seam of 5 feet 6 inches, bulging out in one place to 8 or 9 feet (undoubtedly local and due to folding). Thirty or forty feet below, a tunnel, driven under the Roanoke & Southern Railroad fill, shows a seam of about  $3\frac{1}{2}$  feet thickness, which seemed to be hardening upon driving sideways on the line of strike.

About two miles southwest of Walnut Cove, seam No. 2 shows up 4 feet 2 inches to 4 feet 6 inches thick, and some very fair coal has been taken out here. This place shows up better than any other, and some of this coal has been successfully burned in grates at Walnut Cove.

An analysis of the best coal found in this basin, taken from the report of Dr. H. M. Chance, shows: Moisture, 3.70%; volatile matter, 4.67%; fixed carbon, 81.58%; sulphur, 2.33%; ash, 7.82%; total, 100.00. This shows up well, excepting for sulphur, but it is evidently a picked sample. The nature of the coal is evidently semi-anthracitic, but shows a decidedly angular fracture.

The Cape Fear & Yadkin Valley Railroad parallels the southeastern outcrop from Germanton to Walnut Cove; from that point the Roanoke & Southern Railroad parallels the outcrop for about three miles, following down Town Fork. The outcrop crosses the Dan River near Old Town. As to the nature of the deposit on the other side of the Dan River, I can make no personal statement, as I did not examine it. Dr. H. M. Chance, in his report, says:

"Two or three miles southwest of Leaksville, on the old Wade farm, a section shows: I, sandy slate and shale rock; II, coal, 1 foot; III, slate, 7 inches; IV, coal, 1 foot  $1\frac{1}{2}$  inches; V, slate floor."

I have from the authority of Dr. W. B. Phillips, formerly connected with the Geological Survey of North Carolina, that the best exposure of the seam in the old Wade plantation, near Leaksville, showed three feet of coal, dipping about  $34^{\circ}$ . During the late war a considerable amount of coal was mined here, and used by the Confederate Government. In my opinion the good coal, if any, lies in the deeper part of the basin, and this can only be ascertained by making careful explorations with the diamond drill.

It is not likely that the sulphur will disappear. But in its undecomposed, pyritic form (inasmuch as it may be separated to a great extent in mining).

While the economic value of this coal deposit in regard to quantity and quality is still doubted, it would certainly warrant more careful investigation, and it is to be hoped that the newly organized Geological Survey of North Carolina will pay attention to it. A series of diamond-drill borings is needed to determine its value. Its importance to the development of this district, rich in deposits of high-grade magnetites, could not be overestimated.

## OFFICIAL REPORTS.

Alice Gold and Silver Mining Company.

The following is an abstract of the report of the directors of this company for the year ending December 31st, 1891. The 60-stamp mill was run steadily during the year, and the 20-stamp mill about three-quarters of the time. The total bullion yield, estimating silver at \$1.2129 per ounce was \$1,111,060.37, the net price received from the sale of bullion being \$872,463.67.

The financial statement of the treasurer was as follows:

RECEIPTS.	
Cash in hands of Treasurer, January 1st, 1891.....	\$5,963.46
Corporation on hand, January 1st, 1890.....	6,935.00
Bullion yield.....	1,111,060.37
Compromise on trespass suit.....	50,000.00
Sale town lots on Blue Wing, Walkerville, and Paymaster claims.....	4,319.75
Unclaimed floating checks.....	56C.52
Sundry supplies sold.....	361.53
Rent, etc.....	12.56
<b>Total.....</b>	<b>\$1,179,259.19</b>
EXPENSES.	
Permanent improvements.....	\$69,413.44
Prospecting and dead work.....	69,132.15
Ore extraction.....	214,092.48
Ore reduction.....	249,337.1
Expense accounts and taxes.....	49,388.65
Discount on silver.....	238,596.70
Expense on bullion.....	8,549.49
Bullion reclamations.....	2,314.59
Superintendent's overdraft, January 1st, 1891.....	86.77
General supplies for storehouse and freight.....	20,343.83
Purchase of property.....	113,131.51
Four dividends of \$5,000 each.....	1,000,000.00
Corporation on hand.....	2,500.00
Cash in hands of Treasurer, January 1st, 1891.....	41,448.6
Cash in hands of Superintendent, January 1st, 1891.....	86.31
<b>Total.....</b>	<b>\$1,179,259.19</b>

The property purchased was the Rising Star, Blue Wing, Midnight, Walkerville, and an undivided one-half interest in the Paymaster mines, all of which are contiguous to the company's property. The basis on which these mines were acquired was as follows: The company to mine and mill all ores taken out of said mines, and receive at the rate of \$23 per ton for mining and milling the same; all the value contained in said ores over and above this sum was to be paid to the owners on account of the purchase of the property. The price fixed for the purchase of the entire property was \$142,684.08. There has been paid during the year the sum of \$113,101.51 on account of the purchase, leaving a balance of \$29,582.57 to be paid by proceeds from the above-mentioned mines. The ore in sight in these mines will easily pay the balance and leave large reserves. There was paid on account of the purchase of this property the sum of \$50,000 (which is a portion of the \$113,101.51), which was received from an adjoining mining company in compromise, and the balance of the \$113,101.51 was profit from the working of the ores from the mines over and above the \$3 per ton working charges.

The average chlorination in the two mills was 90.44%: average amalgamations, 89.02%; average value per ton saved of gold, \$1.02; average value per ton saved of silver, \$24.42; total number of tons crushed (estimated), 39,445; average loss in tailings in ounces, 2.15. Average cost of milling (cost of labor, supplies, salt, fuel, assay materials, and quicksilver), \$6.32; loss of quicksilver per ton of ore milled .75 pound. The total number of men employed in the mill was 68; in the Alice mine, 83; Magna Charta, 87; Blue Wing, 34; Rising Star, 18; surface men, 44; total, 334. The main shaft of the Alice was sunk 10 feet during the year, and that of the Blue Wing, 350 feet. In the four mines, 8,144 linear feet of cross-cuts, drifts, raises, and winzes were driven.

[We notice that the directors of this company have continued to pursue the same policy of purchasing new mines which we have criticized in former years. A few dividends are paid the shareholders as a sop and the Messrs. Walker Bros., of Salt Lake City, absorb the balance of the profits in this way. It is true that in the case of the last acquisitions the purchase money is taken out of the mines, but the shareholders of the Alice company have to take all the risk in opening them.—Ed. E. & M. J.]

## 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, APRIL 7th, 1891.

- 449,671. Boiler Cleaner. Royal P. Faras, Wichita, Kan.  
 449,714. Method of Casting. John A. Potter, Munnhall, Pa.  
 449,724. Mill Appliance. Henry Aiken, Pittsburg, Pa.  
 449,726. Process of and Apparatus for Separating Ores Magnetically. Clinton M. Ball, Troy, N. Y., and Sheldon Norton, Hokendauqua, Pa.  
 449,734. Boiler for Generating Steam. Benjamin Ford, Green Tree, Pa.  
 449,803. Crucible of the Manufacture of Steel. George Nimmo, Allegheny, Pa.  
 449,813. Apparatus for Extracting Gold or Silver from Ores. Joseph Cragg, Laltimore, Md., Assignor to Samuel Wilkins Cragg, same place.  
 449,814, 449,815.  
 449,823. Car Wheel. William A. Pearson, Scranton, Pa., Assignor to the Boise Steel Wheel Company, of Pennsylvania.  
 449,824. Press for Forging Car Wheels. William A. Pearson, Scranton, Pa., Assignor to the Boise Steel Wheel Company, of Pennsylvania.  
 449,836. Method of Electric Welding. Elihu Thomson, Swanton, Mass., Assignor to the Thomson Electric Welding Company, of Maine.  
 449,840. Journal Box for Steam Engines. William G. Webber, Erie, Pa.  
 449,864. Rotary Steam Engine. James E. Sackett, Grahamsville, N. Y.  
 449,920. Measuring Instrument for Tunnels. Hunt R. M. Tromb, Baltimore, Md.  
 449,922. Steam Boiler. Henry Vogt and Robert H. Burns, Brooklyn, N. Y.  
 449,931. Furnace. Daniel H. Erdham, Camden, N. J.  
 449,935. Journal Bearing. Ivory Hazelton, Philadelphia, Pa., Assignor of two-thirds to Abraham Engard, same place.  
 449,942. Conveyor and Separator Apron for Mining Machinery. William A. Merriam, Kansas City, Mo.  
 450,013. Ore Concentrator. Walter J. Hammond and John Gordon, Rio de Janeiro, Brazil.  
 450,043. Furnace. Joseph Slimm Milwaukee, Wis.  
 450,052. Apparatus for Burning Gas Tar or other Liquid Fuel. William Bliss and Fench Bradbury, Chipping Norton, and Arthur H. Gibson, Birmingham, England.  
 450,063. Ore Concentrating Machinery. Calvin M. Fitch, Chicago, Ill.  
 450,103. Electrolytic Apparatus. Ernest A. Le Sueur, Ottawa, Canada, Assignor of one-half to Charles N. Waite, Newton, Mass.  
 450,104. Electrolytic Cell. Ernest A. Le Sueur, Ottawa, Canada, Assignor of one-half to Charles N. Waite, Newton, Mass.



## PERSONALS.

Mr. Harold D. Moon, of the engineering staff of the Illinois Steel Company, is inspecting the mineral resources of the South.

Mr. Ralph Nichols, of the Pioche Consolidated Mining and Reduction Company, Pioche, Nev., is spending several weeks in New York City.

Mr. E. E. Olcott, E. M., arrived home in New York City on the 8th inst. from a very successful professional trip in Sinaloa and Chihuahua, Mexico.

Col. John M. S. Egan, manager of the Pay Rock Mines, Limited, has returned to his home in Georgetown, Colo., from a several weeks' trip through Tennessee and North Carolina.

Mr. Thomas H. Sheldon, of Denver, has been re-elected managing director of the Emmons Mining Company, of Horeshoe, Park County, Colo., and Mr. J. S. Olin, superintendent of the mines.

Secretary Ely, of the New York Stock Exchange, sailed for Europe Monday on the steamer Umbria. During his absence Assistant Secretary Chas. L. Burham will discharge the duties of his office.

Mr. J. H. Nichols, for many years supervisor of the West Jersey Railroad, has been appointed as assistant engineer of the West Jersey and Camden & Atlantic railroads, vice Samuel C. McComb, deceased.

Col. W. W. Palmer has been elected president of the Pueblo Mineral Palace, in place of Mr. Donald Fletcher, resigned. Work has been resumed on the structure, and Col. Palmer will give much attention toward hastening its completion.

Mr. J. K. Pardee, the well-known mine promoter, of Montana, was in St. Louis recently en route from New York to the west. Mr. Pardee was in the east for the purpose of procuring and organizing a company to work his litho carbon mines.

Mr. H. L. Morris, of Denver, Colo., has resigned from the directory of the Justice Mining Company in order to give more time to the properties in which he is more largely interested. His place has been filled by the election of Mr. W. B. Root, of Denver.

Governor Markham, of California, has appointed the following named gentlemen as World's Fair Commissioners for his state: John Daggett, Robert Murray, A. T. Hatch, Irving M. Scott, James D. Puelen, L. J. Rose and Thomas H. Thompson. The commission has a \$300,000 appropriation to expend.

Captain John Plummer, present superintendent of the Elkhorn Mining Company of Montana, it is stated, will take the superintendency of the De Lamar group of mines of Idaho, recently sold to an English syndicate. He will be succeeded at Elkhorn by Mr. C. A. Moulson, who has had charge of the Agua Fria, in the Hazelton district, Mont., during the past year, and Mr. O. A. Tibbetts, formerly at Granite, Mont., will succeed Mr. Moulson.

Captain Daniell, of the Tamarack Mining Company; T. S. Couch, of the Boston & Montana Copper and Silver Mining Company; C. H. Palmer, of the Butte & Boston Mining Company and Frank Klapecko, of the Tamarack Company, have been appointed a committee of four to visit the smelter of the Boston & Montana Company now in course of erection at Great Falls, Mont., and to make any suggestions as to alterations or improvements which might be desirable for the new copper plant. The Michigan gentlemen have already left Calumet, Mich., and will be joined by Messrs. Couch and Palmer in Great Falls.

Mr. W. F. Shunk, who is at the head of a party of civil engineers, linemen and assistants, sailed from this city on the 1st inst., for Panama, en route for Ecuador to commence the survey for the inter-continental railway. Another surveying party, under the command of Captain Edgar Z. Steever, Third Cavalry, U. S. A., will start within a short time for the southern Mexican frontier to run the line through the Central American States. Accompanying Captain Steever will be Lieutenants S. M. Foote, Fourth Artillery; Arthur Williams, Third Infantry; S. S. Rwan, Ninth Infantry; A. T. Bullington, Seventh Infantry; C. A. Hedekin, Third Cavalry and Surgeon W. C. Shannon.

## OBITUARY.

Thomas Charles Baring, recently connected with a well-known Anglo-American banking house, died in Rome, Italy, this week.

George N. Keith, who was the first to introduce bluestone flagging into the city of New York, died at Catskill, N. Y., on the 6th inst. He was born at Cairo, Greene County, N. Y., in 1813.

John H. Buckingham, general manager of the Chicago Steel Works, died very suddenly on the 7th inst. at Lansing, Mich. He was a very capable man and was well known and popular in Chicago business circles.

C. E. Hsley, a member of the firm of Hsley, Goodrich & Co., metal brokers, of Chicago, was killed on the 8th inst. by a runaway horse. Mr.

Hsley was a young man in business, but was very well known, and was considered to have a promising career before him.

Ira Jagger died on the 8th inst. at Albany, N. Y., aged 36 years. He was formerly largely identified with the stove industries in Albany. He built the first blast furnace there, which proved unsuccessful because of the panic of 1873 and the stringency of the iron market.

James Farmer, president of the Magna Charta Mining Company, of Gunnison County, Colo., died at his home in Cleveland, Ohio, on the 18th ult. He was upward of four scores of years of age, and was the father of Mr. E. J. Farmer, manager of the Magna Charta company.

William H. Kemp died at his residence, in New York City, on the 8th inst., aged 73 years. He was born in Birmingham, England, where his father was a gold beater, and the son was brought up in the same business. When he was 25 years of age he came to this country and settled in New York, where he established the first gold beating manufactory in the city. He also manufactured gold beater's moulds and ten years ago he established plate rolling mills which proved very successful.

Henry McLean Martin, of the well-known firm of Harding, Martin & Caverly, of Boston, Mass., died suddenly in Montana on the 6th inst. He was born in Roxbury, Mass., in 1847, educated in the Boston public schools and then entered the wool business. He had been associated with the firm with which his interests were at the time of his death since 1876, for the past four years having been its representative in San Francisco. He had extensive ranch and mining interests in California and Montana, and at the time of his death was visiting some mines with which he was connected.

J. C. Carson, more familiarly known through the west as "Kit" Carson, died suddenly, of neuralgia of the heart, at Salt Lake City, Utah, on the 29th ult. He was 49 years of age. Mr. Carson was one of the best known men in the west, especially in Colorado, being particularly identified with the growth and development of the city of Aspen, Colo., of which he was once mayor. He started the famous stage line between Aspen and Leadville, and ran it for many years. He was also interested in mining matters in Colorado. About one year ago he removed to Salt Lake City and began mining operations in the Tintic district, where he was interested in the Golden Chain, Treasure and Julian Lane properties. He was a man of great energy and executive ability, and was universally respected and esteemed for his probity of character.

## SOCIES.

The American Boiler Manufacturers' Association, representing the boiler-makers interests and kindred lines, met recently at the Mercantile Club in St. Louis, Mo., to prepare for the third annual convention of the American Boiler Manufacturers' Association, which will meet in that city on the second Tuesday in May. Mr. Jos. F. Wangle, president, and Col. E. D. Meier was secretary. The following gentlemen were appointed as chairmen of various committees, with power to select their associates on the committee. Finance, Joseph J. Wangle; reception, John O'Brien; entertainment, Paul Kohan. A fund of \$1,250 has already been raised by the boiler-makers, and this will be increased to \$5,000. The association was organized at Pittsburg in April, 1889, and held its first convention in that city in the following October; the second convention was held in New York last July. The present membership is 150, and an attendance of several hundred of boiler manufacturers and dealers in boiler-makers' supplies from all portions of the United States and Canada is expected.

"Engineers of Virginia" is the name of an association formed at Roanoke on the 4th inst. Its membership consists of 126, among whom are many of the leading mechanical, civil, mining and electrical engineers and architects of the state. The objects of the association are set forth in Article II. of its constitution, which is as follows: "To promote the arts connected with engineering, by means of periodical meetings for the reading and discussion of professional papers, and for social intercourse and the circulation by publication among its members of the information thus obtained. No recommendation, indorsement or approval shall be given to or made, or any individual, or for any scientific or literary, mechanical or engineering production; but the opinion of the association may be expressed on such subjects as affect the public welfare, provided this opinion does not carry with it the interests of any individual." Roanoke was chosen as the headquarters. The following board of officers was elected: President, J. H. Wingate, Roanoke; first vice president, W. E. Anderson, Blacksburg; Mechanical and Agricultural College; second vice-president, C. R. Boyd, Wytheville; secretary, H. W. Newby, engineer of construction of the Roanoke & Southern Railroad; treasurer, James R. Shick, assistant engineer Norfolk & Western Railroad.

## INDUSTRIAL NOTES.

The New Haven Rolling Mill, New Haven, Conn., reduced the wages of its employes 10%. The men struck on the 6th inst., the following day.

The North of England ironmasters have given notice of a 12% reduction of wages, alleging that the cost of production exceeds the market price 5s. per ton.

The West Buena Vista Company, of Southwest Virginia, has given a contract for an iron bridge 100 feet long. It will connect Buena Vista with West Buena Vista.

The Berlin Iron Bridge Company, of East Berlin, Conn., has designed and built the building of the new rolling mill for the Washburn & Moen Manufacturing Company. It will be quite extensive, and entirely of steel. The main building will be 140 feet in width by 400 feet long, with a wing on one side of 40 feet in width and 160 feet long, and one on the opposite side 40 feet in width by 100 feet long.

The Pencoyd Iron Works, located near Philadelphia, Pa., owned by Messrs. A. & P. Roberts & Co., refuse to sign the wage scale of the Amalgamated Association of Iron and Steel Workers. The wages paid are about the same as those demanded. The point at issue is that the management insists on the right to hire and discharge labor without reference to any association. The men have gone on a strike.

The New York Board of Trade and Transportation on Wednesday adopted a petition to the Senate and Assembly "to pass a concurrent resolution requesting the President of the United States to call to the special attention of Congress, in his next message, the expo ed condition of the sea approaches to New York city and Brooklyn, and ask immediate action by Congress looking to the better protection of the same."

A celebration in commemoration of the one hundredth anniversary of the establishment of the American patent system was opened in Washington, D. C., on the 8th inst. The exhibition of models of patents was made at the Patent Office. Literary exercises, excursions, banquets, etc., were features of the gathering. The celebration was brought to a close on the evening of the 10th inst. All those who participated expressed themselves in favor of forming a society, to be called the "Inventor's National Association." A committee of nine have the project in charge.

The Columbia Iron and Steel Company, whose works are located at Uniontown, Pa., made an assignment for the benefit of its creditors on the 3d inst., with Charles A. O'Brien as assignee. The liabilities are supposed to be about \$300,000; assets not stated. The negotiations to sell the company's plant, which is an excellent one, to an English syndicate had failed. Christian Yeager is the president of the company, and E. M. Butz, vice-president and treasurer. The latter states that the assignment is only temporary, and the matter will be adjusted within thirty days. The Pennsylvania Construction Company, a tributary concern, has also assigned with liabilities of \$200,000. The two companies have for some time been in trouble, and several weeks ago work at their plants ceased, owing to non-payment of the employes' wages.

## 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 correspondents 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.

2,155. A battery for plating gold and nickel, New York.

2,156. An electric light plant—incandescent system from 100 to 200 lights; also one mile of wire and station apparatus. Georgia.

2,157. Steel and iron roofing, also iron sliding, Virginia.

2,158. Architectural, civil and mechanical engineering supplies. Florida.



- 2,159. House furnishing material, patent sliding blinds, glass, mantels, plumbers' material, sash, doors, blinds and gas fixtures. Georgia.
- 2,160. Telescope for street work. Texas.
- 2,161. Machinery for a first class planing mill, sash, door, blind and moulding factory. Virginia.
- 2,162. A moulding machine for working sash and mouldings. Virginia.
- 2,163. Barrell machinery. New York.
- 2,164. A 200-H. P. engine, condensing; also a 50-H. P. engine, non-condensing. New York.
- 2,171. Pure nickel in either sheets or wire. Massachusetts.
- 2,172. Machinery for a harness factory. Georgia.
- 2,173. A handle lathe for turning axe, pick and hammer handle. Georgia.
- 2,174. Electric steam plant for about nine miles of electric railway. North Carolina.
- 2,175. Machinery for weaving and making wire goods, such as poultry wire, woven wire for fencing, sand screen wire, and window screen wire. Pennsylvania.
- 2,176. Two miles of old rails 40 to 50 pounds per yard, in good order, for one mile of track, with spikes, etc. for same; price f. o. b. Morgan Line Steamers, New York or New Orleans. Louisiana.
- 2,177. Bark and flour mill plant. Maryland.
- 2,178. A five-ton ice machine complete. Texas.
- 2,179. Iron roofing, ceiling, metal shingles and sliding door hangers. Virginia.
- 2,180. Iron and wire fences and lawn seats. Virginia.
- 2,181. Windmills and water elevators. Virginia.
- 2,182. Water-pipe. Virginia.
- 2,183. About 500 feet 8-inch well casing. Georgia.
- 2,184. A first class brick machine. North Carolina.
- 2,185. Steam drill, channeling bar, boiler, engine, saws, etc. Tennessee.
- 2,186. Derricks and material for limekilns and cement works. Tennessee.
- 2,187. An ax-handle and spoke lathe. Georgia.
- 2,188. A hot air engine to pump 2,000 gallons per hour. Georgia.
- 2,189. All sizes of wrought iron pipe from 1/2 to 3 inches, about 5,000 feet in all, and a lot of 14-inch cast-iron pipe in 8 feet lengths or longer. Georgia.
- 2,190. Machinery for grinding mica. Georgia.

## AMERICAN GOODS WANTED ABROAD.

- 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.
- 2,165. Tile machinery. Australia.
- 2,166. Coal-cutting machinery. Australia.
- 2,167. Excelsior machinery. Australia.
- 2,168. Cotton oil presses and machinery. Australia.
- 2,169. Sheep-clipping machinery. Australia.
- 2,170. Machinery, forges, hammers, dies, etc., for making hoes, shovels, picks and other agricultural tools; also for bolts, nails and wire. South America.

## GENERAL MINING NEWS.

**ST. LOUIS ORE AND STEEL COMPANY.**—The Farmers' Loan and Trust Company, of New York, it is stated, is about to foreclose mortgages to the amount of \$2,600,000 on the property of this company. These are 6% bonds, \$1,000,000 on the Pilot Knob mines, in Iron county, Missouri; \$1,000,000 on the Vulcan Iron Works, and \$600,000 on the coal mines at Grand Tower and Carbondale, Ill. Interest on these has been defaulted since July, 1890, when E. A. Hitchcock was appointed receiver. The principal cause of the failure of the company to meet the interest on its bonds was the exhaustion of the Pilot Knob iron mines. These had been very valuable, and formerly were among the most famous iron mines in the United States; for a number of years they yielded immense quantities of fine ores, but the ore has given out, and for more than a year past the company has been boring around and trying to find more ore, but without any success. Beside the Pilot Knob mines, the company owns extensive coal fields in Illinois, the Carbondale Railroad, a short line that is run in connection with the coal mines, and the Vulcan Iron Works in St. Louis. There are, in all, three issues of bonds by the company, each a first mortgage on a part of the company's property, and a second mortgage on another part. The three issues are known as the first mortgage, the Olympian, and the Chouteau bonds, the last named of which are a first mortgage on the Vulcan Iron Works.

**TENNESSEE COAL, IRON AND RAILROAD COMPANY.**—At the meeting of this company at Tracy City, held on the 8th inst., an offer of \$2,500,000 by an English syndicate for the property of the company in Tennessee, which is known as the Tennessee Division, was considered, and an adjournment was taken to allow the stockholders of

the company to consider the proposition. President Thomas C. Platt has given the English people an option on the property at the above figure, the same to be subject to the action of the stockholders. The English syndicate is said to have a large amount of money, and will make large developments in the Sequatchie valley if everything goes smoothly. The stockholders of the Tennessee Coal, Iron and Railroad Company have elected J. H. Inman, T. C. Platt, C. C. Baldwin, W. C. Sheldon, James Stillman, F. T. Brown, James T. Woodward, Samuel Thomas and A. B. Boardman, of New York; Thomas Barrett, Napoleon Hill and Enoch Ensley, of Memphis; N. Baxter, Jr., and A. M. Shook, of Nashville, and T. T. Hillman of Birmingham, directors. The directors will meet in New York on the 15th, inst., to elect officers.

## ALASKA.

**ALASKA-TREADWELL GOLD MINING COMPANY.**—During February there were milled 17,360 tons of ore, and 552 tons of sulphurets treated. The mill ran 25 days. Shipments of bullion amounted to \$64,250, of which \$23,750 were from sulphurets. The expenses for the month were, it is said, between \$25,000 and \$30,000.

## CALIFORNIA.

(From our Special Correspondent.)

**SAN FRANCISCO, April 2.**  
A vein of bituminous coal has been discovered near the city of San Francisco, on the line of the Cliff House & Ferries Railroad. A tunnel for exploration purposes has been commenced. The vein is on the lands of Adolph Sutro, but has every indication of extending into the land of the railroad company adjoining. Samples of the coal appear to be equal to the product of the Livermore mine in quality.

## PLACER COUNTY.

**PARAGON.**—Messrs. Breece & Wheeler, owners of this property, one of the best paying gravel claims in the county, have cut into a new channel in Volcano Cañon, which is from 200 to 300 feet wide. They own 5,000 feet of this new channel. The gravel pays, it is said, \$6 to the car, and one man can take out two cars a day.

## SAN BERNARDINO COUNTY.

(From our Special Correspondent.)

**CARBONATE MINING COMPANY.**—At Oro Grande the excitement is intense. The wonderful development of the past few weeks in the carbonate mine has fired the brain of every miner and prospector in the district. One sack of ore from the mine was sold recently for \$6,000, and one lot of 500 pounds was worth \$7,000. A few days ago Wells, Fargo & Co. had in their office at Los Angeles, \$25,000 worth of this rich rock. The shaft in which the strike was made has now advanced about 25 feet since the strike, which was made at 180 feet from the surface. About four tons of the extremely rich ore have been taken out. A new shaft on the lead, a thousand feet distant from the first, is now in bonanza also, and the carbonate ore body, which underlies the gold vein or deposit, is becoming greatly enriched. That the carbonate mine is a wonderful bonanza seems certain. This mine is one that has a really romantic history. Originally, the ground was a lime quarry, from which material was taken to burn lime in the kilns at Oro Grande. A man named Collins one day discovered a dark heavy mineral in the lime and had it assayed. It proved to be lead carbonate, carrying considerable silver and some gold. The new silver mine was worked under difficulties, and, on the death of Collins, who was murdered by a man named Adams at Oro Grande, the property passed into other hands. The remarkable gold strike was made only about a month ago. The ore is a peculiar mixture of quartz and calcite, with some iron and black oxide of manganese. Free gold is its prominent characteristic, though in some specimens coarse gold is mingled with flakes and lumps of horn silver as big as peas. The mine is a mineralogical wonder.

**SAN JACINTO ESTATE, LTD.**—The five-stamp experimental mill is running smoothly, crushing about 10 tons daily. The rock thus far treated has averaged about 15% cassiterite, though this is probably rather higher than the general average will be. A rich strike is reported from the company's gold mine at Gavilan. It is said the rock runs over \$800 per ton. The extent of the strike is undetermined.

## COLORADO.

At a meeting of the directors of the Colorado Mineral Palace Company, held in Denver on the 4th inst., contracts were let for the completion of the Palace building at Pueblo, work to be begun without delay. It is expected that everything will be ready for the opening of the exhibition to the public some time in June.

Mineral surveys approved by the U. S. Surveyor General of Colorado during the week ending April 4, 1891: Sur. No. A & B 6,745, Land District, Montrose; Name of Claim, Herbert Lode and Mill Site, 6,860, Garfield, Sarah Jane Lode, 6,850, Leadville, Lillian Lode, 6,734, Montrose, Fredonia Lode, 6,866, Garfield, Copper King Lode, 6,863, Gunnison, Manchester, Glasgow, Moscow, Panama, Peak, Peak No. 4, Peak No. 1, Peak No. 2, Peak No. 3, Peak No. 5, and Peak No. 6 Lodes. Amended Survey; 4,163, Garfield; Marlin Lode.

## BOULDER COUNTY.

**CHATHAM MINING COMPANY.**—This property, it is said, is improving with each foot of development, and holds out prospects of becoming as rich a producer as any mine in the district. When the new shaft is connected with the lower level and the new hoisting plant is ready to take out the ore, this mine will have no trouble to supply the entire 40 stamps of the new Boston mill recently purchased by the company. The gold from this lode is of good quality, and it is easily saved on the amalgamated plates. The concentrates, being of good quality, will sell readily at the smelting works. At present two batteries are kept running with ore from development work, and besides the amount of ore necessary to supply the 20 stamps a carload of smelting mineral is shipped to Denver every 10 days.

## CHAFFEE COUNTY.

**MARY MURPHY MINING COMPANY.**—The new dressing works are now running regularly on \$12 ore, and are turning out about two carloads, or 25 tons of concentrates daily. Seventy-five men are employed at the mine.

## CLEAR CREEK COUNTY.

**BELLEVUE-HUDSON MINING COMPANY.**—This company, which is working quite a large force of men, recently made a strike in its crosscut tunnel, concerning which there is likely to be a law suit, according to local papers. The tunnel was driven to cut the Bellevue vein; a lode bearing rich mineral was struck, and ore valued at \$40,000 has already been taken from it, and is piled in the company's bins. It is claimed, however, that this lode was not the Bellevue at all, but the continuation of a newly discovered vein called the Homestake, owned by Messrs. Craig, Wood, Johnson and Maulax, which is located between the Crown Point and Crown Prince claims.

**COLORADO CENTRAL CONSOLIDATED MINING COMPANY.**—The case of John Turk vs. this company has been set for trial in the United States Court on the 5th prox.

**LAMARTINE.**—The owners of this mine are now shipping about 200 tons of ore per month. The output will be increased as soon as the roads are in better condition.

**SHERMAN MOUNTAIN MINING COMPANY.**—This company has been organized by W. G. Franklin to acquire the Mammoth mine. Its capital stock is \$100,000. Wm. T. S. May is President, and Alexander Majors and David Street directors.

## GUNNISON COUNTY.

**COLORADO FUEL COMPANY.**—This company closed down its mine at Crested Butte on the 1st inst. for six weeks, on account of slack orders and to make repairs to machinery. Between 80 and 100 men are thrown out of work. The management of the company offered to continue work if they would accept a 10 percent reduction in wages for three months, but they refused.

## LAKE COUNTY.

**WHITE CAP.**—This mine is reported to be showing the largest body of high-grade lead-carbonate ore uncovered in Leadville. The ore-body lying in a channel in the blue limestone is over 240 feet in length, 25 feet wide and on an average 11 feet thick. At present all of the hoisting is being done through the main incline of the Silver Cord, but winzes are being sunk to connect with the new cross-cut tunnel, being run by the Silver Cord Company, the level of which is about 30 feet below the White Cap workings.

## OURAY COUNTY.

The past winter has been unusually severe in the San Juan country. The snowfall has been excessive, and practically no ore shipments have been made since February 18th. Hundreds of carloads of ore are now piled in the bins of the Red Mountain mines awaiting shipment, and several companies have been obliged to close down for lack of further room in which to store ore. Many lives have been lost in the San Juan mountains this winter, through snow slides.

**AMERICAN BELLE MINES, LIMITED.**—The statutory meeting of this company, required to be held within four months after registration, occurred in London on the 25th ult. The company was registered on November 29th, 1890, and the allotment concluded on December 8th. The application for shares far exceeded the total amount of capital stock, and, after allotment, the number of shareholders on the register exceeded 1,400. The first installment of the purchase money of the property was paid January 21st, 1891, and the purchase completed February 28th. It was arranged with the vendors that the company was to have all of the ore produced from Dec. 1, 1890; the output of the company during December and January, coming entirely from the Silver Bell mine, yielded a profit of \$50,000. From this the company declared an interim dividend of 6d. per share (\$50,000 payable April 15, this being at the rate of 15% per annum on the capital of the company. The working capital of £50,000, which was provided by the company, remains practically intact. No ore was shipped during February on account of the snow blockade, but the production of the mines was large. It is expected that the first steps toward the erection of the new and large



smelting works at Durango to treat the copper ores of the Hudson and National Belle mines will be taken during the month of May. It will have capacity of 300 tons of ore, daily, and it is said that the National Belle mine is now in a position to turn out from 100 to 200 tons of ore of this character per day.

**MINE OWNERS TRUST, LIMITED.**—Letters of all lotment in this company, recently registered, have been posted, and instructions have been cabled to Red Mountain to begin work in the mines.

**NEW GUSTON COMPANY, LIMITED.**—The directors of this company have declared a dividend of 2s. per share and a bonus of the same amount, amounting to £22,000 (\$110,000), for the first quarter of 1891. These dividends are at the rate of 80% per annum on the capital stock of the company. A force of 100 men is now employed at the mine and the regular large output is being made, although shipments have been practically suspended during the past month or six weeks on account of the heavy snowfall.

**YANKEE GIRL SILVER MINES, LIMITED.**—The directors have declared an interim dividend of 2s. per share, amounting to £26,000 (\$130,000), payable on April 15th. This is at the rate of 40% per annum on the capital stock of the company. With previous dividends and bonus this makes a total of 7s. per share, or £91,000 (\$455,000) for the first nine months since the formation of the company.

**PITKIN COUNTY.**

**ARGENTUM-JUNIATA MINING COMPANY.**—This company has acquired the right to mine under the streets in the eastern part of the city of Aspen by payment of \$10,000 into the city treasury. The first installment of \$5,000 was paid by the company in March. The balance is not due for 18 months.

**COMPROMISE MINING COMPANY.**—This company is at present making an excellent record, not only in the way of a large output, but also in the grade of ore being shipped. Of late it has been shipping an average of 160 tons per day, and there is every indication that this rate will be maintained for some time to come.

**MOLLIE GIBSON CONSOLIDATED MINING & MILLING COMPANY.**—The *Aspen Times* is authority for the statement that this company has purchased the Silver King property, adjoining the Mollie Gibson on the west, for \$150,000. The owners of the Silver King were Mrs. George W. Thatcher and George L. Brown, of Aspen, and A. V. Hunter, of Leadville. This purchase gives the company 60 acres of ground and 1,500 ft. on the apex of the vein. The terms of the purchase were \$25,000 down and \$25,000 in five monthly installments.

**IDAHO.**

**OWYHEE COUNTY.**

**BLACK JACK.**—The new silver mill at Silver City is completed, and will probably commence crushing this month. At present the ore has to be hauled from Florida Mountain, but as soon as the snow disappears an incline tramway will be constructed.

**DELAMAR MINING COMPANY.**—The sale of this company's mine has been completed by the deposit at the Boise National Bank of \$475,000 to the credit of J. L. Delamar. Besides the \$475,000, Mr. Delamar also holds 25,000 shares of stock.

**SHOSHONE COUNTY.**

**BADGER.**—This mine was originally bonded for \$60,000 by seven Helena, Mont., capitalists. A year ago this month it was accepted, and during the past year it has paid for itself, and in addition produced \$100,000 net profit.

**HELENA & FRISCO MINING COMPANY.**—The greater part of the ore handled by this company, whose property is situated in the Cœur d'Alene district, comes from the Badger claim. It is reached by two tunnels, both starting on the San Francisco ground and extending in about 1,200 feet. Most of the ore has been taken from the upper tunnel, or tunnel No. 1, the ground having been stope a distance of 200 feet above the level. In tunnel No. 2 the ore is practically the same as in No. 1, but a little higher grade. The ledge is also much wider. Several hundred feet of ground has been stope to a height of from 30 to 40 feet above the level. The distance between the walls varies, but will average 10 feet. In many places swells are encountered 20 feet wide and 100 feet long, which contain good concentrating ore the entire distance across. A solid body of steel galena, varying in width from 1 to 4 feet, is continuous throughout the ledge. Everything goes through the mill. During the month of February, the mill ran only 21 days, the cold weather cutting off the water supply for the rest of the time; and the days the mill did run, the shortage of water very much reduced its capacity. With these disadvantages the mill turned out 500 tons of concentrates, and after deducting the cost of mining, milling, freight, and treatment at the smelter there was a net profit to the company of \$12,279. The ore is shipped to the Montana Smelting Company, at Helena. A new tunnel is now being driven, designated as tunnel No. 3, which will be the main working level of the mine. It starts on a level with the ore bin at the mill and is now in 574 feet. It is estimated that the lead will be encountered at 987 feet, which will give a vertical depth of 900 feet.

**KANSAS.**

A special report shows that during the week ending April 4th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 2,263,790; zinc ore, pounds sold, 1,427,790; lead ore, pounds sold, 73,020. Sales aggregated a total value of \$16,103.

**MICHIGAN.**

**COPPER.**

The production of mineral for March of the companies mentioned is as follows:

	March		Jan. 1 to May 31	
	1891.	1890.	1889.	1888.
	Tons.	Tons.	Tons.	Tons.
Calumet & Hecla.....	3,629	3,346	10,380	9,310
Quincy.....	500	350	1,406	976
Osceola.....	300	215	900	664
Atlantic.....	215	210	438	593
Franklin.....	120	201	528	604
Kearsage.....	82	86	223	243
Peninsular.....	80	75	260	237
Total seven.....	4,926	4,483	14,084	12,632

**ARNOLD MINING COMPANY.**—This company has issued a circular announcing an assessment of 25 cents per share payable April 15th, by stockholders of April 10th. It says the money will be expended for continuing exploration and development work begun last year, the results of which the agent considers justifies further prosecution.

**CENTENNIAL MINING COMPANY.**—Capt. Vivian, agent of this company, writes under date of April 2d, that No. 3 shaft was sunk 70 feet in March, and that the lode is still large and showing a little more copper, but is not of much value. The lode in No. 6 shaft is still small. The only change in this part of the mine is in the third level north, where the lode is between nine and ten feet in width, and showing copper which will pay to stope.

**HURON MINING COMPANY.**—The broken engine shaft, according to Agent Vivian's recent report, has been repaired, and the mine and mill are again in operation. Work has been started to open south of No. 6 shaft at the twenty-first level. The lode at this point to all appearances is quite large, and is showing some fair stamp rock. The twelfth level south will be started at once to reach the productive ground in the levels above as soon as possible. Mr. Vivian states that he is satisfied that the best territory is in that direction, which it must open up without delay to be successful for 1891.

(By Telegraph, April 10.)

**PEWABIC.**—Fire broke out in the lower levels of this mine on the evening of the 8th inst. Under the new or Quincy management a party of engineers were making a survey for the purpose of opening up a mine for operation. A fire was built for the purpose of warming a lunch. The stalls, of which there are a great number in the mine, and which are as dry as tinder, caught fire, and before preventive means could be taken the flames were beyond control. The Pewabic is connected with both the Franklin and Quincy mines. This morning the Quincy management was enabled to stop up the connecting level, thereby shutting off its mine. The Franklin, however, which is connected on a number of levels, is in more imminent danger. At this writing it is impossible to say to just what extent the fire has gained headway. Work has been suspended.

**IRON.**

**MEMONINEE RANGE.**

Incidental to the sale of the Escanaba, Iron Mountain & Western Railroad (see *ENGINEERING AND MINING JOURNAL*, March 28th) the purchasers get a contract for the transportation of all ore produced by the Schlesinger mines during a term of years. The Menominee Transit Company gets a similar long-term contract for the boats now building at Cleveland. The boats will be controlled by the Cleveland men concerned in the deal, including Mr. Hanna and the capitalists interested in the Globe Iron Works.

**SALT.**

The Michigan Salt Association, which expired by limitation on March 31st, has been reorganized under the name of the Michigan Salt Company. Fully 90% of the salt producers are said to have joined the new combination, and the danger to the industry, which was feared upon the disbandment of the old association, is thus averted.

**MINNESOTA.**

**IRON—MESABA RANGE.**

**Moss.**—At the Moss explorations on the S. W. ¼ of S. W. ¼ of section 1, 9-14, work has been discontinued in No. 1 shaft at a depth of 47 feet, after passing through considerable slate. The sinking of another shaft has been commenced about 270 feet north of No. 1; it is down 16 feet.

**MESABA SYNDICATE.**—This corporation has an option on 9,000 acres in range 13, town 60. A series of test pits, extending nearly east and west on the south half of N. W. ¼ of section 23, are bottomed—some of them in very good hematite ore, others in mixed ore and jasper. The ledge was struck at a depth of from 6 to 10 feet, and after passing through about 18 inches of capping the ore was struck.

**STONE IRON COMPANY.**—This company, which has been carrying on explorations on the S. W. ¼ of section 13, 59-14, has uncovered a

body of ore 40x60 feet. The deposit has been traced for a distance of 900 feet. The ore, which is a red specular magnetic, runs from 58% to 64% iron, with from .017% to .02% in phosphorus, low in silica and said to be free from titanium.

**MISSOURI.**

**JASPER COUNTY.**

**ASTOR MINING COMPANY.**—This company has been engaged in making improvements for some time. The plant has been completely changed and doubled in capacity. Everything is now ready to begin operations.

**HOME MINING COMPANY.**—This company's ground at the south end of Main street is rapidly developing into good paying property. At present there are two developed prospects on the ground adjoining the city; three shafts are down to considerable depth with a good showing, and seven others have just been started. Hicks & Warren are said to be operating a paying shaft which is down 70 feet. They are drifting on a 12-foot face at 60 feet. The first clean-up of 8,000 pounds was made by this company last week. The company has a lease on three lots, which will doubtless make good returns in the near future. Albert Hicks is operating another good shaft on this property, and Messrs. Nugent, Waler & Silers have one now down 55 feet. They have been somewhat retarded by the large quantities of water met with.

**TURKEY CREEK MINING COMPANY.**—This company is making some extensive improvements, preparatory to working on a larger scale during the season. The old machinery at the pumphouse is being torn out and removed. A new lot of machinery, consisting of a 60-horse power engine and an 85-horse power boiler, is now being placed in position and will soon be ready for business. The plant will be used to run string pumps on the ground. The company is also putting in a large boiler and pump on the creek near the red bridge. Pipes are laid from the creek to the Astor and other mines on the hill, in order that a sufficient supply of water can be had for wash purposes.

**MONTANA.**

**CASCADE COUNTY.**

In 1881, through the influence of George Clendenin, a smelter was built in Barker. It commenced operations and was run until November 10th, 1883, when it was shut down. The old slag pile furnishes positive evidence that the smelter was neither skillfully nor economically managed. Several months ago Downs, Allen & Hauser, of Helena, completed arrangements whereby they control the entire Clendenin smelter plant, and Robert Sticht, formerly metallurgist at the Montana smelter at Great Falls, was sent to Barker, and under his supervision the machinery, blast furnace and roasters have received a thorough overhauling. The entire plant was found to be in good condition considering the long period of idleness, but some material changes have been made. The doors of the roaster have been closed with brick, and a connecting flue built from the stack of the blast furnace. By this arrangement the smoke from the blast furnace passes through the roaster and out through the roaster flue, thereby making the roaster a depository for the valuable fine dust. The furnaces are now in blast. The syndicate has contracted for several hundred tons of ore from the May and Edna mines. This will be mixed with Wright & Edwards ore, which was roasted by the old company and left in the yards. They will also run through about 1,000 tons of Silver Belle ore. The company will operate the smelter on custom work, if sufficient ore can be had at a satisfactory figure. The capacity of the smelter is only from 40 to 60 tons daily.

**NEIHART-CUMBERLAND MINING COMPANY.**—The owners of this property have recently incorporated as the Neihart-Cumberland Mining Company with a capital of \$600,000, shares \$1 each. The property lies between the Queen of the Hills and Moulton properties. It is developed by a shaft 50 feet down on the lead, and the ore is said to run \$60 in silver. A contract has been let to run a tunnel 425 feet to tap the vein at greater depth, and work on this has now commenced. Treasury stock is now being sold at 10 cents to thoroughly develop the property. The officers are: Duncan McDonald, president; D. McCowen, vice-president; E. R. Clingan, secretary and treasurer.

**MISSOULA COUNTY.**

**IRON MOUNTAIN MINING COMPANY.**—Speaking of the strike recently made in this property, Mr. R. S. Hale said it assayed 123 ounces in silver and 70% lead. Just how much of this ore there is, has not yet been determined, as there has been no drifting on it. But there are 12 inches of solid galena ore on one side and 20 inches on the other, and in addition fine concentrating ore. The tunnel is in about 845 feet, and the intentions are to run it about 1,100 or 1,200 feet, though the expectation is to strike the main ore chute at 900 or 950 feet. A force of 40 men is employed on the mine, but owing to the bad condition of the roads only small shipments of ore can be made. During the next 30 days the expenses will be heavy, it being necessary to move the machinery to the mouth of the tunnel. This expense, added to the difficulty of hauling ore, will keep the net proceeds down probably for two months.



PARK COUNTY.

The importance, to Livingston and contiguous sections, of the development of the Trail Creek coal measures, recently undertaken by W. D. Pinkston, of Butte, can hardly be underestimated. The option covers a period of one year, and the bond given is in the neighborhood of \$25,000. These mines are said to be among the most prominent in the State, and have been developed sufficiently to expose several large veins of semi-bituminous coal, which is exceptionally free from foreign substances, burns freely, and produces hardly any clinkers. Mr. Pinkston now has quite a large force of men at work, and is running a tunnel some 250 feet below the one already in to tap the main vein; an inclined shaft will also be sunk several hundred feet in the seam. This will be purely in the nature of prospect work, and when completed, if the existence of sufficient coal to warrant an outlay of money is demonstrated, Mr. Pinkston will organize a company in Butte. The building of a railroad from Brisbin up Trail Creek to the coal mines, a distance of about eight miles, will probably be one of the first permanent improvements.

**HOMESTEAK MINING COMPANY.**—This mine was first discovered in the fall of 1881, and the final and legal location on April 13, 1882, was made by Mr. Mather after the ratification of the treaty with the Crow Indians, which opened this country to prospectors. The lode has been crosscut by an open cut showing a mineralized zone about 110 feet wide. Sample tests have returned as high as \$45 in gold and silver, beside a good percentage in copper. From the surface croppings of this ledge several tons of high-grade ore were shipped during the season of 1885 and netted fair returns, notwithstanding the exorbitant freight rates. Again, in 1886 shipments, with equally satisfactory results, were made. The development work to date consists principally of three tunnels. The lower, or tunnel No. 1, is now in 110 feet and its face is over 100 feet perpendicularly from the surface. These workings will tap the highest surface croppings at a depth of quite 700 feet. The original purpose was to tap a vein of high grade ore which had been crossed above in tunnel No. 2. It is now, approximately, within 70 feet of this vein, which it will uncover 250 feet below the upper exposure. Its availability as a working tunnel, aside from the ore bodies it will probably uncover, renders this a valuable and permanent improvement to the property. Tunnel No. 2, on the 450 level, is quite 250 feet above No. 1 and is run its entire length of 205 feet on the main lead. About 25 feet from the surface in this opening a fine cross lode four feet wide, pitching into the mountain between well-defined walls of lime and porphyry, was encountered. Over 100 tons of ore, assaying as high as \$35 in gold and silver, have been taken from this lode. One hundred feet from the surface a crosscut was run 30 feet in ore without reaching a wall. This development shows a body of ore of as yet unknown extent, returning by assay as much as \$80 per ton in gold and silver and a liberal percentage of copper. In fact, the entire ledge at this level carries 10 per cent. copper. Tunnel No. 3, on the 200 level, now in 95 feet, was run to expose the highest croppings on the ground. In this opening, 30 feet from the surface, a vein of copper ore, similar in character and value to that uncovered in the lower levels, was crossed. This vein is two feet wide and is pitching at a sharp angle into the mountain. At the face of this tunnel is a solid body of barren quartzite.

SILVER BOW COUNTY.

**BLUE BIRD MINING COMPANY.**—The work of putting the Blue Bird mine in shape, after the recent shut down, due to litigation, is now approaching completion. The miners were prevented from going below the 200-foot level by an injunction. So the pumps on the 300 and 500-foot levels were pulled out, and the water was allowed to accumulate. When the recent settlement was effected the water had reached a point 30 feet above the 500-foot level. The pump on the 300 has been placed and set to work, and now that on the 500 will also be in place in a few days. Meanwhile the ore bins of the mill have been kept filled from the slopes of the 400 and upper levels. At the present time about 120 men are employed in the mine, and there is a daily output of 130 to 140 tons. The work of breaking ore has been commenced exactly where it was left off when the period of enforced idleness began a year and a half ago. In the other Blue Bird properties little is being done. W. H. Keller, the manager of the company, will shortly again resume control. He has been in California for his health, and is now on his way back. During his absence Mr. Ting has been acting as manager. The withdrawal of James A. Murray from the Blue Bird-Little Darling controversy has not by any means finally settled the dispute. P. A. Largey still owns an interest in the Little Darling, and asserts that, owing to the physical peculiarities of the Blue Bird lode, the company mining it has no right to follow its dip under the side lines of the adjoining claim on the south. Mr. Largey proposes to fight the Blue Bird, and has petitioned the District Court to grant a removal to the United States Circuit Court of the action entitled "Blue Bird Mining Company (Limited) vs. P. A. Largey et al., to quit title." After hearing argument in the matter Judge McHatton made an order grant-

ing a removal of the case to the United States Circuit Court for Montana.

**BOSTON AND MONTANA CONSOLIDATED COPPER AND SILVER MINING COMPANY.**—The copper product of this company for March is reported to have been 1,975,000 pounds fine. This tabulation may be made of this company's copper product for the fiscal year to date:

	1890-91.	1879-90.	1888-89.
	Pounds.	Pounds.	
First quarter.....	6,850,000	6,177,789	6,414,941
Second quarter.....	6,800,000	6,925,000	4,400,000
First half year .....	13,650,000	13,122,789	10,814,941
Third quarter.....	6,125,000	6,350,000	6,188,681
Nine months.....	19,775,000	19,472,789	17,003,622

(From an Occasional Correspondent.)

BUTTE, April 1.

**ALICE GOLD AND SILVER MINING COMPANY.**—The Alice mine is looking well. A dividend may be expected this month. The company has within the last year acquired considerable ground, and most of this is now paid for, only \$35,000 remaining unpaid. Superintendent Hall reports this amount will not interfere in any way with the dividends. During the past week the 60-stamp mill was idle three days, owing to the breaking of a shaft. The enforced idleness was very annoying, as, even when the mills are running full capacity, they are barely able to treat the ore as fast as it is raised.

**BUTTE & BOSTON MINING COMPANY.**—This company is running full capacity. The new 400-ton concentrator is one of the finest of the kind in the state. Water and ore are abundant, and the management is pushing work as rapidly as possible. The output of fine copper will probably reach 1,500,000 pounds per month. The silver mill runs very steadily, and is well supplied with ore from the Belle of Butte mine. It is reported that a rich body of silver has recently been struck there. Unless prevented by some unforeseen occurrence, there appears no reason why this company should not soon be on a dividend-paying basis, and it is stated that before many months pass it will break its present record by declaring its first dividend.

**MOULTON MINING COMPANY.**—Preparations are being made to sink the shaft from the 700-foot level to the 900-foot level in the Moulton mine. The 700-foot level has been thoroughly prospected, with rather discouraging results. It is hoped, however, that in the lower levels another body of ore may be encountered. The lower levels of the Alice mine, which adjoins this property on the east, have proved themselves rich in ore. The shaft will be continued down to its present size—three compartments.

**PARFOT SILVER AND COPPER COMPANY.**—This company was obliged to shut down temporarily recently, owing to the bursting of its dam. The unusual amount of snow, followed by a rapid thaw, brought down a heavy flow of water. The concentrator and smelter being shut down, the mine was forced to follow suit as soon as its ore bins were full.

NEVADA.

ELKO COUNTY.

(From our Special Correspondent.)

The Union mill at Tuscarora was not started on N. Belle Isle, North Commonwealth, etc., ore on the 1st inst., as was intended, as the snow is lying about four feet deep, and it was found impossible to haul ore.

ESMERALDA COUNTY.

**HOLMES MINING COMPANY.**—Telegraphic dispatches from Candelaria say that this company has been obliged to practically suspend work in its mine during the past fortnight on account of the ravages of the grip among the miners. It is reported that nearly two-thirds of the working force have been prostrated, and quite a number of men have died.

EUREKA COUNTY.

(From our Special Correspondent.)

**RUBY HILL TUNNEL AND MINING COMPANY.**—The following officers and trustees were elected at the annual meeting for the ensuing year: President, John Macaulay; vice-presidents, F. M. Heitman, C. L. Broy, A. Corenke and R. Sadler. J. N. Hill was appointed treasurer, and B. F. McEwen secretary. The tunnel was advanced during the fiscal year 220 feet, making a total length of 1,820 feet. The company is free of all liabilities, and has in the treasury a cash balance of \$492.

STOREY COUNTY—COMSTOCK LORE.

(From our Special Correspondent.)

SAN FRANCISCO, April 2.

The following shows the amount of ore from Comstock mines milled during the week ended March 23, with the battery assays:

Mine.	Tons.	Assay value.	
		March 28.	March 21.
Con. Cal & Virginia.....	1,575	\$32.10	\$31.90
Chollar.....	535	18.79	15.93
Overman.....	91	14.12	15.35
Savage.....	310	17.10	17.50
Yellow Jacket.....	289	15.00	13.00
Total.....	3,881		

**BEST & BELCHER MINING COMPANY.**—An east crosscut from the north drift, 1,100 level, is being driven to intercept the ore existing on the

1,100 level of the Consolidated California & Virginia. It is estimated that it will have to be run at least 200 feet farther before encountering the continuation of this ore body. The 1,100 level is being reopened.

**CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.**—In the south drift, 1,100 level, there has been an increase in the value of the body of quartz now being opened. It is reasonably certain, also, that a large body of good milling ore exists on the 1,750 level. The ore in winze No. 2, 35 feet above the 1,750 level, extends downward and gives promise of continuing below that level. The lowest workings are in the vicinity of the north line of the Best & Belcher. On the 1,500 and 1,600 levels good milling ore is also being extracted. Forty-three feet above the 1,500 level there is ore leading northeast, the extent of which is not known, but which assays well up to the weekly average. On the 1,100 level stringers of high-grade quartz are being cut by the south drift, and the indications are that the vein is not far ahead.

**CROWN POINT MINING COMPANY.**—The Comstock Pumping Association has levied an assessment amounting to \$25,000, which will be apportioned among the Gold Hill companies, which are defraying the cost of carrying on operations in the Crown Point incline.

**OVERMAN SILVER MINING COMPANY.**—Exaggerated reports are current regarding the improvement in the mine. It is said that 300 feet of ore has been developed by crosscuts, with an average width of 20 feet, and running on an average \$25 per ton. It is undoubtedly true that there has been very material improvement in the mine, but these rumors of bonanzas appear to be without foundation. Battery assays last week were less than the week previous, but that is of no consequence in indicating developments in the mine when it is remembered that it is the custom to fix these to show anything that may be desired. The amount of ore sent to mill has been largely increased.

OHIO.

The Department of Mines and Mining has just issued a notice signed R. M. Haseltine, Chief Inspector of Mines for Ohio, according to which, on and after April 1st, nothing but pure lard or pure cottonseed oil, or their equivalent as to the absence of smoke, will be permitted to be burned in lamps in any of the mines of the state.

Any operator who sells, or any miner or other person who burns an oil inferior to the above named oils will be prosecuted under sections 202 and 6871 of the Revised Statutes.

OIL.

**STANDARD OIL COMPANY.**—This company is building an addition to its refinery at Lima for the purpose of utilizing the paraffine of Lima oil. It is said that an effort has never been made to use the paraffine from Ohio oil for commercial purposes. In the establishment which is now being erected the paraffine will be used to make vaseline, gum and heavy oils of every kind.

OREGON.

BENTON COUNTY.

**OREGON COAL AND NAVIGATION COMPANY.**—This company, operating the coal mine at Newport, 3 miles south of Marshfield, recently reduced the wages of the drivers to \$2.50 per day. The drivers refused to work for less than their former wages, \$2.75. The miners stood a reduction a short time ago, but 40 drivers to-day refused to accept when called to face the reduction of their pay, and walked out. The resisting miners also quit work. The drivers say the only condition they will accept will be a restoration of wages. Unless they accede to the cut of wages probably the mine will close down. The company is indifferent whether operations continue or not, and may accept the action of the drivers for an excuse to close down. The ground controlled by the company, it is said, is about worked out, and if the work should be continued it will necessitate the purchase of adjoining ground at a high figure.

WASHINGTON COUNTY.

The Nehalem coal regions are reported to be very extensive permanent and of great value to the city of Portland; samples now lying in the Smithsonian Institute at Washington, D. C., and analyzed by government officials show:

	7 ft. vein.	4 1/2 ft. vein.
Fixed carbon.....	45.17	42.59
Common gases.....	37.83	33.20
Ash.....	9.	4.46
Water.....	8.	19.75

Total..... 100 100  
The cost of mining on Puget Sound is about \$1.05 to \$1.10 per ton on board cars, and would probably be about the same at the Nehalem, while the railroad transportation to Portland at 2 cents per ton per mile would be \$1.05 per ton delivered. Twenty miles of railroad to Hillsborough are already constructed, 8 to 10 miles more beyond Hillsborough are graded, waiting for the rails, and only 26 miles additional are necessary to be built to reach the coal mines, which can be finished and in running operation at a cost not exceeding \$600,000. It is reported that \$300,000 of this sum is to be raised through the efforts of two eastern coal owners, and an



effort is being made to raise the remaining \$300,000 required on first mortgage bonds in Portland.

PENNSYLVANIA.

COAL.

Options on about 750 acres of coal land situate in Franklin township, held by the Philadelphia Gas Company at figures ranging from \$150 to \$250 per acre, have expired. The lands were owned by Emanuel Shearer, Watson Murphy, Frasher Bros., Jas. Rittenhouse, Cooke Bros., and the Gween estate.

The J. M. Schoonmaker Coke Company, owned by the H. C. Frick Coke Company for more than a year and a half, has been completely merged with the last-named company, and where two distinct official and accounting departments were maintained there will now be but one. Mr. S. L. Schoonmaker, president and treasurer of the absorbed company, is appointed assistant to the president of the H. C. Frick Coke Company, and Mr. W. C. Magee, sales agent, is appointed general sales agent of the latter company.

The commission to revise the anthracite mining laws of the State, now in session, has reached several conclusions. The question of increasing the number of mine inspectors in the anthracite region from seven to nine was agreed upon. The two extra districts to be formed are to be taken from the second and third districts, the inspectors of which at present are Patrick Blewitt, G. M. Williams and H. McDonald. The basis of the division has been the output of coal, any number of collieries sending out 5,000,000 tons of coal being entitled to an inspector. The number of mine openings has also been taken into consideration in the division of the districts. The commission will insist that governors be placed on all boilers. No person except a competent man will be allowed to inspect boilers. The law now provides that the maps of the mine inspectors shall be open to all miners working in dangerous positions, but only to such miners. The commission will amend the law so as to allow all miners, whether in dangerous positions or not, full freedom in the examination of the maps. The reason of this is that a miner may strike into a dangerous place without knowing whether danger lurks ahead of him.

SOUTH DAKOTA.

LAWRENCE COUNTY.

BLANQUILLA MINING COMPANY.—Development work on this group of mines continues steadily, and the ore dump is being enlarged, as the present one has been found too small. It is the owner's intention to make one that will hold from 500 to 1,000 tons. The vein in this mine increases in thickness and grade the further the prospect tunnel is driven. It is a peculiar deposit, resting on quartzite and capped with shale. It is now over six feet thick, divided into two layers, the top one being a very pure manganese ore three and one-half feet thick. The lower one, consisting of galena, quartz, manganese, and heavy spar, is essentially a silver ore. An assay of five samples from the ore body gives an average value of \$38.29.

GOLDEN REWARD CHLORINATION WORKS.—Recently there was considerable difficulty experienced in taking ore to the works on account of the wretched condition of the roads. The stock was allowed to run down so much that there were but four days' run of ore in the bins. President Harris Franklin, in an interview, said, however, that the company had no intention of closing down, having about concluded arrangements for shipping ore from the mine over the Homestake railroad to Piedmont, and thence over the Elkhorn to the mill. They will begin loading cars on the Homestake road as soon as the Elkhorn company begins putting in the switch to the works. From the mine to the Homestake road there will be a wagon haul of about 2,000 feet, all down grade. The works are now using nearly twice as much ore as they were a month ago. For the last week or ten days the consumption has averaged 40 tons per day, and this has been done without additional barrel capacity. The works, using 23 tons of ore per day, have turned out about \$17,000 in gold bullion per month. Consuming 40 tons of the same character of ore per day, the output will therefore probably be \$33,000 per month.

PENNINGTON COUNTY.

CALIBOGA.—This mine, located near Silver City, on Jim Creek, has been bonded to George M. Johnson, of Deadwood, for \$18,000, the bond running for one year. If the payment for the property is not made in six months the purchase price will be raised to \$25,000. A forfeit of \$1,000 was put up by Mr. Johnson, and the deeds placed in escrow in the Merchants' National Bank of Deadwood. Mr. Johnson has agreed to work the mine during the period of the bond, under pain of forfeiture. The shaft is now down 75 feet.

HARNEY PEAK TIN MINING COMPANY.—On the 20th ult. this company paid one-half the amount of the option on the Naiad Queen group at Tin Center. The amount paid was \$5,000, the balance to be paid on the 20th inst. The former owners were: H. A. Albien, S. R. Shankland, J. N. Wright, James Humphreys, Robert McKee and Samuel Scott. This group is supposed to be one of the best on the belt.

TEXAS.

WILBARGER COUNTY.

At Vernon the excitement over the discovery of gold in the Wichita Mountains has led to the organization of a mining company with an authorized capital of \$30,000, composed of citizens of Vernon. The officers are Dr. Dodson, president; Dr. Rhoades, vice-president; Ed McHugh, secretary and treasurer; G. R. McDonald, general manager. Mr. McDonald has been investigating these claims. Two wagon loads of supplies and material left recently for the mountains, where work will be commenced at once.

UTAH.

CACHE COUNTY.

MERCUR MINING COMPANY.—This company lately started its stamp mill in Lewiston district. At the end of five days a clean-up was made, showing that about 80% of the gold had been saved, and that the ore averaged in product about \$28 per ton.

EMERY COUNTY.

PLEASANT VALLEY COAL COMPANY.—This company is making experiments with a view of increasing the strength of its coke, so that it will stand as heavy a burden, as any coke made. The company now has all the orders for coke it can possibly fill and is running 80 ovens constantly.

JUAB COUNTY.

The Miners' Union at Eureka Tintic is endeavoring to break up the boarding-house business conducted by some of the companies. The Bullion-Beck and Champion Mining Company has discharged all of its employes who have left Hyde & Smith's boarding house. It is said by prominent labor officials in Salt Lake City, that this may cause a strike in the district.

No one of the silver mining districts of Utah is at present attracting more attention than Tintic, in which more development was done in 1890, and more progress made in opening the great producing mines, than for a number of years previous. The shipments of ore from Eureka, Silver City and Mammoth during 1890, according to railway statements, amounted to 75,907 tons. This was divided as follows:

Mines.	Tons.	Mines.	Tons.
Bullion-Beck & Champion	29,509	Northern Spy	550
Eureka Hill	20,640	Sunbeam Group	304
Mammoth	9,530	Tesora	259
Dragon Iron	6,050	Sioux Group	221
Centennial-Eureka	3,668	Carlissa	115
Treasure	3,200	Governor	103
Keystone	1,700	Other mines	249
Julian Lane	798		
		Total	75,907

The value of the output of the Centennial-Eureka Mining Company is officially stated to have been \$900,070, and \$150,000 were paid in dividends. The Bullion-Beck & Champion Mining Company spent \$140,000 for improvements and new property, and paid \$325,000 in dividends. The Mammoth paid \$520,000 in dividends, and had a surplus in the bank of over \$300,000 as the product of the year's work. The Eureka Hill is a close corporation, which does not publish its dividends, but these are known to have been very large during 1890. This company is at present shipping between 200 and 300 tons of ore per day. From the record of these mines, during the first quarter of 1891, they bid fair this year to greatly exceed their production of 1890. Capt. W. H. Smith, Superintendent of the Bullion-Beck & Champion Mining Company, in a recent interview, stated that the limestone lying between the shale on the east and quartz on the west, which is the mineral bearing zone of Tintic, had been comparatively but little prospected. The district has now been found to be much richer than was supposed, and shows improvement as the ore goes down.

BULLION-BECK & CHAMPION MINING COMPANY.—This company produced and shipped about 3,000 tons of ore during March. The output for April promises to run much higher, as the company has fallen behind in its contracts with Salt Lake and Eastern smelters, and an increased force of men is being put to work. The stopes throughout the mine are reported to be showing improvement. An important strike has been made in the main drift southward on the 700-foot level, and the heading is now in a fine body of ore. The shaft is being sunk from the 700 to the 800 foot level; at present it is down about 60 feet, and is passing through excellent ore.

EAGLE.—Discoveries of importance are reported in two places in this mine. In a winze from the main tunnel a breast of ore three feet wide, assaying 65% lead, 150 ounces silver and \$12 gold, has been uncovered. Further in the hill, in a lower level, another ore body, of extent undetermined, assaying 200 ounces silver and 3½ ounces gold, has been struck.

SALT LAKE COUNTY.

For the first quarter of the year, the receipts of ore and bullion in Salt Lake City, have been as follows:

	Bullion.	Ores.	Total.
January	\$32,481	\$351,124	\$383,604
February	407,918	203,009	705,927
March	274,077	312,730	586,807
Totals	\$1,014,475	\$967,922	\$2,032,397

The exports during the same time have been as follows:

Material.	No. Cars.	Weight, lbs.
Bullion	163	5,331,487
Lead	46	1,216,745
Matte	20	750,680
Ores	665	26,296,380
Totals	894	33,595,292

SEVIER COUNTY.

SALINA GOLD AND SILVER MINING COMPANY.—This company has shipped the hydraulic apparatus supplies and entire outfit necessary to work its placers, near Biute, and it is expected that operations will be commenced by April 15th. The company owns about 560 acres of placer ground, which is considered very promising; it has good dumpage and ample water supply, and is located in a gold bearing formation. The company has excellent financial backing and it is expected that this will become one of the largest placer mining enterprises in Utah. Twenty-five thousand shares of the capital stock of the company have been disposed of to secure the funds with which to commence work.

SUMMIT COUNTY.

ONTARIO MINING COMPANY.—For the first quarter of 1891, the product of this company has been as follows:

	Bullion, ozs.	Ore sales.
January	76,476.67	\$35,825.96
February	73,049.20	57,644.27
March	86,983.78	53,196.58
Totals	236,469.65	\$146,667.19

The regular monthly dividends of 50 cents a share have been paid out of this. The total output of the Ontario mine, from the starting of the new mill, February 1st, 1877, to the end of 1890, 14 years was 341,497 net (dry) tons of ore, out of which were obtained 24,338,330.99 ounces of fine silver, and for this silver the company received \$24,607,292.83, a fraction of a cent more than \$1 per ounce. The average yield per dry ton was \$72.06; wet ton was \$61.26.

WASHINGTON.

OKANOGAN COUNTY.

FIRST THOUGHT.—The ore in this mine has recently improved in quality quite materially. At the bottom of the winze which is being sunk from the first level four feet of solid ore is showing which has been proved to concentrate quite satisfactorily with a loss of about four per cent of silver. Tunnel No. 3 is now in 450 feet and is expected to strike the ledge about 150 feet farther in and 300 feet below the main level. The first section of 200 feet on tunnel No. 4, which is to be 3,000 feet long, was to be completed this week. Shipments are now being regularly made to the Tacoma smelter. Only ore running over \$100 is shipped, the low-grade being allowed to accumulate on the dump.

WYOMING.

CARBON COUNTY.

(From our Special Correspondent.)

The coal mines at Dana are making an output of 20 cars of coal per day.

There are now about 70 men at Gold Hill, and 14 claims are being developed. A cross-cut is being made at the 60-foot level of the Levethian, which seems to be the most promising mine of the new camp. There is five feet of snow, and it is said that the weather will probably not settle for sometime yet. Work on 15 or 20 leads goes actively on, notwithstanding the great depth of snow. Newcomers are arriving daily.

SWEETWATER COUNTY.

(From our Special Correspondent.)

The Rock Springs coal mines are shipping 250 cars of coal per day.

VICTORIA.—Shipments from this mine will be delayed until the first of June on account of heavy snow in the mountains, there being more than for ten years. The mine is sixty miles from the Union Pacific Railroad. The country about the location is rich in mineral and is filling up with prospectors. There are now a large number of miners employed on development work and breaking ore. The property is owned and operated by a company of New York and Chicago capitalists. The cost of freight from the mine to Carter station on the Union Pacific road is estimated to be \$30 per ton. The ore is copper carbonate with some silver. Assays are said to return as much as 55% copper. The tunnel is not yet in very far, and it is believed that with an increase of depth the ore value will be greater.

FOREIGN MINING NEWS.

CANADA.

PROVINCE OF NOVA SCOTIA.

(From our Special Correspondent.)

COAL.

The outlook for the season is encouraging for Cape Breton and Cumberland, if not quite so for Pictou County. The sales of Cape Breton coals, in contracts, so far reported are: International, 90,000 tons; General Mining Association, 60,000 tons; Caledonia, 55,000 tons; Reserve, 60,000 tons; Gowrie



45,000 tons, making an increase in contracts this year, over last year, to date of about 100,000 tons. Shipping has been almost continuous through the winter from Cow Bay. Coal is being briskly banked from all the mines, and the preparations for reopening and working the Emery, Gardiner and Ontario collieries are about complete. It is said that there will be a general demand for an increase in the prices for cutting coal in Cape Breton collieries as soon as navigation opens. The Messrs. Archibald have purchased a large steamer for the coal and general trade between Cape Breton and Newfoundland. In Pictou county it is reported that the sales of coal to the Grand Trunk Railway are smaller than last season. The mines continue to be fairly busy, and the unusual coldness of the month of March has improved the demand for domestic fuel. In Cumberland county the Springfield collieries are all at work again, the damage to the workings by the late explosion having proved very slight. About \$60,000 has been received toward the fund for the relief of the widows and children. It is reported that the Grand Trunk Railway has placed an order for 65,000 tons of coal with the Springfield mines. Work at the Joggins mines continues fairly steady. Negotiations are reported to be on foot for their sale to some New York capitalists.

GOLD.

Mining continues quiet and no new finds are reported. Some attention has been directed to a locality near Westworth, in Colchester county, where alluvial gold is reported in considerable quantity. The Brookfield conglomerate mine and mill are under way and the result of the first crushing is awaited with curiosity. Should the clean-up result encouragingly, there will be many hundreds of acres of ground to be worked in that locality, and no doubt the points of contact of the carboniferous conglomerates with the auriferous Cambrian slates will prove gold-bearing at many points in the Province.

GERMANY.

According to press reports from Berlin, it is stated that the German coal mine owners, in secret conference, have resolved to found an international union of owners to combat the proposed international miners' union, and it is also reported that German delegates from the conference have been sent to consult English mine owners in regard to the scheme for the owners' union.

MEXICO.

The Mexican Congress was opened on the 1st inst. President Diaz in his address made the following reference to the mining industry of the Republic: "Many new mining discoveries were being reported and smelters were being erected in different sections of the country, so that much of the mineral which was formerly smelted abroad is now being smelted at home. The coinage for the first half of the present fiscal year was \$12,680,231."

MEETINGS.

Clay County Mining Company, at Room 7, News Block, Denver, Colo., April 15th, at 10 A. M.

Diamond, Kyune & Castle Stone Company, at the office of Messrs. Walker Bros., Salt Lake City, Utah, May 4th, at 12 o'clock noon.

Iron Silver Mining Company, at the office of the company, room 103, No. 52 Broadway, New York City, May 5th, at 12 o'clock noon.

Massachusetts Mining Company, at the office of the company in Salt Lake City, Utah, April 22d, at 2 P. M.

Tioga Consolidated Mining Company, at Room 62, Nevada Block, San Francisco, Cal., April 13th, at 1 P. M.

ASSESSMENTS.

COMPANY.	No.	When levied.	D't'q't in office.	Day of sale.	Am't per share.
Alliance, Utah.....	12	Feb. 24	Mar. 31	Apr. 20	.10
Alpha, Nev.....	6	Mar. 14	Apr. 17	May 7	.25
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. Cons. New York, Nev.....	5	Apr. 3	May 8	May 9	.15
Con. St. Gothard, Cal	2	Feb. 12	Mar. 31	Apr. 20	.15
C. S. smopolitan, Nev.	6	Feb. 24	Apr. 7	Apr. 29	.10
Crocker.....	16	Feb. 16	Mar. 20	Apr. 13	.10
Crown Point, Nev.	54	Feb. 19	Mar. 26	Apr. 16	.50
Guscaraw & Cal., C. A.....	4	Mar. 10	Apr. 15	May 4	5.00
Hale & Norcross, Nev	99	Mar. 17	Apr. 22	May 14	.50
Kentucky, Nev.....	1	Mar. 31	May 5	May 26	.20
Lady Washington.....	8	Mar. 3	Apr. 7	Apr. 28	.20
Mexican, Nev.....	42	Mar. 9	Apr. 14	May 5	.25
Nevada Queen, Nev	7	Mar. 4	Apr. 10	Apr. 30	.15
Silver King, Ariz.	5	Feb. 21	Mar. 30	Apr. 28	.20
Teresa, Mex.....	3	Mar. 28	May 1	May 19	.10

DIVIDENDS.

Aspen Mining and Smelting Company, dividend No. 23, of 10 cents per share, \$20,000, payable April 15th at the office of the company, No. 54 Wall street, New York City.

North Star Mining Company, dividend No. 6, of 50 cents per share, \$50,000, payable April 8th at the

office of the company, No. 18 Wall street, New York City.

Tamarack Mining Company, dividend No. 13, of \$4 per share, \$200,000, payable May 1st at the office of the company, in Boston, Mass. Transfer-books close April 13th, and re-open April 21st.

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 462 and 463.

NEW YORK, Friday Evening, April 10.

The mining stock market for the week under review has developed a few offish tendencies that are not compatible with a healthy market. There is no particular reason to assign for this, except, perhaps, the boom—if it can be called such—is off. There has been a falling off in the number of shares sold, as well as the number of stocks traded in. Values as a general thing have slightly decreased, although not so much as would be expected under the circumstances. The Comstocks, which have been losing their hold on the public favor and pocket-book, were nearly all compelled to take a back seat.

The Colorado and California stocks were quite active, at prices which were not particularly discouraging. Quite a number of the lower-priced stocks received sales far in excess of their neighbors, as noted elsewhere. These have had a tendency to keep up totals and a fairly good trade. The sales for the week were 87,620 shares. Of this number 19,470 were dividend-paying shares. The sales for the corresponding week last year were 105,905 shares.

Of the Comstocks, Alta opened the week at \$1.25, declining to and closing at \$1.15 to-day on moderate sales. Best & Belcher showed a marked decline. It received one sale last week at \$8.15, opened on Saturday at \$7.25, and on being called yesterday, received the quotation of \$8.75. Bullion shows a marked decline over previous quotations. It was not in the market last week. Ten days ago it sold at \$3.60 as against \$2.60 the closing, Tuesday. It dropped as low as \$2.40. A few lots of Chollar were sold on different days at \$2.90@3, the former being the closing. Comstock Tunnel experienced another of its decidedly offish weeks. It was very active, the sales aggregating 28,500 shares. It opened the week at 24c. as against its closing of 21c., experiencing a steady decline until it reached 19c. to-day. There seems to be manifest quite a decided bearish movement in this stock. Natural conditions set forth in our last week's report are no doubt operative in a greater or less degree. The bonds sold at 38c. as against last week's closing of 40 1/2 c. They were very active during the middle of the week, 7,500 shares being transferred. The scrip was in less demand, although at the same price. Exchequer experienced one sale of 100 shares at \$1.10; Julia on sales of 1,100 shares maintained the quotation of 35c.

Mexican developed more or less speculative tendencies during the week. On Saturday's call it opened at \$4.15, dropped to \$3.90 on Thursday, rallied and closed to-day at \$4.10. It was moderately active on very small sales. Occidental experienced three sales during the week at \$1.30, \$1.25 and \$1.20, the latter being the closing. This was its history during last week. Scorpion opened strong at 50c., which price was paid until Tuesday, when it dropped to 46c. and was taken from the board. Sales amounted to 1,200 shares. A few blocks of Seg. Belcher were placed on the market. Saturday it sold at \$2, dropping off to \$1.70 on Monday. This is a loss of 5c. compared with last week. Utah, which closed last week at \$1.25, opened on Saturday at \$1.30 and was absent until to-day, when it entered the market at \$1.20. Consolidated California and Virginia, comparatively speaking, experienced a very quiet week. It was quoted on Saturday at \$12.00 and on Tuesday at \$12.25; these prices are considerably better than those of last week, and are about on a par with those on the San Francisco Exchange. The limited number of shares offered evidently kept up the price. Crown Point sold to-day at \$2.50 as compared with \$2.80 of March 28th. Hale & Norcross put in appearance in the market to-day, selling at 25c. The last quotation was \$2.45. Navajo sold 500 shares at 35c. Ophir experienced a sale of 100 shares on Saturday at \$6.25. There was no demand for the stock, however, and it was withdrawn. Savage sold 100 shares on Thursday at \$2.80, a gain of 5c. Yellow Jacket put out 150 shares on Saturday. There seemed to be little demand for it and the quotation received was \$2.20, as against \$3.50 and \$3.60 a week ago.

Of the copper stocks, we note one sale of 100 shares of Allouez, at \$3.75. Atlantic sold 50 shares at \$13.15, the same being a few points below the Boston quotations of last week. Boston & Montana was quoted on Tuesday at \$45.13; on Thursday's quotation it dropped to \$44. The sales aggregated 50 shares. The Colorado stocks were quite active during the week. A stray lot of Aspen, consisting of 50 shares, sold on Saturday at \$5.50. This is to be compared with the quotation of \$6 and \$7, February 4th, the date on which it last made its appearance. Freeland was remarkably active yesterday and, to-day, selling 1,000 shares at 17c. and 15c.

Leadville Consolidated sold 2,200 shares on Thursday at 12c. Little Chief appeared on the boards yesterday at 34c., declining to 33c. to-day on light sales. This was a slight decline from last week's prices. Robinson Consolidated sold on March 12th at 35c., at which price it opened on Monday. There was much inquiry for the stock, and quite a number of small lots were disposed of on Wednesday and Thursday at 40c., and a few sales made to-day at 45c. Small Hopes sold at 85c., as against 75c. March 26th.

Of the Utah stocks, Horn Silver developed very encouraging tendencies. Last week it commenced to regain the ground lost by being put on the market as ex-dividend, reaching the quotation of \$3.25. It made its appearance on Monday at \$3.25, rising to and closing at \$3.40 on Wednesday; 1,800 shares were sold. A small block of Ontario, consisting of 10 shares, was sold on Saturday, evidently by a holder who desired to realize. It was picked up at \$39.

The California stocks, in their quiet way, were quite a feature of the market. Astoria, which sold at 1@2c. last week, led a remarkably active career this week at 2@3c. The transactions involved 6,700 shares. Belmont came to the front as usual, selling steadily and quite actively at 41@42c. Brunswick was very active at 8c., 9c., and 10c., selling 8,500 shares. Middle bar failed to reach the quotation of 4c. this week, 3c. being a maximum. The sales amounted to 6,500 shares. Syndicate, on March 21, sold at 20c.; on Saturday it opened at 12c., and on its second appearance on Monday it rose to 15c.; sales were moderate. A job lot of Excelsior, consisting of 300 shares, sold on Wednesday at 86c. This is the first appearance of the stock this year. Plymouth held its own at \$2; sales were very small. Standard sold to-day at \$1.35, as against its last quotation, Feb. 4, of \$1.45.

Mutual Smelting and Mining was remarkably strong during the week. It regained the lost ground mentioned in our last report, selling as high as \$1.50. The sales were small, and aggregated 1,000 shares.

Phoenix of Arizona, lead a career which tended to brighten the somewhat quiet market. It opened at 45c., and on numerous quotations rose to 48c. on Wednesday, declining to and closing at 44c. to-day; sales, 6,500 shares.

Shoshone, of Idaho, sold 200 shares to-day at 1c. Silver Hill, of Nevada, sold 200 shares on Saturday at 32c.

Boston.

April 9.

(From our Special Correspondent.)

The promise of greater activity and better prices for copper stocks which prevailed last week has given way to dullness and inactivity, and prices have a downward tendency, although this is not very pronounced.

Calumet & Hecla, which sold last week as high as \$280, declined to \$270 on small sales, and Tamarack, which was strong at \$160, declined to \$155.

Quincy has been very strong during the week at \$110, but declined to-day to \$105, and a small lot sold down to \$100 1/2. There is some fear of litigation regarding the Pewabic purchase, which has a depressing influence on the stock and frightens would-be purchasers from going into it until the matter is finally settled.

Osceola declined from \$39 1/2 to \$37 1/2, with a rally to \$38; a fair business was transacted, and, considering the general dullness, held quite well.

Boston & Montana lost the advance of last week and declined to \$43 1/2, with a little reaction to \$44. Butte & Boston sold off to \$15 1/2, a decline of \$1 1/2 from last week's price.

Kearsarge sold last week at \$15 1/2 and lost \$2, declining to \$13 1/2. Centennial has been quite inactive, and sold down to \$15 1/2, a loss of \$1 1/2. Franklin also declined from \$19 to \$17, being rather pressed for sale for a day or two past.

Allouez has been heavy and declined from \$4 1/2 to \$3 1/2.

Bonanza sold at 60@55c. and Santa Fe at 50@57 1/2 c.

A few sales of Hungarian at 25c. and Arnold at 32 1/2@30c. complete the list.

In Silver Stocks there is very little doing. Dunkin sold at 60@65c. and Napa quicksilver at \$3 1/2.

3 P. M. The market was heavy after the noon hour. Calumet & Hecla sold off to \$2.65. Boston & Montana to \$43 1/2 and Allouez to \$3 1/2. Quincy improved on sale of six shares to \$102, and Tamarack sold, buyer 10, at \$157 1/2. Huron sold at \$3; balance of the list unchanged.

By Telegraph.—Quincy \$1.05 1/2; Tamarack \$1.56 Montana \$43, Osceola \$38, Butte and Boston \$15 1/2, Allouez \$3 1/2.

St. Louis.

April 8.

(From our Special Correspondent.)

Stocks have been somewhat quiet during the past week, and the number and amount of sales have not been as large as usual. Prices, however, with only a few exceptions, have gone up considerably on all stocks. Particularly is this the case with Mickey Breen, which has made quite a sensation with its recent actions.

Breen opened the week with 85c., but soon fell to 81c. This was followed by a fall to 77 1/2 c., with a very dull market; later it improved considerably, and 800 shares were sold at 85@90c. With this business the stock again fell back into its old state, and was bid at 83 1/2 c., with no sales. Tuesday, however, witnessed a most decided change,



and one so little expected by the brokers as to cause a big sensation.

Opening the market with sales at \$1, the stock quickly rose to \$1.25, and after several large transactions had been made, fell back to \$1.22 1/2. The cause of this unexpected rise is owing to a reported disagreement between a prominent stockholder of the company and President Culver, which culminated in Mr. Culver buying all the stockholder's stock as the rate of \$1.50 a share.

Granite Mountain continues to stand at \$26, and the market has experienced but few changes. The stock had a sale of 60 shares at \$26.75; five shares at \$26.50, and 205 shares at \$26.

Little Albert continues to be in big demand and the stock is still advancing. During the week the sales amounted to 4,500 shares, of which amount 500 sold at 12 1/2c., and 1,100 shares at 12c.

Central Silver opened at 4c., but soon fell to 3c., at which figure it remained the greater part of the week, closing at 2c. Sales amounted to 4,000 shares, of which 100 sold at 2 1/2c. on Tuesday.

Yuma went up several points. It opened at 67 1/2c. on Tuesday, went up to 71 1/2c., and closes at 65c; 600 shares were sold at 67 1/2c.

Elizabeth was decidedly on the "off" side of the market and settled from \$1.85 to \$1.50. No cause is given for this depression. Sales amounted to 2,000 shares, all of which sold above \$1.75, except 100 shares, which sold at \$1.57 1/2.

Small Hopes had a sale of 500 shares at 80c., and Gold King one of 500 shares at 10c.

Silver Age was in demand, and had a small advance in price. The market opened at \$2, and on Friday 100 shares sold at \$2.07 1/2, after which the market remained quiet at \$2 @ \$2.02 1/2, closing at \$2.

Major Budd opened at 3 1/2c., and on Monday had a sale of 200 shares at 4c. This is the first sale of this stock for a long while, and is due to the proposed reorganization. The reorganized company is to be known as the Leon Mining Company, and the stock of the company will consist of 500,000 shares of \$1 each.

The stockholders who have not paid up will be given until May 1st in which to do so. The new stock will then be exchanged for the old on which the assessment has been paid, and should there be any stock remaining after this exchange, it will be distributed pro rata among the stockholders.

Bi-metallic was in strong demand all week but though the market advanced from \$32 to \$35, the present holders of the stock refused to sell.

American & Nettie fell from 13 1/2c. to 15c.; no sales. Aztec had no sales though the market rose from 10c. to 11c. Adams continues firm with \$1.75 bid and \$1.90 asked.

San Francisco.

April 2.

(From our Special Correspondent.)

The month of March has ended, so far as the mining stock market is concerned, with business quiet. There has been no complaint, however, for the volume of the month's business has been large. When it is remembered that ordinarily 50,000 shares is about the average amount handled in the San Francisco board weekly, it will be seen from the following statement of the month's sales that a "rushing" business was done. During the week ended March 7th, 61,355 shares; March 14th, 216,105 shares; March 21st, 302,875; March 28th, 198,985; total sales for the month, 779,330. The sales made in the Pacific Board are not included in the above, nor the sales made informally, the latter amounting to probably nearly as large a total as the regular sales.

During the week prices have been irregular, the tendency of the market generally being to decline. On Saturday, with few exceptions, prices were much the same as at the opening on the Monday previous. The increase in the assay value of Consolidated California and Virginia ore gave a fillip to that stock during the early part of this week, it selling to \$13.37 1/2. The stimulation was only temporary, for on Tuesday the highest point touched was \$12.50, on Wednesday \$12, and it is ruling this morning at the same figure.

Ophir has been the steadiest stock during the week, the ruling price being \$6, declining sometimes as low as \$5.75, but always recovering to its normal figure.

Of the middle group of stocks Best & Belcher has continued the most prominent, but has fallen from \$8 on Monday to \$7, the ruling price this morning.

The Gold Hill stocks, with the exception of Overman, have been very quiet. A sharp rally in that stock has occurred this week, when the sales were exceptionally large. Rather curiously, R. Morrow, who controls the Overman mine, figured as a seller, and J. Flood as a buyer.

Little has been doing in the outside stocks, Bodie Con., however, has been selling at \$1.45, an advance of 20 cents during the week.

By Telegraph.—The quotations on 10 A. M. Friday, the 10th inst., were as follows: Alta, \$1.05; Best & Belcher, \$6.30; Belle Isle, 65c; Bodie, \$1.25; Bulwer, 45c; Consolidated California & Virginia, \$12.25; Choller, \$2.75; Crown Point, \$2.35; Commonwealth, 90c; Eureka Consolidated, \$4; Gould & Curry, \$3.40; Hale & Norcross, \$3.10; Mexican, \$3.95; Mono, 60c; North Belle Isle, 90c; Ophir, \$5.75; Potosi, \$4.15; Sawage, \$2.70; Sierra Nevada, \$3.40; Union Consolidated, \$3.80; Utah, \$1.10; Yellow Jacket, \$2.60.

Denver.

Prices and sales for the week ending April 4th, 1891:

Table with columns: Company, Open, High, Low, Close, Sales. Lists various mining companies like Alleghany, Amity, Bangkok-C-B., etc.

Total. 345,000. Buyer 30. Seller 60. Seller 30. a Asked b Bid.

Five thousand shares of Mollie Gibson stock were sold in Aspen, ten days ago, at \$2.50. None is now offered below \$3, and it is hard to get any at that figure.

Pittsburg.

At a meeting of the directors of the Pittsburg, Pa. Petroleum, Stock and Metal Exchange, on the 4th inst., it was resolved that the Exchange withdraw from the Conference Oil Exchange, and resolutions were passed repealing all rules and by-laws

relative to trading in oil under Conference rules. Hereafter regular oil will be cash oil, and certificates will be deliverable the day after the sale unless otherwise specified.

Lake Superior Iron Stocks.

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

Table of Lake Superior Iron Stocks with columns: Name, Price, and Sales. Includes Ashland, Aurora, Anvil, etc.

Salt Lake City.

PRICES AND SALES FOR THE WEEK ENDING APRIL 4, 1891.

Table of Salt Lake City prices and sales with columns: Name and Location, Open, High, Low, Close, Sales. Includes Alice, Alliance, Anchor, etc.

PIPE LINE CERTIFICATES.

(Specially reported by Messrs. WATSON & GIBSON.) The petroleum market this week has been a little stronger in sympathy with the increased speculative feeling in Wall street, but the production continues in excess of the consumption, and there is no reason to apprehend any advance in price.

Table of Consolidated Stock and Petroleum Exchange with columns: Opening, Highest, Lowest, Closing, Sales. Lists dates from April 4 to 10.

Total sales in barrels. 164,000

NEW YORK STOCK EXCHANGE.

Table of New York Stock Exchange with columns: Opening, Highest, Lowest, Closing, Sales. Lists dates from April 4 to 10.

Total sales in barrels. 12,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 10. STATEMENT of shipments of anthracite coal (approximated) for the ten days ending April 4th, 1891, compared with corresponding period last year.

Table of Coal Trade Review with columns: Regions, Apr. 4, 1891, Apr. 5, 1890, Difference. Lists Wyoming, Lehigh, Schuylkill regions.

PRODUCTION OF BITUMINOUS COAL for week ending April 4th and year from January 1st: WESTERN SHIPMENTS.

Table of Coal Production with columns: Location, 1890, 1891, Difference. Lists Pittsburg, Westmoreland, Monongahela.



## EASTERN AND NORTHERN SHIPMENTS.

	1891.		1890. Year.
	Week.	Year.	
Phil. & Erie R.R.	1,353	37,079	33,552
Cumberland, Md.	84,376	1,115,275	974,505
Barclay, Pa.	3,717	43,481	37,229
Broad Top, Pa.	6.5.7	16,643	146,351
Clearfield, Pa.	8,868	1,156,619	1,075,353
Allegheny, Pa.	28,391	318,041	3-8,577
Beach Creek, Pa.	40,161	612,538	59,313
Pocahontas Flat Top.	43,834	61,960	475,737
Kanawha, W. Va.	71,235	592,355	553,975
Total	365,026	4,688,041	4,188,175

\* Estimated

† Week ending March 31st.

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending April 4th, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 31,340 tons; year, 838,112 tons; to corresponding date in 1890—1,511,518.

**Anthracite.**

The output for the week ending April 5th was 597,818 tons, an increase of 80,420 tons over the corresponding period of 1890. This is to be compared with an increase of 7,780 tons for the week ending March 23rd.

It is believed that the downward career of the market has been checked, and that it is about to ascend to a plane of better prices and greater activity. There is a more settled feeling developing in the wholesale trade. Buyers have waited two weeks for lower prices—"as low as last year"—and have met with the very determined and unbroken front of the operators. They are now weakening. Last week they "would not buy coal at any price"; this week want of stock has forced them into the market. To be sure, purchases are small and only for immediate use, but being made under conditions set forth they show the exact position of the retailer. It is natural that there should not be any confidence on the part of this factor of the trade until after May 1st. At this date the Cox Bros. decision will be in such shape as to permit of intelligent speculation as to the manner in which it will effect trade. In addition the May prices will have been fixed. Concerning these a prominent operator says, "If the trade expects to get a lower price in May it will be disappointed in degree of its expectancy." The large number of inquiries which are being made, and which are daily increasing, show that the trade is beginning to look toward the future.

The sales agents held a meeting on the 7th inst. for an informal consideration of trade conditions. One prominent operator informs us that after discussing the situation the unanimous opinion of the representatives was that the trade "had as good a year ahead as had been promised in several years, providing the producers held together until June 1st." The necessity for a policy of rigid restriction and the strict maintenance of prices was reiterated. A second meeting will be held during the latter part of the month for the regulation of May business.

There is developing something of a scarcity in steam sizes, a fact which can be attributed both to their rapidly increasing use, and to the restriction in outputs which has been going on during the year.

We will not attempt to quote prices, but refer the reader to our issue of March 23rd, containing the April circular.

**Bituminous.**

The soft coal trade, although dull, is far from being in a demoralized condition. The retrenchment policy, spoken of last week, is being quite generally followed, and with good results. This has had the tendency to relieve the market of any pressure, and a strict adherence to seaboard rates is said to be the rule. The strike, threatened in certain regions May 1st, has a tendency to promote this reticent policy of the operators. Whether operating in regions which are likely to be effected by labor troubles or not, they feel that the strike, which seems more than half probable in certain districts, would, by cutting off the supply, create a good demand and high prices. For this reason they do not care to be burdened with contracts on which there is no money to be made. Hence we find little or no rate cutting.

The line and inner cape trade has played an important part in the week's business. Most of the operators have been on a still hunt for this class of business, for the reason that a tonnage placed in these channels does not cut in upon their yearly allotments. It is claimed by some that all orders secured have been at seaboard rates, by others that there has been a tendency to cut prices. There is at least enough in this last report to have brought about a meeting of the operators and sales agents of the inland trade in this city yesterday. It was held at the office of the Berwind White Coal Company. An agreement was reached, which, it is understood, bears the same relation to the inland trade as the Seaboard Association's agreement does to the coastwise trade. It is said that its terms are similar, its primary object being to harmonize the two great branches in such a way as to prevent any sort of competition in prices. After the meeting one operator said: "The outcome of our meeting showed that there was being made an honest effort to keep up the price of coal, and all I can say is a producer who will break the iron-bound compact entered into is no gentleman."

The local market is in fair condition. It is so essentially a part of the eastern market that

nothing in addition to the preceding can be said. Prices are about \$3.10 @ \$3.15 f. o. b. Amboys.

Ocean freights are a little stiffer. We quote: Philadelphia to Sound ports, 85c.; to Eastern ports, 90c.; Baltimore to Sound ports, 85c @ 90c.; to Eastern ports 95c. @ \$1.

Certain of the operators in the Clearfield district say that they anticipate a strike May 1st, providing the labor unions of the district have money and backing enough to warrant the same. The men have postponed their actions so many times that other operators are inclined to the belief that the action set for May 1st will gain be postponed.

Several new features have developed in the Connellsville strike. Yesterday's advices from the region are to the effect that the leaders have agreed to stand aside and allow the men to act. With this end in view a convention of the strikers is being held to-day for the purpose of appointing a Board of Conciliation. The board will consist entirely of men from the ranks, and will ask for a conference with the operators as representatives of the employees, and act as an organization. In speaking of this convention Peter Wise, master workman, said: "We want peace. If the men can make terms with the operators the officers and leaders are willing to step aside. The operators have said that they are willing to meet the men, and we will give them an opportunity to do so."

On its face, this looks as if the strike was completely broken.

Superintendent Morris, of H. C. Frick's Morewood plant, has commenced the service of eviction notices. The usual 10 days' notice is given. The coroner's inquest into the killing last Friday is still in session. Captain Lear and his deputy sheriffs, who were arrested a few days ago on a minor charge, have been rearrested on the charge of murder.

**NOTES OF THE WEEK.**

The Reading Railroad Company has let contracts for the construction of its extension from Bound Brook to Arthur Kill.

Mr. H. B. Needham, of the Maryland Coal Company, returned to the city yesterday after a several days' trip among his company's mines in the Cumberland district.

At a regular meeting of the New York Retail Coal Exchange, held on the 1st inst., J. Israel & Son, J. D. Frankel, Epstein & Co., and James Dougherty were proposed as active, and F. A. Pot & Co. as associate members.

Advices from Duluth, Minn., and West Superior, Wis., are to the effect that the "Head of the Lake" has enjoyed a remarkably good coal season. About 113,000 tons will be carried over. This amount is to be compared with 200,000 tons surplus in 1890, 400,000 tons in 1889 and a nominal tonnage in 1888.

Col. J. K. Irwin, of Logan County, Va., is having cut a 10-foot cube of coking coal and a 7-foot cube of splint coal for display at the World's Fair. Another party will send a log 10 feet long and 10 feet in diameter. To carry this latter piece to the fair the Chesapeake & Ohio Company will build a special car of 40 tons capacity. These various exhibits will be rafted down the Guayandotte River to the bridge of the Chesapeake & Ohio, crossing its mouth, and then hoisted upon the transporting car.

Mr. John H. Jones, of Philadelphia, Pa., who has collected the statistics of the coal industry for the eleventh census, has completed his work, and his report will soon be issued. The inquiry has covered every state and territory in the Union in which coal is produced. The report will contain complete statistics of the quantity of coal produced, the value of the product at the mines, the number of people employed, the capital invested and other information of a similar nature.

The Ebensburg & Cresson Railroad will be sold at a sheriff's sale on May 8th. It is a road 10 miles long, which was built by Cambria county, Pa., and leased to the Pennsylvania Railroad for 99 years. By a foreclosure, the company seeks to obtain full possession. Its sale will be the first step in opening up an important coal field in the Clearfield district located on a creek which runs parallel with the Cresson & Clearfield properties. A branch line 30 miles long is to be built from Kaylor's station north to a point on Brubaker's Run. A second branch road will run from a point on the extension 3 miles from Kaylor into the Patton lands in Elder township.

There have been in circulation during the week numerous statements to the effect that the German Trans-Atlantic Steamship line has decided to adopt the use of American coal, to the exclusion of the German product. The statement is absurd. The reports arose from the fact that, in consideration of the German coal combine and low freight rates, a little coal has gone to Europe on these lines. Upon inquiry at the New York offices of the North German Lloyd Steamship Company and the Hamburg-American Packet Company we learn the facts to be these: At this season of the year there is a dearth of freight and the companies have several times completed their cargoes, as they have hundreds of times before, with coal. The fact that the steamship companies have decided to boycott the German coal producers because of their combination, and are now obtaining much of their coal from Cardiff, England, naturally set the

American coal men to talking. The Hamburg-American Packet Company informs us that it has not transported more than 3,000 tons during the present calendar year, and that it can only afford to do so in the absence of other freights.

**Boston.**

April 9.

(From our Special Correspondent.)

The anthracite coal market maintains pretty much the same conditions as noted last week. To the surprise of dealers no increase in demand has yet been realized. Buyers are not coming forward very fast, and adhere to the policy of buying only what they need to piece out their stocks. It is their common belief that in a short time they will be able to buy coal at as low a figure as they did at this time last year. With agents the situation has a different phase. The curtailment is favorably commented upon, and they hold the market tone to be much firmer. They daily expect to see the buyers "fall into line" and avail themselves of the situation. Freights are favorable to shipments, and this fact will help to bring out an early demand.

The circular price is being maintained fairly well by agents, although some of the individual operators are doing some pretty tall shading.

There is very little to say of the bituminous market. The feeling is quiet and on the whole is rather disappointing to agents. There is a demand for coal, but not at the \$2.50 f. o. b. price which agents are asking. Contracts are gradually being closed out, but it is slow work. As a rule, the business is being done on the \$2.50 basis, and in no cases are sales made at less than \$2.40.

Freights hold very quiet and low. Large numbers of vessels are offering, and in some instances, where they are particularly desirous of coming in this direction, a very low rate can be obtained. The ruling figures from New York are 50c @ 60c., from Philadelphia 80c @ 90c. and from Baltimore \$1.

The retail demand is quiet. Dealers have all the coal they require at present on hand and are buying in a very restrained way.

The receipts of coal at this port for the week ending April 4 were 21,845 tons of anthracite and 4,728 tons of bituminous, against 30,358 tons of anthracite and 21,920 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 279,747 tons of anthracite and 289,479 tons of bituminous, against 234,148 tons of anthracite and 243,173 tons of bituminous for the same time last year.

**Buffalo.**

April 9.

(From our Special Correspondent.)

The New York Central Railroad will, it is understood, reduce the rates on coal to points on the Rome, Watertown & Ogdensburg Railroad.

The Buffalo Water Department has advertised for 8,000 tons, net, anthracite coal, grate size, to be delivered by canal during the season of navigation; bids should be sent in before 3 o'clock P. M. on Tuesday, April 21st. On Wednesday the first Buffalo vessel of the season went for a load of coal to the Pennsylvania trestle on a contract for Lake Superior.

The Northern Line boats will begin to take Reading coal for Lake Superior at the end of this week. It is expected that the New York, Ontario & Western Railroad will make its appearance in Buffalo as a shipper of coal by lake, and it is said the company is negotiating for the trestle privileges.

Nominally vessel men are asking 60c. for coal to Milwaukee and Chicago, and 70c. to Racine. Captain Vance, of Milwaukee, says his boats will not go into commission until May 15th, no matter what course other owners pursue. Men have struck at Ashtabula because wages have been cut from 12c. to 10c. per ton for handling coal.

**Chicago.**

April 8.

(From our Special Correspondent.)

The coal trade continues very fair for this time of year, both in anthracite and bituminous. Some dealers report almost as good a trade as for any week during the winter. Stocks of consumers are in such a condition that one cold day has an almost immediate effect on orders, which come in good numbers, if not for large amounts. Some of our larger consumers of Illinois coal are laying in a good supply of stock since the first of the month, in anticipation of possible trouble with the miners on May 1st, when the wages for the ensuing year are adjusted. There is nothing now pointing toward such trouble, but they seem to desire to be on the safe side. If trade continues during April, as it shows a tendency to, the stocks on the docks will be reduced to less than 200,000 tons, which is a very fair tonnage for this market to have on hand at the opening of navigation.

Coke is arriving in very fair quantity from the Virginia and Walston regions and also a little from the Connellsville regions. This supply is ample enough for the foundries, but not sufficient for the furnaces in this district, which are about all closed down for the want of this fuel. Prices are being sustained on small orders, but large orders receive concessions.

Prices of anthracite per ton of 2,000 pounds f. o. b. Chicago are: Lehigh lump, \$3.75; 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, \$3.25; Hooking



Valley, \$3; Youghiogheny, \$3.40; Indiana block, \$2.30; Illinois block, \$2.20.

Coke.—Connellsville, 72 hour, per ton f.o.b. Chicago, \$5.05; crushed, \$5.40; Walston, \$5.20; New River, \$5.05.

**Pittsburg.** April 9.

Coal.—The market has ruled firm, with a good local and trade demand. The Ohio River is declining. There is, however, good large water. Coal is shipped to the lower markets as fast as loaded. The situation in the Valley is as follows: First pool, 1,600 men at work, price of coal at tippie, 5½c.; second pool, 2,800 men, price, 5c.; third pool, 2,000 men, price, 5c.; fourth pool, 3,500 men, price, 4½c. All miners can find employment at good wages. The March shipments reach 7,802,000 bushels; deficiency compared with March last year, 5,352,000 bushels.

**COAL SHIPMENTS BY THE OHIO FOR FIRST QUARTER OF THE YEAR.**

	January.	February.	March.	Total.
	Bushels.	Bushels.	Bushels.	Bushels.
1887.....	6,733,000	6,946,000	8,254,000	21,933,000
1888.....	11,746,000	11,110,000	11,792,110	33,648,000
1889.....	3,415,000	2,936,000	16,820,000	23,221,000
1890.....	11,620,000	11,777,000	13,216,000	36,613,000
1891.....	3,630,000	308,900	7,862,000	1,800,000

Connellsville: Coke continues very unsettled. A number of plants have started up, and others are preparing to resume. The week's production was 13,119 tons, an increase of 1,082 tons. The week's shipment to Pittsburg was 21 cars; west, 450 cars; east, 143; total, 614 cars. The increase in production since February 21st, was 7,919 tons. The prices of coke for April are: Furnace, \$1.90; Foundry, \$2.30; Crushed, \$2.65, f. o. b., at works. Prices at western points have advanced.

Freights are without quotable change. Seventeen coke plants are now in operation; nine of them are owned by the H. C. Frick Coke Company.

The Labor Tribune thinks the Frick coke scale a good one and says there can be no two opinions about it. The wages are better than those paid last year.

**FREIGHTS.**

The tariffs by lake and rail between the seaboard and St. Paul have been fixed. Last week the Eastern Railway of Minnesota, the "Soo" line, the St. Paul & Duluth and the Chicago, St. Paul, Minneapolis & Omaha signed the agreement, which had previously received the approval of other interested roads. The rates are as follows in cents per 100 pounds:

	Class 1.	2.	3.	4.	5.	6.
Via Chicago.....	\$1.11	.94	.75	.50	.42	.37
Via upper Lake Superior ports.....	1.01	.86	.69	.46	.48	.34
Differential in favor of Lake Superior.....	\$.10	.08	.06	.04	.04	.03

This opens the season of navigation under the most harmonious arrangement between the Lake Superior routes and the roads between Chicago and St. Paul that has existed for many years. The tariffs are to become effective on the opening of navigation.

From Philadelphia to: Bath, Me., \$1; Boston, \$5c.; Gloucester, 9c.; Marblehead, Mass., \$1.05; New Bedford, 75c.; New Orleans, \$2; New York, 9c.; Norfolk, 50c.; Portland, 97c.; Providence, 75c.; Richmond, 60c.; Salem, 75c.; Washington, D. C., 85c.

\*And discharging. Alongside.

**METAL MARKET.**

NEW YORK, Friday Evening, April 10.

**Prices of Silver Per Ounce Troy.**

April	Sterling Exchange	London Price.	N. Y. Cts.	April	Sterling Exchange	London Price.	N. Y. Cts.
4	4.88¼	4111.6	98	8	4.88¼	4111.16	97½
6	4.88¼	44¼	98	9	4.88	41½	97½
7	4.88¼	44¼	97½	10	4.88	44½	97½

Council bills declined 1-16 on this week's allotment. Owing to the small demand from London for Indian exchanges and a rather large amount of silver pressing for sale here prices have declined somewhat, but close steady upon good buying at the lower figures.

The United States Assay Office at New York reports total receipts of silver for the week to be 61,000 ounces.

**Silver Bullion Certificates.**

	Price.	Sales.
April 4.....	98¼	110,000
April 6.....	97¾	130,000
April 7.....	98	150,000
April 8.....	97¼	240,000
April 9.....	97¼	150,000
April 10.....	97¼	61,000
Total sales.....		850,000

**Domestic and Foreign Coin.**

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

	Bid.	Asked.
Trade dollars.....	76	79
Mexican dollars.....	76¼	77½
Peruvian soles and Chilean pesos.....	73¼	75
English silver.....	4.8	4.88
Five francs.....	.94	.95
Victoria sovereigns.....	4.87	4.89
Twenty francs.....	3.16	3.18
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	19.60
Ten guilders.....	3.90	4.00
Bar silver.....	.97¼	.98

**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 £340,000 bullion, but the proportion of reserve to liabilities was raised from 33.39 to 34.50%, against a rise from 41.23 to 43.90% in the corresponding week last year, when its discount rate was reduced from 4 to 3½%. On the 9th inst. the bank lost £65,000 bullion on balance. The weekly statement of the Bank of France showed an increase of 3,225,000 francs gold and 175,000 francs silver.

Copper.—Little business is being transacted in copper, and we have not heard of any material change in prices. Lake copper is easily obtainable at 13¼c, although the official quotation of the larger companies remains firm at 14c. Bids have been solicited for round lots for delivery May and next three to four months at 13¼c, but we do not hear that any business resulted therefrom, and it does not seem to have been legitimate. Arizona pig copper remains very scarce, and hardly anything is offering, but Arizona ingot copper can be procured at about 13¼c. Casting copper continues firm, with but little offering and a fair demand, with prices, say 11¼c@11½c. Nothing further has been heard from the Anaconda mine, which is still shut down.

The London market has been rather quiet with very little disposition shown by either buyers or sellers to make large transactions. Sales of Boston and Montana copper matte are reported at 10s., which is a comparatively low price. Chili bars have fairly held their own during the present week, and only small fluctuations took place, the closing prices being £52 7s. 6d. for spot; £52 12s. 6d. for three months. For manufacturing copper we quote: Tough copper, £54 10s. @£55; best selected copper, £56 10s. @£56 15s.; strong sheets, £62 @£62 10s.; India sheets, £50 @£50 10s.; yellow metal, 5½d. The exports of copper during the past week were as follows:

To	Quantity	Value
Liverpool—Copper Matte.	Lbs. 30,191	\$30,000
S. S. City of Chester.	3,688 bags.	3,250
Germanic.....	5 casks.	750
Hamburg—Copper (total).	Lbs. 5,908	416
S. S. Scandia.....	10 bbls.	5,908
Hamburg—Copper Matte.	Lbs. 244,413	17,000
S. S. Scandia.....	2,416 bags.	244,413
Antwerp—Copper.	Lbs. 26,944	3,500
S. S. Sorrento.....	89 bars.	26,944
Have—Copper.	Lbs. 75,000	9,500
S. S. La Champagne (6) casks.	112,202	16,000
(2) bars.		

Tin.—Little business has been done during the week, and prices have somewhat eased off. Private advices received from the east report that shipments from the Straits will probably fall off on account of the dry season having set in. Some transactions have taken place for April at 20½c and later on at 20¼c; to-day at 20 10c. for spot and 20c. for May; the closing quotations are April 20 10c., May 20 05c., June 20 05c.

Lead.—A fair business has been doing at gradually declining prices. Offers have been more freely made, and consumers having covered their wants the quantities offered were somewhat in excess of the demand and sellers had to take a lower price. Transactions amount probably to about 500 to 600 tons at from 4.35c. in carload lots down to 4.25c. for lots of a few hundred tons.

In London Spanish is quoted at £12 7s. 6d; English, £12 12s. 6d.

Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: "Market nominal and decidedly weaker. The tendency of prices is toward a lower range. Lead is freely offered at 4.10 @ 4.05c. without takers."

Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: "Lead is weak and lower. Sellers have been pressing their holdings on the market, and probably 600 tons have been sold at from 4.07½c. down to 4c. Buyers feel loath to buy, even at the latter price. Closing is unsteady at 4 cents."

Spelter.—Spelter has also somewhat followed the general decline, and sales have been made at 5c. New York for April-May delivery. Although there is no pressure to sell there is very little doing just now.

Antimony.—Antimony has been quite steady at the old rates: Cookson's, 17½; L. X., 16½; Hallett's, 15½.

Nickel.—The demand lately has been somewhat better. Stocks are very light here and small lots are held for 67½ @ 70c., according to quality and delivery. A short time ago pretty large contracts were made by the principal consumers at somewhat lower prices, but since then sellers have al-

most entirely withdrawn from the market, and round lots are not obtainable at present.

Quicksilver.—The demand has not been very satisfactory, but values have been fairly well maintained at our last quotations. We quote \$43 @ \$44 for the New York market, with lots selling in London at £8 6s.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, April 10.

The local iron market has shown no new features during the past week, the only item of interest having been the placing of the Pennsylvania Railroad Company's contract for steel rails, which has been pending for several weeks. The demand for pig iron shows no improvement, and all business done has continued to be of the same hand-to-mouth character which has marked the trade for so long. Indeed, it could hardly be expected to be otherwise. With the falling prices during the last six months and the likelihood of a still further decline in the immediate future no one cares to buy any more than is necessary to fill immediate wants.

It is estimated that the rate of production of pig iron in the United States is now nearly 50,000 tons per month less than it was on the 1st of March. This means a falling off of about 230,000 tons per month since the 1st of January, and 300,000 tons per month since the 1st of December, 1890. The fact that this immense reduction in production has taken place without affecting prices shows that consumption has decreased in approximately the same proportion, and that until there shall be a general improvement in business it is idle to look for improvement in the iron market.

At present all branches of business are indisputably dull, and the iron industry feels this as much as any other. The railway companies are unable to build, and it is difficult to secure money for any of the new industrial enterprises which consume iron. About business prospects generally Mr. Andrew Carnegie is reported to have said in a recent interview in Pittsburg:

"Bessemer pig iron is selling at about the lowest price on record, but there is very little demand. Even though so many furnaces have been stopped so long a time the supply is in excess of the demand. Truly I have never known the iron and steel business so dull as it is at this moment. There is only one cheering indication. The crops in Europe, owing to the extraordinary season there, are said to be the poorest known in years. The London Standard has predicted that the price of wheat will be higher than for years. If we have good crops, therefore, the prospects are that we shall have prosperous times next year."

American Pig Iron.—The market is stagnant and transactions are reported only in comparatively small lots. Foundrymen are evidently holding off with the expectation of a further decline in prices. At present, however, prices are continuing to hold firm, and there are no reports of any concessions being made. Southern iron remains in about the same position. Reports from inland cities show a decline of 50 cents per ton on inferior brands, but prices in New York remain unchanged. We quote: Northern, No. 1 X, \$17.50 @ \$18; No. 2 X, \$16.50 @ \$17; Southern, No. 1 X, \$17.50 @ \$18; No. 2 X, \$16.50 @ \$17.

Spiegel-isen and Ferro-manganese.—There have been no transactions of any magnitude either in spiegel-isen or ferro-manganese. The Edgar Thomson ferro-manganese furnace has been blown out. We quote prices, nominally: 20% spiegel-isen, \$23 @ \$29; 80% ferro-manganese, \$63 @ \$64.

Steel Rails.—There have been several small transactions during the week and one of magnitude. The Pennsylvania Railroad Company, whose contract has been pending for several weeks, gave out an order for 33,000 tons of standard sections at \$30 per ton at the mill, the price demanded by the rolling-mill companies. The order which was for immediate delivery, was divided between the Cambria Iron Company, the Pennsylvania Steel Company and Carnegie, Phipps & Co. The Pennsylvania Railroad Company has been holding its order for several weeks in order to take any advantage of weakness in price that might develop, and that it was finally obliged to concede the rolling-mill price is evidence of the strength of the agreement between the latter. Other railway companies will now be likely to come into the market before long, but from the general financial condition of the railways of the country there is not much promise of activity in steel rails this year. Very many of them simply have not the money to purchase the rails which they actually need.

Rail Fastenings.—The market is dull, few transactions being reported. We note one sale of 3,000 pair of angle plates to a Southern railway at a price equivalent to \$1.75 here. We quote prices: Spikes, \$2; angle plates, \$1.70 @ \$1.80; bolts and square nuts, \$2.65 @ \$2.75; hexagonal nuts, \$2.55; complete joint, iron and steel, according to weight. Prices are fairly firm, but there is sharp competition, and desirable orders will undoubtedly secure concessions from quoted prices.

Tubes and Pipe.—Business shows some improvement and is expected to show still more during the next two or three weeks. 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 evidently a moderate amount of business doing, although the trade is variable. Some dealers report activity and others the reverse. There is sharp competition for orders. We quote, nominally: Universal plates, \$2.20; bridge plates, \$2.15; angles, \$2.20; beams, \$3.10.

**Merchant Steel.**—The market does not show much activity, although it is reported slightly better than last week. We quote prices, unchanged: 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@6c.; open-hearth spring, 2@6c.; tire steel, 2@6c.; toe calks, 2@6c.; first quality sheet, 10c.; second quality sheet, 8c.

**Old Rails.**—The demand continues at about the same as last week, and a few transactions are noted. We quote: \$22@23 for tees, and \$25 for doubles.

**Wrought Iron Scrap.**—There is but little doing. We quote \$21@22 at yards.

Chicago. April 8.

(From our Special Correspondent.)

The local iron market shows no improvement over last week, and in some branches more dullness is to be noted. Prices are apparently down to the lowest notch, yet consumers show a hesitancy about buying, although their stocks of raw materials are very low.

**Pig Iron.**—The Chicago market continues to show a general dullness in pig iron. Business is very light and orders, to a large extent, consist of car lots for near delivery. Foundry stocks are reported to be very low. Foundry and car-wheel works throughout the northwest are running very light, and report a general falling off of trade. Lake Superior charcoal show no improvement, but the season is approaching when consumers of this class of metal make their season's contracts, and an improvement is consequently expected. Black-band brands are very scarce.

Prices per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$19@18.50; Lake Superior coke, No. 1, \$15.50@16; No. 2, \$15@15.50; No. 3, \$14.50@15; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$16.50@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.**—Orders have not been numerous this week, but they have been very satisfactory. The outlook for a big trade continues good. The only cloud is probable labor trouble. Prices remain unchanged for car lots f. o. b. Chicago: 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.**—No improvement is to be noted. Merchants are looking forward to an improvement when the spring trade begins.

Quotations are: Steel sheets, 10 to 14, \$2.70@2.80; iron sheets, 10 to 14, \$2.60@2.70; tank iron or steel, \$2.50@2.70; shell iron or steel, \$3@3.25; firebox steel, \$4.25@5.50; flange steel, \$3.25@3.40; boiler rivets, \$4.10@4.25.

**Merchant Steel.**—Business continues very fair, and the outlook for a large spring trade is bright. 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.**—A fair amount of business is reported. Orders continue small but in very good numbers. Quotations remain unchanged at \$31.50@32.50 per ton f. o. b. Chicago. Splice bars at \$1.95@2, and spikes at \$2@2.10 per 100 pounds.

**Galvanized Sheet Iron.**—Galvanized sheets continue in fair demand. Trade is not as active as it was last month, and consumers show considerable hesitation about buying large amounts. 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 material improvement is to be noted in black sheets. Trade continues to be rather light, as it has been for some time past. Quotations are \$2.85@3 for No. 27 f. o. b. Chicago for car lots.

**Bar Iron.**—No changes are noted in bar iron. A small amount of trade is being received. Store orders are improving considerably. Quotations remain unchanged. Local mills quote \$1.60@1.70, f. o. b. Chicago; and Valley mills, \$1.55@1.60 f. o. b. mills.

**Tubes.**—A fair trade is reported, but orders are not as numerous or as large as dealers would like. An improvement during the month is looked forward to. Discounts remain unchanged at 50% for 2 inches and larger, and 45% for inch and three-quarters and smaller.

**Nails.**—A general improvement is to be noted this week in both wire and cut nails. Some dealers report the best week of the year, and considerable business has evidently been done. Prices

are being maintained and an improvement is being looked forward to.

Quotations are: Steel wire rails, \$2.20@2.25; steel cut rails, \$1.75@1.85 car loads f. o. b. Chicago.

**Scrap.**—The scrap market continues exceedingly dull and inactive. If anything, it is somewhat worse than last week. Prices are weaker, and so few transactions have been made that quotations are merely nominal. Quotations per net ton f. o. b. Chicago are: No. 1 railroad, \$19; No. 1 forge, \$18.50; No. 1 mill, \$14.50; fish-plates, \$21; axles, \$24; horse shoes, \$19; pipes and flues, \$13; cast borings, \$8; wrought turnings, \$11; axle turnings, \$13; machinery castings, \$12; stove plates, \$8; mixed steel, \$11.25; coil steel, \$15.50; leaf steel, \$16.35; tires, \$17@17.50.

**Old Rails and Wheels.**—But little business is reported, and prices are weaker in old steel rails. Prices quoted are: Old steel rails, \$13.50@17; old iron rails, \$23; old wheels, \$17.

Louisville. April 4.

(Special Report by Hall Bros. & Co.)

We have little or nothing to report of the market; buying is of a hand-to-mouth nature, with a few orders ranging from 50 to 300 tons, and mostly for nearby delivery and generally at figures under current quotations. If anything, the situation is not so strong as it was last week. We quote as last week:

**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. Missonri 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. April 9.

(From our Special Correspondent.)

**Pig Iron.**—Instead of increasing individual purchases, buyers are restricting their orders, and that, too, at a time when a good many furnacemen think contracts ought to be made for the coming summer. There are a few large consumers who are quietly making provision for summer requirements, and are doing so on most favorable terms, namely, \$17.50 for No. 1, and \$14.50 for Grey Forge. Retail lots of some brands are held 50 cents higher. Buyers generally do not care to act until there is a change in the general market. There is scarcely anything doing this week in No. 2 or Bessemer. Furnace companies are not making any effort to sell, excepting to keep up a steady canvass, but no concessions are being offered, or, for that matter, asked, excepting for unusually large lots.

**Muck Bars.**—Muck bars appear to have dropped to about \$26, that being the figure at which some business was done yesterday. Some business was done from 50 to 75 cents higher.

**Steel Billets.**—Steel billets are selling at \$28@28.25; nail slabs, \$27.50. The mills are kept pretty well supplied with work, and, taking it all in all, the steel billet market is in good shape.

**Merchant Iron.**—The mills are in poor shape as regards business. The strike at Pencoyd has assumed serious proportions. Union agitators are quietly progressing in some other Eastern mills. A good deal of iron is selling at \$1.70@1.60. Of course small lots of refined are sold above this figure, but the volume of business of that sort does not make much of a figure.

**Skelp Iron.**—Grooved is quoted at \$1.75@1.85, but there is not much business to report.

**Wrought Iron Pipe.**—The reduction of price has not helped demand much, and the explanation given by some parties who represent buyers is that prices are going lower than the reduction of last week.

**Sheet Iron.**—Retail demand is improving, but the large heavy buyers are not concerning themselves with market quotations.

**Plate and Tank Iron.**—Orders for steel tank were booked this week at 2c.; bridge plate at 2.10c.; shell is quoted at 2.30c. The complaint is that a great deal of business that was expected certainly by April is apparently as far off as ever.

**Structural Iron.**—The only improvement here is to be noted in the receipt of a few small orders, but there is no change in quotations.

**Steel Rails.**—Steel rails are quoted at \$30. Sales amounting to 10,000 tons have been heard of. The market is rather unsatisfactory.

**Scrap.**—There is not much doing, and prices are rather hard to maintain.

Pittsburg. April 9.

(From our Special Correspondent.)

**Raw Iron and Steel.**—Trade during the week shows an improvement—not a large one, but still an improvement. It certainly looks at this writing that bottom prices have been reached, and that from this time forth better prices, a larger demand and an improved condition of affairs may be the rule. Our report to-day shows sales of certain grades above those made last week. The demand for Bessemer was larger than for some time past. Another very promising feature was that certain iron firms that are undoubtedly well informed, have, within

a few days, purchased several good-sized blocks of Bessemer pig for April and May delivery.

Most of the Shenango and Mahoning Valley furnaces are still out of blast, those running being engaged on previous contracts not yet filled. The stock of iron in the "Valley" is said to be light. The coke question is still unsettled; the strike is still on, but coke works are starting up with a limited number of men.

Pittsburg city furnace-made iron commands the highest prices. We learned of sales of Gray Forge at \$13.75 at the furnace. As usual, favorite brands are attracting the most attention. Common and unknown brands in many instances fail to find purchasers unless shaded. In former years sales of large blocks of iron were made, extending three or four months delivery. At present sales do not extend beyond sixty or ninety days. This shows a conservative feeling among dealers. Bessemer pig is firmer, and is attracting more attention with leading dealers.

Grey Forge is fully 25 cents per ton above last week's prices. Steel slabs and billets show no change. The same may be said of 80% ferromanganese. Muck bar is steady, but not very active. Steel rails are dull; most of the works are closed for want of orders. Prices of skelp iron are still in the down grade; low figures are reported. Spiegleisen declined 50 cents per ton; bloom and billet ends are firmer; old iron and steel rails are more inquired for, with light offerings. A good business is being transacted in scrap material at current rates.

Coke Smelted Lake and Native Ores.

3,000 Tons Bessemer	\$15.75 cash.
1,500 Tons Grey Forge	13.75 cash.
1,000 Tons Bessemer	15.85 cash.
1,000 Tons Bessemer	15.75 cash.
1,000 Tons Bessemer	15.75 cash.
1,000 Tons Bessemer	16.00 cash.
1,000 Tons Grey Forge	14.00 cash.
1,000 Tons Grey Forge, at city furnace	13.75 cash.
1,000 Tons Grey Forge	13.90 cash.
500 Tons Grey Forge, all ore	15.00 cash.
500 Tons Bessemer	15.80 cash.
500 Tons Grey Forge, May	14.00 cash.
150 Tons White and Mottled, all ore	14.25 cash.
100 Tons Silvery	16.00 cash.
100 Tons No. 2 Foundry, all ore	16.50 cash.

Charcoal.

100 Tons Cold Blast	26.00 cash.
100 Tons No. 2 Foundry	22.00 cash.
50 Tons Cold Blast	25.00 cash.
50 Tons No. 1 Foundry	23.00 cash.
50 Tons No. 1 Foundry	23.50 cash.
50 Tons Cold Blast, extra	30.00 cash.

Muck Bar.

750 Tons Neutral	26.65 cash.
500 Tons Neutral	26.75 cash.
550 Tons Neutral, April	26.50 cash.

Steel Slabs and Billets.

80 Tons Billets and Slabs	25.75 cash.
500 Tons Billets	25.50 cash.
500 Tons Billets and Slabs	25.75 cash.

Steel Wire Rods.

600 Tons American wires	37.25 cash.
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Ferro-Manganese.

100 Tons 80%, Baltimore	60.45 cash.
75 Tons 80%, Jersey City	63.45 cash.
50 Tons 80%, Domestic, Pittsburg	61.00 cash.

Bloom and Billet Ends.

1,000 Tons Rail Ends, Extra	19.00 cash.
500 Tons Rail Ends, Extra	18.50 cash.
300 Tons Bloom Ends	17.50 cash.

Skelp Iron.

400 Tons Wide Grooved	1.67½ 4 m.
350 Tons Narrow Grooved	1.65 4 m.
200 Tons Sheared Iron	1.54 4 m.

Old Iron and Steel Rails.

625 Tons Steel Rails	18.00 cash.
500 Tons American T's	24.50 cash.

Scrap Material.

500 Tons Old Car Wheels, Gross	16.50 cash.
200 Tons No. 1 W. Scrap, Net	27.75 cash.
200 Tons No. 2 W. Scrap, Extra, Net	19.00 cash.
150 Tons W. Iron Furnings, Net	15.00 cash.
100 Tons No. 2 W. Scrap, Net	18.00 cash.
100 Tons Cast Scrap, Gross	14.00 cash.
10 Tons Soft Steel, Gross	18.00 cash.
100 Tons Cast-Iron Borings, Gross	11.50 cash.
100 Tons No. 1 W. Scrap, Delivered, Net	21.00 cash.
100 Tons Iron Axles, Net	26.75 cash.
50 Tons No. 1 W. Scrap, Delivered, Net	21.00 cash.

## CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, April 10.

The markets continue to present the general features noted last week. The demand, while by no means active, has shown some signs of revival after the Easter dullness, and we think better business may be looked forward to in the near future. This feeling, which, of course, has had its influence upon the markets, is founded on a general conviction that depleted stocks will soon have to be replenished, although no particular increase in business is noticeable at present.

In how great a degree these expectations will be realized cannot, of course, be said, but as manufacturers quite generally have been pursuing a hand-to-mouth policy, anticipations of some more lively movement in the near future do not seem to be entirely without foundation. Arrivals of heavy chemicals, generally speaking, have been quite large, but their depressing effect on values has been hardly noticeable as very little has been forced on the market.

The demand for spot has been very small, and dealers are waiting for greater inquiry, without making many concessions to buyers. The price of brimstone has already taken the first step back to the former values, and while the market can by no means be spoken of as weak, the demands for the time being seem pretty well satisfied, and lower



prices may be looked forward to with some certainty. Dealers are quoting much less for future delivery.

It will be remembered by the readers of the ENGINEERING AND MINING JOURNAL that, as far back as two months ago, we mentioned in this column that shipments of nitrate of soda from Europe might become an important factor in the market. The possibility of such shipments was given hardly more than passing consideration by some dealers who were approached on the subject; but the developments of the week have shown the correctness of this forecast. A large shipment per steamer from Liverpool has recently arrived, and while this has not materially weakened values it has effectually checked the upward movement and frightened holders for a rise, so that the tone of the market is slightly impaired.

Sal Soda continues in heavy stock, and the slight reaction mentioned in our last report does not seem to have been permanent, as sales have been made at figures as low as our lowest quotations of last week.

Caustic Soda, 60%.—The large stock, which has been rather a depressing influence in this market for the past fortnight, seems to have been placed, and a large part of the week's arrivals has been on contract, so that values are a shade higher. The demand for spot is very small, however, and business for future delivery has also not been over large. We quote 3'35c. for spot, and sales for forward shipment have been made at 3'35c. to 3'40c. 70% 74%. The amount available for spot delivery have been small throughout the week, and as recent arrivals were mostly contracted for, the market closes quite firm. Sales have been made at 3'05c. to 3'07½c. Contracting for future shipment could not be done under 3'10c. 77%.—This market continues well sold up. The arrivals have gone immediately into second hands, and at this writing the spot supply is very small. Business has been quite active; the demand leaves no room for complaint and is mostly satisfied by forward shipments.

Alkali, 48%.—The arrivals have been quite large, so that dealers are well stocked. Some spot business has been done, and contracts for shipment have been placed, but the tone of the market is suffering a little from the large stocks. Values have been maintained very nearly at their former level, and no better than 1'55c. for shipment could probably be done. We quote 1'57½c. to 1'62½c. for spot; 58% of the various makes is in good stock, with a fair demand, which has been satisfied at from 1'50c. to 1'55c. The demand toward the end of the week has shown signs of falling off; dealers continue to quote 1'50c. to 1'55c. for forward shipments.

Caustic Soda Ash, 48%.—The very slight demand continues at this writing, and values are only maintained because nothing is pressed on the market. Sales of spot and for future delivery have been made at from 1'55 to 1'60c.

Carbonated Soda Ash, 48%.—The arrivals have been quite large, but to a great extent went into second hands, so that the market is not suffering from large stocks. The demand for spot has been fair, and has led to some sales at 1'57½c. to 1'60c. For future shipments a little less has been asked, and business could probably be done at from 1'55 to 1'57½c. High test is in good stock, and has changed hands quite freely. Some contracts for future delivery have been made at our last quotation, 1'52½c., while spot goods are held a little higher; 1'55c. to 1'60c. would probably have to be paid.

Sal Soda.—Recent large arrivals played havoc with the market just when it was commencing to show signs of regaining its tone. Sales of spot at 1@1'01c. have been repeatedly made, as a good deal was thrown on the market and sold almost for what it would bring. The tone is a little firmer at this writing; we quote 1'05c. as a minimum, with a very small demand. Domestic goods have found an easy market at 1@1'05c., and manufacturers are well sold up. The demand for these goods has been very gratifying to dealers, and leaves values firm at these figures.

Bleaching Powder.—The slight spurt noticed in our last report has given away to a period of dullness. The demand is almost nil and finds dealers in good stock, but as nothing is being forced on the market prices remain at our former quotation. No business could probably be done at less than 1'70c.

Acids.—The end of the stubborn fight, which has had such a baleful influence on the business of the acid manufacturers, seems to be approaching. The Philadelphia dealers, who have been long suffering from the effects of this controversy, now have come to some understanding. The manufacturers here have received a circular letter from Messrs. Wilson, of the Harrison Chemical Works, Philadelphia, asking for propositions by which some plans for combination might be arrived at.

After the experience of New York manufacturers during the past year it would seem hardly likely that they will embark in another undertaking of this kind. The conditions of the local market are not favorable to a combination among them; "each one for himself and etc., etc.," is the motto which characterizes the dealings of most, and a mere agreement not to enter the Philadelphia market without any substantial benefit to be derived therefrom will be far from a restraining influence on the piratical tendencies which have recently been so strongly developed here. This last, as far as we can learn, is substan-

tially what the Philadelphia manufacturers hope for.

Business during the week has been fair; the demand was a little better than during the preceding week and if this consolidation movement have no other effect it has certainly added materially to the tone of the market. Dealers are tired of making concessions to buyers, and have about concluded to hold out for what they ask. Muriatic and nitric acids are changing hands in a limited way at our last quotations.

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', \$5 @ \$5.25; sulphuric, 60' \$1 @ \$1.25; sulphuric, 66', \$1.12½ @ \$1.175.

Fertilizers.—The demand for this class of chemicals continues large, and values of almost the entire list have advanced slightly. Of the lighter chemicals the recent quotations on brimstone and nitrate of soda were, of course, due in a large measure to the speculative element in the market, and these have suffered slightly since our last report. The decline in brimstone has, however, been very small, and nitrate of soda is held at very nearly the same figures as those given in our last report.

The recent arrivals from Europe will merely be prohibitory to any further upward movement. Nitrate of soda can at present be laid down here from abroad at 2.25c., but it is not quite so profitable on account of more unfavorable dockage, and the test is not quite so high. It is not probable that much more will be shipped this way unless the Chilean troubles continue indefinitely. January sailing will doubtless be kept at a figure prohibitory to such further shipments.

Charleston phosphate rock is supplying a steady consumptive demand, which is filled on long contracts. Values have been kept steadily at our last quotation, \$7.25 @ \$7.50 per ton, f.o.b., Charleston, with freights by rail to New York, a little lower; ground rock, \$8 @ \$11.50. Sulphate of ammonia, gas liquor is quite scarce. There have been several arrivals, but these were immediately taken up, and at this writing the demand is greater than the supply. Contracts can easily be made at 3'25c. for spot; 3'25c. to 3'30c. is being asked.

Bone sulphate has met with a good demand, and is well sold ahead at 3'20c. to 3'25c. The demand for blood has been large, and has made the article quite scarce. Holders are asking 2'05c. to 2'10c. for high grade, and it is changing hands freely at the lower quotation. Low grade blood is selling for 1'95c. to 2c. Azotine is held here only in small quantities, and the stocks now are largely depleted, so that 2'05c. to 2'10c. is easily obtained. Fish scrap of last year has also been well sold up, and nothing could probably be had for much less than \$20 @ \$21. Potash salts, tankage, and bone black are all in fair demand. A good business is doing at our last quotations.

Brimstone.—The market has been somewhat relieved by free arrivals, which went into second hands immediately. For future shipment the demands of dealers show signs of weakening; \$33.50 is asked for unmixed seconds, and \$32.50 for thirds, and the market is not particularly active at these figures. For spot the peculiar conditions of the market continue to exert a stiffening influence, and nothing below \$36.50 @ \$37 could be named.

Muriate of Potash.—Arrivals during the week have been quite large, but as these had all been previously contracted for the conditions in the spot market remain much as previously reported. The business of the week resulted in sales of about 400 tons.

Saltpetre.—Messrs. H. H. Crocker & Co., in their monthly circular under date of April 1st, report the present condition of the saltpetre trade in the United States as follows:

Saltpetre.	1891.	1890.	1889.
Bags.	Bags.*	Bags.*	Bags.*
Imported into the United States from Jan. 1st to date.....	16,410	13,602	11,559
On the way for the United States, by mail, to Feb. 18th.....	15,545	14,724	13,820
On the way for the United States, by cable, to March 31st.....	11,530	6,118	2,700
Stocks in New York March 31st.....	16,500	8,000	8,250
Supply for four months....	43,575	28,842	24,770
Stock on hand Jan. 1st....	11,600	5,500	7,750
Deliveries since Jan. 1st in New York and Boston....	10,910	11,102	11,059
Deliveries past 30 days....	1,324	3,648	5,250
for consumption		62,263	52,073
Prices current, March 31st, per pound.....	3½ @ 4¼c.	4½ @ 5¼c.	4½ @ 5¼c.

\*Spot and to arrive.

Kainit.—Business for fall delivery has been quite brisk, and demands now seem to have been nearly satisfied. Prices were reduced from our former quotation to \$8.50 @ \$9, and resulted in sales of about 3,500 tons. There is not much on the way at present.

Nitrate of Soda.—The arrivals from Liverpool have had a quieting influence upon prices, and leave the market rather weaker than at the time of our last report; 2'25c. is being asked for spot

and January sailing, and there seems to be every reason to suppose that no higher figure can be maintained for any length of time. We are indebted to Messrs. Mortimer & Wisner for the following figures:

	1891.	1890.	1889.
	Bags.	Bags.	Bags.
Imported into Atlantic ports from West Coast, S. A., from Jan. 1, 1891, to date.....	121,474	236,365	80,173
Ditto from Europe.....	2,415	.....	.....
Visible supply to Aug. 1, 1891.....	123,889	236,365	80,173
Additional charters.....	212,895	486,900	316,700
Total supply when shipped.....	442,395	486,900	316,700
Stock on hand Jan. 1, 1891.....	36,454	22,409	87,043
Deliveries past month.....	47,918	75,535	11,857
Deliveries since Jan. 1 to date.....	126,948	178,837	110,842
Total yearly deliveries.....	174,866	254,376	122,701
Price current April 1, 1891.....	2¼c	170 @ 17¼c	2¼c

NOTES OF THE WEEK.

The Salina Coarse Salt Company, the Syracuse Coarse Salt Company and the Cape Cod Coarse Salt Company have recently begun to use the Tully Valley brine. The water is 99% strong, the limit of saturation being 100%. The Tully water is much purer than that furnished from the state wells, besides being 30% stronger.

Liverpool. April 1.

(Special Correspondence by J. P. Brunner & Co.)

Since our last, our market has been closed for several days owing to the Easter holidays. Business in heavy chemicals is not brisk, but a moderate amount is passing at late quotations.

Soda-ash continues quiet at late quotations. We quote minimum prices as follows:

Caustic Ash, 48%, £5 2s. 6d.; 58%, £6 4s. per ton, net cash. Carh. Ash, 48%, £5 7s. 6d.; 58%, £6 10s. per ton, net cash. Special brands are held for a premium over these quotations.

Soda crystals are in fair request at £3 7s. 6d. @ £3 10s. per ton, less 2½%. There is some talk of altering the terms of this article to "net cash" also.

Caustic soda is selling rather more freely, and for prompt delivery we quote as follows: 60%, £9 15s.; 70%, £11; 74%, £12; 76%, £13, and upwards, all net cash. A reduction of 5s. per ton for contracts over six months or to the end of the year, also for specially large lines, prompt delivery.

Bleaching powder attracts little attention, but in the absence of resellers hardware is firm at £7 per ton, net cash.

Chlorate of potash is inactive at 5¼d. per pound, less 5%, while possibly a shade less might be accepted by resellers.

Bicarb. soda is selling at £6 17s. 6d. @ £7 per ton, less 2½%, for one hundredweight kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of ammonia has gone easier at £11 @ £11 2s. 6d. per ton for good gray, 24%, in single bags, and £11 12s. 6d. @ £11 15s. per ton for 25% in double bags, f.o.b. here.

Since our last report the Alkali Company has officially announced its terms with regard to export business, which terms are that soda ash, caustic soda and bleach are to be sold at net prices f. o. b. Liverpool, Liverpool exporters to be allowed a commission of 1% up to £30,000, and an additional 1% on all business done over that amount. With regard to the home trade business, the company has appointed special agents, to whom it allows a commission of 2% on all business done with the Union, the agents being bound down to sell only the products of the Union.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, April 10.

The expectations of makers for an increased demand have been partially realized, much larger quantities having gone into second hands than during the preceding week, and doubtless, if the fine weather continues, stocks will commence to show signs of depletion. This increased demand has, as yet, been without effect on values, and may even be consequent upon a general desire among dealers to get rid of their large accumulations, even if they have to accept a little less. The lime market has been acting in sympathy with brick, and the week closes with stocks generally smaller than they were at the opening.

Bricks.—Haverstraws have been sold extensively at \$5 @ \$5.75, and the tendency to have them carefully selected is a prominent feature showing that the demand is not yet very large. Up-rivers have come in in moderate quantities, and may be quoted from \$4.50 to \$5. For very good lots \$5.25 has been paid. The trouble in the Jersey brick yards does not yet seem to have been settled and will doubtless materially curtail production for some time. It was a factor in finally deciding brick makers to postpone the starting of the yards at the usual time, the first Monday in April. We quote \$4 per M. Pale has changed hands in a limited way at \$2.25 @ \$2.50 per M.

Lime.—The demand has been fairly large, and business quite active, so that the somewhat more than usually heavy stocks have been materially reduced. We quote \$1 for Rockland finishing and 90c. for common. State and St. John limes are still held at our last quotations.



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 and amount of last), NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last).

G. Gold, S. Silver, L. Lead, C. Copper. \* Non-assessable. + This company, as the Western, up to Dec. 31, 1890, paid \$1,000,000. \* Non-assessable for three years. † The Dead wood previously paid \$275,000 in eleven dividends, and the Terra \$75,000 for the consolidation in August, 1884, the California had paid \$31,320.00 in dividends, and the Con. Virginia 40,000.00. \*\* Previous to the consolidation of the Copper Queen with the Atlanta, August, 1888, 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, Aspen, etc., with columns for dates (April 4-10) and sales.

\*Ex dividend. †Dealt in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. \*Good Friday. D dividend shares sold, 19,470. Non-dividend shares sold, 67,530. Total, New York, 87,020.

BOSTON MINING STOCK QUOTATIONS.

Main table of Boston Mining Stock Quotations, listing companies like Atlantic, Mich, Bodie, Cal, Bonanza Development, etc., with columns for dates (April 3-9) and sales.

Boston: Dividend shares sold, 8,153. Non-dividend shares sold, 5,995. Total Boston, 14,148.

COAL STOCKS.

Main table of Coal Stocks, listing companies like American Coal, Cambria Iron, Cameron Coal & I. Co, etc., with columns for dates (April 4-10) and sales.

\*\*Sales in New York, 17,330; in Philadelphia, 35,068. Total sales, 123,705.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Main table of San Francisco Mining Stock Quotations, listing companies like Alpha, Alita, Alhonz, etc., with columns for dates (April 3-9) and sales.



STOCK MARKET QUOTATIONS.

Baltimore, Md.

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

Prices hid and asked, lowest and highest, during the week ending April 9.

Birmingham, Ala. April 2.

Table with columns: COMPANY, Bid, Asked. Lists companies like Ala. Coal & I. Co., Ala. Conn. C. & C. Co., etc.

Pittsburg, Pa. April 10.

Table with columns: COMPANY, B., A. Closing. Lists companies like Allegheny Gas Co., Bridgewater Gas Co., etc.

St. Louis. April 8.

CLOSING PRICES.

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

Table with columns: COMPANY, Bid, Asked. Lists companies like Mickey Breen, Mountain Key, Nellie, etc.

Trust Stocks. April 10.

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

Table with columns: COMPANY, Bid, Asked. Lists companies like Am. Cotton Oil Com., Am. Sugar Refineries, etc.

Trust Receipts.

Table with columns: COMPANY, Sales, Price. Lists companies like American Cotton Oil, National Lead, etc.

Foreign Quotations.

Table with columns: COMPANY, Highest, Lowest. Lists companies like Almada, Mex., Amador, Cal., etc.

Paris. March 28.

Table with columns: COMPANY, Francs. Lists companies like Belmez, Spain, Callao, Venez., etc.

CURRENT PRICES.

Those quotations are for wholesale lots in New York.

Table with columns: COMPANY, Bid, Asked. Lists companies like Acid-Acetic, Carbonic, Chromic, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Absolute, Ammoniated, Alum-Lump, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Ammonia-Sulph., Aqua Ammonia, Ammoniates-Azotine, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Asbestos-Am., Ashes-Pol., Asphalium, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Barium-Nitrate, Barytes-Sulph., Bichromate of Potash, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Bismuth, Borax, Bromine, Cadmium, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Chalk, China Clay, Chromium, Cobalt, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Cream of Tartar, Cryolite, Epsom salt, Feldspar, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Fluorspar, Fuller's Earth, Gypsum, Iodine, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Chlorate, Caustic, Carb., etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Silica, Soda-Nitrate, Strontium, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Sulphur, Talc, Terra Albs, etc.

Table with columns: COMPANY, Bid, Asked. Lists companies like Vermilion, Vitriol, Zinc Oxide, etc.

THE RARER METALS.

Table with columns: COMPANY, Bid, Asked. Lists companies like Aluminum, Arsenic, Barium, Bismuth, etc.

BUILDING MATERIAL.

Table with columns: COMPANY, Bid, Asked. Lists companies like Bricks, Croton, Wilmington, etc.