

THE ENGINEERING AND MINING JOURNAL



Entered at the Post-Office of New York, N. Y., as Second-Class Mail Matter.

Vol. LIII. JAN. 9. No. 2.

RICHARD P. ROTHWELL, O.E., M.E., Editor.
ROSSITER W. RAYMOND, Ph.D., M.E., Special Contributor.
SOPHIA BRAEUNLICH, Business Manager
THE SCIENTIFIC PUBLISHING CO., Publishers.

SUBSCRIPTION PRICE:

Weekly Edition (which includes the Export Edition), for the United States, Mexico and Canada, \$4 per annum; \$2.25 for sixmonths; all other countries in the Postal Union, \$7.

Monthly Export Edition, all countries, \$2.50 gold value per annum.

REMITTANCES should always be made by Bank Drafts, Post-Office Orders or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING CO. All payments must be made in advance.

THE SCIENTIFIC PUBLISHING COMPANY.

OFFICERS: R. P. ROTHWELL, Pres. & Gen'l Mang. | P.O. Box 1833.
SOPHIA BRAEUNLICH, Sec'y & Treas. | 27 Park Place, New York.

Cable Address: "Rothwell, New York." Use A. B. C. Code, Fourth Edition

CONTENTS.

	Page.
Zinc Smelting in the United States.....	79
Statistics Collected by the "Mining Industry and Tradesman" ..	79
Our Statistics of the Production of Lead in the United States in 1891.....	79
The Production, Consumption and Stocks of Copper in 1891.....	79
Australian Cheese Mines.....	80
Mining in Colorado in 1891.....	80
Books Received.....	80
New Publications: An Introduction to the Study of Metallurgy	80
Australian Sulphite Ores.By F. M. Drake	81
Water Power Computations Worked Out by the Slide Rule,	81
By William Cox, C. E.	81
Mining on the Gogebic Range in 1891....By Clarence M. Boss, M. E.	82
A Non-Oxidizing Process of Annealing... .By H. P. Jones, M. E.	83
*The Silver Mine of the Comstock.....By Dan De Quille	84
*Improvements in Reverberatory Smelting for Copper,	86
By E. D. Peters, Jr., M. E.	86
The Mining Industry of Mexico in 1891.....	87
Digest of Current Decisions of the Secretary of the Interior Relat-	88
ing to the Mining Industry.....	88
The Lake Superior Mining Stock Market in 1891.....	89
Southern Coal and Iron Stocks in 1891.....	89
Patents Granted.....	89
Notes: The Mineral Production of Colorado, 82—Tests of Rolled	89
Iron Bars, 88—The Russian Petroleum Trade, 88—A New Method	89
of Titrating Mangan-se, 88—The Colorado Desert Lake, 88—Flexi-	89
ble Glass, 89—The Preservation of Sodium, 89—New Oxygen	89
Compounds of Molybdenum and of Tungsten, 89—Interplanetary	89
Signalling, 89—A New Puddling Furnace, 89.	89
Personals — Obituary — Societies — Industrial Notes—Machinery	90-91
and Supplies Wanted.....	90-91

* Illustrated.

MINING NEWS:	Utah..... 95	San Francisco. 100	METALS. 98
Arizona..... 91	Washington..... 95	Baltimore..... 102	IRON:
California..... 91	MEETINGS..... 96	Helena..... 102	New York..... 98
Colorado..... 92	ASSESSMENTS..... 97	Pittsburg..... 102	Chicago..... 99
Georgia..... 92	MINING STOCK	St. Louis..... 102	Philadelphia... 99
Idaho..... 92	MARKETS:	Trust Stocks... 102	Pittsburg..... 99
Iowa..... 93	New York..... 95	Aspen..... 102	CHEMICALS AND
Kansas..... 93	Boston..... 96	London..... 102	MINERALS..... 95
Michigan..... 93	Denver..... 96	Paris..... 102	BUIDING MATER-
Minnesota..... 93	San Francisco. 96	MARKETS: .	IAL MARKET. 102
Montana..... 93	Pipe Line..... 97	COAL:	CURRENT PRICES
Nevada..... 93	MINING STOCK	New York..... 97	Chemicals..... 102
New Mexico..... 94	TABLES:	Buffalo..... 97	Minerals..... 102
North Carolina.. 95	Boston..... 100	Chicago..... 97	Rarer Metals... 102
Pennsylvania.. 95	Coal Stocks.. 100	Pittsburg..... 98	ADVT. INDEX... 19
Tennessee..... 95	New York..... 100		

REVIEWS of the mining industry in Mexico and along the Gogebic Range in Michigan and Wisconsin, which arrived too late for our statistical number, are printed in this issue.

THE prospect for the year 1892 is for a still larger output of spelter than in 1891, many of the zinc works having increased their capacity and some new processes for utilizing zinc-lead ore, having now reached a point which promises to add to the quantity of ore treated.

While it is true that the metallurgy of zinc is in a shamefully backward state, still quite important improvements and economies have been effected in the cost of production in recent years, chiefly through improved details of construction, which permit of a larger output per man and per works.

The question of utilizing the zinc of the zinc-lead ores found in depth in nearly all the lead mines is attracting great attention, and is in fact one of the most important questions in metallurgy to-day. The undoubted success of Mr. BARTLETT at Canon City, Colo., in making a zinc-lead pigment from the treatment of such ores is highly encouraging to the profession.

WITH very commendable promptness and enterprise the *Mining Industry and Tradesman*, of Denver, published complete statistics of the mineral production of Colorado, in its issue of Dec. 31, detailed returns having been received from all the smelters in the State with the exception of one, the product of which was estimated. Commenting upon the failure of this concern to furnish figures, our contemporary suggests the enactment of a law by the next State Assembly which will compel all smelting works in the State handling Colorado ores to make public their statistics of ore purchases and bullion product. The *Mining Industry and Tradesman* is right in emphasizing the importance and value of prompt and reliable statistics of mineral production in a State where mining is the leading industry and all other branches of business are closely interwoven with it and dependent upon it; we doubt, however, if it will seriously advocate the passage of such a law as it suggests, the legality of which would be questionable, to say the least. The press must depend for its statistics upon the courtesy of the producers; in our own case we have found this unflinching and practically universal, the confidential manner in which we treat the figures intrusted to us being recognized and appreciated.

It is an unfortunate characteristic of certain narrow-gauge natures to be envious of the success of others and to seek by petty carping criticism to lessen the estimation of creditable achievements of which they themselves may be incapable. This disposition does not often show itself in the conduct of great newspapers, and especially of the trade and technical papers, which are usually very frank and generous in their recognition of good work by their contemporaries and even by their rivals. It does, however, occasionally show itself, as in the last issue of our esteemed contemporary, the *Iron Age*, whose editor, being himself a statistician, is capable of appreciating the magnitude of the work performed by the *ENGINEERING AND MINING JOURNAL* in collecting the mineral statistics of more than a continent and publishing them within a few days of the close of the year to which they relate. He captiously criticises our statistics of lead production, claiming, without any returns or other data on which to base his assertion, that the production of lead in 1891 was less than 200,000 tons, instead of 205,488 tons, as in our official figures, and he bases this statement on his unsupported guess that Missouri, Kansas, Illinois and Wisconsin did not produce 40,000 tons of soft lead. As a matter of fact the *Iron Age's* statistical guesser is wholly at sea in this matter as he was in his reports of lead and copper production in 1889 and in 1890. As we have stated our statistics are made up from the direct official returns of every producer and refiner in the country, and there is no reason whatever to question the accuracy and good faith of these official statements. Certainly they are not to be called in question on a mere guess wholly unsupported by returns, and which is too evidently inspired by a petty spirit of envy.

THE PRODUCTION, CONSUMPTION AND STOCKS OF COPPER IN 1891.

Notwithstanding the infinite care taken in making up our mineral reports, a clerical error has been discovered in the statistics of copper, where the Tamarack Mining Company, of Lake Superior, is credited with an output in 1891 of 10,199,415 pounds, instead of 16,199,415 pounds, which was its actual production.

This error requires the following corrections to be made in tables on pages 19 and 17, which we would suggest that each of our readers make on the margin of his copy of the *JOURNAL*: The production of Lake Superior mines on page 19 should read 115,370,000 pounds, or 51,505 gross tons; the total production 298,620,000 pounds, or 133,313 gross tons; the total available supply 402,830,000 pounds, or 179,831 tons and the consumption in 1891 216,820,000 pounds, or 96,795 tons.

The production in this country now amounts more nearly to 44 than

to 43 per cent. of the world's output of copper. The corrected table is as follows:

	1890.		1891.	
	Pounds.	Tons of 2,240 lbs.	Pounds.	Tons of 2,240 lbs.
Lake Superior.....	99,750,000	44,531	115,370,000	51,505
Arizona.....	34,900,000	15,580	39,700,000	17,723
Montana.....	111,200,000	49,643	113,200,000	50,536
New Mexico.....	870,000	388	1,600,000	714
California.....	1,600,000	714	3,750,000	1,674
Colorado.....	6,000,000	2,679	7,000,000	3,125
Utah.....	600,000	268	1,700,000	759
Eastern and Southern.....	3,900,000	1,741	1,300,000	580
Other sources (Lead smelters).			3,500,000	1,563
From foreign ores.....	6,100,000	2,723	11,500,000	5,134
Production.....	264,920,000	118,267	298,620,000	133,313
Stocks on hand January 1st.....	65,000,000	29,018	101,000,000	45,089
Imports of pigs, bars, etc.....	664,000	296	3,200,000	1,429
Total available supply.....	330,584,000	147,581	402,820,000	179,831
Deduct exports.....	40,000,000	17,857	110,000,000	49,107
“ consumption.....	189,584,000	84,635	216,820,000	96,795
Stocks on hand December 31st	101,000,000	45,089	76,000,000	33,929

AUSTRALIAN CHEESE MINES.

The Melbourne *Journal of Commerce* for a long time has watched with a jealous eye the splendid growth of American institutions. It has known all along that the United States led all other countries in the richness and variety of its mineral deposits and that New York had, in the *ENGINEERING AND MINING JOURNAL*, the best mining paper in the world. We can not blame our esteemed contemporary for feeling envious; it is a very natural feeling indeed.

Despairing of success in a legitimate manner, our contemporary comes out with a tale of recently discovered mineral riches of a startlingly unique kind. In a late issue it states that a farmer, whilst digging a well, struck a vein of natural cheese $3\frac{1}{2}$ ft. thick, at a depth of 80 ft. An analytical chemist (presumably of Australian birth and education) has declared it to be cheese of a very high grade. It is said to be “of a beautiful golden colour [with an “u”], and will keep any length of time.”

Such are the very meager details furnished by the *Journal of Commerce*. We regret that our contemporary fails to tell us whether the farmer has since signed the pledge, and whether, since the shaft struck the vein, the people of the neighborhood have been obliged to go about holding their noses in one hand and waving away the smell with the other. The *Journal* likewise neglects to enlighten us as to the character of the ore; it does not state whether it is *Limburgerite*, *Brie-blende*, *Stiltonite*, *Parmesanite* (an amorphous mineral much used as a flux in the reduction of refractory maccaroni), or which of the other known varieties. It also forgets to tell us the assay value of the cheese and its gastronomic desirability. The cheese may be good enough for Antipodean palates, and yet be rejected scornfully by New York free lunch fiends.

Howbeit, it is not to be expected that our contemporary should attain to the literary excellence, thoroughness of information and abundance of technical details which are displayed in the mining news of “the best mining paper in the world.” We do not ask the impossible, but we had not looked for so amateurish a way of reporting so grand and gorgeous a discovery, and we advise our readers not to invest in any company which may be formed to exploit it until the *Journal of Commerce* has answered fully and satisfactorily the following questions:

1. (a) Is the farmer a cheese-mining engineer of repute? (b) What is a fair average discount to be made on Australian reports of bonanza “finds”?
2. (a) Is the analyst a competent judge of Welsh-rarebits?
3. Is the cheese impenetrable? (If so, the demand from boarding houses and restaurants insures for it a ready sale.)
4. Can a man smell this cheese and survive? (If not, give the distance at which a sniff may be taken with comparative safety.)
5. (a) Is it combustible, and (b) if so, could the fumes be used successfully in the slaughter of Jersey mosquitoes?
6. At what depth do the Australian engineers think that the source of the deposit, that is, the cow, will be struck?

If the discovery be confirmed, it will no doubt prove of incalculable value to Australia. There is a tone of quiet exultation throughout the *Journal of Commerce* article which lends credit to it, but we cannot ignore the well established reputation these colonists have for losing sight of facts when descanting on the resources of their little world. We do not wish to dampen their natural and patriotic enthusiasm, but we are above all conservative and opposed to all kinds of wild “booming.” We must, however, say that if a cheese mine had been discovered in this country the very next day would have seen shafts on adjoining locations, some of which would undoubtedly have found a pocket of crackers; and since nature in this country has rounded off her blessings with a regard to the eternal fitness of things there would certainly have been struck in the immediate vicinity a never failing artesian source of ice cold lager beer. That is the way things are done in this country, and even our ineradicable modesty cannot overcome our sense of duty in stating the fact.

MINING IN COLORADO IN 1891.

The past year has been a phenomenal one in the history of the mining industry of Colorado, the gross value of the output of the mines of that State having exceeded that of 1890 by nearly \$3,500,000; and that of 1889 by about the same amount; it will be remembered that the product of 1890 showed a slight falling off from 1889. In 1891 however, there has been an increase in the output of each of the four principal metals mined in the State, silver and lead showing the greatest proportional increase. The amount of copper produced in Colorado, as reported by our Denver contemporary, the *Mining Industry and Tradesman*, is below the actual amount that should be credited to the State, for some Colorado copper ores were smelted out of the State and do not appear in its statistics. Our own returns have been traced back to the mines in most cases, and considerably exceed those of the *Mining Industry and Tradesman*.

As the output of the Leadville mines was but a few thousand dollars more in 1891 than in 1890, and as it is improbable that the old camps of Gilpin and Clear Creek counties made more than their average outturn of ore, it follows that the great increases in the silver-lead production of Colorado during the past year has come principally from the two remaining important mining districts of the State—Aspen and the San Juan—although several new camps have helped to swell the total. Three new mining camps—Nolan, Cripple Creek and Creede—have come into prominence during the year. Of these, the last is regarded as one of the most important discoveries that have been made in Colorado since Leadville and Aspen. Large bodies of ore of good grade have been found near the surface, and six mines are already making shipments, the camp being favored with excellent transportation facilities. The extent of the ore bearing zone has not yet been determined, but it is said to be, in all probability, several miles square.

Some of the values attributed by the smelting works to their products and published by the *Mining Industry and Tradesman* are quite ideal. Thus the value of copper is counted at 13½c. a pound, while in reality it was worth less than 9c., being nearly all in the form of matte. Lead is valued at 4.33c. per pound, which is about the average market price during the year in New York for refined lead, while the Colorado product was nearly all in crude bullion which had still to be refined and to pay freight to the market. Probably this item is overvalued fully 25 per cent.

The production of lead in Colorado is given as 63,128 tons of 2,000 lbs. Our own figures were given at 64,000 tons, a close agreement.

The *Mining Industry and Tradesman* has earned the thanks of the mining industry for this excellent statistical work. It is to be regretted that every State has not some local paper with enterprise enough to do similar work for its own district.

BOOKS RECEIVED.

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

Annual Report of the Chief Inspector of Mines of Ohio for the Year 1890. By Robert M. Haseltine, Chief Inspector of Mines. Published by the State, Columbus, O., 1891. Pages, 225. Illustrated.

Ausführliches Handbuch der Eisenhüttenkunde. Gewinnung und Verarbeitung des Eisens in theoretischer und praktischer Beziehung unter besonderer Berücksichtigung der Deutschen Verhältnisse von Dr. Hermann Wedding, Königl. Preussischem Geheimen Bergrath. In drei Bänden, mit zahlreichen in den Text eingedruckten Holzstichen, Phototypischen, Abbildungen und lithographirten Tafeln. Erster Band. Allgemeines Eisenhüttenkunde. Erste Lieferung. Druck und Verlag von Friedrich Vieweg und Sohn, Braunschweig, Germany 1891. Pages, 586. Illustrated.

Electro-Metallurgie. Die Gewinnung der Metalle unter Vermittlung des Elektrischen Stromes von Dr. W. Borchers. Published by Harald Bruhn, Braunschweig, Germany, 1891. Pages, 160. Illustrated.

NEW PUBLICATIONS.

AN INTRODUCTION TO THE STUDY OF METALLURGY. By W. C. Roberts-Austen, C. B., F. R. S., Associate of the Royal School of Mines, Chemist and Assayer of the Royal Mint, Professor of Metallurgy in the Royal College of Science, with which the Royal School of Mines is incorporated. Pages 292. Illustrated by numerous diagrams. Chas. Griffin & Co., London; J. B. Lippincott Company, Philadelphia, publishers.

Roberts-Austen's “Introduction to the Study of Metallurgy” is the first systematic expression in English of the wider scope and area which metallurgy is now embracing. While chemistry and physics are blending into one science, metallurgy and mechanics are assuming relations so close and inter-dependent, that a knowledge of physics is becoming as necessary a part of the equipment of the metallurgist as a mastery of chemistry itself. The effect of very minute quantities of one metal in modifying the physical properties of another have been recognized and applied by the metallurgists of all times, and by none more skillfully than by the ancients in the fabrication of bronzes, or more artistically than by the Japanese in the production of metallic tints. But while the relation has been recognized in all times, the importance of the dependence of metallurgy on physics has been appreciated by the metal workers of Europe and America, at even its approximate value, only since the influence of exceedingly small fractional proportions of certain elements on the character of steel have raised the problem into a position of extreme significance.

This fact once recognized, chemistry was applied to for an explanation.

The explanations given were at first generally accepted; but ere long other facts and phenomena contradictory to the explanations, or for the solution of which the chemical theories were insufficient, spring up so rapidly that the metallurgist has had to turn from the chemist to the physicist, and trust to the testing machine rather than to the analytical balance. As a consequence, while the metallurgical treatises of the past elaborated the chemical features of the science, a modern treatise will devote most space to the physical properties and the molecular structure of metals, to alloys, to the modifying influence on metals of the metalloids, to the change in construction wrought by the temperature at which fusion is effected or maintained, and by the sudden or gradual heating or cooling of the metal; to the effect of pressure on metals in both the fluid and the solid state, and to the physical apparatus and mechanical appliances by which the electrical conductivity, the hardness, the strength, and other properties of the product of the metallurgist's art are to be tested.

The necessity of this intimate alliance of chemistry and physics in metallurgy is suggested by the dual nature of the minerals from which the metals are derived; for, to take only one instance, the relation of condensation to involubility, linking together the chemical constitution with the physical properties of minerals, is so invariable as to be made the ground of the natural system of mineralogy which has been worked out so ingeniously and so plausibly by Hunt.

In Roberts-Austen's treatise, which is an abstract of his lectures, we have a good example of what rational teaching is. Instead of crowding his student's memories, or rather their note books, with details of metallurgical processes many of them out of date; and with dimensions and shapes of furnaces, which if the student accepted as necessarily the best and not merely the size and design which marks the progress attained at any given date, he would become as unprogressive as a theologian of the old school or as a Welsh smelter. Prof. Roberts-Austen lays clearly before him the great principles involved in his noble art. He teaches him that while he is handling enormous masses he can only attain certain safe results by ascertaining the influences of infinitesimal quantities of foreign matter on the basis material. He enlarges with the enthusiasm, which the magnitude and mystery of his subject must excite in a devotee to his science, on the beautiful analogies which exist between fluid and solid metals, and on the allotropic changes in metals brought about by combining them in alloys, and by exposing them to great stress and to heat or cold. For allotropy is the physiognomy of metallurgy. It confers on metals a charm almost akin to that of the play of facial expression. He, of course, gives due prominence to the part which carbon plays in modifying the physical condition of iron and steel, and he describes the chameleon-like facility with which carbon changes its own state and condition as it casts its spell and exerts its mighty power, insignificant though it be in quantity, over the vast metal masses which it dominates. Besides discussing in detail the familiar facts and effects of annealing, hardening and tempering, and the molecular changes which heat and strain effect, he brings the subject up to date by describing the beautiful phenomena of recalescence by condensing the important investigations of Barus and Stronhal on temper and viscosity.

In the chapters on fuel, furnaces, and metallurgical processes the same skill is shown in subordinating the unimportant to the important and in giving prominence to the fundamental laws, chemical and physical, which control all metallurgical operations, rather than to the shifting practices and constantly varying appliances through the means of which these processes are executed. Nevertheless reference is made, and by concise description or tables a clear idea is conveyed of all the more modern metallurgical methods, especially those designed for the economical manufacture of coke and the production and utilization of gaseous fuels.

In the table of reverberatory furnaces the next edition should include the dimensions of the large matteing furnaces at Argo described by Dr. Peters. In the short paragraphs on roasting furnaces it is somewhat invidious to single out Stetefeldt's to the exclusion of the O'Hara, Bruckner, the White-Howell and others, and it is careless to quote as the only disinterested authority so old a work as Küstel's "On the Roasting of Gold and Silver Ores," ed. 1871.

Credit is always given where credit is due, and therefore, as might be expected, repeated reference is made, not only to Mr. Howe's work on iron and steel as a compendium of facts, but to Mr. Howe's opinions, as worthy of weighty consideration.

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.

Australian Sulphide Ores.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In answer to your correspondent "Penn" in your issue of September 19th, 1891; there are millions of tons of sulphide ore in the Broken Hill lode. In the last half-yearly report issued by the directors of the Broken Hill Proprietary Company, results were given from 35 samples of ore taken throughout the length of the company's property (3,960 ft.). The silver contents varied from 7 oz. to 84 oz. per ton of 2,240 lbs., and the lead from 6% to 45%. The average of the 35 samples gave 27 3/4% lead, 20 1/2% zinc, 21 3/4% oz. of silver per ton.

The Block 10 Company, the property of which adjoins the Broken Hill Proprietary Company's on the south, extracted 13,000 tons of sulphide ore during the last half year in purely development work. The average was 23% lead, 29% zinc and 34 oz. silver. And so all along the line. All the companies have developed sulphides in their lower levels. The reason that the ore is not treated is not that it cannot be done with profitable results, but the directors of the several companies deem it advisable to await the discovery of some method whereby the ore will yield a fair proportion of its assay value. Here is an opening for Crosemire or Bartlett with their zinc saving methods. All the silver lead mines so far developed in Australia get down on the sulphides containing large quantities of zinc. In some places the sulphide carries a small quantity of copper, with a little lead. At two or three such mines heap roasting is

practiced and the silver is concentrated into a copper matte, but in most places the treatment of the sulphide is not attempted.

It may be interesting to your readers to know that the square set system of timbering is being "found wanting" at the Broken Hill Proprietary Company's mine, and a system of open quarrying for the shallow levels is being introduced. Whether this will be followed by some system of filling for the lower levels remains to be seen. In a place where mining timber costs over \$50 per thousand one would think so.

LEADVILLE, N. S. W., Australia, Nov. 18, 1891.

F. M. DRAKE.

WATER POWER COMPUTATIONS WORKED OUT BY THE SLIDE RULE.

Written for the Engineering and Mining Journal by William Cox, C. E.

In a former article (in the ENGINEERING AND MINING JOURNAL of August 15th, 1890) we showed that the Slide Rule is specially suited for the solution of all kinds of pump calculations. Another class of computations whose working out is greatly facilitated by its use is that numerous one having reference to water power. In the present article we propose, therefore, to give the various formulæ, with demonstrations for their solution.

It is necessary, however, at the outset to state that in many cases it is more advantageous to work with the slide inverted, that is to say, turned round end for end, so that scale B (now called B inverted) lies along scale D, and scale C (called C inverted) along scale A, the scales of the slide thus having their initial 1 on the right-hand, and progressing toward the left-hand. It will on examination be noticed that when the slide is in this position (called slide inverted) the number on the slide which coincides with any given number on the rule is its reciprocal and vice versa, so that an operation which, when performed with the slide in its usual position is multiplication, now becomes division, just as in arithmetic 3 is the reciprocal of 1/3, and 4 x 2 is equivalent to 4 ÷ 1/2. For the purposes of multiplication therefore with the slide inverted, the two factors, one on the slide and one on the rule, have to be made to coincide with each other, and the quotient is found against either of the indices. By reducing an equation therefore to this form we are often enabled to diminish the number of operations to be performed, and also to see at a glance all the combinations of factors which will produce the same quotient, which cannot be done with the slide in its ordinary position. Thus let it be required to solve the equation a x b x c = x, where c is a fixed constant, and let a = 4, b = 6, and c = 8; then x = 192. The ordinary method of solving this on the slide rule requires two operations, but the solution would be the same if we took for c its reciprocal .125, and divided by this instead of multiplying by 8, thus 4 x 6 / .125 = 192. This en-

ables us to put the formula into the form a x b / c = x, which is the same as the proportion a/c = x/b. With the slide in the ordinary position, a on the

slide has to be set to the constant reciprocal c, on the rule, and over the factor b on the rule, the answer is found on the slide, thus:

A	|		|	
B	|	Set a	|	Find x
C	|		|	
D	|	To C ₁	|	over b

but with the slide inverted, we place the two factors a and b against each other, and on the rule under the reciprocal C₁ we find the answer, thus:

A	|		|	
C ₁ I.	|	Set a	|	Under C ₁
B. I.	|		|	
D	|	To b	|	Find x

The advantage of this latter method is that we see at a glance all the different factors or values of a and b, which, when multiplied together and also multiplied by the constant, give the same product for x. Thus, in the previous example, the same product of 192 is obtained by the factors 4 and 6, 5 and 4.8, 3 and 8, 2 and 12 etc., all these different combinations being obtained by mere inspection. In some cases, as will be seen from our water-power formulæ, this very much simplifies the work required. The only inconvenience is that with all slide rules as at present made, the scale C. I. is found alongside of scale A, and scale B. I. along scale D, so that the Runner has almost always to be used to find coinciding numbers. The writer has, however, just patented a new slide rule in which this difficulty is overcome; it will also have the further advantage that such formulæ as a x b x c = x can be solved with one single setting of the slide and without the use of reciprocals.

We now give the demonstrations of the different formulæ relating to water power, requesting that note be taken that the solutions as given are intended for the Mannheim Slide Rule, which has the two upper scales A and B alike, and also the two lower scales, C and D alike. Let H = head or fall of water in feet; V = velocity in feet per second; C = constants or coefficients; D = diameter in inches; E = percentage of efficiency; R = hydraulic mean depth or radius, = for pipes D/4 = for channels area of wet cross section + wetted border; S = sine of

slope = H/L; L = length in feet.

1. Theoretic velocity of a fall of water = 8.025 √H

A	|	To head in feet.	|	
B	|		|	
C	|	Set 1	|	Under 8.025
D	|		|	Find velocity.

2. Real velocity of discharge = 8.025 √H x coefficient.

A	|	To head in feet	|		|	
B	|		|		|	
C	|	Set 1	|	Runner to 8	|	1 to R Under coefficient.
D	|		|		|	Find real velocity

A NON-OXIDIZING PROCESS OF ANNEALING.

Written for the Engineering and Mining Journal by H. P. Jones, M. E.

The writer has recently been able to conduct some experiments in connection with a non-oxidizing process of annealing iron or steel, and as the process has proved to be very practicable and efficient, he feels warranted in bringing the results of the experiments to the notice of engineers. The ordinary process of annealing, by means of which hard and brittle iron or steel is rendered soft and tough, consists in heating the metal to a good red heat and then allowing it to cool gradually. While the metal is in a heated condition the surface becomes oxidized, and although for many classes of work this scale of oxide is of no practical importance, yet in some cases it is very undesirable and even necessitates considerable expense in its removal.

In order to prevent this oxidation many methods have been devised and some of these, for special purposes, have met with more or less success. In nearly all of these devices use is made of a closed pot or retort, in which the metal to be annealed is placed and then the retort and its contents heated to the required temperature in a suitable furnace. The amount of air and therefore the amount of oxygen contained in the retort is often diminished by filling the intervening spaces with sand, etc., and in some cases the atmosphere within the retort is rendered non-oxidizing by inclosing iron chips or filings, with which the oxygen combines. Another method, similar to the preceding, is to fill the retort with non-oxidizing gas.

It is evident that in order to be of value, a process of the latter character must be not only very efficient, but also practical and inexpensive; as far as the writer is aware such processes have heretofore failed in these requirements.

In those processes that have come to the knowledge of the writer, the practice has been either to confine the gas in a retort containing the metal to be annealed, or to maintain a constant flow of the gas through the retort. The first method is objectionable on account of its requiring a very strong retort, and also for the reason that it is almost impossible to prevent some leakage of the gas during the expansion in heating, and a proportionate entrance of air during the contraction of the gas in cooling, thus resulting in some oxidation of the inclosed metal. The second method is objectionable on account of the quantity of gas required, which makes the process a very expensive one.

The process which will be described is one using a non-oxidizing gas and is the invention of Mr. Horace K. Jones, of Hartford, Conn., to whom patents have been issued. The principal feature of this process consists in keeping the retort in communication with the gas holder or gas main during the entire process of heating and cooling, the gas thus being allowed to expand back into the main, and being therefore kept at a practically constant pressure.

Although the process is now made public for the first time, it has been in constant use for more than two years and during this time several tons of metal daily have been annealed and turned from the retorts perfectly bright, and at a very slight expense. The retorts used were made from wrought iron tubes and were of different sizes suitable for the work to be annealed. The gas used was taken directly from the mains supplying the city with illuminating gas, and while it might be expected that some of the constituent gases would produce a deleterious effect upon the metal, yet the annealed metal has been found to be practically uninjured.

Not only has the process been used in the annealing of work that it is desired to bring out perfectly bright, but it has also been the practice to re-anneal by this process all of the tool steel used in a large machine shop, although already annealed at the steel works where made, and the slight additional expense has been found to be more than compensated by the ease with which the steel is worked and by the saving in wear of cutting tools.

It was also noticed that if metal which had been blued or slightly oxidized was subjected to the annealing process it came out bright, the oxide being reduced by the action of the gas. Practical use has been made of this fact in de-oxidizing metal.

A very important feature of the process is the fact of its being purely mechanical; any workman of fair intelligence being able to produce the best of results. In the case of the ordinary process of annealing it is well known that even an expert workman often either overheats and burns the work or fails to make it soft enough; but in the case of the gas process a very little care entirely eliminates this uncertainty.

Although, as stated above, no injury to the metal could be observed after having heated it in contact with the illuminating gas, yet it is not known that at least theoretically certain gases might have an injurious effect.

It is not intended to discuss the effects of different gases upon iron or steel heated in contact with them; it will be sufficient to quote the conclusions arrived at by Mr. Henry M. Howe, who in connection with the subject of non-oxidizing processes of annealing wire* states that "nitrogen should be perfectly harmless and efficient; hydrogen and hydrogen-bearing gases might be injurious. Carbonic acid would oxidize the iron; and even carbonic oxide would oxidize it slightly, but perhaps so slightly that its effects would be wholly removed in drawing."

In order to ascertain whether any injury to the metal, so slight as to have been overlooked in practice, had resulted from the use of illuminating gas, and therefore whether an advantage would be derived from the use of nitrogen as the non-oxidizing element, comparative tests were made of specimens of metal annealed in illuminating gas and of specimens annealed in nitrogen.

The results of these tests were compared with the results of tests of specimens annealed in an open fire and cooled in ashes and of specimens of the un-annealed metal, and thus the relative efficiency of the gas process determined.

The illuminating gas used was taken from the mains supplying the city, as had been the custom, and the nitrogen was taken from a common gas holder of small size which had been filled with the gas obtained by means of a simple and inexpensive method used by Mr. Jones for the purpose. An analysis of this gas showed it to be practically pure nitrogen.

It is obvious that in order to make a fair comparison between specimens annealed in the two gases the specimens compared must be from the same stock of metal and they must have been subjected to the same conditions as regards heating and cooling. To insure this uniformity the

specimens were placed in two annealing retorts, one using illuminating gas and the other nitrogen, and heated side by side in the same furnace, care being taken to maintain an even fire. After remaining in the furnace the requisite length of time they were withdrawn and carefully cooled together.

The ordinary bending test for flexibility not having been found sufficiently refined to detect any differences in the specimens, it was determined to make the per cent. of elongation the basis of comparison.

Experiments tend to prove that some gases, as for example hydrogen, affect the property of flexibility to a much greater degree than the elongation; but as the elongation is sensibly affected, and as an accurate numerical comparison between specimens with regard to flexibility would be exceedingly difficult, a comparison with reference to the elongation was considered sufficient for the purpose in view.

The specimens were made from steel wire .188 in. in diameter, and were turned down to diameters of .156 in. and .150 in. Different lots of wire were tested in order to secure average results. The elongations were in each case referred to an original length of 1.15 in.

The writer is aware that the use of such a short specimen invites criticism as it seriously detracts from the value of the tests, as tests of metal; but the main object of the experiments was to effect a comparison between the methods of annealing, and the testing machine available was one designed for the use of small specimens only, and, as an accurate comparison between specimens tested in this machine certainly could be made, it was decided to use the above length.

Several specimens of greater length than 1.15 in. were tested and the per cent. of elongation was found to be the same as in the shorter specimens. The elongations were noted for each additional load of 50 lbs., the measurements being carefully made by means of dividers.

In order more easily to study the results of the tests, curves were plotted from data obtained in the above manner, but it is thought unnecessary to reproduce these curves here and the accompanying table of average results is substituted. By a reference to this table it will be seen that the difference in total per cent. of elongation and breaking load between the specimens annealed in nitrogen and those annealed in illuminating gas is very slight, and the conclusion is at once arrived at that for most classes of work practically as good results can be obtained by the use of illuminating gas as by the use of nitrogen.

In the case of each lot annealed the use of nitrogen resulted in a slightly greater total per cent. of elongation, this gain being 1.04% in lot A B, .80% in lot C D, and 1.28% in E F, while, with the exception of lot E F, the breaking loads were slightly greater for those specimens having the smaller percentages of elongation, as would be expected.

If the value of metal after annealing be represented by the product of the breaking load multiplied by the total per cent. of elongation, the value would be slightly greater for the specimens annealed in nitrogen.

In the case of lot G care was used to obtain the results of actual practice, but it will be seen that the total per cent. of elongation falls much below that of specimens annealed in either of the gases.

If the specimens had been annealed in lime or in charcoal dust, instead of being exposed to the open fire, it is probable that slightly better results would have been obtained.

If the efficiency of the nitrogen be represented by 100, then that of illuminating gas will be 95, and that of the ordinary process of heating in an open fire and cooling in ashes will be 86.

In the regular work of the shop where this process was in use a very severe test was found, consisting in striking up plates of the annealed steel in a press, the die having many sharp angles and depressions, but the metal showed no signs of injury after this severe treatment. A coal burning annealing furnace designed to meet the requirements of this non-oxidizing process has been introduced recently into one of the largest manufacturing concerns in England, and is giving entire satisfaction.

In this country both coal burning and oil burning furnaces are in use, the oil burning furnace being preferred where fuel oil is obtainable.

So far as known to the writer, this is the only perfectly non-oxidizing process of annealing, and, as it is an acknowledged fact that in many branches of manufacture such a process is urgently needed, it would seem that its simplicity, economy and efficiency should commend it to manufacturers.

Lot.	Gas Used.	Number of specimens tested.	Diameter in inches.	Breaking load in pounds.	Breaking load, pounds per square inch.	Total per cent. of elongation.	Per cent. elongation gained by annealing.	Treatment.
A	Nitrogen.....	4	.156	1,187	62,110	29.12	22.00	Specimens in retorts during 2½ hours, being kept at a good red heat for 15 minutes, the remainder of the time being taken up in cooling.
B	Illuminating..	4	.156	1,206	63,140	28.08	20.86	
C	Nitrogen.....	4	.150	1,062	60,000	28.00	19.20	Specimens were annealed in retorts with A and B, but were from different stock, and were turned to a slightly smaller diameter.
D	Illuminating..	4	.150	1,069	60,400	27.20	18.40	
E	Nitrogen.....	5	.156	1,095	57,330	30.88	23.76	Annealed in large retorts in connection with routine work of the shop. Specimens in retorts during 20½ hours, being in furnace for 4 hours and cooling for 16½ hours.
F	Illuminating..	5	.156	1,090	57,070	29.60	22.48	
G	Open fire.....	8	.156	1,205	63,090	26.76	19.64	Specimens were annealed at different times, being cooled in ashes.
H	Un-annealed..	5	.156	1,855	97,120	7.12	.....	Specimens from the original stock, tested without annealing.
I	Un-annealed..	5	.150	1,430	80,790	8.80	.....

*Metallurgy of Steel, 1891, p. 225.

THE SILVER MINER OF THE COMSTOCK.*

Written for the Engineering and Mining Journal by Dan De Quille.

Although there had been considerable surface washing for gold in Georgia and North Carolina (in a gold belt extending from the Rappahannock River, in Virginia, to the Coosa, in Alabama) for nearly a quarter of a century (from 1829), as a people we did not begin our career as miners of the precious metals until the discovery of gold in California. That event made gold diggers of men of every State in the Union. Even then, for a considerable length of time, the work was merely the washing of surface material by means of pans, rockers, toms and sluices, and by the newly invented hydraulic method. The men who first flocked to California were more gold finders than gold miners. Nature for untold ages had been doing the mining. The "men of '49" merely came in and made a grand "clean-up" of sluices that had been running for thousands of centuries.

The work done by the early miners of California was merely gold washing, such as had been practiced by the people of many countries, savage as well as civilized, in both the old world and the new, for thousands of years. The nearest approach to real mining made by the first of the California gold hunters was in what are known as "drift diggings"—diggings in which tunnels are run into hills and mountains beneath which are deposits of rich auriferous gravel, popularly supposed to be the channels of ancient rivers of the prehistoric days of the mammoth and the mastodon.

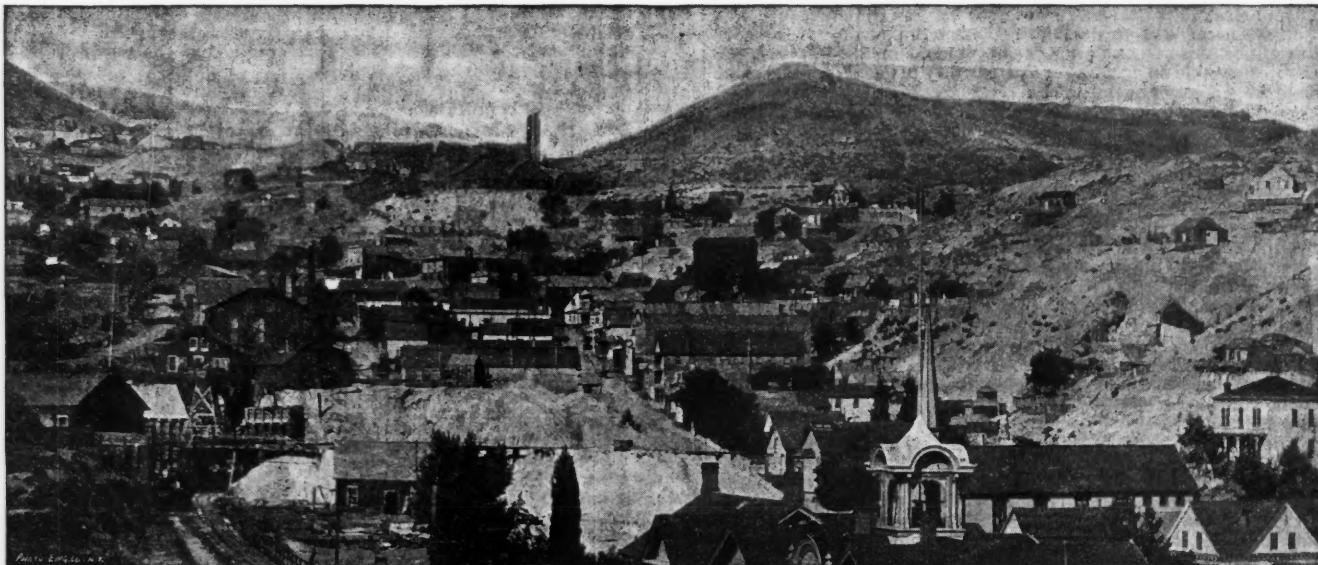
The drifting-out of the "pay gravel" found upon, and for a few feet above the bedrock under the great gravel mountains—frequently lava-capped—was the first move made toward real and scientific mining in California. The real work of mining commenced when the people of that State began (about Grass Valley and Nevada City) to explore and open up the many veins of rich gold-bearing quartz found cropping out all through the surrounding hills and mountains.

of man in the subterranean regions. On the contrary the great stations, the main working drifts and crosscuts, and the large chambers of all the principal levels are lighted up with lamps and candles. In one of our great mines there is neither day nor night; it is always candle-light. Absolute pitch darkness prevails only in some far-away and little frequented drifts in distant parts of a mine. There the darkness is almost palpable.

When landed at the station of his level, dinner bucket in hand, the miner trudges away along a narrow subterranean road to some drift or chamber in which lies his work. When on duty in the depths he knows not whether it is day or night in the world above; whether it is cold or warm there, calm or tempestuous. Cyclones may rage on the surface of the earth, lightning may flash and thunders peal, but no hint of the elemental commotion reaches him. All about him in his distant drift is silent as the grave; indeed the miner when delving in some outlying drift is in a sort of rock tomb of his own digging.

The miner of the Comstock lode may be said to live and labor in a city beneath a city. There are streets and cross-streets through which he may travel miles and miles at points from 1,000 to 2,000 ft. beneath the cities on the surface—Virginia and Gold Hill. The great underground city—in which is sufficient lumber to build 20 towns, each of 5,000 people—has its busy places as well as its lonely and silent nooks and sections. At the stations of the great hoisting shafts, where many men are employed on the several levels, cars loaded with ore are seen arriving and departing. Great lamps with glaring reflectors (similar to the headlight of a locomotive) light up the station, which is an underground hall large enough for a first-class ball room; and the main drifts radiating from the station to different parts of the level, also have their lights, the line of which extends so far away that the most distant seen seems a mere spark or point of light, like the most distant star visible in the heavens—a mere pulsing twinkler.

At the station, and always at his post, will be found the station-tender. It is his business to attend to the landing of cars consigned to his station and to dispatch others that are going to the surface, signaling the engi-



GOLD HILL, COMSTOCK LODGE, NEVADA.

The work of the old placer miner was on the surface of the earth in the free, fresh air, and in the clear light of day. He delved in the beds of creeks, gulches, and rivers or mountain flats, shoveling the gold-spangled gravel into his sluice-boxes, or, holding the hydraulic pipe, poured an irresistible stream of water that caused hills to melt away and forests to totter and tumble. He could see about him on all sides and was never in dread of a hidden danger. In case of a great cave threatening to come down, or of any other danger appearing, the whole face of the country lay open before him and he had choice of routes by which to retreat.

It was not until the discovery of the great silver mines of Nevada, in 1859, that the mining of the precious metals began to be practiced in a scientific manner in the United States, aided by the use of the most approved and powerful machinery that the combined mechanical genius of the world could produce. The immense width of the ore deposit in the Comstock lode, in connection with the vast subterranean reservoirs of hot water, and the consequent heat of all underground openings, almost from the beginning compelled a resort to the best of the known mining methods of Cornwall and Germany, with also the invention of a new system of timbering (by Mr. P. Deidesheimer) and the practice of expeditious in pumping and ventilation unknown in any of the great mining centers of the Old World.

Very different is the life led by the miner of the Comstock lode, when on duty, from that of the old California gold washer. The scene of his labors is hundreds of feet beneath the surface of the earth in subterranean regions to which no ray of sunlight ever penetrates. When he descends the great shaft, going down and still down from 1,000 to 3,000 feet, he leaves behind all the grand upper world, so broadly and beautifully lighted up by the sun. When landed at his station from the car (cage) of his vertical cable road he steps forth into quite a different world—a world hewn out by the hand of man in the realms of eternal darkness, which, just beneath the surface crust, everywhere enwrap our planet. But it is a world with the highways and by-ways of which our miner is familiar.

All is not dark and dismal in this artificial world, shaped by the hand

neer standing at his engine in the hoisting-works far aloft in the upper world. The position of station-tender is one of great responsibility.

The station has much the appearance of the store or lumber-room of some big factory of the surface world. Along the floor against the side walls are seen coils of rope, boxes of candles, tools and many small lots of various other articles required on the level. Also in the station is seen a huge cask of ice-water—water in which several small icebergs are floating—and against the side of the cask hangs a big tin dipper; that is, it so hangs when it has a moment's rest, but it is almost constantly in the hands of some thirsty soul. There is a bench against one of the walls on which the weary who have a wait of a moment may rest, but there is very little time for lounging or "jocund ease."

At each level (generally about every 100 ft. down the shaft from the point where ore is first encountered) there is such a station as I have described. It is the center of life on each level, though at several points on the level there may be at work in the ore breast considerable squads of men. From such sections of the mine at certain times come the booms of blasts, sounding like a distant cannonade. When one is in a drift in the vicinity of the spot where one of the big dynamite blasts is fired one feels more than hears it. The concussion of the air in the narrow drift painfully strains the drum of the ear, and even at a distance the sensation is disagreeable. However, one has warning of what is coming. A cry of "fire, fire, fire" is raised and echoed by group after group in the neighboring drifts and other openings as soon as the fuses have been lighted.

Nothing of all this is heard or known on the surface, and the miner as little knows what is occurring immediately above him in the light of day. Railroad trains, wagons, carriages and crowds of people are at times rushing about over his head; again far above him a ball is in progress, a band is playing and a hundred couples are whirling in a waltz, or a thousand feet above him is a church—he may be beneath the very pulpit—where a minister is praying or expounding the gospel, mayhap uniting a couple in marriage. There may be fights, runaways and all manner of excitements just over the miner's head, but at the face of his drift all is silent as the tomb. It is only when a big fire starts in the city above that

* Copyrighted, 1891, by the Scientific Publishing Company.

news of what is going on there, is sent to the city beneath. Then the alarm spreads almost as rapidly as on the surface, pick boys and others spreading the news, and the men are rapidly hoisted to the surface. It is seldom, however, that a fire is so great that the men from all the mines on the lode are brought out, oftenest it is only those whose dwellings are near the scene of the fire.

The mines of the Comstock are now much better ventilated than before drifts connected the several main shafts and winzes of the many levels. Still the work of the miner is often in a hot and stifling atmosphere. Very frequently his work is at the face of a long prospecting drift where the only air he has to breathe is the scant supply pumped down to him through a pipe from the surface; as though he were a pearl-diver fathoms beneath the sea. The place in which he works at times shows a temperature of from 100° to 110°, or even as high as 120°. In such places he is stripped of all clothing but a breech-clout (heavy shoes protect his feet and he wears a cap to keep the sand from the slaking rock out of his hair), yet perspiration streams from every pore of his body. But for the gallons on gallons of ice-water he swallows he would be baked in his skin like a potatoe—the very life blood would be dried in his veins.

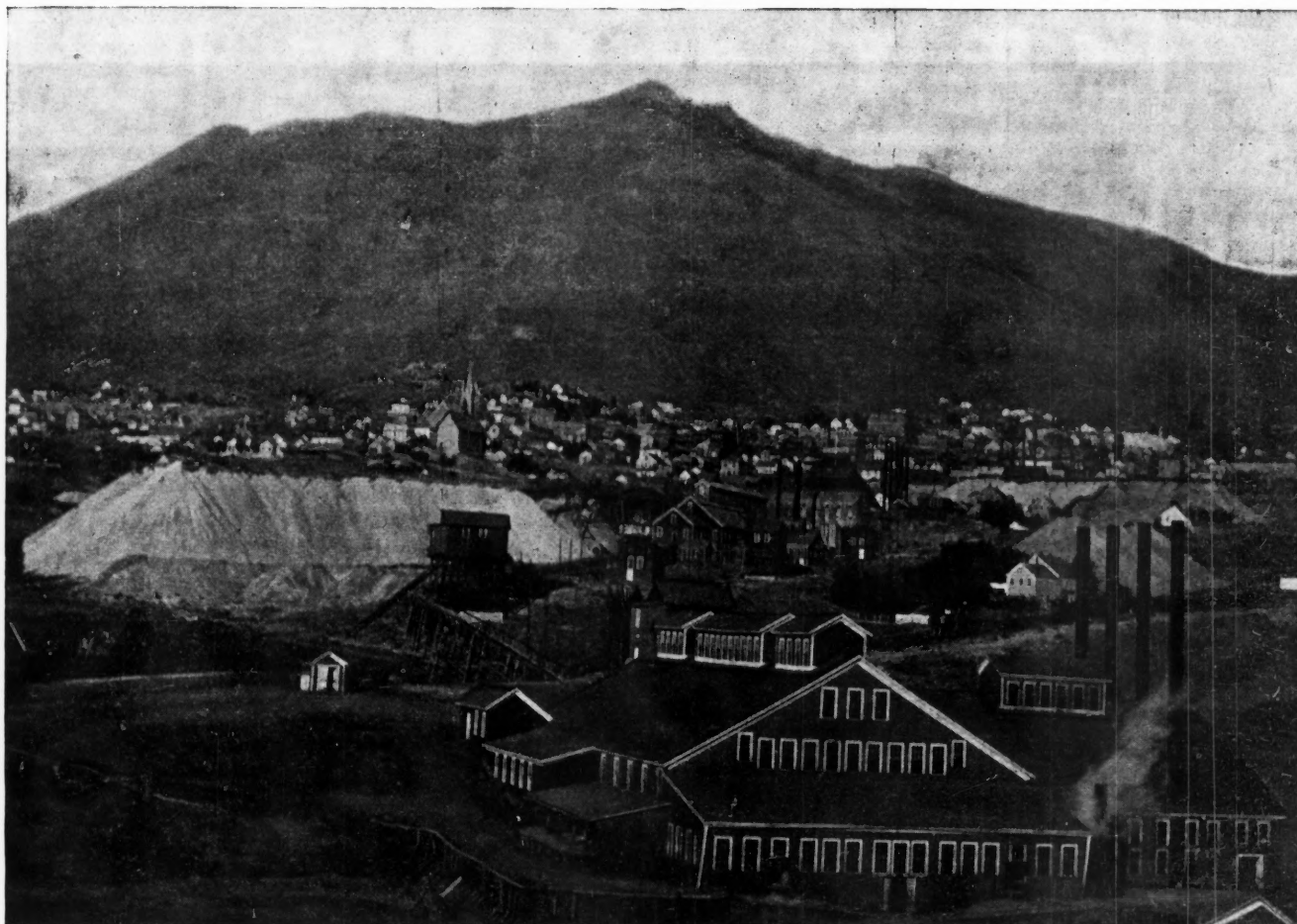
Though sweltering and gasping he must still swing his pick or sledge, must still handle a shovel or crowbar for a certain length of time—till

that merely to walk through the various drifts, cross-drifts, floors and chambers is about all they care to endure in the way of exercise.

In some sections of all our leading mines there have been times when a man would hardly be paid for what he would be obliged to suffer were he to receive a dollar an hour—places in which no man could endure to work more than from five to ten minutes at a time. Yet men have done a vast deal of work in such places—places where it was imperative that connections should be made and a circulation of air obtained.

A first-class mine is as regularly officered as an army. Over all is the superintendent, who commands on the surface as well as underground. Under him are the foremen, and then come the shift bosses. There are three shifts of eight hours each, with bosses for each shift, day and night. On each level where work is being done there are different sets of shift bosses. These bosses and the men belong on that particular level, and are allowed on no other. In his office at the top of the shaft is the time-keeper, who checks off the names of the men of each shift as they go into, and come out of, the mine, they forming in line and passing before his window.

Beside the actual rock-smiting miners there are employed at each mine many carpenters, also timbermen, who look after the timbers and timbering of the several levels; a pumpman, who takes care of the pumps; a ropeman (generally some old sailor), who looks after the ropes



VIRGINIA CITY, NEV., AND MT. DAVIDSON; C. AND C. PAN MILL IN THE FOREGROUND.

the end of his "pass" (of 15 to 20 minutes), when he can pass out of the drift to the cooling-off station and send in his partner to work his "pass."

A thousand dangers beset the miner in the deep and steaming levels. He may suddenly be overwhelmed by foul air or a rush of deadly gases; a charge of dynamite exploding prematurely may blow him to atoms or make him a blinded cripple for life; a fall of rock may crush him to death in an instant; he may fall hundreds of feet down a shaft and *en route* be so torn to pieces that his remains must be gathered up in fragments, the head here, a foot there, and a hand and arm in another place; he may be knocked into a sump and drowned or scalded to death; may be asphyxiated or roasted by a fire in the mine, or crushed to death between a cage and the timbers of the shaft, and even after reaching the top of the shaft in safety may be run up into the sheaves at the top of the "gallows frame" and dashed to death. Besides these and many other ways in which a miner may suffer loss of life or limb, there are almost every month men crippled or killed by the occurrence of accidents of a kind never before heard of, or even dreamed of, therefore of a nature impossible to be foreseen and guarded against.

When we take into consideration all the dangers a miner must brave, and all the suffering he must endure from heat and bad air (insufficient or vitiated), we can but feel that four dollars a day is by no means too large a sum to offer him for eight hours' work in the sweltering lower levels. [As many hot places are found 500 to 1,000 ft. beneath the surface on the Comstock lode as are encountered at a depth of 3,000 ft.] Simply to remain eight hours in the subterranean regions is worth something, not to speak of toiling that number of hours at the hardest of work. Visitors who enter the heated regions of our silver mines usually find

and cables; carmen, who run the cars on the various levels below and on the surface from the shaft to the ore and waste dumps; watchmen—each on his level—go their rounds day and night, on the watch for fires, caring for the many lights, and keeping an eye on everything on and about their beats. On the several levels are also men who run the donkey (compressed air) engines stationed at the tops of the winzes, and others who have charge of the other little engines that run fans or blowers; also with each shift are men who run the power drills. Everywhere in the underground city run pipes distributing compressed air, as power of the same kind is distributed in some cities of the upper world. Under, and at command of, all others are the pick boys. They go about through the levels of the mine collecting the dull picks, sending them to the surface to be sharpened, return the sharpened picks and drills, distribute water among the miners, and do all manner of odd jobs.

In the mines promotions proceed regularly (among the intelligent). The pick boy becomes a miner, the miner a shift-boss, the shift-boss a foreman, and the foreman a superintendent. For bright young men one of our great mines is a good school—the best mining school in the whole world to-day. Graduates from the Comstock mines now hold the position of superintendents of great mines in Mexico, Central and South America, Alaska, Australia, Africa, India, China, Japan, and all other countries on the face of the globe where mining is being done. As we have room here for the promotion of only a limited number of our competent men to the position of mine superintendents, many men are drawn from the ranks of our foremen, shift-bosses, and even from among the brightest of the working miners, to go forth as superintendents of mines in foreign lands.

IMPROVEMENTS IN REVERBERATORY SMELTING FOR COPPER.*

By E. D. Peters, Jr., M. E.

During the past three years there have been considerable advances made in reverberatory practice. Furnaces have been enlarged, improved methods for the removal of the slag have been adopted, and decided advances have been made in other directions.

We are indebted to the Anaconda Works of Montana for some of these advances, but it is to Mr. Richard Pearce, of the Boston & Colorado Works, at Argo, Colo., that we owe the greatest gratitude in this direction.

While there are several minor points of construction, and various points of practice that are not yet made entirely public, yet I can in the main describe these improved reverberatories, and the means by which their capacity has been increased from some 16 tons to over 28 tons per day.

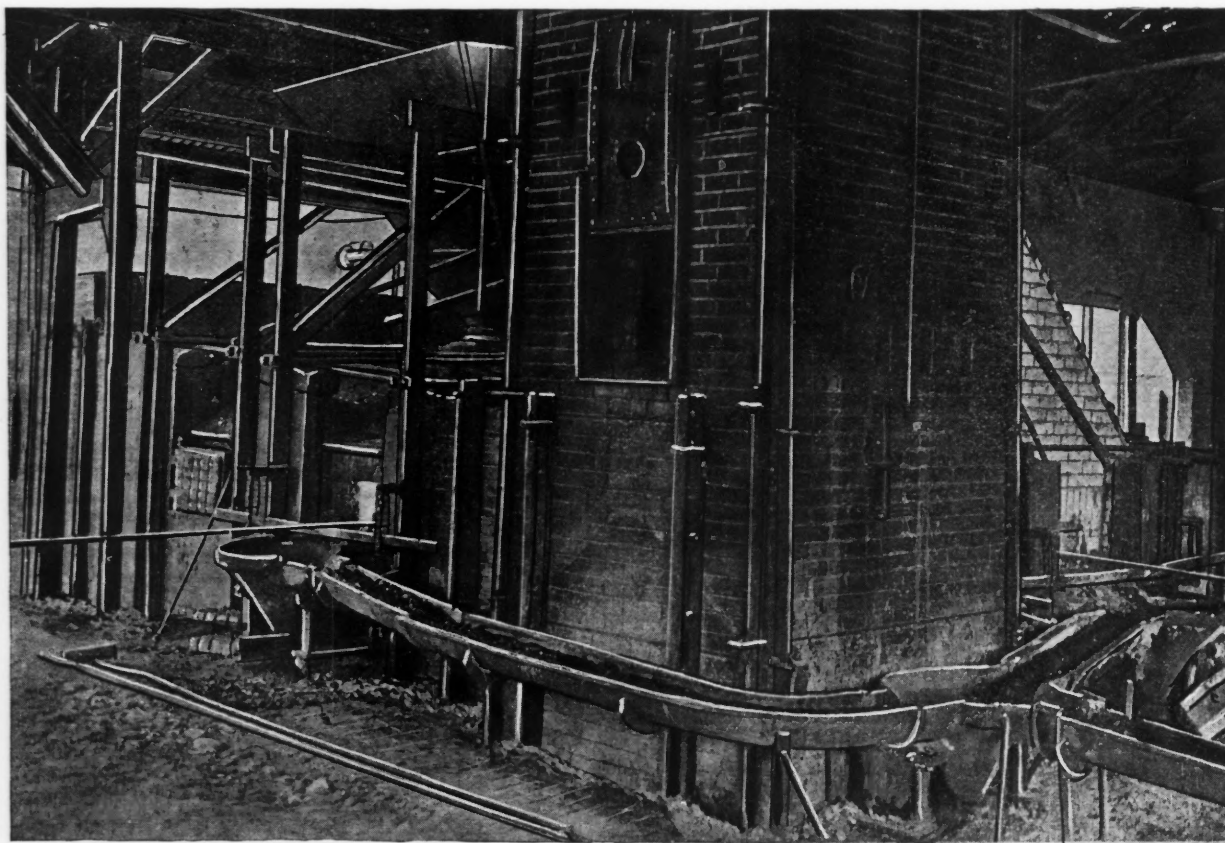
In the first place, the size of the hearth of the furnace has been increased from about 10 x 15 ft. to 14 x 24 ft. The hearth has also been materially enlarged by shaping it differently, and not drawing it gradually to a point at the flue-end as in the older practice, but keeping it nearly its full width until close to the flue, and then contracting it rapidly.

The size of the fireplace has been increased by some 10 ins. in length and 6 ins. in width; and although the amount of fuel used is of course larger than in the old furnaces, yet it has by no means increased in proportion to the additional capacity gained.

As the smelting charges now amount to some 6½ or 7 tons of ore, and the amount of slag is very great (especially in the Argo practice,

iron molds, by which all adherence of sand is prevented, and less slag is made in the next operation, beside the great advantage of always having a clean shed, unencumbered by a vast mass of heated and dusty sand.

There is nothing new in preheating the air necessary for combustion before letting it pass under the grate bars, but at Argo this preheating is more thoroughly and systematically executed than at any other works with which I am familiar. The cold air enters into channels formed in the brick work near the front end of the furnace on each side, which openings are guarded by gratings. Thence it passes along the side walls and close to the hearth lining, and before it reaches its exit under the firebox it has become heated to a considerable degree. This system also assists in cooling the hearth lining and thus lengthening its life materially. Aside from this, heated air is allowed to enter through channels at either end of the bridge wall, cooling the latter and assisting greatly in the combustion of the gases, where it enters the furnace at the bridge. These openings are regulated by a valve, and to show that the benefit was not imaginary, my attention was directed to the difference in the flame shortly after throwing fire and when these openings were alternately opened and shut. When closed the flame was red and dusky, and a great volume of smoke escaped from the stack, while, on opening them, the flame at once became yellow and elongated and the escape of smoke was almost entirely prevented. Others, including myself, have built furnaces with similar valve openings to assist combustion, but owing to the ignorance and prejudice of the workmen they have soon become blocked up and fallen into disuse. But Mr. Pearce has insisted on this



VIEW SHOWING POSITION OF FRONT AND SIDE SKIMMING DOORS, ALSO THE ARRANGEMENT OF SLAG SPOUTS, AT ARGO, COLO.

where only about one ton of matte is produced to from 12 to 18 tons of ore), it was found necessary to adopt some rapid and economical method of disposing of this great quantity of molten material. This is accomplished at Argo, as shown in the figures, by running it directly out of the furnace building in cast iron sprouts.

To lessen the time required for skimming this operation is executed from both the front door and the side door opposite the tap hole. The slag from each of these doors is skimmed into a conical pot, which answers as a settling-pot for the grains of metal, while the iron gutters lead from each of these pots to the front corner of the furnace on the same side as the side skimming door. Here they unite in a third conical safety pot, while from this pot another length of gutter carries the slag outside the shed, the length of it that crosses the working space in front of the furnace being hinged at one end and counterweighted so that it can be easily hoisted out of the way when not in use.

To make this system perfect, this end gutter should discharge direct into a large slag car, or into a powerful stream of water that would granulate and remove the slag, the granules being subsequently removed into cars or to a high dump by means of an automatic bucket elevator; but the conditions at Argo were not suited to such an arrangement, and the slag is simply run into sand molds in the usual manner and then loaded on railway cars, to be used as ballast for the line.

All these arrangements are so simple and obvious, now that they are once in operation, that they require little explanation.

The gutters being very heavy, thick castings cool the slag so rapidly that it does not weld to them or damage them, and they consequently require no clay lining and last a long time. The matte also is tapped into

* From *Modern Copper Smelting*, second edition, p. 324. By permission of the Scientific Publishing Company.

point, until the smelters themselves have become convinced of their advantage and now could not be persuaded to neglect them.

A decided saving in time and fuel may be also effected in reverberatories that are running principally on calcined ore, by charging the red-hot ore from the calciners directly into the smelter, as is done at Anaconda, Mont. But this arrangement involves a plant laid out in a peculiar manner, and in already established works it is often impracticable. But in building new works, where the ground and conditions are favorable, it should always be so arranged. The calciners, whether Bruckner's cylinders or ordinary reverberatory roasters, should be placed on a higher level than the smelting furnaces, so that the cars of hot ore from the former can easily be dumped into the iron hoppers of the latter.

Each calciner should be so arranged as to deliver its roasted ore into the hopper of each and every smelter, for, if using cylinders, the ordinary charge of 10 to 14 tons will have to be divided among three or four smelting furnaces; while, if hand calciners are used, it will require the combined charges of several of them to furnish enough ore for a single reverberatory charge.

The use of red-hot, calcined ore by no means prevents the simultaneous addition of a greater or less proportion of cold ore from other sources, such as heap roasted ore, raw, dry ores, or even cold calcined ore. But unless the hot calcined ore forms at least 50% of the total charge, it is hardly worth while to undertake this method of working, as there will not be sufficient time and fuel saved to make up for the delays and extra labor that it entails.

This plan has been used so little and in so few places, that observations are mostly wanting as to the exact results obtained. From the statements of two gentlemen who are now using it to a greater or less extent, we may infer that where the charge consists mostly of red-hot, calcined

concentrates, a saving in time of some 15% and in fuel of 20% may be anticipated. But these statements are only given as guides and are subject to correction. In a few months I hope to know more about this point, as I am at present planning a smelting plant where the main portion of the reverberatory charges will consist of red-hot concentrates from Bruckner's cylinders, supplemented by a small addition of first-class lump ore, roasted in stalls.

But though the utilization of the red-hot ore may not always be possible there are certain improvements that are open to nearly every metallurgist, especially where he is called upon to plan new works, and is not hampered by old plants laid out on what is usually known in the profession as "The Patent English Wheelbarrow System."

Among these economies may be mentioned in particular:

The charging of the furnace by means of a hopper, instead of the slow and extremely laborious practice of having the ore shovelled in through the side door. This plan not only saves the wages of at least one man to the furnace per shift, but also effects a far more important economy in time and fuel, for every manager must have frequently chafed over the long interval of time that elapses between the beginning of skimming and the final luting-up of the doors on a fresh charge. It is much less labor to spread the ore over the furnace hearth as it falls from the hopper than would be imagined, and especially where red-hot ore is charged, as it flows in a sheet over the entire hearth almost as though it were a liquid. The presence in the furnace of the molten matte resulting from the last one or more charges is also of the greatest benefit in shortening the next

By means of several ventilation holes through the casing of the stack below the flue this air space is placed in communication with the external air, and a powerful current of cold air is established throughout its entire height, which more than doubles the life of the false lining, and it makes exceedingly easy to renew it when worn out.

THE MINING INDUSTRY OF MEXICO IN 1891.

Written for the Engineering and Mining Journal.

In comparison with 1890, complete statistics would probably show a decline in Mexico's output of the precious metals, and also in that of lead, due partly to the effects of the McKinley Bill, and partly to the financial stringency of last winter, incident to the Baring failure. The last half of the current year, however, has witnessed an improvement in mining matters all over the country, and, with two exceptions, to be noted further on, the prospects of mining in Mexico for the ensuing year are very good. As to the exact condition of affairs in each individual mining district, owing to the extreme difficulty, not to say impossibility, of obtaining reliable information, the writer cannot presume to give accurate data, but he believes the following to be an approximately correct statement of the results of the present year's work, and the prospects for the ensuing one.

In Sonora, Sinaloa, and part of Jalisco, the country tributary to No



VIEW OF FURNACE FROM TAP-HOLE SIDE, AT ARGO, COLO.

period of fusion; as it not only keeps the fresh charge from sticking to the bottom, but it acts as a solvent in separating the particles of fresh ore and greatly hastening their fusion.

It follows, therefore, that the matte should be tapped as seldom as possible, it being frequently advantageous to tap it only once in 24 hours; although this must depend upon the richness of the ore and the proportion of sulphur it still contains as well as upon the depth of the hearth and its capacity to hold a large quantity of matte.

In these large furnaces taking 5 to 7 tons of ore at a charge and especially if the ore is poor in copper the amount of slag produced at each skimming is so enormous that Mr. Pearce's plan of having two skimming doors—one at the side and the other in its regular position—greatly lessens the delay.

The regular charging door at the side of the furnace may be arranged for skimming or a separate opening may be made close to it on the same side.

The lining of a reverberatory stack is frequently burned out at short intervals, especially when the combustion of the gases does not take place perfectly in the hearth.

Although the protection of this lining by an air current is nothing novel, yet it is found profitable to go somewhat further in this direction than the ordinary practice dictates.

The chimney proper should be built some 15 in. larger inside than it is destined to be eventually; the inner lining being of 4½ or 9 in. of fire-brick, solidly tied in at intervals with the red brick casing, to make a strong wall. Inside of this, and separated from it by a 3-in. air space, should come the false lining, consisting of one thickness, or 4½ in., of fire-brick. This forms a perfectly independent shaft within the main chimney, and only connected with the latter by an occasional cross brick for steadiness.

gales, Guaymas and Mazatlan, the mines are scattered over an immense extent of territory, there being no one district that is a large producer; the writer has no personal knowledge of this district, but, judging by the mint returns, and other Government data to which he has had access, the total output will not vary much from that of last year. This country is an exceedingly promising one, but, owing to the lack of transportation facilities and other causes, it never has been a great producer, compared with what it would be were carriage from mines to shipping points cheap and secure. The ores marketed being high grade, their shipment to the United States has not been affected to any great extent by legislation of the latter country; quite an amount of ore is also shipped to Germany from this territory.

In Chihuahua and Durango a full report would show a decrease in output from that of last year; this district has felt the effect of legislation in the United States more than any other in Mexico; local causes also have operated to induce a decrease in its product and from these it is only beginning to recover; the large producers of this territory are scattered, and off lines of transportation; while they yield rich ores, the output is irregular and uncertain. These rich mines of Chihuahua and Durango have always been a great temptation to American investors, who have probably thrown away more money on them than on all the rest of Mexico together; while reports of wonderful finds in this territory appear at regular intervals in American publications, the writer has yet to learn of more pleasing tributes and better advertisements in the way of fat and steady dividends to shareholders. The outlook for this section of Mexico is, however, fairly good for the ensuing year, as it undoubtedly is good territory, and has numerous developed and steady producers. This is more especially the case in Durango, where prosecution of the work of extending the International Railway to the city of Durango will stimulate the development of a large and promising portion of the section,

In Coahuila the completion of the Mexican Northern Railroad to the Sierra Mojada has rendered possible the shipment of a very heavy tonnage from that point to the United States, in spite of the duties on lead; in tonnage the output of this camp has been equal to that of any previous year in its history, although the grade is not so good as in past years, as far as silver content is concerned. It is probable, therefore, that in value the product of this year will be somewhat less than that of preceding ones; the outlook for 1892 is exceedingly promising, and it bids fair to prove the most prosperous year yet in this Leadville of Mexico. In the Mula district, where the ores are of such low grade in silver as to be entirely shut out of the United States by the Windom rulings, mining has been very active during the past year, the Monterey smelters having created a good market for the output.

In Nuevo Leon and Tamaulipas, where numerous districts producing lead ores of low silver content exist, the output of this year should have been fully equal, if not in excess, of that of previous years, owing to the market afforded by the completion and operation of the smelters in Monterey. The writer has no data on which to base any comparative estimates as to the relative production of each separate district, but the aggregate should undoubtedly be greater than for the preceding year. The ores of this section are chiefly low grade argentiferous lead ores.

In Zacatecas there has been a falling off in the output, chiefly in the yield of the district tributary to the city of that name, although some of the smaller districts have shown an increase in production; whether the decrease in the district of the city of Zacatecas is due to the exhaustion of the mines, or simply to their having reached the limit of capacity of their hoisting and unwatering plants, the writer cannot say, but inclines to the latter opinion. Several of the mining enterprises in Zacatecas are intelligently directed and properly equipped, but the majority are worked in a happy-go-lucky fashion, with very primitive extracting plant. With the present means of communication, and cheapness with which fuel and supplies can be obtained, there is no reason why all the mines of this section should not be properly equipped and exploited. In such an event the writer believes that the district would long hold its position as one of the chief producers of the Mexican Republic.

Catorce, the largest producer in the State of San Luis Potosí, has maintained a steady production during the year, the gross value of its output being probably in excess of that of the previous one; this district has for several years shipped a larger portion of its product to the United States than any other in the Republic, and as the output is a dry silicious ore, of fair grade, it has not been affected by the McKinley Bill. During the year there has been an advance in smelting charges by American works, which has somewhat checked exportation, and the writer understands that one of the large mines has stopped the shipment of ores altogether, preferring to await the inauguration of the smelter now under construction in San Luis Potosí, which will be in operation early in the ensuing year. The Monterey smelters have been active competitors for Catorce ores during the year, which has probably offset the advance in charges by American smelters as regards the effect of the latter on the output. Matehuala, a district in the neighborhood of Catorce, has had an exceedingly prosperous season; this is due to the fact that the ores of the district, while low grade in silver and lead, are very basic, the gangue consisting of the oxides of iron and manganese and carbonate of lime, giving it great value to the Monterey smelters as a flux; ore of as low a grade as 14 oz. silver per ton is now being mined and shipped from Matehuala. As the two chief mines of the district are now in bonanza, the outlook for 1892 is very encouraging indeed.

In Guanajuato affairs have a very gloomy outlook; there has been a marked decrease in production during the year, many of the "patios" have been closed and others have bought and brought in ore from Pachuca, in order to keep going. The deepest workings in this district being something less than 2,000 ft., one would think that the decline can hardly be due to exhaustion of the ore bodies, but that it is most likely due to the inability of the hoisting and unwatering appliances in use to surmount the difficulties encountered in deep working.

Pachuca, the producer of from one-sixth to one-fifth of Mexico's silver output, has had an even, prosperous year, equal to previous ones, if not exceeding them; this district is, in the writer's opinion, the greatest and most promising of all Mexico's mining regions and will be a heavy and steady producer of the white metal for many years to come. As regards mining machinery, whether for hoisting or unwatering, it is far better equipped than any other district in the country, consequently it is not subject to the vicissitudes of others, where an increase of a few gallons in the amount of water, or of a few tons in the amount of material to be lifted, causes a cessation of operations.

In Michoacan, Guerrero, Oaxaca, and other states to the south, affairs have been about the same this year as in previous ones; comparatively speaking, the output of this territory is insignificant, and while there may have been great differences in local production, the general result remains about the same. While the country is a rich and promising mineral section, its inaccessibility is a serious drawback, and it will be some time yet before it will become an important centre of mining operations.

Tests of Rolled Iron Bars—At the meeting of the Engineers' club of Philadelphia on Dec. 19, the secretary read, for Prof. H. W. Spangler, an account of a series of tests upon $\frac{3}{4}$ -in. round rolled iron bars. Ten such bars were taken, and each bar was cut into lengths of about 16 in. each. The first set was tested as it was cut from the bar, and averaged 34,545 lbs. elastic limit and 51,097 lbs. ultimate strength. The second set was annealed, and the third was heated to a welding heat and cooled on the floor. The fourth set was upset to $\frac{1}{2}$ in. diameter by $2\frac{1}{2}$ in. long. The next set had ends welded on. Another set was cut in two and welded together. Part of another set was prepared in the same way and annealed, and the balance of this set was headed. The last set was also headed in the machine on which the upsetting had been done. The tests show that heating to welding heat and allowing to cool reduced the tenacity 4%, and increased the elongation about 16%. Heating to a cherry red and annealing increased the elongation without reducing the average tensile strength. Upset ends are probably as strong as the original bar. The welded pieces had the same elastic limit as the original bar, but were otherwise greatly inferior, the average tensile strength being about 85%. Annealing had no effect. Headed bars, if without flaws, are as strong as the original bars, but 20% of the heads were defective.

DIGEST OF CURRENT DECISIONS OF THE SECRETARY OF THE INTERIOR RELATING TO THE MINING INDUSTRY.

Reported for the Engineering and Mining Journal.

MINING PURPOSES—INTERPRETATION OF SEC. 2325, U. S. REV. S.—STATE LAWS.

A patent for mineral land can only be obtained for the purpose of carrying on the industry of mining.

A corporation formed for any other than mining purposes cannot receive a patent for mineral land from the United States.

The word "authorized," as used in Section 2325, U. S. R. Stat., evidently refers to the qualification, of the applicant, or applicants, to make an entry under the mineral laws.

For a proper interpretation of the meaning thereof, reference must be also had to the statutory provisions of the State, provided the land in question is situated within a State.—*In re the Buena Vista Electric Light Co., of Colorado.* [Rendered Oct. 29, Prom. Dec. 15, '91.]

RELINQUISHMENT—ADVERSE MINING CLAIM—REPREHENSIBLE PRACTICE.

Relinquishments by claimants of small isolated tracts for the sole purpose of enabling other claims, otherwise invalid, to be made, is wrong and will not be encouraged.

If no adverse claim shall have been filed, or, if filed, judgment is rendered in defendant's favor, he will be assumed to be the owner of the whole tract applied for and final papers will be issued accordingly.—*The Late Acquisition Consolidated Mining Company, for the Monarch Lode.* [Rendered Nov. 17, Prom., Dec. 15, '91.]

RAILROAD GRANT—MINERAL LANDS—APPEAL.

The Northern Pacific Railroad Company is not entitled to notice from the General Land Office, with the view to appeal therefrom, where mineral claims that embrace lands within the odd numbered sections of the grant are approved for patent, and the record shows the discovery and location of the mine was subsequent to the filing of the map of definite location.

The doctrine announced in the case of the Central Pacific Railroad Co. v. Valentine, until otherwise decided by the Supreme Court, U. S., is held to be *stare decisis* so far as the Department of the Interior is concerned.

The Russian Petroleum Trade.—It is stated that the petroleum producers at Baku have entered into a combination for regulating the sale of the oil abroad on their joint account. Under this agreement they will jointly pay the railway charges as far as Batoum, the quality of oil for export will be decided upon between them and a uniform price will be charged.

A New Method of Titrating Manganese.—Herr L. Blum, in *Zeits. für Anal. Chemie*, 1891, p. 284, describes the following new method of titrating manganese: A solution of ferric oxide and protoxide of manganese is combined with tartaric acid, to which ammonia in excess is added. A solution is thus obtained in which by the addition of ferro-cyanide of potassium a precipitate of ferro-cyanide of manganese only results, while the ferric oxide remains in solution. If all the protoxide of manganese is precipitated and there is an excess of precipitate agents, a drop of the fluid, combined with acetic acid, assumes a blue color. This method is only adapted for manganiferous ore with not too much iron. Pig-iron, on the other hand, gives an indefinite final reaction owing to the too great percentage of iron. Five grammes of the ore are dissolved by boiling with concentrated hydrochloric acid, diluted to 250 cu. c., and 50 cu. c. are let off through the pipette into a glass jar. Should the ore be free from iron a few drops of ferric chloride are added. To the fluid are then added 20 cu. c. of cold saturated sal-ammoniac solution, 30 cu. c. of tartaric acid solution (1:2), and finally, ammonia in strong excess. The mixture is then heated to boiling point, and a solution of ferro-cyanide of potassium is afterward added until a drop of the solution, brought on a white porcelain plate with concentrated acetic acid, exhibits a blue colour.

The Colorado Desert Lake.—The lake in the heart of the Colorado Desert is now disappearing. Superintendent Dubrow, of the salt works at Salton, Cal., in speaking of the strange phenomenon recently said: "It was not the quantity of water that passed through the crevasse of the Colorado River that made Salton Lake. This crevasse was measured and was found to be only 300 ft. wide, but the lake was made by the general overflow of the banks for 10 or 12 miles to a depth of $2\frac{1}{2}$ ft. with a current of five miles an hour. That overflow was the true cause of the lake being formed at Salton. At least two-thirds of the water that passes through the crevasse flows southwest and reaches the Colorado River near its mouth. Salton Lake is now only 10 miles long and 8 miles broad, and has only 13 in. of water in its deepest place. Its greatest area in August was 10 miles by 30. It is my opinion that unless the Colorado River rises to nearly the same height as it did last February, little water from the river will reach Salton. Lakes that were formed between the Colorado and Salton have entirely disappeared, and it will take an immense volume of water to fill again these depressions. Indeed, until they are filled the water cannot reach Salton. From present appearances there will be no flood in the Colorado in February, and hence the summer rise will be small. The wind of this winter has been filling up the channels cut by the water that came to Salton last summer. The moisture has started a growth of mesquite, the seed of which was carried over the desert by the water to places where no vegetation was ever known. These trees will be the means of forming sand dunes, which will serve as barriers to future floods. With no high water this year, these trees and drifting sand will have nearly two years to form checks to the high water of 1893. This will be ample time to cut off all water communication of the Colorado with Salton. It is but a question of time when the depression in the Colorado Desert will be entirely cut off from the water of the Colorado River. The sand hills, beginning about Pilot Knob and extending about forty miles, are gradually reaching the Cocopah Mountains. When joined to these mountains, they will form a barrier from 200 to 300 ft. high that will entirely shut off the water of the Colorado River from the New River country and Salton. The channel through which the water came last summer is now entirely dry for 160 miles from Salton."

THE LAKE SUPERIOR MINING STOCK MARKET IN 1891.

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

Owing to comparatively light shipments and extreme depression in the iron ore market during the past year, stocks generally have been dull, with a declining tendency, although a few of the leading stocks have held their own, and to-day are higher than they were one year ago, as the following table will show :

GOGEBIC RANGE.			
Name of mine.	Capital Stock.	Par value.	Cash value.
		Dec., 1890.	Dec., 1891.
Aurora.....	\$2,500,000	\$25.00	\$9.00
Ashland.....	1,000,000	25.00	60.00
Anvill.....	200,000	5.00	3.25
Brotherton.....	2,000,000	25.00	3.00
Germania.....	1,000,000	25.00	11.50
Gogebic Iron Syn. (Fee).....	5,000,000	25.00	.30
Ironton.....	1,000,000	25.00	1.00
Iron Belt.....	5,000,000	25.00	1.00
Metropolitan I. & L. Co.....	2,000,000	25.00	70.00
Montreal.....	500,000	25.00	10.00
Northern Chief (Fee).....	3,000,000	100.00	35.00
North Pabst.....	1,000,000	25.00	2.00
Odanah.....	500,000	25.00	17.00
Pence.....	1,000,000	25.00	1.50
Ruby.....	1,000,000	25.00	3.00
Ryan.....	1,000,000	25.00	.35
Superior.....	250,000	10.00	8.00
Section 33.....	500,000	25.00	18.00
Wisconsin Iron and Steel Co.....	2,500,000	25.00	.75
MARQUETTE RANGE.			
American.....	\$1,000,000	\$25.00	\$2.00
Cambrria.....	500,000	25.00	12.50
Champion.....	500,000	25.00	\$99.00
Cleveland.....	2,500,000	25.00	17.50
East N. Y.....	6,000	25.00	2.00
Jackson.....	300,000	25.00	110.00
Lake Superior.....	1,500,000	25.00	75.00
Milwaukee I. Co.....	.....	25.00	5.00
Pitts. & Lake Ang.....	500,000	25.00	160.00
Republic.....	2,500,000	25.00	35.00
River Side.....	40,000	25.00	2.00
MENOMINEE RANGE.			
Chapin.....	\$2,100,000	\$25.00	.....
Commonwealth.....	500,000	25.00	\$10.00
Monitor.....	1,000,000	25.00	.75
Mastodon.....	.....	25.00	10.00
Sheridan.....	20,000	25.00	4.00
VERMILLION RANGE.			
Chandler.....	\$1,000,000	\$25.00	\$40.00
Chicago and Minnesota Ore Co.....	2,000,000	100.00	105.00
Minnesota Iron Co.....	14,000,000	100.00	75.00
Vermillion Pine & Iron Land Co.....	1,500,000	25.00	2.00
GOLD AND SILVER.			
Michigan Gold Company, Ishpeming, Mich.....	.....	\$1.00	\$0.25
Ropes Gold and Silver.....	.....	.....	1.35

Flexible Glass.—Herr Eckstein, an Austrian engineer, claims to have discovered a strong and flexible substance, as transparent as the ordinary brittle glass. His process is as follows: From 4 to 8 parts collodion wool are dissolved in about 1% in weight of ether or alcohol; this solution is intimately mixed with from 2% to 4% of castor oil or other non-resinous oil, and from 4% to 10% of resin or Canada balsam. This mixture is spread on a glass plate and dried under the influence of a current of hot air of about 50° C., by which it is transformed in a comparatively short space of time into a transparent, hard, vitreous plate, the thickness of which can be regulated as desired. The material thus obtained is said to resist the action of salts, alkalies, and acids, and besides being transparent is odorless. It is flexible, and almost unbreakable. Its inflammability is much inferior to that of other collodion combinations, and it can be further reduced by the addition of magnesium chloride, while an admixture of zinc-white produces an ivory appearance. Any color or shade may be imparted to the new glass.

The Preservation of Sodium.—According to Rosenfeld (*Jour. Chem. Soc. L.X., 982, September 1891*) when sodium, which has been kept under mineral oil and is covered with a crust, is immersed in a mixture of petroleum three parts and amyl alcohol one part, or rubbed with a cloth soaked with this mixture, it acquires at once a silvery luster. If now it be put into petroleum containing 5% amyl alcohol, then washed with pure petroleum and kept in petroleum containing one-half to one per cent. of amyl alcohol, it preserves this luster for a long time; becoming covered very slowly, however, with a film of sodium-amyl oxide which is easily removed with filter paper. Potassium and lithium can be purified similarly. Sodium thus cleaned combines at once with mercury, evolving light. By pressing clean sodium and potassium together under a mixture of one part amyl alcohol and nine parts petroleum, the liquid alloy of these metals is easily obtained. By mixing one gram of the clean sodium rubbed to a fine powder with three grams of salt, with 0.7 grams of sulphur, avoiding pressure, combination takes place with the evolution of light and sodium sulphide is formed. Selenium and tellurium behave similarly.

New Oxygen Compounds of Molybdenum and of Tungsten.—Péchar had examined the yellow coloration produced by the action of hydrogen peroxide upon molybdates and tungstates, and concludes (*Jour. Chem. Soc. L.X., 988, Sept. 1891*) that it is due to higher oxygen compounds of these metals. When potassium trimolybdate is treated with hydrogen peroxide it dissolves forming an orange-yellow solution which deposits on concentration yellow crystals apparently triclinic, having the composition $K_2Mo_3O_8 \cdot (H_2O)_4$. Heated gently in a vacuum, the crystals lose water and oxygen and leave a residue of acid potassium molybdate. The ammonium salt is similarly prepared. Both salts are decomposed by alkalies with evolution of oxygen. They evolve chlorine when treated with hydrochloric acid and set free iodine from potassium iodide. In the same way, sodium paratungstate boiled for a few minutes with hydrogen peroxide becomes yellow in color and is no longer precipitated by nitric acid. On evaporation the solution deposits white crystals having the composition $Na_2W_3O_8 \cdot (H_2O)_2$. The above salts are regarded by the author as establishing the existence of per-molybdic and per-tungstic oxides Mo_3O_8 and W_3O_8 , as well as the corresponding acids, $H_2Mo_3O_8$ and $H_2W_3O_8$.

SOUTHERN COAL AND IRON STOCKS IN 1891.

NAME OF COMPANY.	Opening.		Highest and lowest during year.				Closing.	
	B.	A.	Bid.		Asked.		B.	A.
			H.	L.	H.	L.		
Alabama Coal & Iron Co.....	100	102	102 1/2	100	102	102 1/2	100	102 1/2
Alabama Con. C. & C. Co.....	23	.....	23	.....	23	.....	23	.....
Alabama R. Mill Co.....	100	100	105	.....	100	105	100	105
Allee Furnace.....	104	104	100	105	100	105	100	105
Anna Howe G. Mg. Co.....	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Bessemer Land Co.....	26 3/4	29	26 1/2	30	28 1/2	26 1/2	29	26 1/2
Birmingham Fur. Mg. Co.....	35	35	35	35	35	35	35	35
Cahaba Coal Co.....	61	61	61	61	61	61	61	61
Camille Gold Mg. Co.....	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
De B'rd'leb'n C. & I. Co.....	48	48	48	48	48	48	48	48
Deeat. L. Imp.....	9	10	9	8 3/4	10	9 1/2	8 3/4	9 1/2
Deeat. Mg. L.....	19	19	19	19	19	19	19	19
Ensley Land.....	6 1/2	8	7 1/2	6 1/2	10	7 1/2	7 1/2	10
Florence L. & Mg. Co.....	17	19	17	14	19	15	14	15
Gadsden Land.....	3 3/4	4	3	3 3/4	4 1/2	3 3/4	3 3/4	4 1/2
Henderson S. & M. Co.....	15	3	2 3/4	15	4	2 3/4	4	2 3/4
Jagger Towley C. & C. Co.....	8 1/2	10	8 1/2	10	9	8 1/2	9	8 1/2
Mag-Ellen.....	100	100	110	110	100	110	100	110
Mary Lee C. & C. Co.....	25	25	25	25	25	25	25	25
Sheffield C. & I. Co.....	40	52 1/2	46	55	40	52 1/2	40	52 1/2
Sloss I. & S. Co.....	20	30	20	18	30	21	19	21
Sloss I. & S. Co., 1st mg.....	84	45	87	84	89	86 1/2	85	87
Sloss I. & S. Co., 2d mg.....	49	49	49	49	52 1/2	45	49	52 1/2
Tuscaloosa C. I. & L. Co.....	24	23	25	24	23	25	23	25
Tenn. C. & I. Co.....	34	40 1/2	32 1/2	41 1/2	34	38 1/2	34	38 1/2
Tenn. C. & I. Co., pref.....	78	80	86	78	88	80	80	85
Vulcan C. & C. Co.....	5	5	5	5	7 1/2	5	5	7 1/2
Woodstock I. Co.....	30	28	30	29	28	29	28	29

Interplanetary Signaling.—At its most favorable positions, says A. Guillemin in the *Popular Science Monthly*, Mars is still 42,000,000 miles from us, or a hundred and sixty times farther than the moon; while the diameter of its disk is only 25". According to Schiaparelli, the smallest objects visible on its surface under the most favorable circumstances—such as a bright spot on a dark ground, or a dark spot on a bright ground—must have a diameter equal to a fiftieth part of that of the planet, or about 85 miles. This minimum can, it is true, be reduced by using large objectives permitting stronger magnifying; but even then it is certain that luminous signals, for example, visible from the earth on Mars, must have enormous dimensions. The inhabitants of Mars, if more advanced in astronomical knowledge than we, as one of our imaginative astronomers supposes they are, would have, in case they should desire to start an exchange of telegraphic communications with their earthly neighbors, to give their signals diameters of miles in every direction. But would they think of it? The reciprocal question to this is one that puzzles me. The earth, during all the oppositions of Mars, is in conjunction to it. It is lost in the rays of the sun, and is invisible from Mars, unless it is in transit over the sun's disk. Then it is a little black, round spot, on which we have every reason to suppose the Martian astronomers will be able to distinguish nothing. The earth will be better situated at the quadratures, but also at a much greater distance.

A New Puddling Furnace.—The Cleveland Institute of Engineers, at the opening meeting of their session at Middlesbough, Eng., last month a paper was read by J. von Lange, Leeds, on "The Pietzka Puddling and Heating Furnace," the invention of Mr. Gottfried Pietzka, Witkowitz Iron and Steel Works, Austria. The novel features of the furnace are a reversible hearth, or, rather, a double-hearth mounted on a platform turning on an hydraulic ram. The pig iron is charged on to one division of the hearth and when melted the double-hearth is raised about 4 in. by the hydraulic ram and turned right around, so that the other division of the hearth receives a fresh charge of pig while that already melted in the first division is being puddled. The heating, too, is done by gas fuel instead of by coal as in the ordinary puddling-furnace, a recuperator being erected in close contiguity to the furnace. The furnaces have been in operation at the Witkowitz Works for about 12 months, and have proved so successful that the whole of the furnaces in the puddling works will be replaced by others on the new system, while the Pietzka heating-furnace is being adopted throughout the rolling-mills at these works. The average saving by the use of the furnace at Witkowitz during the last half-year had been \$2.50 per ton, the loss of iron being also 2% to 3% less than in an ordinary furnace. In reply to questions, Mr. Lange stated that the cost of the new furnace was about four times that of the old type, but the output was 7 tons per day against 2 tons in the old style.

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, DEC. 22, 1891.

- 465,461, 465,462. Machine for Enameling Sheet Metal, etc. Hubert Claus, Thale-in-the-Harz, Germany.
- 465,525. Electrolytic Apparatus for Treating Metals. Edward S. Hayden, Waterbury, Conn.
- 465,607. Manufacture of Hydrofluosilicic Acid. Marc. W. Beyligky, New York, N. Y.
- 465,654. Combined Chlorinating and Filtering Vessel. Donald Dennis, Deadwood, S. Dak.
- 465,703. Process of Refining Petroleum and Analogous Oils. Charles C. Mengel, Sr., Bay City, Mich.
- 465,720. Coal Tipple. Thomas B. Murphey, West Elizabeth, Pa.
- 465,736. Device for Raising Liquids. Carl Storia, Belford, S. Dak.
- 465,738. Excavator. Jostah H. L. Tuet, San Francisco, Cal.
- 465,736. Carbonic Acid Generator. Jacob F. Witteman, New York, N. Y.

TUESDAY, JAN. 5, 1892.

- 466,452. Process of Reducing Oxides of Iron. Thomas S. Blair, Jr., Allegheny, Assignor to the Steel and Iron Improvement Company, Pittsburg, Pa.
- 466,513, 476,514, 466,515. Ore Separator. Charles J. Reed, Orange, N. J.
- 466,720. Process of Obtaining Insoluble Chlorides by Electrolysis. Stanley C. C. Currie, Philadelphia, Pa., Assignor to the United Car Improvement Company, same place.

PERSONALS.

Mr. George W. Maynard, M. E., of New York, has gone to Colorado on professional business. He expects to return about the middle of January.

F. J. V. Skiff, chief of the Department of Mines and Mining of the World's Columbian Exposition, was in the city this week in the interests of his department.

President Harrison has made the following nominations for Interstate Commerce Commissioners: James W. McDill, of Iowa; Wm. Lindsey, of Kentucky; Wm. R. Morrison. The last is a re-nomination.

The firm of Miller & Co., phosphate and shipping agents, 209 Commissioner street, Montreal, has been dissolved by mutual consent and the business taken over by O. M. Harris, who has been their manager in Canada for the last six years.

Professor Virchow, the eminent German scientist, was presented with a gold medal, on the occasion of his seventieth birthday, recently. The medal weighs nearly six pounds, and represents a value of about \$1,750 in gold. Frau Virchow received a silver, and each of the professor's children a bronze replica of the medal. The obverse shows the bust of the professor, with the legend: "RVDOLPHVS VIRCHOW, POMMERANVS CIVIS BEROLINENSIS: ÆTAT LXX." On the reverse is an allegorical group representing the genius of investigation, winged, and carrying a flaming torch in the left hand, while with the right he lifts the veil of Isis. At the foot of the Isis column is a table with the representation of the Berlin Pathological Institute. In the background, Science, on her lap an open volume, is seen contemplating a skull, while around her are other pathological emblems. The inscription on this side is "OMNIS CELLULA A CELLULA."

OBITUARY.

Capt. Jas. Taylor, superintendent of the Centennial mine at Houghton County, Mich., on the 2d inst., fell down the steps of the rock house, breaking his neck.

Richard Potter, president of the Grand Trunk Railway from 1869 to 1876, and for some years a director of the Hudson's Bay Company, died recently in London at the age of 75.

George J. N. Monell died in Newburg, N. Y., on the 2d inst., aged 74 years. He was engaged in the banking business on the Pacific Coast during the days of the Californian gold excitement.

Mr. S. B. Reed, a well-known civil engineer, died last week at Joliet, Ill. He built the first railroad into Chicago from the East, and took a prominent part in the construction of the Canadian Pacific and Union Pacific railroads. He also built the first bridges across the Mississippi and Missouri rivers.

M. Jean Servais, the famous chemist, has died at Brussels, at the age of seventy-nine. He was for fifty years a member of the Belgian Royal Academy of Science, and was the author of several important works. Chief among them was his "Recherches sur les Poids atomiques," which won him the gold medal of the Royal Society of London.

W. Vanderbilt died on the 2d inst., at Vallejo, Cal. He was born in this city, and was for many years in the service of his cousin, Commodore Vanderbilt. He was chief engineer of the pioneer steamer "California" when she made her voyage to this coast. Mr. Vanderbilt was in the employ of the Pacific Mail Co. from 1849 to 1869, and for ten years was its general superintendent of the bureau of hulls and machinery. He superintended the rebuilding of the single-turreted monitor "Comanche," and the construction of the double-turreted monitor "Monadnock," now being completed at the Navy Yard of Mare Island.

Frank H. Thomas, furnace manager of the Franklin Iron Company, died suddenly on the 29th ult. He was known as one of the most skillful furnace managers in the country, and under his régime the methods of producing and handling iron at the Franklin works were much improved.

Mr. Thomas was born in Catasauqua, Pa., July 24th, 1856. His early days having been spent in the immediate vicinity of the large iron works at Catasauqua, then under the management of his father, W. R. Thomas, he naturally took a deep interest in the manufacture of iron, and it was not long before his close attention and strict application to his duties attracted the heads of these works, and young Thomas in a few years rapidly advanced and was placed in full charge of one of the leading blast furnaces of the South. After a short time better inducements brought him to Emaus, Pa., and Kensington, Pa., thence he removed to Franklin Iron Works, N. Y., about eight years ago.

Sir George Biddell Airy, of London, Eng., astronomer royal, is dead. As Plumian professor in Cambridge University, to which position he was appointed in 1826, he introduced much needed reforms. His activity in this post procured him in 1835 the appointment of Astronomer Royal, which he held for more than half a century. His attention was largely directed to mathematical subjects and he wrote much on weights, measures and

coinage, being an earnest advocate of the decimal system. He took part in the famous "battle of the gauges" for the English railway system, favoring the Stephensonian or "narrow" gauge as opposed to the broad gauge of Brunel. He received the Lalande medal of the French Institute for discoveries in astronomy, the Copley and Royal medals of the Royal Society and the medal of the Royal Astronomical Society on two occasions for various original researches and discoveries, especially those connected with the theories of vision and of the tides. He was one of the eight foreign members of the Institute of France, was LL. D. and D. C. L. of English and Scotch universities, and had filled the posts of president of the Astronomical Society and president of the Royal Society. By his publication of the long neglected observations at Greenwich of the moon and planets from 1750 to 1830 he rendered a great service to astronomy, as also by his memorable researches on planetary perturbation and the motion of the solar system in space. He prepared the formula and methods for the survey of the boundary between Maine and Canada, devised new transit instruments and observed eclipses of the sun from Turin (1842), Gothenburg (1857) and a point in Spain (1860).

Emil de Laveleye, the well known and excellent writer on political economy, is dead. He was born April 5th, 1822, at Bruges. He received his education at the Athenæum of Bruges, the Stanislas College of Paris, and the University of Ghent. In 1845 he was a writer in various periodical papers of the Liberal press in Belgium and famous in France for a paper published in the *Revue des Deux Mondes* about Lombardy. In 1864 he was Professor of Political Economy at Liege. He represented Belgium at various international assemblies, and was elected a member of the Académie des Sciences Morales et Politiques of France in 1869. He was an admirable writer and a polyglot. He published in 1844 "Mémoire sur la Langue et la Littérature Provençales;" in 1847, "Histoire des Rois Francs;" in 1848, "L'Armée et l'Enseignement;" in 1849, "Le Sénat Belge;" in 1859, "L'Enseignement Obligatoire;" in 1860, "La Question de l'Or;" in 1861, two editions, with notes, of a translation of the "Nibelungen;" in 1863, "Questions Contemporaines" and "Essai sur l'Economie Rurale de la Belgique;" in 1865, "Le Marché Monétaire depuis Cinquante Ans;" in 1868, a "Rapport sur l'Exposition Universelle de Paris;" in 1869, "Etudes et Essais;" in 1870, "La Prusse et l'Autriche depuis Sadowa;" in 1872, "Essais sur les Formes du Gouvernement dans les Sociétés Modernes" and "L'Instruction du Peuple;" in 1873, "Des Causes Actuelles de Guerre en Europe;" in 1874, "De la Propriété;" in 1875, "De l'Avenir des Peuples Catholiques;" "Le Protestantisme et le Catholicisme," and "Du Respect de la Propriété Privée en Temps de Guerre;" in 1878, "L'Afrique Centrale." His works have appeared in all the principal languages of the world.

Sir Andrew Crombie Ramsay, the eminent geologist, died recently at Beaumaris, England. Sir Andrew, who was born in 1814, was a native of the West of Scotland, and received his education at Glasgow. He early interested himself in geology, and his first work, "The Geology of Arran," at once gained for him a great reputation. It was the means of introducing him in 1841 to Sir Henry de la Beche, at whose instigation he joined the Geological Survey of the United Kingdom, then just in its infancy. A few years after, joining the survey he was appointed its director. In addition to that official post Sir Andrew was for some time professor of geology in University College, and subsequently became lecturer on geology at the Royal School of Mines—a position which he held for many years. On the death, in 1872, of Sir Roderick Murchison, he was appointed director general of the Geological Survey, and on his retirement in 1881 received the honor of knighthood. Sir Andrew was at an early date (1849), elected F. R. S., and subsequently received the honorary degree of LL. D. from the University of Edinburgh, and the Neal gold medal from the Royal Society. He also obtained the Wollaston gold medal of the Geological Society of London, and was a past president of that Society and of the British Association. His reputation secured him the honorary membership of many scientific bodies in Europe and America. To Sir Andrew Ramsay science is largely indebted for the explanation and establishment of the now prevalent geological doctrines concerning denudation. His demonstration of the amount of rock which has been removed from the surface of North Wales by subaerial agents, and his account of the origin of the surface-features of our country form conspicuous landmarks in the history of that department of physical geology.

SOCIETIES.

The Michigan Engineering Society will hold its 13th annual convention in the rooms of the Board of Public Works, City Hall, Grand Rapids, Mich., January 19th-21st, 1892, opening at 2 p. m., January 19th. The programme will include papers by Geo. S. Pierson, "A Method of Sewage Disposal;" J. H. Forster, "Hydrographic Surveying;" A. L. Reed, "Development of Water-Bearing Strata for Irrigation;" S. E. Jarvis, "Pneumatic Street Railway Propulsion;" Prof. W. H. Pettee, "Build-

ing Stones of Michigan," and "A Recent Decision of the Supreme Court of the United States on the Ownership of Lake Beds;" E. H. Mumford, "Notes in a Rolling Mill;" E. W. Muenscher, "Easement Curves, 2d Paper;" and numerous others. The local committee have been at great pains to make preparations for the best meeting the society has ever held, and it is hoped that this will be the largest meeting in the history of the society.

The American Metrological Society held its annual meeting at Columbia College, New York, this week. The following officers were elected: President, R. A. Gould, Cambridge; vice-presidents, T. R. Pynchon, Sandford Fleming, T. C. Mendenhall, Washington; J. Walcott Gibbs, Newport, R. I.; T. Egleston, R. P. Fairbairn, J. H. Van Ambridge; treasurer, John K. Rees; recording secretary, John K. Rees; corresponding secretary, O. H. Tittmann; members of the council, H. A. Newton, Cleveland; Abbe, R. H. Thurston, A. M. Maver, C. F. Brackett, W. F. Allen, Simon Newcomb, S. P. Langley, E. O. Leech, George Eastburn. Dr. Gould made an address, and among other things said: "The Society has been active during the year, and its activity seems to have been rewarded with all the measure of success which ought reasonably to have been expected. The progress of metrology in other countries has been noteworthy. Some of the advances made are of exceptional importance. During the year the Society has published and distributed a chart illustrative of the metric systems of weights and measures, and designed to make the principles of this system more widely understood and thus to aid in preparing all classes of our people for its early adoption. In the United States the change must of course be a purely voluntary one, except in offices of the National Government; yet the character and enlightenment of the people is such that the degree of familiarity which the custom-houses and post offices would afford would unquestionably be more than sufficient to make the employment of the new units both easy and welcome." At the International Bureau of Weights and Measures important results have been obtained during the year, and more important action has been taken for the attainment of further knowledge of the metrological units. The society will hold its next meeting in Washington.

INDUSTRIAL NOTES.

A tin plate company was organized on the 6th inst. at Newcastle, Pa., with a capital of \$150,000. W. S. Foltz was chosen treasurer.

The property of the Hunterdon Construction and Quarrying Company, which is doing some work at Clifton Heights, Pa., has been attached for wages due to its workmen.

The Pacific extension of the Great Northern Railway was completed into Kallespel, Minn., on the 1st inst. The bringing of the track to that place completes a branch line 205 miles long.

A strike was begun in the blast furnace department of the Illinois Steel Company at Joliet, Ill., on the 22d inst., throwing out 250 men. The difficulty arose over a matter of wages and the allowing of more helpers.

The Bay View (Wis.) plant of the Illinois Steel Company, which employs 2,000 men, paid during 1891, \$1,200,000 in wages and produced material valued at \$6,500,000. The plant is valued at \$5,500,000.

J. Palmer O'Neill, of Pittsburg, Pa., representing a syndicate of Eastern capitalists, has made an arrangement with Lewis Brothers & Co., of Joliet, Ill., and will take immediate possession of the works recently erected by them and will conduct the manufacture of tin plate.

The blast furnace at West Duluth is now turning out 100 tons of Bessemer pig iron per day. The iron is being shipped to the steel plant at West Superior, Wis., and in about two weeks the Bessemer converters and plate rolling mill will be set at work. The furnace will soon increase its capacity to 125 tons daily.

Bradstreet's reports that the business failures in the United States in 1891 numbered 12,394, or 16% more than in 1890, 6% more than in 1889 and 17% more than in 1888. Liabilities are \$18,000,000 larger than in 1890, about 10%, but this gain may be offset by two or three failures which, with proper management, would not have taken place. About 53 banks and bankers owing \$35,000,000 failed during 1891, against 32 in 1890 with about \$19,000,000 of debts.

The E. P. Allis Company, of Milwaukee, Wis., has about finished a contract for pumping engines for the City of Chicago, amounting to nearly \$400,000. The company is also completing an enormous steam power plant for the West End Street Railway Company, of Boston, and a large pump for the Chapin Mine, which is said to be the largest direct-acting pump in America. During the year it has rebuilt most of the Minneapolis flouring mills, replacing the old machinery with machines of later pattern, and has furnished a large new flour mill at Cardiff, England, with 150 machines.

The *Railroad Gazette* gives the United States mileage of railway construction for the year 1891

as 4,012 miles. About 40% of all the new construction was done in the first half of the year. The mileage in 1886 was 8,018 miles; in 1887, 12,878; 1888, 6,926; 1889, 5,146; 1890, 5,498, and 1891, 4,012 miles. The *Railway Age and Northwestern Railroader* states that 21 railway properties, with an aggregate mileage of 3,223 miles and a capitalization of over \$168,000,000, were sold under foreclosure during the year. During 1891 receivers were appointed for 26 companies, representing 2,159 miles of railroad and \$84,470,000 of capital.

The Pelton Water Wheel Company reports a season of great activity, both in its San Francisco and New York works. Orders for 492 wheels have been filled during the past year of capacities varying from 10 H. P. up to 1,200 H. P. each, an increase in number of nearly 100 over that of the previous year. The majority of these wheels has been sent to the mining districts of the West, though large numbers have gone to Mexico, Central and South America, China, Japan, Australia and many other foreign countries.

Preliminary steps were taken at Wheeling, W. Va., on the 4th inst., in the formation of a powerful glass combine, to oppose the United States Glass Company. The companies in the combine will number ten or twelve of the strongest companies that are not already in the United States Glass Trust. The companies named as members of the new concern are the Crystal, Northwood, Buckeye and Elson, of Martin's Ferry, the North Wheeling Bottle Works, the Wheeling Lamp and Stamping Company, the Riverside and Standard Glass Works, of Wellsburg, and the Fostoria Glass Works, of Moundsville. The combined capital will be in the neighborhood of \$4,000,000.

Every one who was so fortunate as to obtain a copy of the very amusing and highly instructive little pamphlet, entitled "A Midsummer Night's Dream," which was published a short time ago by Messrs Merchant & Company, Philadelphia, Pa., will be pleased to learn its sequel is now being distributed by this enterprising firm. It is seldom that true merit will be found in a work of this kind, yet the artist who designed the illustrations for "What visitors will be shown at the World's Fair by Merchant & Company's Brownies" is certainly deserving of the highest praise. The success of Messrs. Merchant & Company's exhibit at the World's Fair is already assured.

The Carpenter Steel Works, located at Reading, Pa., devoted to the manufacture of high grade steel, were almost totally destroyed by fire on the 26th ult. Three hundred men were employed. The establishment was working on a government contract of over \$230,000 for steel projectiles for heavy ordnance, especially intended for the new guns which have recently been made and tested. Beside this, its steel was also used in the manufacture of steel cannon and fine cutlery, some being shipped abroad. The stockholders of the company are principally New York parties. The loss on machinery, patterns and building is over \$125,000 on which there is a partial insurance. The origin of the fire is unknown.

A. Pysoff, Chief Engineer in charge of the construction of the Ussey and Ammor divisions of the Siberian Railway, is in San Francisco. In a recent interview he said the Ussey division is over 200 miles long, reaching to Crafski. Over 5,000 soldiers, convicts, Corean and Russian subjects are now at work on it. Next year there will be 7,000. It will take 12 years to finish the entire road. "We have had constantly to protect the surveyors and builders of the Siberian road, and have now 18 battalions of troops of 1,000 men each, nine squadrons of cavalry and a brigade of artillery of six batteries. We need them all, too, for the road runs close to the Chinese frontier, and the country is in an extremely turbulent state. The other divisions have been surveyed, and the line has been extended 1,700 miles easterly from St. Petersburg."

Invitations have been extended to Director-General George R. Davis, Secretary Dickinson, Chief Skiff, of the Mines and Mining Department, and other officials of the Executive Board of the World's Fair to attend a reception and luncheon at the Wellington Hotel, Chicago, tendered to them by the coal trade of that city. The object of the reception is to discuss in an informal manner the ways and means to secure for the coal interests of Chicago proper representation, space for exhibits of anthracite and bituminous coal, appliances and methods used in their production, etc. The scheme as at present outlined is to embrace only the fuel handled in this market by Chicago shippers and dealers, and is to be essentially a Chicago exhibit, distinctly separate and apart from the general mining demonstration. Only the products of the coal mines of the States of Pennsylvania, Ohio, Indiana, West Virginia and Illinois will be displayed in this exhibit. Mr. A. T. Thatcher and Mr. J. W. Lowe, of Boyd, Stickney & Co., have the matter in charge.

The directors of Elmore's Patent Copper Depositing Company (Limited) in their report for the year ending June 30th, 1891, state that the accounts show credit balances on June 30 last of £14,261 17s. 10d., made up of £5,000 royalties on copper sheets received in advance, £8,558 7s. premium and profit on land, and balance of profit and loss of £703 10s. 10d., a satisfactory result, considering that the

company had only been able to manufacture small quantities of articles at the date of the making up of the accounts, work on a large commercial scale not having been then commenced. The cost of manufacture has now been found to be only 1/4d. per lb. weight of finished goods—that is, to say, about one-half the cost that the directors estimated in the prospectus. The profits of the works as now completed are put at over £45,000 per annum, being 30% upon the present capital of the company, while, when the time comes for doubling the output to 40 tons per week the profits will be increased, it is said, to over £95,000 per annum, equal to nearly 50% upon the increased capital that will then be required. The report of the directors of Elmore's Wire Manufacturing Company (Limited) for the period from March 15th, 1890, to October 31st, 1891, states that the whole of the period has been devoted to the erection of the company's works. The managing director reports that early in 1892 the company will be in a position to commence with an output of 35 tons per week.

According to press dispatches, affairs at Carnegie, Phipps & Co.'s Homestead Steel Works threaten to become serious. The employes working nickel steel to fill government contracts signed the scale under protest several months ago, and rejected an offer of 25% advance over the scale prices. It is now said to be the intention of the Amalgamated Association of Iron and Steel Workers to demand an increase of 200% over the scale. The indications are that this will be refused and a struggle appears probable. Just now there is trouble over the discharge of a shear crew in the armor plate department. This will serve as a reason for bringing the question of increased wages for nickel steel washers to an open issue between the Amalgamated Association and the firm. It was openly declared at Homestead on the 6th inst. that unless the firm decided to grant an increase the 4,000 men employed would quit work. When the company's proposition to pay an advance of 25% was rejected, the Amalgamated officials were told that this was the maximum price that would be paid. Nevertheless, the executive committee of the Association will present a new scale providing an increase of 200% on present rates. Every possible means will be employed to secure an adjustment of the scale without a conflict. General Manager Potter said on the 6th inst.: "There is no trouble in our mill. No employes were discharged in No. 3 shear mill, and everything is running smoothly. A committee waited upon General Manager Potter on the same day for the purpose of securing the reinstatement of the 14 men discharged for quitting work New Year's Night. They did not succeed. A meeting of the joint committee of the eight lodges represented at the works was held the same evening to consider the firm's answer. It was decided to proceed in the usual manner to secure the reinstatement of the discharged men. The matter is thus relegated to the executive committee of the Amalgamated Association, and if satisfaction cannot be obtained a strike will be ordered."

SOUTHERN INDUSTRIAL NOTES.
(From our Special Correspondent.)

The Carolina Sulphuric Company has been incorporated at Blacksburg, S. C., by T. B. Gautier, T. H. B. Haase and J. F. Jones. The capital stock is \$300,000. The company proposes to manufacture sulphuric acid from domestic pyrites.

The Charlotte Harbor Phosphate Company has sold its complete plant, including dredges, barges, steamer, etc., to J. S. Pence, of Cincinnati, O., who will continue the work already planned. The price paid is said to have been \$40,000.

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, and his address will be furnished to any one desiring to supply him.

Any one 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 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.

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

GOODS WANTED AT HOME

2,510. A 100-h. p. second-hand engine of high grade. Georgia.

2,511. A quantity of 1 1/4-in. pipe and 1 1/4-in. hose. Florida.

2,512. Latest improved pebble phosphate machinery. Georgia.

2,513. A steel storage tank or standpipe, for a water works system; dimensions, 20 ft. inside diameter by 40 ft. in height; tank to be set on iron supports 30 ft. high. Maryland.

2,514. Estimates on an overshot water-wheel to be built of iron and steel, to be 50 ft. in diameter and to generate 35 to 50 h. p. Pennsylvania.

2,515. Three 70-saw gin stands, condensers, feeders, belting, shafting, pulleys, cotton elevators, press, etc. Texas.

2,516. A well pump. Virginia.

2,519. Engine, hoiler and steam pump. Florida.

2,520. A second-hand portable engine to run an Ingersoll drill. Connecticut.

2,521. Machinery for a broom factory. Texas.

2,522. Engines, cars and 40-lb. rails for nine miles of standard gauge railway. Georgia.

2,523. Hoisting engines, saw mills, screens, washers, etc., for mining phosphate. Georgia.

2,524. Galvanized iron, sheet steel and hot-air furnaces. West Virginia.

2,525. A complete outfit of machinery for plow factory, including boiler, engine, drill presses, power hammers, punches, shears, pulleys, shafting, emery wheel, grindstones and blowers. Texas.

2,526. Twelve hundred tons new steel rails, fastenings and rolling stock. Virginia.

2,527. Firebrick, tile, etc., for the construction of 100 standard beehive coke ovens (12 ft. in diameter) in block. Also coal washing machinery including elevators, shafting, helting, engines and boilers; capacity 350 tons per day of 10 hours. Kentucky.

AMERICAN GOODS WANTED ABROAD.

2,509. Catalogues, prices, and discounts of all kinds of machinery, and especially of technical novelties and oil vapor lights. Germany.

2,517. Fancy brass work ornaments for brass bedsteads. Mexico.

2,518. A machine for bending 1/2-in., 3/4 in. and 1-in gas piping. Mexico.

2,528. Sea Island cotton gins and presses. India.

2,529. Linseed, castor, ground wet crushing, and other oil making machines. India.

2,530. Machines for pressing or forming oil cake. India.

GENERAL MINING NEWS.

ARIZONA.

PIMA COUNTY.

(From our Special Correspondent.)

SAN FRANCISCO, Dec. 31.

CROCKER MINING COMPANY.—The work of breaking and prospecting ore north and south from raise No. 2, in the south drift, 300 level, near the west lateral drift, has commenced. The veins are strong and regular, showing ore of milling quality in bunches.

PEER MINING COMPANY.—All the necessary repairs having been completed, the mill started up a week ago.

CALIFORNIA.

Some time ago Manuel Eyre brought suit in San Francisco, Cal., against the directors of five different mining companies to recover in each instance \$1,000 penalty for failure to post monthly statements in detail. The Supreme Court handed down a decision on the 30th ult., in regard to the suit against the Consolidated Imperial Company of Nevada, which, in effect, decides the other cases. The lower court found for defendant, holding that a general statement of receipts and disbursements was all that the law required. The Supreme Court has reversed that judgment and declares that the monthly statement must be itemized, showing what were the sources of income and for what purposes disbursements were made.

CALIFORNIA OIL AND GAS COMPANY.—This company has been incorporated. The capital stock is \$5,000,000, and the directors are: Wm. H. Hart, M. J. Donahoo, G. H. Unbسن, W. H. Snedaker, R. J. Davis, J. P. Kelly and David E. Hayes. The amount of stock subscribed is \$405,000. The company will buy and sell lands, obtain franchises to lay, own and operate pipe lines for the transportation and delivery of crude and refined oils, natural and manufactured gas from the company's property and works in Fresno County and elsewhere to Fresno City, Oakland, San Francisco and other places. The company will also obtain franchises to lay pipes in the cities named for the purposes of distributing gas for domestic, lighting and mechanical purposes, and to sell and collect charges for the use thereof. It also intends to construct pipelines from the company's property to the railroad at Coalingo, and from the works to water navigation in the San Joaquin valley.

BUTTE COUNTY.

GOLDEN FEATHER CHANNEL, LIMITED.—The shareholders of this company held their second ordinary general meeting in London on the 23d ult. The directors could report little progress of a substantial character during the past year. The day before the meeting the following cable dispatch was received from Col. McLaughlin concerning affairs at the mine. "Continuous storms raised river, and again filled claim 19th day of December. If it is possible, we will drain claim and make clean up. Owing to interruption and limited extent of ground worked, and not having reached lower gravel, returns will be insignifi-

cant. After clean up will dismantle claim. Weather indications are unfavorable, with snow in mountains render further work useless this season. The directors expressed their appreciation of the hard work that Col. McLaughlin had rendered for the company. The company had £4,000 in the treasury to provide for next year's work.

MONO COUNTY.
(From our Special Correspondent.)

BODIE CONSOLIDATED MINING COMPANY.—The east crosscut, 1,700 ft. level, has been extended 7 ft., and the raise above the 500 ft. level, 9 ft. The ore in the upraise is from 10 in. to 15 in. wide.

BULWER CONSOLIDATED MINING COMPANY.—The work of hauling on to the Bodie mill has been steadily carried on, the mill having been started on the 27th ult. Good quality ore is being stoped from No. 1 stope, 150 ft. level; also stopes 2 and 3, same level.

SUMMIT MINING COMPANY.—An application has been made to place the shares of this company on the list of the San Francisco Stock Exchange. This action has been taken in consequence of a development made in the shaft of the mine where ore assaying \$40 per ton has been cut.

NEVADA COUNTY.
(From our Special Correspondent.)

A large and enthusiastic meeting was held in Nevada City on December 15th to elect 30 delegates to the State Convention called to assemble in San Francisco on January 20th. It was probably the largest representative body of miners that ever convened in Nevada County. Speeches were made and resolutions adopted in favor of the reopening of the hydraulic mines and the solution of the debris problem in a way, which would be alike satisfactory to the miners and to the valley people. There is no doubt that there is a strong reaction setting in in favor of the hydraulic miners all over the State; the diminishing of the gold output is beginning to be felt in many quarters, not the least in the valley towns from which the principal opposition to hydraulic mining came and still comes. It is to be hoped that the question will now be taken up, studied and solved as a problem of engineering; there is nothing so very formidable in it if approached in the right way. One of the principal objects of the State Convention will be to ask the General Government for help in the regulation of the rivers. The report of the government engineers, based upon a detailed examination made two years ago, is now published. The commission holds that the debris can be safely impounded by restraining dams in the rivers.

HARMONY.—This mine is working the old Pliocene channel under the lava ridge, 2 miles northeast of Nevada City. It is opened up by means of inclines and the company is doing very well in spite of the heavy expense entailed by this mode of working. Not far away the West Harmony is sinking for the continuation of the same channel, which, owing to the configuration of the ground, is difficult to reach by tunnels.

ODIN.—This mine is also a new enterprise; it is owned principally by Major H. Seymour and the intention is to work the channel below the lava flow, north of the old Manzanito diggings, which are known to have been enormously rich. The lead is about to be opened up by an incline. The machinery is now being put in place and reservoir and ditch have also recently been completed.

W. Y. O. D.—Rumors are rife reporting an impending sale of this very rich and recently developed property to English capitalists. The owners are Weissbein Bros., Bankers of Grass Valley.

PLACER COUNTY.
(From an Occasional Correspondent.)

The Ophir district is again coming to the front. The mines at present working are as follows:

ECLIPSE.—After the signal failure of two years ago, the mine and mill have been idle until last fall. Now Mr. W. J. Bevans has purchased the mines and released the labor liens. A few men are at work at present and it is believed the mill will soon be started. There is said to be a narrow ledge of very rich rock in the Eclipse. The trouble with this, as with so many other Ophir mines, is the great discrepancy between assays and mill returns.

HATHAWAY.—The mine and mill have started again. The company expects to add four new concentrators to its plant and to enlarge its reservoir. G. E. Taylor is superintendent of the company.

MINA RICA.—This property, superintended by Mr. McCullough, has been worked pretty steadily during the last few months, and the 10-stamp mill has been kept quite busy.

THREE STARS.—The talk of the day is the rich strike in the Three Stars, otherwise known as the Shipley mine, owned by Mr. B. F. Hartley, who has been prospecting the Ophir district for the last three years and expended much money there during the time. It is located near the Belmont mine, about 4 miles from Ophir, and developed by a 600-ft. shaft. The ledge is 4 ft. wide and is reported to be very rich. There are two small mills on the property.

SAN DIEGO COUNTY.
(From our Special Correspondent.)

During the year just closed mines of San Diego

County have enjoyed increased prosperity to an extent worthy of mention. During the summer of 1890 active work was commenced on several locations in the Julian district. This revival of interest led to work by others, and several good new veins were opened and old ones more thoroughly explored. The good work begun in 1890 continued through the year just past, with the result that most encouraging developments have resulted. The Helvetia, one of the old-time claims, which had practically been abandoned, with the workings flooded to a depth of 200 ft., was reopened. A shaft was sunk to a level with the bottom of the old shaft, and a drift started through country rock toward the vein, which was encountered at a distance of about 100 ft. from the shaft. The vein, at first small, rapidly swelled, and has now been explored for over 200 ft. and found to average between 2½ and 3 ft. in width. This new drift, a few days since, penetrated the old workings. The old workings were found in ore of excellent grade and little stoping had been done. The Helvetia is now the most valuable mine in the Julian district. The quartz in this mine has a dark bluish cast, which is doubtless caused by the innumerable microscopic crystals of moquettite scattered throughout. It shows considerable free gold and about 4% to 5% pyrite, the quartz mills from \$40 to over \$200 a ton; the concentrated sulphides assaying about \$300 per ton.

Other claims in the Julian district which have attracted attention during the year are the Gold King and the Gold Queen, the Cincinnati Belle, Warlock, High Peak, Washington, Golden Chariot, Cable and Ready Relief, all of which have free milling gold quartz veins, and most of them in former days (before the owners of the Cuyamaca Grant attempted to take in the entire mining region) made large outputs. The mines are just recovering from an inactivity of nearly ten years' duration, and promise in the coming year to again become steady and large producers.

The Stonewall mine, belonging to the estate of the late ex-Governor Waterman, is the most extensively developed property in the Julian country. It is understood that recent developments in this property have been very satisfactory, and a few weeks since it was reported that a sale of the mine was being negotiated for \$1,500,000, though this probably includes the Cuyamaca grant. This rumor has been contradicted and declared to be true so frequently that I simply give it for what it may be worth. I am of the opinion, however, that if any negotiations are in progress the figures given are exaggerated.

During the past fall no little excitement has been caused by the reported finding of tin ores in the Laguna Mountains, about fifty miles east of San Diego, and numerous parties have gone out in that region, which is on the confines of the Colorado Desert, and though many hundreds of pounds of "rich tin ore" were brought in, the most diligent effort of competent assayers in San Diego, Los Angeles or San Francisco failed to find any tin. The rock brought in was a low grade of iron and manganese, utterly useless for any purpose in its present location. This tin stampede will soon be a thing of the past.

It is reported that another rich placer find has been made in the Cargo Muchacho Mountains near Yuma in this State. In early days, it is said, that many thousands of dollars were actually picked up on the surface of the ground in that desolate, frightfully lonesome and silent land.

Mining interests, or perhaps I should say the interest in mining, has greatly increased during the past year in this section, and it will no doubt result in the further discovery, development and operation of numerous valuable properties.

COLORADO.

Mineral surveys approved by the U. S. Surveyor General of Colorado, during the week ending January 2d, 1892. Survey No. 7,167; Land District Gunnison; Name of claim Fortune's Favorite and Gray Carbonate lodes; 7,068 A. & B., Central City tunnel lode, No. 2 lode and Western Mill site; 7,067 Central City tunnel lode, No. 7 lode; 7,066 Durango, Elbig lode; 7,063 Leadville, The Mascot. The Swan River and Eckhardt Patch Placers; 7,216 Leadville, Emma lode; 7,204 Leadville, Spar lode; 7,276 Central City, B. B. lode; 7,165 Montrose, 85 lode; 7,290 Central City, Eccentric lode.

CLEAR CREEK COUNTY.

HUBERT MINING AND MILLING COMPANY.—This company is sinking a winze and making an upraise to connect the 850 ft. and 900 ft. west levels, and is employing 25 miners. According to the Idaho Springs Gazette, the smelting ore nets from \$90 to \$180 per ton. The stamp mill dirt yields from 4 to 10 oz. of gold per cord.

SEVEN THIRTY.—This mine continues to output largely. Following are recent millruns: E. Masse, 256 ozs. silver, 31% lead; 109 ozs. silver, 9% lead. B. Veitta, 348 ozs. silver, 30% lead; 114 ozs. silver. Frank Winters, 303 ozs. silver, 30% lead; 126 ozs. silver, 8% lead. B. Linetta, 89 ozs. silver. P. Parachini, 48 ozs. silver. F. H. Ogilvie, 224 ozs. silver, 18% lead; 126 ozs. silver. L. Pilo, 92 ozs. silver, 56% lead; 21 ozs. silver, 22% lead.

GILPIN COUNTY.

According to the Central City Register-Call the shipment of ore and tailings from the Black Hawk station to the smelters at Denver and else-

where from December 1st, 1890, to December 1st, 1891, were as follows:

	Pounds.		Pounds.
December, 1890.....	6,039,000	July.....	4,737,000
January, 1891.....	5,838,000	August.....	5,481,100
February.....	6,240,000	September.....	5,197,400
March.....	5,948,000	October.....	5,733,700
April.....	5,769,000	November.....	6,148,000
May.....	5,585,900		
June.....	6,127,900	Total.....	68,845,000

These figures show a slight decrease from the shipments of last year in this class of ore, but the increased yield from the stamp mills will more than make up for the deficiency. About 30% of the above mineral is tailings, the product of the stamp mills, the balance being smelting ore. Beside the above shipments, the stamp mills crush thousands of cords of low grade ore, or mill dirt, as it is termed, that does not figure in the above returns, except in a concentrated form, as tailings.

LAKE COUNTY.

(From our Special Correspondent.)

IRON SILVER MINING COMPANY.—Some important changes in the personnel of the local management of this company's affairs have followed the late visit of Mr. Wm. H. Stevens to the mines. These changes consist in the placing of Wm. G. B. Huntley, of California, in charge of the property, thus relieving Messrs. W. Arens and Carl Ambrosius of all responsibility as to the mine workings. Mr. Arens, however, will retain the position of financial agent, and make all contract for ores, etc.

Changes are to be made in the plant, looking to a large increase in power, and the concentrating mill will also be altered somewhat, largely increasing its capacity. Two diamond drills have been ordered, though it is not decided as yet where they are to go, Mr. Stevens stating that one was intended for use in the Nisi Prius ground, the other probably going into the Moyer, where a large amount of development has lately been done, and a new streak of iron ore about 2 ft. thick, averaging 94 oz. silver, 0.4 oz. gold per ton has just been struck.

STAR OF HOPE MINING COMPANY.—The Bohn shaft of this company has now attained a depth of 450 ft., though it is probably that the cutting of the big pump station originally intended to go in at this point may be deferred until greater depth is gained. Very little water is encountered, less than 100 gallons per minute being the maximum at present, and every precaution has been taken to handle any amount that may come in. Two additional boilers are now in position, bringing the capacity up to about 230 H.P., which will be amply adequate to any calls that may be made, one 40-H. P. boiler having been found sufficient up to date. It is about 520 ft. from the surface that the ore has been proven to exist, and the work is progressing so fast that ere long connections will, without doubt, be made, and shipments begin.

WHITE CAP MINING COMPANY.—This company has small connections between the main working shaft and the Imes ore channels on the north end of the property, is now laying rails and effecting every facility possible to the immediate and economical handling of these ores. The drift has been run from two headings, and is nearly 1,500 ft. in length. It starts from the 500 ft. point in the shaft, and strikes the ore body about 90 ft. below the present workings which had previously been connected into the main shaft. Here they have large channels the blue Carboniferous limestone, carrying, down to a certain point, very fine lead carbonate ore. Below this point the change to sulphide occurs, though the commercial value of the ore remains the same. In fact, a slight improvement in the silver value is noticeable. Shipments have again been resumed, having been suspended pending the completion of the lower drift.

GEORGIA.

LUMPKIN COUNTY.

(From our Special Correspondent.)

COLUMBIA.—The machinery from the Columbia has been taken down, and will be shipped to South Carolina, where it will be erected on a new property under the management of Jas. Elliot, of Dahlonega.

IDAHO.

ALTURAS COUNTY.

CAMAS No. 2.—The Camas No. 2 mine and mill, which were sold at Sheriff's sale six months ago, to satisfy a judgment in favor of the First National Bank of Hailey, have been redeemed by the owners.

RED CLOUD MINING COMPANY.—The downward continuation of the ore body in the Red Cloud mine was cut into on the 22d ult. on the lowest level. This discovery is of great importance to the owners, as it enormously enhances the visible value of their property and justifies the hope that the payment of dividends can be resumed ere many months.

OWYHEE COUNTY.

DELAMAR MINING COMPANY, LIMITED.—The secretary of this company, Mr. Charles Pakeman, has sent us a copy of the manager's report for the month ending November 30th, 1891, which shows that in consequence of changing from the old engines to the new engine, and cutting the main shaft, putting on driving pulley, etc., three days were lost in milling operations. Under the circumstances the stoppage was very short. Number of

tons crushed, 1,160; assay value in gold, \$17,330; assay value in silver, \$20,300; total, \$37,630; assay value, tailings, gold, \$4,850; assay value, tailings, silver, \$2,000; total, \$6,850; percentage of gold saved, 72.03; percentage of silver saved, 86.73; average percentage, 79.33; number of Doré bars produced, 19; number of ounces gold produced, 714.43; number of ounces silver, 22,230.51; value of the gold, at \$20 per oz., \$14,288.94; value of the silver, at 95c., \$20,168.97; total value of gold and silver, \$34,457.91; estimated value of ore shipped, \$17,160; slag and matte shipped, \$2,640; rentals, \$612; total, \$54,869.91; current expenses for the month, including salaries, labor and supplies, \$25,868.95; estimated profit for month of November, \$29,000.96. The batteries were in service 27 days. "On the 9th November the new engine was turned over and from that date to the present it has worked regularly and satisfactorily. The new pans and settlers were finished by degrees and are now all in operation. We have taken two cracked mortars and have replaced them by two others. We have still one to remove which is cracked and leaking. Everything so far in the way of new machinery is working all right."

IOWA.

APPANOOSE COUNTY.

The coal operators of this county have filed with the Railroad Commissioners an application for hearing on the subject of soft coal rates. Appanoose County is in the extreme southern tier of the counties of the State. The operators allege that it produces 50% of the Iowa coal that is consumed for domestic purposes, and that an increase in the rates for hauls of 200 miles and upward, such as is proposed in order to shut out Illinois competition, would affect 40% of the coal they ship.

KANSAS.

CHEROKEE COUNTY.

During the week ending January 2d the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,623,160; rough ore, pounds sold, 833,930; zinc ore, pounds sold, 446,250; lead ore, pounds sold, 295,640. Sales aggregated a total value of \$9,623.

MICHIGAN.

COPPER.

ADVENTURE MINING COMPANY.—At this mine during the past year ground was broken on the surface on the Knowlton vein and a shaft sunk to the first level, where drifts were started each way to open up ground preparatory to a resumption of sinking. No shipments have yet been made.

ARNOLD MINING COMPANY.—The shaft in this company's mine is 200 ft. deep, and a drift has been started into the ash bed from a point a few feet from the bottom of the shaft. The amygdaloid is said to be showing well in copper. The superintendent has recommended a cessation of work during the winter on the score of expense, with a view of putting on a double force in the spring.

CALUMET & HECLA MINING COMPANY.—Advices from the mine are to the effect that this company will hereafter refuse to give weekly, monthly or yearly reports of its production.

The company closed down three smelting furnaces on the 31st ult., throwing out of employment 30 men. The action was taken for the purpose of accumulating about 1,000 tons of mineral per month for transportation at the opening of navigation to the Buffalo smelting works.

Work has been begun on the addition to the Hecla mill. It will contain room for four additional stamps.

CENTENNIAL MINING COMPANY.—The Calumet Conglomerate says: "It must be admitted by the most sanguine that the prospects for the immediate finding of good ground in the Centennial are extremely discouraging. Superintendent Vivian, until lately, has been indefatigable in his efforts, believing that he had plenty of copper ahead. It is yet impossible to obtain anything officially from this end, but it is expected every hour that a change of management will be announced. Straws have been blowing that way for some time. It is also from very good local authority that there will be a resignation among the under officials. It is very evident that there is a little pent-up volcano smouldering away there and an eruption may take place at any time. Rumors that Supt. John Daniell will succeed Superintendent Vivian at the Centennial and at the Huron are rife just at present, but nobody will talk who can tell anything to a certainty. No. 7 is still idle. No. 6 stopes are lean and a big draft has been made on the stockpile. There is some good ground at No. 4 which may bridge over the gap till some new ground is opened up. No. 3 has found nothing yet, but then it isn't expected until it is much farther down.

HURON MINING COMPANY.—In the Circuit Court at Houghton County, December 31st, 1891, attachments and judgments were taken out against this company aggregating \$198,554, of which \$106,251, including costs, was for D. L. Demmon, secretary and treasurer of the company, through his attorney, A. F. Rees.

NATIONAL MINING COMPANY.—At this mine during the past year the principal operations were exploratory. The main shaft, or No. 2, in the south vein was sunk from the 12th to the 15th level, 300 ft., and several hundred feet of drifting extends on each side of the shaft. From the upper

workings in this vein the National and Minnesota mines paid over \$2,000,000 in dividends. At the depth of about a thousand feet the vein ceased to bear copper in paying quantities, and the object of the present operations is to sink through this barren streak to more productive ground, which it is expected will be found below. On the 11th and 12th levels crosscuts have been driven north to the stamp lode, 140 ft. distant, where they were connected by a winze. The point of intersection at each level opens a rich stamp lode 6 ft. or 8 ft. wide, but a 100 ft. of drifting proved the boundary character of the vein. A month's stamping from these openings, however, showed a decided improvement over the previous openings, and another crosscut was started at the 14th level of the south vein. This is now rapidly advancing, and when "holed" will expose the stamp lode at a depth of 800 ft. below the old workings.—*Ontonagon Herald*.

TAMARACK JUNIOR MINING COMPANY.—A letter under date of December 22nd, from Superintendent Daniell says that the winze under the second level north is down about 10 ft., and the full width of the lode is not exposed. He thinks it is certainly good for 2% mineral. The second level drift is some 15 ft. beyond the winze, and is showing well. The run of copper ground here is over 100 ft. long, but not regular in size and thickness. The third level north is a fairly good drift, but is not over 6 ft. wide. This level south has improved materially. The lode is 10 ft. wide, and is opening out. At present it is carrying a good deal of copper with about 4% mineral. The stopes following the third level are opening as expected. The lode at present is not over 8 ft. wide, and it is expected that wider conglomerate body will be reached soon.

STONE.

The Ayer estate has been drilling for brownstone in the vicinity of Sidnaw. A considerable quantity of the stone has been encountered, but it is so far variegated and mottled.

The case of the Michigan Land & Iron Company vs. the Deer Lake Company has been affirmed in the Supreme Court of this State. In 1860 a tract of several thousand acres was sold by the Marquette & Ontonagon Railroad to Messrs. Ward & Green, from them to others and finally to the Deer Lake Company. The lease contained a clause reserving all mines and ores of metals. When the marble and serpentine was discovered by Mr. Julius Ropes, of Ishpeming, and its beauty became known, there were several deals proposed for the purchase from the Deer Lake Company of tracts of the territory holding the marbles. Then the question of ownership of these minerals arose, and the courts were applied to that a settlement of disputed points might be made. It was contended that the reservation could not hold the marbles.

IRON—MARQUETTE RANGE.

MAGNETIC.—An option to explore this property some 8 miles from Republic has been secured by parties from the latter place, who have already commenced diamond drilling. Considerable money has been spent in searching for ore at this mine, and some has been found, but it has not been of merchantable quality.

MINNESOTA.

MESABI RANGE.

(From an Occasional Correspondent.)

On the Mesabi range but comparatively little exploration and development has been made until within the past 30 days. Some genuine iron mines, of excellent Bessimer ore, have been discovered a few miles west of the Duluth & Iron Range Railway, and that this range has passed beyond the enigmatical there is now no doubt. This is assured by the announcement that that conservative corporation, the Duluth & Iron Range Railroad Company, will build a branch thither by spring. The Duluth, Mesaha & Northern Railway line has been surveyed from Duluth to the range. Large transfers of lands on the Mesabi are of daily occurrence.

VERMILION RANGE.

The Vermilion Range has added materially to its record during 1891, the increase in output having been large. The shipments from the mines by rail, mine weights, were as follows: Minnesota, 517,187 tons; Chandler, 372,722 tons; Pioneer, 3,080 tons; total, 892,995 tons. Chemical analysis showed the Minnesota grades to vary from 62% to nearly 69% metallic iron, and from 0.060% to 0.040% phosphorus; Chandler, 64%, 0.038% phosphorus.

There is a fair prospect for an increase of the Minnesota's output in 1892, and a great increase in the Chandler's is assured. A steam shovel, the first on the range, will be put at work loading cars at the Chandler. The greater part of the present output, from this mine comes from the new "forty," or shaft No. 3, from which 800 tons to 900 tons per day are being hoisted. Its capacity, if pressed, is not far from 50,000 tons per month. The Minnesota and Chandler will each stock-pile 300,000 tons this winter. Both mines are now under one management, the Minnesota Iron Company.

The Pioneer promises to be a larger shipper next season, but to what extent is undetermined. The vein ore so long sought for was discovered a short time since, which, coupled with better management and improved appliances, indicates a roseate fu-

ture for it. The Zenith is now stock piling a small amount of marketable ore. A 40-ft. vein, said to be of excellent quality, has been struck there. Other properties are showing well. The settlement of litigation, involving valuable property, will be followed by a great increase in shipments. The land titles on both ranges are considered good. The only contest of importance is the Hyde-McDonald case, affecting the famous Section 30 lands, which is now on trial before the Land Office at Duluth.

The Duluth & Iron Range Railroad has expended a large amount of money during the past year in improving its right of way and track. The extreme grade at Mesabi Heights, on the divide, has been lowered, and its terminals at Endion (a suburb of Duluth) have been given much attention.

At the port of Two Harbors the season, while of shorter duration than some of its predecessors, has been the greatest in its history. It is the only iron port on the great lakes to show an increase over the phenomenal tonnage of 1890. The following are the official figures: Minnesota, 512,987 tons; Chandler, 369,486 tons; Pioneer, 3,049 tons; total, 885,512 tons. Increase over 1890, 14,653 tons. Grand total shipments since 1884, 4,020,193 tons. But for the low water which prevailed during the entire season at the Sault Ste. Marie canal, necessitating from 200 to 300 tons per cargo less than last season, and the high price paid at Duluth this fall for wheat cargoes, the total would have exceeded 1,000,000 tons. There were 474 clearances with ore, which was 32 more than in 1890.

A small quantity of Chandler ore is being shipped from the mines to the blast furnace at West Duluth.

In addition to its two large ore docks now in operation, the Duluth & Iron Range Railroad Company will build three more, each 1,000 ft. long, with a clear channel of 200 ft. between. The grading of approaches and underground work for dock No. 4 is now well under way.

The Government has expended \$35,000 on harbor improvements at the port of Two Harbors the past year; the east breakwater has been extended 200 ft., and one of the finest light-houses, with fog signal station, on the lakes built. The projected harbor improvements are an additional 250 ft. on the present breakwater and a 1,500-ft. breakwater from the west shore.

The Minnesota Steamship Company, which owns one of the finest line of steel freighters on the lakes, will increase its fleet from six to eight this winter. Representatives of the company have also contracted for a larger whaleback steamer and consort than has yet been built, to handle ore from these docks.

MONTANA.

BOSTON & MONTANA CONSOLIDATED COPPER AND SILVER MINING COMPANY.—This company has issued a circular offering to each holder of 208 shares of stock the right to buy a \$1,000 7% bond at 90 and interest, the subscription to apply to the record of December 31st, and the right to expire January 30th. These bonds are the issue of \$600,000 lately authorized, and mature \$100,000 yearly in 1902-7. The proceeds are to be used to build an electrolytic plant, etc., at Great Falls. Bonds not taken by shareholders will be otherwise disposed of.

DEER LODGE COUNTY.

ELIZABETH MINING COMPANY.—The Elizabeth mine was closed down on the 22d ult., presumably for want of funds. A proposition was recently made by the St. Louis stockholders and directors to make a voluntary assessment of 10 cents per share. This was not satisfactory to the Montana directors, who firmly believe that there is plenty of ore in sight to justify the spending of a little money and doing less prospecting.

GRANITE BELLE.—On the Granite Belle, which is being operated by Mr. Chas. Clark, the tunnel is extended to a depth of nearly 1,000 ft., and at present the face is in extremely hard granite.

JUBILEE.—An important strike has been made in this mine at a distance of nearly 1,300 ft. in the tunnel and at a perpendicular depth of about 200 ft. There is now said to be 14 ft. of rich ore in sight and the footwall is not yet encountered. Large quantities of the ore are being taken out and hauled to the mill, which it is said will start up about the middle of January.

SALT HILL.—The Salt Hill tunnel, one of Chas. Clark's enterprises in mining, at the head of Hasmark gulch, has been run into the mountain over 500 ft., and it is being continued by a day and night shift.

SILVER BOW COUNTY.

A statement appeared in some Montana papers to the effect that the Alice and the Moulton mines had been bonded to an English syndicate. According to the Salt Lake *Tribune* this report is utterly unfounded. The controlling interest of these companies' stock is held in Salt Lake City.

NEVADA.

ESMERALDA COUNTY.

MOUNT DIABLO MILL AND MINING COMPANY.—The annual meeting of the stockholders of this company of Columbus District, was held recently at San Francisco, Cal. The number of shares represented was 36,571, out of 50,000 in the company. The old directors and officers were unanimously re-elected, as follows: J. M. Shotwell, J. N.

Knowles, George W. Grayson, Lewis Teese, Jr., and R. W. Heath. J. M. Shotwell was reappointed president, J. N. Knowles vice-president and R. W. Heath secretary. W. H. Shockley superintendent and the Bank of California treasurer. The company had a surplus of \$3,935.17 in the treasury at the close of the fiscal year, but since then a bullion shipment valued at \$17,019.09 has been received. The mine was shut down on November 30th. The low price of silver being the ostensible cause.

(From our Special Correspondent.)

MOUNT DIABLO MINING COMPANY.—Bullion valued at \$17,019.09 has been received from the mine, being the clean up of the mill on December account. The mill has now closed down for the season.

STOREY COUNTY—COMSTOCK LODE.

(From our Special Correspondent.)

The Eureka mill, which, with the Morgan mill, has been at work on Consolidated California and Virginia ore, has closed down. The Morgan continues running to the full capacity of its 44 stamps. The Brunswick mill is running less than half its capacity. The Mexican mill at Curpin has also closed down, for the present at all events, and the Santiago mill, which has been running on Yellow Jacket ore, will close this week. Hereafter ore from this mine will be worked at the Vivian mill.

The following is the weekly statement of ore extracted from Comstock mines and shipped to the mills, with the battery assay values:

Mine.	Tons		Assay Values.	
	extracted.	milled.	Dec. 26.	Dec. 19.
Con. Cal. & Va.	1,043	980	\$24.55	\$26.10
Chollar.....	448	448	13.10	17.00
Ophir.....	43	.....	19.00	16.50
Overman.....	628	544	22.47	.....
Savage.....	400†	325	21.00	.....

† Car sample \$23.27. † Cars.

The affairs of the Comstock mines, through suits at law and otherwise, appear to be getting very much tangled, and it seems to be the intention, and from the standpoint of the directors, may be wise policy to permit as little information as possible to leak out. The quarterly statements, an analysis of which casts considerable light on the inner working of the companies, which ought to have been on file in the office of the Assessor of Storey County about the first week in October, has either never been filed or else has been hocuspocussed out of the way. As the assessor, like all other Comstock officials, holds office through the patronage and favor of the "mill-ring," it is most likely that the statements for the quarter ending last September are hidden away somewhere in his office, and the Virginia papers have not the power, had they the will, to run counter to the wishes of their common masters.

ALTA SILVER MINING COMPANY.—The work of breaking ore in the Southeast drift, 1,300 level, has ceased, as there is no place to put it, the dumps being full. The ore body is being merely skirted, and is of good quality so far as seen. The Southeast drift, 1,350-ft. level, has now a total distance of 46 ft., the face being in quartz showing bunches of ore.

BELCHER MINING COMPANY.—The raise from the lateral drift, 300-ft level, has been advanced 30 ft., the top being in quartz assaying from \$15 to \$20 per ton. From five to ten tons of fair grade ore is being saved per day from the South drift from the fifth floor of the raise above the 1,300-ft. level.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—The output of the mine during the month of November was as follows: Worked at the Morgan mill 3,760 tons of ore, which produced gold, \$27,003.52; silver \$34,199.04; total, \$61,202.56. The yield in bullion per ton was: Gold, \$7.18; silver, \$9.09; total, \$16.27. Assay value of ore, as per battery samples \$23.65.

Bullion has been received in San Francisco from the mint \$13,831.99, making a total to date on December account \$63,063.43.

GOULD & CURRY MINING COMPANY.—At the annual meeting of the stockholders, held this week, 83,360 shares were represented, and the following Board of Directors elected: H. B. Havens, president; C. H. Fish, vice-president, and R. Sherwood, J. N. Souther, I. Anderson, T. H. Fish and H. Ladig, directors. A. K. Durbrow was re-appointed secretary, and P. Kerwin superintendent. The financial report submitted by the secretary showed an indebtedness of \$4,836.63. The annual report of Superintendent Kerwin was as follows: During the year there were extracted from the different levels 1,449 tons of ore. Sent to the Nevada mill 1,124 tons, the bullion yield of which was \$14,123.28. 200 level—On this level the northwest drift from west crosscut 2, which was advanced 112 ft. at date of last annual report, was advanced a further distance of 220 ft. and discontinued, making its total length 332 ft.; passed through some old fills of a fair quality. At a point 70 ft. from west crosscut 2 on this drift we started upraise 1 and carried same up a distance of 50 ft.; formation passed through were old fills and quartz showing some value. Winze 1 started from bottom of this upraise was sunk 25 ft., passing through some ore of a fair quality. From bottom of this winze started a south drift and advanced same a distance of 22 ft. through a formation of quartz showing spots of ore. In northwest drift at a point 125 ft. north of west crosscut 2 started west crosscut 3 and advanced the distance of 50 ft. through a

formation of porphyry and quartz. Thirty-five feet east of winze 1 started winze 2 and sunk it a distance of 100 ft.; the first 66 ft. passed through was ore of a fair quality. At a point 50 ft. north of upraise 1 started upraise 2, and carried it up a distance of 125 ft.; formation passed through was porphyry, clay and quartz, giving low assays. The main south drift from crosscut 2 has been advanced 105 ft., making its total distance 215 ft.; formation passed through was quartz and porphyry. In this drift 190 ft. south of west crosscut 2 started west crosscut 3, and advanced same 22 ft. through porphyry. In said drift 146 ft. south from west crosscut 1 started east crosscut 2 and advanced same 122 ft., through porphyry and quartz showing value. At a point in east crosscut 1, 45 ft. from main south drift we started a southeast drift, and advanced same 104 ft.; passed through 60 ft. of old fills of fair quality. From upraise 2, 65 ft. above the 200 level, we started west crosscut 1, and advanced same 97 ft. through soft porphyry; also started east crosscut 1 from opposite west crosscut 1, and advanced it a distance of 80 ft., passing through a formation of quartz, porphyry and low grade ore. Run a north drift from upraise 2, and advanced it a distance of 85 ft. through quartz. From end of this drift started east crosscut 2, and extended same 157 ft. through quartz and porphyry. Started west crosscut 2 from opposite east crosscut 2, and advanced it a distance of 235 ft.; passed through a formation of porphyry, clay, and quartz, giving low assays.

250 level—On this level work was resumed in west crosscut 1 from upraise 1 from 300 level, and advanced a distance of 56 ft., making the total length 91 ft.; passed through a formation of porphyry, with streaks of quartz. Started a south drift from upraise 1 from 300 level, and advanced it a distance of 41 ft. through quartz and porphyry.

300 level—At a point in the southwest drift 225 ft. from west crosscut 1 we started west crosscut 2, and advanced same a distance of 70 ft., passing through a formation of porphyry streaks of clay and quartz, giving low assays. In this crosscut 22 ft. from southwest drift, started incline upraise 1 and carried it up a distance of 132 ft., making connection with crosscut 3 on 200 level, thereby greatly improving the ventilation of this section of the mine. At a point in south drift 75 ft. south of this upraise sunk a winze 14 ft. through some low grade ore. In south drift 35 ft. north of our south line started west crosscut 3 and extended it a distance of 104 ft., passing through a formation of porphyry, clay and bunches of quartz.

400 level—West crosscut 3 from northwest drift has been advanced a distance of 95 ft. passed, through a formation of porphyry, clay and quartz. At a point in this crosscut 41 ft. from northwest drift we started a north drift and extended a distance of 18 ft. through quartz of no value. Opposite the drift we started a south drift and advanced it a distance of 15 ft. in quartz giving low assays.

HALE & NORCROSS SILVER MINING COMPANY.—The following letter from our special correspondent in San Francisco mailed from that city, under date December 18, reached us too late for our issue of December 26, and could not be printed in our issue of January 2, that being our annual statistical number, in which the department of general mining news was omitted. We give the letter now, notwithstanding its date, so that our record of this remarkable trial may be complete.

The suit of M. W. Fox vs. this company has not made much headway this week. The substitution of real for bogus names in the complaint and the introduction into the suit of certain "king-pins" of the swindling combination has been opposed so vigorously by defendants' counsel that the matter has dragged along and is now held over. This delay, however, is in no sense detrimental to the plaintiff or his cause, indeed, in the present instance it has had a rather favorable effect, for it has furnished an opportunity for the press, and men interested in mining pursuits, to show on which side of the fence they have ranged themselves. Needless to say, perhaps, the press of this city—excepting always those papers who have fed and thrived on "mill-ring" pap—have been outspoken in denunciation of the Comstock frauds. The Nevada papers continue to play the part of "dumb dogs," as might naturally be expected, for the white slaves are buried underground and no local organ dare voice their wrongs. Heretofore a quiet intimation to any resident on the Comstock from the "powers that be" was tantamount to a command, but the suit now on trial has evidently incited a small percentage of these toilers to assert their manhood, although it is not unlikely that they will come to grief, for the "snake may be scotched but it is not killed." No longer are Comstockers requested to do so and so. Within the last two weeks two cases have come under my notice where the men were threatened with dire vengeance if they came down to San Francisco—on the supposition, presumably, that they intended, either directly or indirectly, furnishing information to the "Enemy." As already shown in the columns of the ENGINEERING AND MINING JOURNAL the State of Nevada is practically carried in the pockets of four or five men, and, as has been developed during the trial of the case now at bar, property is notoriously unsafe. Opposition provokes opposition, and the commands of yesterday have developed into the threats of to-day. It will only be a logical consequence if the chaotic days of '49—minus the rude

justice—are revived, and life becomes as insecure as property is at present. Meantime fighting blood has been aroused all along the line.

As foreshadowed a week ago, Judge Hebbard on Monday ruled in favor of the plaintiff regarding the substitution of real for fictitious names in the pending suit, so that W. S. Hobart, Alvinza Hayward, John P. Jones (United States Senator from Nevada), the Nevada Mill & Mining Company, and Francis Newlands, executor of the Sharon estate, have been made parties to the suit in lieu of John Doe, et al, and are charged as co-conspirators with the Hale & Norcross directors. As the Court made its ruling Ex-Judge Mesick interrupted with a suggestion and argued that in case the parties were joined and real names substituted it would result in a miscarriage of all done up to date.

Judge Hebbard remarked that under Sections 473-4 of the Code of Civil Procedure, he had no discretion in the matter. "But," added he, "it in no way affects defendants already joined." Furthermore the plaintiff has promised to bring the new defendants into court within a reasonable time or dismiss as to those not served. Judge Mesick, one of plaintiff's counsel, challenged opposing counsel by saying that all argument was premature, as counsel for the defense did not allege that they represented the new parties joined in the suit.

"It is a monster proposition in law," retorted ex-Judge Mesick, "to go on with the case until the new parties are cited to appear in court and make answer. In 40 years' practice I never heard of such a proposition, and there is no justification for the stand taken by plaintiff."

This latter outburst brought Attorney Baggett to his feet. "I maintain," he said, "that the plain and explicit language of the Code allows real names to be substituted for bogus ones when the same are disclosed by the testimony, and this is a better guide to the court than the 40 years' experience of opposing counsel."

In view of the serious objections of the defense the matter was carried over one day for the submission of fresh authorities.

On Tuesday ex-Judge Mesick admitted that he appeared for Alvinza Hayward, so that his stand of the previous day was not altogether disinterfered or in defense of an abstract principle of law. W. S. Hobart, though not served, was represented by Gaiber, Boalt & Bishop.

Ex Judge Mesick opened his batteries again by saying, that to proceed with the trial until all the defendants appeared would virtually be trying the case piecemeal. He also added that it would be unjust to the persons who would have to bear the expense of the trial, to try it unless all the defendants were in court and able to proceed with their defense.

Judge Hebbard stated that it was a general principle of law, that there should be but one judgment and a general principal of equity that a case should not be tried piecemeal. He could not, therefore, consent to proceeding unless plaintiff would withdraw his amendment and dismiss all proceedings thereto.

After about five minutes consultation between Mr. Fox and Attorney Baggett, his leading counsel, the latter, on behalf of his client, positively refused to consent to dismissal proceedings relative to the amendment granted by the Court. "We have labored diligently," he remarked, "to find true defendants and having found them we will not let them go. I am willing, however, he added, "for the case to go over for one week and promise to dismiss proceedings as to such defendants as cannot be served."

The Court then granted a continuance until the following Tuesday.

Ever since proceedings were instituted against the Hale & Norcross company, Senator J. P. Jones has been conspicuous by reason of his absence from the streets of San Francisco. He has avoided the city as he would the plague, and consequently—and most unfortunately—it will not be possible to serve papers on him. Francis Newlands, also, has forsaken this delightful climate for the better enjoyment of the vigorous winter East, and he will also not appear in the case.

To-day (Friday) counsel representing Alvinza Hayward, W. S. Hobart and the Nevada Mill and Mining Company, came into court on demurrers filed. Arguments to quash service on legal technicalities consumed all the morning, at the conclusion of which the Court overruled demurrers and granted the three new defendants ten days to answer.

This means that these three, at all events, will be parties to the suit; and as they are a small proportion of the men holding in their hands the wires connecting with the directors' room in the Hale & Norcross office, by which the dummy board was made to obey the behests of its masters, they ought to be able to furnish a mass of most interesting information.

NEW MEXICO.

GRANT COUNTY.

CINCINNATI.—This mine is being worked by a few leasers in a desultory manner. It has, up to the present time, produced some \$60,000 worth of the precious metals. A rich kidney of highly-colored carbonates, 4 ft. in width, extended from the surface to a depth of 60 ft. and averaged 128 oz. silver and 60% lead, and yielded to the original discoverers \$20,000. From that depth to the present, some 150 ft., the vein is badly shattered

and the ore runs in stringers through the matrix, which is 14 ft. wide.

LAST CHANCE MINING COMPANY.—For the three months, October, November and December, since the Last Chance mill at Silver Creek started, there has been milled about 2,000 tons of ore, which has produced about \$16,000 in bullion. In the neighborhood of \$7,000 has been produced and shipped during the past, 15 days says the Silver City *Enterprise*. Heretofore the mill has been handicapped by lack of wood supply and the freezing up of the water. When the mill is running steadily it will crush 1,500 tons per month.

SILVER CELL.—The Dimmick Brothers have commenced work drifting from the bottom of the shaft on the Silver Cell mine in the direction of the shaft on the Climax mine. As extremely rich ore was taken out of both these shafts interesting developments may be looked for in the driving of this drift.

LINCOLN COUNTY.

OLD ABE MINING COMPANY.—Another strike is reported in this gold mine at White Oaks. The vein, which is free milling quartz, is said to have been struck at a depth of 150 ft. and within a short distance of the strike of last summer. The new vein has been prospected but little, still it is reported to be of uniform width of 6 ft. and assaying from \$40 to \$100 in gold to the ton.

NORTH CAROLINA.

CHATHAM COUNTY.

(From our Special Correspondent.)

EGYPT COAL COMPANY.—A fire has been burning in one of the shafts of the mines operated by this company. The depth of the shaft is about 400 ft., but it is not known whether the fire extends throughout the levels or not.

ROWAN COUNTY.

(From an Occasional Correspondent.)

On January 1st I saw about 75 lbs. of extremely rich ore taken from the Barringer mine, five miles below Gold Hill. The ore probably contained at least 5% of gold. It was taken from a depth of 40 ft., and was inclosed in a small vein of calcite. This mine has produced, in the past, as much as \$40,000 from one pocket. The mine is owned in part by Theodore Clutz, Salisbury; it is now being investigated by Ohio parties.

PENNSYLVANIA.

COAL.

The Schuylkill Coal Exchange has issued a report dated Pottsville, December 31, 1891, which shows that the collieries drawn to return prices of coal sold in month of December, 1891, to determine the rate of wages to be paid, make returns as follows: P. & R. C. & I. Co., Reliance Colliery, \$2.27⁵/₁₀₀; P. & R. C. & I. Co., Keystone Colliery, \$2.30⁵/₁₀₀; P. & R. C. & I. Co., Preston No. 3 Colliery, \$2.48⁵/₁₀₀; P. & R. C. & I. Co., North Mahanoy Colliery, \$2.44⁵/₁₀₀; Wm. Penn Coal Co., Wm. Penn Colliery, \$2.20; total, \$11.71⁵/₁₀₀; average, \$2.34⁵/₁₀₀. The rate of wages to be paid for work for last two weeks of December, 1891, and first two weeks of January, 1892, is 5% below the \$2.50 basis.

Over 2,500 miners are idle at the collieries between Shamokin and Mt. Carmel on account of high water. In the immediate vicinity of Shamokin workings have been fortunate in escaping inundations.

The fire in Dunkleberger & Co.'s mines at Tamaqua has become alarming. All efforts to subdue it have been futile. It is now thought that the coal veins have been burning for many years and that the flames have only reached the surface for the first time.

LYSLE COAL COMPANY.—Mr. P. J. Forsyth, of this company, has leased the coal mines of J. S. Neel, at Coal Center. Mr. Neel will retire from business entirely, owing to ill health.

REDSTONE COKE WORKS.—A heavy fall of slate occurred at this company's mines at Uniontown on the 5th inst. Two miners were killed.

TENNESSEE.

Another outbreak is expected in the Coal Creek Valley, an incendiary circular having been sent among the miners praying "destruction to the convicts, lessees and State militia."

ANDERSON COUNTY.

(From our Special Correspondent.)

CAMBRIA COAL COMPANY.—J. T. Williams, David Jones and others have commenced to develop the Star coal mines at Better Chance, and for that purpose, they have organized this company, with a capital stock of \$75,000.

UTAH.

Wells, Fargo & Co.'s report shows that Utah's mineral output for 1891 was the largest in the history of the Territory and will exceed that of 1890 by fully \$1,000,000. The report gives the following figures of the Territory's production: 1,836,060 lbs. of copper at 5¹/₂¢ per pound, \$100,983.30; 6,170,000 lbs. of refined lead at 4¢ per pound, \$246,800; 80,356,528 lbs. of unrefined lead at \$60 per ton, \$2,410,605.84; 8,915,223 ozs. of fine silver at 98¹/₂¢ per oz., \$8,759,206.59; 36,160 ozs. of fine gold at \$20 per ounce, \$723,200; total export value, \$12,240,885.73. Computing gold and silver at their mint val-

uation and other metals at their value at the seaboard, it would increase the value of the product to \$16,198,066.81. The output of the Territory for 1890 was approximately \$11,225,000.

SALT LAKE COUNTY.

SAMPSON.—A strike is reported in the third level of this mine at Bingham. The pay streak is about 18 in. wide, and runs from 60 to 100 oz. silver per ton. The shaft is down 400 ft.

SUMMIT COUNTY.

The following table shows the total ore shipments from Park City during the year ending December 31st, 1891, according to the Park City *Record*. The ore was all handled by the Mackintosh sampler with the exception of the Crescent and Glencoe:

	Pounds.		Pounds.
Ontario.....	27,878,630	Varcoe & Flindt..	690,500
Daly.....	12,662,900	Gem.....	36,330
Anchor.....	20,121,670	Crescent.....	23,876,000
Mayflower.....	10,268,500	J. M. Richardson.	3,880,000
Wedge.....	980,750	Glencoe.....	140,540
Roaring Lion.....	60,380	Sundries.....	140,540
Northland.....	228,220		
Woodside.....	201,040	Total for 1891.....	105,598,900
Creole.....	122,700	Total for 1890.....	69,608,180
Alliance.....	93,630		
Apex.....	199,230	Increase for 1891.....	35,990,720
McHenry.....	57,980		

ONTARIO MINING COMPANY.—During 1891 this company milled 24,603 net tons of ore and produced 814,486 fine ounces of silver, which sold for \$892,421. The total product from bullion and ore sales was \$1,661,053.

DALY MINING COMPANY.—According to the Park City *Record*, the Marsac mill during 1891 milled 23,800 net tons of ore, which produced sulphides containing 850,000 ounces of fine silver and 710 ounces of gold, which sold for \$810,536. The total product of the Daly mine from bullion and ore sales was \$1,156,098.

WASHINGTON.

Governor Ferry, of Washington, has appointed the following board to examine candidates for appointment as coal inspectors, in accordance with a law passed by the last legislature, relating to the proper ventilation and safety of coal mines: Oscar Huber, of Spokane; Alexander Ronald, of Roslyn; John W. Richards, of Reclay; Thomas Ismay, of Bucoda; Morgan Morgan, of Black Diamond; D. T. Davies, of Carbona Jo; and James Williams, of Renton. The board will meet in Olympia January 12th. The law provides that the governor shall, upon recommendation of the board, which must be composed of three practical coal miners, three competent coal operators and one mining engineer, appoint two inspectors of coal mines, who shall hold office for a term of four years, the first term to begin the first Monday in February, 1892, and whose compensation shall be \$1,500 per year and mileage, each. It is the duty of each inspector to examine every mine in his district not less than once every three months, and he will have authority to order such improvements in the working of the mines as he may deem necessary for the safety of the miners. The state is divided into two inspection districts, the first including the northern portion of the state, and the second the southern.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Jan. 8, 1892.

Heavy Chemicals.—During the past week the trade has been experiencing the usual holiday reaction, and aside from transactions in futures very little business of importance has been done. The situation seems to be one potentially active, and a good business will probably develop during the early months of the year. Prices are fairly firm.

Caustic Soda.—This brand is the most active in the heavy chemical market, and during the past week or two has been affected, in one way or another, by the uncertainty of freight rates. As was stated in this column some time ago, there was a discrimination between New York and Boston and Western points in favor of Boston. An adjustment was predicted at the time. This has been effected, and as a consequence quite a heavy Western trade has been experienced. Now comes a report of the increase in ocean freights which, if realized, will absorb the rail reduction. Stocks are ample. Quotations remain about the same and are as follows: 60%, 3'10@3'15c.; 70-74%, 2'85@2'90c.; 76%, 3'15@3'20c.; 77%, 3c.

Carbonate Soda Ash.—The brand is fairly active in futures, although quiet in spot transactions. There is an uncertainty in this market relative to freight rates, which promise an advance, and consequently have a tendency to stimulate buying at present prices. We quote B. M., 48%, 1'62¹/₂@1'67¹/₂c., 78% basis of 48, old process; ashes, 1'55@1'60c.

Alkali.—This brand has been more affected by the season of the year than any other in the market, and at the present time is very quiet. The usual steady volume of contracts, however, is enjoyed and is indicative of the future course of the market. Prices range about as follows: B. M., 48%, 1'55@1'60c.; high tests B. M., 1'47¹/₂@1'50c.

Bleaching Powder.—Business, now that the new year has opened, consists almost entirely of deliveries on and the making of contracts. Spot business, as was expected, is of a very insignificant nature. The price of 2'10@2'15c. rules for

futures. A little advance in figures can be obtained for spot goods.

Sal Soda.—Sales have been limited at 1'12¹/₂@1'15c. Domestic brands have suffered a reduction in price, and are now obtainable at 90@95c.

Acids.—The market is in a wonderfully healthy condition, and makes great promise of stability during 1892. The demand for goods is fully up to, if not in excess of the capacity of the works, and while it is increasing almost weekly, facilities are not being enlarged. One prominent dealer stated that there would not be any move in this direction until the market gave absolute assurance that it was to remain permanent upon a higher basis of prices than has ruled for a number of years. He did not think this possible inside of a year, consequently that the works now in operation would have all the business that they could attend to. Contracts are being made for delivery over a portion of the present year, and almost invariably on the basis of a higher range of values than that which ruled during 1891. In a number of quarters we hear that manufacturers are not at all anxious to enter into these contracts, and in some cases are refusing to do so. Ruling quotations are as follows, per 100 pounds in New York: Aetic, \$1.60@ \$2; alum, lump, \$1.55@ \$2; muriatic, 18°, \$1.12¹/₂@ \$1.25; 20°, \$1.25@ \$1.37; 22°, \$1.50@ \$1.75; nitric, 40°, \$4.50 and upward; 42°, \$6.50@ \$7.50; 60°, sulphuric, brimstone, \$1¹/₂@ \$1.75; oxalic, \$7.25@ \$7.75; blue vitriol, \$3.50@ \$4.25.

Brimstone.—Brimstone has experienced an advance, and is now worth \$33 for best unmixed seconds to arrive. No spot transactions are reported, nor is there any spot stock available.

Fertilizers.—The year opens under very favorable auspices for the fertilizer chemical market. The business consists almost entirely of contract. These are being offered very freely by consumers, and upon a basis of prices established by the different syndicates in control of the various potash salts. The spot demand is, of course, limited to a small jobbing trade, and is not expected to improve during the early months of the year. Stocks are moderate, but abundantly sufficient to supply immediate demands.

Ammonia's are quoted as follows: Sulphate, 3'05@3'07¹/₂c. for spot, and 3'10@3'17c. for December; bone sulphate, 3c.; dried blood, \$2.05 per unit; azotine, \$2.05; tankage, \$19@ \$21 per ton; bone meal, \$22@ \$23; acidulated fish scrap, \$12.50; dried scrap, \$22.50.

Double Manure Salts.—Contracts are now being made upon the basis of syndicate prices and are of a satisfactory volume.

Kainit.—The same can be said of kainit. Muriate of Potash.—Muriate of potash does not differ from the other potash salts in its market conditions. The situation is very satisfactory to dealers, and a prosperous year is promised.

Phosphates.—The phosphates continue weak in the South, a condition strongly reflected in the local market; \$5.50@ \$6.50 for wet and dry respectively vessel rates.

Nitrate of Soda.—The market continues firm and the product in good demand at 2'07@2'10c. for spot and 1'95c. for futures.

Messrs. Mortimer and Wisner, nitrate brokers of this city, furnish the following interesting statistics, issued under date of January 1st, 1892:

	1891. Bags.	1890. Bags.	1889. Bags.
Imported into Atlantic ports from West Coast, S. A., Jan. 1, 1891, to date.....	632,536	638,124	484,555
Imported into Atlantic ports from Europe, Jan. 1—Dec. 1, 1891.....	18,802	.....	.....
	651,338	638,124	484,555
Stock in store and afloat Dec. 31, 1891, in New York.....	50,685	33,954	21,209
in Boston.....	900	.....	500
in Philadelphia.....	.....	.....	.....
in Baltimore.....	2,000	2,500	300
To arrive, actually sailed.....	188,000	155,000	.....
Additional charters.....	210,000	357,046	373,374
Total supply, when shipped.....	451,585	558,500	395,583
Visible supply to April 1, 1892.....	241,585	191,454	.....
Stock on hand, Jan., 1891.....	56,454	22,009	84,043
Deliveries past month.....	36,038	46,573	33,430
Deliveries for the year.....	634,207	673,679	546,589
Prices current Dec. 31.....	2'07 ¹ / ₂ c.	1'70c.	1'9c.

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Birmingham, Ala., Pittsburgh, St. Louis, London, and Paris, see pages 100 and 102.]

NEW YORK, Friday Evening, Jan. 8.

The New Year at the Consolidated Stock and Petroleum Exchange so far as trading in mining stocks is concerned, has opened with a marked absence of interesting features. The past week has been neither better nor worse than any week in November or December. It is claimed that a better feeling prevails, but so far as we have been able to ascertain this consists merely in that there has been a slightly better inquiry for mining stocks. The fact that, as shown by last week's "Annual Statistical Number" of the ENGINEERING AND MINING JOURNAL, this country is now ed-

joying an era of unprecedented prosperity in legitimate mining operations, will, we think, necessarily result in greater activity in mining stock markets. But we cannot refrain from thinking that the remembrance of fleeces shorn long ago is still alive within the "lambs." It will take some time for a mining boom to appear here. We, in common with mining brokers, have long desired its appearance. Mining booms have a habit of coming when they are least expected. This little eccentricity in their past behavior makes mining brokers here hopeful. But we must admit sorrowfully that no sign even of a boomlet appears on the mining horizon.

Since our last report there has been no noticeable change in any of the Comstocks. If anything, prices show a slight decline, and the volume of business has been somewhat smaller. During the current week there were sales of 130 shares of Consolidated California & Virginia at \$4@4.20. Of Crown Point 300 shares were sold at 85c, @ \$1.49. Gould & Curry shows sales of 500 shares at \$1.05@ \$1.15. Hale & Norcross is neglected at \$1, as was Overman at \$1.20. Ophir declined from \$3 to \$2.75, with sales of 400 shares. Savage was dealt in to the extent of 550 shares at \$1.35@ \$1.50. There were 300 shares of Sierra Nevada sold at \$1.75@ \$1.80, and 400 shares of Yellow Jacket at 95c, @ \$1.10. Large sales of Alta are reported; the official lists of the exchange show sales of 1,350 shares of this stock at 65c, @ \$1.15. Best & Belcher was quiet at \$2.20@ \$2.25, as was also Bullion at \$1.50. Chollar shows sales of 200 shares at \$1.15. The trading in Comstock Tunnel stock this week amounted to only 300 shares at 16c. There were 780 shares of Mexican sold at \$1.65@ \$1.80, and 440 shares of Potosi at \$1.35@ \$1.50. Segregated Belcher was very quiet at 85c, @ 90c. There were sales of 300 shares of Union Consolidated at \$1.40 @ \$1.60, and of 900 shares of Utah at 50c, @ 55c.

Of the Tuscarora stocks Del Monte, a comparative stranger to this Exchange, this week shows a sale of 100 shares at 50c. No other Tuscarora stock was dealt in.

Of the California stocks Belmont shows sales of 400 shares at 65@60c., and Brunswick of 500 shares at 8c. Plymouth shows a decline in price which was taken advantage of by buyers. There were 800 shares sold at \$1.50@ \$1.75. In the official sales lists of the Consolidated Stock & Petroleum Exchange there do not appear this week sales of any of the Bodie stocks at 8c. Late San Francisco advices quote Bulwer Consolidated at 65@75c. This is the first time that Bulwer has sold at a higher price than Bodie. There were some rumors about a strike at the property, but Mr. H. L. Shipley, vice-president of the Bulwer Consolidated Mining Company, informed a representative of the ENGINEERING AND MINING JOURNAL that he had received no news about the said strike. Through his courtesy we are enabled to give herewith the latest letter from the superintendent, which is dated December 27th. "During the past week the work of hauling ore to the Bodie mill has been steadily carried on. We started up the Bodie mill on Bulwer ore to-day. We are stopping ore of good quality from No. 1 stoppe, 150-ft. level. Also good ore from stoppes Nos. 2 and 3, on the same level. There are employed 4 miners, 2 carmen and 1 foreman."

The Colorado stocks were not traded in heavily this week, with the exception of Leadville Consolidated, which shows sales of 10,000 shares and which advanced to 20c., at which price it closed. At a special meeting of the Board of Trustees, held to-day, the following resolutions were passed: "Whereas, an all-wise Providence has seen fit to remove from his sphere of usefulness Mr. James E. Hedges, a valued and respected trustee of this company since May 20th, 1887, and its vice-president for nearly three years: Be it resolved, that the Board of Trustees hereby expresses regret and sorry at his demise, feeling that it has lost a most valued member and wise counselor. And the board hereby tenders its most heartfelt sympathy to his family in this, its hour of sorrow and deepest affliction. Feeling that in his demise they have met with an irreparable loss. And be it further resolved: That an engrossed copy of these resolutions be transmitted to his family by the secretary, and, as a mark of respect, that this board attend the funeral in a body." At an adjourned regular meeting held after the special meeting, Mr. W. H. Dike was elected vice-president, *vice* Mr. James E. Hedges, deceased. There were sales of 700 shares of Little Chief at 27@ 28c. No other Colorado stock was dealt in.

Castle Creek was dealt in to the extent of 2,400 shares at 3c. Shoshone which had not been dealt in for a long time, is reported to have under one sales of 1,100 shares at 2c.

Phoenix of Arizona this week was traded in to the extent of 2,100 shares at 40@45c. Silver King has been neglected for some weeks. The directors of this company have issued a circular letter to the stockholders the tenor of which is that they will not sell any of the treasury stock at present, but will endeavor to work the mine and to make it self-supporting. If it becomes necessary to obtain money instead of levying an assessment they will sell the stock in parcels in the open market. Thus they disclaim any intention to sell the stock to themselves as alleged some time ago. The annual meeting of this company will be held in San Francisco on the 12th inst.

There were only 200 shares of Horn Silver sold this week. The quotation was \$3.80. Total number of mining shares sold during the week at the Consolidated Stock and Petroleum Exchange, 27,525.

Boston. Jan. 7.
(From our Special Correspondent.)

The new year opened with a much better feeling in the market for copper stocks owing to the advance in ingot copper both here and in London. In the early dealings there were a goodly number of orders to purchase the leading stocks, which gave an upward tendency to the market, resulting in higher prices all around. There has been a slight reaction the past two days from the top prices owing to realizations, but the market closes fairly strong, and the feeling is quite general in copper circles that this is going to be a good year for the mining industry.

Calumet & Hecla has been in good demand by investors the past week, and several large orders have been filled at \$260.

Boston & Montana sold up to 40%, but the advance was too rapid and on realizing of profits it declined to 33%. The rights have been sold at 10@11c.

Butte & Boston advanced to \$17½, which price brought out some long stock, the market reacting to \$16½.

Centennial recovered from \$8 to \$9½, but lost the advance on adverse rumors regarding the mine, selling down to \$8½ with recovery to \$8¾.

Kearsarge advanced to \$13, but declined to \$12¼ on small sales.

Franklin sold up to \$16, but closed rather heavy at \$15 for a small lot.

Oseola sold up to 30% losing \$1 on the last sales.

Tamarack has been very strong at \$160, and holds at that figure.

Allouez declined to \$1½.

Santa Fe advanced to 30c., closing at 27½c.

Wolverine sold at \$4, and declined to \$3¾.

The balance of the list were neglected.

3 P. M.: At the afternoon call Atlantic sold at \$12; Boston & Montana advanced to \$39; Butte & Boston declined to \$16½; Calumet & Hecla was firm at \$260, and Centennial advanced to \$9.

Denver.

Prices and sales for the week ending January 2d, 1892:

Company.	Open- ing.	H.	L.	Clos- ing.	Sales.
Mines.					
Alleghany	07			08	
Amity	103¼	*03¼	02¼	02¾	11,000
Bangkok C. B.	05	*05¼	04¾	*05	3,800
Bates-Hunter				67a	
Brownlow	05½	112	06½	*06	20,000
Calliope	14			15	
Claudia J.	05	*05¼	04¾	05	55,300
Cash	07			10	
Clay County	110			120a	
Emmons	149a	149	155½	155a	6
Gettysburg	28	28	28	28	
Gold Rock	59	60	60	60	
Leavenworth	06	06	06	06	100
Little Rule	190			115a	
Lexington	135¾	36	135¾	36	1,100
May-Mazappa				75	
Matchless	290				
Oro	75			75	
Pay Rock	01	01½	01½	01½	3,000
Puzzler	02¾	02¾	02¾	02¾	200
Paul Gold	11			10	
Reed National	25				
Rialto	111	114	111	115a	700
Running Lode	29	133	30	31½	3,000
Whale	05	07	07	06	100
Bal Smuggler	122			122	
Sutton	*15½			*15½	
Prospects.					
Argonaut	15			110	
Big Indian	15a			110	
Big Six	05½	*06	05½	05¾	4,100
Century	12			10	
Diamond B.	03¼	04	03¼	04	21,700
Nat. G. & Oil Co. ..	10	113½	09	110¾	14,900
Golden Treasure ..	170			170	
Ironclad	10	11¾	11¾	13¼	5,700
John Jay	01	01	01	01	300
Justice	21½	24½	21	22	8,900
Morning Glim				47a	
Park Consolidated ..	05			05¼	
Potosi	01½			01½	
Total.					160,300

* Buyer 30. † Buyer 60. ‡ Seller 60. § Seller 30. a Asked.

San Francisco.

(From our Special Correspondent.)

The amendment to the by-laws of the San Francisco Stock Exchange prohibiting any broker from giving the use of any stock in his hands to mine managers for use as proxies, has been defeated. At present the members of the Board are divided into two camps; the one crying for reform, the other desiring to maintain the old order of things by reason of which they have made money. The latter appear to be in a minority and it seems certain that most members of the Board recognize the necessity for certain changes, and intend that, so far as lies within their power, these changes shall be made.

Since the disclosures made in the Hale & Norcross suit attention has been drawn to other companies, the management of which has also been notoriously corrupt. The Stock Exchange last week appointed a committee to act on the matter, and an effort will be made to change the directors

of the Savage, Belcher, Overman, Sierra Nevada and Crown Point mines.

A notice was inserted in the papers asking all the stockholders interested in the matter to meet at one of the stockholder's office. Quite a large number attended and signified their intention to make over their stock to their broker friends at the annual election of officers in order that the stock may be pooled and the present directors ousted from office. It was proposed, first, to aim at the removal of H. M. Levy from the presidency of the Savage Company. This is one of the persons who has made such an undesirable showing in the Hale & Norcross case. The name of J. L. Flood was suggested to take his place as he would be acceptable to a majority of the stockholders, who wanted him to agree to lease a mill for the company so as to take this part of the business out of the hands of the dummy directors who would no longer be able to connive at any misappropriation of the stockholders' money. Mr. Flood, however, would not agree to the proposition made to him as he did not desire to antagonize Alonzo Hayward and W. S. Hobart. Stockholders are to be congratulated on his refusal.

So far it has been found that nearly 70,000 shares can be present at the election, and it only requires 77,000 shares to give control.

What steps the moneyed powers will take in the fight that is imminent is unknown, but if they go into the Exchange and buy the stock necessary to support their dummy boards there is likely to be busy times ahead for the brokers for a time.

Trading in the Stock Exchange during the year just closed showed a slight decline compared with the year 1890. The greatest number of sales were made in June, when the Consolidated California & Virginia boom had reached its height and all the stocks were selling strong. January was the next month for active trading, when prices had reached bedrock and the leader was selling for \$2.10. The following table shows the number of shares which changed hands each month: January, 402,185; February, 321,890; March, 844,955; April, 600,490; May, 772,825; June, 414,720; July, 333,230; August, 358,795; September, 292,840; October, 317,720; November, 355,045; December, 332,240; total, 1891, 5,347,535; total in 1890, 5,403,905.

The committee having received all the stock and proxies they can get will report to the Stock Exchange. If enough stock cannot be got to elect a full Board of Directors the committee will be content with one or two directors in each Board. These directors, even if unable to accomplish anything, will watch everything that is done and protest any action taken that may be adverse to the interest of the stockholders. In the event of a full Board of Directors being placed in office by the reform party they will be compelled to have written contracts with the mills, which will oblige them to return not less than 70% of the mine assays, and some arrangements will also be made regarding the tailings and slines. At present the mills charge \$7 per ton for milling and do not return 50% of the mine assay. The superintendents will also be required to comply with the law, which requires that they report the mine assay each week, under oath. At present the mine assay is suppressed and the small milling assay is made public for the sole purpose, apparently, of misleading stockholders.

The last week in the year 1891 has been notable only for the small amount of trading. This, however, is usual during holiday time, and prices have been unaffected, the ruling rates being much the same as a week ago. The leading north end Comstocks are being closely held, and the report is slowly being given currency that an important ore development has been made on the 1,800 level of the Consolidated California & Virginia. If this is not a mere *canard*, and so far the report has not been substantiated, the new year will be inaugurated with a flurry in the stock market. Consolidated California & Virginia was yesterday at \$4.15; Ophir, \$2.75, and Mexican, \$1.60.

Of the Middle Comstocks Best & Belcher sold for \$2.15; Gould & Curry \$1.05; Savage \$1.35; Chollar \$1.05; Hale & Norcross \$1.00; Potosi \$1.30, and Bullion \$1.30.

The South End and Gold Mill stocks have not been in demand. Overman has ruled at \$1.05; Kentuck at 20c.; Crown Point at 65c., and Belcher at \$1.35.

The miscellaneous outside stocks have stagnated. The very few sales made were at following rates: Bodie 70c.; Bulwer 50c.; Grand Prize 15c.; N. Belle Isle 35c., Peer 25c., and Peerless 15c.

SAN FRANCISCO, January 8th (By Telegraph).—To-day's quotations are as follows: Best & Belcher, \$2.10; Bodie, 55c.; Belle Isle, 30c.; Bulwer, 65c.; Chollar, 90c.; Consolidated California & Virginia, \$3.75; Eureka Consolidated, \$2; Gould & Curry, 90c.; Hale & Norcross, 85c.; Mexican, \$1.60; Mono, 55c.; North Belle Isle, 30c.; Navajo, 10c.; Ophir, \$2.65; Savage, \$1.25; Sierra Nevada, \$1.55; Union Consolidated, \$1.25; Yellow Jacket, 90c.

Meetings.

Apollo Consolidated Mining Company, at the office of the company, No. 310 Sansome street, San Francisco, Cal., January 11th, at 2 P. M.

Anson Silver Mining Company, at the office of the company, rooms 506 and 507 Ernest and Cranmer Block, Denver, Colo., January 11th, at 10 A. M.

Comstock Gold-Silver Mining and Milling Company, at the office of the company in Denver, Colo., January 26th, at 2 P. M.

Consolidated St. Gothard Gold Mining Company, at the office of the company, No. 320 Sansome street, San Francisco, Cal., January 14th, at 2 P. M.

Diamond B. Silver Mining and Milling Company, at the office of the company, room 1, Patterson & Thomas Block, Denver Colo., January 12th, at 3 P. M.

Lone Star Quartz and Gravel Mining Company, at the office of the company, No. 2814 Sacramento street, San Francisco, Cal., January 16th, at 2 P. M.

Middle Creek Gold Mining Company, at the office of the company, room 5, No. 318 Pine street, San Francisco, Cal., January 12th, 1 P. M.

Potosi Consolidated Mining and Milling Company, at the office of the company, No. 1608 Champa street, Denver, Colo., January 16th, at 3 P. M.

Shasta Iron Company, at the office of the company, room 19, No. 508 California street, San Francisco, Cal., January 12th, at 12.30 P. M.

Sierra Nevada Silver Mining Company, at the office of the company, room 15, Nevada Block, No. 309 Montgomery street, San Francisco, Cal., January 20th, at 1 P. M.

Tintic Mining and Milling Company, at the office of the company, Commercial Block, Salt Lake City, Utah, January 25th, at 2 P. M.

Volcano Gold Gravel Mining Company, at the office of the company, corner Front and Cooper streets, Santa Cruz, Cal., January 15th, at 2 P. M.

ASSESSMENTS.

COMPANY.	No.	When levied.	D't'nd't in office.	Day of sale.	Amt. per share.
Alliance, Utah.....	16	Nov. 16	Jan. 9	Feb. 2	.10
Bevan, Utah.....	4	Dec. 9	Jan. 16	Feb. 4	.20
Butte Queen, Cal.....	1	Nov. 27	Jan. 5	Jan. 25	.02
Confidence, Nev.....	19	Nov. 17	Dec. 22	Jan. 11	.75
Cons. St. Gothard G., Cal.....	4	Dec. 29	Feb. 6	Feb. 23	.05
Crocker, Ariz.....	11	Dec. 15	Jan. 19	Feb. 11	.10
Crown Point, Nev.....	56	Dec. 2	Jan. 6	Jan. 27	.50
Grass Valley Queen Gold, Cal.....	1	Dec. 8	Jan. 14	Jan. 30	.10
Hale & Norcross, Nev.....	100	Dec. 31	Jan. 26	Feb. 18	.50
Head Centre, Ariz.....	3	Nov. 12	Dec. 18	Jan. 11	.05
Himalaya, Utah.....	10	Nov. 16	Dec. 16	Jan. 16	.005
Justice, Nev.....	49	Dec. 23	Jan. 28	Feb. 17	.25
Morgan, Cal.....	15	Nov. 20	Dec. 28	Jan. 20	.10
Potosi, Nev.....	37	Dec. 10	Jan. 13	Feb. 4	.50
Scorpion, Nev.....	3	Dec. 15	Jan. 22	Feb. 15	.05
Siskiyou Consol. Quicksilver, Cal.....	2	Dec. 22	Jan. 28	Feb. 19	.02
Teresa, Mex.....	6	Dec. 1	Jan. 4	Jan. 22	.10
Umpire S. & S., Ore.	4	Dec. 16	Jan. 25	Feb. 15	.01 1/4

PIPE LINE CERTIFICATES.

Watson & Gibson say: The excitement in railway stocks has not extended to petroleum though there has been some improvement in prices. Commodities generally are out of speculative favor and it never occurs to traders to buy oil for speculation. At the same time the Standard if it chooses to apply itself to the market can make it dance about in a lively fashion. Possibly speculation would follow such a movement despite bitter experience.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

Jan.	2.....	4.....	5.....	6.....	7.....	8.....
Opening.	61 1/4	62 1/4	61 1/4	61 1/4	61 1/4	61 1/4
Highest.	61 3/4	62 3/4	61 3/4	61 3/4	61 3/4	61 3/4
Lowest.	60	61 1/4	61 1/4	61	61	61
Closing.	61 1/4	61 1/4	61 1/4	61	61	61
Sales	24,000	85,000	25,000	30,000	27,000	.....

Total sales in barrels..... 191,000

NEW YORK STOCK EXCHANGE.

Jan.	2.....	4.....	5.....	6.....	7.....	8.....
Opening.	60	59 1/2	59 1/2	59 1/2	59 1/2	61
Highest.	60 1/2	60 1/2	60 1/2	60 1/2	60 1/2	63
Lowest.	60	59 1/2	59 1/2	59 1/2	59 1/2	61
Closing.	60 1/2	60 1/2	60 1/2	60 1/2	60 1/2	63
Sales	10,000	5,000	4,000	.....	.....	60,000

Total sales in barrels..... 79,000

COAL TRADE REVIEW.

NEW YORK, Thursday Evening, Jan. 8. STATEMENT of shipments of anthracite coal (approximated) for the week ending December 26th, 1891, compared with corresponding periods of last year:

Regions.	Dec. 26, 1891.	Dec. 27, 1890.	Difference.
Wyoming Region.....Tons	335,404	275,587	Inc. 59,817
Lehigh Region.....Tons	93,234	92,226	Inc. 1,008
Schuylkill Region.....Tons	195,972	167,113	Inc. 28,859
Total.....Tons	624,610	534,926	Inc. 89,684
Total for year to date Tons	39,813,362	35,437,793	Inc. 4,375,569

PRODUCTION OF BITUMINOUS COAL for week ending December 26th, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.

	1891.		1890.
	Week.	Year.	Year.
Phila. & Erie R. R.....	1,532	156,398	127,396
Cumberland, Md.....	73,862	4,091,137	3,638,603
Barclay, Pa.....	3,651	198,685	146,481
Broad Top, Pa.....	8,175	513,071	492,606
Clearfield, Pa.....	85,273	3,981,541	3,552,225
Allegheny, Pa.....	21,785	1,215,166	1,194,716
Beach Creek, Pa.....	43,293	2,365,137	1,773,421
Pocahontas Flat Top.....	41,734	2,273,020	1,785,490
Kanawha, W. Va.....	51,132	2,595,562	1,977,040
Total.....	337,417	17,187,722	14,687,978

WESTERN SHIPMENTS.

	1891.		1890.
	Week.	Year.	Year.
Pittsburg, Pa.....	29,295	1,252,254	799,248
Westmoreland, Pa.....	37,453	1,921,740	1,106,590
Monongahela, Pa.....	12,578	695,780	522,352
Total.....	79,566	3,769,774	2,428,290
Grand total.....	417,013	20,957,496	17,116,268

PRODUCTION OF COKE on line of Pennsylvania R. R. for the year ending January 2d, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 31,424 tons; year, 31,424 tons; to corresponding date in 1890, 45,451 tons.

Anthracite.

The sales agents held an adjourned meeting in this city last Tuesday. Almost the first question brought up was whether the Philadelphia & Reading was reporting the Coxe Bro. & Co.'s tonnage moved over its line as a part of its tonnage. General Manager Henderson, of the Reading, stated that President McLeod had anticipated the question, and had instructed him in case it was brought up to request a postponement of a consideration in order that he might have time to prepare certain reports and data upon which he was engaged. In compliance with the request the meeting adjourned to Thursday, this 14th inst., at which time this issue will be made a special order of business.

Neither the allotment nor price issues were brought up at this meeting. The tacit understanding reached on the 29th ult. that the January output be confined to 2,000,000 tons exclusive of the Pennsylvania Railroad and the Ontario & Western interests, was thus allowed to stand without formal recognition. It was the unanimous opinion that in the face of an almost total lack of a demand it would be worse than useless to juggle with the problem of a circular.

The market is experiencing an almost unparalleled dullness, one which is not promised any immediate relief. The demand exists in name only. Orders consist of scattering lots, and very naturally go to the person making the lowest bid. As a result, prices have been cut, under sharp competition, until they rule about as follows alongside, New York: Broken, \$3.55@3.65; stove, \$3.85@3.90; egg, \$3.60@3.65; chestnut, \$3.60@3.75. These are for good coals. Some grades of chesnut have sold as low as \$3.50.

Restriction is reported in almost all quarters of the anthracite field. In fact it is no longer a mere essential for the improvement of the market, but a measure of financial self-defense. The companies realize that there is no money in an excessive tonnage of coal piled up at tidewater, or at some interior storage point awaiting a market.

With the close of another week will come some tangible knowledge of the course which the Reading proposes to pursue during the year. If this be antagonistic to the present basis of allotments, the remaining companies will, without doubt, show their hands. The latest report is that the Reading is to make the claim that the Coxe Bro. & Co. coal handled by it does not originate on its line, but upon an independent road owned by the last mentioned company, and, consequently, under the terms of the combination, should not be counted as a part of its (Reading's) tonnage.

The case of John C. Haddock vs. the Delaware, Lackawanna & Western, before the Interstate Commerce Commission has been given two hearings before John Hillary, a notary commissioner. Four witnesses were examined relative to the cost and charges of transporting coal from the mines to Buffalo. Geo. H. Vaillant, second vice-president of the Erie lines testified that the charges for such transportation over his road were \$2.00 per ton. Jas. E. Childs, general manager of the Ontario & Western, Mr. Guilford, general traffic manager New York Central, and Wm. H. Joyce, general freight agent of the Pennsylvania, testified to the same effect. It seems that these different companies charge \$2.00 per ton transportation and 30c. per ton for transferring on hoard vessels. The Delaware, Lackawanna & Western charges \$2.50 transportation either to the port or on board vessels. A third hearing will be held on Monday or Tuesday of next week.

Bituminous.

New business is reported dull, and deliveries on contracts of fair volume. There is something of a shortage of stocks in the tidewater market, due to inadequate transportation facilities.

Ocean freights, notwithstanding the resolution recently adopted by the Vessels Owners' Association, viz., not to take charters after January 1st at less than 95c. and \$1, Philadelphia and Baltimore,

respectively are weak. We heard of a charter this week from Philadelphia to Boston for 80c. This is exceptionally low, however, and about 90c. rules; to Sound ports 75c. From Baltimore and Norfolk the rate is 5c. in advance of these figures.

Steps are being taken to renew the Cumberland Coal Trade Association

The following table, showing the amount of shipments in tons of 2,000 lbs. over the Pennsylvania Railroad for a term of ten years was received too late last week for insertion in our statistical number:

	P. R. R. Div.	P. E. Div.	Total.
1880.....	4,350,240	872,276	5,222,516
1881.....	5,324,478	1,180,244	6,504,722
1882.....	6,451,120	1,323,661	7,774,781
1883.....	6,724,555	1,396,079	8,120,634
1884.....	6,848,787	1,325,681	8,174,468
1885.....	6,876,239	1,685,959	8,562,198
1886.....	7,017,196	1,882,924	8,900,120
1887.....	8,873,487	2,978,194	11,851,681
1888.....	10,420,808	3,279,523	13,700,331
1889.....	9,121,140	3,918,590	13,039,730
1890.....	10,946,358	4,551,242	15,497,600

Boston.

From our Special Correspondent.

The week has been very quiet in the anthracite coal trade. The dealers seem to be well stocked for the present, and as the weather is not snapping cold they are not in any immediate need of new supplies. The sales that have been made have been, we understand, at concessions. Lykens Valley coal is still very scarce and in demand.

In regard to bituminous, there is very little to say. About all dealers are doing, and in fact can do, is to keep their customers going on contracts, as arrivals are still rather light. Bituminous on cars here is worth \$3.85 per ton. Gas coal is dull just at present and a price on it is hard to fix.

Freights are if anything a little easier. Yet they are no lower. Baltimore freights continue to be the firmest on the list. We quote: From New York to Boston, 65@70c.; from Philadelphia to Boston, 90c.@\$1; from Philadelphia to Portland, 90c.@\$1; to Bath, Me., \$1; from Baltimore to Boston, \$1; Newport News to Boston, \$1; Sound points, 75@85c.

Wednesday's snow storm, which was the first of the season, brought a number of small buyers into the market, yet not enough to make much change in the actual price of coal. Retailers' stocks are also sufficient to supply all present needs without replenishing immediately. We quote retail prices in this market: Free burning stove, \$5.50; nut, \$5.50; egg, 5.25; furnace, \$5.25; Franklin, \$7.00; Lehigh furnace, \$5.50; Lehigh egg, \$6.00; Cumberland, at wharf, \$3.75; screenings, \$2.00.

The receipts of coal at this port for the week ending January 2d, were 47,332 tons of anthracite and 16,420 tons of bituminous, against 11,086 tons of anthracite and 7,359 tons of bituminous for the corresponding week last year. The total receipts for the year 1891 were 2,039,443 tons of anthracite and 1,070,688 tons of bituminous, against 1,405,574 tons of anthracite and 1,072,037 tons of bituminous for the same time last year.

Buffalo.

Jan. 7.

(From our Special Correspondent.)

The year 1892 opens quietly as far as the anthracite coal trade is concerned, and with a fair demand for bituminous. Prices are unchanged; bituminous is steady. Stocks of both kinds are ample for all requirements. Car service is good; no complaints have been heard lately of lack of accommodation.

Vessel building at the principal points on the lakes is reported to be active and indicates a large addition to its tonnage on the opening of navigation or by next fall. Repairing is already under way here and elsewhere; owners are determined, apparently, not to delay in putting their craft in ship shape order.

The Hadfield failure is still the principal topic of interest among dealers in coal, and many features of a peculiar character in the circumstances connected with the crash are commented upon with much freedom of language. It is reported that the creditors are a unit in a determination to investigate thoroughly the business methods of the firm, so as to ascertain the true inwardness of the transactions leading to the failure.

The annual statement of the Secretary of the Merchant's Exchange relative to the coal trade of Buffalo is in course of preparation, and will be published in a few days if the necessary data come to hand promptly.

Chicago.

Jan. 6.

(From our Special Correspondent.)

There is little change to note in the condition of the anthracite coal market. The dullness is profound, and many shippers have ceased pressing sales on unwilling customers. New business and orders are very light, and outside of regular contracts there is little doing. The foregoing will practically embrace all trade west of Buffalo. In the matter of the Hadfield failure, the inventory places the total assets at upward of half a million dollars, against \$511,044 of liabilities. The assignee states that some of the values may be, and probably are, over-estimated, and are of course subject to revision, but as the principal creditors are coal men, they will see to it that nothing is sacrificed.

The holiday season and the weather conditions are entirely against any immediate revival of trade in hard coal. The market is overstocked

with all-rail coal, and prices continue weak but unchanged in the circular. Dock coal is offered very freely at \$4.90, and concessions are made on this. Some large shippers are of the opinion that improvement will be noted toward the end of January.

There is a plethora of eastern bituminous coal, Hocking, Pittsburg, etc., hence prices remain weak. Demand has considerably lessened on account of the holidays, and the recent resumption of work at Brazil, Ind., and prices are lower by 10 @ 15c. than they were last month. Supply of Indiana bituminous is fair, but there is no surplus. Shipments from the block coal mines at Brazil have commenced, but the supply in this market will be short for some few weeks, until the large surplus of eastern coal has been worked off. Prices too on this grade of soft coal have advanced 35 @ 40c., and wholesalers are now paying \$2.55 @ \$2.60 f. o. b. Chicago or \$1.60 at mine. Most of the large operators and miners in that field are perfectly satisfied that there will be little difficulty in placing their product in this market, or wherever it has been in ordinary use for steam raising purposes. It is stated on good authority that during the late strike, and nearly every, sort of coal worthy of the name had been shipped to Chicago. This has resulted in disgusting some large consumers, who will gladly return to block coal even at the enhanced price. Most of the coal coming forward from the block coal district is on regular contracts, and there will only be a limited supply from which to fill miscellaneous orders.

Coke is in fair demand and improvement may be expected from now on. The stimulus now felt in the iron market will very soon show in increased demand for this fuel. Prices are unchanged at the following rates: Lehigh lump, \$6.25; large egg, \$5; small egg, range and chestnut, \$5. Retail prices per ton are: Large egg, \$5.75; small egg, range and chestnut, \$5.75.

Prices of bituminous per ton of 2,000 lbs., f. o. b. Chicago, are: Pittsburg, \$3.15; Hocking Valley, \$3; Youghiogheny, \$3.25; Illinois block, \$2.00 @ \$2.15.

Pittsburg. Jan. 8.

(From our Special Correspondent.)

Coal.—The Pittsburg coal market continues very firm. The cold spell and the shortage of natural gas has made business very lively among city dealers. Ohio river shipments, since our last report, have been 1,277,000 bushels; shipments have now been suspended on account of low water. The miners in the pools are all at work and will so continue as long as there are empties to load. The prospect at this writing is that there will be plenty of work for some time to come. The lower markets are abundantly supplied with coal, low price being the rule and likely to continue for some time. Here is the way a city paper puts it: "Coal is king once more. The cold snap of the past two days has caused a great shortage of natural gas in Lawrenceville, Allegheny, and Pittsburg. The local coal dealers have all the business they can do."

Coke.—The outlook in the Connellsville region is not as favorable as it was some weeks since. Restriction in production is still going on and rumor says that some hustling for orders is being done. At all events it is a fact worthy of note that there has been no reduction in prices, nor is there likely to be any. On the other hand, it is rumored that a slight advance may be inaugurated in the near future. There are at present more ovens burning than at any time since the close of the strike. The number being about 13,575 of the 17,110 ovens in the region. Most of the works are running 5 days per week. The shipments for the last week in 1891 aggregated 6,330 cars; previous week, 7,943; deficiency, 1,013. The distribution was as follows: To points west of Pittsburg, 3,415 cars; east of Pittsburg, 1,900; to Pittsburg, 1,615; total, 6,330. Prices are firm at the following figures: Furnace coke, \$1.90; foundry, \$2.30; crushed, \$2.65, all f. o. b. at ovens per net ton.

METAL MARKET.

NEW YORK, Friday Evening, Jan. 8.
Prices of Silver Per Ounce Troy.

Jan. Exch'g'e.	Sterling Pence.	Lond'n Pence.	N. Y. Cts.	Jan. Exch'g'e.	Sterling Pence.	Lond'n Pence.	N. Y. Cts.
2	4.84	43%	94%	6	4.84 1/2	43%	94%
4	4.84	43%	94%	7	4.84 1/2	43%	94%
5	4.84	43%	94%	8	4.84 1/2	43%	94%

Under pressure of enormous offerings to the government and its unusually large purchases so early in the month silver has declined. The export demand is taking some on the decline, but indications do not yet point out any prospect of an advance in price.

The United States Assay Office at New York reports the total receipts of silver for the week to be 67,000 oz.

During the year which is just drawing to a close there were coined at the Philadelphia mint over 92,000,000 pieces, with a valuation of over \$13,000,000. Owing to the discontinuance of the coinage of the silver dollar after July 1st, the total is not so great as that of last year. Below is given the

statement of the coinage of the year as submitted to Superintendent Bosbyshell by Coiner Steel:

Denomination.	Pieces.	Value.
Double eagles.....	1,442	\$28,840.00
Eagles.....	91,863	918,080.00
Half eagles.....	61,413	307,065.00
Quarter eagles.....	11,040	27,600.00
Total gold.....	165,758	\$1,282,185.00
Dollars.....	8,694,206	8,694,206.00
Half dollars.....	200,600	100,300.00
Quarter dollars.....	3,920,600	980,150.00
Dimes.....	15,310,600	1,531,060.00
Total silver.....	28,126,006	\$11,305,716.00
Five cents.....	16,834,350	841,717.50
Cents.....	47,073,350	470,723.50
Total base.....	63,906,700	\$1,312,441.00

Mr. Leech, Director of the Mint, made a statement on the 4th inst. in regard to the arrangements said to have been completed between Germany and Austria-Hungary to demonetize the silver coins known as the vereins-thalers, in which he says:

As early as June last F. D. Grant, our Minister at Vienna, submitted some statements concerning the currency of the Austria-Hungarian monarchy, in which he said: "Last summer, probably on account of prospective legislation in the United States which would affect silver, the relative value of the two precious metals came so near together that the two governments forming this monarchy agreed to nominate legislative committees to meet and discuss the subject of a currency basis, and if possible to arrange a coinage satisfactory to those engaged in these two before mentioned classes of industry (agricultural and manufacturing goods). As an outcome of these discussions the two governments agreed last week to make gold their standard in the future."

It has been stated by the *Economist* that the frequency of gold shipments recently from England to Germany was due to the demand for gold in Vienna and Buda-Pesth, where the Finance Ministers were hoarding gold in preparation for the return to specie payments. It is believed that the Finance Ministers of Austria and Hungary have amassed about \$60,000,000 in gold for this purpose. The amount required for the resumption of specie payments is said to be about \$100,000,000, the notes in circulation being about \$150,000,000. The Austrian vereins-thalers, which it is proposed to melt down, are variously estimated at from \$75,000,000 to \$90,000,000 marks, that is, from \$18,000,000 to \$23,000,000.

Silver Bullion Certificates.

	Price.		Sales.
	H.	L.	
Jan. 2.....	95	.....	10,000
Jan. 4.....	95 1/4	95	77,000
Jan. 5.....	.....	.....	.....
Jan. 6.....	95 1/4	.....	10,000
Jan. 7.....	94 3/4	94 1/2	170,000
Jan. 8.....	94 3/4	94 1/2	75,000
Total sales.....			342,000

Government Silver Purchases.

WASHINGTON, D. C., January 8th (By Telegraph).—The Treasury Department purchased to-day 1,500,000 ounces silver at prices ranging from '9448 to '945 per oz. fine.

Coinage at the Mints of the United States.
The following report shows the coinage executed at the mints of the United States during December, 1891:

Denomination.	Pieces.	Value.
Double eagles.....	208,633	\$4,173,060.00
Eagles.....	48,784	487,840.00
Half eagles.....	67,503	337,515.00
Quarter eagles.....	38	95.00
Total gold.....	324,978	\$4,998,510.00
Standard dollars.....	654,616	654,616.00
Half dollars.....	3,350	1,675.00
Quarter dollars.....	264,150	66,037.50
Dimes.....	150,150	15,015.00
Total silver.....	1,052,266	\$735,343.50
Five cents.....	2,716,350	135,817.50
One cent.....	6,840,550	68,405.50
Total minor.....	9,557,100	\$204,223.00
Total coinage.....	10,934,344	\$5,938,086.50

Domestic and Foreign Coin.

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

	Bid.	Asked.
Trade dollars.....	.74	.75
Mexican dollars.....	.73	.75
Peruvian soles and Chilean pesos.....	.70	.72
English silver.....	4.75	4.85
Five francs.....	.93	.95
Victoria sovereigns.....	4.84	4.89
Twenty francs.....	3.84	3.88
Twenty marks.....	4.74	4.76
Spanish doubloons.....	15.55	15.70
Spanish 25 pesetas.....	4.78	4.83
Mexican doubloons.....	15.50	15.70
Mexican 20 pesos.....	19.50	19.60
Ten guilders.....	3.96	4.00
Fine silver bars.....	.94 1/4	.95

Copper.—We omitted, last week, for want of space, to give the regular weekly reports, but are glad now to be able to record a very good consumptive demand for copper for the past fortnight, at gradually hardening prices, and at the close fairly heavy sales at 11c. for spot, which seems to be the lowest at which copper can be obtained, and 11 1/2 to 11 3/4 c. for February and March delivery is asked, with only a few sellers.

The smaller companies refused lately to sell at any price, being well sold ahead and not caring to bring copper down from Michigan by rail. The Calumet & Hecla Co. has stoutly refused of late to mention any price, and so have most of the other lake producers. With casting copper the tendency is even more pronounced not to meet the present market, and after some sales had been made early this year, the price was practically advanced from 10 1/2 to 10 3/4 to 11c., so that now there is hardly any difference between Lake and casting copper. The Arizona companies also refuse to sell at present prices, and for electrolytic copper 11 1/2 to 11 3/4 c. can be realized. Consumption appears to be very good, and lately there has been a very large demand for export.

In London, against the last reported figures of £45 15s. for spot and £46 5s. for three months. G. M. B.'s, we have to report closing prices now of £46 5s. and £46 15s. respectively, the best prices of the week having been £47 2s. 6d. and £47 12s. 6d. respectively.

Tin.—Tin closely follows the London market and with quite small transactions we have to quote nominally 19'90@20c. for present and February delivery.

The London market closes at £90. 7s. 6d. for spot and 5s. higher for futures, as against £91 10s. and £91 respectively, when last we reported.

Lead.—Lead has been in rather better demand. It is now reported that a big strike has broken out in Idaho, which will practically stop the production there during the period of such strike, and this has now determined the Western producers not to make any offers at all. We have heard of some sales here at 4'30c. and 4'25c., but at the latter price nothing is to be had at the time of writing, and there appears to be no stocks of consequence anywhere, and this is rather a dangerous point as in a contingency, such as a continued stoppage of production at any place, might drive prices up rather quickly.

English Lead is quoted at £11 7s. 6d. in London.

Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: "The market is quiet, with 4'05c. asked. The sales for the week aggregate about 200 tons at 4'05c. The general trade is very quiet."

St. Louis Lead Market.—The John Wahe Commission Co. telegraphs us as follows: "Lead is steady at 4c. with retail sales at that figure for spot and January delivery."

Spelter.—Spelter is irregular, but the demand continues limited. In New York above 4'70c. is not obtainable.

Antimony.—Antimony keeps at about present prices; Cookson's 15 1/2 @ 16c., L. X. 15c., and Hallitt's 12 1/2 @ 12 3/4 c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 8.
The coming of the new year does not seem to have infused any life in the New York iron market. There is manifest the same indifferent tendencies on the part of both buyer and consumer. It is a generally conceded fact that prices have been established over the first half, or at least the first quarter of 1892 by means of a number of contracts for pig iron booked at the prices which have prevailed during the past six months. While this is not a particularly encouraging feature, it gives the feeling of stability which will act as a very important factor in case the promised activity is experienced during the latter half of the year. The extreme evenness of the market during the past year has led the consumer to the belief that it will not be necessary for him to carry any large amount of stock in order to meet his contracts, and consequently nothing short of a strong demand and the general advance in prices, will disturb his present equilibrium.

American Pig Iron.—The remarks preceding apply most especially to this branch of the market. Southern irons are reported to be exceedingly dull owing to general conditions, as well as the season of the year. We quote prices as follows: Northern, No. 1 X, \$17 @ \$18; No. 2 X, \$16 @ \$16.50; Southern, No. 1 X, \$16.50 @ \$17.50; No. 2 X, \$15.50 @ \$16.50.

Spiegeleisen and Ferro-Manganese.—Western production continues to be the paramount factor in the market, so much so, in fact, as to exclude importations. The demand is very light, and the market is decidedly in the buyer's favor. We quote 20% spiegel at \$26.50 @ \$27; 80% ferro-manganese, \$61.50 @ \$62.50. But few orders and of small quantities have been placed during the past two weeks.

Steel Rails.—There is but little inquiry, and these do not seem to promise very much business. We met in trade circles this week a very vague rumor to the effect that an order for 20,000 tons seeking placement. A diligent inquiry failed to verify this, however. Prices remain the same viz., \$30 f.o.b. mills, and \$30.70 tidewater for standard sections.

Rail Fastenings.—Besides an order for fastenings designed for use in laying in a 1,000-ton lot of rails purchased last spring, the market has been without an event. There is an almost total lack of inquiry. We quote: Fish and angle plates, 1'75 @ 1'80c.; spikes, 2'10 @ 2'15c.; bolts and square nuts, 2'75 @ 2'80c.; hexagonal nuts, 2'80 @ 2'85c.

Merchant Steel.—The demand for immediate delivery has improved materially in the last week and we hear reports of quite an active business. Renewals of contracts continue in good number, while the tonnage as called for in the same is fully up to, if not in excess of those of 1891. The basis of prices is about the same. We repeat our quotations as follows: R. Mushet's special, 48c.; English tool, 15c. net; American tool steel, 7@8c.; special grades, 13@20c.; crucible machinery steel, 475c.; crucible spring, 375c.; open hearth machinery, 2.25c.; open hearth spring, 2.50c.; tire steel, 2.25c.; toe calks, 2.25@2.50c.; first quality sheet, 10c.; second quality sheet, 8c.

Tubes and Pipe.—The market is of an indifferent nature, being without especial feature. It can be said to be in a buyer's favor. We quote discounts as follows: Butt, black, 57½%; butt, galvanized, 47%; lap, black, 67½%; lap, galvanized, 55%; boiler tubes, under 3 in. and over 6 in., 55%; 3 in. to 6 in., 60%.

Structural Material.—Business has been very light in volume in the East; in the West we hear of more activity. The *Iron Age* cites an authority which places the year's production of American beams at 100,000 tons. Prices are unchanged, as follows: Universal plates, \$2.20; bridge plates, \$2.10; tees, \$3 10.

Old Rails.—Business is nil. Nominally quotations are \$20.50@21.50 for tees.

Chicago. Jan. 6.

(From our Special Correspondence.)

Business during the past week or ten days in the iron and steel trades has been more or less quiet. But the year opens up with a bright vista before it and the unshaken confidence displayed in all branches pertaining to iron and steel is still a prominent feature. The extensions now in actual progress on several of our western systems of railroads will require on immense tonnage of new steel rails, most of which are not as yet in the market, but will be shortly. It is fully believed that the 600,000 tons already placed for steel rails, will be doubled before next fall; this will assure all of the rail mills a steady run throughout the year. Crude iron is in fair inquiry for small and large lots, demand at present being mostly for coke rather than charcoal grades. Manufactured iron is a little more than holding its own on bars; plates are still low and weak; sheets steady and structural without change. Old material is in better inquiry, though orders are still rather light.

Pig Iron.—Inquiry is coming in very freely and buyers are anxious to place yearly contracts at current rates. Quite a good amount of this class of business has been consummated during the past week or 10 days, some of which was from regular customers, though, as a rule, certain furnaces refuse to enter contracts beyond July, the reason for which is that with the present outlook for coke iron, better prices will obtain several months hence. One reason is, that by mid-summer furnaces will be using ore which will cost them from 25 to 40c. more than that which they are now consuming. Hence the hesitancy to accept large orders for scattered deliveries covering the whole year. Several of the northern manufacturers of coke iron are making lower prices than the situation calls for—as much as 25@50c. There is a reasonable certainty that the cost of production will, six months hence, be 50c. more than it is now. Southern iron continues on the same low level and demand moderately good. Lake superior charcoal is in better inquiry from ear wheel makers and railway supply men, but prices are no higher nor stronger.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$17@17.50; Lake Superior coke, No. 1, \$15.25@15.75; No. 2, \$15@15.25; No. 3, \$14@14.50; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$17@17.50; American Scotch, \$17.75@18.25; Southern coke, Foundry No. 1, \$15.50; No. 2, \$15; No. 3, \$14.50; Southern coke, soft, No. 1, \$15.50; No. 2, \$14.50; Ohio silveries, No. 1, \$18; No. 2, \$17; Ohio strong softeners, No. 1, \$18; No. 2, \$17; Tennessee charcoal, No. 1, \$18; No. 2, \$17.50; Southern standard car wheel, \$20@21.

Structural Iron and Steel.—The beams, columns, girder work and other structural material required for the art institute here is large, being nearly 1,000 tons. Bids are all in, but contracts will not be let for several weeks. There is a good all round inquiry for bridges, viaducts, etc. Quotations for car lots f. o. b. Chicago are as follows: Angles, \$2.2@2.10; tees, \$2.40@2.50; universal plates, \$2.15@2.25; sheared plates, \$2.20@2.30; beams and channels, \$3.20.

Plates.—It is of course too early in the New Year for the general public to be broaching and pushing new enterprises. There is little doing in either mill orders or from warehouses. Values in plates have depreciated some 20% to 25% during the past year. Steel sheets, 10 to 14, \$2.40@2.50; iron sheets, 10 to 14, \$2.20@2.30; tank iron or steel, \$2 10@2.15; shell iron or steel, \$3@3.25; firebox steel, \$4.25@5.50; flange steel, \$2.75@3.25; boiler rivets, \$4.25; boiler tubes, 2¼ in. and smaller, 55%; 7 in. and upward, 65%.

Merchant Steel.—Business in the way of new orders is rather more than fair, the season considered. Manufacturers are well satisfied with the

volume of trade. Demand for tool is improving. We quote \$6.75@7 and upward; tire steel, \$2.30@2.50; toe calk, \$2.50@2.65; Bessemer machinery, \$2.20@2.30; Bessemer bars, \$1.90@2; open hearth machinery, \$2.60@2.75; open hearth spring, \$2.75@3; crucible spring, \$3.75@4.

Steel Rails.—There is quite a good inquiry for both light sections for street railroads, mines, etc., and structural heavy weights, in quantities varying from 1,000 to 3,000 tons, and business of this character is being entered every week. Several large blocks are in negotiation which will probably be closed at an early date. Quotation is steady at \$30 Chicago. Large mill orders have been placed for steel splice bars. Regular quotations are: 1'80@1'85c. for steel and the same for iron; spikes at \$2.15@2.25 per 100 lbs.; track bolts, hexagonal nuts, \$2.70.

Galvanized Sheet Iron.—Demand continues quite brisk. Cornice makers and other manufacturers are heavy buyers. Discounts are unchanged at 67% off on Juniata and 67½% and 5% off on other in large lots. Smaller quantities are quoted at 65% and 10% from list.

Black Sheet Iron.—Consumers of the heavier gauges are placing car lot orders; inquiry from roofers and corrugators is improving, and some of the larger jobbing houses are asking for prices for delivery up to July. Mill quotations are 2'90c. Chicago for No. 27 common. Jobbers' price is 3'10c. from store and demand light.

Bar Iron.—On the whole there is a good deal of inquiry of a general character—manufacturing consumers, jobbers, and car-builders, and prices are 1'6; ½@1'70c., according to specification. The inside figures are rarely shaded, excepting by those mills in need of orders to keep them going. Dealers quote 1'80@1'90c., according to quality and quantity.

Nails.—Actual demand for both steel cut and wire nails is light, and prices are weak. Several eastern mills have declined to meet the low prices named by local mills. Quotations on steel cut are \$1.60 in carloads, usual average, and \$1.70 from stock; wire nails \$1.80, and \$1.90 from store.

Scrap.—Dealers note an improved inquiry on all grades, but the movement is not by any means active. Prices are still nominal. No. 1 railroad, \$18.50; No. 1 forge, \$18; No. 1 mill, \$13.50; fish plates, \$22.50; axles, \$22; horseshoes, \$18.50; pipes and flues, \$11; east borings, \$7.50; wrought turnings, \$9.50; axle turnings, \$12.50; machinery castings, \$12; stove plates, \$7.50; mixed steel, \$10.50; coil steel, \$14.50; leaf steel, \$15; tires, \$15.50.

Old Material.—On the strength of the improved condition of the iron market, holders of iron rails are firm at \$22. Steel rails are steadier at \$13 50@15.50, and car wheels very firm at \$16.25, those figures being refused for small lots.

Philadelphia. Jan. 8.

(From our Special Correspondent.)

Pig Iron.—There is talk of a heavy business being done in crude iron, but it is hard to find who are the buyers and sellers. Some business has been done in No. 1 foundry and forge at \$12.50 and \$14.50, respectively, but to say a general improvement has set in is not true. Large transactions are on the way in Bessemer iron, and as prices are at a low point large sales will be made in a few days. It is impossible to give probable selling prices.

Steel Billets.—There is a genuine activity in billets, both for prompt and deferred deliveries, at what appears to be improving prices. Quotations are \$26.50 @ \$27.75, according to delivery.

Muck Bars.—The only sales heard of were at \$29.

Merchant Iron.—It is impossible to detect any change in the situation, and it is incorrect to say there is any general increase in orders, though there has been in some few cases. Quotations continue at \$1.60@1.75, and buyers are hanging back, probably to their cost, as they will find before very long.

Nails.—Special efforts are being made to deplete mill stocks.

Sheet Iron.—The signs to-day are that large orders will be booked early, to secure the advantage of offers made in December.

Skelp.—Scarcely any business has been transacted.

Wrought Iron Pipe.—Sellers quote the same figures, and buyers, instead of covering when prices are altogether in their favor, are foolishly halting.

Plate and Tank.—The placing of a little over 1,000 tons in Eastern Pennsylvania mills has had a stimulating effect. There is too much anxiety for business, however, to actually advance prices, though some people say an advance of \$2 per ton is within reach in 30 days. It is improbable.

Structural Material.—There has been no large orders placed. The week has been quiet. No charge in quotations.

Steel Rails.—Those who are posted say there is not a single new feature, but much actually is prospected.

Old Rails.—There are a few lots here at \$22.

Scrap.—A few lots of railroad scrap offered at \$21.

Pittsburg. Jan. 7.

(From our Special Correspondent.)

Trade during the first week of the new year shows up fully as well as could be expected when it is taken into consideration that last week's sales of raw iron exceeded 72,000 tons, and that makers and sellers are making no particular efforts to hook new business at present prices. In fact they want more money for the raw article, and unless all signs fail they won't have to wait long. The principal sales reported of Bessemer and grey forge were for delivery in January, February and March, spot iron being scarce. It was currently reported that leading furnaces were asking \$16 for Bessemer, and \$13.75@14 for No. 1 grey forge. Pittsburg furnaces are well sold up, having made liberal sales at the late advance. As one of the owners remarked: "Of course we are willing to sell, but not at present prices. The sales hereafter will be at an advance and for future delivery," which means that they are well sold up. The year just closed will long be remembered as one of considerable dullness and low prices for iron and steel generally.

In January, 1891, production of pig iron was at the rate of 167,000 tons per week; within one month this rate diminished about 21,000 tons, and by April the output had fallen off to about 114,000 tons per week. Commencing with May the production of pig iron increased by rapid strides until it is now fully 198,000 tons per week, or 9,783,000 tons of 2,240 lbs. per year, equivalent to 10,966,900 tons of 2,000 lbs. per year. Since the first of July there has been a considerable increase in the demand for finished iron and steel, but not sufficient to cover the increase in the production of pig iron, so the figures of stock on hand will probably show that there has been a considerable accumulation of unsold iron during the period named.

Notwithstanding the enormous traffic on the railroads during the year just closed, the sales of track material and railroad supplies have been unusually light. This retrenchment means accumulated work to be taken care of as soon as improved conditions shall permit, and the return of confidence, the restoration of credit and the abundance of money promise that a large portion of this accumulation will be disposed of this year in addition to the usual run of business.

The year opens with an active demand from the railroads for rails and other material, and the prospects are about all that could be desired all along the line, and the work postponed last year must be taken care of this year in addition to regular current requirements. A well informed Eastern iron dealer says: "Consumers are pretty well convinced that present prices are safe prices, and they are willing to purchase liberally when they can do so without paying an advance. Sellers have met the demand liberally and it is only in unfinished steel that there is any clearly defined improvement. The general market is firmer, however, and the impression prevails that the tendency all through the list will be toward higher prices."

Coke Smelted Lake and Native Ores.

5,000 Tons Bessemer, first 3 m.	\$15.65 cash.
4,000 Tons Bessemer, first 3 m.	15.75 cash.
4,000 Tons Grey Forge, Jan., Feb., March.	13.50 cash.
3,500 Tons Bessemer	15.75 cash.
3,000 Tons Bessemer	15.65 cash.
3,000 Tons Bessemer	15.75 cash.
2,500 Tons Grey Forge, at furnace	13.40 cash.
2,000 Tons Mill Iron	13.50 cash.
2,000 Tons Bessemer	15.65 cash.
1,500 Tons Bessemer, first 3 m.	15.75 cash.
1,500 Tons Grey Forge	13.50 cash.
1,500 Tons Grey Forge	13.50 cash.
1,500 Tons Mill Iron	13.50 cash.
1,000 Tons Bessemer	15.60 cash.
1,000 Tons Grey Forge	13.50 cash.
1,000 Tons Grey Forge	13.50 cash.
1,000 Tons No. 3 Foundry	14.25 cash.
750 Tons No. 2 Foundry	14.50 cash.
650 Tons Mill Iron	13.00 cash.
500 Tons Open Foundry, Bessemer	16.00 cash.
500 Tons No. 2 Foundry	15.00 cash.

Steel Slabs and Billets.

4,000 Tons Billets, f. o. b. Works, 1st 3 mos.	25.00 cash.
4,000 Tons Billets, f. o. b. Mar., April, May, June	25.00 cash.
2,000 Tons Billets, Jan., Feby., Mar.	25.00 cash.
1,500 Tons Billets	25.00 cash.
1,000 Tons Billets, f. o. b. Works, April, May, June	25.00 cash.
650 Tons Small Billets at Works	23.00 cash.

Muck Bar.

500 Tons Neutral, Spot	23.00 cash.
500 Tons Neutral, Jan.	25.75 cash.

Ferro-Manganese.

300 Tons 80%, delivered at Wheeling	62.40 cash.
100 Tons 80%, delivered	62.40 cash.

Steel Wire Rods.

1,000 Tons American Fives, at Mill	34.00 cash.
Bloom Rail and Crop Ends.	
1,200 Tons, Feby., Mar., April	18.00 cash.

Skelp Iron.

800 Tons Wide Grooved	1.62½ 4m.
700 Tons Sheared Iron	1.82½ 4m.
600 Tons Narrow Grooved	1.60 4m.

Old Iron and Steel Rails.

1,000 Tons American T's, Youngstown	23.00 cash.
1,000 Tons American T's, Youngstown	22.50 cash.

Scrap Material.

200 Tons Heavy Steel Scrap, gross	17.50 cash.
150 Tons Leaf Steel, gross	19.00 cash.
100 Tons No. 1 R. R. W. Scrap, net	19.50 cash.
100 Tons Cast Borings, gross	9.60 cash.

Charcoal.

350 Tons Cold Blast	26.50 cash.
100 Tons No. 2 Foundry	20.00 cash.
100 Tons Cold Blast	25.50 cash.
25 Tons Cold Blast	26.75 cash.

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

Table with columns for Name and Location of Company, dates from Jan. 2 to Jan. 8, and Sales. Includes entries like Adams, Alice, Amador, Atlantic, etc.

Ex-dividend. † Dealt at in the New York Stock Ex. ‡ Unlisted securities. † Assessment paid. ‡ Assessment unpaid. Dividend shares sold, 14,655. Non-dividend shares sold, 12,870. Total shares sold, 27,525.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for Name of Company, dates from Jan. 1 to Jan. 7, and Sales. Includes entries like Atlantic, Bode, Bonanza Development, Bost. & Mont., etc.

* Holiday. Dividend shares sold, 4,926. Non-dividend shares sold, 6,713. Total shares sold, 11,639.

COAL STOCKS.

Table with columns for Name of Company, dates from Jan. 2 to Jan. 8, and Sales. Includes entries like American Coal, Cambria Iron, Cameron Coal & I. Co., etc.

Total shares sold, 372,175.

San Francisco Mining Stock Quotations.

Table with columns for Names of Stocks, dates from Jan. 1 to Jan. 7, and Sales. Includes entries like Alpha, Aita, Belcher, Belle Isle, etc.

* Holiday.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENT (Total levied, Date and amount of last), DIVIDENDS (Total paid, Date and amount of last). Rows include Adams, Alice, Alma & Nel Wood, Amador, American Belle, etc.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last). Rows include Allegheny, Alliance, Alhambra, Alpha Con., etc.

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. + This company, as the Western, up to December 10th, 1881, paid \$1,400,000. † Non-assessable for three years. ‡ The De... Gold previously paid \$275,000 in dividends and the Terra \$75,000. Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends, and the Virginia 40,000,000. § Previous to the consolidation of the Copper Queen with the Atlanta, August 1885, the Copper Queen had paid \$1,200,000 in dividends. ¶ This company paid \$190,000 before reorganization in 1880. ** This company acquired the property of the Raymond & Ely Company, which had paid \$3,750,000 in dividends.

STOCK MARKET QUOTATIONS.

Table with columns for company names and prices. Includes Aspen, Baltimore, Md., and Pittsburgh, Pa. sections.

Table with columns for company names and prices. Includes Baltimore, Md. section.

Table with columns for company names and prices. Includes Pittsburgh, Pa. section.

Table with columns for company names and prices. Includes Helena, Mont. section.

Table with columns for company names and prices. Includes St. Louis section.

Trust Receipts.

Sales at the New York Stock Exchange for week ending Jan. 8: Sales, H. L. Price.

Table listing Trust Receipts and Trust Stocks with prices.

Foreign Quotations.

Table listing Foreign Quotations for London and Paris with highest and lowest prices.

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified. Lists prices for various acids, alcohols, and other chemicals.

Large table listing various chemical products and their prices, including Argols, Arsenic, Asbestos, and many others.

Table listing various chemical products and their prices, including Chlorate, Carbonate, Caustic, and others.

THE RAREER METALS.

Table listing prices for rare metals such as Arsenic, Barium, Bismuth, Cadmium, etc.

BUILDING MATERIAL.

Table listing prices for building materials like Bricks, Croton, Wilmington, etc.